Special Edition ISSN 1811-5438

THE LAHORE JOURNAL OF ECONOMICS

Lahore School of Economics

Papers presented at The Thirteenth Annual Conference on Management of the Pakistan Economy

Igniting Technology Led Growth in Pakistan: Role of Monetary, Fiscal and Investment Policies

29th-30th March, 2017

Volume 22, SE **September, 2017**

THE LAHORE JOURNAL OF ECONOMICS

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22 2017

THE LAHORE JOURNAL OF ECONOMICS

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22 : SE (September 2017): pp. i-vii

Thirteenth International Conference on the Management of the Pakistan Economy

Igniting Technology Led Growth in Pakistan: Role of Monetary, Fiscal and Investment Policies
(29th-30th March, 2017)

The Pakistani economy currently stands at a crossroads; while it has stabilized over the last few years, the focus has turned towards restarting economic growth. This is a challenging task because of structural problems faced by the economy as well as the global economic slowdown. While the economy has avoided a major downturn since the IMF's package in 2013, economic growth has been sporadic due to a variety of causes, including fiscal deficit, and financial vulnerabilities.

The fact remains that Pakistan's economy has experienced a tepid growth rate in the 3-4 percent range over the last decade and has struggled in the management of budget deficits, trade deficits, capital inflows and outflows, "circular debt" plaguing the energy sector, and the handling of domestic and external debt. Currently, the national economy faces two major challenges. The first is to reverse its falling growth of productivity, especially total factor productivity, and through it regain competitiveness in both the global and domestic market. The second is to create more and better jobs for a fast growing, young and increasingly educated labor force. The first is necessary to put the economy on a higher and sustained growth path. The second is the most effective means of ensuring equitable growth and overcoming rising inequalities which have been accentuated in recent years. Yet there can be an apparent tradeoff between the two. Higher productivity can result in lower job generation. But low productivity jobs are neither sustainable nor well paying. The need then is to adopt policies which can realize both objectives at the same time. This requires generating much higher economic growth so as to compensate for a lower employment elasticity of this growth.

This year's Annual Conference on the Management of the Pakistan Economy focused on a range of both macroeconomic and

microeconomic issues facing the Pakistan economy. The reason for this dual focus was the recognition that behind many of the macroeconomic problems confronting Pakistan are a series of microeconomic issues, like low productivity or institutional weaknesses, that need to be addressed. Additionally, many of the macroeconomic problems that Pakistan has faced over the last few decades have resulted in poor developmental outcomes, such as inequality or unemployment, that are best analyzed at a microeconomic level. It is for this reason that the papers vary across themes, though when looked at as a whole they present a series of policy recommendations aimed at promoting sustainable, long-term economic growth.

The papers that focused on macroeconomic issues looked at recent trends in key macroeconomic indicators (GDP growth, fiscal deficit, exchange rate, external debt and monetary policy), their determinants and future outlook in addition to papers that examined the impacts of government policies (trade and innovation) on one of the most important drivers of growth, firm productivity.

Chaudhry, Jamil, and Chaudhry focus on a pressing macroeconomic issue facing the country: trade and the impact of trade policies. They focus on an important trade agreement and find that exports and imports have both risen as a result of the Pak-China Free Trade Agreement 2006/07, but that firm level productivity and value-added have fallen, both in the sectors made more vulnerable (by reductions in Pakistan's tariff rates) as well as in the sectors that China has given greater access (by reductions in China's tariffs). In subsequent trade negotiations, the authors conclude that Pakistan should insist that it get the same access to China as the ASEAN countries and reductions from Pakistan's side should focus on high-quality intermediate inputs to feed its industries rather than importing cheap final goods from China.

Another major concern for the Pakistan economy is the management of the external debt. Because of the lackluster performance of the economy due to severe internal and external pressures, there has been a sharp increase in its external debt and there is a constant debate about whether this debt is sustainable and when Pakistan will face a debt crisis (while some commentators

saying that the country is already facing such a crisis). Uppal based his analysis on the marginal costs of external debt as indicated by the yields on the country's Eurobonds and the spreads on the Credit Default Swaps (CDS) traded in the international markets. The author finds a sharp decline in the yields on the Pakistani Eurobonds from their peak reached during the Global Financial Crisis (GFC) period. Since then this declining trend has continued. He concludes that in the initial post-GFC period, the decline was largely driven by quantitative easing and the resultant low interest rates in international debt markets while the continued decline in the yields in the more recent period, 2013-2017, is due to strengthening of the county's borrowing capacity over the period. The author also finds that Pakistani yields seem to be converging to those for other Asian countries, even though the yield-spreads between Pakistan and other countries are still substantial. The author concludes that the decrease in bond yields and CDS spreads may signal that the country's external debt is currently at sustainable levels. But as the author points out, this positive development has to be tempered with the recognition that Pakistan's continued reliance on external borrowing carries inherent risks.

Unmanageable fiscal deficits are also a problem plaguing Pakistan. Iqbal, Din, and Ghani look at this issue by analyzing the relationship between the fiscal deficit and economic growth, finding that the latter is compromised when the deficit exceeds a threshold of about 5.6 percent. For much of the last 45 years, however, government spending has exceeded that level. Recent trends, that have included increasing government revenues and constraining current expenditures, have been encouraging for the country's fiscal future.

In addition to fiscal problems, the country has faced balance of payments crises with alarming regularity, a problem that has resulted in the need for multiple structural adjustment programs. A often asked question in the context of the balance of payments is whether the Pakistani rupee is overvalued. Hamid and Mir attempt to analyze this question by looking at the degree of currency overvaluation in Pakistan and exchange rate management across different government tenures. The authors find that that prior to

March 2013, the policy target of exchange rate management was the stability of the real effective exchange rate while the current government's policy target has been the stability of the nominal exchange rate against the US dollar. The authors also find that as the currencies of Pakistan's major trading partners (UK, Europe and China) have depreciated against the dollar, the real effective exchange rate has appreciated by over 20 percent since 2013. They conclude with a discussion of how overvaluation in general and the recent reversal in the exchange rate management policy in particular have had an adverse impact on exports and the manufacturing sector and how these may also present a risk to long term growth as well as short-term balance of payments stability.

Despite the many challenges facing the economy, it seems that inflation has been brought under control by the monetary authorities over the last few years. Mangla and Hyder investigate the monetary policy effectiveness of Pakistan amid weak economic growth of developed economies and international oil price movements. They estimate a model in which the impact of international oil prices and global demand is analyzed on the key macroeconomic variables of Pakistan. Their findings suggest that monetary policy is quite effective in controlling inflation in Pakistan and that supply shocks due to increases in oil prices result in increases in the real policy (interest) rate, real exchange rate depreciation, economic growth slowdown and a rise in inflation. At the same time, they find that global demand surges cause the real policy rate to increase, the real exchange rate to appreciate, and economic growth and inflation to increase. Generally, they find that real policy rates adjust upward in response to shocks to inflation and the real exchange rate depreciates if inflation increases. Their results indicate that monetary authorities in Pakistan are fairly effective in stabilizing consumer prices and the real exchange rate in the economy.

While many Pakistani economists tend to focus their attention on monetary and fiscal issues, international experience shows the critical role of financial markets in generating growth and investment. With this in mind, Khalid focuses on the relationship between macroeconomic growth and financial development. He

begins with a review of the microeconomic literature that analyzes how financial deepening could lead to changes in the behavior of economic agents and then looks at the macroeconomic literature which analyzes the literature on the relationship between financial development, financial integration and economic growth. The author then presents empirical evidence on the link between financial and trade integration and growth using data from a sample of countries from Asia Pacific region.

Another lesson from international experience is the role of the state in fostering innovation and technology-led growth, especially in the East Asian economies. Rasiah uses this as a backdrop to analyze the impact of policy frameworks on economic performance for a sample of East Asian economies. The author motivates his discussion by pointing out that while this literature recognizes that capital accumulation and macroeconomic management were critical in accelerating economic growth in East Asia, few analyses have systematically and comparatively addressed how policy frameworks spearheaded through selective interventions stimulated technical progress, and the different performance outcomes achieved by these countries. The author attempts to fill the void by systematically analyzing the investment regimes, sources of finance, technological upgrading and the policy frameworks to explain the economic growth performance of Indonesia, Malaysia, Philippines, South Korea and Thailand.

A fundamental question that many people fail to ask is whether certain countries are trapped in low growth and low development equilibria over the longer term because of structural weaknesses that may be extremely difficult to overcome. McCartney looks at the case of Bangladesh as an example of a country that is at risk of falling into the "middle income trap" or the risk that middle income countries fail to become fully developed countries. The paper uses the theory of Unequal Exchange from the Dependency School to understand why Bangladesh may be caught in this trap and further argues that the ideas of productivity, competitiveness and technological change may not useful in understanding growth prospects and policy responses in contemporary middle income

countries. The paper then focuses on the role of structural change as a means of potentially sustaining growth in middle income countries.

The papers that focused on microeconomic issues looked at how individuals and households are affected by macroeconomic movements and how they adapt to Pakistan's increased economic integration with the global economy.

While looking at macroeconomic issues, many times economists tend to forgot the actual consequences of slow economic growth on individual households. In their analysis, Ejaz and Hyder use multiple rounds of the PSLM (2006 – 2015) to examine the vulnerability of demographic groups in Pakistan to business cycle fluctuations. Breaking down the labor force by gender, province, education level, age, and status (employer/employee/self-employed), they are able to provide a nuanced view of how the real wages of these groups evolve over the business cycle. Some results come out as one would expect: older and younger are more vulnerable than middle-aged workers, and women and employers also tend to be more vulnerable. Other results were surprising, for instance that education was not always protective against business cycle fluctuations.

One way in which many households try and reduce the impact of economic shocks is by trying to find diverse sources of income. Hussain and Said look at the role of income diversification strategies amongst rural households in Pakistan in raising living standards. Unlike Sub-Saharan Africa where only around half of households have multiple income sources, 85 percent of rural households in Pakistan tend to diversify away from a single income source. They find that households that diversify have higher income and spending as compared to households that specialize in a single occupation, using the Pakistan Panel Household Survey 2001-2010. Further, households with diversified occupations also tend to plant a larger number of crop types. Their results suggest that there are synergies between on-farm and off-farm activities that policymakers should take into account.

Another factor that is often overlooked when looking at development in Pakistan is the role of technology in mobilizing financial resources which in turn can impact savings and investment. Rizvi, Naqvi, and Tanveer look at the relatively recent history of mobile banking in Pakistan. Recognizing that the government and private sector have lately taken multiple steps to improve access to financial services such as credit, savings, remittances and insurance, the authors discuss how the introduction of mobile banking platforms is the one of the most prevalent methods of improving access. The authors begin by studying the various models of mobile banking and assess its current state using available data to understand how the segment has been evolving over time and transforming the conventional banking structure in the country. The authors then touch upon the ecosystem that needs to be built in Pakistan to utilize the full potential of mobile technology and makes some recommendations on how to move forward in that direction.

Individually, each paper presents a critical issue that needs to be taken into account by academics, policy makers and stakeholders in Pakistan, while as a whole this special issue presents a picture of an economy that is still in the process of transition. What the history of economic management in Pakistan has shown is that policy makers tend to focus on a small subset of short-run issues while ignoring the bigger picture. This in turn has led to certain problems that are only addressed when they become crises (like the cyclical balance of payments crises the country has faced) or other problems that are perpetually ignored (like the vulnerability of certain income groups to the regular economic shocks). The aim of this issue is to motivate policy makers to move beyond a narrow scope of short-run economic policies towards coordinated strategies that focus on long-run inclusive growth.

The Lahore Journal of Economics
22 : SE (September 2017): pp. 1–24

Pakistan's Experience with the Pakistan–China FTA: Lessons for CPEC

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Abstract

As Pakistan enters the CPEC era, there is a sense of optimism as well as concern in the country, given the uncertain economic impact of this major collaboration between China and Pakistan. Using firm-level and trade data, we empirically test the impact of the 2006 free trade agreement (FTA) between the two countries on the productivity, size and value added of potentially affected Pakistani firms. These results have important policy implications for CPEC initiatives. We start with a difference-in-difference analysis, comparing trends in those sectors in Pakistan made more vulnerable by tariff reductions on Chinese goods relative to sectors for which the tariff did not change significantly. Next, we examine those sectors in Pakistan that were given greater access to Chinese markets through reductions in the Chinese tariff on Pakistani goods relative to sectors for which market access remained roughly the same. In the sectors made more vulnerable by reductions in Pakistani tariffs on Chinese goods, imports to Pakistan have risen, while productivity, value added and value added per worker have fallen relative to other sectors since the FTA. In the sectors for which Pakistan gained access to Chinese markets, exports and employment have risen, but productivity and value added have fallen relative to other sectors since the FTA.

Keywords: Pakistan, China, FTA, CPEC.

JEL classification: F10.

1. Introduction

While there is little doubt that Pakistan is headed full steam into the China–Pakistan Economic Corridor (CPEC) era, there is concern about the impact of many CPEC initiatives on the country's industrial sector. Most CPEC initiatives are centered on infrastructure development and energy, but there is also an element of increased market access for Chinese goods.

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While this has many obvious benefits for consumers, domestic producers are worried about the impact of opening the Pakistani market further to Chinese producers.

One example of the impact of increased market access for Chinese goods is the aftermath of the 2006 free trade agreement (FTA) between Pakistan and China. Under this FTA, numerous Pakistani tariffs on Chinese goods were reduced, as were many Chinese tariffs on Pakistani goods. Most studies examining the impact of this FTA have looked at anecdotal evidence, such as the influx of Chinese goods in Pakistani markets, or macroeconomic data such as export and import figures, which show a significant surge in Chinese imports to Pakistan.

The problem with this approach is obvious: what if the domestic firms that produce goods competing with Chinese exports were already less productive or in decline? This would imply that goods coming from China have simply hastened the demise of these sectors. Similarly, if the domestic firms producing goods that were granted increased access to Chinese markets are noncompetitive, then Pakistani exports to China should not register a meaningful increase. So the possibility exists that some sectors in Pakistan may generally be in decline due to low productivity and lack of competitiveness—in which case, the idea that the FTA has hurt Pakistan's interests is simply masking a general malaise.

This study's approach is unique in that we examine both firm-level and sector-level data from before and after the FTA was signed to gauge its impact on various indicators such as productivity, value added, trade flows, employment and the number of firms. In particular, we focus on (i) firms in those sectors that faced greater competition from Chinese imports and (ii) firms in those sectors that were theoretically granted more access to the Chinese market, and we look at trends in all sectors over time. This allows us to compare the targeted sectors to unaffected ones, before and after the FTA. If the FTA has had no impact, then all the sectors should follow the same outcome path over time. However, if the targeted sectors have been affected differently, then our approach should capture a divergent trend.

We start by tracing the history of Pakistan–China cooperation and then focus on the specifics of the FTA, looking particularly at the concessions granted by Pakistan to Chinese exports as well as the Chinese concessions to Pakistani exports. Next, we perform a firm-level difference-in-difference analysis to test the impact of the FTA on the productivity and value added of firms. We also analyze trade flows, employment and the number of firms in sectors that were affected by the FTA. Finally, we use these results to

formulate policy-relevant recommendations for maximizing the benefits of potential CPEC-related industrial initiatives.

2. Pakistan–China Cooperation Over Time

This section provides a brief overview of economic cooperation between Pakistan and China, and outlines the FTA signed in 2006.

2.1. Bilateral Cooperation Since 2000

In 2001, China and Pakistan signed several memoranda of understanding (MOU) that covered cooperation and projects in areas such as tourism, mining, telecoms and railroads. Since 2002, the two countries have worked jointly on developing the deep-water Gwadar Port on the Arabian Sea as an exit point for goods coming through Pakistan from western China. In 2005, both governments signed additional MOUs, covering, among other areas, higher education, defense, energy and infrastructure.

The agreement to initiate CPEC was signed in April 2015. Work is already underway on the development of coal-fired and renewable energy (wind, solar and water) power plants. The agreement also covers ongoing work to develop the Gwadar region and preparations for building a network of roads that will connect western China to the Arabian Sea via Gwadar Port. There are also plans to upgrade the country's railways (which have seen little improvement in recent years) and to develop several special economic zones.

2.2. Trade Agreements with China

The first trade agreement between China and Pakistan in the 2000s was a preferential trade agreement signed in 2003. Under this agreement, Pakistan reduced its tariffs to 5 percent on 386 items (chemicals and machinery), while China gave Pakistan tariff-free access to 767 items (Shabir & Kazmi, 2007).

The 2006 Pakistan-China FTA was phased in over a period of five years (2007 to 2012) and covered thousands of product lines. Although China gave Pakistan concessions on more items than the latter gave China (6,418 versus 5,686), its exports to Pakistan cover 59 percent of these categories, whereas Pakistan's exports to China cover less than 5 percent (Pakistan Business Council, 2013, p. 4). Despite China's concessions, as of 2013, Pakistan's exports were still subject to higher tariffs than the ASEAN countries. These product lines include several goods in which Pakistan has

a revealed comparative advantage (RCA), including jewelry, leather, frozen fish, polyethylene terephthalate and some categories of readymade garments (Pakistan Business Council, 2013).

During 2006–12, imports from China doubled and Pakistan's exports to China rose fivefold. While Pakistan's export performance appears at first glance to be impressive, the high rate of growth in reality reflects the very small initial export base Pakistan started out with in 2006. China has become Pakistan's major source of imports in electronics, iron and steel, and manmade staple fibers. Overall, by 2012 China accounted for 25 percent of Pakistan's nonpetroleum imports (Pakistan Business Council, 2013). Not surprisingly, Pakistan's trade deficit with China has deteriorated from US$2.4 billion to almost US$4.1 billion over this period.

In response to these trends, the Pakistan Business Council (2013) developed a list of 264 goods at the 6-digit level in which Pakistan had an RCA. It recommended that Pakistan lobby for further tariff concessions in these product lines since China had already granted the ASEAN countries a zero tariff on most of these products.[1] Currently, Pakistan and China are negotiating a new set of tariff reductions under phase 2 of the Pakistan–China FTA. Our analysis will help decision makers gauge the impact of the previous agreement.

2.3. Pakistan's Concessions and its Imports from China

Pakistan's imports from China have increased significantly since the FTA. These include the following product lines: electronic equipment (207 percent), organic chemicals (194 percent), manmade filaments (172 percent), iron and steel (175 percent), plastics (136 percent), fertilizers (16,900 percent), articles of iron and steel (135 percent), vehicles (160 percent), manmade staple fibers (743 percent), rubber (93 percent), paper (156 percent) and footwear (273 percent).[2] In nearly all these product lines, Pakistan now procures at least a third of its imports from China (Pakistan Business Council, 2013). Table 1 shows how dramatically its importance as a supplier to Pakistan has grown over the period 2003–15.

Under the FTA, Pakistan eliminated tariffs on knitting machines, flat-rolled stainless steel, railway equipment, bus tire rubber, turbines and some chemicals. It reduced tariffs to the 0–5 percent range for flat-rolled iron, antibiotics, artificial filament yarn, artificial fibers, electrical

[1] Exceptions are rice, wheat, maize, sugar, wood and paper products.
[2] Authors' calculations based on data from the Pakistan Business Council (2013).

equipment (such as switches and fuses), carboxylic acids and rayon. China has become the country's major supplier for most of these goods (Pakistan Business Council, 2013). Tariffs are now zero (or near zero) for fertilizers, pharmaceuticals and special-purpose machinery. Table A1 in the Appendix lists the changes in Pakistani tariffs on Chinese goods, by sector. Even in categories for which tariffs were reduced by half or less than half, China has become Pakistan's primary supplier for many products. This suggests that the cost advantages of Chinese goods are significant and that further tariff reductions in these categories could lead to even larger increases in imports.[3]

Table 1: Pakistan's imports from China and the rest of the world

	Pakistan's imports from								
Year	**The world**	**China**	**Saudi Arabia**	**UAE**	**US**	**Japan**	**Kuwait**	**Malaysia**	**India**
	US$	%	%	%	%	%	%	%	%
2003	13,048,609,489	7.34	10.86	11.17	6.04	6.61	6.37	4.61	1.73
2004	17,948,583,563	8.29	11.53	9.99	9.61	6.43	5.56	3.53	2.53
2005	25,096,575,301	9.36	10.56	9.88	6.10	6.51	5.04	2.91	2.30
2006	29,825,753,514	9.77	10.17	11.43	6.32	6.28	6.31	2.57	3.74
2007	32,593,936,069	12.78	12.31	8.49	8.00	5.08	5.68	3.55	3.88
2008	42,326,567,149	11.19	14.07	8.93	4.87	4.07	8.14	4.00	4.00
2009	31,583,717,824	11.97	11.08	10.61	5.70	4.08	5.71	5.09	3.42
2010	37,537,025,236	13.98	10.22	13.98	4.34	4.25	6.95	5.47	4.16
2011	43,578,259,220	14.85	10.71	15.65	4.02	4.27	8.93	6.26	3.69
2012	43,813,262,458	15.26	9.78	16.46	3.45	4.28	9.61	4.87	3.59
2013	43,775,183,185	15.14	8.79	17.71	3.81	4.48	9.02	4.39	4.28
2014	47,544,888,942	20.17	9.29	14.89	3.78	3.69	6.22	2.69	4.43
2015	43,989,644,709	25.05	6.84	13.04	4.36	3.92	3.89	2.07	3.79

Source: UN Comtrade Data Base

2.4. China's Concessions and Pakistan's Exports to China

Pakistan's share of Chinese imports has grown in most sectors, but the only substantial gains have been in raw materials and low value-added sectors – especially cotton, cereals, raw hides and leather, fish, cement, copper, plastics, food waste and fodder, and textile made-ups. In each case, exports increased by at least tens of millions of dollars over the period 2006–

[3] Pakistan reduced tariffs by 50 percent for paints and varnishes, silk, mirrors, cosmetics, diapers, resins and some chemicals (binders, sulfonic acid, surface-active agents). It reduced tariffs by 20 percent (from an average of 20–16 percent) on tires for construction vehicles, boilers, water heaters, iron and steel structures (doors and windows), trunks, pens, twine, lamps, bed sheets, grills/netting of iron/steel wire, and electrical motors and generators.

12. The largest gain in exports from Pakistan to China was in cotton, which increased fivefold to US$1.8 billion by 2012. The only category in which Pakistan has become one of China's main sources (supplying 25 percent of its imports) is gums and resins.

China remains a minor market for Pakistan's main exports, receiving less than 10 percent of its imports from Pakistan in cotton,[4] cereals, ores and plastics. Overall, Pakistan accounted for only 0.15 percent of China's imports in 2015 (Table 2). On the other hand, higher value-added items such as steel, surgical equipment and apparel registered far smaller gains (between US$4 million and US$6 million in each case). In 2012, China accounted for less than 2 percent of Pakistan's exports of medical apparatus and less than 1 percent of its exports of apparel, denim fabrics and other textile made-ups.

Table 2: Chinese imports from Pakistan and ASEAN countries

	China's imports from				
Year	**The world**	**Pakistan**	**India**	**US**	**ASEAN (all)**
	US$	%	%	%	%
2007	9.56115E+11	0.12	1.53	7.27	11.35
2008	1.13256E+12	0.09	1.79	7.20	10.33
2009	1.00556E+12	0.13	1.36	7.73	10.61
2010	1.396E+12	0.12	1.49	7.36	11.08
2011	1.74339E+12	0.12	1.34	7.06	11.07
2012	1.8182E+12	0.17	1.03	7.36	10.77
2013	1.94999E+12	0.16	0.87	7.87	10.23
2014	1.95802E+12	0.14	0.84	8.16	10.63
2015	1.68167E+12	0.15	0.80	8.95	11.26

Source: UN Comtrade Data Base

What might account for the lack of progress in Pakistan's exports to China since the FTA came into effect? In cases such as apparel, goods coming from Pakistan are still subject to substantial tariffs relative to China's other trading partners, and especially ASEAN members. In other goods, particularly denim and surgical goods, Pakistan is subject to zero tariffs (phased in during 2007–10), despite which it has made only modest inroads into Chinese markets.

China eliminated tariffs for medical and veterinary instruments, denim, bed sheets, marble, sports goods, unbleached woven fabrics and

[4] Pakistan sent 35 percent of its cotton exports to China in 2012.

twills, copper, chromium and pig iron. During 2006–12, denim exports increased from US$100,000 to US$4.6 million and surgical goods increased from US$700,000 to US$4 million. In percentage terms, these exports have grown substantially, but the figures are still quite small. In 2012, China accounted for less than 1 percent of Pakistan's denim exports and 1.5 percent of its surgical exports.

Among the goods that Pakistan exports to China in the 0–5 percent tariff range (phased in during 2007–12), tariffs hover around 4–5 percent for Pakistani goods, but are nearly 0 percent for the same goods coming from ASEAN countries. Most of Pakistan's exports in this category are yarns, but also include copper-zinc wire, frozen fish, fishmeal and dried vegetables. Insofar as these are mainly intermediate inputs, their value added is lower than that of finished goods. Cement, rubber footwear, household items of plastic, and tubes and pipes were also included in this category of preferences, but exports of these items barely registered.

Pakistan received a 50 percent reduction in tariffs (phased in over five years during 2007–12) for another category of goods, including knitted apparel and polyethylene/polypropylene sacks. However, the tariff on Pakistani goods remains at 8–12 percent, whereas for ASEAN countries it is 0 percent. Given that there were almost no exports of these goods from Pakistan to China before the FTA, the fact that China has become a market is a positive development. On the other hand, barring polyethylene sacks, China receives less than 1 percent of Pakistan's exports of nearly every one of these goods.

The fourth category of goods includes those for which China granted Pakistan a 20 percent reduction in tariffs. The concessions were minor, considering that the post-reduction average tariff was still about 14 percent (ranging from 12 to 17 percent), whereas imports of the same goods from ASEAN countries were being charged no tariffs. This category includes several readymade garments (baby clothes, nightgowns, overcoats, skirts and cotton ensembles), honey, some fruits, and rags and twine/rope. As a result, there was little increase in these exports to China during 2006–12.

The final category of goods includes those for which Pakistan received no concessions. Despite significant protection from Pakistani goods, the tariffs facing ASEAN countries are significantly lower and even zero in many cases for many goods (excluding rice, wheat, maize and its seed, rubber, raw cotton and wool). Pakistan's exports of these goods remained small during 2006–12.

Pakistani goods still face significant tariffs on rice, fertilizer, sugar, apparel and wheat. Table A2 in the Appendix lists the changes in Chinese tariffs on Pakistani goods, by sector.

3. FTA Impact on Pakistani Manufacturing: An Empirical Analysis

Based on the discussion in Section 2, sectors that have been affected by the Pakistan–China FTA include (i) those that may have been hurt by lower Pakistani tariffs on Chinese goods, such as basic chemicals, general-purpose machinery, rubber and fertilizers; and (ii) those that may have been helped by lower Chinese tariffs – and thus improved market access for Pakistani goods into China – such as textiles, apparel, footwear and sports goods. Note that these sectors may overlap or, in cases such as pharmaceuticals, cutlery and hand tools, iron and steel, aluminum products, leather products and special-purpose machinery, be subject to lower Pakistani tariffs as well as lower Chinese tariffs.

In this section, we compare the firm-level characteristics of the two sets of sectors described above with the firm-level characteristics of sectors that were not affected by the FTA. The idea is to use the unaffected sectors as a control group and the affected sectors as a treatment group, and conduct a difference-in-difference analysis. Put another way, we want to disentangle the firm-level effect of the FTA from the impact of factors that affect all firms over time. For this, we use firm-level data for firms in Punjab from the Census of Manufacturing Industries (CMI) for 1995/96, 2000/01, 2005/06 and 2010/11 and the Directory of Industries (DOI) for 2006, 2010 and 2014.

We start with a sectoral analysis of the impact of the FTA and then look at its impact on three main outcomes for firms in Pakistani sectors that should have benefited from lower Chinese tariffs and Pakistani sectors that may have been adversely affected by lower Pakistani tariffs on Chinese goods. In sectors affected by the FTA, these outcomes include:

- Firm-level productivity
- Value added
- Value added per worker
- Pakistani imports from China and Pakistani exports to China
- The number of firms
- Employment.

3.1. Pakistani Sectors Affected by Lower Pakistani Tariffs on Chinese Goods

Our first analysis focuses on the impact of lower Pakistani tariffs on those Pakistani sectors that experienced lower tariffs on Chinese goods. We start by looking at the sector-average data for changes in total factor productivity, total employment, average employment (per firm) and the number of firms for those sectors in which Pakistani tariffs on Chinese goods were reduced by at least 25 percent.[5] We consider these, sectors that were made more vulnerable by the FTA.

At the sector level, Table 3 shows that productivity has fallen in most of the sectors that faced the largest reductions in protection following the FTA. Exceptions include leather, pharmaceuticals and rubber. The impact on employment and the number of firms was less pronounced.

Table 3: Performance of sectors facing the largest drop in protection (phase 1 of Pakistan–China FTA)

Sector	Decrease in Pakistan's average tariff	Change in sector (weighted) av. productivity 2005/06–10/11	Change in total employment 2006–14	Change in no. of firms 2006–14
	% points			
Aluminum products	5	-2.36	-115	-17
Animal feed	5	-0.71	0	0
Basic chemicals	5	-0.82	5,637	15
Cutlery, hand tools, general hardware	10	-0.05	-160	-144
Fertilizer	5	-4.3	-813	-8
General purpose machinery	7.5	-0.08	-399	-89
Iron and steel	5	-0.53	8,369	27
Leather products	5	0.81	-4,473	-136
Pharmaceuticals	5	1.89	5,545	47
Rubber	5	5.24	5,131	12
Special purpose machinery	5	-2.89	6,057	67
Wood and related	5	-2.89	1,703	35

Note: The tariffs in these sectors fell either by more than 5 percentage points or by 5 percentage points constituting at least a 25 percent decrease in the overall tariff. Firm-level productivity calculated as a residual of regressing value-added on capital and labor.
Source: Authors' calculations based on data from the CMI for 2005/06 and 2010/11 and the DOI for 2006, 2010 and 2014.

[5] Tariffs fell by more than 5 points, or by exactly 5 points if this represented at least a 25 percent drop in the initial tariff rate.

Next, we look at firm-level outcomes for those sectors that may have been hurt by lower Pakistani tariffs on Chinese exports. As discussed above, we perform a difference-in-difference estimation of the firm-level impact of Chinese tariff reductions. Tables 4 and 5 gauge the impact of lower Pakistani tariffs on Pakistani firms in those sectors we expect to have become more vulnerable. The results show that:

- Pakistani firms in the vulnerable sectors were more productive than other sectors before the FTA. Although productivity across all sectors has increased over time, the productivity advantage these vulnerable sectors had over other sectors has shrunk. In other words, the productivity of vulnerable sectors has fallen relative to other sectors after the Pakistan–China FTA.
- Pakistani firms in the vulnerable sectors were characterized by greater valued added than other sectors before the FTA. Although value added has increased over time for all sectors, the higher valued added of vulnerable sectors relative to other sectors has shrunk. In other words, the value added of vulnerable sectors has fallen relative to other sectors after the Pakistan–China FTA. The same trends apply to value added per worker.
- Total imports from China have increased significantly over time, but while there was no difference across sectors in Chinese imports before the FTA, Chinese imports in the vulnerable sectors have increased significantly relative to other sectors.
- The number of firms in the vulnerable sectors has fallen relative to the number of firms in other sectors after the FTA, although this fall is not statistically significant.
- Total employment across sectors has increased significantly over time. Employment in the vulnerable sectors has fallen relative to other sectors, but this difference is not statistically significant.

Table 4: How lower Pakistani tariffs on Chinese goods affected Pakistani firms: Firm-level difference-in-difference analysis

	Productivity	Value added	Value added per worker
Treatment*time	-0.240**	-0.427***	-0.179**
	(-0.082)	(-0.117)	(-0.021)
Treatment	0.079**	0.605***	0.156***
	(0.035)	(0.055)	(0.011)
Time	0.628***	0.225***	0.198**
	(0.04)	(0.053)	(0.01)
N	6,688	6,675	6,675

Note: Standard errors in parentheses. Statistical significance at * 10%, ** 5% or *** 1% level.
Source: Authors' calculations based on firm-level data from the CMI for 1995/96, 2000/01, 2005/06 and 2010/11. Firm productivity is measured as the residual from an OLS regression of firm-level value added on capital and labor, with errors clustered at the firm level.

Table 5: How lower Pakistani tariffs on Chinese goods affected Pakistani firms: Sectoral analysis

	Log imports from China	Log no. of firms	Log employment
Time*treatment	1.139*	-0.182	-0.218
	(0.636)	(-0.258)	(-0.213)
Treatment	-0.604	0.755	0.972
	(-0.501)	(0.541)	(0.709)
Time	1.557***	0.069	0.364***
	(0.486)	(0.14)	(0.156)
N	335	90	90

Note: Standard errors in parentheses. Statistical significance at * 10%, ** 5% or *** 1% level.
Source: Authors' calculations based on data from UN Comtrade (imports) and the DOI for 2006, 2010 and 2014.

These results imply that lower Pakistani tariffs on Chinese goods have negatively affected productivity in those sectors that became more vulnerable to Chinese imports. At the same time, there has been a significant decrease in the value added and value added per worker in those sectors that became more vulnerable.[6] The number of firms and level of employment in these sectors has fallen, but not to a statistically significant degree.

[6] We get similar results when we regress productivity, value added and value added per worker on the size of the tariff reduction (see Table A3 in the Appendix).

The analysis implies that the FTA has had a significant impact on the volume of imports from China, especially in sectors that became vulnerable after significant decreases in Pakistani tariffs. At the same time, the productivity and value added of firms in these vulnerable sectors has fallen (as may have the number of firms and employment). The result is that Chinese imports may be pushing Pakistani producers out of the market in certain vulnerable sectors, leaving the remaining firms smaller and less productive.

3.2. Pakistani Sectors Affected by Lower Chinese Tariffs on Pakistani Goods

In analyzing those Pakistani sectors that potentially benefited from lower Chinese tariffs, we start by looking at the sector-average data for changes in total factor productivity, total employment, average employment (per firm) and the number of firms in sectors for which Chinese tariffs on Pakistani goods were reduced by at least 4 percentage points. We consider these the sectors that were most likely to benefit from the FTA.

The most striking result (Table 6) is that productivity has fallen across the textiles sector – the heart of Pakistan's manufacturing – as well as in sports goods and medical and dental instruments, both of which are important export sectors for Pakistan. While these drops in productivity almost across the board may appear to be implausible, we need to take into account that the period covered by the data used in this analysis (the CMI for 1995/96 and 2010/11) overlaps with Pakistan's change from a high-growth/high-inflation regime to a low-growth/high-inflation (stagflation) regime. This occurred in 2008, a period that was also marked by large dips in private and public investment, law and order problems and energy shortages.

Table 6: Performance of sectors facing the largest increase in access to China (phase 1 of Pakistan–China FTA)

Sector	Decrease in Pakistan's average tariff	Change in sector (weighted) av. productivity 2005/06–10/11	Change in total employment 2006–14	Change in no. of firms 2006–14
	% points			
Aluminum products	5.5	-2.36	-115	-17
Beverages	10.25	3.04	1,472	14
Cutlery, hand tools, general hardware	10.5	-0.05	-160	-144
Domestic appliances	6	0.48	7,498	184
Footwear	8.5	-0.12	3,004	-9
Iron and steel	4.5	-0.53	8,369	27
Knitted apparel	12.1	-0.3	5,531	24
Leather products	6.5	0.81	-4,473	-136
Medical and dental instruments		-1.55	1,256	-209
Petroleum and related	4	1.52	318	9
Pharmaceuticals	4.5	1.89	5,545	47
Special purpose machinery	4	-2.89	6,057	67
Spinning and weaving	9	-0.17	-14,031	-51
Sports goods	13.5	-2.77	-8,547	-379
Textile made-ups	8.6	-0.42	-17,283	-60
Readymade garments	6.1	-1.59		

Note: Firm-level productivity calculated as a residual of regressing value-added on capital and labor.
Source: Authors' calculations based on data from the CMI for 1995/96, 2000/01, 2005/06 and 2010/11 and the DOI for 2006, 2010 and 2014.

Next, we analyze firm-level outcomes in those sectors that should have benefited from lower Chinese tariffs on Pakistani exports. This entails a difference-in-difference estimation of the firm-level impact of Chinese tariff reductions (see Tables 7 and 8). The results show that:

- Pakistani firms in those sectors that should have benefited were more productive than other sectors before the FTA. Although productivity across all sectors has increased over time, the productivity advantage these sectors had over other sectors has shrunk. In other words, productivity in those sectors that should have benefited has decreased relative to other sectors after the FTA.
- The higher value added characterizing these sectors before the FTA has also shrunk. In other words, the value added of sectors that stood to benefit from the FTA has fallen relative to other sectors after the FTA.

- The value added per worker has increased across all sectors over time. While the average value added per worker in sectors that should have benefitted from the FTA was initially lower, it has not changed relative to other sectors since the FTA.
- Pakistan's total exports to China in these sectors increased significantly after the FTA. The number of firms in these sectors has also increased relative to the number of firms in other sectors after the FTA, although the change is not statistically significant.
- Employment in the sectors that stood to gain from the FTA has increased significantly relative to other sectors post-FTA.

Table 7: How lower Chinese tariffs on Pakistani goods affected Pakistani firms: Firm-level difference-in-difference analysis

	Productivity	Value added	Value added per worker
Time*treatment	-0.776***	-0.239**	-0.007
	(-0.071)	(-0.101)	(-0.018)
Treatment	0.750***	0.145**	-0.084**
	(0.033)	(0.052)	(-0.01)
Time	1.008***	0.222**	0.154***
	(0.055)	(0.086)	(0.012)
N	6,688	6,675	6,675

Source: Authors' calculations based on firm-level data from the CMI for 1995/96, 2000/01, 2005/06 and 2010/11. Firm productivity is measured as the residual from an OLS regression of firm-level value added on capital and labor, with errors clustered at the firm level.

Table 8: How lower Chinese tariffs on Pakistani goods affected Pakistani firms: Sectoral analysis

	Log exports to China	Log no. of firms	Log employment
Time*treatment	2.341**	0.281	0.484***
	(1.06)	(0.20)	(0.21)
Treatment	0.964	-0.055	-0.813
	(0.90)	(0.63)	(0.56)
Time	0.186	-0.198	-0.063
	(0.73)	(0.16)	(0.16)
N	344	90	90

Source: Authors' calculations based on data from UN Comtrade (exports) and the DOI for 2006, 2010 and 2014.

These results imply that lower Chinese tariffs on Pakistani goods – in the shape of increased access to Chinese markets – have negatively affected productivity in those sectors that could have benefited from the FTA. At the same time, there has been a significant decrease in the value added of these sectors compared to other sectors.[7] Both the level of employment and the total volume of Pakistani exports to China associated with these sectors have risen as a result of lower Chinese tariffs on Pakistani exports.

Interpreting these results in the context of the Pakistan–China FTA yields some interesting insights. First, while Pakistan does not have the same level of market access to China as the ASEAN countries (Chinese tariffs on Pakistani goods tend to be higher than the corresponding tariffs on ASEAN goods), the level of exports in sectors benefiting from lower Chinese tariffs has risen – although its share in Chinese imports has not grown, which means that, as Chinese imports have risen, Pakistani exports have not kept pace. The higher level of exports in these sectors has led to an increase in their employment levels. Second, firm-level productivity and value added in these sectors has fallen relative to other sectors. The analysis implies that, while Pakistan's focus on low value-added exports to China may have led to higher exports, this change was driven by an increase in the number of smaller, less productive firms as opposed to larger, more productive firms. Third, several sectors that gained access to China through the FTA were the same sectors for which Pakistan reduced tariffs on Chinese goods. The fact that these sectors now faced greater competition may have hindered their ability to take advantage of new opportunities in China.

4. Lessons for CPEC

Up to this point, we have focused on the impact of the 2006 FTA on sectors in Pakistan. Here, we discuss why this is important in the context of CPEC.

CPEC is not simply a series of projects. Rather, it is an entire strategy for long-term economic cooperation between Pakistan and China. This means that the existing economic relationship between Pakistan and China can and should be reevaluated and, where necessary, upgraded. In the context of our results on the impact of Chinese tariff concessions to Pakistani exports, it is critical that Pakistan gain the same level of tariff

[7] We get similar results when we regress productivity, value added and value added per worker on the size of the tariff reduction (see Table A4 in the Appendix).

concessions from China as given to its ASEAN trading partners. Only with equal access will Pakistani manufacturers have the chance to move out of a low-productivity cycle (less productive firms producing and exporting low value-added goods to China) and into a higher-productivity cycle (more productive firms producing and exporting higher value-added goods to China).

Additionally, given that the industrial cooperation component is central to CPEC, Chinese industrial initiatives must yield the maximum economic benefits for local stakeholders in Pakistan. There are two ways of achieving this. First, CPEC-related industrial activities must have well-defined local stakeholders to help maximize the local benefits to firms. This could entail joint ventures between the Pakistanis and the Chinese that (i) carry a minimum requirement for local partner involvement in each project and (ii) guarantee that each local partner is allocated a minimum financial share of each project. Second, policymakers need to make pragmatic decisions right now as to the sectors Pakistan should focus on. This will depend on which sectors (i) would benefit most from greater productivity, (ii) could lead to the greatest increase in value added and (iii) have the greatest potential to increase exports. Some of the sectors in which Pakistan has an RCA are:

- High value-added textiles.
- Agro-processing (including dairy).
- Automobiles, motorcycles and auto parts (including tractors).
- Electrical and mechanical goods (including fans, motors, air-conditioners and refrigerators) and pharmaceuticals.
- Leather goods, sports goods and tools (including surgical goods and cutlery).
- Other sectors that are critical from a growth perspective include solar panels, construction materials and machinery.

To increase productivity, employment, value added and exports, policymakers must decide consciously that industrial projects under CPEC should allow Pakistani firms to move up the technology ladder. This could be achieved by:

- Creating firm-level incentives for investment in advanced machinery based on the technological sophistication of output.

- Imposing a minimum local content requirement – a minimum percentage of locally sourced inputs – on all goods created in CPEC industrial zones.
- Ensuring that Pakistan's technology is upgraded through technology transfers from China by making it mandatory for a minimum level of technology transfer to take place over the life of each CPEC initiative.
- Reducing tariffs on importing high-quality intermediate inputs from China that can be used in Pakistan's major industries, to encourage the production of high-quality exports for sale in the Europe and the United States.

The only way to ensure higher firm-level productivity and wages and to move toward higher value-added output is to develop a CPEC-related labor policy that enables the manufacturing sector to switch from low-skilled to high-skilled labor. This should include:

- Stipulating a minimum level of domestic labor for all joint industrial initiatives.
- Setting requirements that improve working conditions and thereby workers' productivity.
- Ensuring that all industrial zones and joint projects automatically include training facilities, of which a set minimum proportion are devoted to training women.
- Making it mandatory for all industrial zones and joint projects to provide their workers with both health and life insurance.

5. Conclusion

In recent decades, the long relationship between Pakistan and China has been accompanied by significant economic interaction, which includes the 2006 FTA as well as CPEC. There is growing realization that this relationship could have a significant economic impact for both countries, although the impact of CPEC has yet to be determined. For this reason, it is useful to look at the consequences of the Pakistan–China FTA to ensure that CPEC-related initiatives yield the maximum benefits.

While the FTA has had a significant impact on the volume of trade between both countries, for Pakistan this trade has also led to movement from higher-productivity to lower-productivity firms. This is far from optimal in the context of an effective growth strategy. Accordingly, we have proposed

some ways of making sure that CPEC-related initiatives do not squeeze productive firms out of Pakistan's manufacturing sector. There is little doubt that pragmatic policymakers on both the Pakistani and Chinese sides will realize that long-run growth and stability in Pakistan depend critically on developing a high-productivity, high value-added manufacturing sector capable of yielding greater exports and growth over time.

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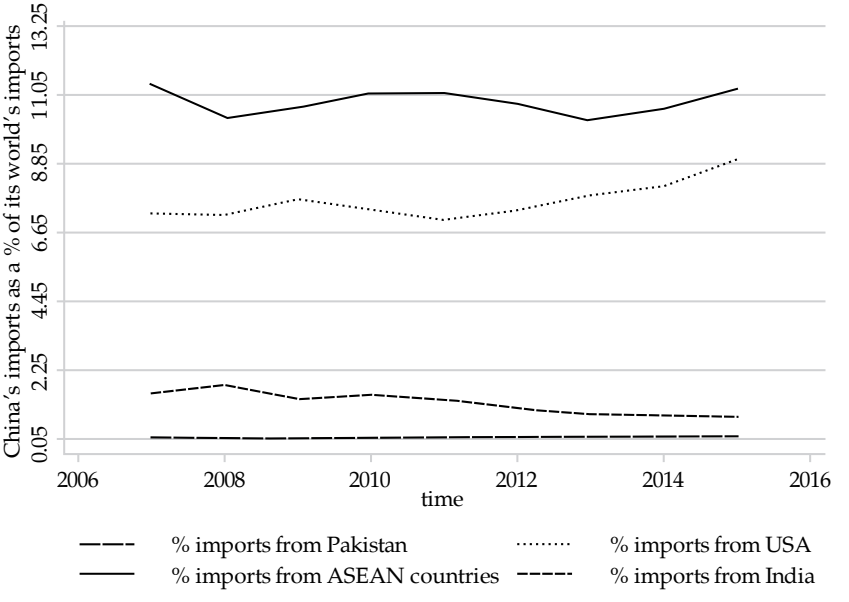
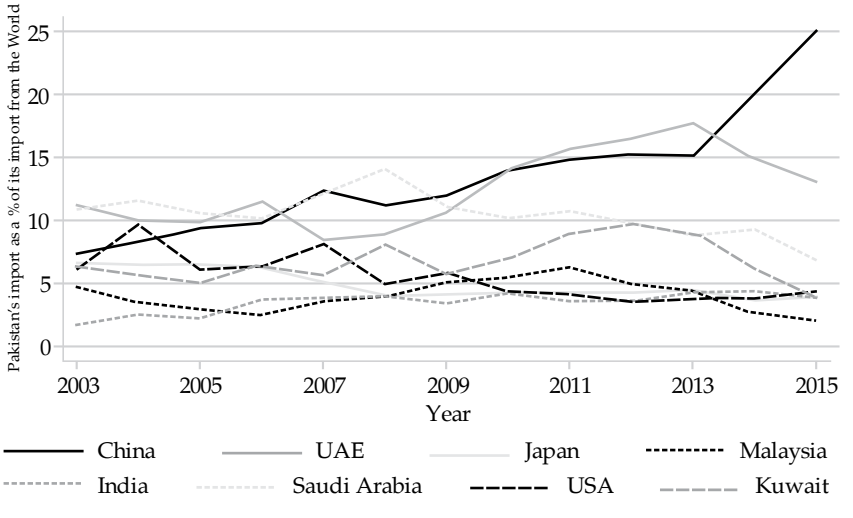
Appendix

Figure A1: Chinese imports from Pakistan and the rest of the world



Source: UN Comtrade Data Base

Figure A2: Pakistani imports from China and other key trading partners



Source: UN Comtrade Data Base

Table A1: Pakistani tariffs on Chinese goods

Sector	Pre-FTA	2011	Pre-FTA	2011	Decrease in average tariff
	% range	% range	% average	% average	% points
Aluminum products	5-20	0-15	12.5	7.5	5
Animal feed (except dog/cat food)	10	5	10	5	5
Basic chemicals	5-10	0-5	7.5	2.5	5
Beverages (nonalcoholic)	25	20	25	20	5
Cutlery, hand tools, general hardware	20	10	20	10	10
Dairy products	25	25	25	25	0
Domestic appliances	20	16	20	16	4
Fertilizer	5	0	5	0	5
Food products	20-25	16-20	22.5	18	4.5
Footwear	20	20-25	25	22.5	2.5
General purpose machinery	5-15	0-5	10	2.5	7.5
Glass and related	20-25	16-20	22.5	18	4.5
Iron and steel	5-10	0-5	7.5	2.5	5
Knitted apparel	25	20	25	20	5
Leather products	5-10	0-5	7.5	2.5	5
Nonmetallic mineral products	25	20	25	20	5
Paper and related	20-25	16-20	22.5	18	4.5
Petroleum and related					0
Pharmaceuticals	5	0	5	0	5
Plastics	20	20	20	20	0
Readymade apparel	25	20	25	20	5
Refined oil					0
Rice	10	10	10	10	0
Rubber	20	15	20	15	5
Soaps and detergents	25	20	25	20	5
Special purpose machinery	5	0	5	0	5
Spinning and weaving (textiles)	25	20	25	20	5
Sports goods	10	6	10	6	4
Sugar (refined)	10	8	10	8	2
Textile made-ups	25	20	25	20	5
Transport equipment	20-50	20-50	35	35	0
Wood and related	20	15	20	15	5

Source: Authors' calculations based on documents downloaded from https://www.tdap.gov.pk/

Table A2: Chinese tariffs on Pakistani goods

Sector	Pre-FTA	2011	Pre-FTA	2011	Decrease in average tariff
	% range	% range	% average	% average	% points
Aluminum products	5-12	0-6	8.5	3	5.5
Animal feed (except dog/cat food)	2-5	0	3.5	0	3.5
Basic chemicals	1-14	0-11.2	7.5	5.6	1.9
Beverages (nonalcoholic)	20-35	5-29.5	27.5	17.25	10.25
Cutlery, hand tools, general hardware	8-18	0-5	13	2.5	10.5
Dairy products	10-15	6.7-13	12.5	9.85	2.65
Domestic appliances	5-15	0-12	10	4	6
Fertilizer	3-50	0-50	28	25	3
Food products	5-30	0-30	16.5	15	1.5
Footwear	10-24	5-12	17	8.5	8.5
General purpose machinery	3-14	0-11.2	8.5	5.6	2.9
Glass and related	6-17.5	5-14.4	11.75	9.7	2.05
Iron and steel	3-20	0-14	11.5	7	4.5
Knitted apparel	14-25	0-14.8	19.5	7.4	12.1
Leather products	5-20	0-12	12.5	6	6.5
Nonmetallic mineral products	8-24.5	5-20	16.25	12.5	3.75
Paper and related	5-7.5	5-7.5	6.25	6.25	0
Petroleum and related	3-10	0-5	6.5	2.5	4
Pharmaceuticals	3-6	0	4.5	0	4.5
Plastics	6.5-10	0-9.2	8.25	4.6	3.65
Readymade apparel	14-18	7-12.8	16	9.9	6.1
Refined oil	10-25	10-25	17.5	17.5	0
Rice	65	65	65	65	0
Rubber	5-20	3-17	12.5	10	2.5
Soaps and detergents	6.5-15	5-12	10.75	8.5	2.25
Special purpose machinery	3-10	0-5	6.5	2.5	4
Spinning and weaving (textiles)	5-18	0-5	11.5	2.5	9
Sports goods	12-15	0	13.5	0	13.5
Sugar (refined)	50	50	50	50	0
Textile made-ups	14-16	0-12.8	15	6.4	8.6
Transport equipment	1-45	0-45	23	22.5	0.5
Wood and related	0-10	0-5	5	2.5	2.5

Note: Motorcycles remained at 45 percent, and triple-ingredient fertilizer and granulated sugar at 50 percent.

Source: Authors' calculations based on documents downloaded from https://www.tdap.gov.pk/

Correlation of tariff reductions with productivity and value added

Table A3: Correlation between Pakistani firm outcomes and lower Pakistani tariffs on Chinese goods

	Productivity	Value added	Value added per worker
Tariff reduction	-0.149***	-0.067***	-0.034*
	(0.039)	(.031)	(0.020)
N	1,209	1,278	1,278

Source: Authors' calculations based on firm-level data from the Punjab CMI for 2005/06 and 2010/11. Firm productivity is measured as the residual from an OLS regression of firm-level value added on capital and labor, with errors clustered at the firm level.

Table A4: Correlation between Pakistani firm outcomes and lower Chinese tariffs on Pakistani goods

	Productivity	Value added	Value added per worker
Tariff reduction	-0.115***	-0.111***	-0.004
	(0.013)	(0.016)	(0.010)
N	1,209	1,278	1,278

Source: Authors' calculations based on firm-level data from the Punjab CMI for 2005/06 and 2010/11. Firm productivity is measured as the residual from an OLS regression of firm-level value added on capital and labor, with errors clustered at the firm level.

Table A5: Industry-level data: Employment, productivity and value added per worker

Industry	Number of Firms			Employment				Weighted Productivity					Value Added per Worker				
	2010	2014	change in the number of firms	2006	2010	2014	change in employment	1995	2000	2005	2010	change in productivity	1995	2000	2005	2010	change in value added per worker
Sugar	46	46	5	26814	32781	39678	12864	11.48	12.50	12.70	13.10	1.62	221.12	240.56	253.36	263.95	42.83
Food Products	1147	1103	-30	14069	16207	14243	174	10.82	9.07	8.62	9.49	-1.33	377.66	373.51	488.24	665.28	287.62
Animal Feed	4		0	40	40		0	6.43	1.06	10.05	9.34	2.91	269.81	262.15	237.74	282.81	13
Spinning and Weaving of Textile	748	721	-51	237944	227827	22913	-14031	12.97	13.01	12.56	12.39	-0.58	207.91	200.16	211.01	207.89	-0.02
Textile Madeups	405	341	-60	56356	26371	39073	-17283	10.99	8.27	11.36	10.94	-0.05	353.38	358.91	346.74	354.148	0.768
Knitted and Crocheied Apparel	94	114	24	2445	2675	7976	5531	14.77	10.82	11.67	11.37	-3.40	947.42	971.93	955.90	950.08	2.66
Wearing Apparel		395				54787		10.6	9.42	11.67	10.08	-0.52	220.37	221.75	225.90	246.20	25.83
Leather Products and Garments (Except Footwear)	456	320	-136	16109	16502	11636	-4473	6.89	9.27	9.75	10.56	3.67	577.78	572.90	583.06	567.95	-9.83
Footwear	113	91	-9	9044	9391	12048	3004	15.69	15.79	9.27	9.15	-6.54	196.50	475.32	627.78	194.79	-1.71
Aluminium Products	43	19	-17	536	736	421	-115	9.99	10.74	12.50	10.14	0.15	103.73	101.75	163.30	298.31	194.58
Non Metallic Mineral Products	28	9	-3	90	221	138	48	14.03	11.86	11.71	11.07	-2.96	192.59	483.05	655.72	155.26	-37.33
Dairy Products	27	8	-18	4250	4706	1458	-2792	6.23	6.45	13.37	15.14	8.91	3551.21	3531.57	3871.14	3531.90	-19.31
Beverages	27	37	14	6331	6706	7803	1472	8.23	9.52	11.24	14.28	6.05	757.76	850.79	896.50	836.49	78.73
Fertilizers	10	3	-8	3715	2864	2902	-813	10.4	8.14	14.53	10.23	-0.17	553.32	548.72	590.50	617.10	63.78
Glass and Related Products	43	41	-2	3913	3559	5696	1783	5.04	1.23	9.09	13.23	8.19	68.54	63.52	129.07	242.05	173.51
Paper and Related Products	126	228	96	3353	5855	15042	11689	6.08	6.21	9.39	12.45	6.37	76.66	73.63	90.62	272.30	195.64
Wood and Related Products	16	41	35	269	422	1972	1703	15.18	12.16	9.56	6.67	-8.51	88.46	85.43	34.70	91.35	2.89
Petroleum and Related Products	15	22	9	1240	709	1558	318	13.46	12.58	11.83	13.35	-0.11	2268.36	2271.20	2824.40	3399.50	1131.14
Basic Chemicals	92	101	15	2958	4635	8595	5637	14.81	15.27	13.87	13.05	-1.76	526.23	569.50	902.50	557.20	0.97
Pharmaceuticals	180	199	47	11001	11265	16546	5545	10.23	8.36	9.61	11.50	1.27	76.60	72.89	57.04	277.96	201.36
Soaps and Detergents	184	100	-88	4385	4483	4236	-149	9.82	10.29	9.42	8.49	-1.33	83.40	71.18	102.72	67.26	-16.14
Rubber	65	75	12	1278	1598	6409	5131	13.81	11.05	7.78	13.02	-0.79	87.00	81.86	48.74	87.35	0.35
Plastics	315	200	-80	3204	4272	9367	6163	7.38	6.35	9.94	6.67	-0.71	179.09	176.77	210.93	230.10	51.01
Iron and Steel	408	411	27	7427	8087	15796	8369	13.67	12.71	9.49	8.96	-4.71	283.41	278.73	367.76	544.06	260.65
Cutlery, Hand tools and General Hardware	221	84	-144	2246	2288	2406	160	20.8	16.05	7.88	7.83	-12.97	223	200.58	251.95	222.90	-0.1
General Purpose Machinery	181	103	-89	1945	2009	1546	-399	12.43	11.95	8.97	8.89	-3.54	386.42	380.31	389.50	370.97	-15.45
Special Purpose Machinery	333	415	67	8433	8469	14490	6057	17.89	15.44	11.29	8.40	-9.49	398.23	542.89	699.73	388.30	-9.93
Domestic Appliances	66	255	184	645	598	8143	7498	10.46	10.16	10.34	10.82	0.36	93.23	78.86	89.20	124.50	31.27
Transport Equipment	-	89	-379	-	-	9374		13.51	11.06	10.42	9.71	-3.8	486.44	478.70	556.42	649.45	163.01
Sports Goods	461	185	-5	21038	21237	12491	-8547	6.78	3.49	9.42	6.65	-0.13	251.90	236.01	1077.10	249.54	-2.36
Refined Oil	87		3	4978	4735		-243	7.99	4.81	11.83	13.85	5.86	2876.21	2959.624	2824.40	3399.59	523.38
Rice	1754			26544	28734		2190	10.93	6.96	7.45	8.36	-2.57	1284.28	1362.44	434.60	1297.35	13.07

Source: Authors' calculations based on firm-level data from the CMI for 1995/96, 2000/01, 2005/06 and 2010/11 and DOI for 2006, 2010, 2014.

The Lahore Journal of Economics
22 : SE (September 2017): pp. 25–51

External Debt Management in Pakistan: A Market-Based Assessment

Jamshed Y. Uppal*

Abstract

Economists typically use multiple indicators to assess the burden of external debt, such as the ratios of the stock of debt to exports and to gross national product, and the ratios of debt service to exports and to government revenue. As opposed to those methodologies, this article examines the Pakistan's external debt position using a market based approach which analyzes the marginal costs of external debt as indicated by the yields on the country's Eurobonds and the spreads on the Credit Default Swaps (CDS) traded in the international markets. The results show a sharp decline in the yields on the Pakistani Eurobonds from their peak reached during the global financial crisis (GFC) period and this decline was largely driven by quantitative easing and the resultant low interest rates in the international debt markets. Also, the continued decline in the yields in the more recent period, 2013-2017, was due to strengthening of the county's borrowing capacity over the period. The analysis also shows that Pakistani yields seem to be converging to yields for other Asian countries, even though that the yield-spreads between Pakistan and others countries are still substantial. In conclusion the decrease in bond yields and CDS spreads may signal that the country's external debt is currently at sustainable levels.

Keywords: External debt, Debt management, economic growth, Pakistan.

JEL classification: H63.

1. Introduction

The sound management of external debt remains a lingering concern in Pakistan, having garnered renewed interest in the wake of the economy's lackluster performance in 2008. Severe internal and external pressures resulted in a sharp increase in Pakistan's external debt, compelling it to request a stand-by-arrangement from the International Monetary Fund

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(2016). The rapid increase in external debt over the last decade has prompted numerous reports questioning its sustainability and possible adverse impact on the country's economic stability and growth (see, for example, Khan, 2016; Abbasi, 2016; Bokhari, 2016; Tirmizi & Masooma, 2017).

Economists use several macroeconomic indicators to assess the burden of external debt, such as the ratios of the stock of debt to exports and to gross national product, and the ratios of debt service to exports and to government revenue. Although these indicators are widely accepted as measures of a country's indebtedness, they are not well demarcated in terms of signaling what constitutes an unacceptable level of debt. For example, the World Bank follows a set of parameters used to categorize countries as "moderately" or "severely" indebted. Since countries with higher export growth rates, for example, can support higher external debt than those with lower export growth rates, it is only possible to lay down broad guidelines governing external debt sustainability (Loser, 2004). A failure to determine appropriate levels of sustainable external debt is a key reason that external debt-related problems have persisted for many developing countries (Muhanji & Ojah, 2011).

Most academic studies focus on conventional debt measures of public debt sustainability (see, for example, Di Bella, 2008; Goktas & Hepsag, 2015). The literature also includes early-warning systems for sovereign debt crises, developed using key economic indicators: see, for example, Lang (2013); Fuertes and Kalotychou (2007); Lewis (2011); Manasse, Roubini and Schimmelpfennig (2003); Tian, Li and Lu (2012); Babecký et al. (2012). Similarly, studies on Pakistan's external indebtedness are based on conventional measures: see, for example, Ahmad (2011); Iqbal et al. (2015); Mahmood, Arby and Sherazi (2014); Waheed (2006). Several studies on sovereign debt, however, use market-based indicators such as sovereign bond yield. Most of these relate bond yields to the conventional measures of indebtedness derived from the national accounts. Afonso and Rault (2010), for example, show that markets consider budgetary and external imbalances and inflation to be relevant determinants of sovereign yield.

Csonto and Ivaschenko (2013) analyze the relationship between global and country-specific factors and emerging market debt spreads. Poghosyan (2012) and Rowland and Torres (2004) study the determinants of sovereign bond yields. Bellas, Papaioannou and Petrova (2010) find that, in the long run, fundamental indicators are significant determinants of emerging market sovereign bond spreads, while in the short run, financial volatility is a more important determinant. Ciarlone and Trebeschi (2005)

have developed an early-warning system for debt crises that integrates the analysis based on macroeconomic variables with an approach based on risky market instruments. Increasingly, the literature has looked at the credit default swap (CDS) spread as an indicator of the debt market perceptions of sovereign creditworthiness (see Atrissi & Mezher, 2011).

Debt market indicators have assumed greater relevance in recent decades, with the remarkable increase in private capital flows to developing countries through the issuance of international bonds. There has been a significant rise in new bond issuance by "frontier markets", including first-time issuers in the international sovereign debt market, particularly sub-Saharan African countries. Gurría (2014) and Arslanalp and Tsuda (2014) estimate that about half a trillion dollars in foreign flows went into emerging market government debt during 2010–12 – most of it from foreign asset managers. They also show how investor-based data can be used to assess countries' sensitivity to external funding shocks and the rebalancing of foreign investors' portfolios.

This paper examines Pakistan's external debt position using a market-based approach. Instead of using conventional measures of external indebtedness such as the debt-to-GDP ratio, we examine the marginal cost of external debt as indicated by the yields on the country's Eurobonds and the spreads on the CDSs traded in international markets. A sharp increase in bond yields or in CDS spreads would signal that the country's external debt is approaching unsustainable levels. The advantage of this approach is that the data needed to evaluate debt sustainability is more frequent (daily) than that used in conventional ratio analyses. National economic data may only be available on a quarterly basis, while the country's credit ratings change infrequently. Bond yields and CDS data is market-generated and reflects the assessment of numerous international market participants, while economic data is generated by government agencies and may be susceptible to window dressing.

The paper is organized as follows. Section 2 reviews the country's external debt, using a conventional ratio. Section 3 provides an assessment of external debt employing market-based indicators. Section 4 presents an econometric study of the linkages between the yields on debt and international yields. Section 5 presents a discussion of the results. Section 6 presents the study's conclusions and policy implications.

2. Conventional Assessments of External Debt

The use of conventional assessment tools is subject to many interpretations, as evident from recent discussions on Pakistan's external debt. While many economic journalists and academics have raised concerns over the country's growing external debt, the finance minister paints a very different picture.

A prominent critic is Khan (2016) who notes that, "apart from the direct consequences for national security, rising debt is also a threat to macroeconomic stability and hence to growth, employment generation and poverty alleviation." He adds: "The recent pace of accumulation of debt suggests that, if [it] remain[s] unchecked, Pakistan's public debt in general and external debt in particular… [will] reach an unsustainable level in the next five years." Khan's arguments are based on analyses using conventional ratios and on projections of the country's GDP and exports. He focuses on the burden of total debt indicators, such as external debt and liabilities (EDL) as a percentage of exports, EDL as a percentage of foreign exchange (FX) earnings (including exports, remittances and foreign investment) and the EDL growth rate, as shown in Figures 1 and 2.

Figure 1: Pakistan, debt ratios, 1999–2015

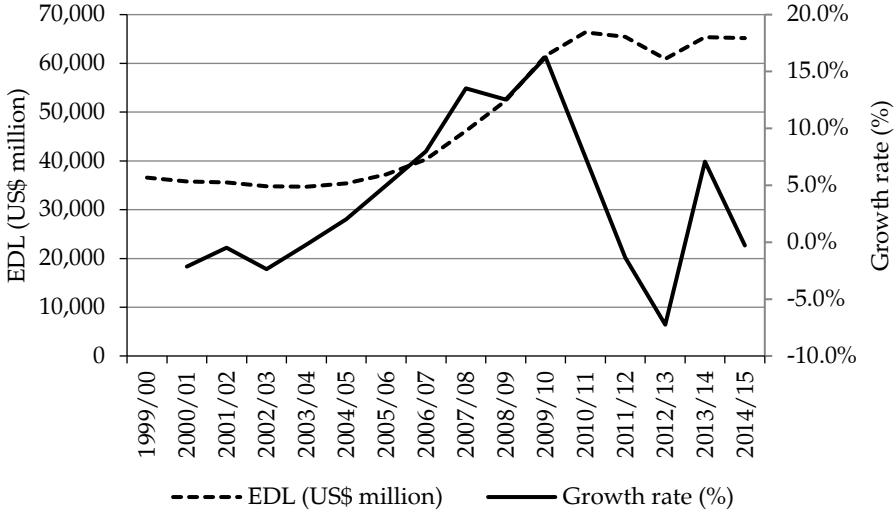
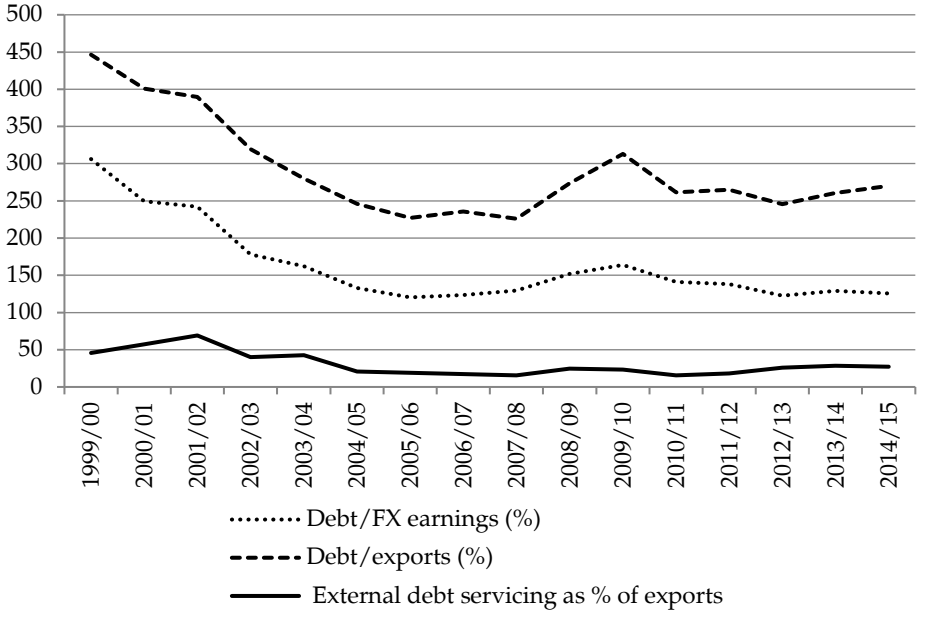


Figure 2: Pakistan, external debt and growth, 1999–2015



In the absence of a hard optimum or cutoff debt burden ratio, such data is prone to varied interpretations and prognoses by judiciously selecting periods and statistical series. As Figures 1 and 2 show, the recent trend (since 2011) in the debt ratio is not all that alarming. For example, the average compound rate of growth in EDL for the period 1990–2015 is 3.85 percent. However, for the subperiod 1999–2006, it is 0.30 percent; for the period 2006–11, it is 11.56 percent and for the more recent period 2012–15, it is –0.45 percent.

Khan's (2016) assessment of the country's debt situation relies more on projections based on his assumptions concerning the growth in GDP and exports and on fresh liabilities likely to be incurred under the China–Pakistan Economic Corridor (CPEC) projects. Again, there is room for both pessimism as well as optimism in making these projections. The federal finance minister's recent comment that "economic indicators are always open to interpretation and debate," builds on two assumptions.[1] First, he considers only 'public debt' and excludes private debt, that is, the FX borrowings of banks, state-owned enterprises and the nonfinancial private sector. The comparative numbers are given in Table 1.

[1] https://www.thenews.com.pk/print/183227-Pakistans-Debt-Putting-the-record-straight

Table 1: External debt, 2013 and 2016

	2013 US$ billion	2016 US$ billion	Growth rate Percent
Public external debt	48.1	57.7	6.25
EDL	60.9	73.0	6.23

As the table shows, the compound annual growth rate over the last three years is not much different, although the larger debt figures do seem ominous. Second, the minister takes a "pragmatic and realistic" approach to measuring "net external indebtedness", that is, external public debt less official FX reserves held by the State Bank of Pakistan. Comparing the last three years' external debt position gives us the following picture (Table 2):

Table 2: Reduction in indebtedness

	June 2013 US$ billion	June 2016 US$ billion
External public debt	48.10	57.70
SBP FX reserves	4.00*	18.10
Net external public debt	44.10	39.60
Reduction in indebtedness		4.50

Note: * does not include US$2 billion of short-term FX swap.

Based on this, the minister shows that Pakistan's indebtedness had improved by US$4.5 billion by the end of June 2016 compared to June 2013. He may have a valid point, as FX reserves can be drawn to pay maturing debts. However, a sudden drawdown of reserves would signal financial distress, rattling the FX and credit markets and possibly triggering an economic crisis.

Some economists have questioned the wisdom of building up reserves by incurring external loans. Arguably, FX reserves carry economic benefits: they (i) provide a cushion to absorb any shocks to the country's current and capital accounts, (ii) help tone down FX rate volatility and thus FX risk, (iii) help bring down the cost of borrowing by improving credit ratings, and (iv) moderate the cost of imports and credit insurance as the country's creditworthiness improves from the perspective of foreign suppliers. However, the cost of maintaining FX reserves must be balanced

against the benefits.[2] Pakistan's FX reserves, equivalent to about five months of exports, are lower relative to those of comparator countries.

The discussion above shows that there is considerable room to interpret economic data and it is easy to disagree as to prudent levels of debt. Much of this disagreement arises because there are no universally accepted limits to debt levels and economists differ widely as to the future course of the economy. Finance theory suggests that, as a country moves closer to its debt capacity, its marginal cost of borrowing will increase sharply (see Figure 3). Therefore, this paper gauges Pakistan's external debt position using an alternative approach. Instead of using conventional measures of external indebtedness such as the debt-to-GDP ratio, we examine the marginal cost of external debt as indicated by the yields on the country's Eurobonds and the CDS spreads being traded in international markets. As noted above, a sharp increase in bond yields or CDS rates would signal that the country's external debt is reaching unsustainable levels.

Figure 3: Cost of debt and debt capacity

3. Market-Based Assessments of External Debt

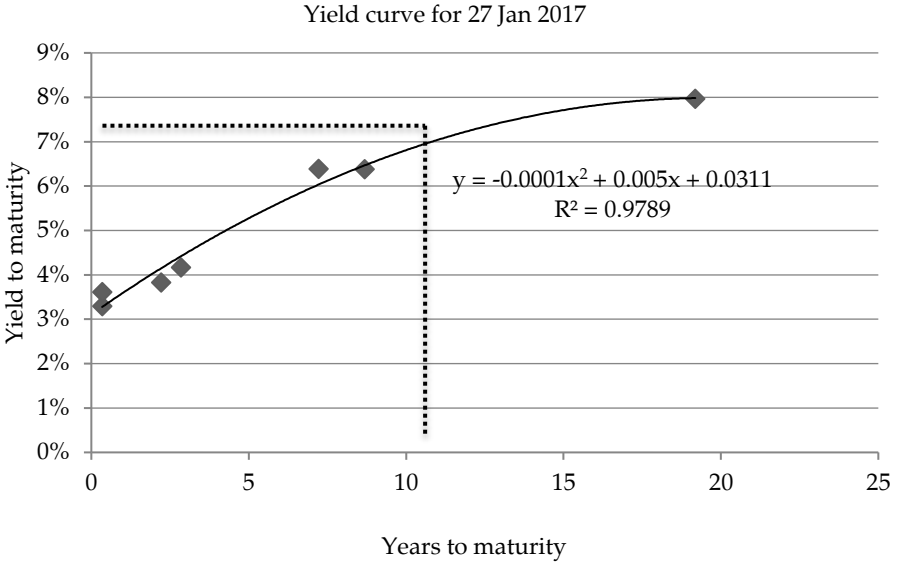
As with other developing countries, Pakistan has tapped into other financial markets to raise sovereign debt, such as the recent issue of US$1 billion in sukuk bonds at a coupon rate of 5.5 percent. As of the beginning of 2017, the total volume of Eurobonds and sukuk issued by the Government

[2] For example, cost of maintaining additional reserves of $14 billion at a marginal rate of 5% percent ($700 million) will be roughly offset if there is 1 percent decrease in the borrowing cost ($730 million) over the total EDL of $73 billion.

of Pakistan (and its special purpose entities, SPVs) was worth US$5.5 billion or about 9.5 percent of the public external debt. The main features of these internationally issued securities are summarized in Table A1 in the Appendix. The market price information on the Eurobonds/sukuk allows us to compute the yield to maturity on these securities. In addition, CDS are traded against sovereign and sovereign-guaranteed securities. We use this information as follow:

- The *yield to maturity* is computed daily, based on the quoted prices of the securities (obtained from Datastream, Thomson Reuters), their promised cash flows (periodic coupon and principal payments) and time to maturity. A yield curve is constructed for each day, based on the outstanding maturities of each bond. The daily yield curves are then used to interpolate the yield for one-year, five-year and ten-year maturity bonds, using a polynomial curve fitting. This method, illustrated in Figure 4, is similar to that used by the US Treasury to report constant-maturity yields for various tenures. We obtain a series of one-year, five-year and ten-year constant-maturity yields, which are then compared with the US Treasury constant-maturity yields.

Figure 4: Determining constant maturity yield



- *JP Morgan emerging market bond indices (EMBIs)* are used to track bonds in emerging markets (as constructed by JP Morgan). We use EMBIs for Asia, Pakistan and selected countries for comparison and empirical analysis as explained in the next section.

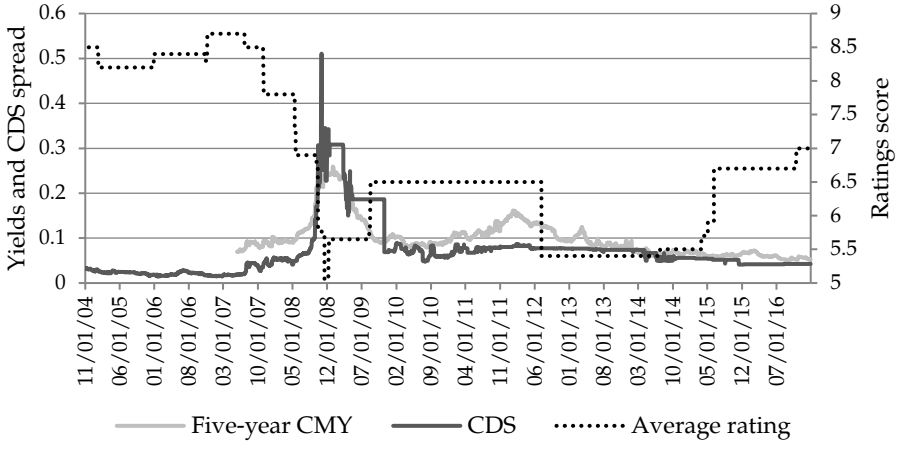
- *Country credit ratings* or Pakistan's sovereign debt ratings are obtained from two major agencies: Standard and Poor's and Moody's. We convert their letter ratings to numerical values to create a rating score for comparison purposes.[3]
- *CDS* denote contracts designed to transfer the credit exposure of fixed-income products between two or more parties. The buyer of the swap agrees to make payments to the seller until a certain maturity date. In return, the seller agrees that, should the debt issuer default or experience a credit event, the seller will pay the buyer the security's premium as well as all interest payments that would have been paid between the event time and the security's maturity date.

An International Monetary Fund (2013) study finds that sovereign CDS are generally reliable market indicators of sovereign credit risk – reflecting the same economic fundamentals and other market factors. However, CDS markets appear to incorporate information faster than bond markets in periods of stress. CDS spreads, therefore, reflect the default probability of the underlying security and provide insurance to the security holder against default. The CDS spreads were obtained from Datastream and are used in the empirical exercise in this study.

Figure 5 plots the five-year constant-maturity yields, the CDS spreads (left axis) and the sovereign debt rating scores (right axis) for Pakistan from November 2004 to January 2017. We can see that the yields on Pakistani securities are positively related to the CDS spreads, which in turn reflect the country's default risk. On the other hand, the credit ratings are inversely related to the yields. It is noteworthy that the yields spiked sharply to over 25 percent during the global financial crisis (GFC) period 2007–09, along with a sharp increase in CDS spreads, while credit ratings dropped precipitously. Another rise in the yields occurred in 2011, but this was not accompanied by an increase in the CDS spreads. This likely reflects tighter international financial markets rather than the country's creditworthiness, as also reflected by the steady credit ratings. Post-GFC, we see a sharp drop in Pakistani yields, followed by an upward trend during 2009–11. There has been, however, a general downward trend in the yields since January 2012, accompanied by an improvement in credit ratings and a decrease in the CDS spreads.

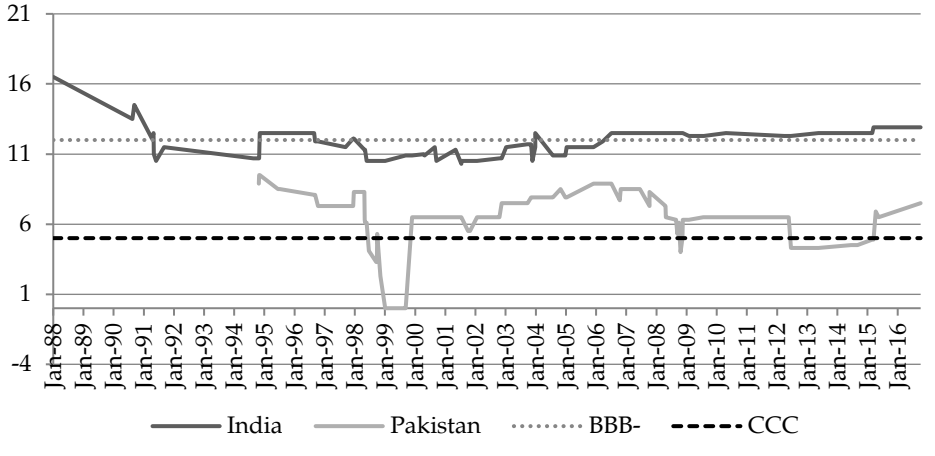
[3] Standard & Poor's ratings are issued as letter grades from AAA to D. Moody's follows a similar system from AAA to D. Standard & Poor's BBB rating implies "adequate financial performance, but may be adversely affected by economic downturn." The "BBB-" rating is the lowest grade that will likely be considered by investors. These letter grades are further classified by the debtor's "outlook". We assign a score of 12 to the "BBB-" rating.

Figure 5: Pakistan, sovereign ratings, CDS spreads and yields



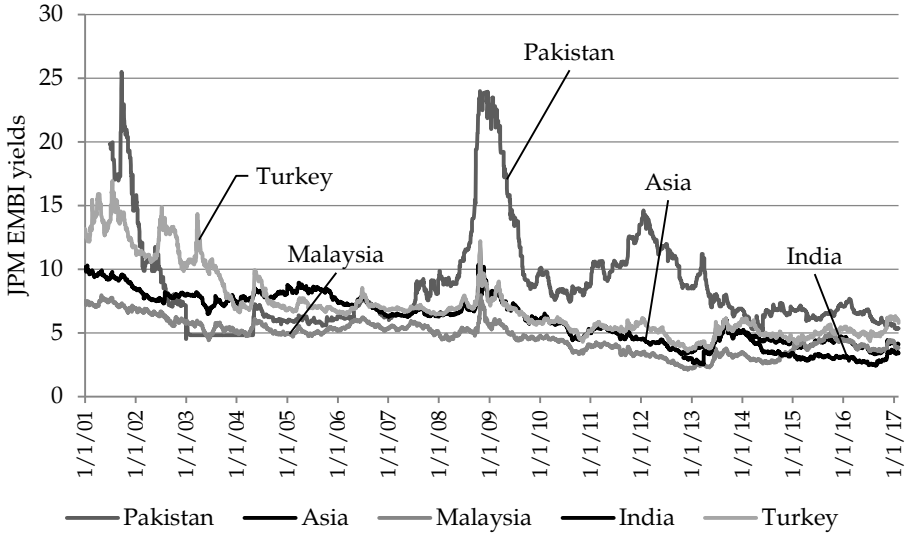
A key factor that affects yields and the cost of borrowing is sovereign ratings. Figure 6 compares Pakistan's ratings with those of India, showing that the latter's sovereign debt is rated far above that of Pakistan. India's ratings have been consistently classified as investment-grade (above BBB-) since 2007, while Pakistan's have fallen below CCC – indicative of a "vulnerable financial condition" – for some periods. In recent years, however, Pakistan's ratings have improved. The latest upgrade in October 2016 was by Standard & Poor's to B with a "stable" outlook. Despite the recent uptick, Pakistan's ratings are still about 5.5 notches below those of India (Moody's Baa3/positive).

Figure 6: Sovereign ratings, Pakistan versus India



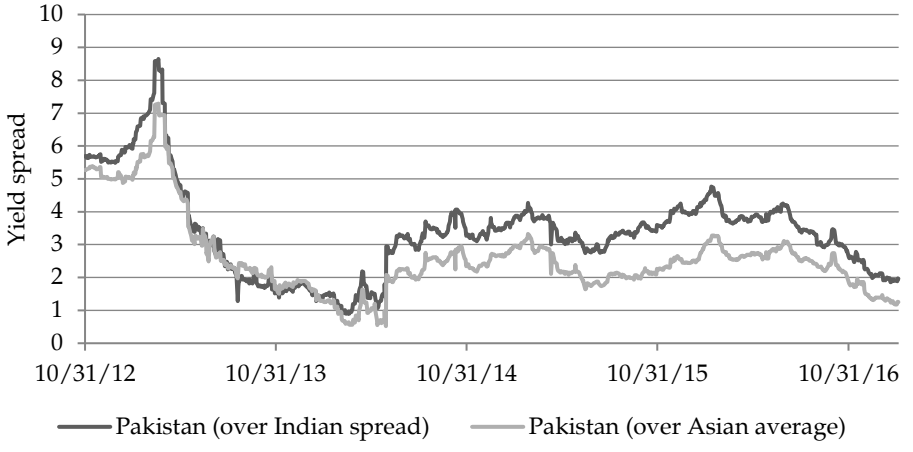
For comparison purposes, we plot the EMBI yields for Pakistan, the Asia group averages and yields for selected countries in Figure 7. We can see that the EMBI yields for Pakistan declined from a peak in 2001 and remained within the range of yields for the peer group until about the onset of the GFC. The yields seem to rise disproportionately during the GFC period. A disproportionate response also occurs in 2010/11, when the Pakistani yields shoot up in response to a somewhat mild increase in the other series. Since the beginning of 2012, there has been a continuing decline in the yields, which more recently has brought them closer to the yields for the peer group.

Figure 7: JPM EMBI yield-to-maturity



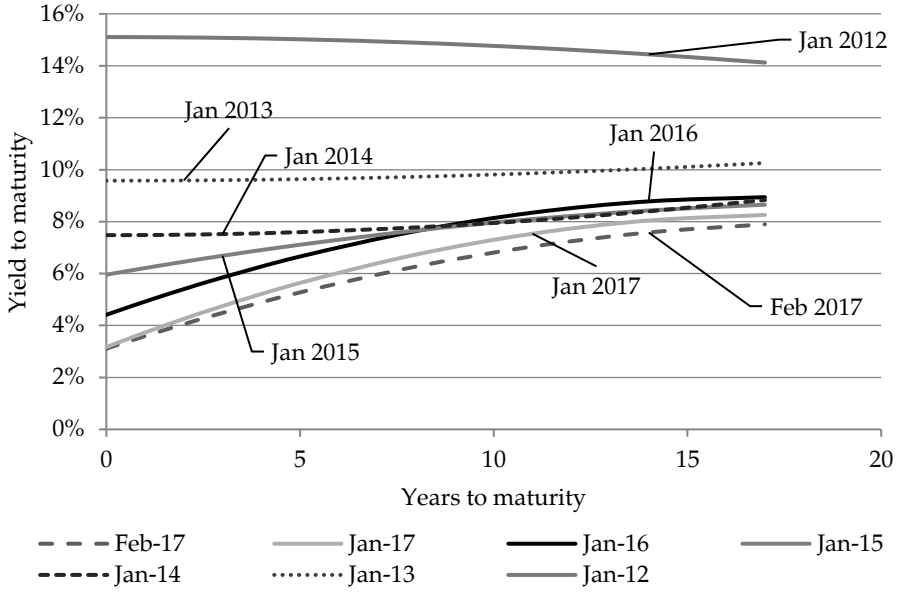
Although the Pakistani yields seem to be converging onto the yields for other Asian countries, we note that the yield spread between Pakistan and the other countries is still substantial, as Figure 8 shows. We note a sharp decline in the yield spreads over their peak in March 2013, which continues until about May 2014. Then there is a jump in the yields, followed by a period in which they fluctuate within a range: about 2.5 percent over the Asian average and 3.5 percent over the Indian yields. The more recent period (since January 2016) has seen a downward trend in the spreads, which were close to their historical lows of just over 1 and 2 percent (the minimum was about 0.5 percent for a brief period, February–March 2014).

Figure 8: JPM EMBI yield spread



Next, Figure 9 shows the yield maturity structure for Pakistani Eurobonds/sukuk estimated at the beginning of each year for the period 2012–17. As the figure shows, the yields have declined for all maturities over the period. This reinforces the reading of the trend in yields over recent periods, that is, a continuing decline in yields and, therefore, in the marginal cost of external debt to the country.

Figure 9: Yield curves over time



Here, the yield-to-maturity represents a rate of return for the investor in the bonds at current prices. It also represents the cost at margin for the issuer, although to obtain an estimate of the effective cost to the borrower, we need to factor in the flotation costs associated with each issue.[4] Thus, a spread of 2 percent would translate into approximately US$20 million for a US$1 billion bond in terms of the annual financial cost advantage in favor of one's competitor. This is still a far better position than having a spread of 7 or 8.5 percent, which would translate into US$70–85 million a year. Here, we are considering the yields on sovereign debt, which reflect the cost of borrowing for the private sector (including the cost of financing trade) and are typically linked to the country's sovereign yields. Thus, any decrease in sovereign yields will also bring down financial costs for the private sector, providing considerable relief, especially to the exports sector.

It is not possible to determine precisely which factors are responsible for the decline in yields, part of which may be due to improvements in domestic factors such as the economic and political environment or a lower incidence of terrorism. However, part of this decline may also be attributable to international supply factors such as easier interest rate regimes, a decline in crude oil prices and smaller risk premiums required by international investors. In the next section, we attempt to empirically separate the impact of domestic factors from that of international factors to better understand the cost of Eurobonds for Pakistan.

4. Empirical Tests for Yields

We examine the behavior of the yield on Pakistani bonds (JPM EMBI Pakistan) over time as affected by international and Asian yields. US treasury yields (constant five-year maturity) are used as a proxy for the former, while JPM EMBI Asia yields represent the latter. The US interest rate and macroeconomic fundamentals play a significant role in determining bond spreads in emerging economies (see, for example, Min et al., 2003). We also include the spreads on the Pakistan CDS (five-year). The long-term relationship is studied using two empirical models: (i) a four-variable vector error correction (VEC)/error correction model (ECM) to capture the long-term relationship between Pakistani yields and the three explanatory variables and (ii) multivariate GARCH models to examine the yields over time.

[4] A 2 percent flotation (issuance) cost will add 26 basis points on a 5 percent, five-year bond to the cost of debt for the borrower.

4.1. Cointegration Analysis

The ECM is a useful model for detecting long-term relationships between time-series variables (including many macroeconomic variables) that may be nonstationary (Engle & Granger, 1987). In this case, we use an ECM to examine the long-term relationship between the yields series and CDS spreads. The VEC representation of the model is a restricted VAR with the cointegration restrictions built into the specifications. The endogenous variables are restricted in the VEC representation so that they converge on their cointegrating relationships in the long run. At the same time, the model allows a wide range of short-run deviations from the long-run equilibrium, which are corrected through a series of partial short-run adjustments. Johansen's method is used to test the restrictions imposed by cointegration on the unrestricted VAR model.

We hypothesize a simple long-term relationship between the Pakistani bond index yields and the explanatory variables, with an intercept but without a trend, with one cointegrating equation and two lagged difference terms. Since the fundamental structure of the expected yield is expressed in finance as the risk-free rate plus premiums, the yields on the US treasuries are included to represent the risk-free rate. The Asian index is expected to capture a base risky yield and the CDS spreads are expected to reflect country risk. The ECM equations are as follows:[5]

$$\Delta PKY_t = \alpha_1 + \gamma_1(ECT_t) + \delta_{1,1}\Delta PKY_{t-1} + \delta_{1,2}\Delta PKY_{t-2} + \delta_{1,3}\Delta ASY_{t-1} + \delta_{1,4}\Delta ASY_{t-2} + \delta_{1,5}\Delta UTY_{t-1} + \delta_{1,6}\Delta UTY_{t-2} + \delta_{1,7}\Delta CDS_{t-1} + \delta_{1,8}\Delta CDS_{t-2} + \varepsilon_{1,t} \quad (1)$$

$$\Delta ASY_t = \alpha_1 + \gamma_2(ECT_t) + \delta_{2,1}\Delta PKY_{t-1} + \delta_{2,2}\Delta PKY_{t-2} + \delta_{2,3}\Delta ASY_{t-1} + \delta_{2,4}\Delta ASY_{t-2} + \delta_{2,5}\Delta UTY_{t-1} + \delta_{2,6}\Delta UTY_{t-2} + \delta_{2,7}\Delta CDS_{t-1} + \delta_{2,8}\Delta CDS_{t-2} + \varepsilon_{1,t} \quad (2)$$

$$\Delta UTY_t = \alpha_1 + \gamma_3(ECT_t) + \delta_{3,1}\Delta PKY_{t-1} + \delta_{3,2}\Delta PKY_{t-2} + \delta_{3,3}\Delta ASY_{t-1} + \delta_{3,4}\Delta ASY_{t-2} + \delta_{3,5}\Delta UTY_{t-1} + \delta_{3,6}\Delta UTY_{t-2} + \delta_{3,7}\Delta CDS_{t-1} + \delta_{3,8}\Delta CDS_{t-2} + \varepsilon_{1,t} \quad (3)$$

[5] The ECM/VEC models (such as equations 1-4) are widely used procedures for testing cointegration of several time series. The Johansen test permits more than one cointegrating relationship and is thus more generally applicable than the Engle–Granger test which is based on the test for unit roots in the residuals from a single cointegrating relationship.

$$\Delta CDS_t = \alpha_1 + \gamma_4(ECT_t) + \delta_{4,1}\Delta PKY_{t-1} + \delta_{4,2}\Delta PKY_{t-2} + \delta_{4,3}\Delta ASY_{t-1} + \delta_{4,4}\Delta ASY_{t-2} + \delta_{4,5}\Delta UTY_{t-1} + \delta_{4,6}\Delta UTY_{t-2} + \delta_{4,7}\Delta CDS_{t-1} + \delta_{4,8}\Delta CDS_{t-2} + \varepsilon_{1,t} \quad (4)$$

where the four time (t) series variables are defined as below:

- PKY ≡yield on JPM-EMBI index for Pakistan
- ASY ≡yield on JPM-EMBI index for Asia
- UTY ≡five-year constant-maturity yield on US treasury bonds
- CDS ≡CDS spread for Pakistan.

The error correction term is:

$$ECT_t = \alpha_0 + PKY_{t-1} - \beta_1.ASY_{t-1} - \beta_2.UTY_{t-1} - \beta_3.CDS_{t-1} \quad (5)$$

ECT represents the long-term relationship and the coefficients γ_i denote the speed of adjustment. The cointegrating equation is:

$$PKY_{t-1} = -\alpha_0 + \beta_1.ASY_{t-1} - \beta_2.UTY_{t-1} - \beta_3.CDS_{t-1}$$

The error correction term in a long-run equilibrium is expected to be zero. However, if the modelled variables deviate from the long-run equilibrium in the last period, the error correction term is nonzero and the returns will adjust to partially restore the equilibrium relation.[6]

The long-term relationship in the ECM is "disturbed" by short-term deviations from the equilibrium. The ECM (equations 1–4) captures the dynamics of the short-term adjustment process. For it to hold, at least one of the γ_i terms must be significant. If two coefficients (γ_i) are significant, this implies that the series influence each other or that there is a feedback relationship between the two. If only one of the error term coefficients (γ_i) is significant, it implies that one yield series is driving the other toward long-term equilibrium, but not the other way around. The sign of the error term coefficient (γ_i) should be negative for the previous period's positive

[6] The null hypothesis of no cointegrating equation was rejected for the sample by the log likelihood ratio test (not reported here) and indicated at least one cointegrating equation at a 5 percent significance level, implying that yields exhibit a long-term relationship. We work with first differences, as the series are found to be integrated of the order I(1) in ADF tests.

(negative) deviation to lead to a negative (positive) correction in the current period and drive it toward equilibrium.

The lagged terms of the change in yields, included as independent variables, indicate a short-run dynamic (or statistical cause-and-effect) relationship between the two yields. If the lagged coefficient of ΔASY is significant in the ΔPKY regression or if ΔASY significantly affects ΔPKY, this would suggest that Asian yields affect the Pakistani yields. Similarly, if the lagged coefficient of ΔUTY is significant in the ΔPKY regression, we can infer that treasury yields affect the Pakistani yields. If neither lagged coefficient is significant, then no inter-exchange "cause-and-effect" relationship can be inferred.

4.2. Multivariate GARCH Model

An appropriate approach to modeling the dynamic behavior of yields is to use the expanded GARCH (p, q) model, which is the standard method of incorporating dynamic volatility in financial time series (see Poon & Granger, 2003). Our preliminary checks on the data reveal that the assumption of constant volatility does not hold. This is consistent with the well-documented phenomenon of volatility clustering, i.e., large changes in asset values are followed by large changes in either direction. This leads us to use a GARCH (1, 1) model, the dynamics of which have the following specification:

$$X_t = \mu_t + \sigma_t Z_t \tag{6}$$

Here, the dependent variable X_t is the yield on the Pakistan EMBI (PKY). The mean equation μ_t contains three explanatory variables: ASY_t, UTY_t and CDS_t. We run two models, one with the CDS spread for Pakistan and one without, to examine the effect of domestic risk on bond yields. The variance equation is structured as follows:

$$\sigma_t^2 = w + \alpha(X_{t-1} - \mu_{t-1})^2 + \beta\sigma_{t-1}^2 \tag{7}$$

with w, α and $\beta > 0$ and $(\alpha + \beta) < 1$ and where σ_t is the volatility of the return on day t and μ_t and X_t are the expected return and actual yield, respectively. The stochastic variable Z_t represents the residuals assumed to be i.i.d.

The data series spans the period November 2004 to January 2017. This is divided into subperiods, accounting for the special circumstances of the GFC period, as follows:

- Full sample: 11/1/2004 to 1/27/2017
- Pre-GFC period: 11/1/2004 to 4/2/2007
- GFC period: 7/2/2007 to 6/30/2009
- Post-GFC full sample: 7/1/2009 to 1/27/2017
- Post-GFC subsample I: 7/1/2009 to 6/30/2013
- Post-GFC subsample II: 7/1/2013 to 1/27/2017

5. Results and Discussion

Tables A2–A3 in the Appendix give the results of the empirical exercise using the cointegration model (VEC/ECM equations 1–5). The results are reported for each period (A–F) as described above. Tables A4–A5 give the results obtained from the GARCH models (equations 6–7) for each period, A–F. In each case, the model is estimated first excluding and then including the CDS spread series. The t-statistics are reported in italics under each coefficient and the statistical significance indicated by asterisks.

5.1. Cointegration Results

We focus on the ECM equations in which the Pakistani yield series (PKY) is the dependent variable. The following observations emerge from Tables A2 and A3 (see Appendix). The coefficient (γ) of the first cointegration equation (PKY) is not significant for the full-period sample (A = 11/1/2004 to 1/27/2017). This is also the case for the full-period sample post-GFC as well as for the GFC period (7/2/2007 to 6/30/2009). This implies that any long-term relationship between the yields is tenuous, although the relationship may hold for subperiods, as indicated by the significant coefficients for subperiod B (pre-GFC) and both post-GFC periods, E and F, subsamples I and II. The instability of a long-run cointegrating relationship is revealed by the shifting signs and magnitudes of the coefficient values for different periods.

This inference is reinforced when we see that, while the coefficients of determination (R-squares) are high (0.30–0.45) for the PKY equations, much of the model's explanatory power lies in the lagged value of the Pakistani yields. However, the international market variables (the Asian and

US yields and the CDS spreads) seem to play a substantive role in all subperiods excluding the GFC, as indicated by the significant coefficients of the lagged values of these explanatory variables.

A comparison between the last two subsample periods, E (7/1/2009 to 6/30/2013) and F (7/1/2013 to 1/27/2017) should be of significant current interest. For the most recent period (F), the models have higher explanatory power than in the previous period (E). In addition, the coefficients of all the explanatory variables are significant, whereas the coefficients of the US yields and CDS were not significant in the previous period.

It is interesting to note that, in the cointegrating equation, the coefficients of the Asian yields are positive in subsample I (before 7/1/2013), but negative in subsample II (since 7/1/2013). Over the first period (2009–13), the Asian yields continued to decline due to monetary easing in many developed countries. The Pakistani yields also declined during this period, implying that there was a positive relationship between the two. For the second subsample period (2013–17), we see global interest rates and Asian yields increasing somewhat, as quantitative easing policies were relaxed. However, there is a negative relationship between the Asian and Pakistani yields: the latter appear to have fallen during this period in response to the domestic economic environment, despite a slight increase in international interest rates.

Notwithstanding the apparent improvement in the country's financial conditions, there is still a substantial residual or model risk stemming from exogenous risk factors, which seems to be driving the yields on the Pakistani Eurobonds. These factors could include political and security factors such as the incidence of terrorism. A decline in the price of crude oil could also be a factor, as it would lower the country's default probabilities. It follows that further improvement (i.e., a fall in the bond yields) could be achievable by improving domestic conditions.

The period-to-period variation noted in the values of the estimated parameters is consistent with earlier findings. For example, Comelli (2012) finds that the impact and significance of country-specific and global explanatory variables on bond spreads varies across regions as well as economic periods. In crisis times, good macroeconomic fundamentals are helpful in containing bond spreads, but not as much as in non-crisis times.

It seems that bond spreads may reflect the impact of extra-economic forces, particularly when a financial crisis occurs. Hall, Anderson and Granger (1992) use cointegration analysis to analyze US treasury bill yields and find that their ECM is unstable over the Federal Reserve's policy regime changes. McGuire and Schrijvers (2003) find that a single common factor explains approximately 80 percent of the common variation in spreads on emerging market bond debt across countries. This factor seems to reflect changes in investors' attitudes toward risk and risk premiums.

5.2. GARCH Model Results

The results obtained from the empirical models with GARCH effects (equations 6 and 7) are reported in Tables A4 and A5 (see Appendix). As before, the estimations are carried out for each period (A–F). Two models are run for each period, that is, with and without the CDS spreads on the right-hand side. The tables also report the p-values against each estimated parameter.

We see that the Asian yield (ASY) coefficients are statistically significant for all periods at 1 percent or better levels. Across most periods, the coefficients of the US treasury yields are also significant for the three subperiods – the full-sample period (A) and the post-GFC full-sample period (D) at 1 percent level of significance, and for the pre-GFC period (B) at 5 percent level of significance. This reflects the linkages between Pakistani bond yields and international interest rates. However, for the most recent period, the coefficient of the CDS spreads and the constant term are highly significant. This may be because the assessment of the country's default probabilities as reflected in the CDS spreads is beginning to affect the bond yields in a statistically meaningful manner.

The constant term in the empirical equation captures the average day-to-day change in the yields.[7] The estimated values of the constant terms are –0.0035 and –0.0030 percent for the two post-GFC subperiods (E and F), respectively, which when annualized represent a decrease of –1.27 and 1.10 percent a year for the two periods, respectively. Therefore, the empirical evidence shows a definite downward trend in the yields over the post-GFC period. The rate of decrease was faster in the first period (2009–13) than in the second period (2013–17). This is as expected: at lower levels of yield,

[7] Note that the models use first differences in yields. The series are not stationary at level: they are integrated of the order I(1) and, therefore, first differences are used.

further declines would be harder to accomplish, i.e., the yields tend to stabilize at lower levels.

As in the case of the ECM models, the explanatory power of the GARCH models is rather weak. The R-squares are in the range of 1–3 percent, except for the most recent period (2013–17) when the R-square statistic is about 8 percent – which is much larger than the 1.3 percent estimated for the previous subperiod (2009–13).

These results have two implications. First, the Pakistani Eurobond yields in this period appear to be more in sync with international yields, indicating that country-specific risk factors have less influence. Second, there is still a large part of risk that is unexplained and originates from country-specific conditions. Therefore, the key to driving the yields lower lies in ameliorating domestic economic, political and security conditions.

6. Conclusion and Implications

This paper examines Pakistan's external debt position, using the marginal cost of external debt as indicated by the yields on the country's Eurobonds and the spreads on the CDS being traded in international markets. We conduct an econometric analysis of the linkages between Pakistani yields and international yields. The market pricing of the Eurobonds and related derivative securities (CDS) provides valuable market signals as to the marginal cost and future sustainability of external debt. The marginal cost of external debt should be the relevant cost component in the weighted average cost used to evaluate capital projects with an FX component.

Our analysis of the yields on Pakistani Eurobonds reveals a sharp decline in these yields from the peak they reached during the GFC. Since then, this declining trend has continued. In the initial post-GFC period, the decline was driven largely by quantitative easing and the resultant low interest rates in international debt markets. However, we note a continued decline in the yields in the more recent period, 2013–17, which seems to indicate that the county's borrowing capacity strengthened over this time. This inference is consistent with what emerges when we examine the country's conventional ratios used to evaluate the sustainability of external debt, such as the debt/GDP ratio and sovereign debt ratings. While the Pakistani yields seem to be converging onto the yields for other Asian countries, the yield spread between Pakistan and other countries is still substantial.

We should be mindful of two risk factors. First, we have seen the yields spike disproportionately in response to increases in international interest rates during periods of turmoil. Thus, the country seems to be vulnerable to adverse shocks to the financial market. Second, the country's Eurobond yields are not explained well by the financial fundamentals of the international debt market, for example, the Asian bond index yields. This low degree of correlation with international bond yields may be desirable from the perspective of international investors, as it represents portfolio diversification opportunities for them. On the other side of the coin, the low explanatory power of the model based on international market yields indicates that a large part of the total risk is country-specific and is not diversifiable by the country. It is, therefore, important to monitor and manage the risk exposure of external debt.

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Appendix

Table A1: Summary of listed Eurobonds/sukuk

	Issue year	Bond type	Borrower	Regulation	Market	Placement date	Maturity date	Coupon	Latest value	Amount
								%	%	USD
1	2006	Straight	GOP	144A	US	3/30/2006	3/31/2036	7.88	96.500	300,000,000
2	2006	Straight	GOP	Reg S	Intl	3/30/2006	3/31/2036	7.88	96.800	
3	2007	Straight	GOP	144A	US	6/1/2007	6/1/2017	6.88	101.418	750,000,000
4	2007	Straight	GOP	Reg S	Intl	6/1/2007	6/1/2017	6.88	101.300	
5	2014	Straight	GOP	144A	US	4/8/2014	4/15/2019	7.25	105.750	1,000,000,000
6	2014	Straight	GOP	Reg S	Intl	4/8/2014	4/15/2019	7.25	105.900	
7	2014	Straight	GOP	144A	US	4/8/2014	4/15/2024	8.25	108.375	1,000,000,000
8	2014	Straight	GOP	Reg S	Intl	4/8/2014	4/15/2024	8.25	108.450	
9	2014	Sukuk	SPV2	144A	US	11/26/2014	12/3/2019	6.75	105.125	1,000,000,000
10	2014	Sukuk	SPV2	Reg S	Intl	11/26/2014	12/3/2019	6.75	106.950	
11	2015	Straight	GOP	144A	US	9/24/2015	9/30/2025	8.25	109.649	500,000,000
12	2016	Sukuk	SPV3	NA	NA	10/5/2016	10/13/2021	5.50	NA	1,000,000,000
									Total	5,550,000,000

Note: GOP = Government of Pakistan (sovereign), SPV2 = Second Pakistan International Sukuk Company Ltd (agency), SPV3 = Third Pakistan International Sukuk Co Ltd.

Table A2: VEC estimates, periods A–C

Cointegrating Equation:	**A: Full Sample 11/1/2004 to 1/27/2017**				**B: Pre-GFC Period 11/1/2004 to 4/2/2007**				**C: GFC Period 7/2/2007 to 6/30/2009**			
PAKY(-1)	1.0000				1.0000				1.0000			
ASIAY(-1)	-91408.37				1.01				18.43			
t-Stat	*-25.91*				*7.82*				*12.79*			
USTY(-1)	50514.31				-1.38				-13.08			
t-Stat	*9.11*				*-8.13*				*-4.59*			
CDS(-1)	21553.33				-1.67				-3.94			
t-Stat	*40.54*				*-13.76*				*-19.52*			
Constant	-0.9641				0.0000				0.0004			
Error Correction	Δ(PAKY)	Δ(ASIAY)	Δ(USTY)	Δ(CΔS)	Δ(PAKY)	Δ(ASIAY)	Δ(USTY)	Δ(CΔS)	Δ(PAKY)	Δ(ASIAY)	Δ(USTY)	Δ(CΔS)
CE Coefficient	0.000	0.000	0.000	0.000	-0.358	-0.096	0.139	0.468	-0.002	-0.004	0.003	0.372
t-Stat	*-0.34*	*6.43* ***	*-3.37* ***	*-36.92* ***	*-8.33* ***	*-2.83* ***	*5.02* ***	*11.66* ***	*-0.42*	*-1.61* *	*1.79* **	*17.66* ***
Δ(PAKY(-1))	-0.664	0.018	0.003	0.166	-0.443	0.071	-0.061	-0.262	-0.667	0.040	0.002	0.044
t-Stat	*-39.47* ***	*2.40* ***	*0.56*	*2.86* ***	*-9.38* ***	*1.91* **	*-2.01* **	*-5.93* ***	*-16.88* ***	*2.26* **	*0.18*	*0.29*
Δ(PAKY(-2))	-0.334	0.010	0.004	-0.007	-0.229	0.080	-0.046	-0.102	-0.333	0.022	0.009	-0.123
t-Stat	*-19.89* ***	*1.29* *	*0.67*	*-0.12*	*-5.94* ***	*2.62* ***	*-1.86* **	*-2.83* ***	*-8.44* ***	*1.22*	*0.76*	*-0.82*
Δ(ASIAY(-1))	0.140	-0.344	-0.041	-2.942	0.250	-0.454	-0.087	-0.304	0.210	-0.288	-0.050	-3.536
t-Stat	*2.85* ***	*-15.74* ***	*-2.38* ***	*-17.39* ***	*4.27* ***	*-9.82* ***	*-2.31* **	*-5.57* ***	*1.79* **	*-5.46* ***	*-1.45* *	*-7.90* ***
Δ(ASIAY(-2))	-0.039	-0.212	-0.003	-2.323	0.268	-0.216	-0.047	-0.039	-0.110	-0.259	0.007	-3.564
t-Stat	*-0.89*	*-11.01* ***	*-0.19*	*-15.61* ***	*5.06* ***	*-5.16* ***	*-1.38* *	*-0.79*	*-1.06*	*-5.54* ***	*0.24*	*-8.99* ***
Δ(USTY(-1))	0.054	-0.035	-0.648	1.996	-0.268	-0.084	-0.510	0.559	0.041	-0.094	-0.643	3.409
t-Stat	*1.09*	*-1.60* *	*-37.47* ***	*11.68* ***	*-3.79* ***	*-1.51* *	*-11.23* ***	*8.46* ***	*0.30*	*-1.50* *	*-15.80* ***	*6.41* ***
Δ(USTY(-2))	0.043	-0.003	-0.381	0.805	-0.279	-0.037	-0.282	0.186	0.132	0.015	-0.401	1.162
t-Stat	*0.90*	*-0.14*	*-22.89* ***	*4.90* ***	*-4.46* ***	*-0.75*	*-7.01* ***	*3.18* ***	*0.98*	*0.25*	*-10.26* ***	*2.27* **
Δ(CΔS(-1))	0.002	-0.029	0.007	0.087	-0.413	-0.132	0.144	-0.195	-0.007	-0.024	0.007	0.212
t-Stat	*0.31*	*-8.11* ***	*2.57* ***	*3.17* ***	*-7.18* ***	*-2.91* ***	*3.88* ***	*-3.63* ***	*-0.38*	*-3.05* ***	*1.37* *	*3.23* ***
Δ(CΔS(-2))	-0.009	-0.009	0.003	0.123	-0.257	-0.041	0.075	-0.198	-0.009	-0.003	0.002	0.209
t-Stat	*-1.62* *	*-3.74* ***	*1.54* *	*6.77* ***	*-6.20* ***	*-1.24*	*2.82* ***	*-5.11* ***	*-0.84*	*-0.67*	*0.67*	*4.91* ***
Constant	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
t-Stat	*0.00*	*0.01*	*-0.01*	*0.01*	*0.01*	*0.01*	*-0.01*	*0.01*	*-0.03*	*0.00*	*-0.02*	*0.00*
# Observations	3191				627				588			
R-squared	0.338	0.208	0.351	0.589	0.435	0.247	0.344	0.516	0.352	0.201	0.362	0.630
Adj. R-squared	0.336	0.206	0.349	0.587	0.427	0.236	0.335	0.509	0.342	0.189	0.352	0.624
F-statistic	180.65	93.04	190.96	505.80	52.88	22.44	36.00	73.08	34.85	16.19	36.38	109.31

Note: ***, **, * represent significance level at a%, 5% and 10%.

Table A3: VEC estimates, periods D–F

Cointegrating Equation:	D: Post GFC Full sample:7/1/2009 to 1/27/2017				E: Post GFC-sub sample I 7/1/2009 to 6/30/2013				F: Post GFC-sub sample II 7/1/2013 to 1/27/2017			
PAKY(-1)	1.0000				1.0000				1.0000			
ASIAY(-1)	-11.63				14.58				-2.12			
t-Stat	*-15.86*				*6.81*				*-16.94*			
USTY(-1)	19.94				-42.11				1.66			
t-Stat	*24.55*				*-18.13*				*11.54*			
CDS(-1)	-1.01				2.12				0.41			
t-Stat	*-8.36*				*7.29*				*10.28*			
Constant	-0.0001				0.0001				0.0000			
Error Correction	Δ(PAKY)	Δ(ASIAY)	Δ(USTY)	Δ(CΔS)	Δ(PAKY)	Δ(ASIAY)	Δ(USTY)	Δ(CΔS)	Δ(PAKY)	Δ(ASIAY)	Δ(USTY)	Δ(CΔS)
CE Coefficient	-0.003	0.025	-0.039	0.104	-0.008	-0.008	0.021	-0.071	-0.483	0.176	-0.092	-0.756
t-Stat	*-0.67*	*13.83* ***	*-20.19* ***	*7.69* ***	*-2.28* **	*-6.52* ***	*17.19* ***	*-6.79* ***	*-9.81* ***	*7.88* ***	*-3.80* ***	*-8.41* ***
Δ(PAKY(-1))	-0.648	-0.033	0.018	-0.015	-0.612	-0.019	-0.025	0.078	-0.408	-0.122	0.077	0.530
t-Stat	*-30.05* ***	*-4.31* ***	*2.17* **	*-0.27*	*-20.48* ***	*-1.88* **	*-2.46* ***	*0.89*	*-9.61* ***	*-6.34* ***	*3.65* ***	*6.83* ***
Δ(PAKY(-2))	-0.337	-0.026	-0.001	-0.028	-0.285	-0.020	-0.028	0.042	-0.297	-0.069	0.056	0.188
t-Stat	*-15.83* ***	*-3.37* ***	*-0.07*	*-0.50*	*-9.67* ***	*-2.06* **	*-2.81* ***	*0.49*	*-9.03* ***	*-4.64* ***	*3.45* ***	*3.12* ***
Δ(ASIAY(-1))	0.212	-0.409	-0.297	0.783	0.391	-0.504	-0.148	0.707	-0.494	-0.376	-0.236	-0.981
t-Stat	*3.06* ***	*-16.53* ***	*-11.43* ***	*4.26* ***	*4.08* ***	*-15.77* ***	*-4.55* ***	*2.51* ***	*-5.11* ***	*-8.57* ***	*-4.94* ***	*-5.55* ***
Δ(ASIAY(-2))	0.183	-0.143	-0.136	0.480	0.245	-0.151	-0.051	0.599	-0.073	-0.145	-0.164	-0.386
t-Stat	*3.02* ***	*-6.62* ***	*-5.99* ***	*2.99* ***	*2.67* ***	*-4.94* ***	*-1.63* *	*2.23* **	*-0.98*	*-4.30* ***	*-4.48* ***	*-2.85* ***
Δ(USTY(-1))	0.109	-0.232	-0.152	-1.591	-0.171	-0.174	-0.057	-2.264	0.683	-0.009	-0.611	0.916
t-Stat	*1.26*	*-7.52* ***	*-4.69* ***	*-6.95* ***	*-1.36* *	*-4.16* ***	*-1.35* *	*-6.14* ***	*7.82* ***	*-0.23*	*-14.17* ***	*5.73* ***
Δ(USTY(-2))	-0.005	-0.119	-0.109	-0.576	-0.127	-0.068	-0.061	-0.780	0.269	-0.027	-0.315	0.511
t-Stat	*-0.08*	*-5.33* ***	*-4.64* ***	*-3.48* ***	*-1.37* *	*-2.22* **	*-1.96* **	*-2.88* ***	*3.81* ***	*-0.85*	*-9.06* ***	*3.97* ***
Δ(CΔS(-1))	0.007	0.017	-0.027	-0.632	0.015	0.010	-0.028	-0.580	0.171	-0.044	0.016	-0.625
t-Stat	*0.76*	*5.54* ***	*-8.32* ***	*-27.81* ***	*1.36* *	*2.81* ***	*-7.64* ***	*-18.08* ***	*8.11* ***	*-4.65* ***	*1.57* *	*-16.25* ***
Δ(CΔS(-2))	-0.005	0.007	-0.014	-0.307	0.005	0.003	-0.016	-0.286	0.046	-0.019	0.007	-0.292
t-Stat	*-0.65*	*2.29* **	*-4.78* ***	*-14.38* ***	*0.46*	*0.85*	*-4.61* ***	*-9.67* ***	*2.64* ***	*-2.39* ***	*0.78*	*-9.22* ***
Constant	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
t-Stat	*0.04*	*0.02*	*0.02*	*-0.01*	*0.04*	*-0.08*	*0.00*	*0.01*	*0.07*	*0.13*	*0.05*	*0.04*
# Observations	1977				1043				934			
R-squared	0.324	0.358	0.462	0.379	0.302	0.303	0.479	0.374	0.452	0.382	0.407	0.499
Adj. R-squared	0.320	0.355	0.460	0.376	0.296	0.297	0.474	0.369	0.447	0.376	0.401	0.494
F-statistic	104.52	121.65	187.92	133.54	49.76	49.96	105.35	68.71	84.85	63.58	70.33	102.21

Note: ***, **, * represent significance level at 1%, 5% and 10%.

Table A4: GARCH model results, periods A–C

Dependent Variable: PAK_Y	A: Full Sample 11/1/2004 to 1/27/2017			B: Pre-GFC Period 11/1/2004 to 4/2/2007			C: GFC Period 7/2/2007 to 6/30/2009		
	# observations = 3194			# observations = 630			# observations = 587		
Variable	Coeff.	z-Stat	Prob.	Coeff.	z-Stat	Prob.	Coeff.	z-Stat	Prob.
ASIA_Y	0.408	24.394	0.000	0.406	24.300	0.000	0.147	3.751	0.000	0.158	4.183	0.000	0.474	4.164	0.000	0.456	3.714	0.000
UST_Y	-0.066	-2.954	0.003	-0.066	-2.625	0.009	-0.103	-1.831	0.067	-0.101	-1.784	0.074	0.097	1.154	0.248	0.096	1.023	0.306
CDS				0.005	0.736	0.462				-0.049	-1.478	0.139				0.011	0.576	0.565
Constant	0.000	-1.120	0.263	0.000	-1.074	0.283	0.000	1.488	0.137	0.000	1.319	0.187	0.000	-0.167	0.867	0.000	-0.162	0.871
	Variance Equation			*Variance Equation*			*Variance Equation*			*Variance Equation*			*Variance Equation*			*Variance Equation*		
Constant	0.000	29.943	0.000	0.000	29.783	0.000	0.000	24.741	0.000	0.000	24.412	0.000	0.000	4.641	0.000	0.000	4.792	0.000
RESID(-1)^2	0.064	45.691	0.000	0.063	41.450	0.000	0.619	6.165	0.000	0.633	6.335	0.000	0.074	9.618	0.000	0.071	8.904	0.000
GARCH(-1)	0.941	788.61	0.000	0.941	761.05	0.000	0.107	3.568	0.000	0.105	3.550	0.000	0.951	259.08	0.000	0.953	243.72	0.000
Adjusted R-squared	0.020	Akaike	-10.60	0.019	Akaike	-10.60	0.000	Akaike	-11.74	-0.001	Akaike	-11.74	0.001	Akaike	-9.03	-0.003	Akaike	-9.03
Durbin-Watson stat	2.025	Schwarz	-10.58	2.028	Schwarz	-10.58	2.143	Schwarz	-11.69	2.136	Schwarz	-11.69	2.079	Schwarz	-8.98	2.086	Schwarz	-8.97

Method: ML-ARCH (Marquardt) – Normal distribution

Table A5: GARCH model results, periods D–F

Dependent Variable: PAK_Y	D: Post GFC Full sample:7/1/2009 to 1/27/2017			E: Post GFC-sub sample I 7/1/2009 to 6/30/2013			F: Post GFC-sub sample II 7/1/2013 to 1/27/2017		
	# observations = 1977			# observations = 1043			# observations = 934		
Variable	Coeff.	z-Stat	Prob.	Coeff.	z-Stat	Prob.	Coeff.	z-Stat	Prob.
ASIA_Y	0.595	23.756	0.000	0.594	23.740	0.000	0.324	3.305	0.001	0.322	3.292	0.001	0.725	49.006	0.000	0.725	47.002	0.000
UST_Y	-0.150	-3.541	0.000	-0.150	-3.528	0.000	-0.111	-1.190	0.234	-0.110	-1.172	0.241	-0.001	-0.031	0.976	-0.017	-0.672	0.501
CDS				0.008	0.835	0.404				0.007	0.436	0.663				0.026	6.929	0.000
Constant	0.000	-1.279	0.201	0.000	-1.251	0.211	0.000	-1.182	0.237	0.000	-1.162	0.245	0.000	-4.549	0.000	0.000	-3.173	0.002
	Variance Equation			*Variance Equation*			*Variance Equation*			*Variance Equation*			*Variance Equation*			*Variance Equation*		
Constant	0.000	20.387	0.000	0.000	20.352	0.000	0.000	3.952	0.000	0.000	3.922	0.000	0.000	15.777	0.000	0.000	15.968	0.000
RESID(-1)^2	0.058	33.358	0.000	0.058	33.251	0.000	0.020	2.770	0.006	0.020	2.764	0.006	0.771	13.737	0.000	0.818	13.289	0.000
GARCH(-1)	0.933	502.25	0.000	0.933	500.52	0.000	0.355	2.208	0.027	0.357	2.211	0.027	0.436	19.730	0.000	0.408	17.872	0.000
Adjusted R-squared	0.032	Akaike	-10.82	0.032	Akaike	-10.82	0.014	Akaike	-10.31	0.013	Akaike	-10.31	0.083	Akaike	-11.67	0.078	Akaike	-11.68
Durbin-Watson stat	1.918	Schwarz	-10.80	1.919	Schwarz	-10.80	1.809	Schwarz	-10.28	1.810	Schwarz	-10.27	2.168	Schwarz	-11.64	2.172	Schwarz	-11.64

Method: ML-ARCH (Marquardt) – Normal distribution

The Lahore Journal of Economics
22 : SE (September 2017): pp. 53–72

The Fiscal Deficit and Economic Growth in Pakistan: New Evidence

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Abstract

This study revisits the relationship between the fiscal deficit and economic growth in Pakistan to determine whether there exists a threshold fiscal deficit that might serve as a benchmark for policymakers aiming to promote growth through fiscal expansion. We apply the smooth transition autoregressive model to time-series data for the period 1972–2014. The empirical analysis shows that the threshold level of fiscal deficit is 5.57 percent of GDP, above which the deficit has a negative impact on growth. Overall, the fiscal deficit has a negative impact on economic growth, mainly because it has tended to remain above the threshold level. However, there is room for fiscal policy to promote growth, provided the fiscal deficit is kept below the threshold level and public spending is channeled into productive investments that raise the country's long-term growth potential.

Keywords: Fiscal deficit, threshold level, economic growth, STAR, Pakistan.

JEL classification: H12, O47, C24.

1. Introduction

The role of the fiscal deficit in economic growth has been debated extensively in the literature. Studies based on the neoclassical school of thought argue that the fiscal deficit impedes economic growth by putting pressure on the interest rate on the back of increased government borrowing, which crowds out private investment. Other studies, following the Keynesian approach, argue that the fiscal deficit can stimulate domestic production, leading to economic optimism among private investors and

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resulting in more investment – what is known as the "crowding-in" effect (Bernheim, 1989). Proponents of rational expectations postulate that debt-financed expansionary fiscal policy has no role in stimulating demand because agents expect future increases in taxation and adjust their spending accordingly (under the Ricardian equivalence hypothesis). An expansionary fiscal policy leads to a decrease in government saving, which triggers an offsetting increase in desired private saving. As a result, desired national saving does not change at all. Consequently, the real interest rate does not have to rise to maintain a balance between national saving and investment demand, leaving overall output unchanged (Saleh & Harvie, 2005).

The empirical evidence on the impact of the fiscal deficit on growth is inconclusive. One strand of the literature indicates a positive association between the fiscal deficit and economic growth, while other studies find a negative relationship. These mixed findings suggest the possibility of a nonlinear relationship between the fiscal deficit and economic growth. This, in turn, implies there may be a threshold level of fiscal deficit that indicates the extent to which fiscal expansion can serve as a growth-promoting policy instrument.

Several recent empirical studies have explored the existence of this threshold effect in the relationship between the fiscal deficit and economic growth. Adam and Bevan (2005) find evidence of a threshold effect at a fiscal deficit of about 1.5 percent of GDP for developing countries, indicating that fiscal deficits higher than this would hamper economic growth. Other studies find a threshold effect at significantly higher levels of the fiscal deficit – about 5–7 percent of GDP for selected countries, depending on the structure and openness of the economy, the political system and institutional arrangements (see, for example, Onwioduokit, 2012, 2013; Aero & Ogundipe, 2016). This study explores the relationship between the fiscal deficit and economic growth in the case of Pakistan. Its objective is to identify a threshold level of fiscal deficit that can serve as a benchmark for macroeconomic policy.

Pakistan's economy has two notable features. First, despite a historical average growth rate of over 5 percent, it has experienced numerous ups and down in economic performance, with high-growth periods followed invariably by sharp slowdowns (Iqbal, Khan & Irfan, 2008). Second, these high-growth (low-growth) periods have been recently characterized by lower (higher) levels of fiscal deficit. During 2002–07, the average fiscal deficit was 3.5 percent, with an average GDP growth rate of over 5 percent. However, during 2008–15, the average fiscal deficit was 6.3

percent, with an average GDP growth rate of 3.3 percent. The overall budget deficit declined substantially from 8.2 percent of GDP in FY2013 to 4.6 percent of GDP in FY2016, primarily due to better expenditure management during the recent recovery period. The country's growth experience seems to imply that the economy tends to perform well in periods of moderate fiscal deficit, while higher fiscal deficits have been associated with economic growth. This suggests that there may be a threshold level of fiscal deficit that policymakers can target to promote economic growth while maintaining macroeconomic stability.

A key feature of this study is that it uses the smooth transition autoregressive (STAR) model to investigate the possible presence of a threshold level of fiscal deficit. The model uses a continuous transition function to capture the nonlinear relationship between the variables of interest. This is unlike earlier studies, which use either a squared term to estimate the threshold level (see Ali & Ahmad, 2010; Qasim, Kemal & Siddique, in press) or the threshold model developed by Khan and Senhadji (2001) to calculate threshold inflation (see Aero & Ogundipe, 2016; Onwioduokit, 2012, 2013; Onwioduokit & Bassey, 2014).

The rest of the article is structured as follows: Section 2 provides an overview of fiscal indicators in Pakistan. Section 3 presents a brief review of the literature. Section 4 explains the data, modeling framework and estimation method used. Section 5 presents our empirical results. Section 6 provides some concluding remarks and policy implications.

2. Fiscal Indicators: An Overview

The objective of recent fiscal efforts in Pakistan has been to sustain macroeconomic stability, while ensuring an environment that is conducive to economic growth. This has entailed reducing the fiscal deficit without cutting development expenditures (State Bank of Pakistan, 2016). Table 1 shows that the overall budget deficit has declined substantially from 8.2 percent of GDP in FY2013 to 4.6 percent in FY2016, largely due to better expenditure management (Pakistan, Ministry of Finance, 2017).

Table 1: Fiscal indicators, as percentage of GDP

Year	Overall fiscal deficit	Expenditure			Revenue		
		Total	Current	Development	Total	Tax	Nontax
2006	4.0	17.1	12.6	4.5	13.1	9.8	3.3
2007	4.1	19.5	14.9	4.6	14.0	9.6	4.4
2008	7.3	21.4	17.4	4.0	14.1	9.9	4.2
2009	5.2	19.2	15.5	3.5	14.0	9.1	4.9
2010	6.2	20.2	16.0	4.4	14.0	9.9	4.1
2011	6.5	18.9	15.9	2.8	12.3	9.3	3.0
2012	8.8	21.6	17.3	3.9	12.8	10.2	2.6
2013	8.2	21.5	16.4	5.1	13.3	9.8	3.5
2014	5.5	20.0	15.9	4.9	14.5	10.2	4.3
2015	5.3	19.6	16.1	4.1	14.3	11.0	3.3
2016	4.6	19.9	16.1	4.5	15.3	12.6	2.7
2017BE	3.8	19.8	15.0	4.7	16.0	12.9	3.1

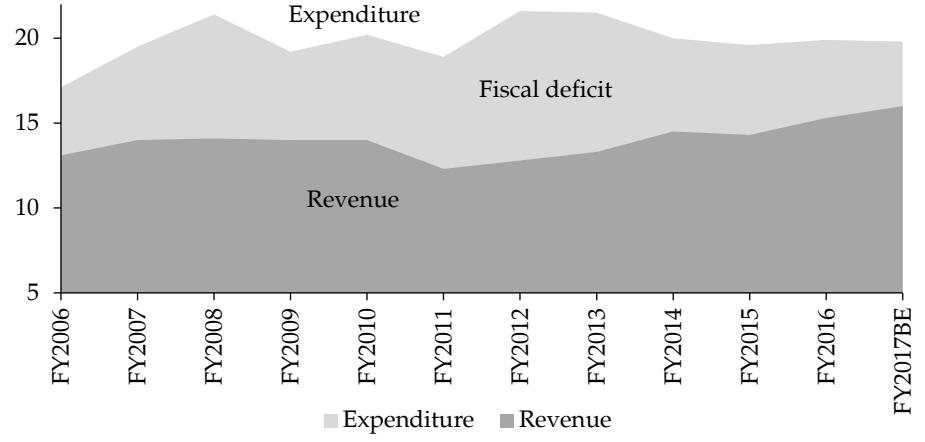
Source: Pakistan Economic Survey for 2016/17.

The State Bank of Pakistan (2016) attributes the reduction in the budget deficit to the following three factors:

- Over 20 percent growth in tax collections by the Federal Board of Revenue.
- A fall in debt servicing expenses, which has helped contain the growth in federal current expenditures.
- Higher surpluses recorded by the provincial governments.

This reduction in the budget deficit has also been accompanied by healthy growth in revenues and a slight contraction in total expenditure as a percentage of GDP (Figure 1). The overall tax-to-GDP ratio, which was 9.8 percent of GDP in FY2013, increased to 11.0 percent in FY2015 and 12.9 percent in FY2016 (Pakistan, Ministry of Finance, 2017).

Figure 1: Revenue-expenditure gap, as percentage of GDP



Source: Pakistan Economic Survey for 2016/17.

3. Literature Review

There is extensive empirical literature on the impact of the fiscal deficit on economic growth. Using cross-sectional data, Fischer (1993) finds a negative relationship between the budget deficit and economic growth – a finding supported by Easterly and Rebelo (1993). In the case of Pakistan, several studies show a negative association between the fiscal deficit and economic growth (see, for example, Ali & Ahmad, 2010; Fatima, Ahmed & Rehman, 2011, 2012; Iqbal & Zahid, 1998; Shabbir & Mahmood, 1992). Others find that this relationship is insignificant (see Ahmad, 2013; Nayab, 2015). On the other hand, Gupta et al. (2005) find a positive relationship between the budget deficit and economic growth both in the short and long terms. They also find that productive and nonproductive expenditures both have a positive impact. Bose, Haque and Osborn (2007) consider the type of public spending and show that, if the budget deficit is due to productive spending, its impact on economic growth is positive.

These contradictory findings have prompted researchers to investigate the possibility of a nonlinear relationship between the fiscal deficit and economic growth that captures both the negative and positive association between the two. The idea is that there may be a threshold level of fiscal deficit below which it can help promote economic growth and above which it hampers growth.

Fay and Porter (2006) argue that the threshold effect depends on the relative importance of country-specific factors such as the intergenerational distributive effects of a deficit. These include the change in the debt burden, the composition of taxes and spending, macroeconomic indicators (growth, savings and inflation), national debt levels and the expected impact of certain political and procedural aspects of the budget process. They also argue that imposing restrictions by fixing the fiscal deficit level compels elected representative to act within set constraints.

Adam and Bevan (2005) estimate the threshold level of fiscal deficit for a panel of 45 developing countries, using the bootstrap method. They find evidence of a threshold effect at a fiscal deficit of about 1.5 percent of GDP for developing countries. Other studies, however, point to far higher threshold levels for developing economies. For example, Onwioduokit (2012) identifies 5 percent of GDP as the threshold level of fiscal deficit for Western African Monetary Zone countries. Similarly, Onwioduokit (2013) puts the estimated threshold level for Sierra Leone at 7 percent of GDP, arguing that a budget deficit beyond this point is detrimental to growth.

Onwioduokit and Bassey (2014) estimate the threshold level of deficit for the Gambia at 6 percent of GDP. Using a threshold autoregressive model, Aero and Ogundipe (2016) investigate the effect of a fiscal deficit on growth in Nigeria and establish a threshold level of 5 percent of GDP. Overall, the empirical literature shows that the threshold level of fiscal deficit ranges between 1.5 to 7 percent of GDP, depending on country-specific characteristics such as the structure and openness of the economy, the political system and institutional arrangements.

Some studies have explored the possibility of a nonlinear relationship between the fiscal deficit and economic growth in Pakistan. Ali and Ahmad (2010) show that the fiscal deficit has a positive effect on growth up to a threshold level beyond which the impact becomes negative. In a recent contribution, Qasim et al. (in press) find a threshold level of fiscal deficit equal to 0.74 percent of GDP for Pakistan. These studies, however, lack formal theoretical frameworks and use simple nonlinear equations that fail to capture the smooth transition of variables. In contrast, the present study relies on a rigorous theoretical framework and uses the STAR model – applied to time-series data – to estimate the threshold level of fiscal deficit. This method finds considerable support in the literature: various studies show that the STAR model is an efficient nonlinear approach to estimating threshold levels (see, for example, van Dijk, Teräsvirta & Franses, 2002; Nawaz, Iqbal & Anwar, 2014; Teräsvirta, 1998).

4. Theoretical Model, Data and Methodology

The impact of the fiscal deficit on economic growth varies across theoretical perspectives, including the neoclassical and Keynesian schools and the rational expectations hypothesis. This is discussed below, followed by a description of the data and model used.

4.1. Theoretical Model

Under the neoclassical approach, fiscal deficits are thought to reduce economic growth by putting pressure on the interest rate and thus crowding out private investment (Saleh & Harvie, 2005). The Keynesian school postulates that an increase in government spending leads to higher growth by stimulating aggregate demand (Nawaz & Khawaja, 2016). The fiscal deficit causes an increase in domestic production, which makes private investors more optimistic about the future of the economy, thereby resulting in greater investment – referred to by Bernheim (1989) as "crowding in". Under this framework, an expansionary fiscal policy raises the overall fiscal deficit and the government absorbs part of the private savings thus generated to finance the deficit. The rise in the fiscal deficit increases aggregate demand, which in turn promotes employment and output. According to the rational expectations school, however, the fiscal deficit has no role in stimulating economic activity: rational agents adjust their spending because they expect taxation to increase to finance this deficit (Barro, 1989; Saleh & Harvie, 2005).

To conceptualize the role of the fiscal deficit in economic growth, we use the growth model proposed by Mankiw, Romer and Weil (1992), adding the fiscal deficit as an explanatory variable. We assume a Cobb–Douglas production function with constant returns to scale for the entire economy, as given below:

$$y_{it} = A_t k_t^{\alpha} h_t^{\beta} FD_t^{\gamma} e^{\varepsilon_t} \quad (1)$$

where y is per capita real output, k is the stock of physical capital, h is the stock of human capital and FD is the fiscal deficit. A_t is the deterministic term, measured as $A_t = C_0 exp(dt)$, where C_0 is a constant, (dt) is a linear time trend, and α, β and γ are parameters with respect to physical capital, human capital and the fiscal deficit. ε_t is a white-noise error term.

After applying log transformation and substituting for the value of A_t, the function can be written as follows:

$$\log(y_t) = \log C_0 + dt + \alpha \log(k_t) + \beta \log(\mathrm{h}_t) + \gamma \log(FD_t) + \varepsilon_t \quad (2)$$

Based on the recent literature, we assume that the fiscal deficit may follow a nonlinear path. To incorporate the possibility of nonlinearity in the model, this study uses a two-regime logistic STAR model. The standard STAR model with a logistic transition function has the following form:

$$\log(y_t) = \alpha + b_1 \log(k_t) + c_1 \log(\mathrm{h}_t) + d_1 \log(\mathrm{FD}_t) + (b_2 \log(k_t) + c_2 \log(\mathrm{h}_t) + d_2 \log(\mathrm{FD}_t))G(q_{t-j}, \gamma, \theta) + \varepsilon_t \quad (3)$$

where $G(q_{t-j}, \gamma, \theta)$ is the transition function of the observable variable q_{t-j}. To capture any nonlinearity between the variables, we employ a logistic transition function:

$$G(q_{t-j}, \gamma, \theta) = \left[1 + exp\left(-\gamma(q_{t-j} - \theta)\right)\right]^{-1} \quad (4)$$

where the parameter γ determines the slope of the transition function. The condition $\gamma > 0$ determines the smoothness of the transition function and the value of γ indicates the speed of transition from one regime to another.

4.2. Data

The empirical analysis is based on time-series data for the period 1972–2014. Data on per capita GDP at constant prices, physical capital and human capital is taken from the Penn World Table 9.0 (published by the Groningen Growth and Development Centre). Real GDP per capita is calculated by dividing the real GDP by the population. The capital stock is based on the accumulation and depreciation of past investments and is estimated using the perpetual inventory method (see Feenstra, Inklaar & Timmer, 2015). Human capital is measured by the human capital index, which is based on years of schooling and the return on education.[1] The budget deficit data is taken from the Pakistan Economic Survey for 2016/17 and the State Bank of Pakistan's Handbook of Statistics for 2015. The budget deficit is computed as the difference between expenditure and revenue, divided by GDP. Log transformations are applied to all the variables.

[1] For more detail, see http://www.rug.nl/ggdc/docs/human_capital_in_pwt_90.pdf and Feenstra et al. (2015).

4.3. Methodology

The stationary properties of the time-series variables are examined using the augmented Dickey–Fuller (ADF) test (see Dickey & Fuller, 1979). Following this, the study uses the autoregressive distributed lag (ARDL) bounds testing approach to cointegration proposed by Pesaran, Shin and Smith (2001) to examine the long-run relationship between the variables.[2]

We employ the STAR model developed by Teräsvirta (1998) to estimate the threshold level of fiscal deficit for Pakistan. The model is an extension of the autoregressive model and is used widely to estimate nonlinear relationships in time-series data because it allows smoother transitions across different regimes. To control the regime-switching process, the STAR model uses logistic and exponential functions instead of the indicator function used in threshold autoregressive models (see Nawaz et al., 2014). Van Dijk et al. (2002) show that the STAR model is suited to the regime-switching procedure for assessing the nonlinear dynamics of variables. The modelling cycle comprises the following steps:

- Specify a linear autoregressive model of order p using the appropriate model selection criteria. This provides the basis for a nonlinear model.
- Test the null hypothesis of linearity against the alternative of STAR nonlinearity. If the test fails to reject linearity, select the appropriate transition variable s_t from among the possible variables. The form of the transition function $G(s_t, \gamma, \theta)$ can be either logistic or exponential.
- Estimate the parameters using the appropriate STAR model selected in the previous step.
- Gauge the model's adequacy using various diagnostic tests such as serial correlation, uneven variance and normality. Modify if necessary to obtain an appropriate STAR model.
- Use the final model for descriptive and forecasting purposes.

5. Results and Discussion

The study's descriptive statistics are given in Table 2, indicating the mean range and scale of the relationship between the variables. The average

[2] To examine the stability of the ARDL bounds testing approach to cointegration, we use the CUSUM and CUSUMSQ stability tests. The Akaike information criterion is used to select the optimal lag length.

log of GDP per capita is 7.8 while the average log of the budget deficit is 1.82 and ranges from 0.83 to 2.32. The correlation coefficient matrix shows that physical capital and human capital have a positive and significant correlation with GDP per capita. The budget deficit has a negative and significant correlation with GDP per capita. These observations suggest that the budget deficit has a negative effect on economic growth.

Table 2: Descriptive statistics

Statistics	Lny_t	Lnk_t	Lnh_t	$LnFD_t$
Mean	7.87	8.19	0.38	1.82
Maximum	8.44	9.01	0.59	2.32
Minimum	7.49	7.68	0.19	0.83
SD	0.27	0.43	0.14	0.32
Observations	43	43	43	43
Correlation				
Lny_t	1			
Lnk_t	0.9255*	1		
Lnh_t	0.9377*	0.9325*	1	
$LnFD_t$	-0.3089*	-0.3911*	-0.5346*	1

Note: * = statistically significant at 5 percent.
Source: Authors' calculations.

The stationary characteristics of the series are examined using the ADF test (Table 3). The Akaike information criterion is used to select the lag structure. The results show that all the variables are nonstationary and they become stationary following a difference transformation, which indicates that all the variables are integrated of order 1.

Table 3: Results of ADF unit root test

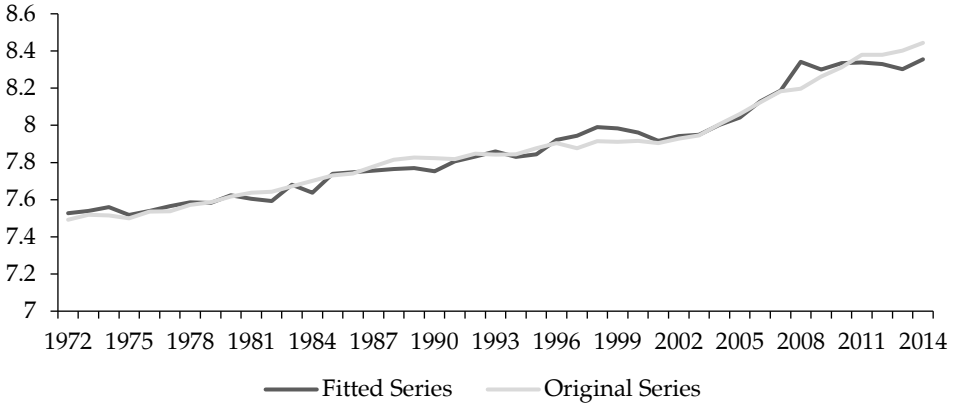
Variable	**At level**			**At first difference**		
	Intercept	**Intercept and trend**	**Result**	**Intercept**	**Intercept and trend**	**Result**
Lny_t	2.20	-0.17	NS	-5.00	-5.61	S
Lnk_t	2.53	-1.18	NS	-5.23	-5.45	S
Lnh_t	-0.13	-1.01	NS	-5.79	-5.73	S
$LnFD_t$	-2.64	-3.20	NS	-8.13	-8.02	S

Note: Critical values = –3.60, –2.94 and –2.61 at 1, 5 and 10 percent, respectively, with intercept, and –4.20, –3.52 and –3.19 at 1, 5 and 10 percent, respectively, with intercept and trend.
Source: Authors' calculations.

To examine the long-run relationship between variables and select an appropriate linear model, we use the ARDL bounds testing approach to co-integration. The results confirm the long-run relationship between GDP per capita, physical capital, human capital and the budget deficit (F-statistic = 5.54 at 95 percent, with a lower bound of 4.29 and an upper bound of 5.61). This linear model serves as a benchmark for the STAR model. The estimation results show that the fiscal deficit has a nonlinear impact on economic growth. Within the logistic smooth transition function, the appropriate transition variable is the fiscal deficit. Using this as the threshold variable, we develop a logistic STAR model with two regime shifts – a monotonic change in the parameter from linear to nonlinear.

The model's estimation results are given in Table 4, along with the results of the diagnostic tests used to ensure its specificity. The normality test statistic is consistent with the model's requirements and the variance is not uneven. As Figure 2 shows, the model is very closely fitted: GDP per capita follows the model with significant precision.

Figure 2: Real and fitted GDP per capita



The slope coefficient is equal to 2.46, indicating a slow transition from regime 1 to regime 2. The threshold value of the fiscal deficit is 5.57 (based on a logarithmic value of 1.46). Figure 3 traces the behavior of the transition variable (fiscal deficit) around the threshold value. The fiscal deficit generally remains above the threshold level, indicating that the fiscal deficit has been a potential constraint to growth in Pakistan over time.

Figure 3: Behavior of transition variable around threshold value

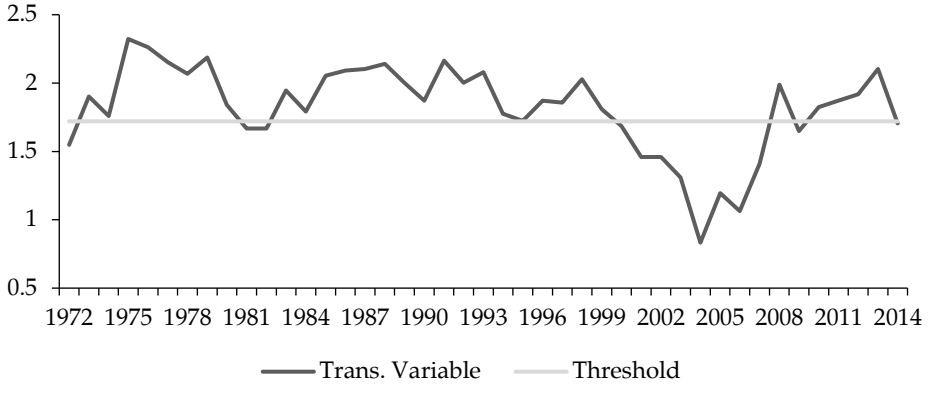


Table 4 shows that there is a negative but insignificant association between the fiscal deficit and economic growth under the first regime. After reaching the threshold level, the impact of the fiscal deficit on growth becomes significant. The estimated coefficient is –0.06, which is significant at the 1 percent level. This implies that, if the budget deficit is above the threshold level (5.57 percent of GDP), a 1 percent increase in the budget deficit will reduce GDP per capita by 0.06 percent. On the other hand, if the budget deficit is below the threshold level, it has an insignificant impact on GDP per capita. These findings are consistent with the threshold levels estimated for other developing countries, for example, 5 percent of GDP for Nigeria (Aero & Ogundipe, 2016) and 6 percent of GDP for the Gambia (Onwioduokit & Bassey, 2014).

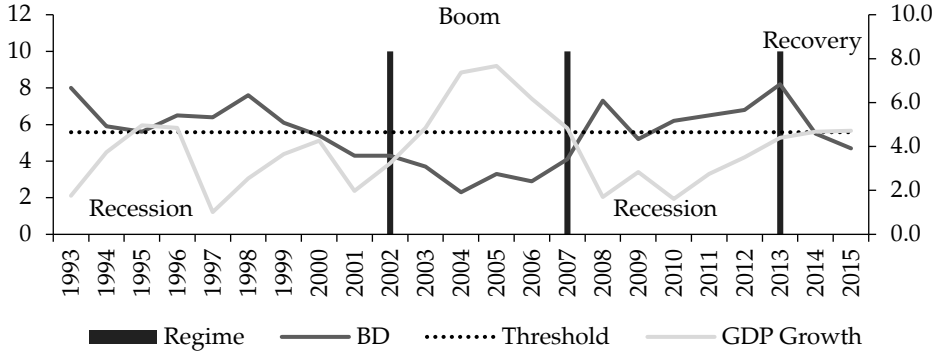
Table 4: STAR model with logistic transition function estimates

Variables	Coefficient	SE	t-stat
Linear part of model			
Lnk_t	0.78	0.27	2.95***
Lnh_t	-0.20	0.71	-0.28
$LnFD_t$	-0.07	0.22	-0.34
Constant	1.54	1.03	1.49
Nonlinear part of model			
Lnk_t	-0.94	0.34	-2.74***
Lnh_t	2.72	0.96	2.84***
$LnFD_t$	-0.06	0.02	-2.60***
Constant	7.03	2.51	2.80***
Slope parameter γ	2.46	1.98	1.24
Threshold extreme C	1.72	0.10	17.42***
$\bar{R}^2$	0.97		
ARCH-LM test [p-value (F)]	0.51		
[t-stat]	[6.09]		
Normality test (JB test) [p-value (chi sq.)]	0.23		
[t-stat]	[2.86]		

Source: Authors' calculations.

To investigate further the nonlinear behavior of the fiscal deficit vis-à-vis economic growth, we divide the study period 1993–2016 into four regimes: (i) regime 1 (1993–2001), a low-growth or recession period; (ii) regime 2 (2002–07), a high-growth or boom period; (iii) regime 3 (2008–13), a low-growth or recession period; and (iv) regime 4 (2014–16), a recovery period. Figure 4 demonstrates the relationship between the fiscal deficit and GDP growth under these four different regimes. The dotted line indicates the threshold level of fiscal deficit (5.57). During high-growth periods, the budget deficit lies below the threshold level; during low-growth periods, it is higher than the threshold level. Moreover, during the recovery period, the fiscal deficit shows a declining trend.

Figure 4: Comparative analysis of two regimes



The analysis above shows that the fiscal deficit in Pakistan has generally exceeded the threshold level over time, with adverse consequences for economic growth. Clearly, keeping the fiscal deficit below the threshold level could potentially yield better growth outcomes. However, the benefits of such a policy will only materialize if prudent macroeconomic policies are adopted to channel resources into productive public investment, thereby boosting productivity and enhancing competitiveness among private investors. A fiscal policy that is geared toward raising the long-term growth potential of the economy could set in motion a virtuous cycle in which public investments complement private investments, thus enhancing productive capacity. In turn, a stronger economy would help fiscal consolidation, promote macroeconomic stability, improve investor confidence and sustain growth momentum.

6. Conclusion and Policy Recommendations

This study revisits the relationship between the fiscal deficit and economic growth in Pakistan to determine whether there exists a threshold level of fiscal deficit that could serve as a policy benchmark in promoting growth through fiscal expansion. The analysis applies the STAR model to time-series data for the period 1972–2014. We find that the threshold level of fiscal deficit in Pakistan is 5.57 percent of GDP. Historically, the fiscal deficit has had a negative impact on economic growth in Pakistan, having generally remained above the threshold level. This shows that macroeconomic policy needs to keep the fiscal deficit below the threshold level to avoid its adverse consequences for growth.

It may be tempting to argue that running a fiscal deficit below the threshold level is desirable because fiscal expansion within acceptable limits would spur economic activity and encourage growth. However, the benefits of such a policy will be realized only if public spending targets long-term investments that yield adequate returns on infrastructure, education, health and other development projects. Such public investments might also improve the marginal productivity of private capital. This implies that, if public capital were to complement private capital, then investing in public capital would "crowd in" private investment, thereby reinforcing the process of economic growth.

Finally, it needs to be cautioned that the threshold level of fiscal deficit does not represent an optimal level of deficit ensuring inter-temporal solvency conditions. It merely indicates a level of fiscal deficit that policymakers could use as a benchmark, beyond which fiscal expansion could potentially hamper economic growth. Furthermore, the threshold level may be conditional on the composition of deficit financing i.e. the threshold level of the fiscal deficit could rise or fall as a result of changes in methods of deficit financing. Future research could investigate how the threshold level of fiscal deficit depends on different financing options, including public borrowing and seigniorage.

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Appendix

Figure A1: Transition function

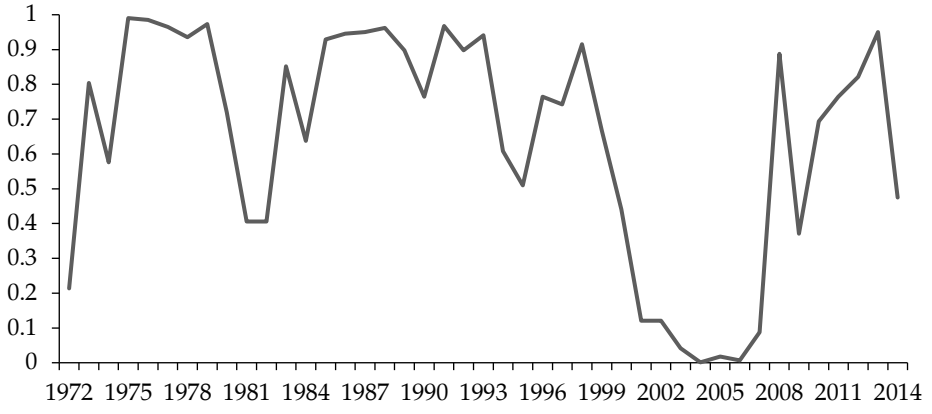


Figure A2: Cross plot for G(Ln_BD(t))

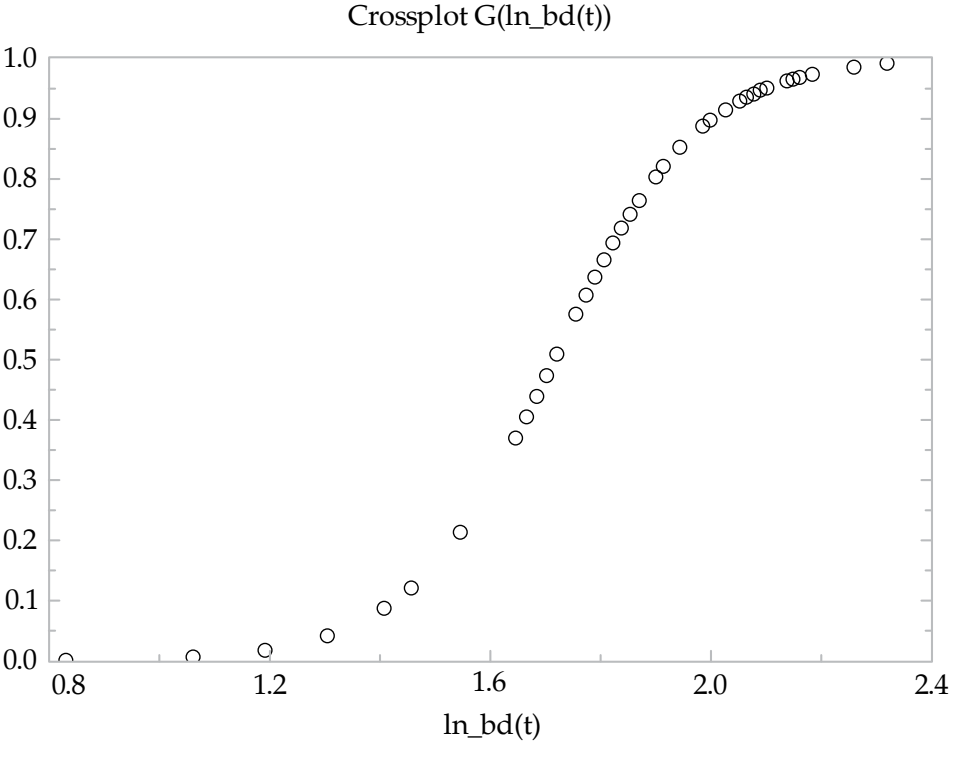
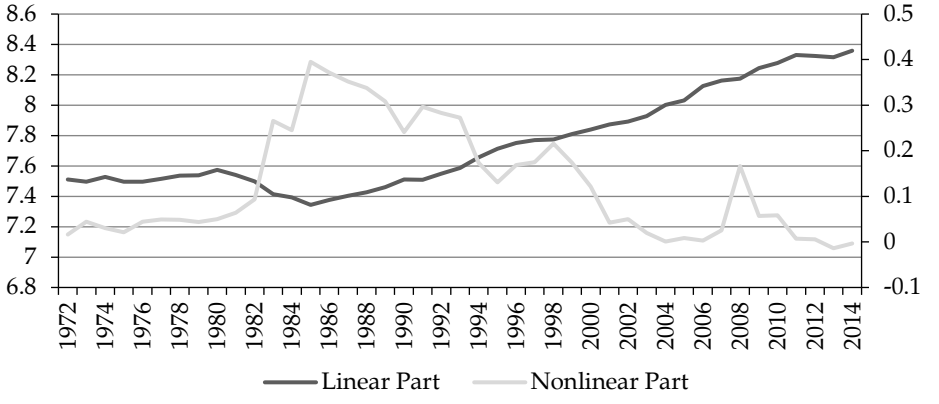


Figure A3: Linear and nonlinear components of the model



The Lahore Journal of Economics
22 : SE (September 2017): pp. 73–110

Exchange Rate Management and Economic Growth: A Brewing Crisis in Pakistan

Naved Hamid* **and Azka Sarosh Mir****

Abstract

In this article it is argued that Pakistan has had a consistently overvalued exchange rate and the policy with regards to management of the exchange rate has undergone a significant change in recent years. We show that prior to March 2013, the policy target of the exchange management was stability of the real effective exchange rate. However, during the tenure of the current government, the policy target for exchange rate management seems to have been stability of the nominal exchange rate against the US dollar. As the currencies of Pakistan's major trading partners (UK, Europe and China) have depreciated against the dollar during this period, the real effective exchange rate has appreciated by over 20 percent since the time that the current policy makers took office. Overvaluation in general and the recent reversal in the exchange rate management policy in particular have had an adverse impact on exports and the manufacturing sector. This not only has serious negative consequences for the long term, growth of the economy, but has greatly increased the short-term risk of a balance of payments crisis.

Keywords: Pakistan, exchange rate, overvaluation.

JEL Classification: F31, F33, F63, O24.

1. Introduction

It is widely accepted among development economists that the exchange rate plays an important role in resource allocation and economic performance of a country. In Pakistan, the exchange rate management policy has mostly been driven by individuals[1], some of whom have relatively limited understanding of economics, and has tended to be non-transparent and subject to arbitrary changes. Moreover, the exchange rate has been generally overvalued and the misalignment has increased in recent years. It is our view, currency overvaluation is largely responsible

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for the declining competiveness and growth of the tradable sector, particularly manufacturing, during the last decade. Also, we believe that the chronic overvaluation of the exchange rate is a key factor underlying the repeated balance of payments crises experienced by Pakistan since 1990. However, in Pakistan most policymakers and a few economists blame everything possible other than the misalignment of the exchange rate for these problems.

In this paper we argue that the exchange rate matters and the lack of a proper exchange rate management policy together with the increasing overvaluation of the currency in the last decade is leading to a decline in the contribution of the manufacturing sector and exports to the economy. Because manufacturing has historically driven growth across countries and since balance of payments crises have been responsible for ending every economic expansion over the last 30 years in Pakistan[2], the increasing overvaluation, and the accompanying loss of competitiveness in manufacturing and exports, is jeopardizing the prospects for sustainable economic growth in the country. Therefore, in this paper we argue that reform of the exchange rate management policy is of the highest priority in Pakistan.

The rest of the paper is organized as follows. Section 2 summarizes the discussion on the importance of the exchange rate for a country's economic development from both theoretical and empirical perspectives. Section 3 provides an overview of the evolution of exchange rate management regimes in Pakistan and a brief discussion on how policymakers in the 1980s undertook a radical reform of the exchange rate policy, involving a move to flexible exchange rates and a large reduction in the overvaluation of the Pakistani Rupee, with a salutary effect on the country's performance in manufacturing, exports and economic growth. Section 4 focuses on whether the exchange rate in Pakistan is currently overvalued and, if so, to what extent. Section 5 discusses how the change in exchange rate policy in 2013 has resulted in increasing overvaluation of the currency which seems to be having the predicted negative effects on the economy. Section 6 concludes with some recommendations on reforms of the exchange rate management policy in Pakistan.

2. Why is the Exchange Rate Important?

A major element in the critique of the import substitution strategy followed by most developing countries in the 1950s and 1960s was that

[2] which is usually followed by a long period of stagnation and low growth.

overvalued exchange rates, which were an integral part of the strategy, discouraged exports, led to a slowdown of growth in the agricultural sector and limited employment generation in the manufacturing sector, even though the strategy led to rapid economic growth[3]. Since the 1990s, there has generally been consensus among development economists that competitive exchange rates are good for economic growth. However, in Pakistan the dominant view among public sector economists, policy makers and businessmen seems to be that the exchange rate does not matter because in the case of exports (and the manufacturing sector) the binding constraints are on the supply side (such as power shortages, security issues, etc.) and in the case of imports the demand is highly inelastic (because imports are mostly essential raw materials, oil, etc.). In this section, we briefly look at the theoretical reasons and the empirical evidence in support of our position that exchange rates do matter and are a key determinant of the long term economic performance of a country.

The various ways in which the exchange rate impacts the economy are well summarized by Frenkel and Taylor (2006) as follows: "It scales the national price system to the world's, influences key macro-price ratios, such as those between tradable and non-tradable goods, capital goods and labor, and even exports and imports (via the costs of intermediate inputs and capital goods, for example)," (p. 1). In other words the exchange rate plays a significant part in determining resource allocation between sectors and the choice of technology, and as a result the growth rate of the economy. Economic growth is adversely affected by overvaluation because "[e]xcessively appreciated currencies affect mostly the profitability of investments in the manufacturing (tradable) sector where increasing returns are ubiquitous. By relocating resources to nonmanufacturing sectors, especially non-tradable activities and commodity production, where decreasing returns rule, overvaluations affect negatively the overall productivity dynamics of the economy" (Gala & Libanio, 2010, p. 11). This relationship between "manufacturing growth and economic growth" is referred to as Kaldor's first growth law, which is often stated as 'manufacturing is the engine of growth" (Thirlwall, 2015, p.272).

Pacheo-Lopez and Thirlwall (2013), further demonstrate that the "strong causal relation between the growth of manufacturing output and

[3] The objective of the import substitution strategy was rapid industrialization, with growth in the manufacturing sector being encouraged through subsidized credit, cheap imported capital goods (because of an overvalued exchange rate) and protection from international competition. While the manufacturing sectors grew rapidly in most developing countries in this period, manufacturing was highly capital intensive and thus did not generate much employment.

the growth of GDP," (p. 2) is not only due to "the static and dynamic returns to scale that characterize manufacturing more than agriculture and services [i.e., Kaldor's mechanism, but also] through the impact that manufacturing output growth has on export growth, and the effect that export growth has on GDP growth by providing foreign exchange for imports and relaxing a balance of payments constraint on demand," (pp. 11-12). In other words, an overvalued exchange rate has a two-fold effect – first, by reducing the profitability of the manufacturing sector relative to other sectors of the economy it negatively impacts investment and growth in the manufacturing sector and thus the growth of productivity and output in the economy; and second, by adversely affecting the competitiveness of exports (particularly of manufactured goods) it reduces export growth and thus limits GDP growth.

Historical experience seems to substantiate the insights above and it is seen that most developing countries that maintained competitive exchange rates were able to achieve higher growth. It is also often argued that competitive or undervalued exchange rates were a major factor in the success of export-led growth strategy followed by the East Asian economies[4]. Econometric evidence provides considerable support to this view. In one of the earliest studies, Dollar (1992) constructed an index of outward orientation based on extent of distortion in the real exchange rate for 95 developing countries for the period 1976-85, and found that *this* measure of outward orientation was highly correlated with GDP growth rates. Since then numerous other studies have validated these findings; for example, Williamson (2008, pp. 14-15) cites a number of econometric studies, such as Razin and Collins (1999), Prasad, Rajan, and Subramanian (2007)[5], Aguirre and Calderon (2006), Rodrik (2007), and Bhalla (2007), which demonstrate that overvaluation of the currency harms growth in developing countries and a few of these articles (i.e., the last 3 listed above) also show that a small undervaluation is helpful to growth.

To summarize, as the exchange rate determines the relative prices of tradables and nontradables in a country, it influences resource allocation and investment decisions in the economy. Further, if the exchange rate in

[4] As Edwards (2015) puts it, "The experience of the East Asian Tigers with export-led growth attracted considerable attention, and a number of works were penned on the policies followed by those nations. One of the messages that emerged from these case studies was that avoiding currency overvaluation – and, in some cases deliberately encouraging undervaluation – had helped develop a vibrant export sector" (pp. 40-41).

[5] Prasad, et al., estimate that a "1 percent increase in average overvaluation accompanies a decline in long run growth of about 0.1 percent" (page 18).

a country is overvalued it will have a negative impact on the manufacturing sector, employment and exports and thus on the GDP growth rate in that country. These theoretical conclusions are widely supported by the available econometric evidence which shows that there is a significant negative correlation between overvalued exchange rates and GDP growth rates in developing countries.

3. Exchange rate regimes and policies in Pakistan

Pakistan has had various exchange rate arrangements since independence, starting with a fixed exchange rate regime between 1947 and 1982, with two major devaluations (in 1955 and 1972) and one revaluation (in 1973) during this period[6] (see Table 1). In 1982, Pakistan moved to a managed floating arrangement which continued until 1998 after which, following the nuclear test in May 1998, there were several years of ad hoc exchange rate regimes and a substantial depreciation in the nominal exchange rate between 1998 and 2001. In 2001, Pakistan returned to a managed floating arrangement, which it has maintained since then. Pakistan has never made public the rules or targets that have guided its management of the exchange rate in different periods and since the guiding principles can change at any time without a formal discussion within the government, it potentially creates uncertainty for businesses particularly with regards to their investment and planning decisions.

[6] In the 1960's, Pakistan used a system of multiple exchange rates (under what was called the bonus voucher scheme) to encourage exports. The 1960s was also a period when Pakistan had one of the highest rates of growth in manufacturing, manufactured exports and GDP in the world.

Table 1 : Overview of Pakistan's Exchange Rate Regimes[1]

Period	Exchange Rate Regime	Comments	Nominal Exchange rate (Rs/US$)	Real Effective Exchange Rate (REER)[2]
1947	Fixed exchange rate: August 1947 to January 1982		3.31	-
1955		Devaluation – August 1955	4.77	-
1970			4.77	383.69
1972		Devaluation – May 1972	11.01	155.43
1973		Revaluation – February 1973	9.91	200.74
1977		Zia Period – 1977 to 1988	9.91	207.88
1981			9.91	222.58
1982	Managed Float: January 1982 to July 1998		12.87	186.69
1984			15.17	191.00
1988		Benazir/Nawaz Sharif multiple governments – December 1988 to October 1999	18.73	126.16
1990			21.91	111.80
1997			44.16	106.53
1998	Two tier exchange rate /dirty float: July 1998 to July 2000		46.12	94.86
1999		Musharraf Era – October 1999 to March 2008	51.76	96.54
2000			57.99	96.55
2001	Managed Float since July 2000		60.58	98.40
2007			61.18	98.68
2008		PPP Government – March 2008 to March 2013	78.92	97.08
2009			84.00	92.46
2012			97.19	100.74
2013		PML(N) Government – June 2013 to date	106.97	99.57
2014			100.82	115.53
2016			104.72	127.10

Source: A table in Janjua (2007, p. 132) has been adapted and extended by the authors. Nominal and Real Effective Exchange Rate data is taken from: (i) for 1947 - 2015: Handbook of Statistics of Pakistan Economy 2015; (ii) 2015- 2017: *State Bank of Pakistan* various monthly statistical bulletins.

[1] Nominal exchange rate and REER data is for month of December for all the years

[2] Base year used is 2010=100

The initial period of managed exchange rate arrangements (1982 to 1988) provides some useful lessons and therefore is worth looking at in some detail: In 1982, the Pakistan Government took the decision to delink the currency from the dollar and move to a managed floating exchange rate arrangement. The management of the currency was entrusted to Mr. A. G. N. Kazi, the Governor of the State Bank of Pakistan. During the next 6 years, the government brought about a huge reduction in the overvaluation of the real exchange rate by depreciating the REER by as

much as 43 percent between 1982 and 1988 (see Table 1)[7]. Interestingly, despite such a large depreciation in the exchange rate (47 percent in nominal terms) the economic managers were able to restrict the annual inflation rate to around 6 percent. This was the result of intelligent management of the adjustments in the nominal exchange rate[8], deregulation of administered commodity prices (including wheat, sugar, edible oils and fertilizer) to reduce the fiscal impact of the devaluation, and slowing down monetary expansion by tapping new sources of non-bank borrowing[9]. The reduction in overvaluation seems to have had the effects that we would expect based on the discussion in Section 2, i.e. an impressive GDP growth rate (6.5 percent per annum over the 6 years) and an increase in the share of large scale manufacturing (LSM) in the GDP (from 11.9 percent in FY1982 to 13.0 percent in FY1988) and in Pakistan's share in world exports (from 0.13 percent in 1982 to 0.16 percent in 1988)[10].

An obvious question that arises is why was the economy unable to sustain this improved performance in the 1990s? The answer is that while the real exchange rate is important, other factors also have an impact on the performance of the economy. Among these factors, possibly one of the most important is political and policy stability, as that is generally a major consideration in private investment decisions. Unfortunately, the period 1988 to 1998 was characterized by considerable uncertainty on both counts, as the country had 4 general elections and 10 prime ministers (with the longest tenure of any government being that of Benazir Bhutto from 19 October 1993 to 5 November 1996, i.e. 3 years and 17 days) during these 10 years. It is not surprising therefore that the performance of the economy during this period was much worse than that of the previous period.

4. Is the Exchange Rate Overvalued in Pakistan?

Whether or not the exchange rate is overvalued has been a lasting debate among economists in Pakistan, but the rapid appreciation in the Real Effective Exchange Rate (REER) in recent years has brought this issue to the forefront in the country. There have been a number of academic

[7] According to our estimates (using the R-JOS approach discussed in section 4.3) the real exchange rate overvaluation was reduced from 81 percent in 1981 to 60 percent in 1988.

[8] For example: "The policy in 1983 was to keep the real exchange rate steady against the basket of currencies of 14 important trading partners. [but] When the dollar started falling in 1985, the exchange rate management policy was changed [and it was] decided to allow the rupee to slide down against the basket of currencies" (Hamid & Hamid, 1992, p. 50)

[9] For a detailed discussion of the exchange rate reforms process, management of the currency adjustments and implementation of measures to prevent inflation during this period see Hamid and Hamid (1992)

[10] See Data Appendix.

papers on the subject recently and most have concluded that the exchange rate is overvalued in Pakistan. For example, Ahmad (2009, p. 77) in her study of the Dutch Disease impacts of remittances and other capital inflows on the Real Exchange Rate (RER) and its overvaluation for the period 1971 to 2007, concluded that the "RER suffers from chronic overvaluation in Pakistan [and the] Dutch Disease hypothesis holds in the case of Pakistan". Similarly, in his study on sources of RER misalignment, Hussain (2008, p. 14) concluded that "on average RER remains overvalued over the entire period [1970-2007]". In a more recent study, Debowicz and Saeed (2014, p. 26) find that "the Pakistani rupee has been over-valued from 2006 to 2010 by on average 10 percent and as much as 25 percent in 2010". However, other authors have found the opposite; an example is the paper by Hyder and Mahboob (2006, p. 258) who examined exchange rate misalignment in Pakistan for the period 1978-2005 and concluded that "the current exchange rate is not too far away from EREER [Equilibrium Real Effective Exchange Rate] and more or less reflects the underlying macroeconomic fundamentals".

In this section our focus is on the extent of exchange rate misalignment, if any, in the post-2001 period. While there are a number of methodologies for estimating the RER and calculating the overvaluation (misalignment) of a country's currency[11], we discuss briefly below three approaches, which have been selected because of the credibility of the sources and the availability of estimates of possible exchange rate misalignment in the last decade. These are State Bank of Pakistan's Real Effective Exchange Rate (REER) Index approach, the IMF's External Balance Assessment (EBA) approach, and the Purchasing Power Parity (PPP) with Balassa-Samuelson Effect approach used by Rodrik (2008), the latter of which we have used in our empirical analysis.

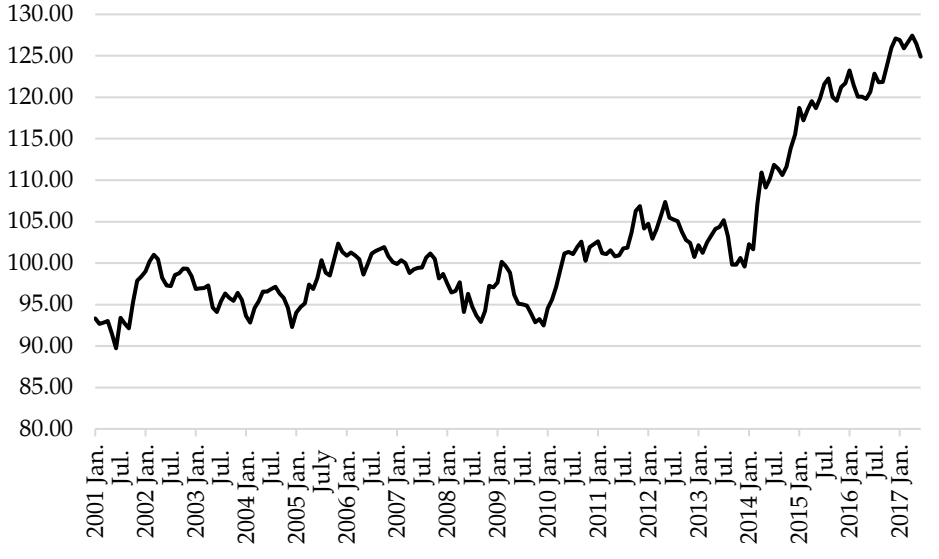
4.1. State Bank of Pakistan's (SBP) Real Effective Exchange Rate (REER) Index Approach

The REER index approach is based on the "absolute PPP hypothesis [which] states that the exchange rate between the currencies of two countries should equal the ratio of the price levels of the two countries," (Khalid, 2015, p. 4). Thus, changes in a country's competitiveness resulting from movements in the country's nominal exchange rate can be measured by changes in the REER index. SBP's REER index is constructed by adjusting the nominal exchange rate index (with a selected base year) for the difference in inflation in Pakistan and in its trading partners, using their

[11] For an excellent summary of the different methodologies see Khalid (2015, pp. 4-5).

shares in Pakistan's trade as weights. The REER index is used by many countries, including at times Pakistan, as a tool for exchange rate management. While the REER index provides valuable information on changes in a country's competitiveness over time, it has two drawbacks: First, the underlying assumption is that there was no misalignment of the exchange rate in the base year which is usually selected because of convenience rather than any assessment of minimum exchange rate misalignment; And second, the implicit assumption is that the country's economic fundamentals, which can affect the equilibrium exchange rate, have remain unchanged since the base year. In Figure 1, it can be seen that since 2001 (the base year) the REER was mostly below a 100 until December 2010 and slightly above it for the next 3 years. In December 2013 (when it was again a 100) the REER began to rise and it had increased to 127 in December 2016, i.e., according to this approach a significant overvaluation of the Rupee has taken place in the last three years.

Figure 1: Monthly Real Effective Exchange Rate (REER) Index – 2001-2017 (Base 2010=100)



Source: Graph is based on the following: (i) January 2001 - June 2015: Handbook of Statistics of Pakistan Economy 2015 (http://www.sbp.org.pk/departments/stats/PakEconomy_HandBook/Chap-7.06.pdf); (ii) July 2015- June 2017: *State Bank of Pakistan* various monthly statistical bulletins.

4.2. *IMF's External Balance Assessment (EBA)/EBA-lite Approach*

The IMF's External Balance Approach (EBA) was introduced in 2012 and the EBA-lite approach was introduced in 2014, with the main differences between the two methodologies being "the exclusion of public health spending ([because of] data limitations) and inclusion of aid and remittances" in the latter (IMF 2016(a), p. 6). The EBA-lite methodology "includes three approaches: the current account model, the real exchange rate model, and the external sustainability approach. The current account and exchange rate models are based on two panel regressions of current account and real exchange rate respectively. They provide current account and real exchange rate norms that are consistent with fundamental and desirable policies. External gaps [in the two approaches] are assessed by the difference between the actual current account and the real exchange rate and the corresponding norms. The external sustainability approach calculates a current account norm that would stabilize the net foreign asset (NFA) position at some benchmark level" which again provides an estimate of the external gap (IMF 2016(a), p. 7). In each of the three approaches, the exchange rate adjustment required to close the external gap provides a measure of the overvaluation of the currency. An IMF country report may give either the range, or an average, of the estimates of the exchange rate overvaluation from the three approaches as the misalignment of a country's currency in a particular year. According to the IMF (2017, p. 11), based on the EBA approach, the real exchange rate in Pakistan was overvalued by 14 percent in 2016, while according to the EBA-lite approach overvaluation in Pakistan was much greater, i.e. around 20 percent.

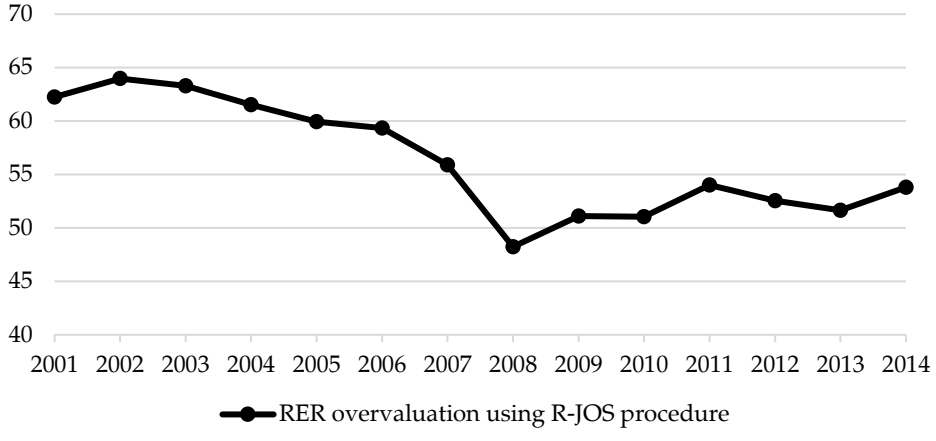
4.3. *Purchasing Power Parity (PPP) with Balassa-Samuelson Effect Approach*

Rodrik (2008) uses PPP conversion factors to calculate the real exchange rate (RER) and then adjusts it for Balassa-Samuelson effect. This technique was initially developed by Johnson, Ostry and Subramanian (2007) and was subsequently adapted by Rodrik (2008); we refer to it as the R-JOS approach. Rodrik (2008) used a three step procedure to get the index of overvaluation: First, he used the data on nominal exchange rates and PPP conversion factors to calculate a real exchange rate (RER) using Penn World Tables; Second, he adjusted the RER for the Balassa-Samuelson effect, to account for lower prices of non-traded goods in low income countries, by regressing the RER, calculated in step 1, on real GDP per capita of each country and using the results to generate the predicted

values of RER; And third, the predicted values of RER were used to calculate the overvaluation.[12]

We have used the R-JOS approach to estimate the real exchange rate for Pakistan for 1950-2014 and our estimates of exchange rate overvaluation since 2001 are shown in Figure 2. It is seen that the real exchange rate in Pakistan has been overvalued throughout the 2000-2014 period. The overvaluation was around 60 percent until 2006 after which it declined to 48 percent in 2008 and since then it has fluctuated between 51 percent and 54 percent. In 2014, overvaluation of the real exchange rate was about 54 percent.

Figure 2: Overvaluation Index Using R-JOS Procedure - 2001-2013



Source: Author's calculations based on the data given in Penn World Table, version 9.0

To conclude this section, we discuss some comparative estimates for recent years (Table 2 provides a summary of the estimates of overvaluation from the three sources for the period 2008-2016). According to the SBP's REER Index approach, the exchange rate has only shown significant overvaluation since 2014, being 27 percent overvalued in December 2016. IMF country reports over the years have indicated that the Pakistani rupee was only slightly overvalued until recently with the estimated overvaluation depending on the methodology (i.e. EBA or EBA-lite) applied. According to the latest report, the IMF estimates that the Rupee was overvalued by about 20 percent in 2016. Our estimates, as shown in Figure 2, indicate substantial overvaluation throughout the period and in 2016 the overvaluation was probably over 50 percent. It is

[12] For more details regarding R-JOS procedure, see the Methodology Appendix.

not surprising that different methodologies give different estimates of overvaluation for the same period and therefore it is more appropriate to talk of a range, rather a single number, for the extent of exchange rate overvaluation in 2016. However, it is evident that according to all three approaches the Rupee was significantly overvalued in 2016, i.e. in the range of 20 to 50 percent.

Table 2: Exchange Rate Overvaluation According to the Three Approaches – 2008-2017

Approaches	Magnitude of Overvaluation
1) SBP REER[1] (2010=100)	*2008*: exchange rate was 4 percent below the base year exchange rate *2013*: exchange rate was 2 percent above the base year exchange rate *2016 (December):* exchange rate was 27 percent above the base year exchange rate
2) IMF EBA/EBA-lite	***EBA*** 2013[2] : exchange rate was 3-6 (mid-point 4.5) percent overvalued 2016[3]: exchange rate was 10-18 (mid-point 14) percent overvalued ***EBA-lite*** 2016[3]: exchange rate was 20 percent overvalued
3) R-JOS procedure[4]	2008: exchange rate was 48 percent overvalued 2013: exchange rate was 52 percent overvalued

Source: Figures are taken from the following sources:
[1] for 2008 and 2013: Handbook of Statistics of Pakistan Economy 2015 (http://www.sbp.org.pk/departments/stats/PakEconomy_HandBook/Chap-7.06.pdf); ii) for 2016: *State Bank of Pakistan* monthly statistical bulletin.
[2] IMF (2013, p. 7)
[3] IMF (2017, p. 11)
[4] Authors' estimates.

5. Pakistan's Exchange Rate Management Policies and their Impacts on the Economy

5.1. Exchange Rate Management Policies in Pakistan

According to IMF (2016), there are three principal types of exchange rate arrangements, namely hard peg, soft peg and floating, and countries that do not fit into any of these three types are classified as "other managed arrangements". In 2016, out of 192 countries in the IMF, exchange rate arrangements in 25 countries (13 percent) were categorized as hard peg, 76

(40 percent) as soft peg, 71 (37 percent) as floating, and 20 (10 percent) as "other managed arrangements" (see Table 3). Mostly a country's exchange rate management policy is guided by some rules and objectives and, out of the 192 countries, 82 (43 percent) had an "exchange rate anchor" as the guide and in 62 countries (32 percent) "monetary aggregates and inflation" were the target. In only 27 (14 percent) countries (excluding the 21 countries with free floating arrangements), was the monetary policy framework classified as "other", i.e., as having "no stated nominal anchor of exchange rate; rather, they monitor different indicators for monetary policy implementation" (footnote 2, Table 3).

Thus Pakistan was one of only 9 (5 percent) countries whose exchange rate arrangements in 2016 were classified by IMF as "other managed arrangement" and whose monetary policy framework was also classified as "others" (Table 3). It may be mentioned that Pakistan is the only country in South Asia that does not have a declared basis for its exchange rate management policy; the rest are either classified as floating (i.e., India), or as having a soft peg (i.e. Nepal, Bangladesh and Sri Lanka). In other words, Pakistan is a fairly unusual country in terms of its exchange rate management policies. This is also evident from the fact that IMF (2015) classified Pakistan's *de facto* exchange rate arrangement as "other managed" and the *de jure* arrangement as "managed float with no predetermined path" (informational annex, p. 3). This classification is there because Pakistan's exchange rate arrangement "does not meet the criteria for any other categories" and/or may be "characterized by frequent shifts in policies" (IMF, 2016b, p. 48).

Table 3: IMF Classification of Exchange Rate Arrangements and Monetary Policy Frameworks

Exchange rate Arrangements	Monetary Policy Framework			Total
	Exchange rate Anchor[1]	Target Monetary Aggregates and Inflation	Other[2]	
Hard Peg				
No Separate legal tender	14	-	-	14
Currency board	11	-	-	11
Soft Peg				
Conventional Peg	42 *(Nepal[3])*	-	2	44
Stabilized arrangements	7	8 *(Bangladesh[4])*	3	18
Crawling peg	3	-	-	3
Crawl-like arrangements	2	3	5 *(Sri Lanka[5])*	10
Pegged exchange rate with horizontal bands	-	-	1	1
Floating				
Floating	-	33 *(India[6])*	7	40
Free Floating	-	10	21	31
Residual				
Other managed arrangement	3	8	9 *(Pakistan[7])*	20
Total	82	62	48	192

Source: IMF Annual report on Exchange Rate Arrangements and Exchange Rate restrictions (AREAER) 2016.

[1]Exchange rate acts an anchor of monetary policies. There is buying and selling of foreign exchange by the monetary authorities to maintain the exchange rate within a range or predetermined level. US dollar, Euro, Composite and other are some of the exchange rate anchors used by countries according to IMF.

[2]Countries classified as others have no stated nominal anchor of exchange rate, rather they monitor different indicators for monetary policy implementation.

[3] The country's exchange rate flexibility is limited vis-à-vis another single currency.

[4] The country's exchange flexibility is limited vis-à-vis the U.S. dollar.

[5] The country's exchange flexibility is limited vis-à-vis the U.S. dollar.

[6] The country's monetary policy framework is such that it targets inflation.

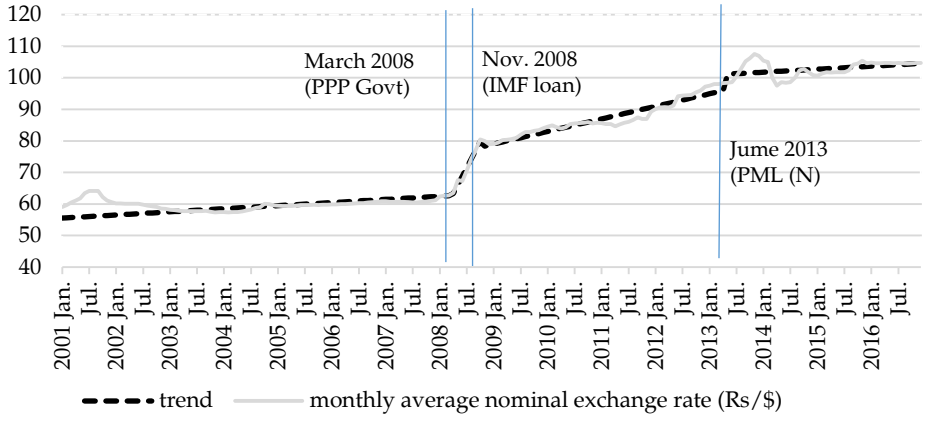
[7] The country monetary policy framework is based on monitoring of various indicators as it does not have stated nominal anchor of exchange rate.

Although Pakistan does not have a stated exchange rate target, which creates uncertainty for economic decision makers in the private sector, ex-post it is possible, by looking at the historical nominal and real effective exchange rates, to deduce what may have been the implicit target of the exchange rate management policy of the government/SBP in

different periods. Next, we attempt to identify the implicit exchange rate policies under different political regimes since 2001 and the apparent impact,[13] in the last decade, of these on large scale manufacturing, exports, contribution of the external sector to domestic demand (i.e. net exports) and current account deficit.

The monthly nominal exchange rate (PRs/US$) and REER index for the period 2001 to 2017 and trends[14] in these two variables during each regime are plotted in Figures 3 and 4 respectively. In the Musharraf era, the nominal exchange rate was very stable for most of the period, increasing slowly from PRs 59.06 to a US$ in January 2001 to PRs 60.68 to a US$ in October 2007[15], i.e. by under 3 percent (Figure 3). The REER index was much more variable and it increased from 93.32 in January 2001 to 100.49 in October 2007, i.e. by over 7 percent (Figure 4). As the REER index fluctuated much more than the nominal exchange rate and appreciated significantly as well, it seems that *during the Musharraf regime the implicit exchange rate policy was a soft peg with the dollar.*

Figure 3: Monthly Average Nominal Exchange Rate (Rs./$)



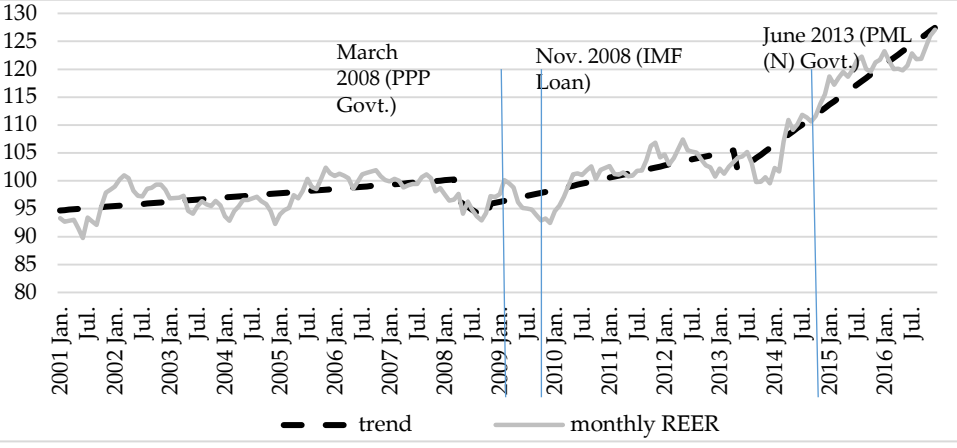
Source: Author's calculation are based on the following: (i) January 2001- June 2015: Handbook of Statistics of Pakistan Economy 2015 (http://www.sbp.org.pk/departments/stats/PakEconomy_HandBook/Chap-7.05.pdf); (ii) July 2015- December 2016: *State Bank of Pakistan* various monthly statistical bulletins.

[13] As we are going to look at the impact by observing trends in these variable in different periods and not through a rigorous econometric analysis, this obviously is only the apparent impact.

[14] Trend was estimated by regressing the monthly exchange rate (or REER Index) on the time variable and the predicted values were plotted.

[15] October 2007 is chosen as end year for this purpose because after that, as discussed below, the Musharraf Government had limited ability to manage the nominal exchange rate.

Figure 4: Monthly Real Effective Exchange Rates (REER) Index (Base 2010=100)



Source: Author's calculations based on the following: (i) January 2001- June 2015: Handbook of Statistics of Pakistan Economy 2015 (http://www.sbp.org.pk/departments/stats/PakEconomy_HandBook/Chap-7.06.pdf); (ii) July 2015- December 2016: *State Bank of Pakistan* various monthly statistical bulletins.

In 2007, the government stopped adjusting domestic administered prices of energy (i.e. power and oil) and other commodities (such as fertilizer and wheat) in response to changes in international prices. Thus the rapid increase in oil and other commodity prices, starting in the second-half of 2007, increased both fiscal and current account (CA) deficits. Initially, the government kept the nominal exchange rate stable, but as international reserves declined, this became increasingly difficult and the nominal exchange rate started to depreciate in the last quarter of 2007 and continued to do so in 2008. By October 2008 the nominal exchange rate had depreciated to PRs 80.43, i.e. almost 25 percent in one year. Exchange rate stability was restored only in November 2008 when the Pakistan Peoples' Party (PPP) government, which had come into power in March 2008, reached an agreement with the IMF for a loan of about US$7.6 billion.

For most of the PPP government's remaining time, i.e. November 2008 to March 2013, management of the economy was largely guided by policy conditions under the IMF Program. Still, the government implemented an exchange rate policy which minimized appreciation of the REER, despite double-digit inflation. During this period, the REER appreciated by only about 5.5 percent (see Figure 4) as the government allowed the nominal exchange rate to depreciate to PRs 98.06 per US$ in March 2013, i.e. by over 20 percent (see Figure 3). Thus, one can conclude

that under the PPP Government the implicit exchange rate policy was a soft peg with a trade-weighted basket of currencies.

After the general election in 2013, a PML(N) Government took office in June of the same year. Over the previous fiscal year (FY2013), international reserves with the State Bank of Pakistan (SBP) had declined substantially (from US$ 10.8 billion at the end of FY2012 to US$ 6 billion at the end of FY2013) and this decline continued in the first few months of the PML(N) Government, with the reserves reaching a low of US$ 3 billion (i.e., less than one month's imports) by end-November 2013 (SBP, 2017). As a result, during the first few months of the PML(N) Government, there was increasing speculation against the Pakistani Rupee, which depreciated to PRs 107.50 per US$ in November. The declining value of the Rupee was the subject of widespread criticism by the opposition parties and in the media and, as a result, in December the Finance Minister announced that the Government would ensure that the nominal exchange rate be brought down to the level that prevailed when the PML(N) Government came into power in June 2013 (i.e. around Rs 99 per US$) (EIU, 2013). In the meantime, in September 2013, the IMF had approved a three year arrangement under the Extended Fund Facility (EFF) for Pakistan for an amount of US$ 6.64 billion. Also in early 2014, Pakistan received a loan of US$ 1.5 billion from Saudi Arabia in response to a request by the Prime Minister (Dawn, 2014). The inflow of IMF and Saudi funds made it possible for the SBP to intervene in the foreign exchange market and bring down the nominal exchange rate as pledged by the finance minister. The government succeeded in bringing the exchange rate down to PRs 97.49 per US$ in April 2014 and since then a strong Rupee has been a cornerstone of the government's economic policy.

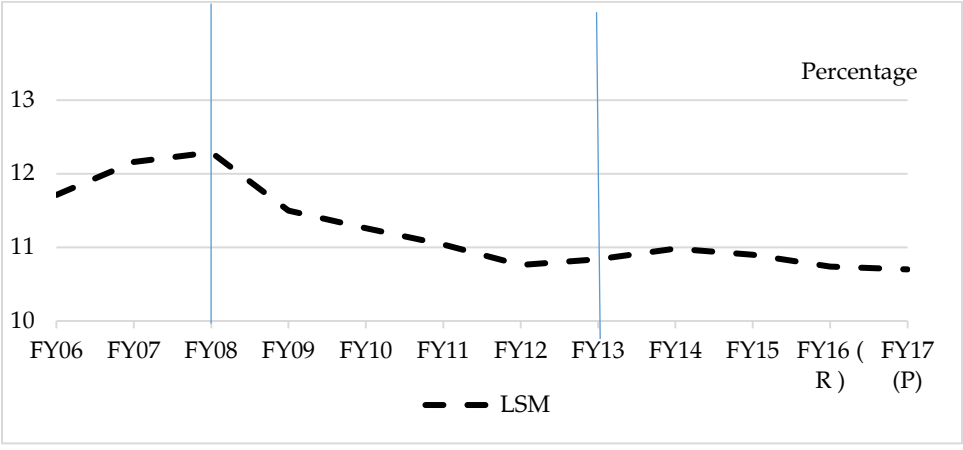
It can be seen from Figures 3 and 4 that during the period of the PML(N) government (except during the episode discussed above) there is hardly any fluctuation in the nominal exchange rate and the trend line is virtually flat (in December 2016 the rate was PRs 104.77, i.e. a depreciation of less than 6 percent in the prior three and a half years), while the REER index has been subject to substantial fluctuations and the trend line is sharply rising with the REER index appreciating by about 16 percent over the same three and a half year period). Thus we can conclude that PML(N) Government's implicit exchange rate policy has been a soft peg with the dollar. An important reason for the appreciation in the REER, despite relatively low inflation in Pakistan during this period, was the large depreciation in the currencies of Pakistan's major trading partners (UK, Europe and China) against the dollar.

5.2. Effect of Overvaluation on the Economy?

As argued in Section 2, overvaluation of the currency has adverse implications for the economy through its negative impact on tradables (manufacturing and agricultural sectors) relative to the rest of the economy. Overvaluation not only reduces exports, which negatively effects the production of tradables for the international market, but it also makes imports cheaper and thus it negatively effects the production of tradables for the domestic market. In this section, we look at the changes in the share in the GDP of large scale manufacturing (LSM), exports and net exports (which to an extent reflects the total *short-term* negative effect on production of tradables in the economy) since 2006. The objective is to see if the changes in the overvaluation of the Pakistani Rupee, arising from the different exchange rate policies followed by the PPP and PML(N) governments, are associated with changes in these variables.

Value added in LSM as a percentage of GDP is presented Figure 5, and it is seen that during the PPP government's tenure, LSM's share in GDP declined sharply in the first year (from 12.3 percent in FY2008 to 11.5 percent in FY2009) as IMF conditions, such as reduction in the fiscal deficit as well as in growth of the money supply (i.e., Net Domestic Assets), resulted in a sharp contraction in effective demand. With inflation at double digit levels, contractionary fiscal and monetary policies remained in place and the LSM's share continued to decline, though more gradually, to 10.8 percent in FY2013. Under the PML(N) government, which also negotiated an IMF loan in September 2013, contractionary policies continued as did the decline in the LSM's share. In other words, due to generally contractionary policies since November 2008 and the underlying large chronic overvaluation, increases in overvaluation in recent years did not have a significant effect, though there has been a small dip in the share of LSM over the last few years (when most of the appreciation in the REER index took place).

Figure 5: Large Scale Manufacturing (LSM) Share in GDP (at constant basic prices)

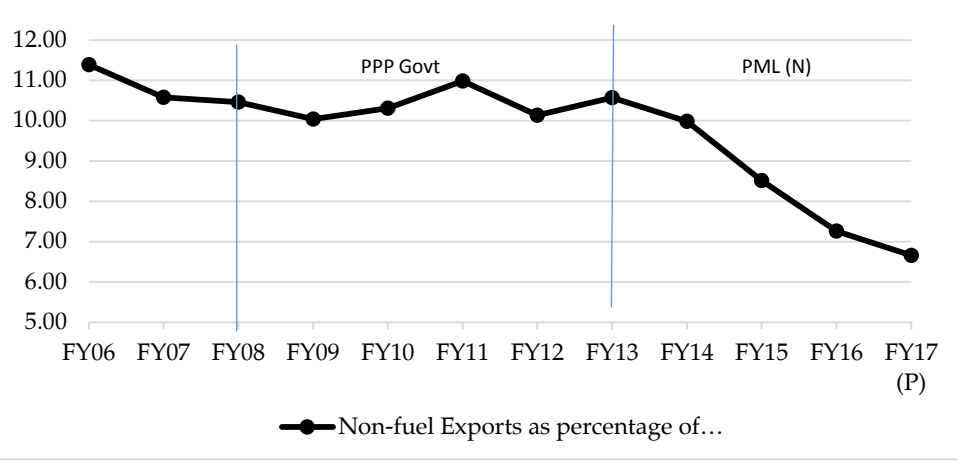


Source: Graph based on data from Pakistan Bureau of Statistics website. Retrieved from http://www.pbs.gov.pk/sites/default/files//tables/Table-7_0.pdf , 26 August 2017

A much more obvious difference between the two periods is observed in non-fuel exports as percentage of GDP (see Figure 6). It is seen that during the PPP government, the export share in GDP fluctuated between 10 and 11 percent but during the PML(N) government it has declined continuously, falling from 10.6 percent in FY2013 to only 6.7 percent in FY2017, which is a historic low for Pakistan. While undoubtedly world trade has declined during this period, we cannot entirely blame the fall in Pakistan's exports[16] on the slowdown in world trade because Pakistan's share in world exports has also declined under the PML(N) government (i.e. from 0.136 percent in 2013 to 0.130 percent in 2016)[17]. It is worth mentioning here that the decline in exports in the last few years has taken place despite the fact that Pakistan was granted GSP+ status by the European Union (EU) (preferential treatment for Pakistan's exports) in December 2013, the first year of the PML(N) government.

[16] Exports have declined by about 20 percent since 2013.
[17] Incidentally, Pakistan's share in world exports had increased from 0.125 percent in 2008 to 0.132 percent in 2013 under the PPP Government (see Data Appendix, Table 3)

Figure 6: Non-fuel exports as percent of GDP



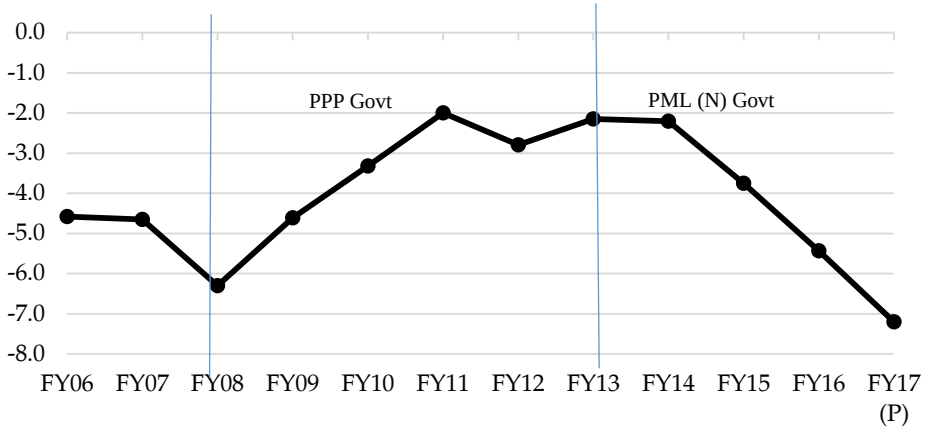
Source: Author's calculations based on the following data: i) for FY2006-16: SBP Annual reports-statistical supplements for multiple years (source cited: Pakistan Bureau of Statistics); ii) FY2017: *State Bank of Pakistan* monthly statistical bulletin August 2017; iii) data for GDP: Pakistan Bureau of Statistics dataset (http://www.pbs.gov.pk/content/table-4-gross-domestic-product-pakistan-current-basic-prices).

Net exports, which we have defined as "non-fuel exports" minus "non-fuel imports", is a measure of the contribution of the external sector to the demand for tradables[18], so if this is negative then the external sector has negative impact on the domestic production of tradables. It is noted that, throughout the period net exports have been negative and this is what we would expect in a situation of chronic overvaluation (see Figure 7)[19]. We can also see that as overvaluation has increased under the PML(N) government, the negative impact of the external sector on the domestic tradable sector has grown, from 2.2 percent of GDP in FY2013 to 7.2 percent of GDP in FY2017.

[18] Non-fuel exports and imports are used because Pakistan is a large net importer of oil and oil products, and the impact of fluctuations in oil prices during this period could overwhelm any trends in rest of the exports or imports.

[19] It may be noted that most East Asian countries had large trade surpluses during their period of rapid growth, i.e. the contribution of the external sector to their domestic production of tradables was positive.

Figure 7: Net-export (non-fuel) as percent of GDP



Source: Author's calculations based on the following data: i) for FY06-16: SBP Annual reports-statistical supplements for multiple years (source cited: Pakistan Bureau of Statistics); ii) FY2017: *State Bank of Pakistan* monthly statistical bulletin August 2017; iii) data for GDP: Pakistan Bureau of Statistics dataset (http://www.pbs.gov.pk/content/table-4-gross-domestic-product-pakistan-current-basic-prices).

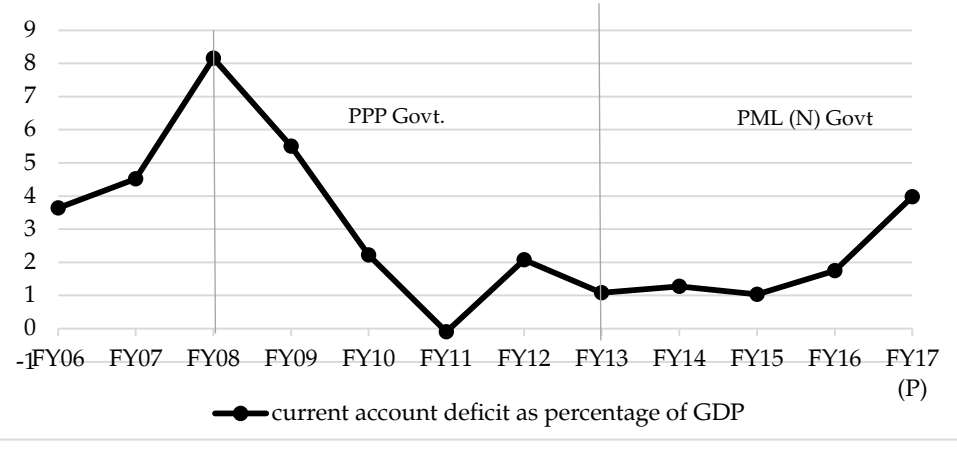
To sum up, the impact of increasing overvaluation in recent years on the relevant variables is as expected; while the decline in LSM's share of GDP is a small, there is large decline in the share of exports in GDP (just under 4 percentage points) and an even larger increase in the negative impact of the external sector on domestic production of tradables (5 percentage points). It is not surprising therefore that, despite an increase in GDP growth rate from 3.7 percent in FY2013 to 5.2 percent in FY2017, private investment has stagnated at around 10 percent of the GDP in these four years (see Figure 9 in Section 5.3 below).

5.3. Possible short term consequence of the overvaluation of the Pakistani Rupee

In addition to the long term impact of the overvaluation of the currency on employment and growth of the economy discussed in Section 2, there are potentially disastrous short term consequences of the rapid increase in REER that has taken place in the last few years. Shrinking exports and rising imports have had an adverse impact on the current account (CA) balance, and the CA deficit has increased from around 1 percent of GDP in the period FY2013 to FY2015 to almost 3 percent of the GDP in FY2017 (see Figure 8). Moreover, recent monthly data shows that the CA deficit is increasing and the international reserves held by SBP are declining at a faster rate. The last time

this happened was in 2007-2008, which ultimately forced Pakistan to go to the IMF for balance of payments support, which had serious negative consequences for GDP growth and investment in the country and it is probably useful to revisit that experience.

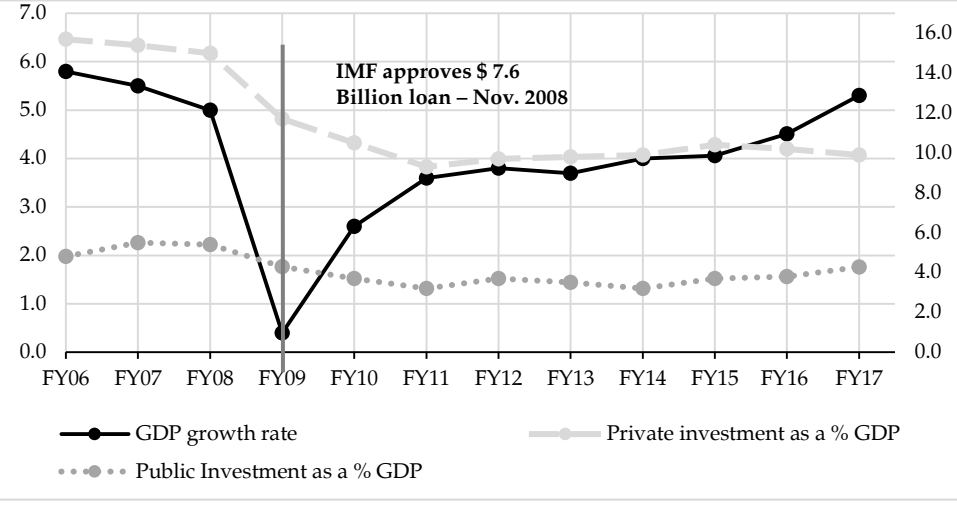
Figure 8: Current account deficit as percentage of GDP



Source: Author's calculations based on the following data: (i) FY2006-14: Handbook of Statistics of Pakistan Economy 2015 (http://www.sbp.org.pk/departments/stats/PakEconomy_HandBook/Chap-7.01.pdf); (ii) FY15-17: *State Bank of Pakistan* monthly statistical bulletins for August 2017; (iii) data for GDP: Pakistan Bureau of Statistics dataset (http://www.pbs.gov.pk/content/table-4-gross-domestic-product-pakistan-current-basic-prices).

The balance of payments crisis of 2008 and the policies that Pakistan was forced to adopt under the IMF stabilization program had a huge negative impact on economic growth and investment and the economy entered a period of stagnation from which it is just beginning to emerge. Pakistan received an IMF loan in November 2008 (mid-FY2008) and GDP growth declined dramatically from about 5 percent in FY2008 to 0.5 percent in FY2009 (see Figure 9). In the next two years, while GDP growth recovered somewhat, private and public investment that had declined by over 3 and 1 percentage points respectively in FY2009, continued to decline. It is only nine years later that GDP growth has reached the FY2008 level, while private investment as percentage of GDP is still significantly below that level (i.e. 10 percent of the GDP in FY2017 compared to 15 percent in FY2008). In other words, the negative short- and medium-term consequences of increasing overvaluation can be so serious that is critical to revise the exchange policy at the earliest.

Figure 9: Impact of IMF loan in November 2009



Source: Graph is based on the following data: (i) Private and Public Investments FY2006-FY14: SBP Annual reports – statistical supplements for various years; (ii) Private and Public Investments FY2015-FY17: Pakistan Economic Survey 2016-2017; (iii) for GDP growth rate FY2006-14: Handbook of Statistics of Pakistan Economy 2015 (http://www.sbp.org.pk/departments/stats/PakEconomy_HandBook/Chap-1.3.pdf); (iv) GDP growth rate FY2015-17: Pakistan Economic survey 2016-2017. Retrieved from http://www.finance.gov.pk/survey/chapters_17/01-Growth.pdf, August 28, 2017.

6. What should be Pakistan's Exchange Rate Management Policy?

It is evident from the discussion so far that Pakistan needs to move away from its current ad hoc exchange rate management policy and at the minimum make public the objectives and the guiding principles of its exchange rate policy even if it is simply announcing that it will be using a trade weighted basket of currencies as its exchange rate anchor. Such an announcement will, at least, remove some of the current uncertainty regarding the exchange rate among private economic decision makers and prevent any further appreciation of the Pakistani Rupee in real terms. However, we would recommend going further and adopting a more sophisticated policy which is aimed at restoring the competitiveness of the economy by eliminating the overvaluation of the RER (say over a period of 3 to 5 years) and then keeping the RER stable at that level. It is important to note that, as Frenkel (2008) puts it, "[r]eal exchange-rate stability does not mean mechanically indexing the nominal exchange rate to the difference between domestic and international inflation. The aim is to achieve stability over more extended periods. The main goal here is to reduce uncertainty about the real exchange rate over the time frames that

matter for decisions about recruitment and investment in existing or new tradable activities" (pp. 192-193).

It is often argued that devaluation has not worked in Pakistan in the past, so why should we expect it to work now? The reasons given for why devaluation won't work in Pakistan fall into two groups: First, that in Pakistan the demand for imports and the supply of exports are both inelastic[20]; and second, that devaluation will result in inflation which will quickly erode its benefits, if any. These are valid arguments, to some extent, but inelasticity of demand for imports or supply of exports can only be in the short term, and if private decision makers find the government's commitment to "maintaining a competitive real exchange rate" credible, then consumption, production and investment decisions will ensure that demand for imports and supply of exports are both elastic in the long term. The inflation argument only applies if devaluation is not supported by complementary monetary and fiscal policies to manage effective demand and thus limit its inflation impact and most economists would agree that for devaluation to work it is essential that it be supported with appropriate demand management policies. Moreover, the demand management policies would not have an adverse impact on GDP growth because with a competitive exchange rate the impetus to growth comes from external rather than domestic demand.

The argument about inflation on a more sophisticated level is often referred to as the "macroeconomic policy trilemma, also called the impossible trinity, [which says that] a country must choose between free capital mobility, exchange-rate management and an independent monetary policy. Only two of the three are possible. A country that wishes to fix the value of its currency and also have an interest-rate policy that is free from outside influence cannot allow capital to flow freely across its borders" (Economist, 2016). For example, if a country successfully devalues its currency so that it has a competitive real exchange rate and maintains it at that level it will generate surpluses on the balance of payments which will lead to an increase in the money supply and inflation resulting in appreciation of the currency in real terms. However, East Asian countries (particularly Japan in 1960s and 70s and China in the 1990s and 2000s) successfully dealt with this problem by accumulating international reserves and sterilizing the impact of increasing reserves on domestic

[20] Or as some put it, on the demand side: 'most of our imports are essentials and prices don't matter' and on the supply side: 'there is no surplus available for export'. This argument in a sense is a throwback to the "trade elasticity pessimism" of the 1950s and 60s (for example, see Edwards, 2015, p. 29)

money supply (and inflation) through contractionary monetary and/or fiscal policies. However, they were also able to have an independent (i.e. contractionary) monetary policy because they restricted capital mobility[21].

To sum up, if Pakistan wishes to restore its international competitiveness to enhance growth and employment generation it needs to eliminate the overvaluation of the currency and adopt an exchange rate policy which is aimed at maintaining a competitive real exchange rate. This would involve devaluing the Rupee (over a period of 3 to 5 years) until the desired real exchange rate is reached and then maintaining it at that level. As discussed earlier, overvaluation of the real exchange rate ranges from 20 to 50 percent and it may seem that a large adjustment would be impossible to undertake. However, as discussed in Section 3, in the 1980s Pakistan was able to manage a change of a similar magnitude in the REER without excessive inflation and with a positive impact on manufacturing, exports and GDP growth. Finally, it must be reiterated that for such a policy to work, one, it will be necessary to prevent the impact of devaluation on inflation to erode the improvement in the real exchange rate through appropriate monetary and fiscal policies; and two, long term commitment to the exchange rate policy must be credible and the implementation of the policy must be relatively transparent so that the adjustment in the real exchange rate has the desired impact on investment and resource allocation decisions in the country.

[21] Generally, foreign direct investment (FDI) was allowed freely but portfolio and debt inflows were relatively restricted. The East Asian Financial Crisis in 1997 was the consequence of many East and Southeast Asian countries ignoring the "monetary policy trilemma", i.e. maintaining fixed exchange rates and keeping domestic interest relatively high (i.e. higher than in the developed countries) to control inflation, while allowing virtually unrestricted capital mobility.

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Methodology Appendix

R-JOS methodology for calculating overvaluation

The R-JOS methodology has been used to compute the overvaluation index. This approach uses PPP conversion factors to calculate the real exchange rate (RER) and then adjusts it for Balassa-Samuelson effect. Rodrik (2008) uses a three step procedure to estimate the overvaluation index.

First, "data on exchange rates (XRAT) and Purchasing Power Parity conversion factors (PPP) from Penn World Tables version 6.2 [is used] to calculate 'real' exchange rate (RER)" (Rodrik, 2008, p. 371) as follows:

$$\ln RER_{it} = \ln (XRAT_{it} / PPP_{it})$$

where i indexes countries and t indexes five-year the time periods (Rodrik, 2008, p. 371).

Second, the RER is adjusted for Balassa-Samuelson effect in order to take into account the fact that non-traded goods are cheaper in low per capita income countries. To adjust RER for this effect, RER is regressed on real GDP per capita (RGDPCH) as shown in equation (1).

$$\ln RER_{it} = \alpha + \beta \ln RGDPCH_{it} + \gamma_f + \mu_{it} \quad (1)$$

where β is the estimate of Balassa-Samuelson effect, γ_f denotes the time period fixed effects and μ_{it} is the error term.

Third, using the results from equation (1), predicted values of RER, i.e. RER(hat) are generated and these are used to calculate the overvaluation index as shown below:.

$$\ln UNDERVAL_{it} = \ln RER_{it} - \ln RER(hat)_{it} \quad (3)$$

If the computed index is less than one it indicates that locally produced goods are relatively cheaper in dollar terms and thus the currency is undervalued and vice versa.

We have applied the above methodology, but with two main differences. First, we have used the latest version of Penn World Table (version 9.0) for PPP conversion factors compared to Rodrik who used version 6.2, because the latest version has data to 2014 while version 6.2

had data only to 2004. However, to check if we were replicating Rodrik's methodology accurately, we estimated equation (1) using version 6.2 and obtained same results to those reported in Rodrik's paper. Second, in running the regression for equation (1) we have used one-year rather than five-year fixed effects as used by Rodrik (2008) and in all other calculations we have denoted "t" as one-year time period rather than five-year time periods. This change was made because we are interested in looking at the overvaluation in a particular year, or change in overvaluation over a specific time period which was not possible using five year averages. However, we also calculated the overvaluation using five-year fixed effects/periods and the results were more or less the same as the five-year average overvaluation that we get using one-year time period for all comparable periods.

Data Appendix

Table 1: Annual Average Nominal and Real Effective Exchange Rates

Fiscal Year (FY) (1970 = FY1969-70)	Nominal Exchange Rate (Rs./$)	Real Effective Exchange Rate (REER) Index (Base 2010=100)
1970	4.77	-
1971	4.77	382.45
1972	5.81	325.72
1973	10.55	158.05
1974	9.91	189.28
1975	9.91	206.68
1976	9.91	220.65
1977	9.91	222.71
1978	9.91	208.97
1979	9.91	189.46
1980	9.91	192.23
1981	9.91	200.76
1982	10.56	214.32
1983	12.69	190.70
1984	13.49	194.80
1985	15.17	193.70
1986	16.15	165.94
1987	17.18	138.57
1988	17.60	129.03
1989	19.22	127.10
1990	21.45	115.85
1991	22.42	111.82
1992	24.84	108.51
1993	25.96	110.50
1994	30.16	105.63
1995	30.85	106.07
1996	33.57	105.54
1997	38.99	104.07
1998	43.20	108.18
1999	46.79	97.80
2000	51.77	98.70
2001	58.44	95.74
2002	61.43	97.17
2003	58.50	97.37
2004	57.57	95.38
2005	59.36	95.78

Fiscal Year (FY) (1970 = FY1969-70)	Nominal Exchange Rate (Rs./$)	Real Effective Exchange Rate (REER) Index (Base 2010=100)
2006	59.86	100.32
2007	60.63	100.41
2008	62.55	98.11
2009	78.50	96.46
2010	83.80	95.94
2011	85.50	101.52
2012	89.24	104.59
2013	96.73	103.15
2014	102.86	104.12
2015	101.29	115.61
2016	104.24	120.97
2017	104.70	125.15

Source: (i) January 2001 - June 2015: Handbook of Statistics of Pakistan Economy 2015 (http://www.sbp.org.pk/departments/stats/PakEconomy_HandBook/index.htm); (ii) July 2015- June 2017: *State Bank of Pakistan* various monthly statistical bulletins.

Table 2A: Large Scale Manufacturing (LSM) as a Percentage of GDP - 1980 to 1999
(At constant prices - Base 1980-81=100)

Fiscal Year (FY) (1980 = FY1979-80)	LSM % GDP
1980	10.55
1981	11.08
1982	11.91
1983	11.90
1984	12.32
1985	12.23
1986	12.34
1987	12.50
1988	13.00
1989	12.69
1990	12.70
1991	12.69
1992	12.71
1993	12.94
1994	12.13
1995	12.45
1996	12.21
1997	11.78
1998	12.18
1999	12.11

Source: Authors' calculations based on the following data: (i) 1982–97: 50 years of Pakistan, vol. 1 (1947–1997) (http://www.pbs.gov.pk/content/50-years-pakistan-volume-i-5); (ii) 1997–99: PBS year book 2007. Retrieved from http://www.pbs.gov.pk/content/pakistan-statistical-year-book-2007, 29 August 2017

Table 2B: Large Scale Manufacturing (LSM) as a Percentage of GDP - 2000 to 2017
(At constant prices - Base 2005-06=100)

Fiscal Year (FY) (2000 = FY1999-2000)	**LSM % GDP**
2000	8.34
2001	8.99
2002	9.10
2003	9.28
2004	10.23
2005	11.24
2006	11.71
2007	12.16
2008	12.29
2009	11.50
2010	11.26
2011	11.04
2012	10.76
2013	10.84
2014	10.98
2015	10.90
2016 (R)	10.74
2017 (P)	10.70

Source: Authors' calculations based on data from Pakistan Bureau of Statistics in Table 7 --- Sectoral Shares in GDP (at constant basic prices). Retrieved from http://www.pbs.gov.pk/content/table-7-sectoral-shares-gdp-constant-basic-prices, 26 August 2017

Table 3: Share of Pakistan's Exports in World Exports

Calendar year	Pakistan exports ($ million)	World exports ($ million)	Pakistan's Export Share (%)
A: 1980 to 1990			
1980	2618	2018861	0.130
1981	2883	2003617	0.144
1982	2397	1871539	0.128
1983	3077	1815242	0.170
1984	2558	1942848	0.132
1985	2740	1959044	0.140
1986	3384	2148521	0.158
1987	4172	2522646	0.165
1988	4522	2900615	0.156
1989	4709	3137428	0.150
1990	5615	3566861	0.157
B: 2006 to 2016			
2006	16932	11969551	0.141
2007	17837	13800097	0.129
2008	20323	16004384	0.127
2009	17523	12410003	0.141
2010	21410	15109860	0.142
2011	25383	18047716	0.141
2012	24567	18086187	0.136
2013	25121	18461313	0.136
2014	24706	18653106	0.132
2015	22089	16274862	0.136
2016	20524	15767927	0.130

Source: Author's calculations based on the following data: (i) for 1980 to 1990: World Bank: Retrieved from https://data.worldbank.org/topic/trade , August 29, 2017; (ii) for 2006 to 2016: UN Commodity Trade. 2008 to 2016: 2016 International Trade Statistics Yearbook, Volume I and for 2006 to 2007: 2008 International Trade Statistics Yearbook, Volume I. Retrieved from https://comtrade.un.org/pb/first.aspx , September 5, 2017.

Table 4: Data Used in Figures 6 to 8 in the Paper

Fiscal Year (FY) (2006 = FY2005-06)	Current[1] account deficit ($ million)	Non-fuel[2] exports ($ million)	Non-fuel[2] imports ($ million)	Net Non-fuel exports (% of GDP)	GDP (Market Prices)[3] (Rs million)	GDP ($ million)
2006	4990	15623.5	21906	-4.577	8216160	137264.1
2007	6878	16117	23204.5	-4.651	9239786	152385.7
2008	13874	17792.9	28500	-6.295	10637772	170077.8
2009	9261	16882	24629.1	-4.607	13199707	168152.8
2010	3946	18281	24173	-3.321	14866996	177406.9
2011	-214	23454	27726	-1.998	18276440	213755.3
2012	4658	22728	29002	-2.793	20046500	224646.1
2013	2496	24431	29407	-2.150	22385657	231430.8
2014	3130	24388	29781	-2.204	25168805	244692.1
2015	2,795	23079	33246	-3.753	27443022	270922.6
2016	4,867	20627	35791	-5.431	29102630	279201.8
2017 (P)	12,098	20269	42184	-7.200	31862167	304380.3

Note: P = Provisional

Sources: Author's calculations based on the following data:

[1] (i) FY2006-14: Handbook of Statistics of Pakistan Economy 2015 (http://www.sbp.org.pk/departments/stats/PakEconomy_HandBook/Chap-7.01.pdf);
(ii) FY2015-17: *State Bank of Pakistan* monthly statistical bulletins for August 2017;

[2] (i) for FY2006-16: SBP Annual reports-statistical supplements for multiple years;
(ii) FY2017: *State Bank of Pakistan* monthly statistical bulletin August 2017;

[3] Pakistan Bureau of Statistics dataset (http://www.pbs.gov.pk/content/table-4-gross-domestic-product-pakistan-current-basic-prices)

Table 5: Data Used in Figure 9 in the Paper

Fiscal Year (FY) (2006 = FY2005-06)	GDP growth rate (%)	Total Investment (% of GDP)	Public Investment (% of GDP)	Private Investment (% of GDP)
2006	5.8	22.10	4.80	15.7
2007	5.5	22.50	5.50	15.4
2008	5.0	22.10	5.40	15.0
2009	0.4	17.50	4.30	11.7
2010	2.6	15.80	3.70	10.5
2011	3.6	14.10	3.20	9.3
2012	3.8	15.10	3.70	9.7
2013	3.7	15.00	3.50	9.8
2014	4.0	14.60	3.20	9.9
2015	4.1	15.71	3.70	10.4
2016	4.5	15.55	3.80	10.2
2017	5.3	15.78	4.28	9.9

Sources: **Private and Public Investments:** (i) FY2006-FY14: SBP Annual reports and statistical supplements for various years; (ii) FY2015-FY17: Pakistan Economic Survey 2016-2017

GDP growth rate: (i) FY2006-FY14: Handbook of Statistics of Pakistan Economy 2015 (http://www.sbp.org.pk/departments/stats/PakEconomy_HandBook/Chap-1.3.pdf); (ii) FY2015-17: Pakistan Economic Survey 2016-2017. Retrieved from http://www.finance.gov.pk/survey_1617.html

The Lahore Journal of Economics
22 : SE (September 2017): pp. 111–134

Global Uncertainty and Monetary Policy Effectiveness in Pakistan

Inayat U. Mangla* **and Kalim Hyder****

Abstract

This article investigates monetary policy effectiveness in Pakistan in the presence of external uncertainties stemming from the economic growth of developed economies and international oil price movements. We estimate a structural VAR model to gauge the impact of international oil prices and global demand on key macroeconomic variables in Pakistan. Our findings suggest that monetary policy remains an effective tool for controlling inflation. An increase in oil prices (supply shock) leads to higher real policy rates, real exchange rate depreciation, an economic growth slowdown and rising inflation. A global demand surge leads to higher real policy rates, real exchange rate appreciation, economic growth and rising inflation. Real policy rates adjust upward in response to inflation and real exchange rate shocks. The real exchange rate depreciates if inflation increases. This indicates that the monetary authorities in Pakistan are generally able to stabilize consumer prices and real exchange rates in the economy.

Keywords: Monetary policy, real exchange rate, inflation, oil prices, Pakistan.

JEL classification: E22, E47, E52, E58.

1. Introduction

There is only one difference between a bad economist and a good one: the bad economist confines himself to the visible effect; the good economist takes into account both the effect that can be seen and those effects that must be foreseen. (Claude-Frédéric Bastiat, 19th century French economist)

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The objective of this paper is to analyze the global spillover effects that different central banks' monetary policies can have on emerging economies such as Pakistan. Former governor of the Reserve Bank of India, Raghuram Rajan, suggests categorizing such policies as green, red or orange.[1] Green denotes policies with very little spillover. Red policies are those that should be avoided: these include unconventional monetary policies that have a small positive effect on exports to emerging economies, enable a feeble recovery in the source country and lead to large capital outflows and asset price bubbles in emerging markets. Orange, therefore, denotes those policies that should be used temporarily and with care.

In investigating the impact of global uncertainty, it is important to ask where macroeconomics stands. For over four decades, macroeconomics has moved in reverse, with macroeconomic theorists now inclined to dismiss such simple assertions as "tight monetary policy can cause a recession" (Romer, in press). One way of testing the claim that monetary policy does not matter is to consider the case of the Volcker deflation. The best indicator of monetary policy is the real federal funds rate or real short-term rate (the nominal rate minus the inflation rate), which was higher during Paul Volcker's term as chairman of the Fed than at any other time post-World War II. Romer and Romer (1989) recount the internal discussion at the Fed leading up to this abrupt change. Fed officials expected the change to cause a "prompt increase in the Fed funds rate" that would "dampen inflationary forces in the economy". Thus, US unemployment increased from 7.2 to 10.8 percent. The US data suggests a simple causal explanation for this that is consistent with what Fed insiders anticipated:

- High real interest rates decreased output and increased unemployment.
- The rate of inflation fell, either because the combination of higher unemployment and a larger output gap caused it to fall or because the Fed's actions changed expectations.

If the Fed can cause a 500-basis point change in nominal interest rates above the prevailing inflation rate, it is unreasonable to wonder if monetary policy is important. The only sense in which monetary policy is not important is if we argue that, despite what people at the Fed thought, they

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[1] See http://economictimes.indiatimes.com/news/economy/policy/rbi-governor-raghuram-rajan-for-guidelines-by-nations-on-monetary-policy-behaviour/articleshow/51587642.cms

did not change the Fed funds rate. If history tends to repeat itself, then the US monetary policy experience offers insights for other central banks that wish to make their policies more effective in a global economy. The prevalence of recessionary tendencies in the developed world is a major concern, as monetary policy is constrained by zero-bound interest rates. Macro-prudential regulation and the adoption of quantitative easing (QE) are considered complements to (in the US and UK) or substitutes for (in Japan and the EU) the interest rate setting policy.

Let us keep in mind that the trend toward lower interest rates dates back well before the global crisis of 2008/09. Globally, the decline in long-term interest rates falls into three broad categories: (i) an increase in the propensity to save, (ii) a fall in the propensity to invest and (iii) shifts in the demand and supply of different types of assets. The evidence supports the idea that shifts in saving associated with demographics and Chinese financial integration were likely dominant factors, particularly in the decade or so before the global financial crisis.

There are several ways in which a Fed rate hike hits the global economy. One interest rate hike in 2015 is a tweak. A second in mid-March 2017 and a third in June 2017 denotes the process toward normalization. There are five key trends to watch for: (i) marking the end of super-cheap money, (ii) preparing for inflation, (iii) expecting the saving rate to rise, (iv) expecting heavy budgetary pressure on governments and (v) expecting a trade war between the US and Europe. Nonzero rates have been the most important factor in the global economy for a decade: they have changed the way assets are priced, dictated saving rates and allowed governments to borrow.

Against this background, we explore the impact of global monetary developments on Pakistan's economy. The declining demand for its exports stems primarily from recessions in the developed world and the uncompetitive nature of these exports, given the lack of technological upgrading. This has created uncertainties with respect to Pakistan's economic revival. While capital flows to emerging economies due to significant Quantitative Easting (QE) in the developed world may have positive effects, a sudden reversal of these flows – as policy changes taper off – can also have negative repercussions. The ineffectiveness of monetary policy can also be considered a challenge.

We assess and quantify the effectiveness of monetary policy in the presence of these uncertainties, which stem from declining exports, falling

remittances and volatile capital flows. In addition, the effectiveness of monetary policy relies on the extent of policy coordination between fiscal and monetary policy. The relative dominance of either can create an imbalance and hinder the effectiveness of both policies. Therefore, balanced, coordinated policy efforts are imperative if monetary policy is to be effective.

We use recursive structural vector autoregression (SVAR) to measure the impact of global uncertainty on the effectiveness of monetary policy. A recursive model is useful because small open economies have no effect on the global economy, while on the other hand global development can affect small economies. Our findings indicate that global demand and international commodity prices have a significant impact on Pakistan's economy. Further, the State Bank of Pakistan plays an effective role in controlling inflation and managing the exchange rate.

2. Literature Review

Discretionary monetary policies become ineffective when policymakers make inconsistent policy decisions after optimizing the social objective function (Kydland & Prescott, 1977; Calvo, 1978; Barro & Gordon, 1983). The social loss function assigns weights to the deviations of output and inflation from their optimal levels. Thus, dynamic inconsistency produces higher inflation than is socially optimal (Rogoff, 1985). This arises when the rational public uses the expected path of a given variable to make current economic decisions.

This issue of inconsistency can be resolved by setting rule-based policies with regard to the future path of a variable (Kydland & Prescott, 1977). Paul Volcker's disinflation policy of 1979–82 demonstrates that firm commitment on the central bank's part to controlling inflation has effective results. The success of Volcker's experiment and its solid theoretical rationale shows that the credibility of the policymaker is a core factor in the effectiveness of monetary policy. Following these developments, central banks were given greater independence. Most of them adopted inflation-targeting regimes with a firm commitment to reducing inflation. Governments aiming to increase social welfare indicated their commitment to price stability by giving the central bank the mandate and credibility needed to manage inflation expectations.

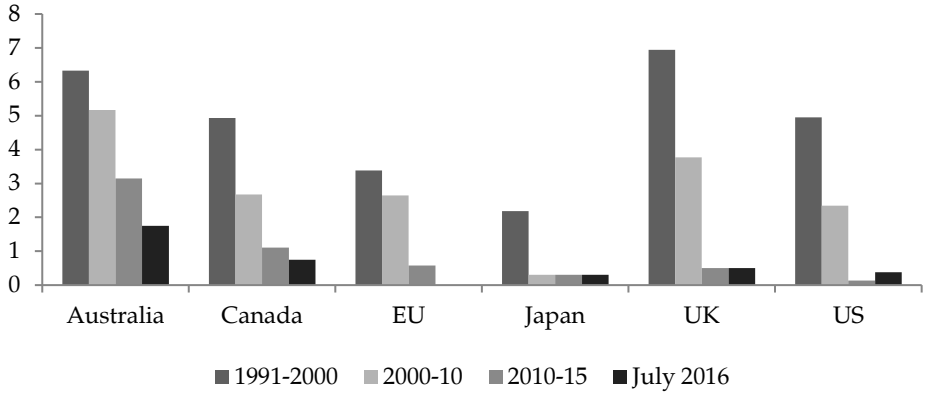
Bernanke (2007) and Rusticelli, Turner and Cavalleri (2015) show that economic developments, the conduct of monetary policy and the credibility of the central bank play an important role in anchoring inflation

expectations. Beechey, Johannsen and Levin (2011) find that long-run inflation expectations are reasonably well-anchored in the EU and US. Weise (1999) indicates that the positive and negative shocks of monetary policy have symmetric effects. These findings show that monetary policy has been successful in reducing inflation uncertainties in developed countries. The stylized facts reaffirm that monetary policy plays an effective role in controlling inflation.

However, after the financial crisis, monetary policy was deemed ineffective in helping economies out of a recession. Blanchard, Dell'Ariccia and Mauro (2010) argue that low inflation limits the scope of monetary policy in a recession. This gives more credence to the use of fiscal policy over monetary policy. Tenreyro and Thwaites (2016) find that monetary policy in the US has been more effective during an expansion than a recession. For instance, the US initiated QE in November 2008, signaled in May 2013 that it was going to stop these measures and then terminated the QE in October 2014.

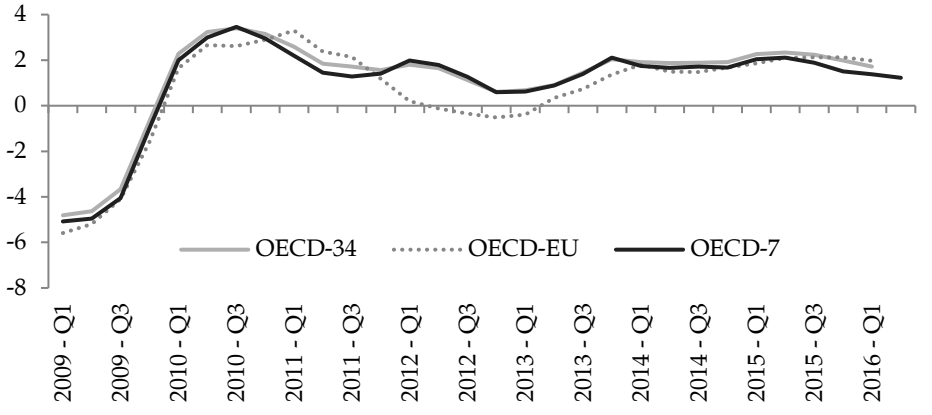
Figure 1 illustrates how developed economies took steps to recover from the recession by drastically reducing their policy rates. However, these efforts did not pay off, as growth and inflation remained below target. The temporary recovery that followed the financial crisis can be attributed to bailout packages and policy actions. The inflation and growth targets were not achieved until 2010, after which real economic growth stagnated even as inflation fell. The prevalence of recessionary tendencies in the developed world is, therefore, a key concern for policymakers (Figures 1 and 2).

Figure 1: Average policy rates of major economies



Source: Average Policy Rates of Developed Economies

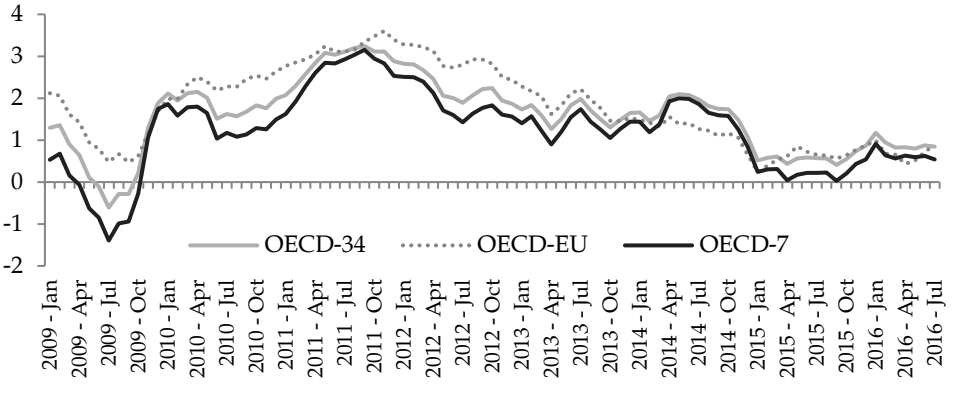
Figure 2: Real economic growth (year-on-year)



Source: Real Economic growth of Developed Economies

In attempting to restore growth and achieve their inflation targets, central banks deployed one target (inflation) and one tool (short-term interest rates) and reduced policy rates mechanically. However, these large doses of monetary expansionary not only failed to improve the situation, but also left central banks with zero-bound policy rates (Figure 3). Given the uncertain pace at which such steps were likely to pass through, central banks adopted the more unconventional monetary policy of large-scale asset purchase (QE). However, the data for the first two quarters of 2016 reflects the same problem: low growth and below-target inflation.

Figure 3: Inflation (year-on-year)



Source: Inflation of Developed Economies

Such developments have had both positive and negative implications for connected emerging economies. Georgiadis (2016) and Bowman, Londono and Sapriza (2015) examine the impact of QE on domestic and cross-border economies. Ishi, Stone and Yehoue (2009) indicate that limited financial stress, external vulnerabilities and the smaller scope for quasi-fiscal activities may restrict the role of unconventional policies in emerging economies. This implies that when a global recession passes through to emerging economies in the shape of lower export demand, their limited ability to tackle this creates greater uncertainties.

On the other hand, emerging economies enjoy the benefits of excess currency supplies in developed countries and historically low interest rates. The main spillovers are stable currencies, large capital inflows and the availability of low-cost debt. Fratzscher, Lo Duca and Straub (2017) show that capital flows in emerging economies improve due to QE in advanced economies. Highly indebted economies gain some breathing space in their interest rate payments due to lower interest rates. Aizenman, Binici and Hutchison (2014), however, point out that these inflows are due to news effects and may be reversed at any time, with an adverse impact on emerging economies. To gauge the impact of these global developments on Pakistan's economy, Table 1 provides some statistics on foreign direct investment (FDI) for selected Asian countries.

Table 1: FDI inflows to selected countries (US$ mil)

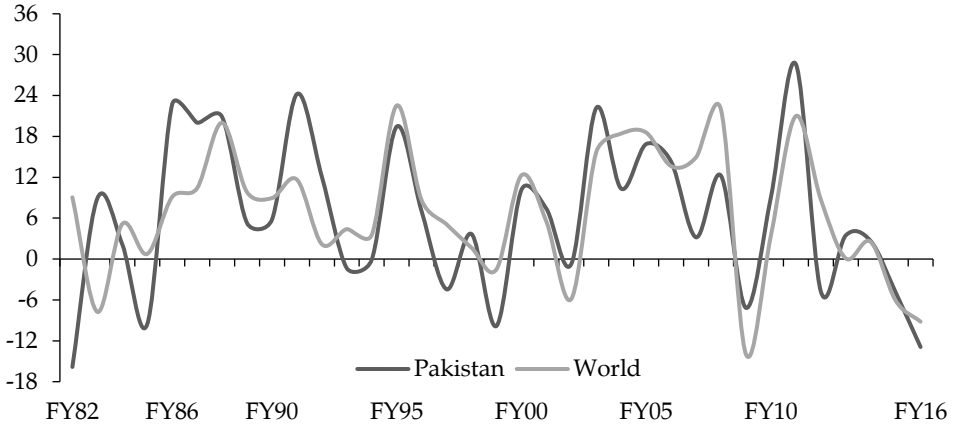
Year	Bangladesh	India	Indonesia	Malaysia	Pakistan	Philippines	Thailand
2000	280	3,584	-4,550	3,788	308	1,487	3,366
2001	79	5,128	-2,977	554	378	760	5,067
2002	52	5,209	145	3,193	826	1,769	3,342
2003	268	3,682	-597	3,219	534	492	5,232
2004	449	5,429	1,896	4,376	1,118	592	5,860
2005	761	7,269	8,336	3,925	2,201	1,664	8,223
2006	457	20,029	4,914	7,691	4,273	2,707	8,926
2007	651	25,228	6,929	9,071	5,590	2,919	8,621
2008	1,328	43,406	9,319	7,573	5,438	1,340	8,566
2009	901	35,581	4,877	115	2,338	2,065	6,427
2010	1,232	27,397	15,292	10,886	2,022	1,070	14,715
2011	1,265	36,499	20,565	15,119	1,326	2,007	2,468
2012	1,584	23,996	21,201	8,896	859	3,215	12,895
2013	2,603	28,153	23,282	11,296	1,333	3,737	15,822
2014	2,539	33,871	26,277	10,619	1,867	5,740	3,719
2015	3,380	N/A	N/A	10,963	979	5,724	7,062

Source: Foreign Direct Investment Inflows to Selected Countries (Mil. US$)

Generally, declining external demand is due to recessions in developed countries, which creates uncertainties for emerging economies. Pakistan's economy has been unfortunate in attracting capital during the QE period. FDI inflows to Pakistan have been low since the 1980s: on average, 0.58 percent of GDP from 1976 to 2000. Under privatization, these flows increased to 2 percent of GDP during the 2000s, but have fallen to 0.56 percent over the last six years.

Table 1 shows that Bangladesh, India, Indonesia, Malaysia, the Philippines and Thailand received larger inflows than Pakistan. This may have been due to the country's uncertain security situation and inadequate efforts to attract FDI. These statistics improved in 2016 due to CPEC inflows. Pakistan's case is different when it comes to QE spillovers. Although it mobilized foreign debt by issuing bonds, these inflows were used to stabilize the currency. The fiscal space created by cheaper debt helped reduce the budget deficit from 8.8 percent in FY2012 to 4.6 percent in FY2016. While Pakistan did not benefit as much from QE spillovers as other emerging economies, it was still hit as hard by the fall in global demand for exports (Figure 4).

Figure 4: Trends in world exports and Pakistan's exports



Source: Trend of World and Pakistan's Exports

Since the EU, the US and the UK are Pakistan's most important export destinations, the slowdown in these economies has had a severe impact on its export performance. This is evident from the negative growth in exports in recent years. The exports-to-GDP ratio was 11 percent in FY2012 and declined to 8.9 and 7.7 percent, respectively, in FY2015 and

FY2016. Falling commodity prices and diminishing demand were both responsible for this decline in exports.

3. Theoretical and Methodological Framework

This paper analyzes the impact of external shocks and monetary policy changes on inflation and economic growth in Pakistan. The external shocks we look at are international crude oil prices and foreign demand. The effectiveness of monetary policy is gauged by the effect of real policy rates on inflation in consumer prices.

Using a reduced-form SVAR (see Ahmed, 2003; Ahmed, Ara & Hyder, 2006) applied to quarterly data, we estimate the impact of unanticipated external shocks on the policy variable, based on impulse responses. Our findings could help policymakers better understand the impact of global changes on Pakistan's economy and thus design a more effective monetary policy.

Although the variables in question are stationary, there is the possibility of a long-term relationship among these variables. Ignoring this cointegrating relationship could lead to a misspecification error. To prove the robustness of the estimates, the same SVAR is estimated using the local projection method (see Jordà, 2005), the advantage being that its results are not sensitive to misspecification errors. There may also be structural changes in the data that could lead to invalid estimates. We resolve this by using fixed and flexible windows for the subsample.

3.1. Structural VAR

The SVAR equation without the intercept term is as follows:

$$AY_t = \sum_{i=1}^{J} B_i Y_{t-i} + \epsilon_t \equiv B(L)X_{t-i} + \epsilon_t \quad (1)$$

Y is the vector of stationary variables. A represents the contemporaneous interactions between the endogenous variables and B represents the lag effects. ϵ is the vector of i.i.d. structural disturbances with the covariance matrix G. As a small open economy, Pakistan can be affected by external variables, but cannot influence the external environment. This implies that there is no likelihood of reverse causality. Therefore, the Y vector is decomposed into external and domestic variables:

$$Y = \begin{bmatrix} Y_1 \\ Y_2 \end{bmatrix} = \begin{pmatrix} OIL \\ UIP \\ TBR \\ EXR \\ Grt \\ Inf \end{pmatrix} \text{ and } \epsilon \equiv \begin{bmatrix} \mu \\ \nu \end{bmatrix} = \begin{bmatrix} \mu_1 \\ \mu_2 \\ \nu_1 \\ \nu_2 \\ \nu_3 \\ \nu_4 \\ \nu_5 \end{bmatrix} \tag{2}$$

The external variable Y_1 denotes the growth in international crude oil prices (OIL) and in US industrial production (UIP). The policy and domestic variables denoted by Y_2 include the real treasury bill rate (TBR), the real exchange rate (EXR), domestic output growth (GRT) and domestic inflation (INF). The vector μ includes external shocks (OIL and UIP) and the vector ν denotes domestic shocks to the real interest rate, exchange rate and domestic price level after accounting for the impact of external shocks on these variables.

The fundamental economic disturbances in the vector μ are i.i.d., which implies that a diagonal covariance matrix cannot fully identify structural models such as equation (1). To analyze the effect of various shocks, further identification restrictions are needed. We place coefficient restrictions on the A and B matrices as shown below:

$$A \equiv \left(\begin{array}{c|c} A_{11} & A_{12} \\ \hline A_{21} & A_{22} \end{array}\right) = \left(\begin{array}{ccc|ccc} 1 & 0 & 0 & 0 & 0 & 0 \\ * & 1 & 0 & 0 & 0 & 0 \\ * & * & 1 & 0 & 0 & 0 \\ * & * & * & 1 & 0 & 0 \\ * & * & * & * & 1 & 0 \\ * & * & * & * & * & 1 \end{array}\right) \tag{3}$$

$$B(L) \equiv \left(\begin{array}{c|c} B(L)_{11} & B(L)_{12} \\ \hline B(L)_{21} & B(L)_{22} \end{array}\right) = \left(\begin{array}{ccc|ccc} * & * & 0 & 0 & 0 & 0 \\ * & * & 0 & 0 & 0 & 0 \\ * & * & *1 & 0 & 0 & 0 \\ * & * & * & * & 0 & 0 \\ * & * & * & * & * & 0 \\ * & * & * & * & * & * \end{array}\right) \tag{4}$$

An asterisk denotes that the coefficient is unrestricted. Given that Pakistan is considered a small open economy, the external variables are assumed to be exogenously given. This is reflected in A_{12} and $B(L)_{12}$ being null matrices. Note that this makes the system block recursive.

Regarding the external variables, we assume that the contemporaneous direction of causality is from oil prices to foreign output, which means that A_{11} is lower-triangular. Since monetary policy decisions are based on information about global developments, real policy rates will be influenced by the latter. Monetary policy decisions have no impact on

global developments. This is consistent with the causal ordering above and implies that $B(L)_{11} = 0$.

Regarding the domestic variables, we assume the contemporaneous causal ordering is from the real exchange rate to domestic output to the domestic price level, which implies a lower-triangular A_{22}. Since prices are usually sticky in the short run, putting the price level last seems appropriate. What is more controversial is the direction of contemporaneous causality between the real exchange rate and output. Certainly, changes in the exchange rate policy, which could be one source of domestically driven shocks to the real exchange rate, can affect output. However, some domestic shocks, such as supply shocks or fiscal shocks, can also affect both output and the real exchange rate. Since asset markets typically react faster, the exchange rate is likely to respond to these shocks more quickly than output. Hence, we put the real exchange rate ahead of output in the contemporaneous causal ordering – feedback from output changes to real exchange rate changes with a lag is, of course, allowed.

The SVAR given in equation (1) cannot be directly estimated, but must be retrieved from the reduced form of the system. The relationship between the SVAR and its reduced form becomes evident when we pre-multiply equation (1) by A^{-1} to yield

$$Y_t = A^{-1}B(L)Y_{t-1} + A^{-1}\epsilon_t \equiv \mathrm{T}(L)Y_{t-1} + \nu_t \tag{5}$$

This is the reduced form of the system that can be estimated using OLS. The relationship between the matrix of the structural disturbances and the reduced form can be written as:

$$E(\nu_t\nu_t') \equiv \Omega = E[(A^{-1}\mu_t)(A^{-1}\mu_t)'] = E\left(A^{-1}\mu_t\mu_t'A^{-1'}\right) = A^{-1}DA^{-1'} \tag{6}$$

E is the expectation operator. Identifying the structural model from the estimated reduced form of equation (5) thus involves finding an A matrix such that $\Omega = A^{-1}DA^{-1'}$ where D is diagonal. While this process does not yield a unique A, the restriction mentioned above provides a lower-triangular A that is unique.

3.2. Local Projections

The presence of a unit root in the variables raises the question of whether to estimate the SVAR in levels (with variables in nonstationary form), first-differenced (with variables in stationary form) or in a VAR that imposes

cointegration (an error correction model). The considerable body of literature on this issue tends to suggest that, even if the variables have unit roots, it is still desirable to estimate an SVAR in levels. Sims, Stock and Watson (1990) show that the estimated coefficients of a VAR are consistent and the asymptotic distribution of individual estimated parameters is standard (i.e., the asymptotic normal distribution applies) when variables have unit roots and there are some variables that form a cointegrating relationship.

We do not impose possible unit roots and cointegration in our VAR. We justify the specification in levels based on the Monte Carlo results of Lin and Tsay (1996). The problem is that cointegration tests often indicate too many or, occasionally, too few, cointegrating vectors and, therefore, lead to misspecification. On the other hand, a VAR specified in first differences assumes that the variables are not cointegrated because no error correction terms are included. If there is cointegration, then such a model in first differences is mis-specified.

The impulse response functions of the VAR model in levels are also consistent estimators of their true impulse response functions in the short and medium run, but not in the longer run. As shown by Phillips (1998), in the longer run the standard impulse responses do not converge to their true values with a probability of 1 when unit roots or near-unit roots are present and the lead time of the impulse response function is a fixed fraction of the sample size. For this reason, we use an alternative method to estimate the impulse responses, based on local linear projections as suggested by Jordà (2005), which are robust to this problem.

4. Data and Unit Root Tests

The real policy rate is considered a tool of monetary policy. In this case, we examine its impact on the exchange rate, inflation and growth. The empirical model uses average international crude oil prices of Saudi Arabian light and US industrial production as an indicator of global demand or real economic activity. The bilateral exchange rate (Pakistan rupees in terms of US dollars) is taken as the real exchange rate, after deflating it by the consumer price index.

The impact variables include inflation in consumer prices and real economic growth (represented by the growth in industrial production). Barring the real interest rate, we calculate the growth of the other variables, using data from various issues of the Pakistan Economic Survey and the State Bank of Pakistan's annual reports and statistical bulletins. While the level of

these variables is nonstationary, their growth is stationary. The real interest rate is stationary at level (Table 2). We use the short-term treasury bill rate (TBR) instead of the discount rate. The TBR is the continuous form of the discount rate (the discrete monetary policy tool). It changes instantly with a change in the discount rate and also captures changes in the money market.

Table 2: Unit root test results

Variable	ADF	DF-GLS
Growth in international oil prices	-13.32*	-4.31*
US industrial production index	-10.95*	-4.021*
Real TB rate	-2.50*	-2.60*
Exchange rate	-16.08*	-15.22*
CPI inflation	-6.70*	-3.87*
Industrial production, Pakistan	-12.39*	-8.70*

Note: * = significant at 1% level.

5. Empirical Results

We estimate the block recursive reduced-form SVAR for Pakistan, using monthly data for January 1991 to October 2016. The optimal lag length is chosen based on the AIC. The short-run coefficients are restricted to zero in case of insignificance, which helps save the degrees of freedom and improves the identification. After estimating the SVAR given in equation (5), the structural disturbances are used to carry out the impulse response and variance decomposition analyses (see Figures A1 to A5 in the Appendix). An investigation of the residuals indicates that oil prices and the exchange rate are relatively volatile.

5.1. Impulse Response Analysis

Impulse response functions capture a variable's response to an unanticipated shock to any of the external, policy or domestic variables. The impulse responses are derived from the SVAR, which is estimated using simple OLS and local projections. In both cases, the variable's impulse responses are found to move closely together, thus confirming the robustness of the results. The consistent estimates from the flexible and fixed windows estimation of the SVAR also indicate that these results are robust and there are no visible structural shifts in the data.

An unanticipated shock to oil prices will reduce the real policy rate due to increasing prices. The real policy rate remains low during the first 12 months and then starts to increase, indicating that it adjusts upward in

response to the supply shock. Oil price shocks are regulated by the fiscal authorities, which administer energy prices in Pakistan. This gives the central bank enough time to respond to a shock, although Bernanke (2007) argues that the immediate impact of oil price shocks is due to the upward adjustment of inflation expectations. The central bank manages these expectations by gradually increasing the policy rate. The standard error bands confirm that oil price shocks have a statistically significant impact on the real policy rate. A shock to the US growth variable initially reduces the real policy rate during the first two months, although it increases later. This result is not statistically significant.

The results indicate that the monetary authorities are vigilant in the case of the exchange rate. An unanticipated depreciation shock leads to a statistically significant increase in the real interest rate. This occurred during June to September 1993, when the Pakistan rupee fell by PKR3 to the US dollar and the discount rate was increased by 200 basis points. Similar policy responses were witnessed in September 1995, September 1996, August 2000, FY2008 and August 2013. The real policy rate does not change much in response to an increase in productivity. An output shock does not have a statistically significant impact on the real rate. However, there is a slight increase in the real policy rate due to consumer price shocks. The magnitude of the upward adjustment in the policy rate is observed after 12 months.

While the response of the real exchange rate to an oil price shock is smaller in magnitude, there is a slight currency depreciation that adjusts in a couple of months. US productivity shocks have no significant impact on the real exchange rate. An increase in the real policy rate causes some depreciation in the real exchange rate in the first month, but significant appreciation in the second month and thereafter. Improvements in domestic productivity, indicated by shocks to real domestic industrial production, lead to a currency appreciation. An unanticipated increase in inflation causes the real value of currency to depreciate.

An unanticipated shock to oil prices is a contractionary supply shock according to our results, and reduces output in the second month. An improvement in US growth increases productivity in Pakistan – this may be due to an increase in the demand for exports. Real policy rates have no significant impact on economic growth. Depreciations are expansionary in the first two months and become contractionary later. This clearly implies that efforts to boost exports using depreciation are a short-term solution. Inflation also reduces economic growth.

An oil price shock and demand surge in the US increases inflation in Pakistan. The effectiveness of monetary policy is evident from the response of inflation to an unanticipated shock to the policy rate. Overall, monetary policy is an effective means of controlling inflation. Depreciations are inflationary because any unanticipated shock in the real exchange rate increases inflation significantly in the second month. However, there is a slight fall in inflation due to a depreciation shock in the first horizon. Shocks to economic growth reduce inflation in the third month to a significant degree.

5.2. Variance Decomposition Analysis

In examining the role of external and domestic factors in economic fluctuations in Pakistan, we perform a variance decomposition analysis that measures the percentage of the forecast error variances at different forecast horizons that are attributable to individual shocks or a group of shocks. These are presented in Table 3. The 1, 6 12, 18 and 24-month decomposition of forecast error variance is presented for the domestic variables. Oil prices and exchange rates are the important contributors to errors associated with the real interest rate. Almost 7 percent of the forecast error variances is shared by oil prices, while 14 percent is shared by the exchange rate. Inflation is shared primarily by the real interest rate and oil prices. Economic growth is shared by US demand and the exchange rate.

Table 3: Variance decomposition results

Month	Oil prices	US growth	Real interest rate	Real exchange rate	Domestic economic growth	Consumer price inflation
Variance decomposition of real interest rate						
1	0.37	1.57	98.06	0.00	0.00	0.00
6	1.69	0.41	90.63	6.62	0.07	0.58
12	6.34	1.67	79.63	11.56	0.09	0.72
18	7.36	2.57	75.26	13.72	0.13	0.95
24	7.43	2.95	74.12	14.23	0.13	1.15
Variance decomposition of real exchange rate						
1	0.00	0.66	0.87	98.48	0.00	0.00
6	2.11	2.42	1.68	90.06	1.27	2.45
12	2.17	2.57	1.78	88.38	1.97	3.13
18	2.19	2.60	1.84	88.14	2.00	3.23
24	2.20	2.61	1.87	88.08	2.00	3.24
Variance decomposition of domestic economic growth						
1	0.36	0.65	0.40	0.23	98.37	0.00
6	2.67	4.79	0.71	3.14	86.78	1.90
12	2.88	5.06	0.92	3.52	84.97	2.65
18	2.93	5.13	0.93	3.55	84.77	2.69
24	2.94	5.13	0.94	3.55	84.75	2.69
Variance decomposition of consumer price inflation						
1	0.66	1.49	44.90	3.72	0.13	49.10
6	5.47	4.01	38.12	4.40	2.45	45.56
12	6.16	5.35	36.91	4.95	2.94	43.68
18	6.28	5.34	37.34	5.34	2.94	42.76
24	6.37	5.28	37.60	5.68	2.91	42.18

Note: Percentage of the k-step-ahead forecast error variance explained by.

6. Conclusions and Policy Implications

Since the early 1980s, central banks have improved their credibility in managing inflation expectations and controlling inflation, and thus been given greater autonomy by their governments. However, the onset of the global financial crisis called these institutional arrangements into question. The literature and stylized facts indicate that the recession in the aftermath of the crisis raised questions as to the effectiveness of monetary policy in advanced economies, where central banks were constrained by zero-bound or low interest rates. Monetary policy was, therefore, deemed less effective in a recession. Unconventional monetary policy and macro-prudential regulation were considered better ways of reviving the economy.

Given the degree of global interconnectedness, an economic change in one part of the world can have spillover effects elsewhere. The global financial crisis, for instance, was triggered by a crisis in the US subprime mortgage market. Similarly, the loss in effectiveness of monetary policy resulted in historically low interest rates, with positive and negative effects for the rest of the world.

This paper investigates the effectiveness of monetary policy in Pakistan in the presence of external uncertainties stemming from changes in the economic growth of developed economies and international oil price movements. Decreasing returns in advanced economies are associated with capital flows to emerging economies – a benefit of expansionary monetary policies in the former. However, Pakistan has attracted lower capital inflows, primarily due to noneconomic factors. To gauge the impact of such international developments on Pakistan, we estimate an SVAR that measures the effect of international oil prices and global demand on a key macroeconomic variable. The SVAR is identified by imposing theoretical and statistical restrictions. We also test for robustness and structural shifts in the estimation procedure.

The real policy rate experiences an upward adjustment, the real exchange rate depreciates, economic growth slows down and inflation rises due to an unanticipated increase in international oil prices. We also find that, when the real policy rate increases, the real exchange rate appreciates, while economic growth and inflation rise due to an increase in US economic growth. The real policy rate adjusts upward in response to inflation and real exchange rate shocks. The real exchange rate depreciates if inflation increases. This indicates that monetary policy is an effective means of stabilizing consumer prices and currency values in Pakistan.

While independent central banks aim to control inflation and reduce inflation uncertainty, real economic growth and investor confidence are spillovers of the latter. It is well established that monetary policy cannot directly boost economic growth in the long run. Rather, it helps smooth out short-run fluctuations. Our empirical analysis suggests that this also holds for Pakistan. Enhancing real economic growth is the domain of fiscal policy. Therefore, the fiscal authority needs to help revive the economy in times of recession. Furthermore, the fiscal and monetary authorities must coordinate their policy efforts to improve the country's economic potential and manage inflation expectations.

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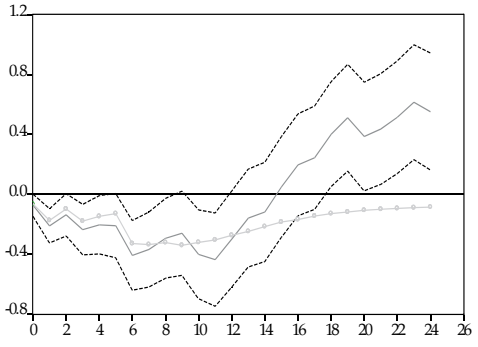
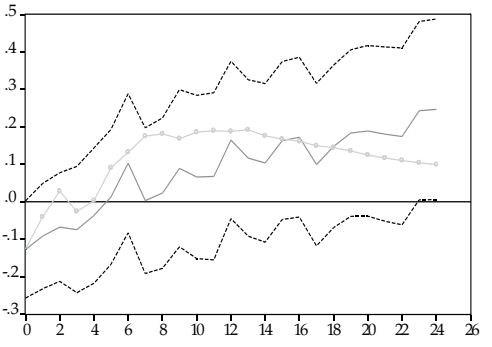
Appendix

Figure A1: Response of real policy rate

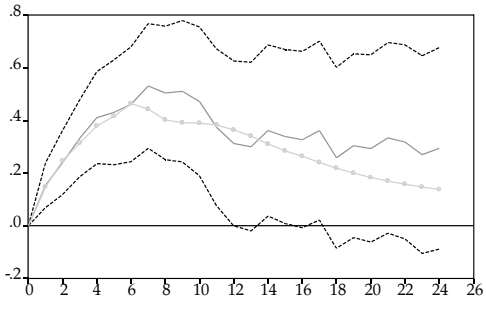
Oil price shock



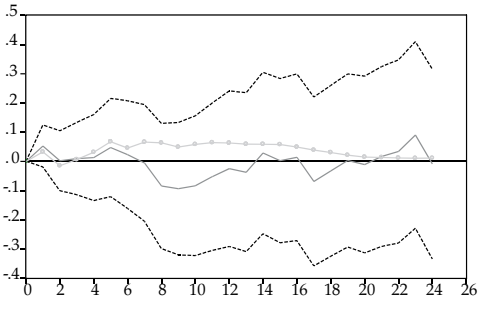
US growth shock



Real exchange rate shock



Domestic growth shock



Consumer price inflation shock

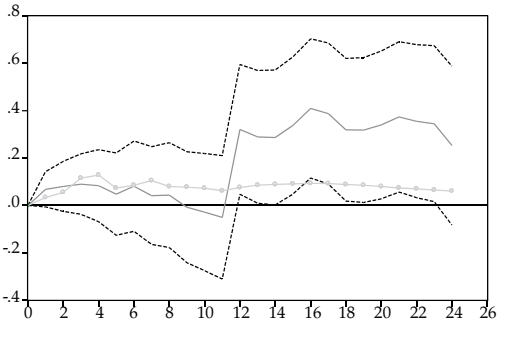
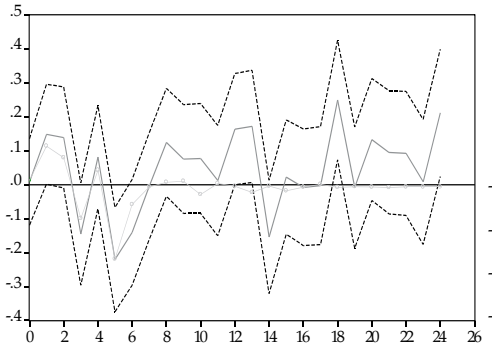
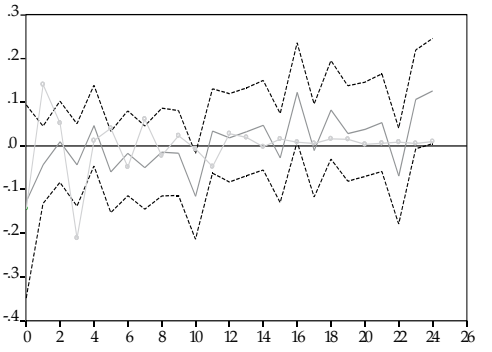


Figure A2: Response of real exchange rate

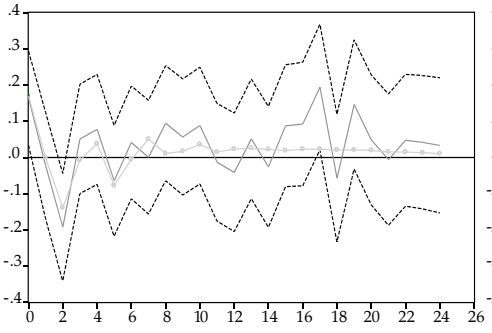
Oil price shock



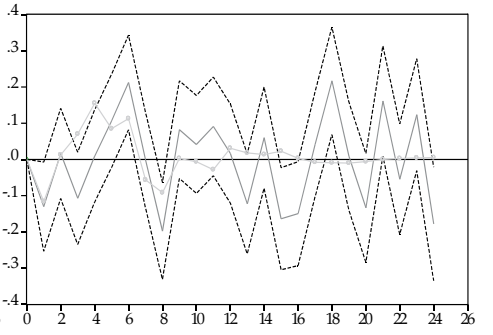
US growth shock



Real policy rate shock



Domestic growth shock



Consumer price inflation shock

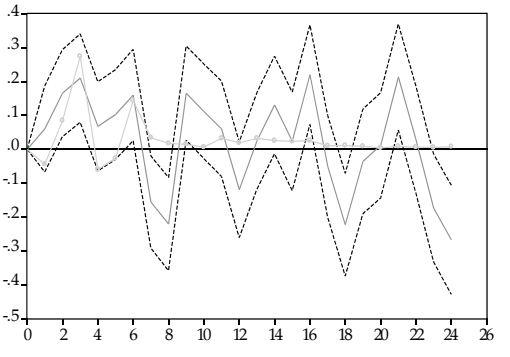
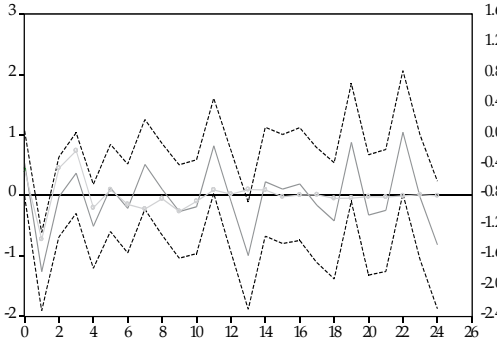
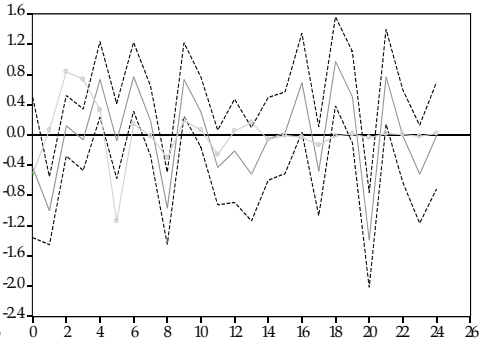


Figure A3: Response of domestic economic growth

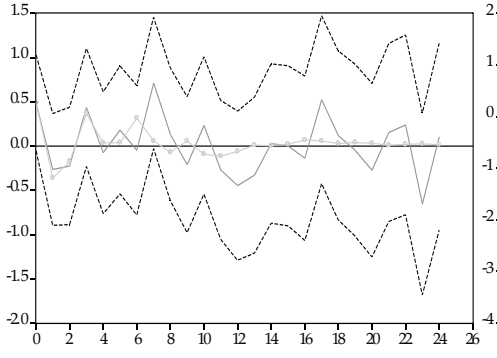
Oil price shock



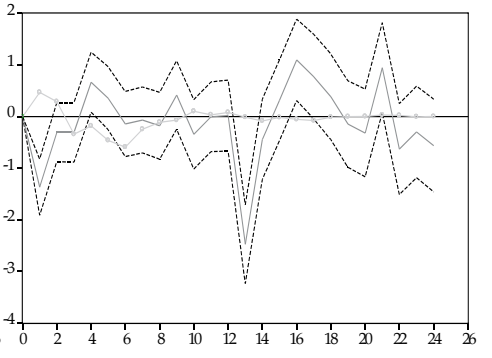
US growth shock



Real policy rate shock



Real exchange rate shock



Consumer price inflation shock

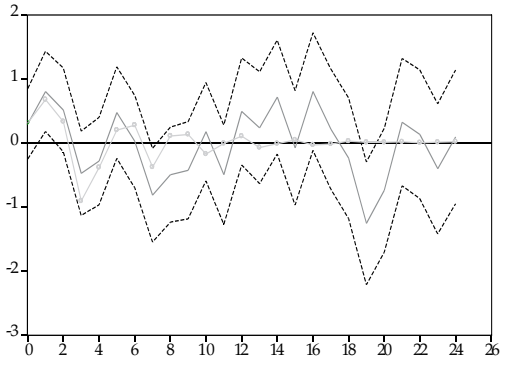
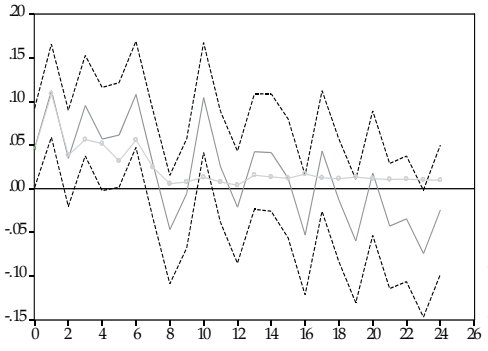
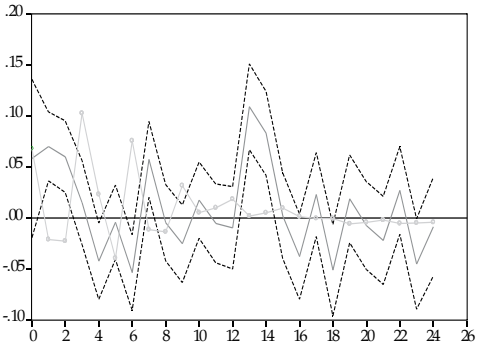


Figure A4: Response of consumer price inflation

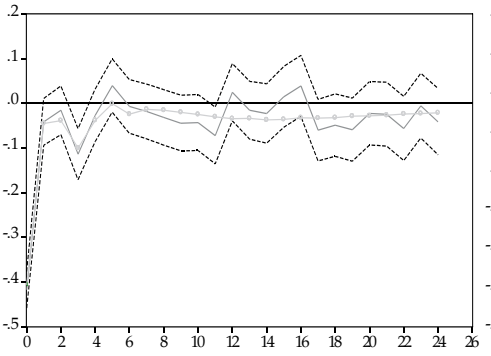
Oil price shock



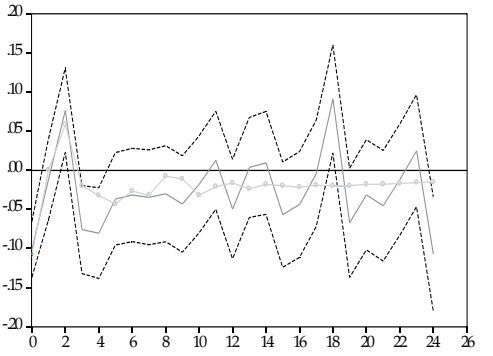
US growth shock



Real policy rate shock



Real exchange rate shock



Domestic growth shock

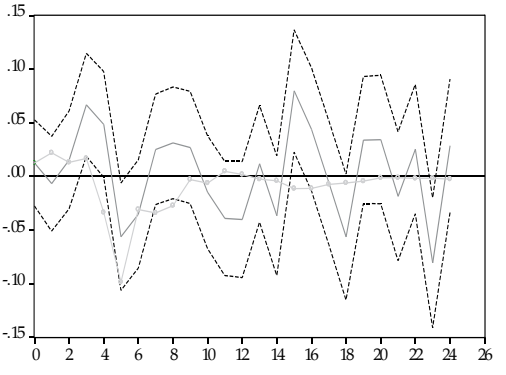
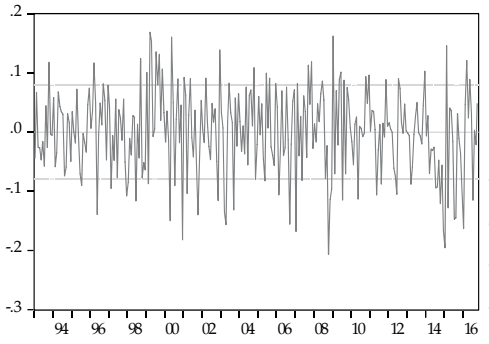
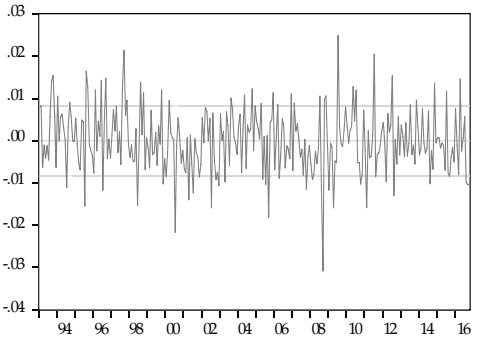


Figure A5: Residuals of SVAR equations

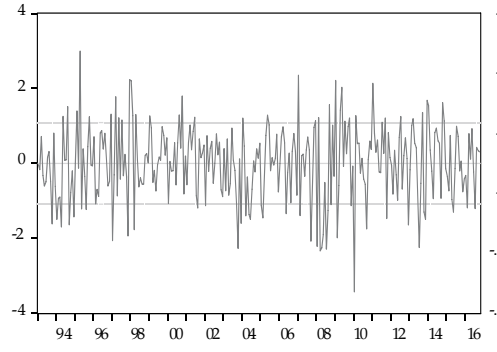
Oil prices



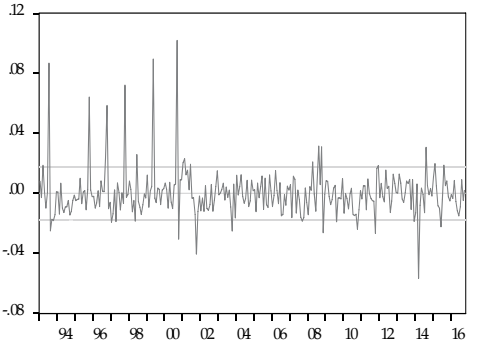
Industrial production (US)



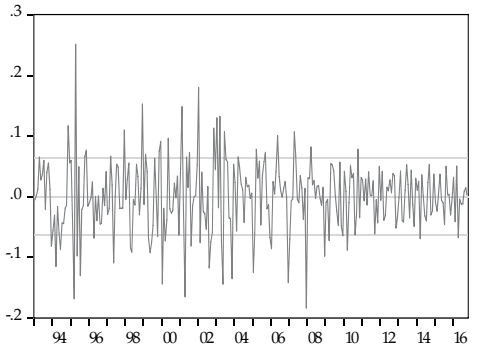
Real interest rates



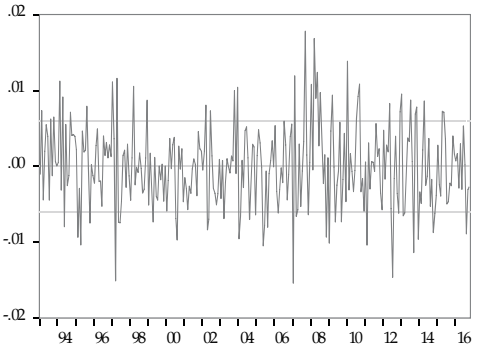
Real exchange rate



Industrial production (domestic)



CPI inflation



The Lahore Journal of Economics
22 : SE (September 2017): pp. 135–152

Combining Macroeconomic Stability and Micro-based Growth: The South East Asia/Asia Pacific experience

Ahmed M. Khalid*

Abstract

Macroeconomic growth and stability are two of the major benefits of financial development, though there are differences in the literature on the channels through which this growth and stability can be achieved. In recent years, a number of emerging economies experienced phenomenal growth. At a micro level, one needs to understand why and how financial deepening could bring changes in economic agents' behavior leading to an impact on the saving- investment relationship. At the macro level, financial development, integration and globalization could be possible channels to growth. The purpose of this paper is two-fold. First, we provide a comprehensive discussion of the theoretical and empirical literature on the role of important micro- and macro-policy variables in achieving macroeconomic stability with reference to Southeast Asia. Second, we present new empirical evidence using data from a selected sample of countries from the Asia Pacific region on the links between financial integration, trade integration and growth.

Keywords: Macroeconomic stability; financial development; economic integration; financial inclusiveness; fixed-effect; Granger causality.

JEL Classification: E61, F02, F15, F43, F63, C33.

1. Introduction

A stable macroeconomic system allows individuals, businesses and the government to plan more effectively for the future, increases investment, and enhances productivity. Growth-promoting policies play an important role in shaping the vulnerability to and resilience of an economy facing macroeconomic shocks. These include monetary and budgetary policies, labor and product market policies, and fiscal policies. As many crises are linked to financial sector shocks, financial stability is considered important for macroeconomic stability.[1]

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Note: The author thanks the Lahore School of Economics for the support provided to participate at the conference. Usual disclaimer applies.
[1] See García-Herrero and Wooldrige (2007) for more detailed discussion on this.

A stable macroeconomic system is one in which financial intermediaries, markets, and market infrastructure facilitate the smooth flow of funds between savers and investors and, by doing so, help promote growth in economic activity. In addition, a resilient financial system is one in which there are well developed crisis management arrangements for handling distressed financial institutions in such a way that public confidence in the financial system is not undermined. Financial integration is a phenomenon in which financial markets in regional and/or global economies are closely linked together.

The relationship between macroeconomic stability and micro-based growth is a long debated issue. This debate takes a central stage in the context of the experience in the strong economic performance of the Southeast Asian economies since the 1980s. Researchers have debated if such growth is through macroeconomic policies or microeconomic initiatives. Obviously, the benefits of well-structured policies of financial development, financial integration and openness played an important role in the growth performance of the region. The macro-financial linkages through financial integration also increases the importance of supervisory authorities in redefining risk exposures, designing appropriate risk measures and implementing adequate mechanisms to monitor the enforcement of these measures. Hence, the micro-based initiatives such as institutional reforms, restructuring of laws and rights of ownership, and creation of investment friendly environments played an important role in the success of the Asian economies.

Financial integration has been a priority item on the agenda of Asian policymakers since the 1980s. While the 1997 Asian financial crisis was a setback to the growth of the region, it turned out to be a temporary shock and by 2000, most of the countries moved back to their original growth path. In fact, the 1997 Asian financial crisis did not hinder the process of financial reforms and integration in the Southeast Asian region. Rather, as highlighted in the Chiang Mai Initiative (CMI), the 1997 crisis served as a driving force leading to greater regional financial integration in Asia as a means of ensuring financial stability and promoting economic growth. Cross-border holdings among Asian countries are significant in many cases and have increased over the last decade. In addition, Asian countries hold a significantly large share of their overall equity and debt portfolios as investments within the geographical boundaries of Asia.

Besides East Asia, a number of emerging economies experienced phenomenal growth in recent years. For instance, the Indian economy

enjoyed 7.3 percent growth during 2014-15 as compared to and average of 4.6 percent in emerging markets and only 3.4 percent in the global economy. The record of China is no different, although the economy has recently slowed down. Researchers have focused on the channels through which some of the Asian countries have achieved this stable growth. At the micro level, one needs to understand why and how financial deepening could bring changes in economic agents' behavior leading to an impact on the saving-investment relationship. There is also a need to discuss the importance and role of the supervisory authorities in redefining risk exposures, designing appropriate risk measures, and implementing adequate mechanisms to monitor the enforcement of these measures. On the macro level, financial development, integration, and globalization are possible growth channels and need further assessment.

Table 1 presents a comparison of the growth during the period 1990-2000 (early phase of financial development and reforms) and 2000-2016 (middle and later phase of financial development, reforms, and integration) for a sample of Asia-Pacific countries. Table 1 shows that more open and integrated countries did not have significant change in their average growth between the two periods. On the other hand, Malaysia experienced a decline from 7 percent average growth in the first period to 4.9 percent average growth in the second period. Singapore and South Korea also experienced a significant decline. Growth did not significantly slow down in the cases of Australia, China, Japan, New Zealand, Thailand and Vietnam. However, countries which implemented economic reforms in the mid- to late-1990s enjoyed higher growth in the later period (2000-2016). For instance, average growth in Bangladesh increased from 4.7 percent in the first period to 6 percent in the second. This pattern of growth is similar in other countries including India, Indonesia, and Philippines. No significant change in growth is observed in the case of Pakistan where average growth remained low. This may be due to political instability and the security situation faced by the country during the second period.

Table 1: Per Capital GDP Growth

Country	1990-2000	2000-2016
Australia	3.6	3.0
Bangladesh	4.7	6.0
China	10.6	9.9
India	6.0	7.5
Indonesia	3.9	5.5
Japan	1.3	0.7
Malaysia	7.0	4.9
New Zealand	3.4	2.3
Pakistan	3.8	4.2
Philippines	3.3	5.2
Singapore	7.2	5.8
South Korea	6.6	3.8
Sri Lanka	5.3	6.0
Thailand	4.1	3.9
Vietnam	7.9	6.4

Source: World Development Indicators; http://wdi.worldbank.org/table/4.1; retrieved on 27 July 2017.

The aim of this paper is to further explore these issues in the context of the East Asia and Pacific region. The purpose of this paper is two-fold. First, we plan to provide a comprehensive discussion of the theoretical and empirical literature on important micro- and macro-policy variables focused on macroeconomic stability with reference to Southeast Asia. The discussion will focus on the interdependency between micro- and macro-financial measures to achieve sustainable growth. Second, we show empirical evidence of the link between financial development and integration, openness, and economic growth using data from a sample of countries from the Asia Pacific region. Key indicators from the financial and real sector are be used to assess macroeconomic stability.

2. Macro and Financial Stability – A Look at Literature

On the macro-level, researchers have emphasized the role and importance of macroeconomic variables in achieving sustainable growth. Monetary and fiscal policies as well as real exchange rate stability are considered to be means of economic expansion but cannot guarantee output stability or prevent the economy from facing external shocks. Kydland and Prescott (1977) argue that achieving output stability at the expense of inflation and real exchange rate stability or a viable fiscal policy is not good macroeconomic management. Bleaney (1996) argued that

macroeconomic instability may impact investment through increased uncertainty about the returns on investment. Rodrik (1991) suggested that macroeconomic instability may lead to political instability and hence impact the investment environment of a country.

Researchers have also identified a number of channels through which macroeconomic stability and sustainable growth can be achieved. Levine and Renelt (1992) believe that the even though the empirical evidence on the correlation between investment and growth is generally consistent in the literature, the causal relationship is not well defined. Bleaney (1996) used a sample of 41 developing countries and found some evidence that measures of policy-induced macroeconomic instability are negatively associated with growth. Ulvedal and Mehlum (2013) suggest that policies such as the implementation of an open international trade regime, the adoption of national innovation policies, well-functioning factor markets, and an investor-friendly legal and regulatory environment could impact economic growth.

Rodrik (1999) argues that institutions play an important role in achieving stable and sustainable growth and that a lack of coordination among institutions and policymakers makes it difficult to implement adjustment policies to deal with external shocks. Using a sample of 101 developed and developing countries, Fischer (1993) found a negative relationship between inflation, the government budget deficit and economic growth. Kormendi and Meguire (1985) found empirical evidence suggesting that money supply changes may adversely affect economic growth. Other researchers have emphasized the importance of factors like institutions, culture and geography in determining growth rates (Acemoglu, 2009).

The literature has also looked at the relationship between openness or trade orientation and economic growth, though there is no consensus on whether outward orientation leads to higher growth though the evidence implies that openness helps bring in foreign capital as well as new technology leading to an increase in total factor productivity.

Huang and Wajid (2002) suggests a three-way approach to growth. They suggest (i) a comprehensive assessment of financial sector vulnerabilities and development needs; (ii) strengthening the monitoring and analysis of the financial sector, developing guidelines, and promoting transparency and integrity; and (iii) building strong institutions. Volz (2013) also suggests that financial integration requires rigorous regional

institutional building to ensure effective monitoring and surveillance. Borensztein and Loungani (2011) observed that Asian financial systems are more financially integrated with global financial markets as compared to regional neighbors. They also noted that cross-border holdings among Asian countries are significant in many cases and have increased over the last decade.

3. Macro and Financial Stability – Asia-Pacific Experience

An important step in achieving financial stability in the ASEAN countries is the enhancement of monetary and financial cooperation between countries including surveillance agreements, financial safety nets and systems to prevent, manage and resolve crises. These steps along with measures under the "New Financial Architecture" such as improving information flows on risk assessment, advancing regional financial infrastructure and capacity building, and providing a regional forum to voice key international developments are all aimed at providing regional financial stability.

While research shows the interdependency between financial stability, integration, and development, the recent EU crisis also exposed the problems such interdependency. A highly integrated and developed financial system does not always and necessarily strengthen financial stability since financial integration can also increase the exposure to more vulnerabilities and systematic risks. The experience of Australia and Asian markets during the 2008 global financial crisis (GFC) reinforces the importance of efficient supervision, gradual development of innovative securitization techniques, and appropriate incentive structures. If we analyze the case of Australia (as well as East Asia) during the GFC, we do not see Australia and East Asia experiencing the same negative impacts of the crisis as did Europe. It is believed that the former group escaped the crisis because of better monitoring and supervision of the financial system. Hence, there is a case for financial integration with prudential supervision. The lessons learnt from the GFC suggest that the European crisis was the consequence of many factors including the fact that supervisory practices and regulatory frameworks did not keep up with the rapid transformation of the financial system. Part of this is due to the introduction of complex financial products such as collateralized debt obligations (CDOs). On the other hand, the ASEAN economies took major steps towards financial cooperation and achieving financial stability in the post-1997 financial crisis period and focused their new financial architecture on crisis prevention and management.

The literature on monetary policy suggests a number of transmission channels for monetary policy to impact the real sector. The underlying assumption in this transmission mechanism is existence of a sound and well-supervised banking system. However, the last two decades have witnessed rapid and unprecedented development in credit intermediation mainly outside the usual banking system which has led to the movement of funds to unregulated financial intermediaries which has in turn increased risk exposure. One example of this is that, according to some estimates, unregulated financial intermediaries provide up to 80 percent of real estate financing in some countries. These developments have lead the Basel Committee and Financial Stability Board to recommend appropriate regulatory reforms and monitoring systems. For instance, the ASEAN countries have focused on regional macroeconomic and financial stability and a number of groups were established to achieve this goal. Kawai (2012) suggested establishing an Asian Financial Stability Board as a sub-regional forum similar to the Financial Stability Board global forum. Borensztein and Loungani (2010) found evidence supporting the hypothesis of increased financial integration in East Asia using data for equity returns and interest rates.

Table 2 (below) presents the financial development scores published by World Bank (2013) for a sample of Asia-Pacific countries. The composite score included a number of factors assessing financial sector development. Although the overall scores vary from 5.31 (Hong Kong) to 2.92 (Vietnam), the individual categories do not follow the same pattern. For instance, Singapore is ranked highest in institutional environment (6.24), business environment (6.03), financial stability (5.67) and financial markets (5.11) but has a low score on banking and financial services (4.78, ranked similar to Malaysia), non-bank financial services (3.44, below China) and financial access (4.45, ranked 3rd). Similarly, Vietnam, which is ranked lowest overall in this sample scored better in banking and financial services and financial access.

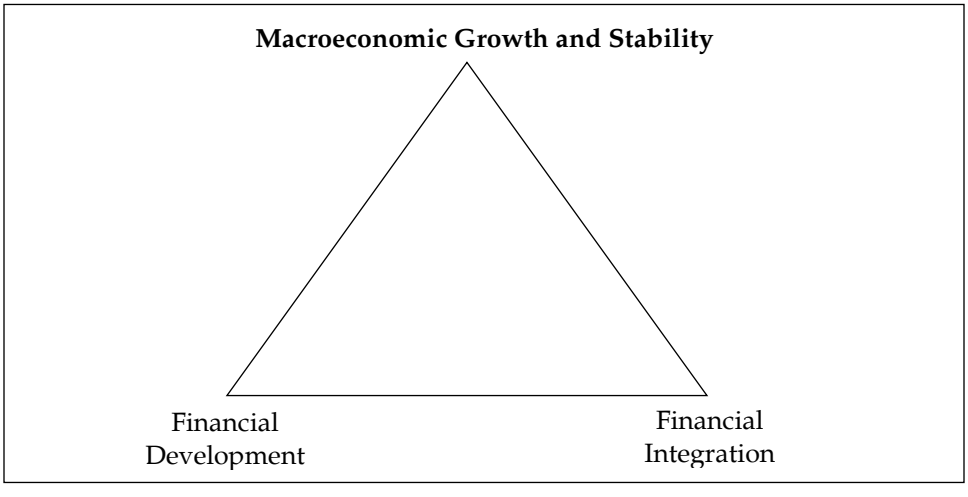
Table 2: Financial Development Scores

Country	Overall	Institutional Environment	Business Environment	Financial Stability	Banking Financial Services	Non-Banking Financial Services	Financial Markets	Financial Access
Hong Kong	5.31	5.77	6.03	5.35	6.15	3.76	5.04	5.08
Singapore	5.1	6.24	6.03	5.67	4.78	3.44	5.11	4.45
Australia	5.01	5.48	5.6	5.26	5.04	4.35	4.37	5
Japan	4.9	5.58	5.27	4.93	5.69	4.32	4.71	3.81
South Korea	4.42	4.18	5.41	4.08	4.37	5.04	3.78	4.06
Malaysia	4.24	5.12	4.85	5.24	4.71	3.23	2.71	3.79
China	4	4.1	3.95	4.89	4.43	4.48	2.98	3.15
India	3.63	3.42	3.61	4.67	2.61	3.24	2.99	4.90
Thailand	3.55	4.22	4.14	4.4	4.08	1.77	2.27	3.94
Pakistan	3.46	3.09	3.48	4.11	3.91	1.73	3.58	4.33
Philippines	3.12	3.94	3.44	3.87	3.02	2.68	2.18	2.74
Indonesia	2.95	3.46	3.49	4.4	2.82	2.38	1.39	2.69
Vietnam	2.92	3.44	3.32	3.26	3.87	1.53	1.99	3.06

Source: World Economic Forum (2013).

Based on the above discussion, we suggest that macroeconomic stability, financial development and financial integration are closely linked together. This is depicted in Figure 1.

Figure 1: The Three Linkages



Source: Author

A number of policy initiatives are needed to connect these three areas and achieve sustainable growth. One important initiative is the understanding of macro-financial linkages (MFLs) which has increased significantly since the GFC. A good understanding of MFLs is believed to be significantly important in promoting sustainable growth. Accordingly, both the real and the financial sectors are considered equally important for the economy. In the credit market, the pro-cyclical behavior of economic agents can be observed through the movement of credit-to-GDP ratio and GDP growth rates. In the capital market, capital flow volatility could be used to find a similar relationship. At the same time, a stable and resilient financial system requires a combination of a prudential policy framework (capital adequacy, market conduct, consumer protection, and safety and soundness) and other policy measures (monetary policy and payments and settlement systems).

Financial inclusion is also a major factor in providing macro and financial stability. As Alfred Hannig, AFI Executive Director, pointed out "…the importance in distinguishing financial deepening and financial inclusion. The traditional approach of measuring deepening does not measure the proportion of the population which has access to formal regulated financial services. Therefore, to measure the health of a country's financial sector, measuring both deepening and inclusion can maximize the benefit for financial sector and macro-economic resilience," (AFI, 2017). Demirguc and Klapper (2012) measured financial inclusion and Figure 2 (adopted from Demirguc and Klapper; 2012) suggests that besides lack of resources, financial literacy is an important factor in low financial inclusion which constrains resources and impedes growth. World Bank (2015) also presents a "financial development barometer" which is based on survey responses from 73 countries. According this barometer, 78 percent of the respondents identify the lack of basic knowledge of financial services as the major barrier to financial access among the poor. This, again, points to the lack of financial inclusion internationally (See Table 3).

Figure 2: Measuring financial inclusion

Note: Respondents could choose more than one reason. The data for "not enough money" refer to the percentage of adults who reported only this reason.
Source: Adopted from Demirguc-Kunt and Klapper (2012).

Table 3: Financial Development Barometer - Global views

Statements Assessed in the Poll	**Agree? (% of all respondents)**
"Access to basic financial services is a significant problem for *households* in my country."	61
"Limited access to finance is a significant barrier to the growth of *small enterprises* in my country."	76
"In my country, access to finance has *improved significantly* over the last 5 years."	78
"*Social banking* (that is, state banks and targeted lending programs to poorer segments of the population) *is potentially a useful tool* to increase financial access."	80
"*Social banking actually plays an important role* in financial access in my home country."	43
"The *lack of knowledge* about basic financial services is a major barrier to financial access among the poor in my country."	78

Source: Financial Development Barometer, World Bank (2015).
Note: The barometer is an informal global poll of country officials and financial sector experts from 21 developed and 54 developing economies. From 265 polled, 161 responded (61 percent). Results are percentages of "fully agree" and "partially agree" responses out of total responses received.

The International Monetary Fund (IMF), in a blog under the title "Seven Pillars of Prosperity" (IMF Blog, May 2011), observed seven important operational (policy) and institutional factors contributing to growth. They include (i) reducing the role of the state; (ii) generating openness to new domestic and foreign firms; (iii) a competitive and efficient banking sector; (iv) governance and quality of institutions; (v) improvements in the business environment; (vi) improvements in transport and communications; and (vii) improvements in regional trade and investment links.

4. Empirical Evidence

To further understand the relationship between growth and macroeconomic stability in the Asia-Pacific context, we provide some empirical results using a sample of countries from the Asia-Pacific region. The empirical estimation focuses on these two relationships:

1) The role of important macroeconomic variables in determining economic growth
2) The causal relationship between certain indicators of financial and trade integration and growth

The underlying model with fixed effects takes the form:

$$g_{it} = \beta_0 + \beta_1 FDI_{it} + \beta_2 GFCF_{it} + \beta_3 Trade_{it} + \beta_3 controls_{it} + \eta_i + \theta_t + \varepsilon_{it} \quad (1)$$

where g_{it} is economic growth measured by growth of the real GDP in country i at time t. η_i is a country-specific fixed effect, θ_t is a time effect and ε_{it} is a multivariate normally distributed random disturbance.

A fixed effects model, rather than a random effects model is estimated, as the η_i's are likely to represent omitted country-specific characteristics which are correlated with other explanatory variables. We use three policy variables. GFCF, FDI and Trade and a set of control variables (INF, GE, Pop and PrCredit).

where,

g_t: real per capita GDP growth

FDI: ratio of FDI to GDP

GFCF: ratio of gross fixed capital formation to GDP

Trade: ratio of total trade to GDP

INF: inflation

GE: ratio of government expenditure to GDP

Pop: growth rate of population

PrCredit: ratio of private credit to GDP

The analysis follows two different approaches. First, to avoid endogeneity (as well as small sample) issues, we estimate a fixed effect model for pooled data for the sample of East Asian. Then, we move on to South Asia, and we estimate the same model for a sample of South Asian countries. Second, we use Granger causality tests to investigate causal relationships between the variables of interest.

The data used in the empirical analysis spans 25 years (1989-2013). We use two samples: Sample 1 consists of East-Asian economies (China, Indonesia, Japan, Malaysia, Philippines, Singapore, South Korea and Thailand) while Sample 2 includes South Asian economies (Bangladesh, India, Pakistan and Sri Lanka). The variables used in the estimations are in logs.

The results of the first empirical tests are reported in Table 4. Model 1 excludes the trade-to-GDP ratio while Model 2 includes it. The results suggest that domestic investment is an important determinant of growth in both samples. Similarly, growth is also affected by changes in population (Pop) which is consistent with the predictions of the Solow model.[2] Although trade does not seem to play any significant role in Sample 1, it negatively affects growth in Sample 2. This could be due to the heavy oil-dependence of countries in South Asian region.

Finally, we perform tests of Granger causality. These results are reported in Table 5. The empirical results show that growth Granger causes domestic investment (GFCF) while the reverse is true in the case of Indonesia. FDI Granger causes growth in the case of Malaysia. In the case of the Philippines, growth is Granger caused by trade. For Singapore, GFCF Granger causes growth and growth Granger causes FDI. This means

[2] As an alternative, we use the following model for individual Asian countries.

$$g_t = \beta_0 + \beta_1 FDI_t + \beta_2 GFCF_t + \beta_3 Trade_t + \beta_4 controls_t + e_t \quad (A1)$$

The results presented in Appendix Table A have low power. These results reveal that for China and Thailand all three policy variables are important determinants of growth. Both domestic and foreign direct investment are important in case of Malaysia. In case of Philippines and South Korea, only domestic investment is significant while for Indonesia and Singapore, FDI determines growth.

that domestic investment is needed to accelerate growth and then attract FDI. In the case of South Korea, economic growth is needed to promote trade whereas the reverse is true for Bangladesh and India. In the case of Pakistan, growth is Granger caused by both GFCF and trade while trade also Granger causes growth. No relationship for the variables under consideration was found for Thailand and Sri Lanka.

Table 4: Determinants of Growth

Dependent Variable: g_{it}

Variables	**Sample 1**		**Sample 2**	
	Model 1	**Model 2**	**Model 1**	**Model 2**
RGDP (-1)	0.0481	0.0478	0.0170	-0.0103
	(0.44)	(0.44)	(0.15)	(-0.08)
lFDI	0.462	0.460	0.204	0.289
	(1.06)	(1.03)	(1.58)	(1.42)
GFCF	0.185***	0.185***	0.216**	0.278**
	(2.00)	(1.91)	(3.59)	(3.84)
lTrade		0.0427		-1.379**
		(0.03)		(-3.27)
INF	-0.0386	-0.0386	-0.00413	-0.00950
	(-0.28)	(-0.28)	(-0.09)	(-0.20)
GE	-0.148	-0.149	-0.0530	-0.0317
	(-0.67)	(-0.62)	(-0.82)	(-0.50)
Pop	-1.524*	-1.523*	-0.856	-0.967
	(-5.41)	(-5.85)	(-2.03)	(-2.25)
lPrCredit	-3.643	-3.653	-0.286	-0.220
	(-1.89)	(-1.77)	(-0.50)	(-0.50)
Constant	18.48**	18.34**	1.661	5.275**
	(2.62)	(2.92)	(0.57)	(3.30)
Observations	178	178	93	93

Source: Author's estimation

Notes: *, **, and *** indicate significance level at 1%, 5% and 10% respectively.

Sample 1: China, Indonesia, Japan, Malaysia, Philippines, Singapore, South Korea and Thailand

Sample 2: Bangladesh, India, Pakistan and Sri Lanka

Table 5: Granger Causality Test

Country	To GDP	From GDP
China	None	RGDP → GFCF
Indonesia	GFCF → RGDP	
Malaysia	FDI → RGDP	
Philippines	Trade → RGDP	
Singapore	GFCF → RGDP	RGDP → FDI
South Korea	None	RGDP →Trade
Thailand	None	None
Bangladesh	Trade → RGDP	None
India	Trade → RGDP	
Pakistan	GFCF → RGDP	RGDP →Trade
	Trade → RGDP	
Sri Lanka	None	None

Source: Author's estimation
Notes: *, **, and *** indicate significance level at 1%, 5% and 10% respectively.

5. Concluding Remarks:

An attempt is made in this paper to provide a detailed discussion on macroeconomic stability and micro-based growth in the context of the Asia-Pacific. Although there are a number of different micro- and macroeconomic factors determining stable and sustainable economic growth, the discussion in this article focuses on two important channels. First, the article analyzes the broad-based macroeconomic policies leading to economic reforms and integration (including both financial and trade integration). The second focus is on financial inclusion which is essential for the success of macro-policies and is crucial for economic growth.

The interesting question is, whether financial development and economic integration enhances financial and macroeconomic stability. The results discussed in this paper suggest that it does but with certain conditions. These conditions include the use of appropriate policy tools which helps to maintain transparency and market confidence; ensuring the long-term viability of financial institutions in business decisions (through lower agency costs and underlying risk attitude); preventive measures to avoid excessive concentration of risks and leverage to achieve systematic stability; tools to reduce the risk of contagion; prompt corrective actions in case of a forthcoming crisis (crisis management resolution); and good monitoring, assessment and supervision of financial activities leading to financial stability.

The paper provides both a theoretical framework and empirical evidence for the relationship between financial development, financial integration, and economic growth. The empirical analysis uses pooled data for two samples of East Asian and South Asian countries. The results of the analysis confirm that domestic and foreign investment as well as trade openness are significant determinants of economic growth in most of the sample countries.

Based on the discussion provided and the empirical results presented in this paper, one can draw some lessons and policy implications for countries planning for sustained growth. We suggest that to achieve such growth, countries should embark on policies including reliance on market systems for resource allocation; effective governance and leadership in building consensus (for policy implementation and enforcement); sound economic management (macroeconomic environment); focus on mobilizing savings and investment; resource mobility; and transfer of knowledge and technology (G2G, B2B, and G2B).[3]

[3] G2G is government to government, B2B is business to business and G2B is government to business.

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Appendix

Table A: Individual Country Regression

Countries/ Policy Variables	GFCF	lFDI	lTrade
China	0.501***	2.410**	5.322**
	(1.81)	(2.14)	(2.19)
Indonesia	0.220	0.924***	6.463
	(1.01)	(1.76)	(0.86)
Malaysia	0.280**	2.742*	-0.482
	(2.18)	(3.12)	(-0.05)
Philippines	0.923*	0.460	-0.439
	(2.82)	(0.76)	(-0.15)
Singapore	-0.472	4.719**	-10.88
	(-1.27)	(2.15)	(-0.64)
South Korea	0.799*	-2.539	-7.495
	(3.88)	(-1.67)	(-0.87)
Thailand	0.559*	-3.885**	-25.74*
	(5.32	(-2.58)	(-3.23)

Source: Author's estimation
Notes: *, **, and *** indicate significance level at 1%, 5% and 10% respectively.

The Lahore Journal of Economics
22 : SE (September 2017): pp. 153–182

Financing Technological Upgrading in East Asia

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Abstract

There has been considerable discussion on the drivers of economic growth in East Asia. While most studies recognize that capital accumulation and macroeconomic management were critical in hastening growth, few have examined systematically and comparatively how policy frameworks – spearheaded through selective interventions – stimulated technical progress and the different performance outcomes achieved by these countries. This article attempts to address the gap by systematically analyzing the investment regimes, sources of finance, technological upgrading and policy frameworks of Indonesia, Malaysia, the Philippines, South Korea and Thailand with a view to explaining their economic growth performance.

Keywords: Finance, innovations, industrial policy, technological upgrading, East Asia.

JEL classification: O16, O40.

1. Introduction

The East Asian economies' successful experience of growth and distribution led the World Bank (1993) to classify them as high-performing economies. Among these, Singapore and Hong Kong are often removed from policy lessons since their city-state and colonial structures gave them gateway status to trade with the rest of the world. Among the high-performing economies, we exclude China because of its sheer size and socialist structures, which would be politically difficult to introduce in most countries. Taiwan is excluded because of data constraints. Accordingly, we re-examine the financing of technology development in Indonesia, Malaysia, the Philippines, South Korea and Thailand. In doing so, we attempt to evaluate the sources, direction and management of investment and their impact on industrial technological upgrading in these countries.

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Among the selected East Asian economies, South Korea grew by 22.2 times over the period 1960–2015, followed by Thailand, Malaysia and Indonesia, which grew by 9.9, 7.5 and 6.4 times, respectively, over the same period. The Philippines grew by only 2.4 times over 1960–2015. While numerous reasons might explain such contrasting growth outcomes (ranging from political leadership and human capital development policies to trade strategies), monetary and fiscal policies are likely a key factor in explaining technological upgrading in these countries. That the most successful of these countries, South Korea, relied heavily on debt and grants in its early decades of development suggests that the management of capital – rather than simply capital endowments at the origin, as argued by Summers (2003) and Rodrik (2011) – may be the most powerful explanatory factor.

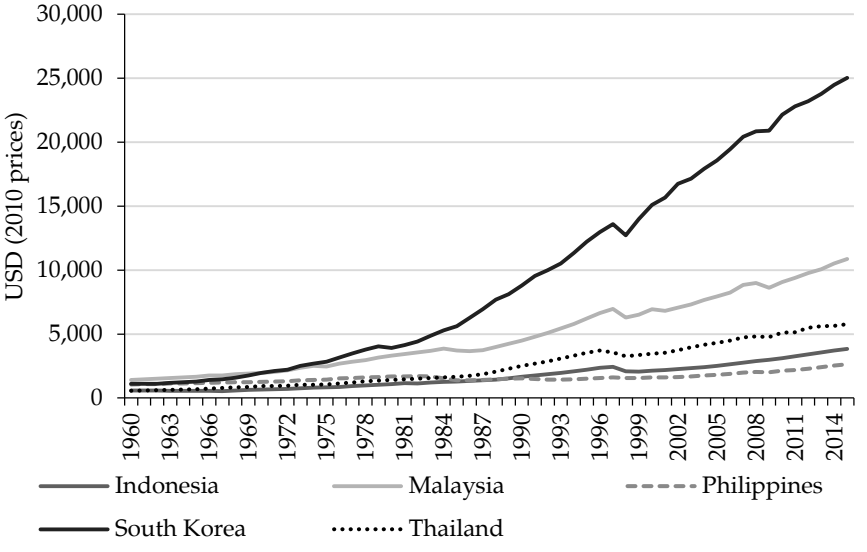
This paper attempts to analyze the key factors driving technological upgrading and rapid economic growth in Indonesia, Malaysia, the Philippines, South Korea and Thailand. The rest of the paper is organized as follows. Section 2 compares the economic growth performance of these five East Asian economies over the period 1960–2015. In Section 3, we consider the theoretical arguments relevant to analyzing and explaining the different outcomes. Section 4 evaluates East Asian investment flows and sources. Section 5 analyzes the technological upgrading that took place in these economies (note: our discussion is based on selected measurable outputs). Section 6 discusses the type of governance mechanisms deployed by these economies to explain differential growth outcomes. Section 7 concludes the study.

2. GDP per Capita Growth

This section compares the economic growth performance of Indonesia, Malaysia, the Philippines, South Korea and Thailand. In current US dollars, South Korea had the highest GDP/capita in 2015 at USD27,222, followed by Malaysia in distant second place at USD9,768. The commensurate figures for Thailand, Indonesia and the Philippines are USD5,815, USD3,346 and USD2,904, respectively. In constant 2010 prices, Malaysia's GDP/capita (USD1,408) was highest, followed by South Korea (USD1,103), the Philippines (USD1,059), Indonesia (USD577) and Thailand (USD571) (Figure 1). The GDP/capita of these countries has grown at different speeds over the period 1960–2015. In constant 2010 prices, the GDP/capita of South Korea expanded by 22.7 times over this period, followed by Malaysia, Thailand, Indonesia and the Philippines – 7.7, 10.1, 6.6 and 2.5 times, respectively (Figure 1). The annual average GDP/capita

growth rates of South Korea, Malaysia, Thailand, Indonesia and the Philippines were 5.8, 3.8, 4.3, 3.5 and 1.7 percent, respectively.

Figure 1: GDP per capita, selected East Asian economies, 1960–2015



Source: Adapted from the World Development Indicators database.

While the nature of trade policies and integration with global markets have been important in explaining differential growth rates (see Krueger, 1980; Weiss, 1990; Krugman, 1986), it is widely acknowledged that investment policies and technical change were critical in building the creative capacity of these countries to grow through global integration and competition. Therefore, we consider the key theoretical issues underlying the latter two in explaining the differential economic growth rates achieved by these economies.

3. Theoretical Considerations

Marx (1957), Veblen (1915) and Schumpeter (1942, 1961) laid the foundation for a real assessment of technology through the unbundling of the 'black box' (Rosenberg, 1975, 1982). This spawned a plethora of work defining technological capabilities (see Dahlman, 1984; Pavitt, 1984; Lall, 1992). While technology and technological capabilities were the primary focus of these scholars, manufacturing also became an important platform

for stimulating productivity through learning and innovation in processes, products and organizational technologies (Rasiah, 2002, 2004).

The catch-up literature, which has its historical origins in Marx and in Luxembourg's (1967) notion of capitalist integration and accumulation, was supplemented by the work of Veblen (1915), Gerschenkron (1962) and Abramovitz (1956). These works gave rise to the developmental function of the state, which goes beyond a regulatory role. The empirical foundations of the developmental state, articulating the active role of government in stimulating industrial structural change, can be found in works explaining industrial catch-up by Japan (Johnson, 1982), Korea (Amsden, 1989) and Wade (1990). While Amsden (1989), Amsden and Chu (2003), Chang (1994) and Kim (1997) provide explicit accounts of catching up for given industries, Johnson (1982) and Wade (1990) do not present any empirical evidence of innovation and technology against the industrial policies pursued by Japan and Taiwan, respectively. This explains the need to re-investigate the topic. Moreover, none of these works distinguish between the expansion of incremental and radical innovations when analyzing technological upgrading.

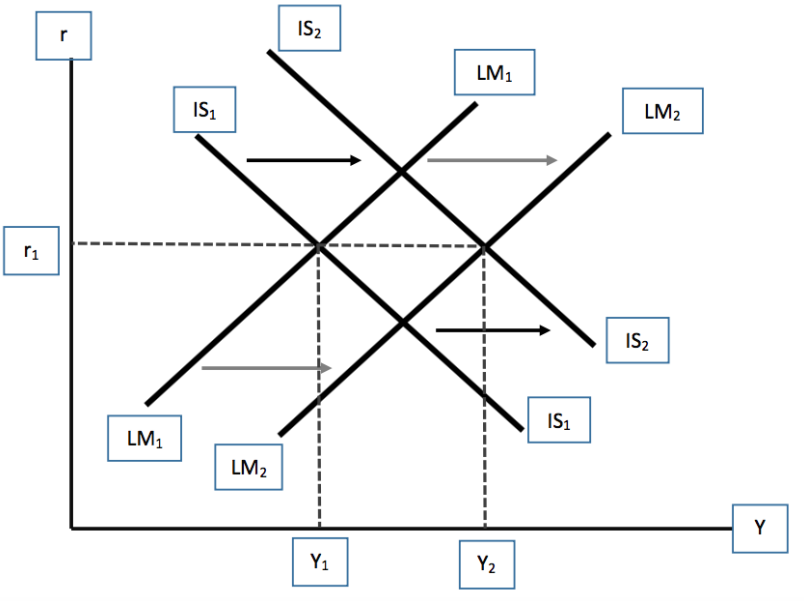
Elsewhere, we have discussed how the type of industrial policy and the nature of technological upgrading strategies helped these countries stimulate economic growth (see Rasiah & Nazeer, 2015, 2016). In making these arguments, we address the importance of an autonomous but progressive state in directing growth and structural change (see also Poulantzas, 1969; Jessop, 1989; Skocpol, 1994, 1995; Evans, 1995). In this paper, we focus on both the innovation strategies and investment policies employed to achieve technological upgrading.

3.1. Investment Regimes

Five financial models are examined in this section to develop a theoretical guide to evaluating investment regimes in Indonesia, Malaysia, the Philippines, South Korea and Thailand. In the typical Keynesian investment–savings (IS) and liquidity preference monetary (LM) model (Figure 2), governments can expand income through both monetary and fiscal policies. Savings are the basis of such investment in these models. Monetary policy can take the form of changes in the interest rate or money supply in closed-economy models. In open-economy models, either the currency or capital market is fixed to prevent runs in one from the other. Savings can be expanded when the government lowers taxes. These savings and/or increased government expenditure shifts the IS curve to the right.

An increased money supply to match the income increase then shifts the LM curve to the right. Once fiscal and monetary policies are matched, then an increase in income (Y2 – Y1) from the increase in investment can be achieved at the same or a similar interest rate (r1).

Figure 2: Keynesian IS-LM curves



Source: Authors' estimates.

Neoclassical economists do not prescribe fiscal and monetary policies, as markets are assumed to clear any disequilibrium. Markets are considered the best establisher of interest rates and investment functions, while flexible exchange rates and capital market convertibility are critical prerequisites to governing investment and savings. However, typical macroeconomic analyses do not broach the role of innovation in expanding income. Typically, governments seek to offset a fall in aggregate demand – arising from either a deflationary impact on the domestic economy due to a fall in domestic demand or from a contraction in exports – by introducing fiscal stimulus packages, which occurred in many countries, following the global financial crisis of 2007/08 (Stiglitz, 2009).

Feldman (1928/1964) and, subsequently, Mahalanobis (1953) targeted capital goods production as a means of supporting the production of domestic consumer goods in the former Soviet Union and India, respectively. The focus here was on domestic accumulation based on a

closed economy and without a significant assessment of savings or of the capacity of these economies to finance further accumulation. Hence, not only were they unable to appropriate gains from trade, but they were also denied a scrutiny of the capital sources used to finance growth. Unsurprisingly, both models eventually became unpopular.

A second neoclassical model examines exchange rates and capital flows based on free markets and factor endowments. With Solow (1956) and Romer (1986), the Solow–Romer neoclassical model of relative prices determines the choice between capital and labor in production and existing demand patterns.[1] Capital accumulation is the basis of economic growth, but is driven by factor endowments, with technical change captured in static terms even in this endogenous growth model. Capital market convertibility is critical in such models, so that both currency and capital markets are required to be flexible (see also Fleming, 1962; Mundell, 1963).

The McKinnon–Shaw model of financial repression became popular in the 1960s as governments sought to stimulate capital accumulation. Savers face lower rewards compared to the costs borne by investors, and governments can settle debts easily by keeping saving rates low. High interest rates are supposed to simultaneously stimulate savings and sterilize entrepreneurial markets, so that only capable entrepreneurs seek to borrow to make their businesses viable.

Consistent with Summers (2003), Rodrik (2011) notes that savings need not be an essential requirement, as capital can come from abroad, while making the case that integration with the global economy is a key requirement. Under this framework, the terms of the capital sought and its management are more important than simply domestic savings. While Summers and Rodrik offer insights into the importance of managing capital regardless of whether it is drawn largely from domestic savings or from aid, like the other macroeconomic approaches, this too lacks any deep assessment of innovation and technology. As with typical neoclassical arguments, Rodrik simply assumes that economic growth in developing economies is targeted at infrastructure development and capital accumulation through the absorption of technology from abroad. Kalecki (1976) recognizes this shortcoming in Keynesian approaches and argues that fiscal policies only make sense if they help raise the productive capacities of an economy.

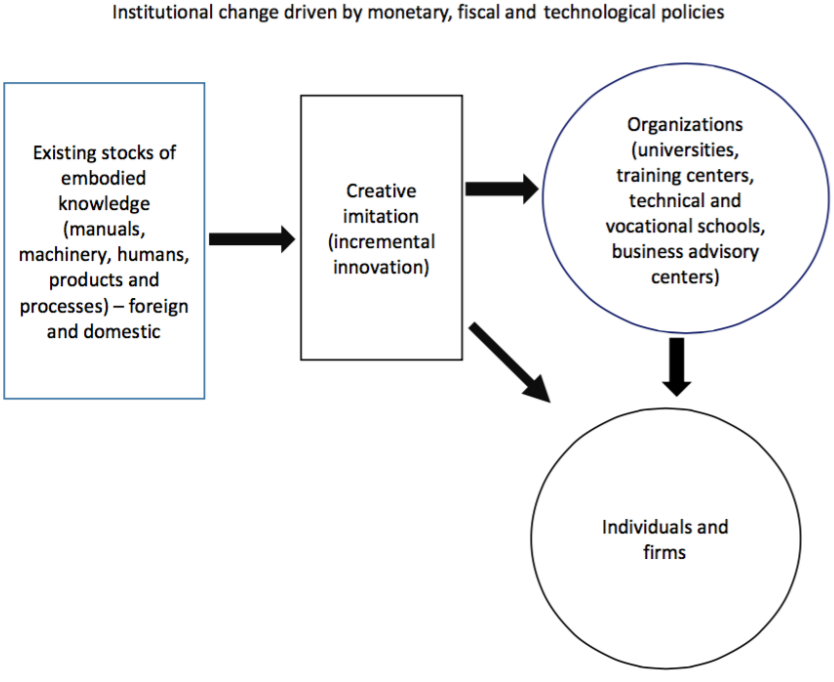
[1] Following Romer (1986), the Solow–Romer model endogenizes technology so that the residual, its exponents argue, captures total factor productivity.

3.2. Innovation Regimes

Drawing on earlier economists such as Marx, Schumpeter brought innovation into the discussion on spurring economic development. Schumpeter (1934) referred to entrepreneurs as innovators who generate incremental innovation, and who adapt, modify and proliferate existing stocks of knowledge without significantly generating new knowledge. These latecomers play a key role in stimulating economic development through adaptive learning, as they creatively transform existing stocks of knowledge.

The extension of Schumpeter's notion of incremental innovation on a broader national scale is shown in Figure 3. Existing stocks of knowledge not new to the universe, but new to the enterprises seeking them, are both imported from abroad and drawn from national sources such as manuals, machinery, licensing and the acquisition of brownfield firms. They are also accessed through nonpecuniary knowledge flows and creatively adapted to solve production and distribution problems and to generate new products, processes and organizational structures.

Figure 3: Systemic flows of knowledge and entrepreneurial synergies



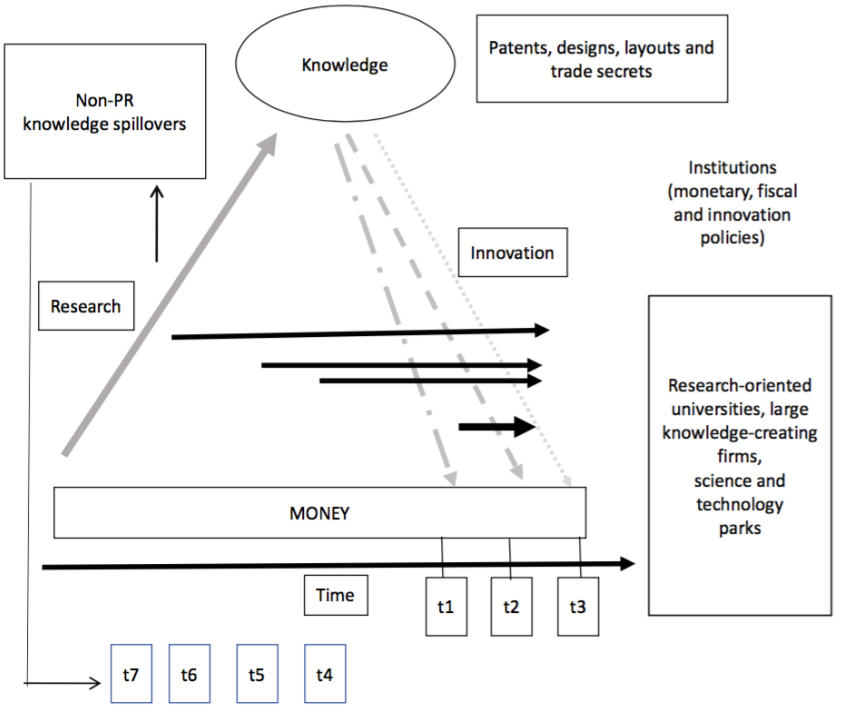
Source: Rasiah (2017).

Institutional change through a blend of institutions then molds economic agents – both firms and individuals – that solve collective action problems through organizations and stimulate incremental innovation in national economies. Such technical change activities are financed largely by firms, but the government can assist by institutionalizing the methods, processes and connections between producers and users. Hence, there is no need for governments to offer R&D grants for such activities.

Subsequently, Schumpeter (1943) emphasized the initiators of new cycles of innovation and business by focusing on large R&D laboratories that could generate new stocks of knowledge to produce radical innovations. Since he did not envisage the development of science and technology (S&T) parks and strong university–industry linkages, his focus was on the internal R&D operations of large firms, which raised the concentration in certain industries. Innovation structures have since transformed to allow smaller firms to produce new stocks of knowledge through integration with S&T parks and with university R&D laboratories.

As shown in Figure 4, research is critical to generating new stocks of knowledge. However, the returns on research are always uncertain. Even if new stocks of knowledge are generated, not all these can be appropriated and registered with property rights by those who carried out the research. Nor can all registered property rights be scaled up to generate returns.

Figure 4: New stocks of knowledge synergies



Source: Rasiah (2017).

Nonetheless, such new stocks of knowledge are critical to spurring cycles of innovation. Latecomers eventually appropriate significant aspects of new knowledge without paying for it, owing to the nonexcludable nature of public goods: they end up producing products t4 to t7 in Figure 4 when first-movers only manage to sell products t1 to t3. Since public goods are also nonrivals, it is important for governments to finance major aspects of such knowledge stocks.

Barring a handful of large firms, financing radical innovation activities generally requires strong government assistance. Not only is there the need to institutionalize linkages between R&D labs/universities and firms, but it is also important for governments to develop S&T parks to scale up the research being carried out at firms. The uncertainty element should be underwritten using R&D grants. Since the incidence of failure can be high in frontier R&D activities, governments offering financial support must have an evaluation and appraisal mechanism to reduce failures and the dissipation of new knowledge. A significant share of new discoveries recorded in the US, Germany and Japan were financed by governments.

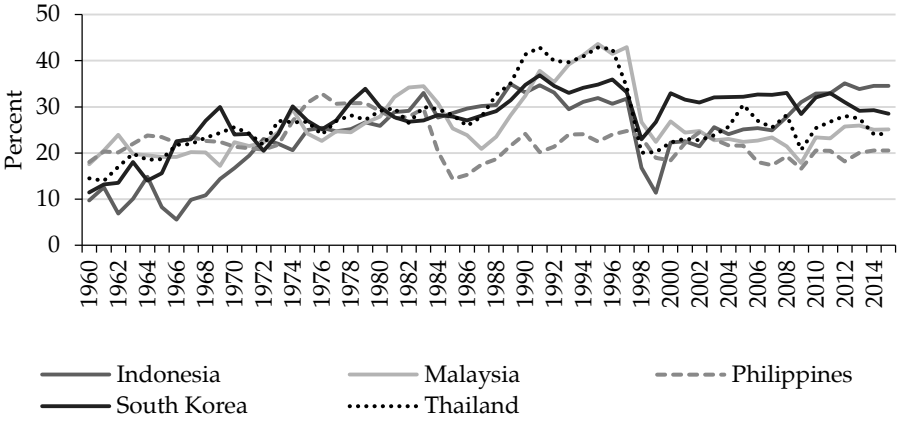
4. Sources of Financing

This section looks at capital formation and its sources, which include savings, aid and grants. Since South Korea had a poorly developed stock market until the 1980s, we discuss how monetary and fiscal policies were used either to spearhead growth or support recovery from financial crises. Instead of focusing solely on how to stimulate economic growth, we examine how funds were used to support technological upgrading.

4.1. Investment Patterns

Over the period between 1960 and the Asian financial crisis of 1997/98, gross fixed capital (GFC) as a share of GDP rose in Indonesia, South Korea and Thailand (Figure 5). Malaysia and the Philippines, however, faced a considerable fall in GFC, caused by a sharp contraction in commodity prices. The Philippines was also affected by a severe balance of payments (BOP) and debt servicing crisis, which led to the introduction of a structural adjustment package under the International Monetary Fund (IMF). The crisis affected all five countries, with Indonesia, Malaysia, South Korea and Thailand seeking bailouts from the IMF, although Malaysia managed to avoid this, following the introduction of Keynesian capital controls in 1998. All five countries faced a sharp currency depreciation, following a speculative attack on the baht, which generated a domino effect on the ringgit, won, peso and rupiah. Chronic BOP and short-term debt deficits failed to translate into currency falls, owing to currency pegs and expanding capital markets from a rise in portfolio equity and foreign direct investment (FDI).

Figure 5: GFC as a share of GDP, selected economies, 1960–2015

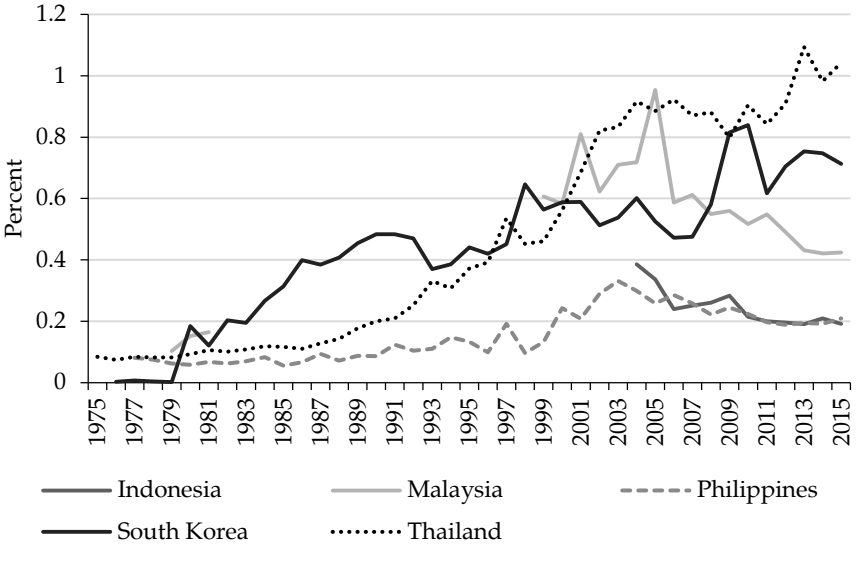


Source: Adapted from the World Development Indicators database.

While the global financial crisis affected external demand, which led to a contraction in GDP in Malaysia, the Philippines, South Korea and Thailand, its impact was not serious since these economies had learnt from the Asian crisis and had kept their nonpayment loans low. Having been decoupled from developed export markets since 2000, Indonesia did not undergo a serious crash in exports during this crisis.

Instead of simply targeting investment to support capital accumulation and infrastructure development, significant allocations of capital were also targeted at stimulating knowledge inflows through payments made for intellectual property (IP) rights from abroad and learning through incremental innovations in all five countries (Figure 6). During the 1970s, the institutionalized framework in South Korea drew extensive licensing agreements and firm acquisitions for upgrading, which helped the chaebols catch up in strategic industries faster than firms in the other four countries. While there was government support for R&D in Indonesia, Malaysia, the Philippines and Thailand, these amounts were small. Government expenditure in Malaysia began to focus on technology and R&D in 1991, following the introduction of the Action Plan for Industrial Technology Development and the Intensification of Research in Priority Areas program.

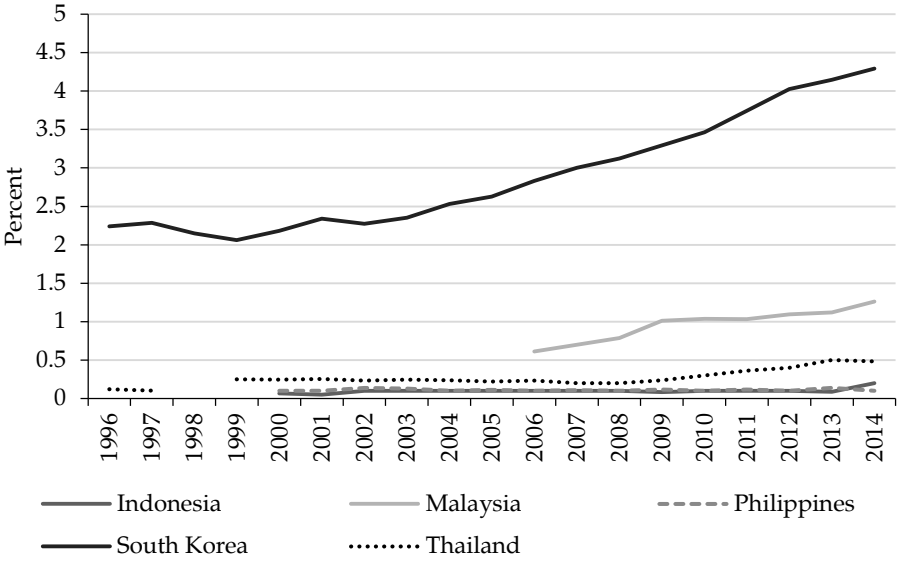
Figure 6: International IP payments, selected economies, 1975–2015



Source: Adapted from the World Development Indicators database.

Owing to the lack of historical data, we present R&D expenditure as a share of GDP for these countries since 1996 (Figure 7). What is clear from the data is the significantly higher percentage and steeper gradient of R&D expenditure in South Korea compared to Indonesia, Malaysia, the Philippines and Thailand. Indeed, South Korea (4.1 percent) had the second highest R&D expenditure as a share of GDP in 2014 after Israel (4.5 percent).[2] Malaysia ranks second among the five countries in Figure 7. The government began to raise R&D expenditure in 2005, following efforts by the Ministry of Science, Technology and Innovation and the Ministry of Higher Education to support the deepening of scientific research and intellectual output. Thailand ranks third, while Indonesia and the Philippines have extremely low levels of investment in R&D.

Figure 7: R&D expenditure as a share of GDP, 1996–2014



Source: Adapted from the World Development Indicators database and national sources.

4.2. Sources of Funds

Typically, the supply of money from incomes and domestic interest rates as well as exchange rates and the potential for earnings abroad influence national savings. However, investment is affected not just by savings, but also by net FDI, aid, grants and portfolio equity investment,

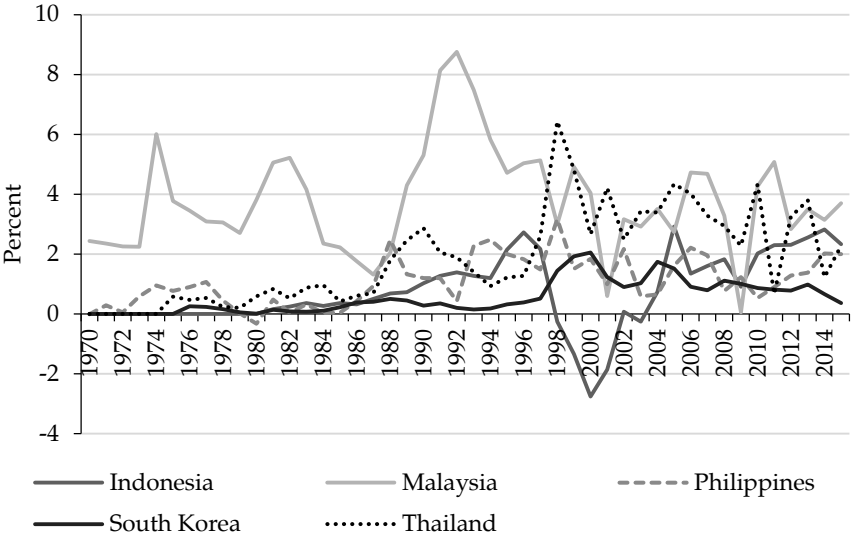
[2] http://data.uis.unesco.org/

which have a bearing on overall gross capital formation. Here, we examine the sources of funds to explain the investment levels discussed above.

Savings as a share of GDP were lowest in Indonesia and South Korea in the 1960s, with the former seriously derailed by the removal of Sukarno and the New Order government established under Suharto. Malaysia had the highest savings level until the mid-1980s. However, as South Korea faced its first wave of technological expansion in 1975–78, savings grew strongly as the government sought to draw high arbitrage differential gains to service its debt while subsidizing preferred firms targeted for technological catch-up.

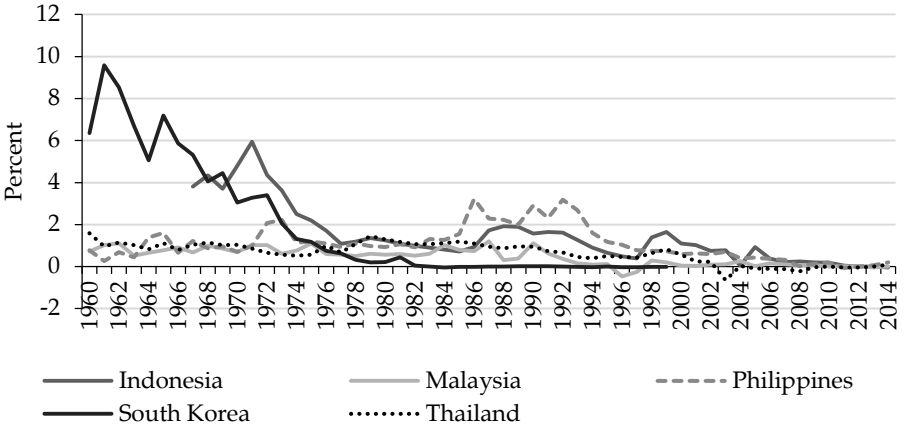
Net FDI was a major source of investment financing in Malaysia throughout and in the Philippines and Indonesia since the 1990s (Figure 8). In South Korea, overseas development assistance (ODA) and grants were the primary sources of funds used to develop infrastructure and support national firms' technological catch-up in the late 1960s and 1970s (Figure 9). Aid was also important in Thailand in the late 1960s, early 1970s, and late 1980s and 1990s. The Philippines enjoyed high levels of ODA during the late 1980s and 1990s.

Figure 8: Net FDI, selected economies, 1970–2015



Source: Adapted from the World Development Indicators database.

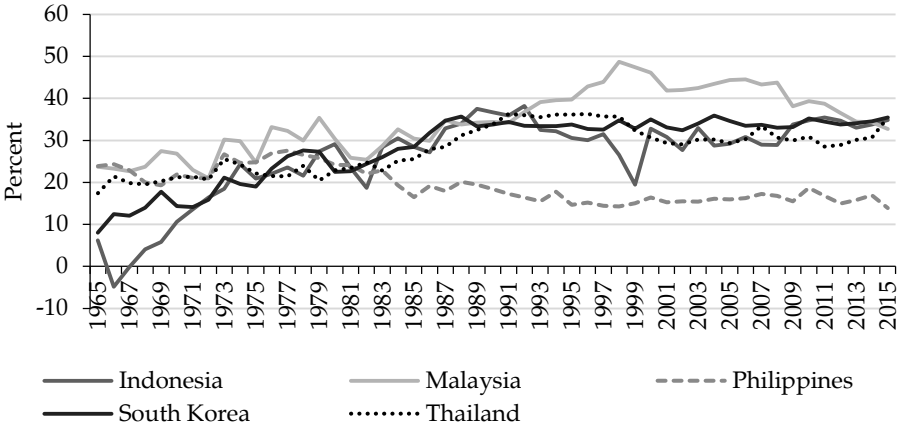
Figure 9: ODA, selected economies, 1960–2015



Source: Adapted from the World Development Indicators database.

The periods 1973–75 and 1979–81 experienced a fall in savings when oil prices rose four times and 2.5 times, respectively. Savings also fell in other countries owing to the inflationary pressure created by the oil shocks and falling commodity prices. Although all five countries were affected by the Asian financial crisis of 1997/98, only Indonesia faced a sharp fall in savings due to massive capital flight (Figure 10). The Philippines began with the highest savings ratio in 1965, but the introduction of liberal policies in the mid-1980s caused the savings ratio to decline. Savings in South Korea stabilized during the mid-1980s at over 30 percent of GDP.

Figure 10: Savings as a share of GDP, selected economies, 1960–2015



Source: Adapted from the World Development Indicators database.

We can see that domestic savings were not central to financing economic development in general and technological upgrading in particular. Indeed, South Korea relied heavily on aid and grants in the 1960s and early 1970s. FDI was significant in Malaysia's case in the 1970s, while its significance in Thailand and Indonesia rose in the mid-1990s, although there was a sharp fall during the Asian financial crisis. Domestic savings were important in Malaysia, Thailand and the Philippines in the 1960s and 1970s. In the latter, domestic savings as a share of GDP fell and stagnated in the early 1980s, as a series of structural adjustment packages from the IMF were initiated to help the country overcome its chronic BOP deficit.

5. Technological Upgrading Experience

This section analyzes the innovation experience of Indonesia, Malaysia, the Philippines, South Korea and Thailand. Since we cannot assess incremental innovations, especially those not registered as IP, we look at the innovation output of these countries based on the number of patents granted in the US – considered the most rigorous criterion. We also examine innovation dependence on foreign countries by analyzing the trade balance between receipts and payments for international IP recorded by these countries.

While significant inflows of knowledge from abroad and the evolution of knowledge domestically are key drivers of incremental and radical innovations, these sources are difficult to capture. We focus, therefore, on imports of IP captured by payment receipts against the sale of IP. Exports of IP can be viewed as a part of radical innovations. We examine the patents granted in an industry common to all five countries: the integrated circuits (IC) sector. Although not necessarily synonymous with radical innovations, IC patents granted in the US can be seen as a rough proxy for radical innovations. Table 1 shows the number of US patents granted in Indonesia, Malaysia, the Philippines, South Korea and Thailand for the IC industry.

Table 1: Patents filed in the US, IC firms in East Asian developing economies, 1985–2011

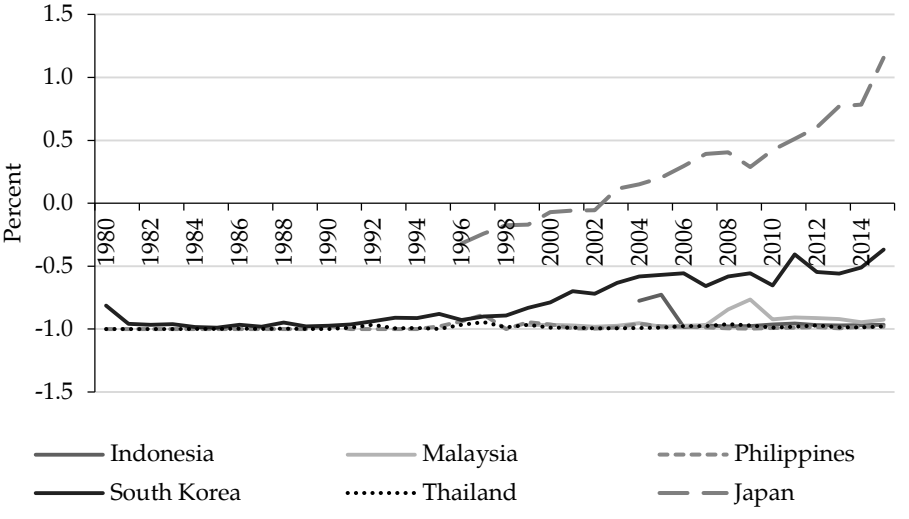
Period		Indonesia	Malaysia	Philippines	South Korea	Thailand
1981–85	N	0	0	0	1	0
	F	0	0	0	0	0
1986–90	N	0	0	0	103	0
	F	0	0	0	2	0
1991–95	N	0	0	0	1,526	0
	F	0	1	0	1	0
1996–2000	N	0	0	0	5,095	0
	F	0	5	5	11	3
2001–05	N	0	4	0	8,049	0
	F	0	39	40	139	45
2006–11	N	0	3	0	25,014	0
	F	0	270	70	409	3
2012–15	N	0	17	0	27,610	0
	F	10	444	41	606	46

Note: N = firms with complete or majority national control, F = firms with complete or majority foreign control.
Source: United States Patent and Trademark Office (2016).

Patents registered by national IC firms in South Korea rose sharply from 1 in 1981–85 to 27,610 in 2012–15. Malaysia ranks second, with only 17 national patents in 2012–15. Patents granted to foreign firms operating in South Korea rose from 0 in 1981–85 to 606 in 2012–15. Again, Malaysia ranks second at 444 patents. Indonesia, the Philippines and Thailand follow with fewer than 50 patents each. The results show that the incentives, grants and innovation ecosystem evolved by the government in South Korea successfully moved national firms to the technology frontier. Among IC firms, Samsung Semiconductor is a world leader in memory chips. Foreign firms still dominate patent filing in the other countries, but the far smaller number of patents demonstrates the weak innovation capacity of firms in these countries.

Figure 11 shows the international trade balance in IP receipts and payments for the five countries relative to Japan, Asia's leading technology producer. We can see that Japan began to experience a positive balance in 2003, and has since enjoyed a sharp expansion in its IP trade surplus. Indeed, its IP receipts were over double its IP payments in 2015, indicating that the country has become a strong net IP exporter with a significant degree of radical innovations.

Figure 11: IP trade, selected economies, 1980–2015



Source: Adapted from the World Development Indicators database.

All five East Asian countries have a negative IP trade balance, but that of South Korea has improved tremendously in trend terms from –1.00 in 1987 to –0.37 in 2015. The Philippines and Thailand have performed the worst: with marginal IP exports, their trade balance has remained negative (–0.98 in 2015). Malaysia has not fared much better, with a corresponding trade balance of –0.93 in 2015. Although its R&D expenditure has risen since 2012, it will take time for such investments to translate into IP tangible enough to improve the country's IP trade balance significantly.

6. Governance Mechanisms

While the direction of investment with a strong focus on innovation activities, both incremental and radical, is important in explaining the differential growth outcomes of Indonesia, Malaysia, the Philippines, South Korea and Thailand, the management of financing and the governance of technological upgrading were also key to growth.

6.1. Growth Performance Policies

All five countries had in place some form of import substitution behind tariffs, quotas and incentives to export. However, only South Korea managed to execute effective appraisal instruments on a large scale and thus drive national firms toward the technology frontier. While it has

enjoyed radical innovation on a national scale, Indonesia, Malaysia, the Philippines and Thailand have experienced incremental innovation. In this section, we discuss the policies implemented by these countries with respect to growth performance.

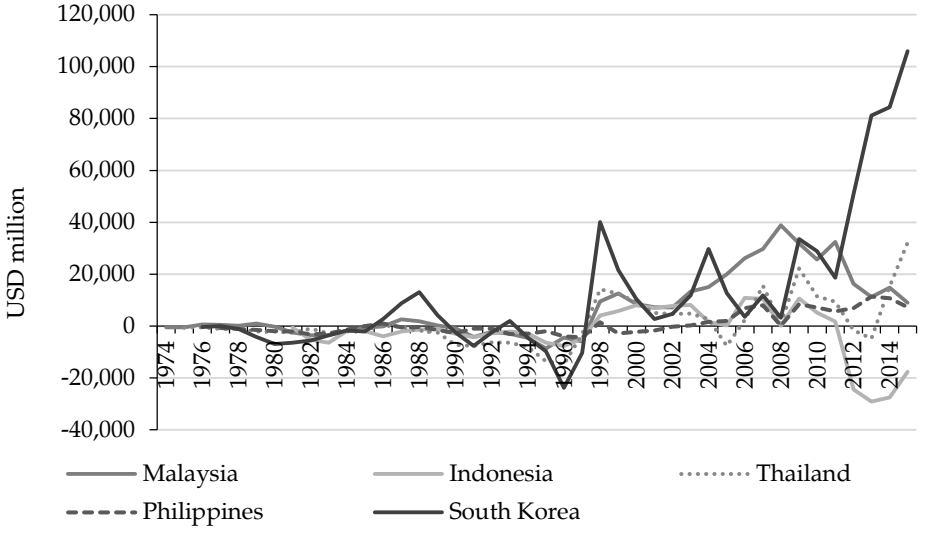
Government policies in South Korea favored national firms in spearheading economic development. Restrictions on FDI were removed only in 1985 and FDI allowed in nonstrategic industries during the 1960s (Amsden, 1989; Kim, 1997). As foreign exchange from aid fell sharply in the 1970s, the government pressured all firms accessing subsidized loans and protection in the domestic market to increase exports. This was strictly enforced: violators were penalized and nonperformers removed from the list of productive rent-recipients (Amsden, 1989). The selection of corporate directors with an engineering background was also critical during the late 1960s and 1970s, given that firms such as Samsung, Hyundai, POSCO and Daewoo began at the bottom of the technology frontier. Since the government controlled the establishment of technology licensing agreements and the acquisition of firms (it controlled all foreign exchange dealings), it could influence technology transfer effectively. Indeed, the catch-up of Daewoo, Hyundai and Samsung relied heavily on technology acquisition from foreign firms (Edquist & Jacobsson, 1987; Kim, 1997).

While government expenditure in all five countries was strong, fiscal policy in Indonesia, Malaysia, the Philippines and Thailand was less interventionist in promoting technology than in South Korea. In 1991 and 2000, respectively, Malaysia and Thailand introduced proactive policies to stimulate technological upgrading, including incentives and grants. These instruments spurred the production of innovation output, including patent filing and scientific publications, but in the absence of effective vetting and appraisal and few university–industry linkages, firms in these economies could not appropriate significant innovation gains.

Between the late 1960s and 1985, the won–US dollar exchange rate remained fixed, the handling of foreign currencies was tightly regulated by the central bank and all commercial banks were government-owned in South Korea. Managing these key financial instruments enabled the government to channel funds directly to productive activities. Exchange rate management and ownership ended, following the Plaza Accord of 1985 when the won was floated and Korean banks gradually privatized. The liberalization that followed left the economy vulnerable to harmful financial practices, culminating in the financial crash of 1997/98.

By effectively managing investment to support innovation, which drove rapid economic growth and structural change, South Korea turned its BOP deficits of the 1970s, 1980s and 1990s into massive surpluses by 1998 (Figure 12). Malaysia did reasonably well from 1998 to 2008, but its surpluses have fallen since then. Thailand (2012/13) and Indonesia (2012–15) have faced deficits, but shown improvements since 2013.

Figure 12: BOP trends, selected economies, 1974–2015



Source: Adapted from the World Development Indicators database.

6.2. South Korea

As the country endowed with the least natural resources of the five examined here, South Korea, embarked on a stringent policy of supporting productive investments (Amsden, 1989; Chang, 1994). Export orientation was identified as a measure of competitiveness and exporting firms enjoyed subsidized interest rates, protection in domestic markets and access to foreign currencies. During 1970–80, exporting firms enjoyed a real interest rate of between –10.3 and –16.3 percent, compared to the kerb market rate of 16.3–28.2 percent (Dornbusch & Park, 1987: 419).

Even after Park Chung, the export sector faced a real interest rate of 4.7–7.7 percent during 1982–86, compared to the normal market rate of 20.8–23.4 percent. The emphasis on exports and a fixed won–US dollar exchange rate till 1985 helped clear the current and capital account deficits accumulated through large imports of raw materials and capital goods. FDI

was restricted in strategic sectors and not tied to any incentives. Importantly, the Economic Planning Board, which had direct access to the President, could successfully execute government policy (Kim, 1991).

While trade and financial coordination were important (implemented through quotas and tariffs, and subsidized interest rates for targeted firms), technological catch-up became the means of upgrading and manufacturing expansion (Amsden, 1993). Moreover, human capital development became a key thrust of technological catch-up. On the one hand, the government invested heavily in widening and deepening the supply of S&T-based human capital (Vogel, 1991). On the other, large outflows of students seeking a science education in the West generated experiential knowledge – gained from studying at the best research universities and working at frontier firms – as they returned in large numbers or participated in knowledge flows to stimulate technological catch-up (Saxenian, 2006). The government also supported initiatives by Korean firms to acquire technologically superior firms to move up the value chain. For example, Samsung purchased Schlumberger, Zilog and Micron Technology to hasten its catch-up in memory production (Edquist & Jacobsson, 1987).

Under Park Chung Hee, the state had enough autonomy to play a developmental role (see Jessop, 1989; Skocpol, 1994, 1995). The stringent application of what Chakravarty (1987) and Sen (1983) call the 'carrot-and-stick approach' drove technological catch-up by Korean firms. Thus, national firms such as Samsung, Hyundai, POSCO and Daewoo could shape the world technology frontier either alone or as one of the lead firms doing so in their respective industries (Amsden, 1991). To this end, the government offered large grants to stimulate R&D. Indeed, South Korea's R&D expenditure as a share of GDP was less than 2 percent a year before reaching 2 percent in 1994. It has since risen from 2.2 percent in 1996 to 4.1 percent in 2014.[3] Commercialization was a key instrument used by the government to stimulate innovation by national firms.

6.3. Malaysia, Thailand and the Philippines

Early import substitution policies in Indonesia, the Philippines and Malaysia in the 1950s and 1960s – following the laissez faire regimes of the Dutch, Spanish and British, respectively, strong American influence in the

[3] http://data.uis.unesco.org/ and https://stats.oecd.org

Philippines since 1898 and British influence in Malaysia – did little to spur industrialization (Rasiah & Nazeer, 2016). American goods enjoyed free access to the Philippines until 1954, following the Bell Trade Act of 1946 (Hutchcroft, 1989). British goods could enter colonial Malaya and (after 1957) independent Malaysia without trade restrictions until the enactment of the Pioneer Industry Ordinance in 1958 (Rasiah, 1993).

Indonesia opposed foreign ownership until Suharto's New Order regime replaced the Sukarno government. Thailand was never directly colonized, but was integrated strongly with European trade interests. Despite strong American influence in the 1960s, Indonesia had strong import substitution policies in place. Ownership was tightly controlled until the early 1990s when special privileges were given to exporting firms relocating in Batam and Bintan. Import-substitution industrialization in Indonesia, Malaysia and the Philippines enjoyed tariff and quota protection, but lacked the discipline of performance standards needed to spur technological catch-up.

Patronage through clientelist influences from the Bourgeoisie dictatorship in the Philippines (Ofreneo, 2016) and Thailand (Phongpaichit & Baker, 2004), from the ruling political party in Malaysia (Gomez & Jomo, 1999) and from the army in Indonesia constrained the capacity of competition to stimulate upgrading. It was under such constrained policy regimes that their governments launched national car and steel firms in Malaysia (Jomo, 1990), the 'people's car' in the Philippines (Ofreneo, 2016), steel and aircraft firms in Indonesia and cement firms in Thailand.

Export processing zones were set up in the Philippines and Malaysia in the early 1970s, in Thailand in the 1980s and in Indonesia in the 1990s to stimulate FDI inflows and employment. However, both import substitution and export orientation coexisted in these countries. Apart from the Marcos regime of the 1970s and early 1980s, when the communist rebellion threatened to undermine foreign manufacturing activities in the Philippines, foreign multinationals dominated manufactured exports in both countries.

While all four countries introduced a range of incentives and offered basic infrastructure (at least in export processing zones) to attract FDI, they had no strategy in place to stimulate technological upgrading for several decades. Malaysia attempted to do so in 1991, but could not for want of a framework to govern this upgrading. Strategic industries were identified and given financial incentives and grants, but no roadmap or appraisal was implemented. While the 'carrot' (rents) was proffered, the 'stick' (discipline)

remained largely absent. Thus, manufactured exports in Malaysia remained in low value-added assembly and processing activities.

Malaysia and Thailand have done better than the Philippines and Indonesia. This is primarily because Malaysia attempted to stimulate upgrading in 1991, while resource endowments helped generate foreign exchange from oil and gas exports and oil palm processing. In Thailand's case, the country supported upgrading in 2000 in industries such as the automotive industry (Intarakumnerd & Chaoroenporn, 2013).

The institutions set up thereafter include the Human Resource Development Council, the Malaysian Technology Development Corporation, the Multimedia Super Corridor and the Malaysia Industry Government High Technology and Multimedia Corporation. Additionally, the Malaysian Institute of Microelectronics Systems was corporatized, S&T parks established and R&D grants provided. Nonetheless, there has been no effective selection, monitoring and appraisal of state-promoted industrial enterprises (Rasiah, 1999). In the case of the Philippines, which accepted structural adjustment packages in the mid-1980s, no active industrial policy has re-emerged (Ofreneo, 2016).

Localization policies – especially in automobile assembly, based on components sourced domestically – and joint ventures were the norm in all four countries during import substitution. This rule still applied in 2016 through nontariff barriers in Malaysia after the ASEAN Free Trade Area was launched in 1992. Such provisions were deregulated in the Philippines, Thailand and Indonesia in the 1980s, 1990s and 2000, respectively. While such policies stimulated joint ventures in components and knocked down parts production, they were confined to low value-added national and regional markets.

The lack of connectivity to a highly evolved innovation system networked with universities, R&D laboratories and science parks has restricted technological upgrading in supply chain firms in Indonesia and the Philippines. The development of meso-organizations such as R&D labs, linkages with universities and provision of grants in numerous industries in Malaysia and in electronics and automotive products in Thailand has enabled some firms to progress to designing activities (Rasiah, 2013; Intarakumnerd & Chaoroenporn, 2013).

To some extent, Malaysia was the first to follow South Korea's example when the government launched its 'Look East' policy in 1981.

Subsidized interest rates were offered to state-supported heavy industries (automobiles, cement and steel) and double-deduction incentives to exporting firms (Jomo, 1990). While the state-supported heavy industries enjoyed strong protection in the domestic economy, there was no pressure to export, although some firms such as Proton managed to export small shares of output intermittently.

In the absence of a 'stick' to compel firms to perform in global markets, they have not been subject to the discipline needed for national firms to compete overseas. The country's steel and automobile firms have yet to achieve international competitiveness. Nevertheless, palm oil conglomerates such as Sime Darby, IOI and Felda Global Ventures, and construction firms such as United Engineering Malaysia, Gamuda and YTL have gained from technology transfers via foreign firms and strategic development to become world-class firms (Perkins, Rasiah & Woo, 2017).

Despite being endowed with the least resources and facing large debts in its early years, South Korea has – of the five countries – effectively managed its productive investment as a driver of technological catch-up among national firms. As a result, it has witnessed extensive structural change and rapid economic growth. Its autonomous government used the carrot-and-stick approach to engender the conditions needed for capital accumulation and technical progress. Malaysia, Thailand, Indonesia and the Philippines, which were less insulated from clientelist pressures, have also managed to grow, but not as swiftly – either given the lack of emphasis on discipline (in the first two countries) or the lack of concerted national focus on technological progress.

7. Conclusion

The evidence shows that managing financial flows and using them effectively to stimulate technological upgrading, rather than accumulating domestic savings, is the key to rapid economic growth. Indeed, South Korea relied heavily on aid and grants in its early years of rapid growth and imposed stringent governance conditions on rent recipients to stimulate exports. Malaysia and Thailand follow in terms of economic growth, but remain far behind South Korea. These countries used incentives and grants to support the development of R&D activities between firms and labs/universities, but had no stringent mechanism to appraise and retain such support for firms that managed to increase their exports in higher value-added activities.

Not only does South Korea have a far higher per capita GDP than the other five countries, but it has also managed to transform several industrial corporations into shaping the global technology frontier. While incremental innovation characterizes all five economies, only South Korea has managed to participate in radical innovations. The combination of an autonomous state and strong governance mechanisms for sustaining discipline among firms has ensured that the rents received (through subsidized interest rates, tariff protection in early years and grants) are used productively.

Indonesia, Malaysia, the Philippines and Thailand have tried to reproduce these elements, but on a much lower scale, without effective governance and under clientelist pressures. Much of the manufactured exports sector still comprises foreign-owned firms in these countries. Formal technological catch-up strategies were never part of government planning in Indonesia, the Philippines or Thailand, although all three countries made an effort to stimulate heavy industry. Malaysia launched its Way Forward Policy in 1991 to drive technological transformation, but its execution fell short since the developmental role required to implement such a policy was compromised by political patronage.

Consistent with the arguments presented by Summers (2003) and Rodrik (2011), the evidence shows that it does not matter whether investment funds are generated through overseas debt, grants or domestic savings. What matters is how these investment flows are managed and how their use to finance technical progress is governed. South Korea, for instance, had the largest debt and the smallest domestic savings in its formative years, but went on to become a developed economy in one generation. What mattered was how it managed its financial resources. However, as with typical macroeconomic analyses, both neoclassical and Keynesian, fiscal policies have not emphasized the critical force behind such successes. Marx (1957) and Schumpeter (1934, 1943) were correct in putting technology at the forefront to explain economic transformation. Indeed, Kalecki (1976) makes the point that fiscal policies can only be effective if they stimulate productive investment.

South Korea's phenomenal success depended greatly on its focus on technological catch-up and leapfrogging as well as on its stringent implementation and enforcement of a governance mechanism of productive rents that gradually improved matching between recipients and performers, and prevented rent dissipaters from sapping the economy. Its success is all the more impressive because it transformed national firms from backward latecomers to frontier first-movers in a number of industries.

While Malaysia, Thailand, Indonesia and the Philippines have experienced significant incremental innovation, all four countries lie well below South Korea in terms of technological capabilities and economic growth. Malaysia and Thailand began to finance innovative activities in the 1990s and 2000s, respectively, which has helped them achieve upper middle-income status. However, the lack of effective meso-organizations and governance mechanisms has reduced the synergies essential to sustaining long-term economic growth.

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The Lahore Journal of Economics
22 : SE (September 2017): pp. 183–198

Bangladesh 2000-2017: Sustainable Growth, Technology and the Irrelevance of Productivity

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Abstract

This paper focuses on the case of Bangladesh as an example of a country that is at risk of falling into the 'middle income trap', in other words the risk that a country that has attained middle income levels will then be unable to join the club of developed countries. This paper uses the theory of Unequal Exchange from the Dependency School to understand the middle income trap in Bangladesh and further argues that the ideas of productivity, competitiveness and technological change derived from orthodox economic thinking are not useful in understanding growth prospects and policy responses in contemporary middle income countries. Alternately, the paper explains the role of structural change as a means of sustaining growth in middle income countries.

Keywords: Bangladesh, middle income trap, unequal exchange, structural change.

JEL Classification: O40, O14.

1. Introduction

In recent years, Bangladesh has unobtrusively joined two prestigious clubs; those of the "economic successes" and also the "development successes". Steady economic growth over recent decades has continued throughout global and regional crises and seen Bangladesh attain middle income level status. A striking ability to translate this economic growth into improvements in human welfare - higher literacy and life expectancy and lower child mortality and female fertility, for example - has seen Bangladesh being tentatively added to an even more exclusive list. This is the short list containing the Indian state of Kerala, China in the 1970s, Costa Rica, Cuba and very few others - those states or countries that have made striking achievements in human welfare despite low levels of national income. In 2017, Bangladesh begins to face new challenges that have emerged as a result of this success. Bangladesh faces

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a transition towards facing market prices for imported pharmaceutical products and is no longer able to rely on an aura of hopeless poverty to access them at steeply discounted rates. This paper focuses on a new economic threat, one that is again paradoxically a product of success. This is the "middle income trap" or the fear that countries who have successfully attained middle income level (roughly GDP per capita of USD 1000-5,000) will then be unable to sustain their prior growth momentum and go on to become developed countries. While utilizing this new organizing concept this paper uses an old-fashioned theoretical perspective - that of Unequal Exchange from the Dependency School to make sense of the middle income trap in Bangladesh. This paper argues that the ideas of productivity, competitiveness and technological change derived from orthodox economic thinking are not useful starting points in thinking about growth prospects and policy responses in contemporary Bangladesh. Instead, Unequal Exchange points towards the importance of structural change as a means to sustain growth in contemporary Bangladesh. While the analysis is clear this paper does not have an optimistic conclusion as it suggests that countries like Bangladesh lack the state capacity to pursue this policy goal.

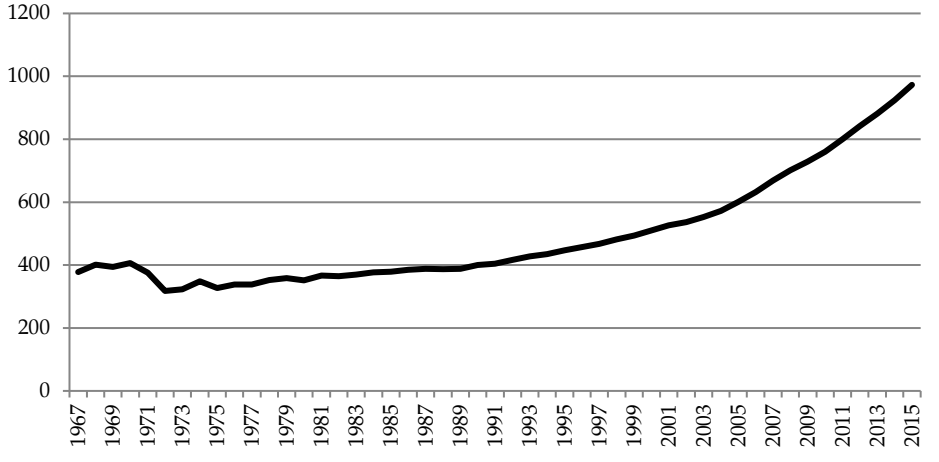
This paper is organized as follows. Section 2 introduces the idea of Bangladesh as a growth and development success story, section 3 introduces and illustrates the idea of the middle income trap, section 4 discusses the orthodox view of competitiveness, productivity and technology, section 5 makes a case for an old-fashioned economic theory - that of Unequal Exchange - to think about contemporary Bangladesh and section 6 concludes.

2. Bangladesh: A Growth and Development Success Story

In the early 1970s, Henry Kissinger, the US Secretary of State, called Bangladesh a "basket case". This referred to the widespread view that the country was socially and economically non-viable. Bangladesh was an agricultural economy suffering from famine; it was dependent on the exports of raw jutes to be processed by mills in Pakistan, a market now severed by civil war and independence, and it was dependent on foreign aid to preserve its normal social and economic functioning. Thirty years later, Bangladesh by contrast was widely perceived to be an economic success story. During the 2000s the Bangladeshi economy has been growing at more than 6 percent per annum. The years 2011 to 2015, which saw a slowdown in various emerging economies, including India, saw by contrast broad-based growth in Bangladesh: in agriculture (2.5-4.4

percent), in industry (8-10 percent) and in services (5-7 percent). Over the 2000s, other indicators pointed to the likely sustainability of this growth; inflation fell (11 to 6.5 percent), investment as a share of GDP remained steady (27-28 percent), and debt service as a share of GDP declined (17 to 12 percent) (Asian Development Bank, 2016). Bangladesh is now even being talked up as a human-development success story. Although India has outpaced Bangladesh in terms of growth over the last two decades, "in terms of many typical indicators of living standards, Bangladesh not only does better than India, it has a considerable lead over it" (Dreze & Sen, 2013, p. ix). Evidence for this proposition is not hard to find: Between 1990 and 2015, life expectancy at birth increased from 56 to 71, adult literacy increased from 37 to 64.6 percent, primary school enrollment increased from 56 to 109 percent, and child malnutrition declined from 61.5 to 32.6 percent (Asian Development Bank, 2016). Figure 1 reveals this story: the economic decline after the late-1960s and the steady economic growth after 1990, not interrupted by the 1997 Asian Crisis, 2001 DotCom crisis or by the 2008 Global Financial Crisis.

Figure 1: GDP per capita in Bangladesh 1967 to 2015 (2010 constant $)



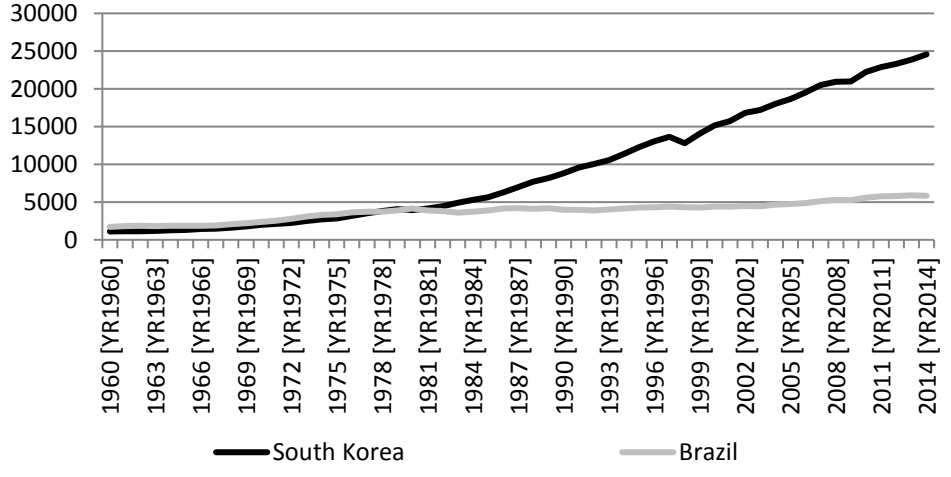
Source: World Bank (2017b)

3. Bangladesh and the Middle Income Trap

While lauding long years of steady economic growth in Bangladesh and similar successful developing countries, various scholars have voiced concerns about the likely medium to long term sustainability of this growth. This is part of a wider discussion that acknowledges the success of

various developing countries that have achieved rapid GDP growth and reached the status of middle income countries (Bangladesh was thought to have achieved this status by 2015) but also that sustaining growth beyond this point represents a new and more difficult challenge. There was a consequent risk of Bangladesh and others falling into a middle-income trap of economic stagnation (Felipe et al., 2012). Figure 2 shows the reality of such a trap. Between 1960 and 1980, both Brazil and South Korea experienced rapid economic growth and both achieved middle-income status. After 1980, South Korea sustained that growth such that the Asian Crisis of 1997 and Global Financial Crisis of 2008 have had only a relatively minor impact and are dominated by a longer term upward trajectory. Economic growth in Brazil, by contrast stalled after 1980, and by 2014, GDP per capita was only slightly higher than it had been thirty years earlier.

Figure 2: GDP Per Capita in Brazil and South Korea, 1960 to 2014 (constant 2005 US$)



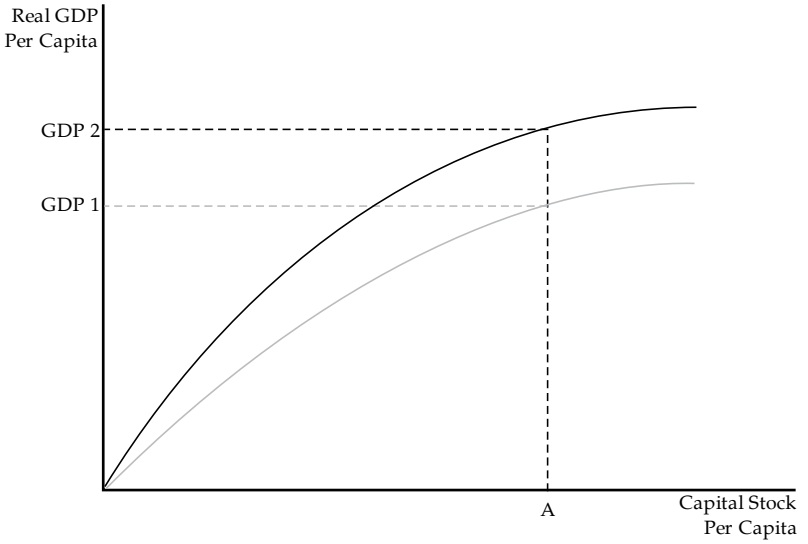
Source: World Bank (2017b)

4. The Orthodox View: Productivity, Competitiveness and Technology

The orthodox theoretical perspective used to understand countries like Bangladesh can be seen in Figure 3. This illustrates how Bangladesh has grown since the 1970s based on accumulating more factors of production, notably capital and labor. Investment has increased from negligible levels to around 27 percent of GDP and literacy rates and primary school enrolment doubled in the twenty five years after 1990. This growth was was export-led and these exports mostly comprised of ready-

made garments which expanded from negligible levels in the late 1970s (US$ 40,000 in 1977) to 3,500 factories in the mid-1990s and by 2010 readymade garments exports topped US$ 16 billion. Export growth was structured around bringing women into the labor force, with the percentage of women in manufacturing rising from around 4 percent in 1974 to 55 percent in 1995/96 when the sector employed around 1.5 million women (Kabeer & Mahmud, 2004). This pattern of growth can be represented by a move from the origin of Figure 3 (in 1970) to point A (in 2017) which is associated with GDP per capita rising to GDP_1. After this point, there are diminishing returns to accumulating more labor and capital. In Bangladesh, the empirical evidence supports this theoretical perspective; there are growing shortages of young women able to enter the labor force. There is good evidence that real wage growth in Bangladesh has accelerated since the early 2000s as "the supply of seemingly unlimited labor was exhausted, the terms of trade in the labor market started to shift in favour of workers, leading to a tightening labor market and an increase in agricultural wages." (Zhang et al., 2014, p. 274). This has been accompanied by lower returns to human capital and empirical studies show declining social returns to education after the primary level across a broad cross-section of countries (Psacharopoulos, 1994). This is the reality of the middle income trap as it begins: Continuing with the same growth strategy that has successfully sustained growth to point A (roughly middle-income level) will run into diminishing returns to accumulation and slowing economic growth. The orthodox way of thinking about how best to sustain economic growth in Bangladesh and other middle income developing countries is that escaping the middle income trap requires a shift in development strategy. This shift would need to utilize new technology to boost the productivity of existing factors of production, which in turn would shift the production possibility curve in Figure 3, leading to sustained economic growth and raising GDP per capita to GDP_2.

Figure 3: Sustainable Growth in Bangladesh



One way in which this thinking has proved influential is in terms of the idea of "competitiveness". The World Economic Forum has been publishing the Global Competitiveness Report and its associated competitiveness index since 2004. The 2015/16 report noted that we "define competitiveness as the set of institutions, policies and factors that determine the level of productivity of an economy, which in turn sets the level of prosperity that the country can earn." (World Economic Forum, 2015, p. 4). The World Bank shares this same understanding: Productivity, "is what drives competitiveness in the long run, and boosting productivity leads to rising living standards through higher wages and returns in investment." (World Bank, 2017a, p. 18).

The measure of competitiveness produced by the 2015/16 Global Competitiveness Report combines 114 indicators that are further combined into 12 "pillars"[1]. These pillars are institutions, infrastructure,

[1]In the 2015/16 Global Competitiveness Bangladesh rated 107th from 140 countries (World Economic Forum, 2015, p. xv). This ranking represented a gradual improvement, from 118th in 2012/13, 110th in 2013/14, and 109th in 2014/15. Over this same time period, Bangladesh's overall competitiveness score (out of 7.0) increased from 3.6 to 3.8. In 2015/16 Bangladesh rated well on its macroeconomic environment (5.0 out of 7.0), market size (4.7) and health and primary education (5.2), but poorly on higher education and training (2.9), infrastructure (2.6), institutions (2.9) and innovation (2.7). Among the more disaggregated components of the various pillars Bangladesh does well in regard to the strength of investor protection where it ranks 42nd out of 140 countries, General government debt, 46th, HIV prevalence joint 1st, the total tax rate 49th, legal rights 44th and domestic market size 32nd. Bangladesh does less well on irregular payments and bribes 139th, efficiency of the

macroeconomic environment, health and primary education, higher education and training, goods market efficiency, labor market efficiency, financial market development, technological readiness, market size, business sophistication and innovation (World Economic Forum, 2015, p. 5). The ninth pillar is "technological readiness" which "measures the agility with which an economy adopts existing technologies to enhance the productivity of its industries……..firms operating in the country need to have access to advanced products and blueprints and the ability to absorb and use them" (World Economic Forum, 2015, p. 36). The report understands technology as "a broad concept covering not only products such as machinery, equipment, and material, but also processes and organization methods, all linked by the common factor of enhancing efficiency in production" (World Economic Forum, 2015, p. 52). The logic behind this is clearly that technology boosts productivity and higher productivity sustains economic growth.

Policy recommendations stemming from the competitiveness paradigm on how to boost productivity focus on facilitating the use of new technology by making markets work better. The reasoning is that better functioning markets will increase the competitive pressure on Bangladeshi firms to utilize new technologies and facilitate the efficient access of such firms to global technologies at low cost. For example World Bank (2017a, p. 37) describes the investment climate as "the environment which determines entrepreneurs' ability to work efficiently, such as the degree of difficulty in accessing production inputs and dealing with regulatory and legal requirements, and the level of security in running operations and obtaining payments". The report notes with approval that various new government initiatives have improved the functioning of markets - that the Economic Zones Act of 2010 has improved incentives, the Competition Law has leveled the playing field for businesses, the Value Added Tax (VAT) has reduced the cost of compliance, regulatory reforms have eased business registration, trademark and patent registration, and simplified licenses and construction permits (World Bank 2017a, p. 42). The World Bank (2016, p. 103) continues along the same lines and argues that "Bangladesh needs to address the fundamental drivers of global [value] chains, such as lowering the trade costs and barriers to services". And the same report argues that foreign investors are "confronted with major regulatory issues ranging from entry and establishment, taxation, access to skills and land, foreign exchange regulations, corruption and public governance." (World Bank, 2016, p. 251).

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legal framework in settling disputes 131st, reliability of police services 136th, ethical behaviour of firms 135th, country capacity to attract talent 122nd, and university-industry collaboration in R&D 131st (World Economic Forum, 2015, p. 108-9).

5. Unequal Exchange and Old-fashioned Economics

The very general diagnostics of thinking rooted in competitiveness ignores the very specific and peculiar conditions of economic growth in contemporary Bangladesh. At first glance, productivity *would* appear to be crucial in any long term strategy to sustain economic growth in Bangladesh. Exports from Bangladesh grew by 13 percent per annum between 2000 and 2013, at the end of which Bangladesh had only a 0.2 percent share of the global market, implying that there is clearly scope to increase exports further from Bangladesh. Also exports from Bangladesh have been concentrated in low cost, low value added textiles. This focus has resulted in a growing movement among the international community of textile buyers to pressure Bangladesh into raising labor standards, including wages[2]. This would require Bangladesh to shift to a productivity led growth strategy to raise wages (and improve labor conditions) whilst remaining competitive in world markets. But let us pause at this point to question this easy assumption. Without thinking carefully about the precise nature of such a productivity-led strategy, the effort could run into significant problems. This is where one particular strand of dependency thinking - that of Unequal Exchange; can better help us understand the situation in contemporary Bangladesh.

The Dependency School of economics is the old-fashioned economics that will help us to better understand the constraints and opportunities facing the economy of Bangladesh in recent times. The Dependency School flourished in the 1960s and 1970s and took as its starting point the idea that the prospects for economic growth in a developing country are principally determined not by competitiveness or the functioning of markets but by its structural position in the international economy (Hunt, 1989). Industrial development in a developing country is dependent on markets, technology, brand names, services such as insurance and marketing and also foreign capital originating in developed countries. The analytical frameworks of the Dependency School revolve around how profit (known as an economic surplus) is extracted by the developed world from the developing world. The means by which this surplus is extracted have varied and include colonial era

[2] A key point of that vulnerability remains over concerns about labor standards in Bangladesh and the possible reaction of importing countries. In June 2013, for example, the US suspended trade privileges granted to Bangladesh - the Generalized System of Preferences (GSP). The move was in response to concerns over safety and labor rights violations in the garments sector and in particular a reaction to the disaster at the Rana Plaza building in Dhaka. At the same time, 190 mostly European global apparel brands agreed a legally binding plan to inspect Bangladeshi garment factories and provide publicly available inspection reports. By September 2014, 1,103 factories had been inspected resulting in reports of 52,605 safety issues (World Bank, 2016, p. 17).

plunder and enforced trade, excessive profits earned by monopolistic MNC investment, technological dependence and associated royalty payments, and debt and consequent financial transfers (Dos Santos, 1970; Palma, 1978). This extraction, goes the argument, reduces the prospects for economic growth in the developing world. The more extreme versions of the Dependency School argue that such a dependent relationship will completely inhibit growth in the developing world. That "contemporary underdevelopment is in large part the historical product of past and continuing economic and other relations between the satellite underdeveloped and the now-developed metropolitan countries," and that "the structure and development of the capitalist system as a whole account for its simultaneous generation of underdevelopment in some of its parts and of economic development in others." (Frank, 1966, 5). The more moderate versions argue that in order to understand the economic growth of developing countries (such as Bangladesh) it is necessary to understand the general functioning of the world capitalist system and that economic growth and development in developing countries is possible but will be "a kind of dependent capitalist development in the sectors of the Third World integrated into the new forms of monopolistic expansion." (Cardoso, 1972, p. 89).

Export and hence economic growth in Bangladesh are clearly dependent on developed country markets. Although export growth was relatively rapid in Bangladesh (by 11.2 percent per annum between 2000/01 and 2009/10), there was a concern about what some have labelled the "Walmart Effect". The vast majority of Bangladeshi exports (96 percent) to the US are concentrated in ready-made garments and textile products and principally bought by cheaper retailers such as Walmart and Target. Measures of the "sophistication" of exports from Bangladesh have shown little change over the 2000s. By contrast, measures of sophistication have increased significantly in Vietnam, where cell phones and accessories overtook garments in the country's export profile over the 2000s. In addition to product categories, the destination of Bangladesh's exports has been very concentrated. Two-thirds of all exports went to the EU and the US (World Bank, 2016, p. 10), illustrating that export growth from Bangladesh over the last decade has been based around increasing exports to existing markets. Those exports were also driven by incumbents increasing output. Between 1998 and 2008 the top five textile exporters from Bangladesh remained the same, while in China only one remained in the top five. This is also shown by the low rate of entry and exit of firms in the garment sector in Bangladesh (World Bank, 2016, p. 26).

This increasing degree of specialization and dependence is very unusual. While the share of garments in total exports from Bangladesh increased from 77 to 84 percent between 2000 and 2012, it declined in China, Vietnam, India, and Pakistan (though did grow in Sri Lanka). The empirical evidence shows that developing countries tend to diversify their production and export structures as they experience sustained economic growth (Imbs & Wacziarg, 2003). Only at relatively higher levels of income (around the GDP per capita of Ireland) is further growth associated with increased specialization. This effect is not capturing a structural transformation from agriculture to industry but rather is driven by a process of diversification and expansion of the range of activities within manufacturing (Rodrik, 2006).

The most relevant work within the Dependency School is that of Arghiri Emmanuel and his theory of Unequal Exchange. Emmanuel (1972) argued that the root cause of underdevelopment lies in the exchange relations between developed and developing countries. He argued that under certain conditions, countries can become net losers through international trade which is a striking difference from the orthodox theory of comparative advantage. Emmanuel argued that capital is mobile while labor is not and that the rate of profit is equalized in all countries (assumptions which are reasonable approximations for contemporary Bangladesh). Under these conditions the ratio at which products are exchanged is determined not by the forces of demand and supply in international markets but by the domestic costs of production in developing and developed countries. Free movement of foreign direct investment (FDI) in the global economy means that capital costs can be assumed to be uniform internationally, but controls on the migration of people mean that wage costs differ dramatically between developed and developing countries leading to price differentials in production, especially in labor-intensive sectors like cheap textiles. The higher standard of living (wages) in developed countries will be reflected in the higher price of developed country exports relative to those of developing countries. In most cases, exports from the two regions are distinct and so developed country prices are not forced down by the lower cost competition from developing countries. Under these circumstances any productivity gains in developing countries will lower costs of domestic production and then be passed on as lower prices of exports and lower prices for consumers in developed countries (Hunt, 1989).

Unequal Exchange has become a pressing reality for Bangladeshi textile exporters. Although Bangladesh has a small share of global exports it

has a significant share of global textile exports. The share of South Asia in the global textiles market increased from 7.4 percent in 2000-04 to 11.4 percent in 2010-14 with a full 50 percent of this increase being due to Bangladesh. This share expanded with little change in the composition of exports over 15 years. Approximately 80 percent of Bangladesh's export growth was based on selling more of the same goods to the same destinations, a further 20 percent from selling the same goods to new destinations, while diversification into new products accounted for only 0.07 percent of export growth from Bangladesh (World Bank 2017a, p. 7-8). Productivity growth, implying the ability to produce Bangladesh's existing exports utilizing fewer inputs and so at lower cost may sustain growth for a while longer but Bangladesh is likely to run into market constraints by attempting to export ever more of the same product to the same markets. Gains in productivity in the competitive Walmart textiles market will reduce costs of production and in turn prices. The gains of such a strategy will be more likely to benefit US consumers than Bangladeshi firms and workers.

The missing concept in this discussion of competitiveness and technology is that of structural change. Structural issues are the traditional heart of development policies, whereby the movement of labor from traditional activities in agriculture to the modern sector is key to raising saving, investment, productivity and economic growth. There is a clear stylized fact, that rapidly growing countries are those with large and expanding manufacturing sectors (Rodrik, 2006). Growth accelerations are empirically linked to a rapid increase in the share of manufactured goods in total exports (Johnson et al, 2007) and to increases in the share of manufacturing employment in total employment (Jones & Olken, 2005). But recent thinking on economic policy has paid much less attention to structural transformation and industrial development.

Bangladesh has proved adept in recent decades at absorbing familiar technology, by using more of the same machines to produce more of the same (textiles output). So in the Bangladeshi case, technology is not irrelevant but technological change must be driven by the need to support structural change, not produce more of the same exports at ever lower cost. This creates a distinct problem for Bangladesh. Unlike investment that expands existing production or replicates well-known technologies, new technologies have an unknown payback period. Technological change tied to structural change will likely require the purchase and financing of new machinery, the training of workers and employees to effectively use new machinery/new processes for new markets/new products and investments in ancillary factors (especially in land) to enable the efficient

expansion of production. Together this means that structural change utilizing new technologies involve a higher degree of risk and uncertainty (Khan, 2008). In the presence of these learning costs, a latecomer firm (an infant industry) faces a disadvantage relative to established competitors in global markets who have already have undergone the learning process. The unpredictability, lack of information and capital market imperfections endemic to developing countries means that sudden exposure to full import competition can prevent entry into technologically more complex sectors (Khan, 2008). Learning-by-doing may imply a lengthy and unpredictable period of losses as firms learn and adapt technology to make it more appropriate to developing country conditions. Some learning involves serious externalities and coordination problems. In theory, private capital markets could fund firms through the period of learning. In practice, uncertainty, risk and illiquidity mean private capital will be reluctant to do so. In labor-intensive activities such as garment assembly, the wage cost advantage of developing countries may offset the learning costs completely making protection unnecessary. In complex activities with large-scale advanced information and skill needs, wide linkages and organizations, by contrast, the learning process could take decades and might possibly never be undertaken (Lall, 1994). Successful developing countries have frequently created market imperfections to offset these market failures. One such example is that of state provided incentives, known as rents. A rent could be a subsidy that offsets the initial high costs of production, allows a firm to produce, learn how to utilize new technology (engage in a process of learning-by-doing) and eventually become able to compete on world markets. The solution is not to make markets more competitive and perfect (the World Bank strategy) but to intervene and overcome a market failure so to induce structural change.

There are of dangers associated with such rent creation. Firstly, there is a risk of policy failure due to lack of information. The state may not have the information necessary to pick winners. Secondly, rent-seeking theory shows that state-created rents can generate social waste by diverting entrepreneurial energies from productive to unproductive activities like lobbying. Thirdly, state backed rents, once created are difficult to remove and there is plenty of evidence of infant industries that failed to grow up (Chang, 1993). There is evidence that the capacity of the state in Bangladesh has remained stagnant over the past decade and is one not likely to be capable of implementing sophisticated industrial policy reforms. The World Economic Forum (2015) compiled indices, ranging from 1 to 7 (7 being the best) to measure various aspects of governance. Table 1 compares

World Economic Forum reports from 2006/07 and 2015/16[3]. This reveals no significant change in the low level of state capacity in Bangladesh.

Table 1: Stagnant State Capacity in Bangladesh

Measure of Governance	2006/07 (rank)	2015/16 (rank)
Quality of Institutions	2.9 (121st)	2.9 (132nd)
Diversion of Public Funds	2.4 (113th)	2.8 (108th)
Judicial Independence	2.5 (102nd)	2.4 (130th)
Favoritism shown in decisions of government officials	2.0 (119th)	2.2 (128th)
Wastefulness of Government Spending	2.6 (99th)	2.6 (106th)
Reliability of Police	2.4 (119th)	2.6 (136th)
Burden of Government Compliance	2.4 (106th)	3.0 (107th)

Source: World Economic Forum (2006, 2015)

A key requirement for a state to implement grand policy and institutional reform is that the bureaucracy be relatively autonomous and so empowered to take a long run growth-promoting view of the economy that is not side-tracked by the populist and short-term demands of politicians. The reality is very different in Bangladesh. Table 1 showed that Bangladesh scores very poorly in terms of the favoritism shown in decisions of government officials. World Bank (2016) notes that policy making in Bangladesh remains "fragmented". There is for example no national trade strategy. The Ministry of Commerce has principal responsibility for domestic and international trade, for trade negotiations, tariffs and non-tariff policy and for ensuring WTO compliance. The Ministry of Commerce lacks the legal knowledge of trade law and lacks the data and analytical resources to keep up with WTO negotiations. The Ministry employed one statistician in 2012 (World Bank, 2016). The Ministry of Industry has responsibility for incentives under the Board of Investment. The Ministry of Finance takes the lead in setting tariffs which are treated as a sub-set of fiscal policy with revenue considerations rather than trade policy being the most important consideration. There is little coherence between import policy (which promotes protection of import substituting, domestic market-oriented and labor intensive industries) and export incentives propagated through the Export Policy and Industrial

[3] The comparison is marred somewhat by the fact that the 2006/07 report contained only 125 countries and the 2015/16 report 140 countries.

Policy. This has created a highly distortionary incentive environment - selected domestic and export sectors are subsidized through high effective rates of protection (World Bank, 2016).

6. Conclusion

Much like good governance, "technology" has become a goal that academics' research and policy makers strive for without questioning its ultimate desirability. All technology is good goes this development mantra and policy must focus on issues such as the acquisition, absorption and diffusion of technology by developing countries. This paper and the theory of Unequal Exchange more generally argues that technology cannot be viewed as an unalloyed good. Utilizing new technology in the existing ready-made garment dominated manufacturing economy of Bangladesh will likely lead to few benefits for Bangladeshi firms and workers. The effort of technology adoption will be borne by Bangladeshi firms and workers and the benefits be transferred to US and EU consumers. Technology *could* be part of a policy solution to help Bangladesh avoid the middle income trap but it must be carefully integrated into a strategy led by the goal of structural change within industry. Technology is ultimately not a neutral scientific process but one in part driven by and in part contributing to the maintenance of a divided global economy. For a dependent developing country technology and technological transfer may perpetuate dependence on foreign imports, royalty and patent payments, and while paying to import new technology developing countries may inadvertently also transfer back to developed countries the benefits of higher productivity and lower costs to those same developed countries. Studies that seek to uncover the influences on and constraints to productivity growth and technological change such as Hussain et al. (2012) and Chaudhry and Faran (2015) need to be supplemented by studies that consider technological transfer in the context of global production, trade and markets. But the true goal for developing countries must remain that of structural change; breaking away from dependence on agriculture and low-tech manufacturing. Technological change can have a valuable role in supporting structural change but should not be valued and pursued for its own sake.

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The Lahore Journal of Economics
22 : SE (September 2017): pp. 199–231

Are Some Groups More Vulnerable to Business Cycle Shocks than Others? A Regional Analysis of Pakistan's Labor Market

Mehak Ejaz* **and Kalim Hyder****

Abstract

This study identifies the extent to which various socioeconomic groups are vulnerable to aggregate business cycle fluctuations. Socioeconomic groups are classified by gender, location, employment status, education, income and age cohort. The asymmetric behavior of aggregate economic growth indicates that some groups gain less during recovery and boom phases and are thus most vulnerable to recessions. A vulnerability index in calculated for different socioeconomic groups and the empirical results show that employers with a graduate degree in Balochistan are the most vulnerable group and that female workers are more vulnerable than male workers. Additionally, the study employs panel data on inflation and employment to investigate the implications of macroeconomic fluctuations on vulnerable groups. The results indicate that food inflation has a strong negative impact on real earnings, while nonfood inflation increases real earnings. The panel data and vulnerability index findings are consistent with each other. The study also presents policy implications for existing public social safety net programs and prospective private social innovation programs targeting vulnerable households.

Keywords: Business cycle fluctuations, socioeconomic groups, vulnerability, GMM, Pakistan, real earnings, gender.

JEL classification: E24, E31, E32, J11, J16.

1. Introduction

Since Mitchell's (1927) pioneering study of business cycles, followed by Keynes' *General Theory* (1936), the literature has assumed that key economic variables exhibit asymmetric behavior over the course of the business cycle, with a dynamic relationship between business cycle fluctuations and unemployment. In a recent study, Belaire-Franch and Peiró (2015) examine the relationship between unemployment and business cycles in the UK and

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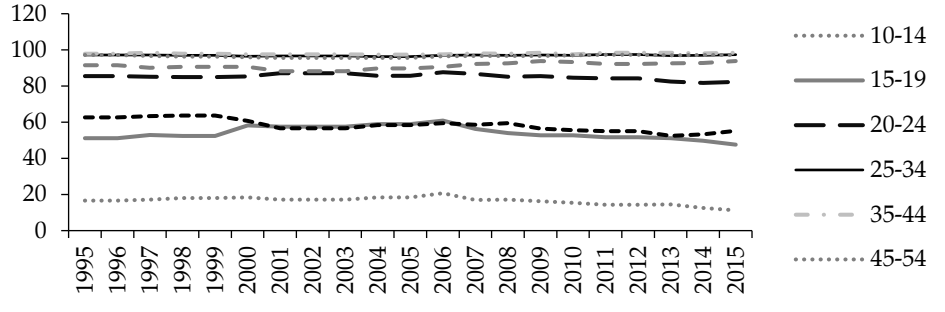
US. They find an unconditional asymmetry in both countries' employment rate. In the US, cyclical contractions have a far stronger effect on unemployment than expansions. However, in the UK, male unemployment is more sensitive to cyclical changes than female employment. Several other studies have investigated the asymmetry and nonlinearity of the relationship between unemployment and cyclical movements from the perspective of Okun's law: see, for example, Huang and Chang (2005), Silvapulle, Moosa and Silvapulle (2004), Virén (2001) and Cuaresma (2003).

In the field of labor economics, it is well established that aggregate supply is only slightly pro-cyclical (Mincer, 1966; Pencavel, 1986; Killingsworth & Heckman, 1986; Heckman, 1993). Consequently, macroeconomists have focused on unemployment as a business cycle indicator while abstracting from labor force participation. The literature on monetary policy and simple rules assume that the unemployment gap and output gap are roughly equal (Erceg & Levin, 2014). Blagrave and Santoro (2017) find that age plays an important role in determining participation decisions, especially among men. They explain how the labor participation decision is based on age cohort and business cycle effects. Using a cohort-based analysis, their projected participation rates suggest that population aging may put downward pressure on labor supply and, therefore, on potential output. The study recommends policy measures to increase female labor force participation to compensate for the downward demographic pressure.

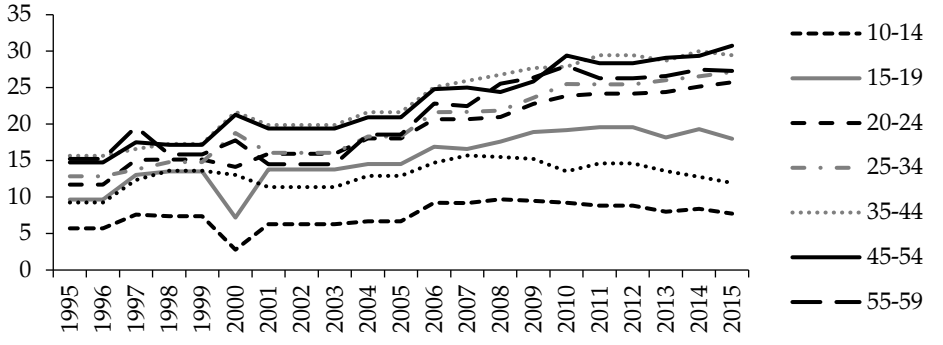
This study takes into account previous findings and labor market developments over recession and boom periods in Pakistan. Figures 1 and 2 illustrate labor force participation trends by gender as well as the role of age in determining labor force participation. Movements in female labor force participation are more sensitive to age than male labor force participation.

Figure 1: Trends in male labor force participation



Source: Pakistan Economic Survey (2015-16)

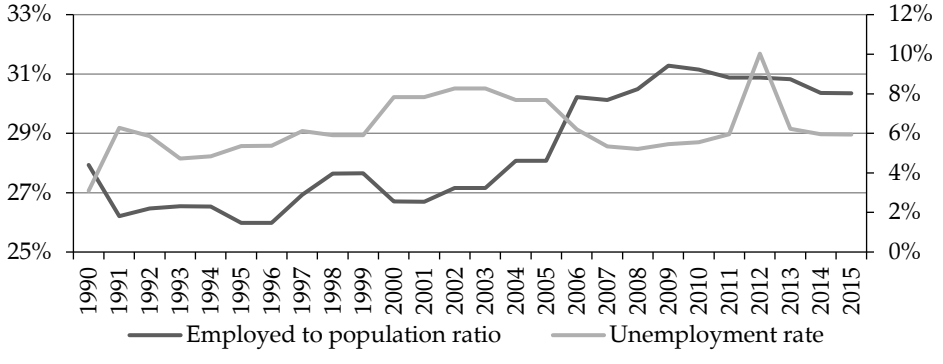
Figure 2: Trends in female labor force participation



Source: Pakistan Economic Survey (2015-16)

Many studies argue that cyclical movements in the hourly earnings ratio are due to changes in the characteristics of workers in each group or to changes in pure wage discrimination over the cycle (Figure 3). Biddle and Hamermesh (2013) relate the composition effect to the greater vulnerability of women and minorities to cycle-related job loss. They find that women are more likely to be employed in relatively stable, albeit lower-paid industries and that their relative earnings are hurt by negative shocks.

Figure 3: Labor market developments



Source: Pakistan Economic Survey (2015-16)

Glewwe and Hall (1998) identify which socioeconomic groups are most vulnerable to macroeconomic shocks, based on panel data from Peru. Their findings suggest that households headed by women and those with better-educated heads are less vulnerable, while households with more children are more vulnerable. Their study finds that government transfer networks are unable to protect the poor during major macroeconomic shocks.

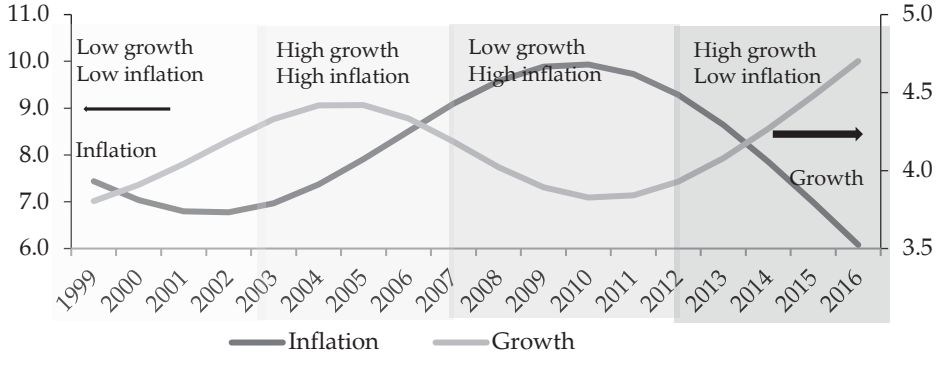
Broadly, there are two types of vulnerability: (i) policy-induced (in response to changes in government policies) and (ii) market-induced (in response to a macroeconomic shocks). That certain groups are unable to adapt to business cycle shocks reflects market forces interact with household characteristics and earning ability in a rapidly changing environment. For example, older individuals have less incentive to learn new skills and, therefore, their income may decline by more than average after a business cycle shock.

We focus on market-induced vulnerability, as measured by changes in the earnings of individuals over the business cycle. The analysis is disaggregated by gender and employment type. We categorize historical trends in real economic growth as recession, trough, expansion and boom periods by applying the Hodrick–Prescott (HP) filter. Changes in the real earnings (representing a macroeconomic shock) of various socioeconomic groups are determined during growth transition periods (from boom to trough and trough to boom). The study tests the hypothesis that growth shocks during an economic downturn have an adverse impact on lower-income groups, while expansions tends to benefit higher-income groups.

2. Business Cycle Fluctuations

The short-term cyclical movements and long-term trajectory of macroeconomic indicators provide valuable information on recession and boom phases. Our objective is to investigate the impact of macroeconomic changes on the real earnings of various socioeconomic groups. Therefore, short-term cyclical movements are filtered out from real economic growth and inflation using the HP method (Figure 4). This enables us to identify the country's economic conditions over time.

Figure 4: HP filter trends in growth and inflation



Source: Pakistan Economic Survey (2015-16)

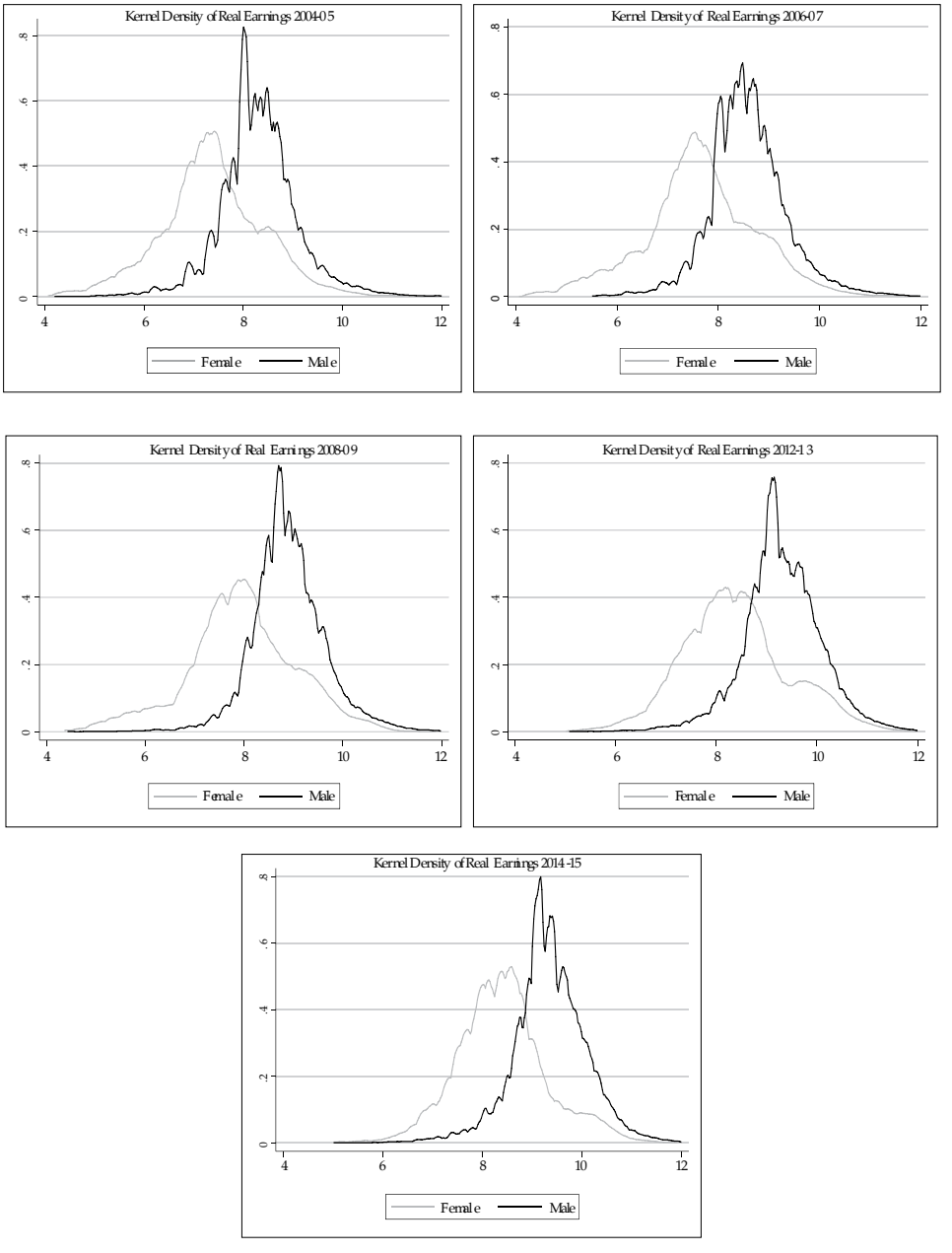
Pakistan's economy witnessed low real economic growth and low inflation (pure recession) during the FY1999-FY2003 period, and high growth and high inflation during the FY2003-FY2007 period. Following oil price shocks and the global financial crisis, inflation continued to rise while real economic growth plunged in the FY2008-FY2012 period. Decreasing international commodity prices and prudent fiscal and monetary management led to historically low levels of inflation, while real economic growth started to improve during the FY2013-FY2016 period.

Our objective is to investigate the impact of these macroeconomic developments on different socioeconomic groups, particularly in relation to the labor market. District-level data from the Pakistan Social and Living Standards Measurement (PSLM) Survey for 2004/05, 2006/07, 2008/09, 2012/13 and 2014/15 is used to compute the various indicators of earner groups. The consumer price index (CPI) is used to convert the data into real terms. Average real earnings were PKR 5,896 in 2005 and increased to PKR 6,472 and PKR 6,623 in 2007 and 2009, respectively. In 2015, earnings fell to PKR 5,708 from PKR 6,598 in 2013. Real earnings improved as the economy recovered from a recession in the mid-2000s, but shrank during the recession of 2008–10.

These patterns indicate that movements in the business cycle pass through into earnings, which may be due to consistent changes in wages and earning opportunities. The purpose of this study is to investigate the implications of economic fluctuations for various earner groups and determine which groups have benefitted most during boom periods and which have suffered most during recessions.

Kernel density plots of real earnings (in logarithmic form) are presented in Figure 5. These indicate that the median is lower and dispersion higher for women than for men. The distribution of men's real earrings shift to the right, which implies that the gains of the recovery period during 2004–07 benefitted male workers more than female workers. However, the situation was reversed during the recession of 2008: we see a significant leftward shift in the distribution of women's earnings, while men's earnings do not change that much. These stylized facts capture the varying impact of economic fluctuations across gender.

Figure 5: Kernel density of real earnings



Source: Pakistan Social & Living Standard Measurement Survey (2004-05, 2006-07, 2008-09, 2012-13 and 2014-15)

3. Methodology

We use two methods to investigate the impact of economic fluctuations. The first method entails calculating the vulnerability index developed by Guillaumont (2009), which measures the extent of changes in the impact of economic growth on real earnings. The second method uses economic activity indicators such as inflation, employment opportunities and regional characteristics to determine real earnings. The generalized method of moments (GMM) is used to resolve any endogeneity and heterogeneity in the data.

3.1. Vulnerability Index

Changes in real economic growth affect real earnings differently. When individuals' real earnings are in line with real GDP growth, this is considered 'normal'. Fluctuations in real earnings due to economic changes reflect vulnerability. For instance, if real economic growth slows down from 6 to 2 percent and individuals' real earnings follow a similar pattern, then this is considered normal. However, if individuals' earnings drop by 5 percent, then these individuals are considered to be vulnerable to economic shocks. Using this concept, we calculate the vulnerability index for different earner groups in Pakistan.

Real earnings are calculated by deflating nominal earnings with the price index:

$$y_{i,t} = \frac{Y_{i,t}}{PI} * 100$$

$y_{i,t}$ denotes the real earnings of an individual at time t, $Y_{i,t}$ denotes the nominal earnings of an individual at time t and PI is the price index.

Next, the data is sorted by income group – lower, lower middle, middle, upper middle and higher – based on the real earnings of each individual. The lower-income group includes individuals who earn less than the 10th percentile of total earners. The lower middle-income group comprises the 25th percentile. The middle-income group includes median earners. The 75th percentile represents the upper middle-income group and the 90th percentile comprises the upper-income group. Following this classification, individuals are sorted by gender, location, demographics, education and employment type.

Real earnings are standardized and converted into Z scores:

$$Z = \frac{X - \mu}{\sigma}$$

X denotes the real earnings of individual i in a specific group, μ is real GDP growth and σ is the standard deviation of the individual's real earnings:

$$f(X) = \frac{e^{-(X-\mu)^2/2\sigma^2}}{\sigma\sqrt{2\pi}}$$

Under the standardizing process, the standard deviation (σ) becomes unity. Therefore, the probability density function becomes:

$$f(X) = \frac{e^{-(X-\mu)^2/2}}{\sqrt{2\pi}}$$

This function captures the probability that the individual's earnings correspond to real GDP growth. The probability takes a minimum value close to 0 and a maximum value close to 1. The vulnerability index is derived by multiplying these probabilities by 100. An index value of 0 indicates that the individual's earnings correspond to aggregate economic growth. An index value of 100 represents the maximum diversion of the individual's earnings from aggregate economic growth.

3.2. Model Specification and Estimation

To gauge the impact of aggregate fluctuations on various groups, we determine their real earnings based on macroeconomic indicators and group-specific socioeconomic indicators. The real earnings of a given group are specified by a set of explanatory variables as follows:

$$\bar{y}_{j,t} = f(Z_1, Z_2)$$

where $\bar{y}_{j,t} = \frac{1}{\mathrm{N}}\sum_{\mathrm{i}=1}^{\mathrm{N}} y_{i,t}$. $\bar{y}_{j,t}$ denotes the average earnings of group j, Z_1 is the vector of endogenous covariates and Z_2 is the vector of exogenous variables. The endogeneity of the specification and the heterogeneity of the groups means we must employ GMM (Hansen, 1982) to obtain consistent and efficient estimates. Using the appropriate instrumental variables, GMM is applied to resolve the endogeneity of the aggregated price data for each city.

The vector of endogenous covariates includes employed labor and inflation. Employed labor is an indicator of economic opportunity and, therefore, represents economic growth. The variable is instrumented by

inflation in the previous period, unemployment and the fraction of married persons in the district. Nonfood inflation is considered endogenous to the system and is instrumented by its previous values. Food inflation is determined by seasonal factors and considered an included instrument. Given the lack of information on other aspects of this variable, we assume that food inflation is exogenous because it may lead to under-identification. The fraction of rural areas in the district are exogenous. The final model is:

$$Y_{i,t} = \alpha_i + \beta_1(\hat{g}_{i,t}) + \beta_2(\hat{\pi}_{i,t}^{nf}) + \beta_2(\pi_{i,t}^{f}) + \gamma(R_{i,t}) + \epsilon_{i,t}$$

$$g_i = f(\pi_{i,t-1}, U_{i,t}, M_{i,t}) \text{ and } \pi_{i,t}^{nf} = f(\pi_{i,t-1}^{nf})$$

where α_i = fixed effects, t = time in years, i = district, $Y_{i,t}$ = real earnings (of a specific group), g_{it} = employed labor force, $\pi_{i,t}^{nf}$ = nonfood inflation, $\pi_{i,t}^{f}$ = food inflation, $R_{i,t}$ = fraction of rural areas in the district, $U_{i,t}$ = unemployment rate prevailing in the region and $M_{i,t}$ = fraction of married persons in the district. Here, $Y_{i,t}$ (real earnings) is the dependent variable, g_{it} and $\pi_{i,t}^{nf}$ are endogenous covariates, $\pi_{i,t}^{f}$ and $R_{i,t}$ are the included instruments, and $U_{i,t}$ and $M_{i,t}$ are excluded instruments.

4. Data and Variables

This study requires household-level data on employed labor, its demographics and its earning capacity. We employ district-level data from the PSLM Survey for 2004/05, 2006/07, 2008/09, 2012/13 and 2014/15, which provides information on the working-age population, employed labor and household earnings. The Pakistan Economic Survey provides data on overall consumer prices and food and nonfood prices at the district level. The PSLM indicators are aggregated at the district level, enabling us to measure the employed labor force, the fraction of rural areas in the district and the fraction of married persons in the district.

Since the district is our basic unit of analysis, we construct income distribution parameters from the PSLM data at this level. These indicators are disaggregated by gender and earning percentiles within a district (see Section 3.1). The district-level CPI is then used to convert earnings into real terms. Finally, real earnings are converted to standardized Z scores. The probability density of each Z score variable is computed and multiplied by 100 to construct the vulnerability index. An index value close to 0 means that the change in real earnings of specific individuals is equal to aggregate economic growth. An index value close to 100 indicates maximum vulnerability.

Given the lack of consistent time-series data, we can determine only five observations for each variable computed from the PSLM data. However, a consistent inflation time-series is available. The vulnerability of lower-income groups is also measured with respect to changes in inflation over time. The availability of city-level data on inflation allows us to examine vulnerability across districts, while the panel data on inflation and economic growth enables us to investigate the implications of the tradeoff between economic activity and inflation for vulnerable groups.

5. Results

Gauging the extent to which macroeconomic fluctuations affect different socioeconomic groups helps identify which of them is most vulnerable. This is measured by the change in real earnings during the recovery and boom phases of the business cycle and vice versa.

We start by measuring the impact of business cycle fluctuations on the real earnings of male and female workers. To gauge the impact of aggregate economic fluctuations on income distribution, each subgroup is categorized by real earnings (lower-income, lower middle-income, middle-income, upper middle-income and high-income) and each earner group by gender, province, employment type, age cohort and education level. This leads to the division of all earning persons into 330 groups. The vulnerability index is calculated for each category: the extent of vulnerability of each group is given by income group and over time. A stochastic analysis using GMM is carried out to estimate the impact of inflation and economic activity on the real earnings of each group.

Table 1 reports the percentage difference in the vulnerability index for female and male workers. Overall, the results indicate that employed women are 63.3 percent more vulnerable to economic shocks than men. Differences in the extent of vulnerability by income class vary: for instance, middle-income female workers are 151 percent more vulnerable to economic shocks than their male counterparts.

Table 1: Percentage difference in female versus male vulnerability

	Earner groups					
Variable	**L**	**LM**	**M**	**UM**	**H**	**Overall**
Location						
Pakistan	40	52	151	20	90	63.3
Punjab	48	99	161	170	114	111.1
Sindh	124	231	252	72	123	134.4
KP	171	21	64	101	41	70.7
Balochistan	428	299	222	115	69	224.1
Employment type						
Employer	160	44	44	-11	-16	20.2
Self-employed (nonagriculture)	86	144	135	-10	51	76.9
Paid employee	-7	67	59	45	79	48.7
Self-employed (agriculture)	198	-29	15	68	63	35.2
Age						
Age cohort 10–19	141	-17	19	-7	43	38.7
Age cohort 20–29	67	27	144	114	53	74.8
Age cohort 30–39	64	8	-13	106	89	54.1
Age cohort 40–49	3	-26	16	60	147	42.2
Age cohort 50–59	110	14	17	45	177	71.5
Age cohort 60 and above	3	9	41	71	24	25.1
Education						
Illiterate	88	88	21	-33	-50	24.7
Primary	89	148	140	85	186	116.7
Secondary	214	173	82	-10	168	132.1
Matric	39	63	479	36	88	99.8
FA	4	-22	58	-37	-58	-12.0
BA	42	23	52	28	6	30.0
Professional	94	54	-8	30	41	38.6

Note: L = lower-income, LM = lower middle-income, M = middle-income, UM = upper middle-income, H = higher-income.
Source: Authors' calculations based on data from the PSLM Survey.

A significant degree of gender discrimination emerges from this analysis. Clearly, certain socioeconomic groups face greater fluctuations in income due to business cycle movements. The aggregate analysis suggests there is no significant difference among the provinces in terms of the extent of vulnerability. However, female workers in Balochistan are highly vulnerable to shocks compared to male workers, while female workers in KP are less vulnerable than their counterparts in the other provinces.

Barring employers, there is no significant difference in vulnerability among employment categories – employers are highly vulnerable to economic growth shocks. A closer analysis reveals that female workers are more vulnerable than male workers across all employment categories. The largest differences occur among self-employed persons in the nonagriculture category. However, higher-income female employers are less vulnerable to economic shocks than their male counterparts.

Both younger as well as older age cohorts are more vulnerable than the age cohorts in between, although this decreases in the case of workers who have completed secondary school or matriculation. Among paid employees, teenage workers and those above 60 are more vulnerable to economic shocks. Female workers in their 20s and 50s are more vulnerable than their male counterparts in other age categories. The vulnerability index is highest for graduates and lowest for earners who have finished secondary school and matriculation. Among those with an intermediate degree, male workers are more vulnerable than female workers. While higher-income female workers with no education are not vulnerable to economic shocks, female workers who have completed primary and secondary school and matriculation are highly vulnerable relative to their male counterparts.

The extent of vulnerability across earner groups over time indicates that vulnerability was highest during 2006/07. It fell by almost 60 percent in 2008-09 and then increased by 80 percent in 2012/13. This was followed by a slight decline of 10 percent in 2014/15. Since these indices are based on real earnings, they can be examined in terms of real growth. The increase in economic growth during 2002 to 2007 enhances the variability of real earnings. Both genders have similar patterns of vulnerability to economic growth shocks. The extent of vulnerability is higher in Punjab and KP than elsewhere. Barring employers (whose vulnerability increases over time), all employment categories face the same extent of vulnerability as a whole. In terms of age cohort, vulnerability to economic shocks decreases across all categories except workers over 60. Highly educated workers become more vulnerable over time.

The asymmetric impact of business cycle fluctuations is determined by looking at changes in the vulnerability index over time. In the case of both genders, the results indicate that three categories – workers in Balochistan, employers and workers with a graduate degree – are more sensitive to shocks during a recession than during recovery and booms. These effects are more pronounced among female workers. Barring those in KP, female earners in all the provinces, employers, the self-employed in nonagriculture

sectors and those with an intermediate or graduate degree are more vulnerable during a downturn and benefit less during recovery and booms than their male counterparts. There is no evidence of the asymmetric impact of economic growth among different age cohorts.

The index-based analysis indicates that, overall, female workers are the most vulnerable. New labor force entrants and older workers about to retire are also more vulnerable to economic shocks. Less-educated female workers are less vulnerable to economic shocks, while those with a graduate degree and above are more vulnerable. See Tables A1–A8 in the Appendix for the indices computed for each socioeconomic group.

Following the deterministic analysis, we compute real earnings by employed labor, food inflation, nonfood inflation and the percentage of rural areas in the district. Given the endogeneity of the employed labor variable as an indicator of economic activity in the district, we use the lagged values of unemployment and inflation as instruments. The GMM results of all 66 equations are reported in Tables A9–A13 in the Appendix. The validity of over-identifying restrictions is tested by the Sargan J statistic. The goodness of fit is indicated by the adjusted R-squared term and the F statistic represents overall significance. The results indicate that almost all the equations satisfy the necessary diagnostics.

Employed labor is positively correlated with real earnings, food inflation has a negative impact on real earnings and nonfood inflation increases real earnings. Moreover, real earnings are higher in rural areas than in urban areas. The magnitude of the coefficients of employed labor, food inflation and nonfood inflation are higher for female workers, which indicates that they are more vulnerable to economic growth and inflation shocks than male workers. The coefficient of economic activity for female workers is 64 percent higher than for male workers, which is consistent with the findings of the simple index analysis. The magnitude of economic activity is higher for Punjab and Balochistan than for the other two provinces. Female workers in Sindh are more sensitive to economic fluctuations than their counterparts elsewhere.

In terms of employment type, the results confirm that employers are more sensitive to economic shocks. However, female workers who are self-employed in agriculture are less sensitive to economic shocks than male workers. The sensitivity of real earnings with employment opportunities increases with the level of education. The impact of food inflation on real earnings falls with the level of education, while nonfood inflation has the opposite effect. The coefficient of employed labor (the

impact of economic opportunity) is higher for older age cohorts. The impact of food and nonfood inflation is greater among older age cohorts. Finally, the estimates suggest that female workers are more vulnerable to economic fluctuations than male workers.

6. Conclusion and Policy Recommendations

Our findings suggest that the extent to which aggregate economic fluctuations pass through to vulnerable segments is important. Further, those groups that suffer most during a recession or slowdown do not necessarily benefit during a recovery or boom. For both genders, the most vulnerable groups include earners in Balochistan. Generally, the most vulnerable groups tend to be female, especially self-employed women in agriculture and female employers. Female earners with an intermediate or graduate degree are also among the most vulnerable, as are graduate male earners. Among male earners overall, those in Balochistan are the most vulnerable.

In terms of income group, high-income female workers are more vulnerable than lower-income female workers in Sindh. Moreover, higher-income paid female employees are more vulnerable than lower-income earners in the same category. The age cohort analysis suggests that young, lower-income female workers are more vulnerable than their older counterparts.

Tackling such variations in vulnerability to economic shocks will require financial innovations in the transfer payment system. An innovative support program that targets the most vulnerable households during a downturn will not only reduce the welfare losses accruing to this segment, but also help increase their consumption, in turn enabling the economy to climb out of the recession. A platform such as the Benazir Income Support Program may be best suited to addressing vulnerability.

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Appendix

Table A1: Percentage change in total real earnings of employed labor, by region and gender

	Both					Female					Male				
Year	**L**	**LM**	**M**	**UM**	**H**	**L**	**LM**	**M**	**UM**	**H**	**L**	**LM**	**M**	**UM**	**H**
	Pakistan														
2006/07	22.8	7.5	14.6	14.6	10.5	7.5	19.0	14.6	15.7	24.5	16.7	11.1	7.5	14.6	16.1
2008/09	10.0	14.4	4.0	0.1	2.7	-1.9	-0.8	14.4	3.9	5.4	4.9	5.8	6.8	4.9	1.7
2012/13	-19.5	-6.9	-1.7	8.6	8.5	30.4	-6.1	-10.6	-2.5	11.8	-5.6	-2.2	-0.2	6.7	7.5
2014/15	-8.4	-6.1	-8.5	-11.9	-11.9	5.7	4.9	-3.7	-22.0	-33.9	-3.2	0.7	-2.4	-9.4	-11.5
	Punjab														
2006/07	29.0	29.0	19.2	17.9	20.7	2.4	14.6	8.3	14.6	20.4	24.0	19.0	7.5	15.7	21.8
2008/09	6.0	1.7	3.3	1.1	4.0	-8.5	5.6	1.7	4.4	9.0	-0.8	6.3	6.8	9.0	3.4
2012/13	-3.4	0.6	3.2	7.5	0.6	78.8	17.0	34.1	101.7	60.9	-22.6	-3.7	-4.2	0.6	-5.7
2014/15	-7.0	4.0	5.7	-6.7	-8.7	-17.4	-25.3	-26.6	-35.8	-15.3	1.8	1.8	5.7	-8.4	-8.7
	Sindh														
2006/07	10.2	-0.6	6.5	11.1	24.2	10.1	-10.8	3.2	19.4	41.3	7.5	-4.5	3.2	11.1	21.0
2008/09	-0.8	4.3	5.6	3.9	-6.1	-4.6	10.3	-7.2	0.6	-12.0	1.7	5.6	5.6	6.3	-3.7
2012/13	-32.9	-11.7	-3.1	3.6	4.8	-30.2	-31.2	-34.9	-47.7	-30.3	-7.2	4.1	0.9	7.3	9.0
2014/15	-2.1	-8.3	-11.9	-11.9	-10.9	5.7	-4.6	-3.1	-8.3	-31.5	-4.6	-1.7	-2.4	-11.9	-11.9
	KP														
2006/07	43.3	14.6	24.2	19.2	14.6	99.8	59.7	43.3	36.4	24.2	14.6	19.4	22.8	19.2	14.6
2008/09	14.4	17.4	6.8	3.0	3.0	-24.0	1.7	1.7	-3.8	-0.8	14.4	14.4	6.8	4.5	6.0
2012/13	-10.6	-12.8	-13.8	3.5	19.4	20.7	-2.2	-22.6	-24.6	23.8	0.6	-10.6	-11.6	2.0	16.1
2014/15	-8.3	-2.1	-11.9	-20.7	-23.7	1.6	-18.5	-19.9	-41.3	-50.5	-2.1	-6.4	-6.4	-20.7	-23.7
	Balochistan														
2006/07	7.5	3.2	4.2	4.7	3.2	69.4	26.4	7.6	7.5	1.9	7.5	3.2	3.2	4.7	3.2

	Both					Female					Male				
Year	**L**	**LM**	**M**	**UM**	**H**	**L**	**LM**	**M**	**UM**	**H**	**L**	**LM**	**M**	**UM**	**H**
2008/09	6.8	6.0	0.6	-3.6	-4.6	-77.1	-29.6	-12.0	-8.5	-13.1	9.9	6.0	1.2	-3.6	-4.6
2012/13	-12.2	7.3	16.2	20.7	16.2	34.1	-61.3	-77.7	-50.3	-1.9	3.5	11.8	15.5	22.7	18.5
2014/15	-11.3	-11.9	-11.9	-4.0	-2.9	76.2	98.2	91.5	-20.7	-41.3	-7.5	-11.9	-11.9	-3.7	-3.6

Note: L = lower-income, LM = lower middle-income, M = middle-income, UM = upper middle-income, H = higher-income.
Source: Authors' calculations based on data from the PSLM Survey.

Table A2: Percentage change in total real earnings, by employment status and gender

	Both					Female					Male				
Year	**L**	**LM**	**M**	**UM**	**H**	**L**	**LM**	**M**	**UM**	**H**	**L**	**LM**	**M**	**UM**	**H**
	Employers														
2006/07	5.00	-20.60	-42.00	-14.00	-12.80	415.88	157.94	-22.62	-7.57	19.05	-0.26	-21.98	-42.22	-11.40	-16.65
2008/09	-0.80	-11.40	-23.70	-61.90	-63.30	27.15	27.15	5.96	-38.49	-50.41	-4.09	-11.45	-23.71	-63.38	-62.94
2012/13	-10.60	66.90	139.50	223.30	175.10	-79.88	-67.81	-35.63	55.90	243.87	8.56	87.75	156.59	235.27	168.22
2014/15	32.10	5.70	-0.40	-15.70	-31.30	-2.14	147.71	127.53	30.22	-4.59	13.98	-2.14	-5.15	-18.70	-28.44
	Self-employed (nonagriculture)														
2006/07	30.40	14.60	7.50	7.80	16.10	20.37	28.97	14.64	3.18	19.05	28.97	20.37	9.13	9.92	11.77
2008/09	9.00	14.40	14.40	14.40	-2.20	8.99	4.03	14.44	5.96	5.19	8.99	8.99	8.19	11.89	1.72
2012/13	-29.60	-10.60	-10.60	-10.60	-12.80	-22.63	-35.12	-32.95	-22.63	-29.75	-6.12	0.58	3.16	-7.16	-10.20
2014/15	-5.60	-11.90	-11.90	-11.90	-11.90	37.40	45.11	17.43	-8.40	-11.92	-2.14	-9.67	-10.95	-14.81	-17.80
	Paid employees														
2006/07	14.60	7.50	13.40	14.20	18.10	11.77	20.37	17.10	26.10	24.19	19.42	9.13	13.76	11.77	14.64
2008/09	14.40	14.40	4.10	-3.40	-0.80	1.72	-4.64	-2.90	-0.13	5.63	5.63	5.19	4.56	-1.91	-0.82
2012/13	-10.60	1.60	-1.80	12.90	12.10	-16.18	7.29	11.76	-3.29	21.07	-3.14	5.37	-1.39	11.26	13.48
2014/15	-3.70	-7.00	-4.60	-17.40	-12.20	1.63	-11.92	-11.92	-28.76	-29.54	5.69	-6.05	-7.52	-11.92	-13.26
	Self-employed (agriculture)														

	Both					Female					Male				
Year	L	LM	M	UM	H	L	LM	M	UM	H	L	LM	M	UM	H
2006/07	43.30	25.40	15.50	14.20	29.00	3.18	19.94	14.64	28.97	28.97	37.57	19.05	17.92	12.44	25.06
2008/09	6.80	-1.90	-1.10	9.00	6.00	1.72	-10.99	-8.45	-4.64	-8.45	-4.64	1.72	-4.64	7.70	5.96
2012/13	-28.20	-10.60	-4.20	0.60	0.60	-16.18	-4.21	-10.59	-10.59	-6.87	-21.77	-16.18	2.44	6.45	0.58
2014/15	-11.90	-11.90	-3.10	-2.10	2.80	32.11	5.69	10.09	2.75	5.69	0.66	2.75	-2.32	-2.91	2.75

Note: L = lower-income, LM = lower middle-income, M = middle-income, UM = upper middle-income, H = higher-income.
Source: Authors' calculations based on data from the PSLM Survey.

Table A3: Percentage change in total real earnings, by gender and age group

	Both					Female					Male				
Year	L	LM	M	UM	H	L	LM	M	UM	H	L	LM	M	UM	H
	Age cohort 10–19														
2006/07	33.7	23.8	22.8	23.8	14.6	34.9	14.6	10.5	10.2	7.5	10.5	19.4	7.5	29.0	14.6
2008/09	14.4	6.0	6.0	6.0	1.7	-35.2	-4.6	-8.5	-0.8	-7.2	11.3	9.9	14.4	1.7	2.7
2012/13	-17.5	-7.2	-3.4	0.6	-9.5	136.7	0.6	11.8	7.3	2.9	-17.5	-10.6	-0.7	0.6	-4.2
2014/15	5.0	6.0	5.7	-4.0	0.7	5.7	22.3	2.8	10.1	13.2	6.0	10.1	5.7	-2.1	0.2
	Age cohort 20–29														
2006/07	14.6	11.8	23.8	12.0	22.8	19.0	11.8	20.9	19.2	19.0	14.6	3.2	11.8	11.8	19.4
2008/09	10.0	6.0	1.7	3.8	-4.6	-0.8	-4.6	1.7	-4.6	6.0	-0.8	14.4	1.7	1.6	-1.9
2012/13	-18.6	-3.4	0.6	2.6	7.3	19.2	7.3	0.6	-7.2	0.6	3.2	3.2	0.6	7.3	4.3
2014/15	-5.6	-3.1	-6.6	-5.1	-11.9	-0.9	-8.3	-17.8	-25.7	-28.8	-4.6	-4.6	-2.1	-4.6	-8.3
	Age cohort 30–39														
2006/07	14.6	3.2	8.3	12.5	9.6	-11.1	3.2	10.5	18.2	22.8	11.8	14.6	11.5	9.6	14.6
2008/09	2.2	6.0	1.0	6.1	3.6	32.7	6.8	1.7	-2.9	-0.8	1.7	3.3	2.0	3.6	3.0
2012/13	-13.1	0.6	-1.7	4.6	4.6	-0.7	-7.9	0.6	-14.9	11.4	-2.2	-1.0	3.2	4.6	4.3
2014/15	-11.9	-11.9	-7.6	-11.9	-13.0	-0.9	-4.6	-11.9	-24.7	-34.8	-9.4	-2.1	-11.9	-10.3	-11.9

	Both					Female					Male				
Year	**L**	**LM**	**M**	**UM**	**H**	**L**	**LM**	**M**	**UM**	**H**	**L**	**LM**	**M**	**UM**	**H**
	Age cohort 40–49														
2006/07	14.6	14.6	3.2	14.6	14.6	3.2	7.5	26.7	13.8	21.8	7.5	6.1	7.5	14.6	11.1
2008/09	1.7	3.0	2.8	-0.8	-1.0	2.7	-8.5	3.5	11.0	0.5	1.7	6.8	5.0	3.0	-1.6
2012/13	-9.5	-0.7	7.8	10.1	4.9	10.7	-1.7	-6.9	-9.5	19.7	0.6	3.5	9.2	9.3	7.5
2014/15	-18.4	-12.8	-17.2	-13.4	-9.7	5.7	3.4	-4.9	-26.6	-38.3	-11.9	-11.9	-12.9	-9.9	-8.7
	Age cohort 50–59														
2006/07	24.0	5.1	12.6	14.6	13.5	3.2	22.8	17.2	29.0	35.1	7.5	14.6	7.5	14.6	11.8
2008/09	-0.8	4.0	1.7	6.8	1.7	-17.4	-4.6	11.9	-2.2	12.0	6.8	2.2	4.0	9.9	6.0
2012/13	-7.5	0.6	4.8	9.0	4.8	54.7	0.6	0.6	10.4	24.5	-4.2	0.1	10.6	7.5	1.9
2014/15	-11.3	-11.9	-11.9	-14.6	-13.1	5.7	4.4	-11.9	-25.1	-28.1	-11.9	-10.5	-13.0	-10.9	-13.1
	Age cohort 60 and above														
2006/07	40.4	29.0	29.0	19.4	34.3	115.0	32.3	36.5	33.5	29.0	50.5	29.0	24.2	24.7	31.3
2008/09	7.4	1.7	-0.8	9.9	-4.6	-11.0	10.2	-7.8	10.2	1.7	9.0	2.7	1.7	5.2	-1.8
2012/13	-27.1	-16.2	-5.9	-2.2	7.3	15.0	0.6	0.9	-10.6	11.8	-21.8	-13.8	-3.2	0.6	7.3
2014/15	2.8	-7.5	-7.3	-13.6	-20.7	10.1	-8.3	-11.4	-20.7	-33.9	-9.4	-1.1	-8.5	-11.9	-19.4

Note: L = lower-income, LM = lower middle-income, M = middle-income, UM = upper middle-income, H = higher-income.
Source: Authors' calculations based on data from the PSLM Survey.

Table A4: Percentage change in total real earnings, by education level and gender

	Both					Female					Male				
Year	**L**	**LM**	**M**	**UM**	**H**	**L**	**LM**	**M**	**UM**	**H**	**L**	**LM**	**M**	**UM**	**H**
	Illiterate														
2006/07	29.0	16.1	14.6	11.8	14.6	-4.5	10.5	7.5	5.5	7.5	14.6	7.5	14.5	5.1	13.4
2008/09	1.7	1.7	10.0	1.7	1.7	-4.6	-1.1	1.7	3.6	1.7	14.4	6.0	3.1	4.0	3.3
2012/13	-16.2	-6.9	-3.1	0.6	1.8	60.9	-3.4	0.6	4.2	0.6	-12.5	-3.4	0.6	7.3	7.3

	Both					Female					Male				
Year	**L**	**LM**	**M**	**UM**	**H**	**L**	**LM**	**M**	**UM**	**H**	**L**	**LM**	**M**	**UM**	**H**
2014/15	5.7	1.6	-4.9	-8.3	-3.3	32.1	21.0	17.4	2.0	5.7	-0.1	1.6	-4.0	-6.4	-7.5
	Primary														
2006/07	14.6	11.8	11.8	10.4	11.7	47.4	22.8	12.6	14.6	10.2	19.0	3.2	10.2	9.9	7.5
2008/09	11.3	6.0	1.7	3.0	5.6	-11.0	14.4	-11.7	-12.0	-11.4	10.2	14.4	-0.8	-0.5	6.8
2012/13	-20.4	-3.4	0.6	4.3	0.6	32.6	-10.6	6.2	16.2	12.7	-6.9	-0.7	0.6	11.8	-0.2
2014/15	1.8	2.8	-2.1	-5.6	-2.5	-2.7	-0.9	4.3	-11.9	-11.9	5.7	-0.9	2.8	-7.0	1.5
	Secondary														
2006/07	24.0	19.0	14.6	7.5	10.2	44.9	25.0	12.8	4.3	29.0	19.4	12.3	7.5	7.5	10.2
2008/09	-0.8	1.7	4.9	1.7	-0.8	-15.1	-12.5	9.0	-1.9	-12.0	1.7	5.6	5.6	1.7	-0.8
2012/13	-6.9	1.7	-2.5	0.6	3.2	34.1	7.3	-10.6	3.2	1.7	-5.5	-0.4	-3.1	7.3	3.2
2014/15	-2.4	0.7	1.6	1.6	-3.1	-23.5	-13.1	-7.9	-8.7	0.7	-6.3	-2.1	5.7	-3.7	-0.8
	Matric														
2006/07	11.0	14.6	12.6	11.8	14.6	43.3	29.0	29.7	20.4	27.4	29.0	14.6	11.8	10.5	14.6
2008/09	5.2	3.8	1.7	1.7	-0.8	-12.0	-2.5	-19.1	-18.3	-8.5	1.7	10.0	1.7	1.7	-1.9
2012/13	-4.2	-1.5	0.6	7.8	8.0	0.6	-12.5	25.7	-4.2	16.1	-9.2	-6.1	0.6	11.8	8.7
2014/15	-11.9	-0.9	-4.6	-4.9	-5.4	-8.4	-11.9	-23.7	-1.4	4.3	-2.4	-1.9	1.6	-7.5	-3.4
	FA														
2006/07	3.2	17.1	18.4	11.1	10.2	3.2	0.9	7.8	13.1	8.5	11.2	14.6	19.0	16.7	3.2
2008/09	14.4	-0.1	-1.7	-1.6	-4.6	10.0	-1.5	-2.8	-1.5	1.7	1.7	1.7	-2.2	-4.6	-4.6
2012/13	-14.0	-14.0	-2.5	0.6	-18.6	-22.5	-35.1	-31.6	3.9	3.8	-13.8	-16.2	-1.2	-3.1	-17.5
2014/15	-11.9	-4.6	-8.3	-11.9	-9.4	-3.1	1.6	-14.9	-2.1	1.1	-9.6	-11.9	-11.9	-8.4	-11.7
	BA														
2006/07	18.6	22.1	19.7	11.5	2.9	-56.7	-52.8	-26.3	5.0	29.2	17.9	29.0	21.2	4.3	4.8
2008/09	10.0	-0.8	4.0	-4.4	-11.2	-37.1	-12.9	-38.2	19.5	11.1	10.0	-6.1	-0.8	-4.4	-13.9
2012/13	-59.8	-50.1	-52.4	-54.1	-51.2	-12.8	-46.4	-22.8	-50.8	-52.1	-47.7	-45.5	-48.6	-51.1	-47.5
2014/15	-23.7	-19.9	-9.0	-3.8	-14.1	-26.6	-11.9	-23.7	-3.9	-0.2	-11.9	-11.9	-8.1	-4.7	-16.6

	Both					Female					Male				
Year	**L**	**LM**	**M**	**UM**	**H**	**L**	**LM**	**M**	**UM**	**H**	**L**	**LM**	**M**	**UM**	**H**
	Professional														
2006/07	2.6	14.6	19.0	14.6	17.9	-11.7	3.2	21.0	19.0	29.0	7.5	16.9	20.4	14.6	14.6
2008/09	-4.1	-1.0	-4.6	-0.8	-8.5	-8.5	14.4	4.8	1.7	-8.5	-1.9	-1.3	-1.9	-0.7	-4.6
2012/13	-10.6	3.3	8.5	0.6	-2.2	-7.9	-18.4	-7.5	-3.3	2.4	-2.2	9.7	11.8	-1.0	-3.4
2014/15	-23.8	-17.4	-15.1	-18.4	-24.5	-38.9	-35.7	-11.9	-16.0	-23.9	-20.1	-15.3	-15.3	-14.1	-20.5

Note: L = lower-income, LM = lower middle-income, M = middle-income, UM = upper middle-income, H = higher-income.
Source: Authors' calculations based on data from the PSLM Survey.

Table A5: Vulnerability index, by region and gender

	Both					Female					Male				
Year	**L**	**LM**	**M**	**UM**	**H**	**L**	**LM**	**M**	**UM**	**H**	**L**	**LM**	**M**	**UM**	**H**
	Pakistan														
2006/07	51.72	18.18	34.74	34.74	25.42	18.18	44.19	34.74	37.16	54.82	39.21	26.74	18.18	34.74	37.88
2008/09	24.23	34.28	9.87	0.32	6.61	4.69	2.02	34.28	9.54	13.18	12.05	14.13	16.58	11.97	4.22
2012/13	45.19	16.73	4.05	20.77	20.57	64.98	14.93	25.54	6.04	28.23	13.59	5.42	0.53	16.27	18.14
2014/15	20.38	14.76	20.70	28.61	28.61	13.89	11.86	8.98	50.15	70.33	7.87	1.61	5.98	22.76	27.53
	Punjab														
2006/07	62.69	62.69	44.55	41.82	47.63	5.78	34.74	20.22	34.74	46.89	53.96	44.19	18.18	37.16	49.74
2008/09	14.54	4.22	8.11	2.66	9.87	20.50	13.75	4.22	10.75	21.77	2.02	15.27	16.58	21.77	8.32
2012/13	8.43	1.43	7.74	18.33	1.43	98.46	39.95	70.57	99.82	93.90	51.34	9.10	10.29	1.43	13.92
2014/15	17.12	9.73	13.89	16.43	21.00	40.79	56.31	58.66	72.92	36.22	4.35	4.35	13.89	20.38	21.00
	Sindh														
2006/07	24.69	1.58	15.72	26.74	54.30	24.28	26.10	7.78	44.95	79.62	18.18	10.92	7.78	26.74	48.22
2008/09	2.02	10.43	13.75	9.54	14.89	11.34	24.96	17.49	1.48	28.72	4.22	13.75	13.75	15.27	8.95
2012/13	68.89	28.06	7.70	8.88	11.67	64.61	66.30	71.62	85.75	64.79	17.41	10.08	2.19	17.73	21.71

	Both					Female					Male				
Year	L	LM	M	UM	H	L	LM	M	UM	H	L	LM	M	UM	H
2014/15	5.24	20.03	28.61	28.61	26.35	13.89	11.21	7.63	20.03	66.71	11.21	4.13	5.98	28.61	28.61
	KP														
2006/07	81.69	34.74	54.30	44.55	34.74	99.79	93.35	81.69	73.70	54.30	34.74	44.95	51.72	44.55	34.74
2008/09	34.28	40.67	16.58	7.33	7.33	53.97	4.22	4.22	9.37	2.02	34.28	34.28	16.58	11.08	14.54
2012/13	25.54	30.67	32.83	8.52	44.91	47.55	5.42	51.34	54.99	53.55	1.43	25.54	27.81	4.79	37.84
2014/15	20.03	5.24	28.61	47.61	53.32	3.99	42.98	45.84	79.56	87.92	5.24	15.65	15.65	47.61	53.32
	Balochistan														
2006/07	18.18	7.78	10.20	11.54	7.78	96.72	58.37	18.46	18.18	4.59	18.18	7.78	7.78	11.54	7.78
2008/09	16.58	14.54	1.48	8.89	11.34	98.23	63.68	28.72	20.50	31.20	23.82	14.54	2.95	8.89	11.34
2012/13	29.22	17.73	38.22	47.55	38.22	70.57	94.03	98.31	87.82	4.74	8.52	28.23	36.72	51.49	42.97
2014/15	27.19	28.61	28.61	9.84	7.03	98.08	99.75	99.51	47.61	79.56	18.29	28.61	28.61	9.16	8.85

Note: L = lower-income, LM = lower middle-income, M = middle-income, UM = upper middle-income, H = higher-income.
Source: Authors' calculations based on data from the PSLM Survey.

Table A6: Vulnerability index, by employment status and gender

	Both					Female					Male				
Year	L	LM	M	UM	H	L	LM	M	UM	H	L	LM	M	UM	H
	Employers														
2006/07	12.26	47.42	80.39	33.36	30.53	19.46	100.00	100.00	50.20	17.95	0.65	50.08	80.57	27.40	39.13
2008/09	2.02	27.52	53.40	94.28	94.85	41.28	58.41	58.41	14.17	75.13	10.00	27.52	53.40	94.87	94.70
2012/13	25.54	96.03	100.00	100.00	100.00	99.34	98.33	95.78	71.43	90.61	20.77	99.30	100.00	100.00	100.00
2014/15	67.65	13.89	1.02	37.04	66.41	8.38	5.11	100.00	99.99	63.48	33.27	5.24	12.58	43.47	61.81
	Self-employed (nonagriculture)														
2006/07	65.01	34.74	18.18	18.99	37.88	46.89	62.69	34.74	7.78	44.19	62.69	46.89	22.10	23.96	28.26
2008/09	21.77	34.28	34.28	34.28	5.37	21.77	9.87	34.28	14.54	12.67	21.77	21.77	19.89	28.54	4.22

	Both					Female					Male				
Year	**L**	**LM**	**M**	**UM**	**H**	**L**	**LM**	**M**	**UM**	**H**	**L**	**LM**	**M**	**UM**	**H**
2012/13	63.71	25.54	25.54	25.54	30.67	51.34	71.97	68.89	51.34	63.97	14.93	1.43	7.74	17.41	24.61
2014/15	13.75	28.61	28.61	28.61	28.61	74.98	83.46	40.80	20.38	28.61	5.24	23.37	26.35	35.11	41.57
	Paid employees														
2006/07	34.74	18.18	31.92	33.86	42.22	28.26	46.89	40.09	57.78	54.30	44.95	22.10	32.77	28.26	34.74
2008/09	34.28	34.28	10.12	8.24	2.02	4.22	11.34	7.11	0.32	13.75	13.75	12.67	11.15	4.69	2.02
2012/13	25.54	3.92	4.30	30.91	28.90	38.12	17.73	28.23	8.05	48.29	7.70	13.12	3.41	27.08	32.14
2014/15	8.98	17.02	11.21	40.79	29.14	3.99	28.61	28.61	62.34	63.62	13.89	14.76	18.29	28.61	31.65
	Self-employed (agriculture)														
2006/07	81.69	56.49	36.62	33.73	62.69	7.78	46.02	34.74	62.69	62.69	10.10	74.06	43.26	40.93	29.11
2008/09	16.58	4.69	2.71	21.77	14.54	4.22	26.47	20.50	11.34	20.50	23.59	11.07	4.12	11.07	18.29
2012/13	61.33	25.54	10.29	1.43	1.43	38.12	10.29	25.54	25.54	16.73	3.74	48.66	37.29	5.85	15.35
2014/15	28.61	28.61	7.63	5.24	6.75	67.65	13.89	24.37	6.75	13.89	2.03	1.57	6.59	5.54	6.96

Note: L = lower-income, LM = lower middle-income, M = middle-income, UM = upper middle-income, H = higher-income.
Source: Authors' calculations based on data from the PSLM Survey.

Table A7: Vulnerability index, by gender and age group

	Both					Female					Male				
Year	**L**	**LM**	**M**	**UM**	**H**	**L**	**LM**	**M**	**UM**	**H**	**L**	**LM**	**M**	**UM**	**H**
	Age cohort 10–19														
2006/07	68.90	52.53	50.69	52.53	33.97	70.49	33.97	24.85	24.13	17.76	24.85	44.01	17.76	61.56	33.97
2008/09	33.53	14.20	14.20	14.20	4.12	70.88	11.07	20.03	1.97	17.19	26.46	23.27	33.53	4.12	6.46
2012/13	40.01	17.01	8.23	1.39	22.40	100.00	1.39	27.59	17.32	7.02	40.01	24.96	1.58	1.39	10.05
2014/15	11.83	14.33	13.57	9.61	1.77	13.57	49.73	6.59	23.82	30.90	14.33	23.82	13.57	5.12	0.44
	Age cohort 20–29														
2006/07	33.97	27.63	52.53	28.03	50.69	43.26	27.63	46.98	43.62	43.26	33.97	7.60	27.63	27.63	44.01

	Both					Female					Male				
Year	**L**	**LM**	**M**	**UM**	**H**	**L**	**LM**	**M**	**UM**	**H**	**L**	**LM**	**M**	**UM**	**H**
2008/09	23.68	14.20	4.12	8.98	11.07	1.97	11.07	4.12	11.07	14.20	1.97	33.53	4.12	3.76	4.58
2012/13	42.43	8.23	1.39	6.11	17.32	43.58	17.32	1.39	17.21	1.39	7.56	7.56	1.39	17.32	10.29
2014/15	13.43	7.46	15.68	12.29	27.97	2.19	19.57	40.69	56.00	61.21	10.95	10.95	5.12	10.95	19.57
	Age cohort 30–39														
2006/07	33.97	7.60	19.61	29.15	22.74	26.00	7.60	24.85	41.57	50.69	27.63	33.97	26.91	22.74	33.97
2008/09	5.21	14.20	2.33	14.43	8.52	67.44	16.19	4.12	6.95	1.97	4.12	7.92	4.81	8.52	7.16
2012/13	30.54	1.39	3.96	11.00	11.00	1.58	18.73	1.39	34.43	26.81	5.30	2.31	7.56	11.00	10.29
2014/15	27.97	27.97	18.08	27.97	30.39	2.19	10.95	27.97	54.16	70.33	22.24	5.12	27.97	24.27	27.97
	Age cohort 40–49														
2006/07	33.97	33.97	7.60	33.97	33.97	7.60	17.76	57.74	32.23	48.73	17.76	14.64	17.76	33.97	26.13
2008/09	4.12	7.16	6.65	1.97	2.32	6.46	20.03	8.46	25.81	1.25	4.12	16.19	11.87	7.16	3.85
2012/13	22.40	1.58	18.61	23.84	11.76	25.18	3.96	16.34	22.40	44.66	1.39	8.26	21.67	21.93	17.89
2014/15	42.03	30.02	39.43	31.15	22.83	13.57	8.18	11.65	57.55	75.04	27.97	27.97	30.13	23.42	20.71
	Age cohort 50–59														
2006/07	52.90	12.14	29.38	33.97	31.46	7.60	50.69	39.54	61.56	70.82	17.76	33.97	17.76	33.97	27.63
2008/09	1.97	9.64	4.12	16.19	4.12	39.76	11.07	27.89	5.25	28.21	16.19	5.21	9.64	23.27	14.20
2012/13	17.84	1.39	11.39	21.31	11.39	89.97	1.39	1.39	24.55	53.85	10.05	0.32	25.06	17.72	4.60
2014/15	26.59	27.97	27.97	33.78	30.59	13.57	10.48	27.97	54.92	60.07	27.97	24.85	30.39	25.76	30.55
	Age cohort 60 and above														
2006/07	77.52	61.56	61.56	44.01	69.69	99.94	66.75	72.63	68.49	61.56	87.03	61.56	53.24	54.11	65.29
2008/09	17.65	4.12	1.97	23.27	11.07	25.87	24.05	18.54	24.05	4.12	21.27	6.46	4.12	12.47	4.31
2012/13	58.44	37.29	14.13	5.30	17.32	34.65	1.39	2.25	24.96	27.59	48.66	32.11	7.72	1.39	17.43
2014/15	6.59	17.86	17.29	31.70	46.63	23.82	19.57	26.86	46.63	69.18	22.24	2.52	20.05	27.97	44.03

Note: L = lower-income, LM = lower middle-income, M = middle-income, UM = upper middle-income, H = higher-income.
Source: Authors' calculations based on data from the PSLM Survey.

Table A8: Vulnerability index, by education level and gender

	Both					Female					Male				
Year	**L**	**LM**	**M**	**UM**	**H**	**L**	**LM**	**M**	**UM**	**H**	**L**	**LM**	**M**	**UM**	**H**
	Illiterate														
2006/07	61.56	37.06	33.97	27.63	33.97	10.67	24.85	17.76	13.17	17.76	33.97	17.76	33.72	12.14	31.21
2008/09	4.12	4.12	23.68	4.12	4.12	11.07	2.65	4.12	8.62	4.12	33.53	14.20	7.40	9.64	7.92
2012/13	37.29	16.34	7.52	1.39	4.26	93.26	8.23	1.39	10.13	1.39	29.16	8.23	1.39	17.32	17.32
2014/15	13.57	3.89	11.65	19.57	7.87	66.50	47.13	39.93	4.74	13.57	0.14	3.89	9.61	15.28	17.86
	Primary														
2006/07	33.97	27.63	27.63	24.50	27.35	84.52	50.69	29.38	33.97	24.13	43.26	7.60	24.13	23.29	17.76
2008/09	26.46	14.20	4.12	7.16	13.43	25.87	33.53	27.46	28.07	26.89	24.05	33.53	1.97	1.18	16.19
2012/13	46.01	8.23	1.39	10.29	1.39	67.28	24.96	14.80	37.39	29.59	16.34	1.58	1.39	27.59	0.52
2014/15	4.25	6.59	5.12	13.43	5.90	6.41	2.19	10.18	27.97	27.97	13.57	2.19	6.59	16.72	3.50
	Secondary														
2006/07	52.90	43.26	33.97	17.76	24.13	82.26	54.71	30.03	10.33	61.56	44.01	28.91	17.76	17.76	24.13
2008/09	1.97	4.12	11.69	4.12	1.97	35.05	29.34	21.27	4.58	28.07	4.12	13.43	13.43	4.12	1.97
2012/13	16.34	4.07	5.90	1.39	7.56	69.42	17.32	24.96	7.56	4.07	13.01	0.90	7.52	17.32	7.56
2014/15	5.84	1.57	3.89	3.89	7.46	52.03	30.70	18.72	20.60	1.57	15.01	5.12	13.57	8.77	1.84
	Matric														
2006/07	25.98	33.97	29.38	27.63	33.97	80.64	61.56	62.72	45.92	58.89	61.56	33.97	27.63	24.85	33.97
2008/09	12.38	9.18	4.12	4.12	1.97	28.07	6.03	43.31	41.65	20.03	4.12	23.68	4.12	4.12	4.58
2012/13	10.05	3.52	1.39	18.44	19.06	1.39	29.34	56.01	10.05	37.02	21.75	14.59	1.39	27.59	20.50
2014/15	27.97	2.19	10.95	11.59	12.84	19.91	27.97	52.27	3.25	10.32	5.84	4.45	3.89	17.86	8.06
	FA														
2006/07	7.60	39.23	41.95	26.13	24.13	7.60	2.12	18.60	30.66	20.16	26.29	33.97	43.26	38.42	7.60
2008/09	33.53	0.31	4.11	3.85	11.07	23.68	3.49	6.65	3.59	4.12	4.12	4.12	5.25	11.07	11.07
2012/13	32.65	32.65	5.90	1.39	42.43	50.09	70.81	65.72	9.25	9.02	32.11	37.29	2.89	7.52	40.01

	Both					Female					Male				
Year	**L**	**LM**	**M**	**UM**	**H**	**L**	**LM**	**M**	**UM**	**H**	**L**	**LM**	**M**	**UM**	**H**
2014/15	27.97	10.95	19.57	27.97	22.24	7.46	3.89	34.45	5.12	2.62	22.63	27.97	27.97	19.91	27.55
	BA														
2006/07	42.28	49.28	44.62	26.91	6.94	91.11	88.74	57.08	11.97	61.90	40.93	61.56	47.49	10.33	11.43
2008/09	23.68	1.95	9.64	10.57	26.42	73.50	30.04	74.80	44.16	26.06	23.68	14.54	1.97	10.57	32.42
2012/13	92.72	86.71	88.43	89.58	87.60	29.99	83.68	50.57	87.30	88.23	84.79	82.82	85.54	87.47	84.64
2014/15	52.27	45.04	21.35	9.13	32.85	57.55	27.97	52.27	9.36	0.43	27.97	27.97	19.20	11.28	38.25
	Professional														
2006/07	6.20	33.97	43.26	33.97	40.93	27.52	7.60	47.23	43.26	61.56	17.76	38.88	45.92	33.97	33.97
2008/09	9.78	2.32	11.07	1.97	20.03	20.03	33.53	11.41	4.12	20.03	4.58	3.04	4.58	1.59	11.07
2012/13	24.96	7.92	20.09	1.39	5.30	18.73	41.90	17.84	7.86	5.85	5.30	22.97	27.59	2.31	8.23
2014/15	52.48	39.92	34.91	42.03	53.81	75.76	71.59	27.97	36.98	52.76	45.47	35.43	35.43	32.85	46.15

Note: L = lower-income, LM = lower middle-income, M = middle-income, UM = upper middle-income, H = higher-income.
Source: Authors' calculations based on data from the PSLM Survey.

Table A9: Determinants of overall real earnings (GMM results)

Variable	Both genders	Female	Male
Employed labor force	0.41***	0.58***	0.25**
Inflation (food)	-2.23***	-3.24***	-1.97***
Inflation (nonfood)	1.47***	3.80***	0.91
Rural	0.71***	0.46	0.76**
J statistic	3.16	2.37	2.31
Observations	209	208	209
R squared	0.58	0.52	0.45
F stat	23.07	18.59	15.65

Source: Authors' calculations based on data from the PSLM Survey.

Table A10: Determinants of real earnings, by employment status (GMM results)

Variable	Both genders	Female	Male	Both genders	Female	Male
	Employers			Self-employed (nonagriculture)		
Employed labor force	0.93***	1.87***	0.79***	0.50***	0.69***	0.28
Inflation (food)	-5.81***	-5.41	-6.52***	-1.33**	-2.95***	-0.87
Inflation (nonfood)	4.85***	-3.27	4.81**	0.37	2.36***	-0.17
Rural	0.71	8.88***	0.47	0.45	0.55	0.25
J statistic	4.32	0.09	3.48	1.48	1.31	1.84
Observations	175	37	174	209	196	209
R squared	0.72	0.64	0.68	0.56	0.62	0.38
F stat	42.64	22.99	42.04	6.88	7.57	5.69
	Paid employees			Self-employed (agriculture)		
Employed labor force	1.13***	1.00***	0.74***	0.65***	0.67***	0.46***
Inflation (food)	-3.49***	-4.40***	-2.96***	-2.68***	-0.64	-2.51***
Inflation (nonfood)	1.92***	2.95***	1.41***	1.77**	0.87	1.48*
Rural	0.83***	0.81***	0.72***	1.33***	3.55***	1.54***
J statistic	2.77	3.85	3.43	1.58	9.64	1.98
Observations	209	208	209	208	173	208
R squared	0.76	0.66	0.78	0.6	0.58	0.51
F stat	58.93	36.17	51.63	19.32	15.9	13.34

Source: Authors' calculations based on data from the PSLM Survey.

Table A11: Determinants of real earnings, by province (GMM results)

Variable	Punjab	Sindh	KP	Balochistan
Both genders				
Employed labor force	0.73***	-0.1	0.33	0.52***
Inflation (food)	-4.34***	-2.66	-3.03***	-1.18
Inflation (nonfood)	3.76***	2.01	2.78***	0.56
Rural	0.47	1.88**	0.51	0.93**
J statistic	16.74	3.18	3.86	1.91
Observations	105	45	30	29
R squared	0.78	-0.13	0.57	0.65
F stat	28.23	2.76	4.09	7.76
Female				
Employed labor force	0.47***	-0.03	0.68***	0.68***
Inflation (food)	-3.64***	-9.36***	-3.60***	-0.35
Inflation (nonfood)	2.93***	9.80***	4.09***	1.33
Rural	0.58	-1.35	-0.09	2.88***
J statistic	13.62	2.93	0.57	1.62
Observations	105	45	30	28
R squared	0.69	0.14	0.67	0.53
F stat	31.13	5.24	7.58	8.16
Male				
Employed labor force	0.74***	0.01	-0.43	0.58***
Inflation (food)	-4.34***	-2.98	-3.87***	-1.04
Inflation (nonfood)	3.38***	2.54	3.10*	0.2
Rural	0.64*	1.84***	-1.06	1.03***
J statistic	16.26	3.63	0.19	1.97
Observations	105	45	30	29
R squared	0.77	0.04	-0.19	0.65
F stat	25.16	3.86	1.62	5.38

Source: Authors' calculations based on data from the PSLM Survey.

Table A12: Determinants of real earnings, by education level (GMM results)

Variable	Illiterate	Primary	Secondary	Matric	Inter-mediate	Graduate	Post-graduate
Both genders							
Employed labor force	0.44***	0.49***	0.50***	0.02	0.76***	0.94***	1.21**
Inflation (food)	-1.62***	-2.06***	-3.11***	-1.77***	-1.29*	-2.11	-2.85***
Inflation (nonfood)	1.06*	1.39***	2.34***	0.56	1.16	1.66	1.45*
Rural	1.18***	1.09***	1.21***	0.5	0.46	0.01	0.23
J statistic	2.43	3.5	2.79	1.75	0.32	0.4	0.71
Observations	209	209	209	209	209	181	208
R squared	0.63	0.62	0.64	0.18	0.68	0.94	0.77
F stat	23.28	27.11	32.04	7.5	14.18	372.8	42.63
Female							
Employed labor force	0.81***	0.46***	0.87***	0.70***	1.21***	0.77***	0.82***
Inflation (food)	-3.54***	-3.21***	-1.73	-2.28***	-3.18***	-3.67	-4.43***
Inflation (nonfood)	6.05***	1.93	3.54**	1.41	2.64***	-0.43	3.11***
Rural	1.23**	0.43	1.74***	0.11	2.13***	-0.28	-0.15
J statistic	2.29	3.84	2.94	4.55	1.01	2.34	3.2
Observations	206	192	177	199	203	91	185
R squared	0.55	0.45	0.53	0.45	0.62	0.82	0.71
F stat	28.39	30.62	36.67	16.17	23.71	50.89	32.04
Male							
Employed labor force	0.46***	0.61***	0.50***	0.17	0.69***	0.93***	1.09***
Inflation (food)	-1.81***	-2.27***	-3.18***	-2.07***	-1.05	-1.98	-3.01***
Inflation (nonfood)	0.84	1.56***	2.35***	0.95	0.99	1.32	1.37
Rural	1.16***	1.10***	1.22***	0.57	0.37	0.17	0.14
J statistic	2.2	4.11	2.82	2.21	0.35	0.99	0.2
Observations	209	209	209	209	209	179	208
R squared	0.62	0.66	0.63	0.33	0.65	0.94	0.74
F stat	19.49	32.49	31.77	9.41	10.45	325.53	39.77

Source: Authors' calculations based on data from the PSLM Survey.

Table A13: Determinants of real earnings, by age group (GMM results)

	Age cohort					
Variable	**10–19**	**20–29**	**30–39**	**40–49**	**50–59**	**60 and >**
Both genders						
Employed labor force	0.37***	0.51***	0.72***	0.85***	0.79***	1.12***
Inflation (food)	-0.81	-2.22***	-3.02***	-2.48***	-2.90***	-3.59***
Inflation (nonfood)	0.95	1.62***	2.63***	1.39***	1.96***	3.33***
Rural	0.68**	0.55**	0.91***	0.44*	0.45	0.73***
J statistic	1.74	8.26	4.09	3.54	2.88	2.13
Observations	209	209	209	209	209	209
R squared	0.42	0.65	0.69	0.73	0.65	0.7
F stat	9.02	26.01	29.72	50.48	30.76	54.93
Female						
Employed labor force	0.47***	0.71***	0.59***	0.69***	0.75***	0.83***
Inflation (food)	-2.66**	-2.72***	-3.75***	-3.32***	-5.64***	-0.53
Inflation (nonfood)	3.37**	3.83***	4.08***	3.64***	8.26***	2.35
Rural	0.59	-0.4	1.09**	0.16	1.05	-0.79
J statistic	2.76	3.87	2.88	3.55	3.92	1.61
Observations	198	206	206	206	194	144
R squared	0.29	0.51	0.45	0.56	0.35	0.35
F stat	8.13	16.97	23.12	31.67	17.8	8.55
Male						
Employed labor force	0.40***	0.33***	0.80***	1.25***	0.90***	1.21***
Inflation (food)	-1.02	-1.85***	-3.22***	-3.25***	-3.18***	-4.06***
Inflation (nonfood)	1.17	0.8	2.51***	1.54***	1.79***	3.45***
Rural	0.65*	0.62**	0.99***	0.54**	0.47	0.66**
J statistic	0.97	6.08	3.5	4.61	2.59	1.9
Observations	209	209	209	209	209	209
R squared	0.42	0.52	0.69	0.68	0.65	0.67
F stat	9.31	16.45	27.11	28.89	23.27	45.88

Source: Authors' calculations based on data from the PSLM Survey.

Table A14: Vulnerability index of economic groups of earners, by gender

	Both					Female					Male				
	L	LM	M	UM	H	L	LM	M	UM	H	L	LM	M	UM	H
Pakistan	35.38	20.99	17.34	21.11	20.30	25.43	18.25	25.88	25.73	41.64	18.18	11.98	10.32	21.43	21.94
Punjab	25.69	19.52	18.57	19.81	19.98	41.38	36.19	38.42	54.56	49.69	27.92	18.23	14.73	20.18	23.24
Sindh	25.21	15.03	16.45	18.44	26.80	28.53	32.14	26.13	38.05	59.96	12.75	9.72	7.42	22.09	26.87
KP	40.39	27.83	33.08	27.00	35.07	51.32	36.49	45.77	54.41	49.45	18.92	30.10	27.94	27.01	35.11
Balochistan	22.79	17.16	19.63	19.45	16.09	90.90	78.96	61.25	43.53	30.02	17.20	19.79	19.01	20.27	17.73
Employers	26.87	46.21	58.70	66.17	72.95	42.12	65.46	88.55	58.95	61.79	16.17	45.53	61.64	66.43	73.91
Self-employed (nonagriculture)	41.06	30.79	26.65	26.86	25.63	48.74	57.00	44.68	23.51	37.36	26.16	23.36	19.02	26.25	24.67
Paid employees	25.88	18.35	14.39	28.45	25.57	18.65	26.14	26.01	32.12	44.99	20.07	15.66	16.40	22.16	25.13
Self-employed (agriculture)	47.05	28.83	14.32	15.54	21.35	29.44	24.17	26.29	26.58	28.45	9.86	33.84	22.82	15.85	17.43
Age cohort 10–19	38.57	24.52	21.67	19.43	15.57	63.73	24.04	19.76	16.81	18.22	26.41	29.01	16.61	18.05	12.73
Age cohort 20–29	28.38	14.38	18.43	13.85	26.76	22.75	18.90	23.30	31.98	30.01	13.61	14.91	9.56	14.91	19.61
Age cohort 30–39	24.42	12.79	11.00	20.63	18.16	24.31	13.37	14.58	34.28	37.45	14.82	12.33	16.81	16.63	19.85
Age cohort 40–49	25.63	18.18	18.07	22.73	17.72	13.20	12.48	23.54	34.50	42.42	12.81	16.77	20.36	21.62	17.15
Age cohort 50–59	24.82	12.78	18.21	26.31	19.39	37.72	18.41	24.20	36.57	53.24	17.99	16.09	20.71	25.18	19.25
Age cohort 60 and above	40.05	30.21	23.74	26.07	36.18	46.07	27.94	30.07	41.03	40.61	44.80	25.66	21.28	23.99	32.76
Illiterate	29.13	15.35	19.20	13.18	12.55	45.38	20.71	15.80	9.16	9.21	24.20	11.02	13.03	13.59	18.58
Primary	27.68	14.16	9.56	13.84	12.02	46.02	27.84	20.46	31.85	27.15	24.30	11.22	8.52	17.19	9.49
Secondary	19.26	13.26	13.87	6.79	10.28	59.69	33.02	23.74	10.76	23.82	19.04	12.09	13.07	11.99	8.87
Matric	19.09	12.22	11.46	15.44	16.96	32.51	31.22	53.58	25.22	31.57	23.32	19.17	9.26	18.61	16.78
Intermediate	25.43	20.78	17.88	14.84	24.97	22.21	20.08	31.35	12.16	8.98	21.29	25.84	19.84	19.23	21.56
Graduate	52.74	45.75	41.01	34.05	38.45	63.04	57.61	58.68	38.20	44.15	44.34	46.72	38.55	29.91	41.69
Professional	23.35	21.04	27.33	19.84	30.02	35.51	38.65	26.11	23.06	35.05	18.28	25.08	28.38	17.68	24.86

Note: L = lower-income, LM = lower middle-income, M = middle-income, UM = upper middle-income, H = higher-income.
Source: Authors' calculations based on data from the PSLM Survey.

Table A15: Vulnerability index of economic groups of earners, by gender over time

	Both genders				Female				Male			
Earner group	**2006/07**	**2008/09**	**2012/13**	**2014/15**	**2006/07**	**2008/09**	**2012/13**	**2014/15**	**2006/07**	**2008/09**	**2012/13**	**2014/15**
Pakistan	32.96	15.06	21.46	22.61	37.82	12.74	27.94	31.04	31.35	11.79	10.79	13.15
Punjab	51.88	7.88	7.47	15.63	28.47	14.20	80.54	52.98	40.65	12.79	17.22	12.80
Sindh	24.61	10.13	25.04	21.77	36.54	16.80	70.61	23.90	22.37	11.19	13.82	15.71
KP	50.00	21.24	28.49	30.96	80.57	14.76	42.57	52.06	42.14	22.15	19.48	27.49
Balochistan	11.09	10.56	34.18	20.26	39.26	48.47	71.10	84.90	10.61	12.31	33.59	18.70
Employers	40.79	54.41	84.31	37.20	57.52	49.48	91.10	55.39	39.57	56.10	84.01	31.27
Self-employed (nonagriculture)	34.96	26.00	34.20	25.64	39.26	18.62	61.50	49.65	36.78	19.24	13.22	26.33
Paid employees	32.18	17.79	18.71	21.43	45.46	7.35	28.08	37.43	32.56	8.86	16.69	21.44
Self-employed (agriculture)	54.24	12.06	20.00	15.37	42.78	16.60	23.24	25.31	39.50	13.63	22.18	4.54
Age cohort 10–19	51.73	16.05	17.81	10.22	25.11	15.34	18.67	25.07	37.76	14.70	4.34	6.38
Age cohort 20–29	38.57	12.41	15.10	15.36	39.09	8.49	8.97	37.68	33.09	4.15	9.67	11.88
Age cohort 30–39	22.61	8.94	11.58	26.47	30.47	6.67	17.33	37.13	27.87	6.83	9.61	26.73
Age cohort 40–49	28.70	4.44	15.64	33.09	34.84	11.93	17.75	36.08	25.95	7.63	20.49	24.75
Age cohort 50–59	31.97	7.21	12.67	29.38	48.07	17.72	18.25	36.28	26.45	15.70	15.79	28.90
Age cohort 60 and above	62.87	11.62	26.49	24.02	71.29	18.40	20.97	36.90	57.55	6.97	8.85	30.68
Illiterate	38.84	8.03	13.36	11.31	21.50	10.61	10.06	21.10	25.69	8.32	12.01	14.25
Primary	28.22	13.07	13.46	7.06	36.29	28.00	24.62	16.37	21.72	6.45	9.83	8.94
Secondary	34.40	4.77	7.05	4.53	40.13	17.48	13.38	17.32	19.88	6.51	10.80	8.06
Matriculation	30.19	6.35	10.49	13.11	58.13	23.03	30.84	19.93	28.82	4.27	16.49	9.94
Intermediate	27.81	10.57	23.00	21.74	19.56	4.39	37.38	13.74	29.76	9.13	16.81	25.15
Graduate	34.00	14.45	89.01	32.13	52.12	39.75	78.91	23.60	23.08	14.99	85.89	22.91
Professional	31.67	9.03	11.93	44.63	35.48	14.73	15.75	46.95	37.96	5.75	12.71	38.14

Source: Authors' calculations based on data from the PSLM Survey.

The Lahore Journal of Economics
22 : SE (September 2017): pp. 233–249

Diversification on Small Farms: An Empirical Investigation of Panel Data for 2001–10

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Abstract

Pakistan's agricultural sector has experienced restructuring over the last decade, from changes in land markets to the move toward nonagricultural labor markets. However, agriculture remains one of the most important sources of livelihood, accounting for 45 percent of the country's workforce. It is also a key policymaking area, but the role of small farmers in poverty reduction is still being examined. The future of small farms cannot be viewed in isolation, that is, without taking into account their synergies with nonfarm rural activities. We measure the impact of diversifying sources of livelihood on household income and consumption among small farms in rural Pakistan. Using a balanced panel of 2,058 households from the Pakistan Panel Household Survey (2001–10), we find that both consumption and income are (i) significantly higher for households that have diversified their sources of income and (ii) diversified households also plant greater varieties of crops. These results suggest that nonagricultural activities tend to complement agricultural activities with a view to improving welfare in a rural economy.

Keywords: Agriculture, income, diversification, Pakistan.

JEL classification: E2, O1, Q1.

1. Introduction

Across countries and over time, economic development is almost always accompanied by a decline in the agriculture-to-GDP ratio. Rural areas in many developing countries have undergone a structural transformation as agricultural households moved toward nonfarm activities. Pakistan is no exception to these trends. The share of agriculture in GDP declined from 26 to 22 percent between 2001 and 2010. However, the sector is far from becoming redundant. Agricultural activities account for 45

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percent of the workforce through direct employment.[1] The benefits are amplified if we consider the indirect employment opportunities associated with cultivation, including on-farm and off-farm labor. Recent studies have emphasized the role of nonagricultural activities in sustaining the agricultural economy. That is, nonagricultural activities should be viewed as complements to, rather than substitutes for, agricultural production (van der Ploeg, 2014).

This study draws on a panel dataset collected by the Pakistan Institute of Development Economics in collaboration with the World Bank, covering households in 16 districts of Pakistan between 2001 and 2010. On average, 15 percent of the households surveyed relied on one source of income. As the dataset shows, the average consumption expenditure of a district corresponds to the average proportion of households that 'specialize' in one income source.

Figure 1 maps those districts that lie above or below the average proportion of specialized households (as mentioned above, 15 percent of the surveyed households were 'specialized' in 2001) and Figure 2 shows the quintiles of average consumption in 2010. Note that the 'specialized' districts in panel A correspond to lower average annual consumption in 2010. Conversely, this points to the possible benefits of diversifying livelihoods in a rural economy, which is what we intend to test for empirically.

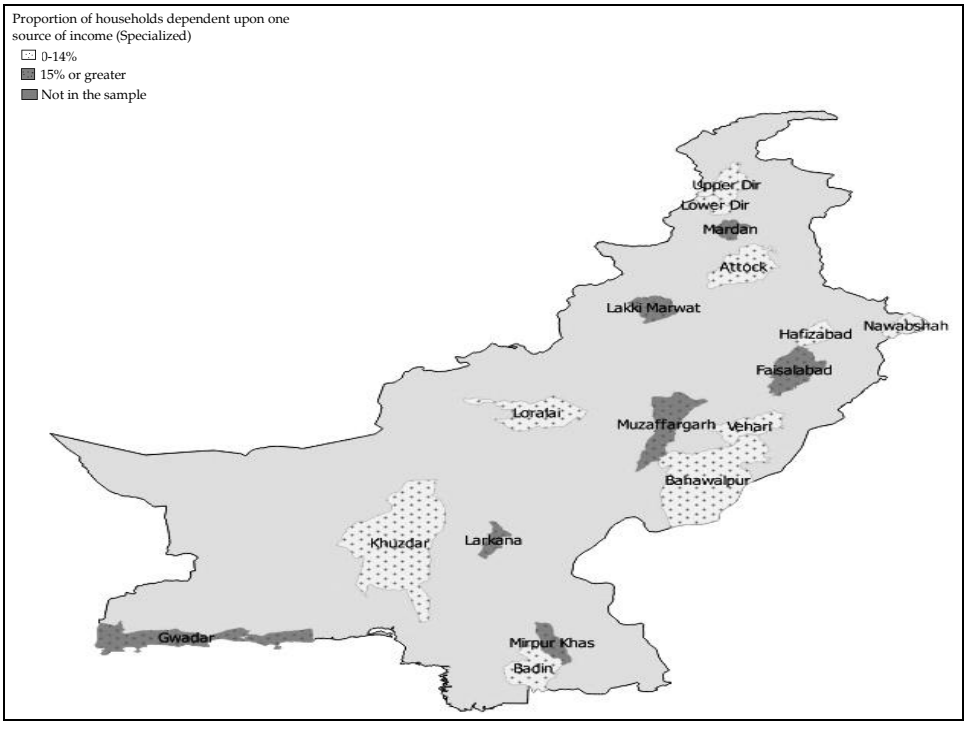
In this paper, we explore structural changes at a micro level, using panel data from the Pakistan Panel Household Survey (PPHS), which covers 2,058 households across Pakistan over a ten-year period. We find that households with diversified sources of income in 2001 had statistically higher annual consumption and income in 2010. On the other hand, both consumption expenditure and income decreased for households that focused consistently on one source of income over 2001–10. The evidence also suggests complementarities in diversification: agricultural households that have diversified their sources of livelihood are also more likely to diversify the types of crops they cultivate during the year.

Despite the large body of literature on developing countries, there is a dearth of longitudinal studies on Pakistan. Kurosaki (2003) presents evidence of agricultural transformation at the district level: although aggregate land productivity in western Punjab remained unchanged during

[1] Based on data available from Agriculture Census Report 2010 at http://www.pbs.gov.pk

1903–92, cropping patterns showed a shift in land acreage toward more productive districts. This reallocation of cultivated land from low-value-added to cash crops explains the area's rapid agricultural growth.

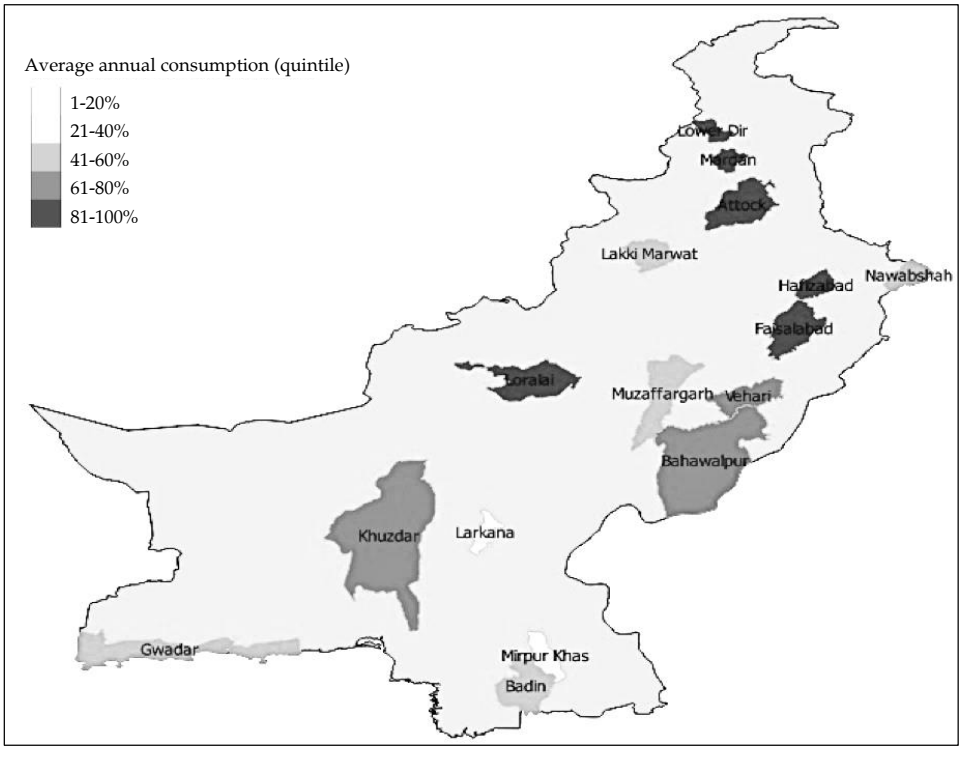
Figure 1: Proportion of households that 'specialize' in one source of income



Note: Districts are grouped into two categories: above the sample district average (15 percent) and below.
Source: Based on authors' calculations, using data from the PPHS 2010.

Rapid specialization in crop production seemed to be the norm in the early 1990s. Until recently, most studies on agricultural growth focused on scale enlargement, intensification and specialization. Conversely, such scale-centric policies were associated with persistent rural poverty as well as increased regional disparities (Knickel, 1990). Furthermore, the removal of agricultural subsidies after trade liberalization changed the country's economic landscape (Bryceson, 1999). This explains why it is necessary to revisit the paradigm by exploring the livelihood strategies of rural households through the lens of diversification.

Figure 2: District average of annual real consumption expenditure, 2010



Source: Based on authors' calculations, using data from the PPHS 2010.

Rural development is not nested in agricultural activities alone. Rather, it needs to be promoted through the synergies between agricultural and nonagricultural activities. Previous studies have explored why households move toward nonfarm activities. On one hand, the burgeoning nonagricultural sector offers higher rates of return, thus 'pulling' in productive household resources, particularly capital and labor. On the other hand, the volatility of returns arising from negative production shocks, missing insurance markets and credit constraints 'push' households away from agricultural activities. Barrett et al. (2000) find that the livelihood strategies adopted by rural households depend on household characteristics, geography, climate and market institutions. The diversification of livelihood strategies follows a distinct pattern among wealthier households, which diversify into capital-intensive and more remunerative activities, while poor households are restricted to activities with low barriers to entry.

Farm wage employment emerges as a popular choice because it provides a safety net to households that are below the poverty line and are vulnerable to negative shocks. Richer households have both the capacity and incentive to move into more profit-generating activities through greater investment. Furthermore, they have the necessary human capital and marketable skills to develop nonfarm alternatives. This phenomenon is referred to as the "meso-paradox". Reardon, Berdegué and Escobar (2001) use data from 11 rural household income studies and find an increase in the multi-activity rate, moving from the poorest to the richest income quartiles in Latin America. Interestingly, some forms of diversification are evident irrespective of the level of income.

The role of diversification in livelihoods to promote rural development has been contested by many researchers. Diversification can weaken agricultural productivity when alternative activities compete for productive resources. While diversification serves as a risk management tool, it may also keep households from taking a higher risk-return approach. Finally, the gains from specialization may be lost through diversification (Berkvens, 1997; Collier & Gunning, 1997). On the other hand, proponents of diversification correlate welfare with involvement in multiple activities. In this sense, diversification can be used as a risk coping and accumulation strategy.

Recent findings from agro-based economies show that many have transitioned from relying heavily on agriculture to nonagricultural activities. Furthermore, these income-diversifying strategies vary between African and non-African economies. While 51 percent of African households tend to specialize,[2] diversification is more common among non-African economies[3] (Davis, Di Giuseppe & Zezza, 2017). Other studies on rural livelihood strategies support this argument, finding that nonfarm earnings are significantly higher than agricultural wage or self-employment earnings. Around three quarters of the rural households in Africa rely on off-farm activities for consumption smoothing (Bryceson, 1999).

Other studies suggest that the livelihood strategies of rural households are more complex, emanating from the linkages between farm and nonfarm activities – the two are linked through channels of investment,

[2] Specialization is concentrated in nonagricultural wage employment and self-employment.

[3] Only 21 percent of households in non-African economies specialize. These households diversify into farm-related activities at lower levels of development.

production and consumption. An increase in agricultural production leads to higher levels of household income, resulting in an increase in demand for nonagricultural outputs. In one sense, the linkages between on-farm and off-farm activities are complementary and set the stage for diversification (van der Ploeg, 2014; Wiggins, Kirsten & Llambí, 2010; Reardon et al., 2001).

Based on the literature, this study explores whether similar complementarities exist between agricultural and nonagricultural activities among rural households in Pakistan. It also gauges the impact of diversification on household welfare, as measured by household income and consumption. Section 2 outlines the research questions and empirical strategy followed. Section 3 describes the data and identifies some interesting patterns that emerge from this. Section 4 presents the results of our empirical analysis. Section 5 concludes the study and provides some policy implications.

2. Empirical Strategy

In examining the impact of rural dynamics on household welfare over the period 2001–10, we see a substantial movement between occupations and ask what has motivated this. Indeed, traditional economic theory would suggest that specialization leads to increased returns and so, households that wish to maximize their income should concentrate on their most lucrative source of income. However, diversification can help stabilize income and allow consumption smoothing, which may be more important to cash-constrained households. What, then, is the impact of diversification – relative to specialization – on household spending?

Looking at two conventional measures of welfare and poverty (for which data is available), consumption and income, we ask if diversified households have had better welfare indicators than specialized households over the last decade. Using panel data enables us to follow the same households over time and control for other time-varying factors.

We test for the effect of diversification on real consumption and income values in 2010 by running the following regression:

$$y_{h,2010} = \beta_0 + \delta_1 Diversified_{h,2001} + \delta_2 Diversified_{h,2010} + \delta_3 Diversified_{h,2001} * Diversified_{h,2010} + \beta_1 X_{h,2001} + \varepsilon_{h,t} \quad (1)$$

where $y_{h,2010}$ is the real annual consumption or income for household h. *Diversified* is a binary variable equal to 1 if the household has more than one

source of livelihood. Equation (1) measures the effect of diversification in each period and the effect of consistently diversifying as compared to those households that were specialized in both 2001 and 2010. The vector $X_{h,2001}$ includes baseline (2001) characteristics such as the number of literate members of the household or, if the household head is literate, his or her age, the dependency ratio and household assets as a proxy for household wealth. All consumption and income values have been deflated to 2001 values.

All the regressions and results given in Section 4 are robust to the inclusion of district-level effects. All errors are clustered at the household level and robust standard errors reported.

3. Data

The PPHS provides a longitudinal database of key social and poverty indicators. The first round of the survey, conducted in 2001, covers rural households across 16 districts in Pakistan. For security reasons, districts in Khyber Pakhtunkhwa and Balochistan were not surveyed in the second round in 2004. However, the third round, carried out in 2010, includes all the households surveyed originally in 2001 as well as urban households in the 16 districts.[4] Independent researchers have established that sample attrition over the three rounds is nonrandom (Nayab & Arif, 2014). We use a balanced panel of 2,058 rural households surveyed in both 2001 and 2010. Since the 2010 round was conducted during a period of high inflation, we have used inflation-adjusted values for the nominal income and consumption variables employed.[5]

3.1. Sample Description

Table 1 describes key characteristics of the sampled households. On average, 80 percent of the total sample can read and write. A typical household earned slightly more than PKR400,000 in 2001 and has an annual consumption of approximately PKR128,000. The inflation-adjusted values of both income and consumption were lower in 2010. Interestingly, the sampled households appear to accumulate significant savings over one year, arguably by investing in durable assets.

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[4] The PPHS is public data, shared free of cost. The questionnaires, data and sampling strategy is available at: http://www.pidelms.com/pphs/

[5] Available from: http://data.worldbank.org/. All nominal values were deflated using 2001 as the base year.

Table 1: Sample statistics for a balanced panel consisting of 2,058 households

Variable	2001	2010	p-value
Age of household head (years)	47	51	0.000***
Income (2001 values, PKR)	425,813	382,305	0.851
Consumption (2001 values, PKR)	128,513	108,222	0.000***
Family size	8	7	0.486
Dependency ratio	0.9830	0.9504	0.192
Literacy to family size ratio	0.4130	0.4640	0.000***
Landownership (%)	56	60	0.009***
Small: 3 acres or less (%)	25	20	0.188
Medium: 3 to 10 acres (%)	19	16	0.056**
Large: more than 10 acres (%)	12	24	0.005***
Occupation			
Cultivation (%)	56	53	0.041**
Livestock ownership (%)	70	74	0.039**
Wage employment (%)	67	88	0.109**
Nonagricultural enterprise (%)	20	10	0.000***
Reported experiencing production shocks (%)	55	84	0.000***
Type of crops cultivated in a year	4	3	0.000***

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.
Source: Authors' calculations based on data from the PPHS 2010.

More than half the rural sample consists of landowners; this proportion increases over the 10-year study period, but only a small, static minority of landowners have more than 10 acres of land. Correspondingly, more than half the respondents identify themselves as cultivators. However, wage employment remains the dominant occupation: the share of households that include a wage-earning member has risen significantly from 67 to 88 percent over the 10-year period. The shift toward a fixed income stream is understandable, given the economic situation following the 2007/08 global depression. Not surprisingly, the share of respondents who reported having experienced an income shock has also increased substantially from 55 to 84 percent. Here, another factor to consider is the impact of the heavy floods that occurred in 2010.

3.2. Stylized Facts

Table 2 shows the proportion of households considered 'stagnant' (relying on the same sources of livelihood over the study period) – 20 percent

of the total sample continued the same occupation during this time. Of this proportion, over 85 percent had more than one source of income. The average household had at least three different sources of income. Tables A1 and A2 in the Appendix show that most households relied on 'livestock, cultivation and land ownership' or 'cultivation, wage employment, livestock and land ownership'.

Table 2: Sources of livelihood: Households relying on the same sources of income

Number of income sources	Number of households	% of households in this category	As % of sample
One	57	14	3
Two	83	20	4
Three	156	37	8
Four	116	28	6
Five	8	2	0
Total	420	100	20

Source: Authors' calculations based on data from the PPHS 2010.

Table 3 presents the same categories as above, but for those households that shifted between occupations, moving from one source of income to another. The total number of such households is small. However, of the 12 percent that shifted from one source(s) of income to another, the dominant category includes households with three or more different sources of income. Diversification, in terms of income source, seems to be the norm.

Table 3: Sources of livelihood: Households switching to different, but the same number of, sources of income

Number of income sources	Number of households	% of households in this category	As % of sample
One	36	14	2
Two	76	30	4
Three	105	42	5
Four	32	13	2
Total	250	100	12

Source: Authors' calculations based on data from the PPHS 2010.

Next, we look at the proportion of households that moved from a single source of income to multiple sources. Almost a third of the sample (30 percent) diversified their income sources (Table 4) and 31 percent of these households moved from a single income source to multiple sources. Table

A3 in the Appendix shows that wage employment was the most common additional source of income.

Table 4: Sources of livelihood: Households moving toward diversification

Number of income sources	Number of households	% of households in this category	As % of sample
One to two	117	19	6
One to three	76	12	4
One to four	0	0	0
One to five	2	0	0
Two to three	115	19	6
Two to four	91	15	4
Two to five	6	1	0
Three to four	149	24	7
Three to five	10	2	0
Four to five	21	3	1
Total	611	100	30

Source: Authors' calculations based on data from the PPHS 2010.

Finally, we look at the proportion of households that moved from a diversified position to a more specialized one (Table 5). Again, about a third of the sample shifted to fewer sources of livelihood, 36 percent of which moved to a single source of income. As before, wage employment emerges as the preferred choice of occupation (see Table A4 in the Appendix).

Table 5: Sources of livelihood: Households moving toward specialization

Number of income sources	Number of households	% of households in this category	As % of sample
Two to one	86	15	4
Three to one	85	15	4
Four to one	29	5	1
Five to one	4	1	0
Four to two	61	11	3
Three to two	170	29	8
Four to three	118	20	6
Five to four	25	4	1
Total	580	100	28

Source: Authors' calculations based on data from the PPHS 2010.

Some interesting insights emerge from this description of the sample. The first is that a significant proportion of households diversified their income sources. Traditional economic theory tends to predict such behavior in times of greater economic uncertainty. One could argue that, in the aftermath of a global financial crisis and natural disaster, there was greater economic uncertainty in 2010 than in 2001. However, an equally large proportion of households also moved toward a more specialized position.

The second point worth noting is that wage employment, which offers a relatively fixed and steady stream of income, seems to be the occupation of choice among both kinds of households. Thus, diversifying households diversify into wage employment and specializing households move away from other occupations, but often toward wage employment. To investigate if these decisions were motivated by economic concerns, we look at the impact of diversification on the income and consumption of the households in our panel.

4. Results

The main determinants of household welfare – total annual income and total annual consumption – are adjusted for inflation. As discussed in Section 3, our main variables of interest relate to diversification in terms of sources of income. We measure the impact of consistent diversification by households i.e. diversified in both 2001 and 2010 on income and consumption in 2010. Likewise, we gauge whether relying on one source of income in 2001 affected income and consumption in 2010. First, we identify the impact of diversification by looking at the affect of being diversified in either 2001 or 2010. Next, we explore whether this affect is coming from consistent diversification. In all the regressions, we control for baseline household characteristics (literate members of the household, dependency ratio, value of household assets and the age of the household head).

Table 6 presents the results of the regression analysis. The qualitative results are similar for both welfare measures – income and consumption. Households that were either diversified in 2001 or 2010 have higher consumption levels and substantially higher incomes than the baseline group that relied on specialized sources over the decade (columns 1 and 2). Note that households with higher levels of income and consumption in the base year (2001) did not experience an increase in income and consumption thereafter.

Interestingly, we find the impact of diversification in a single time period disappears once the effect of consistent diversification is included. Diversified households, those that continued reliance on multiple sources of income, were better off. The results appeal to economic intuition since diversification enables households to increase investment in multiple activities over time.

Table 6: Impact of diversification on real annual income and consumption

	(1)	(2)	(3)	(4)
Dependent variable	**Annual consumption in 2010**	**Annual income in 2010**	**Annual consumption in 2010**	**Annual income in 2010**
Consumption expenditure in 2001	0.0674*		0.0677*	
	(0.0403)		(0.0403)	
Income in 2001		-0.000613		-0.000672
		(0.000853)		(0.000847)
Diversified in 2001	27,264	308,887***	-10,884	-63,220
	(16,744)	(101,969)	(31,473)	(118,558)
Diversified in 2010	45,899**	524,806***	5,948	134,995
	(22,200)	(151,614)	(20,672)	(90,432)
Diversified in 2001 and 2010			51,670	504,097**
			(36,700)	(228,925)
Literate household members in 2001	23,715***	156,489**	23,645***	155,875**
	(4,575)	(67,926)	(4,578)	(67,759)
Age of household head in 2001	495.3	14,646	491.3	14608
	(602.0)	(25,293)	(602.0)	(25,286)
Dependency ratio in 2001	-12,078	212,687**	-12,321	210,314**
	(8,928)	(100,793)	(8,941)	(100,354)
Worth of household assets (PKR)	0.000103	-0.000357	0.000108	-0.000299
	(0.000111)	(0.000308)	(0.000112)	(0.000287)
Constant	48,909	-1.607e+06	77,447**	-1.329e+06
	(36,834)	(1.333e+06)	(37,050)	(1.225e+06)
Observations	1,603	1,603	1,603	1,603
R-squared	0.035	0.005	0.036	0.005

Note: Income and consumption are inflation-indexed and presented in 2001 (PKR) values. Robust standard errors given in parentheses; errors are clustered at the household level. Dependent variable is measured in terms of inflation-adjusted PKR.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Source: Authors' calculations based on data from the PPHS 2010.

Next, we gauge whether diversification had an impact on household development in 2010. While baseline values matter (the baseline number of literate household members or the types of crops cultivated in 2001 are associated with higher literacy and cultivation in 2010), the effect of diversification is almost as large.[6] For instance, in Table 7, the effect of livelihood diversification in 2001 increases the types of crops cultivated in 2010 twofold, relative to the baseline value of the type of crops cultivated in 2001. While the types of crops cultivated falls, on average, between 2001 and 2010 (see Table 1), the diversified sample shows an increase in the types of crops being cultivated. This signals to potential complementarities in diversification, such that diversification in occupation possibly encourages diversification in cultivation.

Table 7: Impact of diversification on the type of crops cultivated in 2010

Dependent variable	Types of crops cultivated in 2010
Types of crops cultivated in 2001	0.248***
	(0.0252)
Diversified in 2001	0.495***
	(0.184)
Literacy to family size ratio in 2001	0.774***
	(0.247)
Age of household head in 2001	0.0116***
	(0.00378)
Dependency ratio in 2001	0.139**
	(0.0694)
Worth of household assets (PKR)	1.43e-10
	(7.46e-10)
Constant	0.464*
	(0.272)
Observations	685
R-squared	0.218

Note: Robust standard errors given in parentheses; errors are clustered at the household level.
*** p < 0.01, ** p < 0.05, * p < 0.1.
Source: Authors' calculations based on data from the PPHS 2010.

[6] Results available on request.

5. Conclusion

Like many other developing countries, Pakistan has undergone a structural change that has shifted its mainly agrarian economy to one that relies increasingly on the services and nonfarm sectors. At the micro level, this has culminated in agrarian and rural households moving away from agriculture-based livelihoods altogether. However, many households still cope with the greater demands on their resources by drawing on multiple sources of livelihood. Our results support the argument that nonfarm activities can complement and help sustain the rural economy.

Using a 10-year panel dataset comprising 2,058 rural households, we investigate the effect of 'diversification' on household welfare, as measured by income and consumption expenditure. We find that only 15 percent of the sampled households relied on one source of livelihood. Those with diversified sources of income in 2001 and 2010 had significantly higher consumption levels in the latter period. This implies households that specialized consistently in one occupation were significantly worse off.

These results are in line with studies that emphasize the importance of synergies between agricultural and nonagricultural activities in developing countries (see Reardon et al., 2001; van der Ploeg, 2014). Moreover, the stylized facts we present for this sample point to a preference for wage employment as another source of livelihood, given that a steady stream of income allows consumption smoothing and may improve welfare. In addition, diversifying sources of livelihood tends to promote diversification in the type of crops cultivated by such households.

These findings provide important insight into rural dynamics, particularly with greater policy focus on inclusive growth. Improving rural welfare does not necessarily entail reallocating resources away from agriculture. Rather, policymakers take advantage of the complementarities between rural activities. Public investment that promotes complementary nonfarm labor in services and manufacturing could help improve overall household welfare in rural economies.

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Appendix

Table A1: Occupations in households with three sources of income

2001 2010	Livestock, wages, land	Livestock, cultivation, land	Cultivation, wages, land	Livestock, enterprise, wages	Livestock, wages, cultivation
Livestock, wages, land	7	2	2	2	2
Livestock, cultivation, land	15	138	11	4	22
Cultivation, wages, land	1	3	7	0	6
Livestock, enterprise, wages	0	0	1	4	1
Livestock, wages, cultivation	0	0	0	0	0

Source: Authors' calculations based on data from the PPHS 2010.

Table A2: Occupations in households with four sources of income

2001 2010	Cultivation, wages, land, livestock	Land, enterprise, livestock, wages	Cultivation, wages, livestock, enterprise	Cultivation, enterprise, land, wages	Land, cultivation, livestock, enterprise
Cultivation, wages, land, livestock	116	4	1	3	16
Land, enterprise, livestock, wages	1	0	0	1	0
Cultivation, wages, livestock, enterprise	0	0	0	0	0
Cultivation, enterprise, land, wages	0	0	1	0	0
Land, cultivation, livestock, enterprise	1	1	0	0	3

Source: Authors' calculations based on data from the PPHS 2010.

Table A3: Households moving from three to four sources of income

2001 / 2010	Land, cultivation, wages	Land, cultivation, livestock	Livestock, wages, cultivation	Wages, land, livestock	Enterprise, wages, livestock	Others
Land, livestock, cultivation, wages	31	46	37	19	3	13
Land, livestock, wages, enterprise	1	1	0	0	0	0
Cultivation, wages, livestock, enterprise	0	0	0	0	0	0
Cultivation, enterprise, land, wages	0	0	0	0	0	3
Land, cultivation, livestock, enterprise	1	6	3	0	1	3

Source: Authors' calculations based on data from the PPHS 2010.

Table A4: Households moving from three to two sources of income

2001 / 2010	Land, cultivation, wages	Land, cultivation, livestock	Livestock, wages, cultivation	Wages, land, livestock	Enterprise, wages, livestock
Cultivation, wages	7	18	10	4	3
Cultivation, livestock	0	0	0	0	0
Livestock, wages	8	16	28	34	16
Livestock, land	0	3	0	2	0
Livestock, enterprise	0	0	0	1	5
Enterprise, wages	1	0	0	1	2
Land, wages	1	3	0	7	0

Source: Authors' calculations based on data from the PPHS 2010.

The Lahore Journal of Economics
22 : SE (September 2017): pp. 251–281

Mobile Banking: A Potential Catalyst for Financial Inclusion and Growth in Pakistan

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Abstract

Almost half the world's adult population lacks access to a formal bank account and other financial services. Pakistan is no exception and it is also among those countries at the lower end of the spectrum of financial inclusion. However, steps are being taken by government regulators and the private sector to improve access to financial services such as credit, savings, remittances and insurance. The introduction of mobile banking is a notable step in this context. Mobile banking, which comprises mobile wallets and over-the-counter transactions, is rapidly growing around the world and has the potential to reduce barriers to financial inclusion and thus transform economies. The benefits of this platform are even more pronounced for economies with a weak financial architecture and where formal banking entails considerable costs in terms of time and distance. This paper traces the history of mobile banking in Pakistan, studies various models of mobile banking and assesses its current state using the available data to understand how this segment has evolved and transformed conventional banking structures in the country. It also touches on the ecosystem that needs to be built in Pakistan to utilize the full potential of mobile technology.

Keywords: Mobile banking, financial inclusion, branchless banking, Pakistan.

JEL classification: G21, G23, G28, O16.

1. Introduction

Financial inclusion is the process of ensuring the availability of, and access to, basic financial products and services. This includes credit facilities,

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savings, bank accounts and insurance services. If targeted at disadvantaged groups such as low-income and vulnerable households in a reasonable and transparent way, it can serve as a tool for social and economic development and poverty alleviation. On a larger scale, it can strengthen financial institutions, boost economic progress and reduce income inequality (Cull, Ehrbeck & Holle, 2014).

Almost half the world's adult population (approximately 2.5 billion people) lacks access to a formal bank account and other financial services, with Pakistan being no exception. The Financial Inclusion Insights Survey for 2015 reports that approximately 93 percent of the adult population of Pakistan is financially excluded – barely 7 percent of respondents had a bank account – while listed accounts with other types of financial institutions are significantly low.[1] However, financial inclusion figures are gradually improving. This improvement was recently acknowledged by Findex and the Access to Finance Survey.[2] Findex shows an improvement in inclusion from 10 percent in 2011 to 13 percent in 2014; access to finance numbers have improved from 10 to 23 percent.

Despite these notable improvements, Pakistan's financial inclusion numbers still disappoint when compared to regional and global standards. In South Asia, Pakistan ranks lowest, with only 13 percent of adults having bank accounts relative to Sri Lanka (83 percent), India (53 percent), Nepal (34 percent), Bhutan (34 percent) and Bangladesh (31 percent). At a global level, financial inclusion is also low when compared to sub-Saharan Africa (34 percent), Latin America and the Caribbean (51 percent) and developing countries overall (51 percent) (Khan & Rashid, 2015). Moreover, Pakistan falls below the international gender gap: more women are financially excluded than men. The disparity is also visible between rural and urban dwellers and their relative access to basic financial services.

Government regulators and the private sector have taken steps to improve access to financial services such as credit, savings, remittances and insurance, with mobile banking being the most important step. The mobile banking platform, which comprises mobile or m-wallets and over-the-

[1] http://finclusion.org/

[2] According to the Findex definition, financial inclusion means "having an account either by oneself or together with someone else, at a bank or another type of financial institution, or having personally used [mobile money] in the past 12 months." The Access to Finance Survey by the State Bank of Pakistan defines financial inclusion as those who are "formally served" within this sector.

counter (OTC) transactions, has grown rapidly around the world and has the potential to reduce barriers to financial inclusion and thus transform economies (Klein & Mayer, 2011). The benefits are even more pronounced for economies with a weak financial architecture and where formal banking entails considerable costs in terms of time and distance (Ghosh, 2016).

With mobile banking, conducting financial transactions – such as bill payments, money transfers and purchases – in a timely, secure and efficient manner becomes easier. This builds the aspiration toward a world in which everybody with a mobile phone, even those living in remote areas, can access and operate a full set of financial services. For the poor, it improves income and expense management and reduces their vulnerability to unforeseen events (Hughes & Lonie, 2007; Johnson, 2014). Mobile penetration has also led to the emergence of branchless banking (BB) by minimizing the cost of transactions and bank branches. It contributes to economic growth through the channels of output growth, employment generation, productivity, reduced transaction costs, better functioning markets and financial inclusion, leading to poverty alleviation (Triki & Faye, 2013).

In this paper, we aim to trace the history of mobile banking in Pakistan. We also study various models of mobile banking and assess its current state using the available data to understand how the segment has evolved and transformed conventional banking structures in the country. The paper also touches on the ecosystem that needs to be built in Pakistan to utilize the full potential of the mobile banking platform and to accelerate economic growth.

In what follows, Section 2 discusses the potential of mobile banking to increase financial inclusion and transform economies. Section 3 provides a structural overview of mobile banking in Pakistan. Section 4 documents the evolution of mobile banking from its inception in 2011. Section 5 analyzes the current state of the industry, its key players and growth in different segments of mobile banking. Section 6 describes the ecosystem needed to foster the growth of mobile banking to help policymakers achieve the broader goals of financial inclusion and economic development. Section 7 concludes the study.

2. Mobile Banking and Financial Inclusion: Transforming Economies

Several definitions of mobile banking exist, but all acknowledge the use of a cellphone to facilitate financial transactions (Porteous, 2007;

Donner & Escobari, 2010). Mobile phones give users access to a digital wallet, which can be used to conduct various transactions – transfer funds, check account balances, send and receive remittances, repay loans, generate receipts, pay bills and school fees and even save without the need for minimum account balances and heavy banking fees (see Jenkins, 2008; Aker & Mbiti, 2010; McKinsey Global Institute, 2016; Hughes & Lonie, 2007; Khan & Rashid, 2015).

Access to mobile and digital devices has grown rapidly across the world. Mobile money applications have become popular in Asia, Africa and Latin America (Klein & Mayer, 2011). For instance, the M-PESA mobile application in Kenya has enabled users to make transactions such as bill payments, money transfers and purchases, transforming a money transfer system to a platform that permits organizations, schools, hospitals and firms to send and receive payments (Hughes & Lonie, 2007; Johnson, 2014).

With mobile banking, individuals can make bank transactions without having to visit a bank branch, which increases the efficacy of the account holder by saving time (Ahmed et al., 2011; Mishra & Sahoo, 2013; Aker & Mbiti, 2010). It is also an alternative to the traditional bank branch and ATM network through which most people, even those in remote areas, gain easier access to formal financial services (Siddik et al., 2014). The cost of transactions and running bank branches has been reduced with mobile penetration, leading to the emergence of BB (Ivatury & Mas, 2008).

Some studies have identified a link between mobile money and economic growth through various channels, including increased output and employment creation (Lewin & Sweet, 2005), better firm productivity (Donner & Escobari, 2010), improved capital accumulation (Venturini, 2009), reduced transaction costs (Aker & Mbiti, 2010), better functioning markets and financial inclusion. Mobile money drives the process of financial inclusion by improving the flow of information and providing cost-effective financial services to customers and unbanked clients (Andrianaivo & Kpodar, 2012). This is a way of closing the financial infrastructure gap in emerging economies where formal banking entails considerable costs in terms of time and distance.

With the improved flow of information, the data collected on depositors facilitates the analysis of creditworthiness, credit allocation monitoring and deposit uptake. Mobile banking allows access to several market instruments and financial services at a lower cost for all income levels, which gives it the potential for affecting growth and development

through productivity gains (Triki & Faye, 2013). The mobile network also unlocks access to markets and services for numerous, generally low-income, customers who would otherwise be financially excluded. Their inclusion within the financial system helps alleviate poverty by enabling people to acquire large sums of money to invest in income-generating activities, asset creation, and training and education (thus expanding their job market prospects).

Mobile banking also improves income and expense management and reduces vulnerability to unforeseen events such as accidents, illness, theft or drought, as people reduce their reliance on unsafe informal financial services and formal products they cannot afford (Jenkins, 2008). By improving the flow of information within networks, mobile banking also improves household risk sharing and awareness of income shocks (Aker & Mbiti, 2010; Khan & Rashid, 2015). These improvements in making the unbanked population a part of the formal financial system by improving their access to financial services can serve as a poverty eradication tool, foster inclusive growth and help countries meet the Millennium Development Goals (Chibba, 2009). Ghosh (2016) finds that mobile telephony in India has had a positive and significant impact on growth, financial inclusion and loan disbursement.

Greater mobile penetration boosts rural development, as it allows dispersed families to keep in touch. Better information flows via mobile phones reduce information asymmetries for farmers, improve their bargaining power and facilitate nonagricultural economic activities (Andrianaivo & Kpodar, 2012). As more people enter the pool of formal finance, the mass of the financial sector grows, in turn enhancing economic growth (Levine, 2004).

Mobile banking also provides financial access to more women in developing economies. When women have access to financial accounts, they tend to increase expenditure on food, education and healthcare, which increases household wellbeing and productivity (Doepke & Tertilt, 2011). For individuals, mobile banking improves the convenience, cost and range of available financial products. It boosts the capacity of loans granted to individuals and businesses and helps the government save billions every year by reducing leakages in spending and tax revenues (Khan & Rashid, 2015). These savings can then be effectively utilized to increase expenditure on public investment in education, healthcare and infrastructure.

Digital payments improve revenues by decreasing the extent of the informal economy and unregistered businesses that do not pay taxes or adhere to business regulations. This creates efficiency improvements and results in cost savings (McKinsey Global Institute, 2016). Moreover, mobile banking boosts the GDP by reducing the cost of transferring money, which leads to more remittances, capturing cash for savings and investments. This augments neighboring industries. For instance, mobile banking facilitates financial tools such as cash transfers, prepaid savings and credit, performance-based funding and micro-insurance. The benefits of the latter feed into the healthcare industry by facilitating access to affordable healthcare services. This, in turn, improves people's productivity, eventually increasing GDP (Gencer, 2011).

Increases in GDP may also be linked to the rise in productivity of businesses and governments using digital payment methods and from the supplementary investment that greater financial inclusion (of people and small businesses) brings. The remaining increase in GDP would be a result of the time saved by individuals that could be used for additional hours of work (McKinsey Global Institute, 2016). From a business point of view, mobile banking gives businesses the opportunity to improve services for existing customers and target new ones. In specific industries such as software, telecommunications and retail, it gives firms the chance to develop new business lines (Khan & Rashid, 2015).

Overall, expanding access to finance through mobile money (mobile banking) not only increases financial inclusion, but also improves productivity and investment, reduces poverty, empowers women and helps strengthen institutions by making them more transparent. These benefits to individuals, businesses and governments can have a cumulative effect on growth in emerging economies.

3. Overview of the Mobile Banking Industry in Pakistan

Mobile banking or BB is an alternative to conventional banking and involves the use of technology to generate cheaper, alternative channels for conducting transactions. The State Bank of Pakistan (SBP)'s Branchless Banking Regulations address commercial banks, Islamic banks and microfinance banks under the domain of financial institutions.[3] The bank-led BB model holds the bank ultimately accountable, irrespective of whether other partners/agents have a regulatory stake in the bank. The regulations

[3] http://www.sbp.org.pk/bprd/2011/C9-Enclosure-2.pdf

allow bank–agent relationships through joint ventures or agency arrangements. Table 1 outlines the BB models approved by the SBP.

Table 1: Permissible BB models in Pakistan

Model	Description
One-to-one (1–1)	Permits a single bank to enter an agency agreement or joint venture with one mobile network operator, allowing improved customer service and product innovation.
One-to-many (1–∞)	Permits a single bank to collaborate with various mobile network operators to provide multiple financial services over mobile phones, reaching a larger clientele. However, this limits exclusivity in a relationship and product innovation due to less intricacy and coordination.
Many-to-many (∞–∞)	Permits multiple banks and telecoms to offer joint services to customers. This involves a third-party service provider (usually a financial institution or its subsidiary) that directs the flow of transactions. The advantage is wider outreach, but coordination becomes more difficult with so many players involved.

Source: Authors calculations

In addition, the SBP recognizes that any of the permissible models can be implemented and executed using one of two, or both, key channels (OTC and m-wallet) available to customers for BB services.

3.1. OTC Channels

OTC is the most widely used channel, through which the customer need visit the retailer offering BB services only once. This eliminates the need for a distinct account with any financial institution, mobile service provider or mobile network. Utility bill payments and domestic remittances are among the most common BB OTC services being offered and account for the majority market share.

Consumers can avail the services they need without having to enter a long-term contract with any service provider. The retailers who serve as intermediaries earn a commission on every transaction. They work under a prepaid model: the super-agent (the telecom company) provides cash deposit/withdrawal services to customers via their mobile phones, which

differentiates it as a retailer, and/or installs a POS machine onsite, which eliminates the need to arrange cash at that end.

3.2. Mobile Wallets

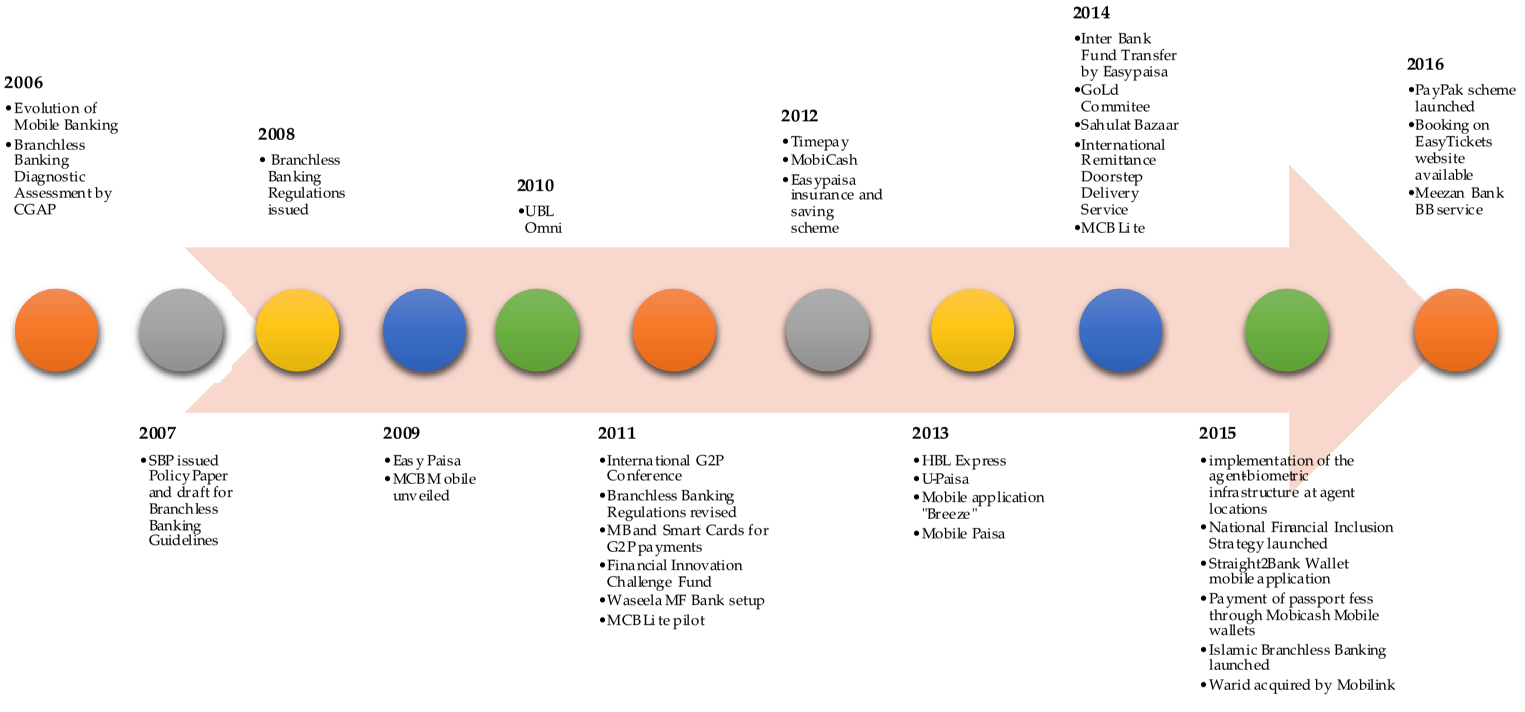
The concept of a mobile wallet is that it provides banking services and account access to clients through their mobile phones and a reliable telecom connection. This reduces the customer's reliance on the retailer. Service providers benefit in the form of direct access to the customer and higher margins since they do not have to split commissions with retailers. Having a long-term relationship with the customer means that s/he is less likely to switch providers. In return, the service provider offers better service and more innovative products.

While ATM cards with m-wallets have also been introduced to reduce reliance on retailers, ATMs are not all that widely distributed, especially in rural areas where many BB customers live. Commercial approval of m-wallets has been slow and is still less than expected, even though they offer financial inclusion to the unbanked.

4. Evolution of Mobile Banking in Pakistan

The initial achievements of mobile banking in Pakistan are due to the collective efforts of a diverse range of stakeholders. These include the government, regulatory bodies, development agencies, financial institutions, telecom operators and technology companies. As Figure 1 shows, mobile banking was initiated in 2005/06 when the SBP began discussions with international agencies to build its knowledge of international best practices. In 2006, the Consultative Group to Assist the Poor (CGAP) carried out a BB diagnostic assessment of Pakistan to develop an understanding of the regulatory environment linked to BB. Following this, a seminar on improving access to financial services – titled 'mobile money transfer and beyond' – was arranged by the SBP and Asian Development Bank to share information and experiences of technology models such as mobile money transfer.

Figure 1: Evolution of Mobile Banking in Pakistan



Source: Authors calculations

In 2007, under its Expanding Microfinance Outreach strategy, the SBP agreed to draft a set of BB regulations to aid profitmaking and to help microfinance banks boost their outreach via this technology. It then issued a policy paper highlighting the regulatory framework for mobile banking and a set of draft BB guidelines for stakeholders. The Branchless Banking Regulations were issued and adopted by the SBP in 2008 and revised in 2011 to allow a structural approach to know-your-customer (KYC) requirements, which made Pakistan the first country to have issued these regulations. The regulations encouraged partnership models, both one-to-one and one-to-many.

The first such partnership was Easypaisa, which was launched in 2009 as a one-to-one joint venture between Telenor Pakistan and Tameer Microfinance Bank. The SBP also licensed United Bank Limited (UBL) to start its pilot BB product, UBL Omni, which was formally launched in 2010 as a direct agent-based BB model. In July 2009, MCB Bank became the first bank in Pakistan to unveil a mobile financial service, MCB Mobile.

In 2010, the SBP announced a strategic framework for sustainable microfinance that reiterated its support for transformational BB to encourage financial inclusion in Pakistan. Government efforts to promote novelty and technology in banking culminated in an international government-to-person (G2P) conference held in May 2011. Policymakers and analysts debated the dynamics of BB and Pakistan's performance in this context: the country was portrayed as an upcoming market with visible market development. Subsequently, the government introduced G2P payments – such as cash transfers under the Benazir Income Support Program and payments to flood-affected households – through mobile phones and smart cards. Tameer Microfinance Bank signed an agreement with the Employees Old-Age Benefits Institution (EOBI) to make pension payments through Easypaisa to hundreds of pensioners registered with the latter.

In 2011, the Financial Innovation Challenge Fund was launched under the British-funded Financial Inclusion Program (FIP) by the former governor of the SBP. This was followed by the initial round of G2P payments. Worth GBP10 million, the fund was aimed at providing grants to encourage innovations and assess new markets, reduce the cost of service delivery, help systems and procedures become more effective and offer innovative ways of addressing the unmet demand for financial services. Further pilot BB products were rolled out by MCB (MCB Lite) and Askari Bank. Waseela Microfinance Bank was set up after Orascom, the country's largest mobile network operator, received a license to do so.

The Nationwide Financial Literacy Program was launched in 2012 by the SBP in collaboration with the Asian Development Bank. This was aimed at conducting financial workshops and introducing low-income Pakistanis to the concept of savings, investment and BB across the country. The SBP signed an MOU with the Pakistan Telecommunication Authority (PTA) to collaborate on procedural and regulatory matters related to BB. There was also tremendous growth in the BB industry in the same year, with two more entrants. Askari Bank and Zong jointly launched Timepey, a BB solution. Waseela Microfinance Bank partnered with Mobilink to launch MobiCash, a portfolio comprising services such as utility bill payment, money transfers, cash deposits and withdrawals. To enhance the use of BB services, Easypaisa launched an insurance and savings scheme for account holders in the third quarter of 2012.

HBL became the fifth player in the BB sector after launching a one-to-many BB model, HBL Express, in April 2013. It also joined hands with NADRA Technologies under the Branchless Banking Super Agency Agreement as a planned association, enabling more than 5,500 NADRA e-Sahulat outlets to offer BB financial transactions under HBL Express. In August, U Microfinance Bank commenced UPaisa BB operations in partnership with Ufone with an extensive network of about 90,000 agents. It also partnered with EFU Life to provide insurance products and services to customers, and with Southern Sui Gas Company to enable customers to make online payments at thousands of UPaisa payment points.

Warid Telecom signed an MOU with Meezan Bank and Monet, following which it rolled out a Warid Telecom payment gateway for Meezan Bank's BB services, with Monet serving as their technology partner. Standard Chartered Bank launched a mobile banking application under the brand name 'Breeze', making Pakistan the second market in the MEPA region where this application is used. U Microfinance Bank signed an MOU with the National Bank of Pakistan (NBP) to offer private and corporate solutions through BB services to NBP customers across Pakistan. Warid Telecom, in collaboration with Bank Alfalah, launched a mobile financial service named Mobile Paisa in the last quarter of 2013.

In 2014 an MOU was signed between the Bank of Punjab, Zong and Inov8 to publicize their partnership for digitizing government flows through BB. Easypaisa became inter-operable with the banking structure by introducing an inter-bank funds transfer service that allowed its customers to transfer funds across various bank branches through 1LINK. It also launched two innovative products, the Gold Committee and Sahulat Bazaar,

in partnership with ARY Digital. Easypaisa has played an active role in the education sector, having signed an agreement with the Sindh Education Reform Program to manage the distribution of stipends to empower girls and fight poverty.

Other events during the year included an international BB conference organized by the SBP, during which it signed an MOU with NADRA to reduce the cost of biometric variation to PKR10 for m-wallet applications at the industrial level. A second MOU was signed between the Gates Foundation and DfID to set up a digital financial inclusion unit at Karandaaz, a recently incorporated company that nurtures small and developing businesses in Pakistan.

In October, the SBP organized a two-day in-house training session in conjunction with CGAP to provide SBP officials with a knowledge platform on international perceptions and practices in BB, particularly on payment efficacy, regulatory background, payment mechanisms and standards, and inter-operability. Other highlights included the Easypaisa launch of an international remittance doorstep delivery service, an MOU between the NBP and Ufone for payments and reimbursements under the Prime Minister's Youth Business Loan scheme, and an agreement signed by MobiCash to make payments on behalf of the Pakistan Bait-ul-Mal Child Support Program.

In 2015, the implementation of an agent biometric infrastructure at agent locations was begun, primarily by Easypaisa and MobiCash, to promote financial inclusion. The federal finance minister formally launched the National Financial Inclusion Strategy (NFIS) in May, which aims to introduce reforms for enhancing financial inclusion prospects in a sustained manner. Several notable partnerships emerged: between HBL and NADRA for launching BB services, between Karandaaz and the Bank of Punjab for digitizing government transactions, and between Easypaisa and Standard Chartered Bank for a corporate mobile payment service, Straight2Bank Wallet.

The NBP, the Directorate General of Immigration and Passports and MobiCash signed an MOU for the payment of passport fees at MobiCash outlets and through MobiCash m-wallets. Batwa and Wavetec collaborated with MobiCash to become the first mobile company to launch near-field communication payments through vending machines for some 1.5 million mobile account holders. Finally, the world's first Islamic BB service was inaugurated and Warid was acquired by Mobilink.

Key developments in 2016 included the launch of PayPak, a domestic payments scheme, and EasyTickets, a website enabling customers to book cinema tickets online. The SBP and PTA signed an MOU for developing a regulatory framework for mobile banking interoperability. Meezan Bank emerged as a new player in the sector and Bank Alfalah's BB offered computerized salary disbursements for corporate companies and EOBI pension disbursements and collection.

5. Current State of Mobile Banking in Pakistan

This section provides an overview of the industry and its key players. It also looks at the evolution of different key performance indicators in mobile banking.

5.1. Industry Players

As mentioned earlier, although players in this sector follow a bank-led model, the inclusion of multiple partners – particularly technology partners – has meant that they focus on brand development rather than projecting the original identities of one or more partners. Table 2 outlines the characteristics of each brand being operated in the mobile banking sector.

Table 1: Industry Players

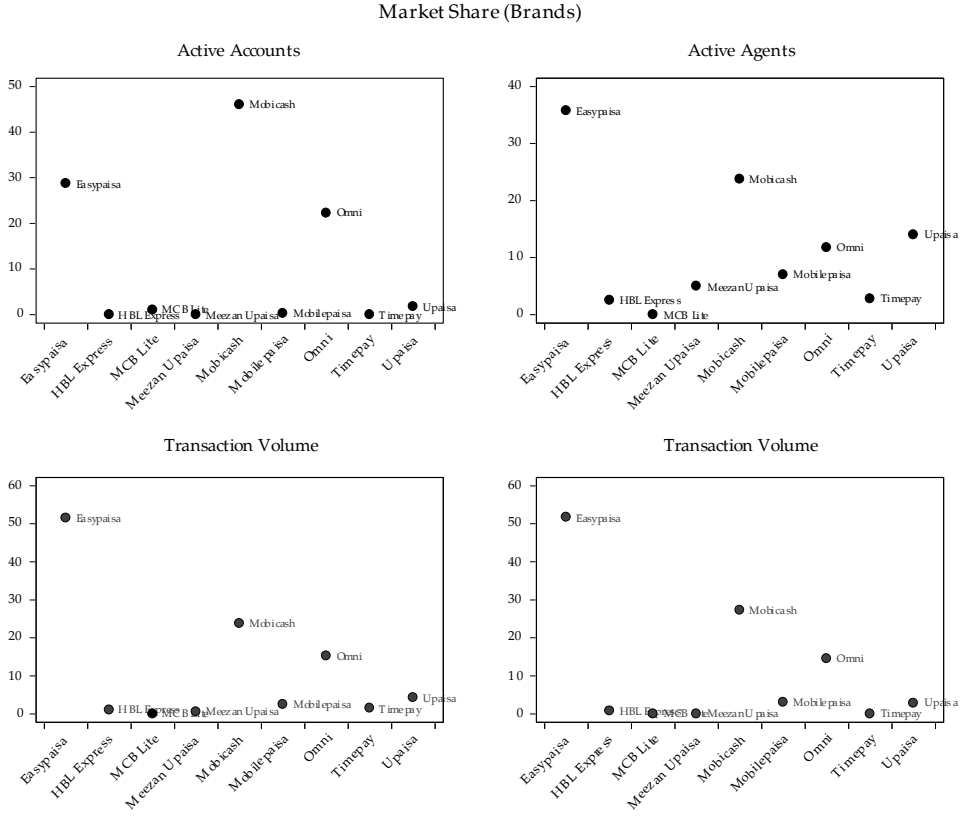
MB Player	Easypaisa	Omni	Timepey	Mobicash	HBL Express	UPaisa	MobilePaisa	MCB Lite
DOE	2009	2010	2012	2012	2013	2013	2013	2014
Banking Partner	Tameer Microfinance Bank	United Bank Limited	Askari Bank	Waseela Bank	Habib Bank Limited	UMicrofinance Bank	Bank Alfalah	Muslim Commercial Bank
Technological Partner	Telenor	Ufone, Zong	Zong	Mobilink	Warid	Ufone	Warid	
Other Partner	Standard Chartered Bank, KASB, Daraz.pk, Bookme.pk, Government of KPK,	PTCL,SSGC,PESCO,LESCO, SEPCO, Wi-tribe,Wateen, PTCL, TCS Connect, Paramount Books,Shaukat Khanum Memorial, HOPE, Sahara Trust, The Citizen's Foundation	The Citizen's Foundation,Inov 8 technology,LESC O.PTCL, KESC,SSGC	NADRA Technologies Limited,Shifa Foundation, SOS Village, Shopistan, Cheezmall.com	Akhuwat, Finca Microfinance Bank,Khushali Bank,NADRA Technologies Ltd Governmnet of Pakistan			
Products	OTC, Mobile Accounts, Straight2Bank Wallet for corporate clients, Khushaal Munafa savings,Bill Payments, Money Transfer, Bank Transfer, Health and Life Insurance, International Remittance Transfer, ATM Cards, Donations, Ticketing Solutions, G2P Disbursements	OTC, M-Wallet, ATM Cards, Internet Banking, Life Insurance, Mobile Top Ups, IBFT,Money Transfer, Bill Payments, Domestic Remittances,	M-Wallet, OTC, Utility Bill payments, Funds transfer, Cash withdrawal/deposit, salary disbursements,	OTC, M-Wallet, money transfer, bank deposits, donations, bill payments	OTC, M-wallet, G2P payments, salary disbursements,	OTC money transfer, bill payments, donations, airtime, Upaisa Debit Card	OTC (money transfer, bill payments), M-Wallet	M-Wallet with VISA Debit Card
Strenghts/Niche	Easypay Retail and Online payments, Easypaisa corporate solutions (salary disbursements, loan disbursements/ repayments, school fee payments)				Branchless solution to businesses/government.	World's first branchless banking service		Internet Banking, Global acceptance

**Table 1 depicts the characteristics of the major mobile banking players in the industry. These include their date of entry, banking, technological and other partners, products offered by each along with their strengths

Source: Authors calculations

Among these players, MobiCash dominates the category of active accounts with a 48 percent share, followed by competitors such as Easypaisa (28 percent) and Omni (23 percent). The remaining brands have negligible market shares in this group. Easypaisa leads with 33 percent of active agents, followed by MobiCash (24 percent), Upaisa (16 percent) and Omni (13 percent). Mobile Paisa, Meezan Upaisa, HBL Express, Timepey and MCB Lite account for the remaining active agents (less than 10 percent). Easypaisa, MobiCash and Omni have the highest market shares in terms of transaction value and volume (Figure 2).

Figure 2: Market shares of brands

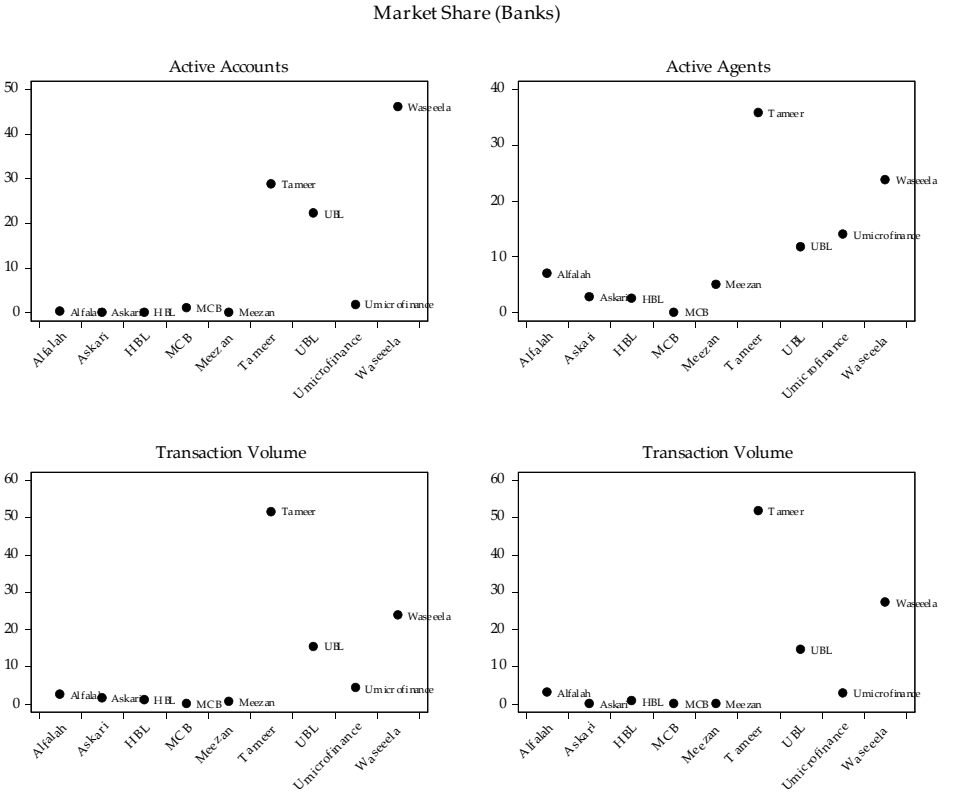


Source: Authors calculations

It is interesting to see which banks are behind the most successful brands. Based on the share of each bank, Waseela Microfinance Bank has the highest percentage (48 percent) of active accounts, followed by Tameer Microfinance Bank (28 percent), UBL (22 percent) and U Microfinance Bank. The strength of the OTC network can be gauged from the network

of active agents. Tameer leads with a 36 percent share of all active agents, followed by Waseela, U Microfinance and UBL. Alfalah, Meezan Bank and others account for the remaining share (Figure 3). In terms of the value and volume of transactions, Tameer accounts for more than half the market, followed by Waseela and UBL. U Microfinance, Alfalah and others occupy a very small share.

Figure 3: Market shares of banks

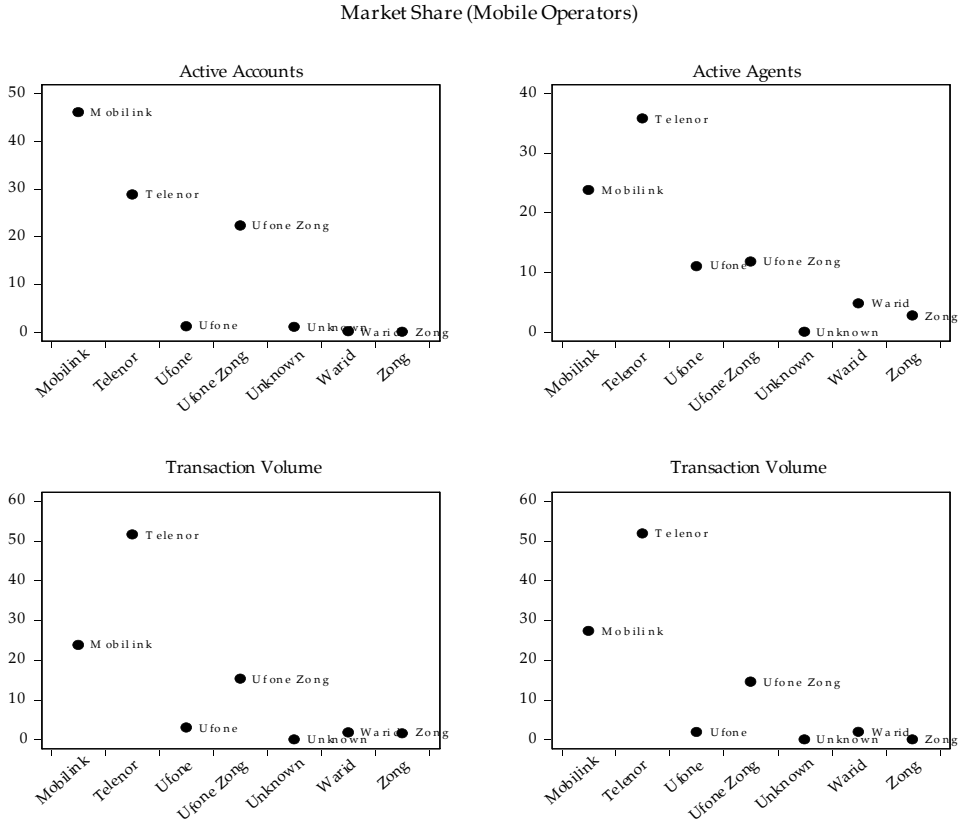


Source: Authors calculations

Figure 4 illustrates the share of each mobile network operator or telecom partner. Mobilink, Waseela Bank's technology partner, manages MobiCash and has the most active accounts, followed by Telenor and the joint venture between Ufone and Zong (Omni). In terms of active agents, Telenor has the highest share, followed by Mobilink and Ufone/Zong. Telenor accounts for more than half the market in terms of the value and volume of transactions, followed by Mobilink (about 25 percent) and

Ufone/Zong (Omni). Other technology partners such as Warid, Zong and Ufone (independently) have a very small share of the market.

Figure 4: Market shares of mobile network operators



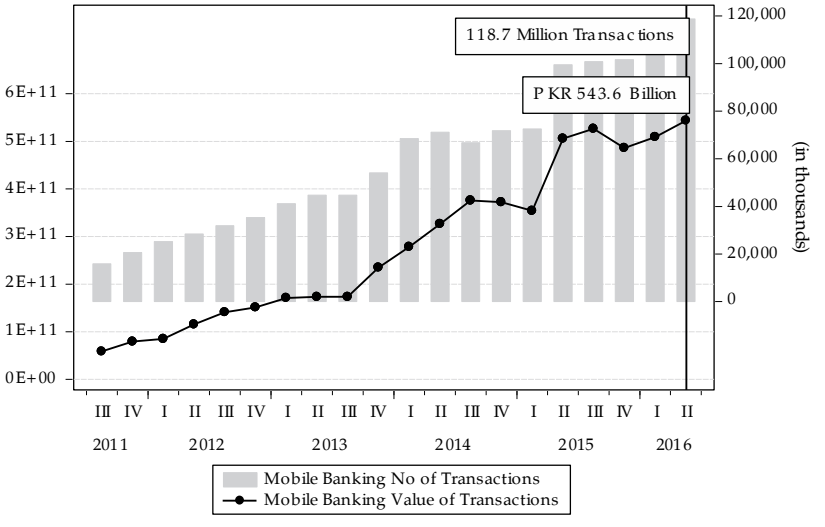
Source: Authors calculations

5.2. How Big is the Market?

Figure 5 illustrates the evolution and size of the mobile banking market at the end of the second quarter of 2016 (the latest data available at the time of writing). The number of mobile banking transactions shows an increasing trend during 2011–16. Starting from 15 million transactions in the third quarter of 2011, the number has risen over time with slight fluctuations in the last quarter of 2014, when the growth of this sector remained almost stagnant. However, immediately after this pause, the second quarter of 2015 saw a noticeable increase in the volume of transactions, nearing 100 million in this quarter compared to the previous one (73 million). The following quarters witnessed persistent growth, reaching 118.7 million transactions in

2016. As with volume, the value of transactions has also increased over time, with some dips in the third quarters of 2013, 2014 and 2015, after which it reached PKR543.6 billion in 2016.

Figure 5: Growth trends: Value and volume of BB transactions



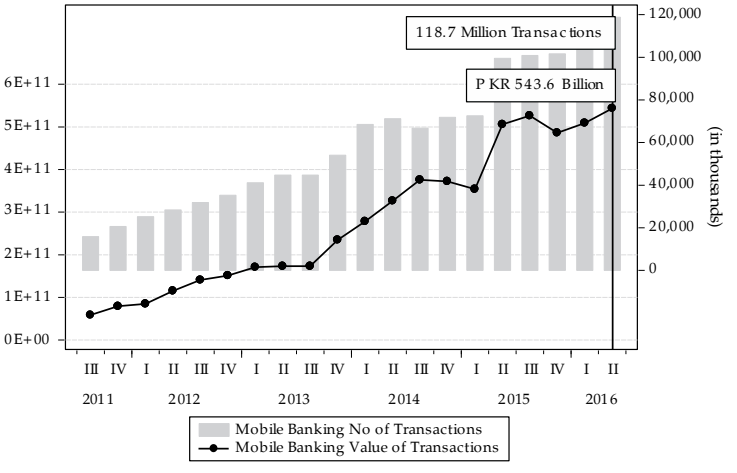
Source: Authors calculations

Figure 6 illustrates differential performance based on the annualized growth rate of several BB variables. The number of mobile banking (BB) accounts has grown at an annual rate of around 114.3 percent since 2011. The growth rate of active agents and agents is 45.1 and 99.2 percent, respectively. The number of transactions per day has a growth rate of 50.8 percent, although the average transaction size has grown more slowly at 6.9 percent annually. Deposits have grown, on average, by 130 percent annually over the last five years. The value of transactions reveals a reasonable growth rate of 61.9 percent, indicating users' adaptability and their confidence in conducting higher-value transactions using a mobile platform.

Next, we analyze the nature and flow of transfers made by mobile banking users through OTC or m-wallet channels. Figures 7 and 8 illustrate the volume and growth rates of different types of transfers made by mobile banking users. Of these, agent-to-agent, person-to-person (P2P) and bank-to-agent transfers dominate in terms of volume, although they have grown fairly slowly. Agent-to-agent transfers have grown by 16 percent, bank-to-

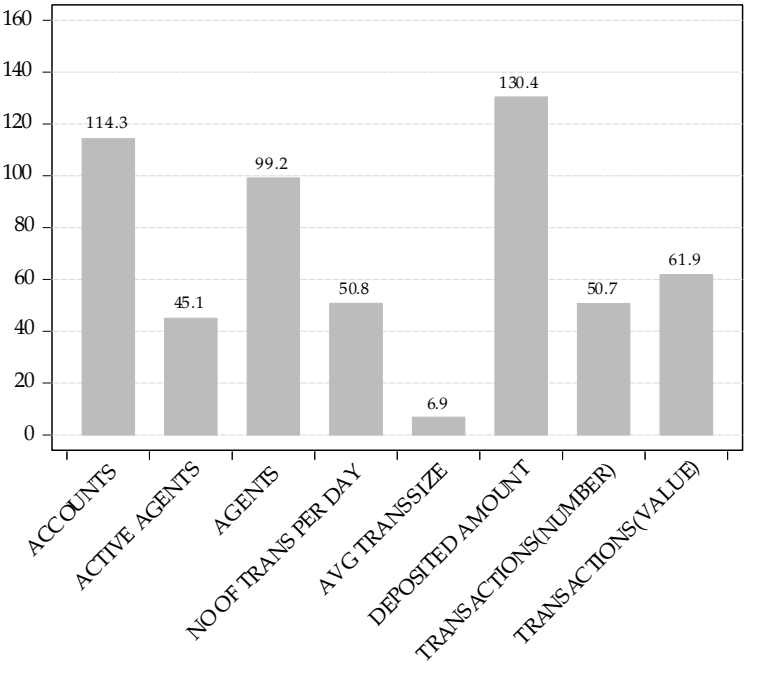
agent transfers by 10 percent and P2P transfers by 7.7 percent per quarter. Agent-to-bank transfers have the lowest growth rate (2.5 percent).

Figure 6: Average yearly growth rates, BB variables



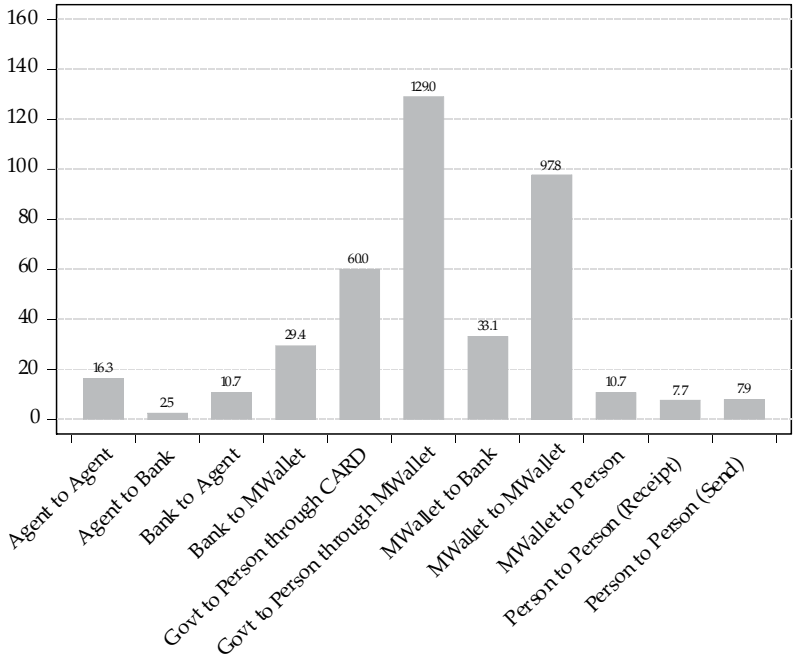
Source: Authors calculations

Figure 7: Average volume of different types of transfers (in millions)



Source: Authors calculations

Figure 8: Average quarterly growth rate of different types of transfers



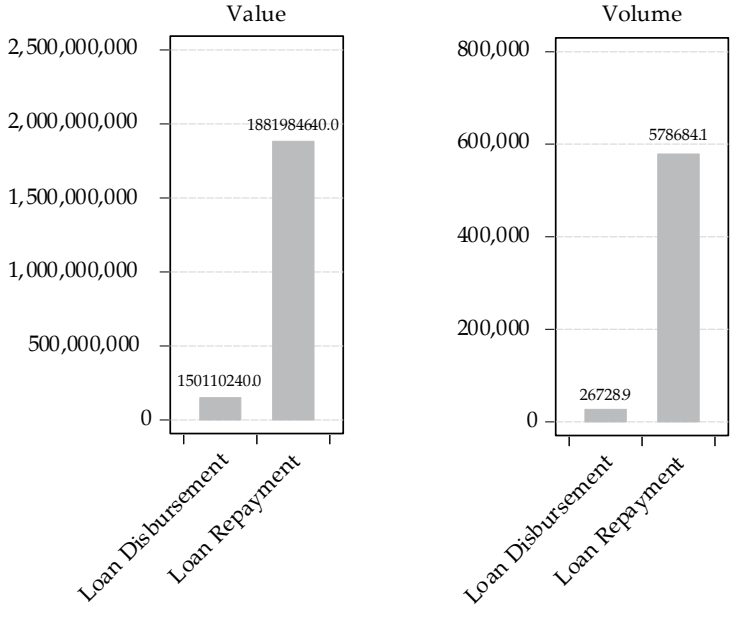
Source: Authors calculations

M-wallet transfers, an emerging component of mobile banking, have remained weak in terms of volume, but displayed impressive growth over time. Bank-to-m-wallet and m-wallet-to-bank transfers have the lowest volumes, but have shown reasonable growth rates of 29.4 percent and 31 percent, respectively. M-wallet-to-m-wallet transactions account for PKR3,790 million on average, which translates into a very high average growth rate of 97.8 percent per quarter. For G2P transfers, cards are more commonly used than m-wallets, although their respective growth rates show the opposite. G2P transfers by m-wallet have grown rapidly by 120 percent per quarter, which is almost double the growth rate of G2P transfers by card.

Another important dimension is the difference between the use of OTC and m-wallet transfers to disburse and repay loans. Figure 9 shows that mobile banking platforms are not used extensively to disburse loans, as the volume and value of such transactions is nominal. On the other hand, loans are commonly repaid through BB, accounting for PKR1.8 billion on average and more than half a million transactions (578,684) every

quarter. This underlines the increasing popularity and acceptability of this market segment.

Figure 9: Loan disbursement and repayment transactions in Pakistan



Source: Authors calculations

6. What Kind of Ecosystem Helps Mobile Banking Thrive?

Despite the evident success of mobile banking in Pakistan, there are several inherent constraints to the existing regulatory and financial structure that could limit the sector's growth. First, the limited range of permissible models are all bank-led. This needs to be expanded to allow other entities, primarily telecom companies, to play a greater role in the industry. What regulators must not ignore is that the sector is heavily dominated by agents that operate primarily under telecom companies. The latter need to be allowed – and given incentive – to become more prominent players rather than merely technical service providers on banks' behalf.

Second, innovation in this industry must be encouraged. So far, the industry has restricted itself to the provision of payment solutions – that too, on a partial basis. There is considerable room to expand in this and other areas. G2P transactions, for instance, have enormous potential. Transfers under the Benazir Income Support Program and payments to pensioners through mobile accounts are clear success stories.

Third – and most important – is the large disparity in the share of mobile banking between loan disbursements and loan repayments (see Figure 9). The low penetration of mobile banking platforms in loan disbursements signals that commercial and microfinance banks still prefer the traditional banking practice of borrowers applying for loans in person at a physical bank branch, providing documents for the assessment of credit risk and putting up collateral to mitigate the chances of fraud. On the other hand, the frequent and significant use of mobile banking to make loan repayments highlights its potential to augment financial inclusion using low-cost mobile technology and to improve access to financial products and services. Mobile banking also aids the inclusion of people who might otherwise lack access to financial services, especially in rural areas.

Box 1: Mobile banking: from 'cake to cash'

From an early age, I was interested in culinary arts – especially baking. I enjoyed baking cakes and cupcakes for friends and family, who encouraged me to start a home-based bakery. Starting with occasional orders, I moved onto learning new cake-decorating techniques and recipes. My friends and family were very supportive of the idea and helped me at every step, from designing a brand logo, name and menu to having customized boxes made. That was when Sugar 'n' Spice, my home-baking venture, formally started. I used social media such as Facebook and Instagram to promote the business and boost orders.

While it has become common for people to order customized cakes to celebrate occasions, no profession is without its hiccups. These can range from late pickups and deliveries to the difficulty of catering last-minute orders and customers who refuse to collect their orders. Mobile banking services such as Easypaisa and MobiCash have facilitated the business, enabling me to receive advance payments from clients outside Lahore who want cakes made and delivered in the city. These safe and easy modes of payment allow me to receive payment confirmation text messages from clients, after which I can collect the cash from the nearest agent at local shops.

Despite having no professional diploma in culinary arts, my desire to learn and love of baking has always produced a great deal of positive energy and enabled me to grow and improve as a baker. My only worry is that I might accidently delete an Easypaisa confirmation message from my smartphone and be unable to collect payment!

Source: Fatima Tanveer (researcher and entrepreneur)

In addition to these three constraints, which are specific to mobile banking, there are other barriers to inclusion at the macro level – these need persistent government support to facilitate greater financial inclusion. For example, there is still great disparity among the groups of people that are financially included. While the international gender gap in access to bank accounts has fallen to 7 percent in recent years, Pakistan lags behind with a gender gap of approximately 11 percent (World Bank, 2014). Above all, financial inclusion figures show that women are still more financially excluded than men: only 7 percent of women have a bank account relative to 23 percent of men (Khan & Rashid, 2015).

The absence of a saving culture in Pakistan is another barrier to financial inclusion. Savings have risen, but most sources remain informal: more than half the cash saved is kept at home (51 percent) or with committees (27 percent) and only 3 percent of savings are deposited in a bank or microfinance institution. Pakistan's formal savings rate is the lowest among countries such as Kenya (30 percent), India (14 percent) and Bangladesh (7 percent). Moreover, there is scant awareness of insurance in Pakistan: the Financial Inclusion Insights Survey for 2013 shows that only 1 percent of people have insurance, the bulk of which is life insurance. The remainder are unaware of what insurance is or how to acquire it or feel they do not need it.

While the low savings rate is still a constraint to financial inclusion, domestic money transfers remain popular in Pakistan in comparison to peer countries such as India and Bangladesh. About 24.8 percent of people send remittances to friends and family, compared to 9.8 percent in India and 14.1 percent in Bangladesh. Most people (93 percent) rely on personal delivery, only 4 percent deposit this money directly into a bank and 3 percent use agent mobile money accounts to make transfers. Formal financial service use remains low due to unstable incomes, insufficient money to open an account and unawareness of products and services.

Given these macro-constraints, the SBP has implemented vital modifications to strengthen the financial system and increase financial inclusion. Issuing licenses to new private banks, initiatives to encourage the development of the microfinance sector, revolutionizing the governance and monitoring frameworks of the banking sector and capitalizing in a commercial bank for women are among the most visible steps taken.

The SBP has developed the FIP in conjunction with the UK Department for International Development (DfID) to address the lack of

access to banking for a large share of Pakistan's population. Moreover, with support from the World Bank, it has developed a comprehensive NFIS to improve access to financial services such as credit, savings, remittances and insurance. However, to increase financial inclusion, the FIP and NFIS must be implemented more rigorously and persistently to overcome macroeconomic constraints such as the gender gap, low savings rate and prevalence of informal money transfers.

7. Conclusion

Mobile banking serves as a potential mechanism for stimulating financial inclusion, given the widespread penetration of mobile telephony and the viability of connecting data in a secure and economical way. The use of mobile phones connected to banking products aids the expansion of business models offering financial services to people who would otherwise have been excluded from the formal financial system. In addition, mobile penetration contributes to economic growth through the channels of output growth, employment generation, improved productivity, lower transaction costs, better functioning markets and financial inclusion leading to poverty alleviation.

Mobile banking in Pakistan began in 2005/06 when the SBP decided to initiate the concept. A key step was the preparation and adoption of the Branchless Banking Regulations in 2008. These were revised in 2011 to allow a structural approach to KYC requirements, which made Pakistan the first country to have issued such regulations. The BB regulations encouraged a range of partnership models. The first such partnership, Easypaisa, was launched in 2009. Since then, significant developments have occurred in mobile banking in Pakistan, including the recent launch of the NFIS and Straight2Bank wallet mobile application.

In recent years, the number of mobile banking transactions has risen. From 15 million transactions in 2011Q3, the number has increased to 118.7 million transactions in 2016. The value of such transactions has also increased, reaching PKR543.6 billion in 2016. The annualized growth rate of multiple BB variables indicates the progress of the sector. The number of mobile banking (BB) accounts has grown at an annual rate of around 114.3 percent since 2011. The growth rate of active agents and agents is 45.1 and 99.2 percent, respectively. The number of transactions per day has a growth rate of 50.8 percent, although the average transaction size has grown more slowly at 6.9 percent a year. Deposits have grown, on average, by 130 percent per annum consecutively for the last five years. The value

of transactions has a reasonable growth rate of 61.9 percent, indicating users' adaptability and their confidence in conducting higher-value transactions using a mobile platform.

Despite the success of mobile banking in Pakistan, several aspects of the existing regulatory and financial structure could limit the sector's growth. First, the limited number of permissible models are all bank-led. Second, the industry has restricted itself to the provision of payment solutions and thus lacks innovation. Third – and most important – is the large disparity between the share of mobile banking in loan disbursement and loan repayments. The low penetration of mobile banking in loan disbursement signals that commercial and microfinance banks still prefer the traditional banking practice of borrowers applying for loans at a physical bank branch.

In addition, Pakistan falls below the international gender gap in terms of the groups of people that are financially included: women are still more financially excluded than men and there is still considerable disparity between rural and urban dwellers in terms of access to basic financial services. Finally, the culture of low savings and informal money transfers also poses challenges to financial inclusion. Nonetheless, these barriers provide a significant opportunity for regulators and policymakers to improvise and improve financial inclusion in Pakistan, given its projected role in economic growth.

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Appendix

Milestones in the mobile banking industry, 2016/17

	Event	Details
1	Easypaisa partners with EFU Life to collect insurance premiums	With its countrywide network of about 77,000 agents, Easypaisa will facilitate premium collection for EFU. This partnership will support inter-operability to enhance financial inclusion.
2	JazzCash and Karandaaz enter a strategic partnership for digital financial inclusion	Karandaaz will provide financial and technical support to JazzCash in implementing key findings of the human-centered design research study recently completed by the former. This will help JazzCash innovate its existing mobile application and increase its uptake among over 50 million Mobilink-Warid customers.
3	JazzCash partners with Tranglo to enable international money transfers	Tranglo is a global cross-border digital remittance hub. This partnership enables JazzCash users to transfer money internationally using Tranglo's global network.
4	Easypaisa app allows new users to register for an Easypaisa account regardless of their mobile operator	Customers register using their mobile number and CNIC, upon which a one-time password (OTP) is sent to their phone and fed into the app automatically. They enter the desired PIN and use it to login to the application. Users can transfer money to any other CNIC holder, bank account or Easypaisa account. They can also pay utility bills and buy any operator's airtime.
5	Easypaisa introduces money transfer to any mobile number	Easypaisa users dial *786# and select the money transfer option. They choose the 'send to any mobile' option and enter the receiver's mobile number and transfer amount, followed by their Easypaisa account PIN to complete the transaction. If the receiver doesn't have an Easypaisa account, the money transfer notification will prompt them to open one and receive payments in that account instantly.
6	Tameer Microfinance Bank partners with the Punjab government to disburse digital interest-free loans	This partnership entails the disbursal of smart digital loans to over 35,000 farmers across Punjab, worth over PKR2 billion. The total scheme announced by the Punjab government is worth over PKR77 billion and targets 450,000 farmers. This is intended to strengthen the agricultural sector by increasing overall yield and crop productivity.

	Event	Details
7	JazzCash and Visa introduce Visa debit cards	JazzCash is a collaborative platform launched by Mobilink and Mobilink Microfinance Bank. In partnership with Visa, a global payments technology company, JazzCash will offer Visa debit cards to consumers. JazzCash mobile account customers will be able to make purchases at more than 50,000 retail outlets in Pakistan and from all online merchants that accept Visa and millions of merchants in more than 200 countries worldwide. This will also enable JazzCash to introduce loyalty offers for its customers by building alliances with key merchants.
8	JazzCash forms a strategic alliance with the Access Group	This partnership will promote nationwide retail payment acceptance. One such innovative payment method to be introduced under this agreement is JazzCash's recently launched near-field communication payment solution.
9	Easypaisa offers an affordable, accessible car insurance policy	In collaboration with United Insurance Company, Easypaisa has introduced the industry's first car insurance scheme.
10	Easypaisa introduces a money transfer facility using biometric verification devices	Easypaisa has introduced a biometric money transfer facility across its extensive network of retailers in Pakistan. Using biometric services, customers can avail advances of up to PKR50,000 and transfer higher amounts. Customers who do not wish to share their CNIC details will now be able to use this mobile financial service.
11	Easypaisa and JS Bank enter a strategic alliance on BB	
12	Easypay becomes the exclusive payment partner for Giftpoint.pk	In collaboration with Giftpoint.pk (a product of fintech company Inov8), Easypaisa will enable users to purchase gift cards either through their Easypaisa account or Visa/MasterCard credit/debit card, or by paying any of 75,000 Easypaisa agents across Pakistan.
13	JazzCash facilitates Kaymu customers	This partnership enables customers to pay for transactions on Kaymu using any debit/credit card, JazzCash mobile account or voucher from the nearest JazzCash outlet.

	Event	Details
14	Easypaisa introduces a convenient school fee payment solution	With Easypay, Easypaisa enables parents and students to pay online with the convenience of choosing a payment option that suits their needs. Users logon to the institution's website and provide their roll number, against which the system will automatically retrieve the amount payable. They can choose to pay via their Easypaisa account or any Visa or MasterCard credit/debit card or pay at any of the 75,000 Easypaisa agents across Pakistan.
15	Easypaisa launches Pakistan's first mobile credit line	This offers a term deposit with attractive returns and a credit facility with an instant approval bundle for Easypaisa account users. The deposit product offers a 10 percent return on savings with a monthly profit payout. These are among the best terms available among any banks in the country. Customers can avail a credit line at the cheapest possible rates without having to break their deposit.
16	Telenor Easy Shops and Daraz.pk partner to promote e-commerce across Pakistan	Telenor will promote Daraz.pk, a leading e-commerce website, through Telenor Easy Shops.
17	JazzCash launches health insurance with an annual cover of up to PKR50,000	Sehat Sahulat is an affordable health insurance service offered in partnership with TPL direct insurance to JazzCash mobile account customers. The service covers emergencies and inpatient hospitalization.
18	Cinepax acquires a one-touch solution offer for ticket purchases with JazzCash	Moviegoers can buy tickets online at the Cinepax website or through the mobile app and pay using their JazzCash account.
19	Meezan Bank honored	Meezan Bank was named 'Innovator in Islamic Finance 2016' by *Global Finance* magazine for accelerating financial inclusion through Meezan UPaisa.
20	Easypaisa enables users to open an Easypaisa mobile account with any mobile operator SIM	Easypaisa has introduced 'other mobile operator' interoperability through SMS-based transactions for feature phone users and a smartphone app for smartphone users. This means that anyone – regardless of their operator SIM – can open an Easypaisa mobile account and operate it using a channel of their choice, including apps, SMS, USSD or phone banking.

	Event	Details
21	MobiCash becomes JazzCash	Mobilink replaces its MobiCash brand with JazzCash.
22	SBP and PTA sign an MOU for developing a regulatory framework for mobile banking	This will formalize cooperation between the two institutions in this area.
23	Easypaisa upgrades to a next-generation financial services platform	Easypaisa has upgraded to a next-generation financial services platform established by technology provider Ericsson. The new platform's open application programming interface protocol will enable quicker product development and pricing, thus providing enhanced service quality.
24	Waseela Microfinance Bank employs a TPS IRIS payment switch	This entails a next-generation enterprise switch and financial middleware for ATM, POS and debit cards with an IRIS end-to-end prepaid card solution.

Source: Authors calculations

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