Pakistan and the rest: A tale of dismal productivity growth, misallocation, and missing transformation

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Pakistan and the rest: A tale of dismal productivity growth, misallocation, and missing transformation*

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Abstract

We leverage newly available datasets to study key factors which explain why Pakistan has seen limited transformation in recent decades. First, we show that one of the reasons for this is low productivity growth. Average labour productivity growth due to *within* sector improvements equals only 0.73% between 1990 - 2018. This is explained by decreasing capital-output ratio. In sharp contrast, factor inputs only explain 6.22% of variation in labour productivity in Pakistan. Second, while we show that the extent of misallocation across the economy has decreased over time, there is significant misallocation between the agriculture and the non-agriculture sectors. Finally, we explore the extent to which GVC linkages can facilitate the transformation process by decreasing misallocation and increasing productivity. Throughout the paper, we also highlight trends in other developing countries.

Keywords: Structural transformation; productivity; misallocation; GVCs.

JEL Classification: E24, F6, O11, O13, O41, O47, O53, O57.

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1 Introduction

Countries that develop also undergo a large-scale change in the structure of their economies in a process known as structural transformation (Herrendorf et al., 2014). It is commonly understood as the reallocation of resources across broad sectors of the economy. Over the course of development, this reallocation involves a decline in both the share of labour force engaged in the agriculture sector and the sector's share in the country's GDP. It is not only the case that economic develoipment results in structural transformation but the process of transformation itself can facilitate an increase in productivity and, thus, economic development (Duarte and Restuccia, 2010).

Pakistan is of the few developing economies which have seen limited transformation over the last few decades. The share of agriculture in total employment has decreased by one of the lowest since 1990. The few countries which rank below Pakistan already have a low agriculture share in total employment with only few exceptions such as Botswana, Lesotho, Uganda, and Zambia (Kruse et al., 2022). At the same time, the composition of both the export and the import basket has also changed by only a little (Borchert et al. , 2022). Worse still, the limited transformation that we do observe has been in the direction which is not condusive for future growth. Specifically, the dynamic reallocation effect has been negative which is more in line with the experience of African and Latin American economies (McMillan et al., 2017).

Why has Pakistan experienced only limited structural transformation during this period? This paper explores the role of low labour productivity growth in both the agriculture and the non-agriculture sectors, and the misallocation of resources across sectors as potential reasons for this. Alvarez-Cuadrado and Poschke (2011) discuss the role of improvements in productivity in the agriculture and the non-agriculture sectors in driving the transformation process at different stages of development. Restuccia et al. (2008) discuss how frictions in the economy can result in overallocation of resourses in less productive sectors thus hindering structural transformation. Herrendorf and Valentinyi (2012) find that it is productivity differences in the agriculture and the equipment sectors which, to a large extent, explain low levels of labour productivity observed in developing economies. We leverage the new datasets that have become available in recent years to understand these questions in the context of Pakistan. The focus on Pakistan is insightful as the country has not only struggled to transform itself but its relative position in the world in terms of GDP per capita has also declined from around 135 in the 1990s to around 145 in the 2010s.

We start with documenting that in the three decades since 1990 the decrease in the share of agriculture in total employment was one of the lowest for Pakistan compared to the 51 countries for which comparable data is available. The employment share decreased by only 10 percentage points. In decades preceding the 1990s, the speed of transformation was once again much lower than that observed for the fast-growing economies at the time such as South Korea. An important reason for this is that labour productivity in both the overall economy and the agriculture sector has increased by the least in the case of Pakistan relative to the regional economies. Pakistan's labour productivity has increased at an average annual growth rate of only 1.33%. Moreover, the increase in labour productivity due to within sector improvements is even lower at only 0.73%. As a result, unlike in most other countries, there is limited incentive for labour to move from agriculture to non-agricultural sector.

When analysing the reasons for dismal growth in labour productivity at the aggregate level, we find that a critical reason for this is the lack of capital deepening. In fact, capital-output ratio has been declining since late 1970s such that today Pakistan has one of the lowest levels of capital-output ratio across the list of 183 countries included in the

PWT 10.01 dataset. Moreover, capital accumulation explains only 6.22% of the fluctuation observed in labour productivity in Pakistan. On the other extreme, almost all the variation in labour productivity in Viet Nam is explained by the variation in capital accumulation. Within South Asia, countries saw capital accumulation explaining more than 30% of the variation in labour productivity. Inklaar and Timmer (2013) use PWT 8.0 dataset to show that the average for the world has been close 35% for the period between 1980 – 2011.

Next we consider the extent to which misallocation may hinder structural transformation in Pakistan. We start with considering the degree of misallocation acorss the 12 sectors for which we have relevant data available. While there is evidence of misallocation across sectors, we find that this has decreased considerably since the 1990. Moreover, the level of misallocation is comparable to that of other fast growing economies. However, this is not the case when we restrict our attention to a two sector economy with an agriculture and a non-agriculture sector. In line with the findings in Gollin et al. (2014) and Herrendorf and Valentinyi (2012), we document that the agriculture sector has one of the lowest levels of labour productivity in Pakistan. Labour productivity in the agriculture sector is only 47% of that in the non-agriculture sector. Under certain assumptions, this should imply higher wage in the non-agricultural sector and, as a result, should lead to the reallocation of labour from the agriculture to the non-agricultural sector. This should happen until the point when both wages and labour productivity are once again equal across the two sectors. But this is not the case. While labour productivity differs across agriculture and non-agriculture sectors, we find wages to be roughly similar. This suggests that the limited economic transformation we observe in Pakistan is not only due to dismal improvement in labour productivity but also due to a combination of policies and market failures such as those in credit markets which incentivise overallocation of resources in the agriculture sector at the expense of more productive sectors in the economy.

In similar spirit, a small body of work also studies how restrictions to international trade may hinder the transformation process (Matsuyama, 1992; Dio et al., 2002; Uy et al., 2013; Betts et al., 2017; Gollin et al., 2014a and 2014b; Teignier, 2018). Theoretically, Meza et al. (2019) show how an increase in barriers which affect firms access to intermediate inputs used in production decrease aggregate productivity. We study if this is indeed the case in the context of imported inputs. We use panel data on dispersion in productivity gap and measures of GVC integration to show that GVC participatoin indeed affects the extent of misallocation in the economy. We further show that an increase in GVC participation is consistent with an increase in future TFP growth. With initial conditions which are comparable to Pakistan, the effect of backward integration on future TFP growth is statistically significant. Thus, policies which address barriers to backward GVC integration can go a long way to increase labour productivity and, as a result, facilitate the transformation process in Pakistan. We calculate that a one percentage point increase in backward linkages increases GDP by 1.6% in the long-run.

The rest of this paper is structured as follows. Section 2 provides a brief overview of the literature on structural transformation. Section 3 documents the limited transformation observed in Pakistan relative to other developing economies. Towards this end, we consider both the standard measure of transformation and changes in the composition of trade basket. Section 4 starts with providing a theoretical foundation for how productivity improvements are critical for the transformation process. We then analyse how labour productivity has evolved in Pakistan both at the aggregate and the sectoral level. Moreover, we decompose productivity growth into improvements due to within-sector improvements and due to the reallocation effect. We do this for all the South Asian economies. Section 5 explores the reasons behind dismal growth in labour productivity in Pakistan. Section 6 discusses the extent to which misallocation across sectors can explain the missing transformation in Pakistan. Section 7 takes a more prescriptive approach and asks if an increase in integration in GVCs can increase productivity growth and, thus, facilitate the transformation process. Section 8 offers some reflections and, finally, section 9 concludes.

2 Literature

A large body of work attempts to answer the question on differences in income levels across countries through the lens of structural transformation and factors which may prevent this (Restuccia et al., 2008; see Herrendorf et al. (2014) for an overview). Kuznet (1966) notes structural transformation as one of the key stylized facts of economic development. Duarte and Restuccia (2010) show how the process of structural transformation itself facilitates an increase in productivity and, thus, economic development. Kongsamut et al. (2001) show how this transformation can be brought about due to changes in income. As income grows, households demand disproportionately more of non-agriculture goods than agriculture goods. This then drives the reallocation of resources across sectors. On the other end, Ngai and Pissarides (2007) focus on differences in productivity growth across sectors as the driver of the transformaiton process. Herrendorf et al. (2013) show that the income effect dominates the transformation process when we focus on households' expenditure on final goods across sectors. In contrast, changes in relative prices dominate when we consider expenditure on value-added produced by different sectors. The change in relative prices is driven by heterogeneity in productivity improvements across sectors. Herrendorf et al. (2015) find "differences in technical progress" as "the dominant force behind structural transformation."

The role of heterogeneity in productivity improvements across sectors has also been emphasised by others (Timmer et al., 2010; Jorgenson and Timmer, 2011; Fan et al., 2023).

However, while there is considerable agreement on the role played by technological progress in driving the transformation process, it is less clear if this happens due to an increase in productivity in non-agricultural sectors or the agriculture sector. The former represents technological progress which pulls resources out of agriculture, whereas the latter represents technological progress which pushes resources away from agriculture. Alvarez-Cuadrado and Poschke (2011) find evidence in favour of the pull factors during the early stages of structural transformation while suggesting that it is the push factors which dominate during the later stages.

Focusing on sectoral differences in productivity across developed and developing countries, Herrendorf and Valentinyi (2012) note that it is the equipment, construction, and food sectors where productivity in developing countries is disproportionately lower relative to the levels observed in developed countries. For countries which are at the 10th percentile of the distribution, the productivity gap in these sectors can be 2-3 times as large as the gap observed at the aggregate level between developed and developing countries. The productivity gap is largest for the equipment sector. In contrast, while productivity gap for the manufactured consumption sector is similar to that observed at the aggregate level, the productivity gap for the services sector is smaller between the two sets of countries. These findings raise important policy questions. Should developing countries import equipment and food where possible and specialise in sectors where the productivity gap is relatively smaller?

Gollin et al. (2014a, 2014b) particularly focus on the productivity gap for the agriculture sector and find that the gap cannot be explained by differences in production technology and human capital across sectors. Labour productivity in the agriculture sector is considerably lower than in the rest of the economy for developing economies thus pointing to factors which are exacerbating the misallocation of resources between the agriculture and the non-agriculture sectors by preventing transformation. Hayashi and Prescott (2008) appear to agree. In trying to understand why the Japanese economic miracle did not take place before the World War II, they point to the barriers and institutional arrangements in place which prevented economic resources from moving from the less productive agriculture sector to the more productive manufacturing sector.

Starting mostly with Matsuyama (1992), a small body of literature has also emerged which brings international trade at the core of the discussion on structural transformation. Some of the recent papers in this literature include Matsuyama (2009), McMillan and Rodrik (2011), Uy et al. (2013), Betts et al. (2017), and Teignier (2018). Teignier (2018) consider the case of South Korea and Britain and show that South Korea's economy would have transformed at an even faster rate if they had not continued to protect their agriculture sector from international competition. Likewise, Britain would have transformed at a much slower rate and would have had a significantly higher share of labour in agriculture if it had not liberalised international trade during the 19th century.

The approach to understanding economic transformation in this paper is different from a parallel body of work which uses firm level data to study the extent to which resources are misallocated across firms (Restuccia and Rogerson, 2008; Hsieh and Klenow, 2008). More recently, in a 2022 World Bank report focusing on Pakistan, Gonzalo Varela and his team use firm level data for the 410 publicly listed firms for the period 2012-2017. Their sample covers 11 sectors and accounts for 13% of Pakistan's GDP in 2017. Varela et al. (2022) find that the productivity of these firms remained largely stagnant during this period. The report further noted that foreign-owned or exporting firms had higher productivity growth than other firms in their sample. Notably, they emphasise the negative implications of high import duties on the productivity of firms operating in the downstream industries.

In other work focusing on Pakistan, Wadho and Chaudhry (2018) highlight the positive influence of product innovation at the firm level on both the level and the growth of labour productivity. They find "vertical knowledge flows from foreign clients and suppliers" as key determinants for firms willingness to innovate. In subsequent work, Wadho et al. (2019) use survey data covering a sample of firms operating in the textile and apparel sector to study the effect of innovation on employment growth. They find that innovation indeed leads to increase in employment at the firm level. Wadho et al. report this to be particularly true for young firms. Wadho and Chaudhry (2022) find considerable variation in how different types of innovation affect labour productivity, with organizational innovation having the largest effect. This is followed by process innovation. They further report, "Foreign competition has a negative effect on product innovation and a positive effect on organizational innovation." Earlier, Haseeb and Chaudhry (2014) use firm level data from census for manufacturing industries for Punjab to study the extent of misallocation within the manufacturing sector.

In a compendium published by PIDE under the title Sludge, Haque et al. (2022, 2023) identify regulatory and bureaucratic barriers within different sectors ranging from agriculture to services which increase the cost of undertaking economic activities in Pakistan. In another study published by PIDE, Ahsan Pirzada and his co-authors specifically look at the laws and regulations which govern the sugar industry in Pakistan and how these may sustain inefficiencies in the agriculture sector (Pirzada et al., 2023b). A body of work funded by RASTA PIDE attempts to understand these issues at a micro level in detail. Earlier, the Economic Advisory Group (EAG) in its Vision Document gave a broad overview of what factors can potentially explain the missing transformation in the case of Pakistan (EAG, 2021).

3 Pakistan: A case of missing transformation

We start with a brief overview of the structural change Pakistan experienced during the first few decades and how it compares with the rest. This is followed by a detailed discussion covering the period from 1990 – 2018. For the latter, we use the UNU-WIDER Economic Transformation Database (ETD) database (Kruse et al., 2022). The database includes data for the period 1990 – 2018 and covers 51 countries. This includes 20 economies from Asia, 9 from Latin America, 4 from the Middle East and North Africa (MENA), and 18 from sub-Saharan Africa. ETD provides disaggregated data on value-added, and the number of people engaged across 12 of the sectors which make up the economy.

In discussing the social and economic impact of colonial rule in India, Angus Maddison notes, "the area which was to become Pakistan had practically no industry at all." In 1951, the share of agriculture in total employment stood at 67.5% (Guisinger, 1980). Over the next decade, the share decreased to 59.9%. It remained almost unchanged between 1961 – 1972. In 2000, the share of agricultural sector in employment was still as high as 50%, suggesting very little structural transformation during the first five decades after independence. In comparison, for many advanced economies, despite the share of agriculture in total employment being considerably low, this decreased even further from around 20% to less than 5% in the decades following 1950s (Alvarez-Cuadrado and Poschke, 2011). The speed of economic transformation for many of the fast-growing developing economies was even more impressive. The share of agriculture fell by significantly more and from a much higher level. For example, the share for South Korea fell from 80% is 1950 to about 10% by 2000s. The same for Japan fell from close to 50% to less than 10% during the same period.

Figure 1 compares the trends across countries in recent decades. Once again, compared

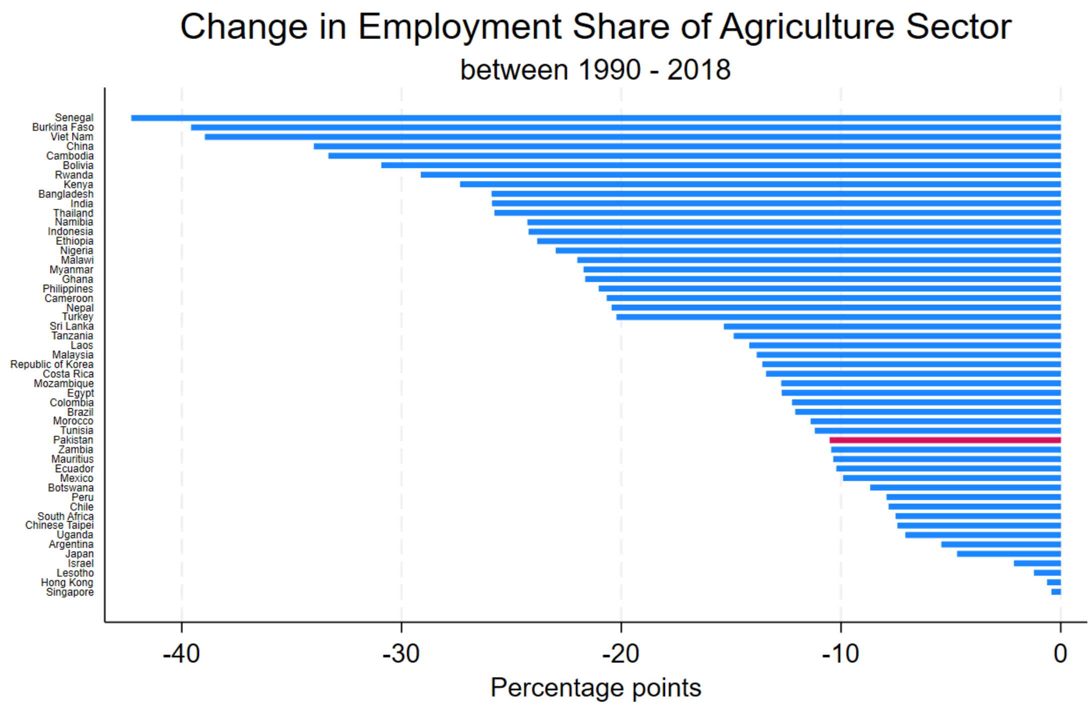

Figure 1: The figure plots how the share of agriculture in total employment has changed between 1990 - 2018. The red bar shows this for Pakistan.

to most other countries in the ETD database, the share for Pakistan has decreased by considerably less. Since 1990, the share has fallen by almost 40 percentage points for Viet Nam and China, and between 20 to 30 percentage points for countries such as Bangladesh, India, Thailand, Indonesia, Turkey and Sri Lanka. While some of these countries had a higher share to begin with, the speed of transformation has been considerably faster. For example, while it has taken Pakistan seven decades to achieve a 30 percentage points decrease in the share of agriculture in total employment, it has taken China, India and Bangladesh only three decades or less. The few countries which rank below Pakistan already have a low agriculture share in total employment. The few exceptions include Botswana, Lesotho, Uganda, and Zambia.

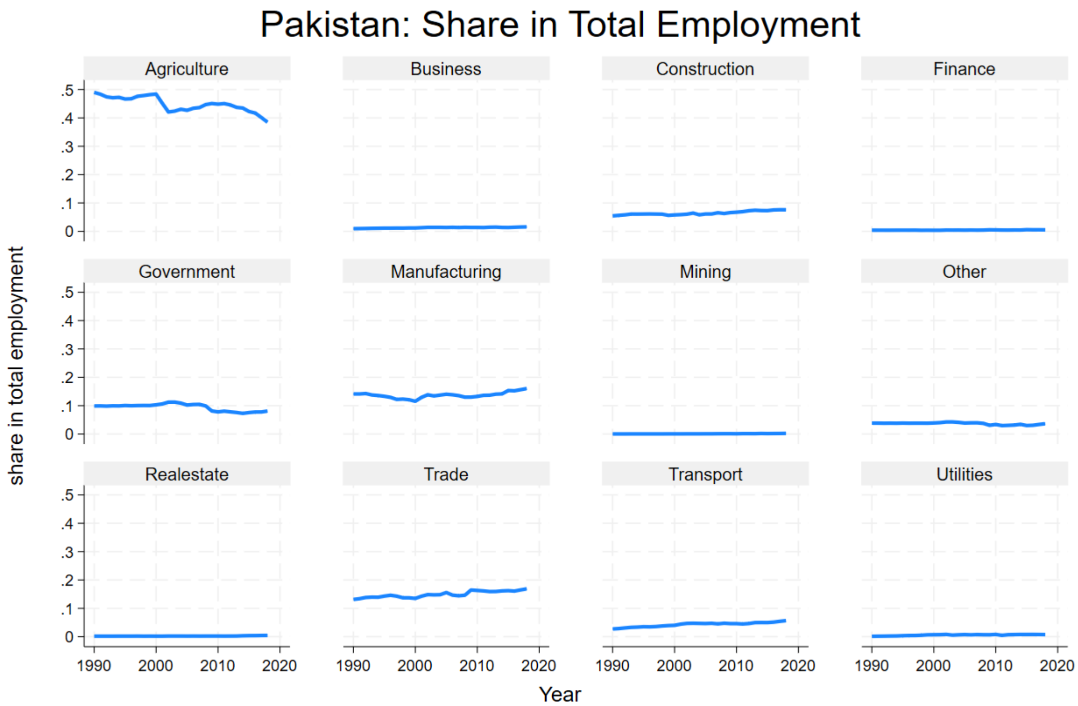

Figure 2: The figure plots data on employment share for each of the twelve sectors in the ETD database for Pakistan.

What about changes across sectors? Figure 2 plots the share of different sectors in total employment for Pakistan. After remaining stable at close to 49% during the 1990s, the share of agriculture fell by 10 percentage points from 2000 onwards. The share of government sector has also decreased from 10% to 8.1% over the same period. Meanwhile, the share of construction, trade and transportation sectors increased from 5.4%, 13.1%, and 2.7% in 1990 to 7.6%, 16.8%, and 5.7% in 2018, respectively. This reflects an earlier trend that was also documented by Guisinger. The three sectors also benefited from the decline in the share of agriculture sector between 1951 – 1972. Contrary to popular belief that the country has seen deindustrialisation, the share of manufacturing has also increased from 14.1% in 1990 to 16.1% in 2018. Nonetheless, this remains far from impressive. The

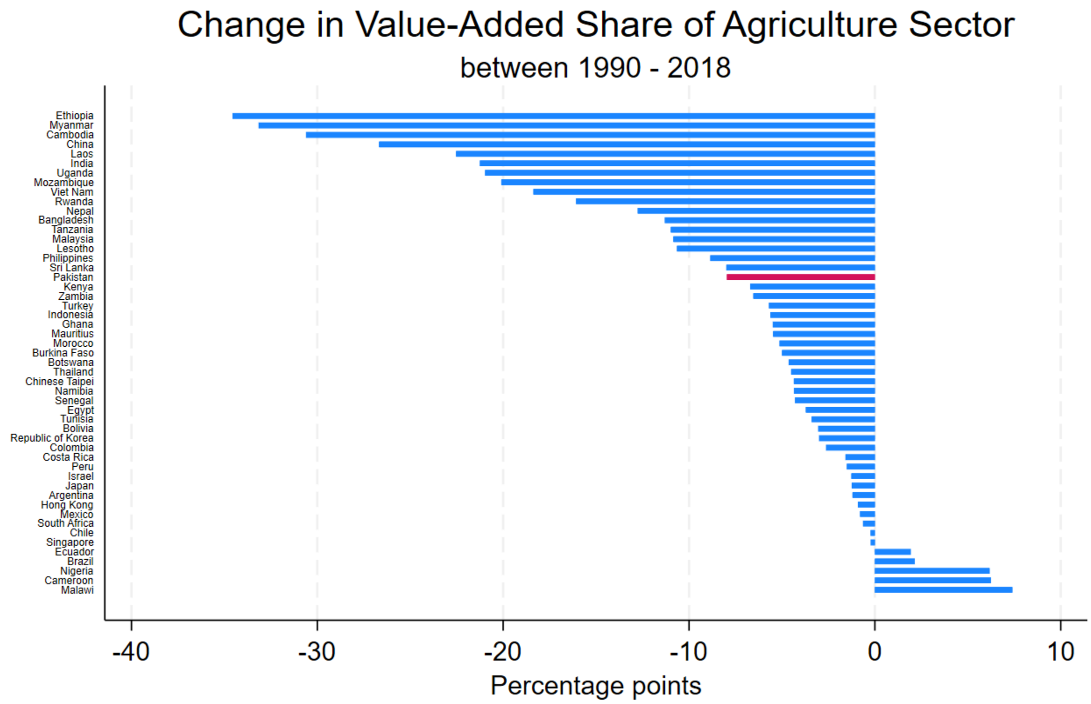

Figure 3: The figure plots the change in the share of agriculture is total value-added for all the countries in the ETD database. This is done for the period between 1990 - 2018. The red bar shows this for Pakistan.

manufacturing share in total employment increased from 10% in 1951 to 14% in 1962 before decreasing again to 8.3% in 1972 (Guisinger, 1980). Today it is close to what it was in 1962.

The evidence for economic transformation is disappointing even when we consider the share of agriculture in total value-added. Figure 3 plots the change in the value-added share of the agriculture sector across countries for the period 1990 – 2018. While Pakistan ranks slightly better relative to its position when considering the share of agriculture in employment, the decrease in the value-added share over the three decades is still quite low at only 8%. In contrast, China, India and Bangladesh saw a bigger decline despite having a comparable value-added share in 1990. Sri Lanka, which had a value-added share of only 16% in 1990, saw a similar decline to that of Pakistan in the following three decades. Like before, many of the countries which rank below Pakistan already have a value-added share which is significantly less than that of Pakistan in the 1990.

3.1 Evidence from international trade

In the discussion above, we have looked at the share of agriculture in total employment as the metric for economic transformation. An important limitation of this approach is that it overlooks transformation within different sectors of the economy. While this is not the focus of this paper, we discuss this briefly in this section. We look at micro data on international trade to understand the nature of economic transformation over the last three decades. Focusing on international trade is useful for this purpose as it sheds light on the nature of economic transformation conditional on becoming internationally competitive.

We use data on international trade from the second release of the International Trade and Production database (Borchert et al., 2022). The database includes data on bilateral trade for 265 countries and 170 product categories for the period 1986-2019. The 170 product categories cover 28 product categories belonging to the agriculture sector; 7 belonging to Mining & Energy; 118 to Manufacturing; and 17 to services. Data on services is only available for the period 2000-2019. Together, the dataset includes 72.5 million observations.

We start with considering how the composition of Pakistan's export basket has changed between 1990-2018. Since data for services exports is only available from 2000, we drop services from the dataset. Figure 4 plots the share of the remaining product categories in the export basket. The horizontal axis plots the share for the year 1994 whereas the vertical axis plots the share for the year 2018. The upward sloping red line is the 45-

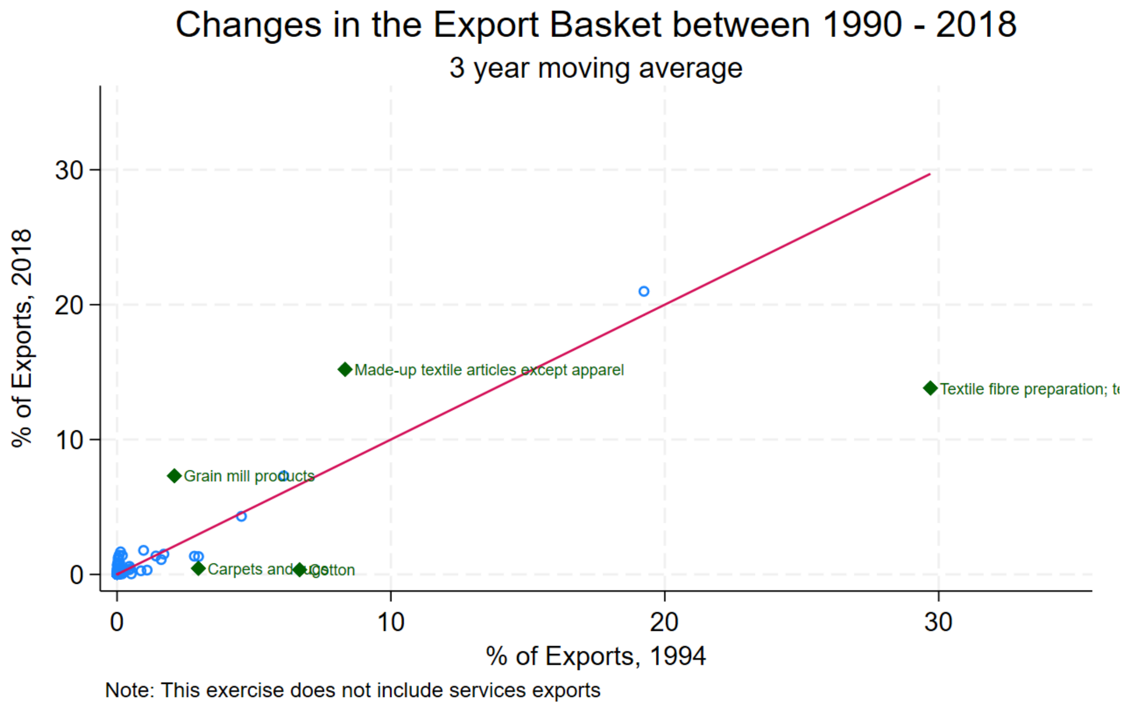

Figure 4: The figure shows the change in the composition of Pakistan's export basket between 1994 - 2018. We take three year moving average before plotting the data to smooth out changes due to business cycle fluctuations. The green diamonds show products whose share in the export basket has changed by more than 2 percentage points.

degree line. If a product category falls on this line, its share in the export basket remained unchanged between 1990 and 2018. We take three-year moving averages to remove changes in the export share which may be due to short term fluctuations in domestic or international economic conditions. The green diamonds represent product categories for which the export share has changed by more than 2 percentage points over this period.

Two facts stand out. First, almost all the product categories are concentrated around zero and, thus, contribute little to total exports. Second, there are only 5 product categories for which the share in the export basket has changed by more than 2 percentage points over the last three decades. Export share decreased for three of these five categories. These include textile fibre, carpets, and cotton. In contrast, export share increased for grain products and made-up textile articles.

What about imports? However, before looking at imports, it is worth emphasising that the country saw a sharp increase in remittances during the period under consideration. Remittances increased from only $2 billion in 1990 to $22 billion in 2019 thus affecting households' purchasing power in a significant way. The increase in income due to significant inflows from abroad can play an important role in shaping the structure of the economy.[1] [2]

Figure 5 repeats the same exercise as in figure 4 but for imports. Almost all the product categories fall close to the 45-degree line suggesting no change in their share in the import basket between 1994-2018. However, there are eight product categories for which the import share has changed substantially. Import share has decreased for five of these, whereas it has increased for the remaining three. The categories for which the share has increased include petroleum products and iron and steel. In contrast, the share has decreased for machinery, automobiles, aircrafts, wheat, and vegetable oil.

Both figure 4 and figure 5 lend further support to the conclusion above that Pakistan has not undergone any meaningful economic transformation over the past several decades

[1] In an exercise which we do not report here, we use the panel data on trade flows to estimate a fixed effects model where the growth rate of imports depends on the growth rate of exports and other global and domestic macroeconomic variables. We allow for product specific fixed effects, a time trend and cross-sectional dependence. The results confirm that while the increase in GDP growth rate increases the growth rate of imports for the manufacturing sector, the relationship is not statistically significant for the non-manufacturing categories. The result is robust across different specifications. This is in line with the suggestion that the increase in income levels does indeed increase the demand for non-agriculture goods more than the agriculture goods.

[2] Given Pakistan's dismal performance in terms of growth in labour productivity, significant inflows from abroad in the form of remittances and debt flows from multilateral and bilateral creditors may be important to explaining whatever limited transformation Pakistan has seen. The nature of inflows may also explain why resources have moved to sectors with low growth potential (see section 4.3).

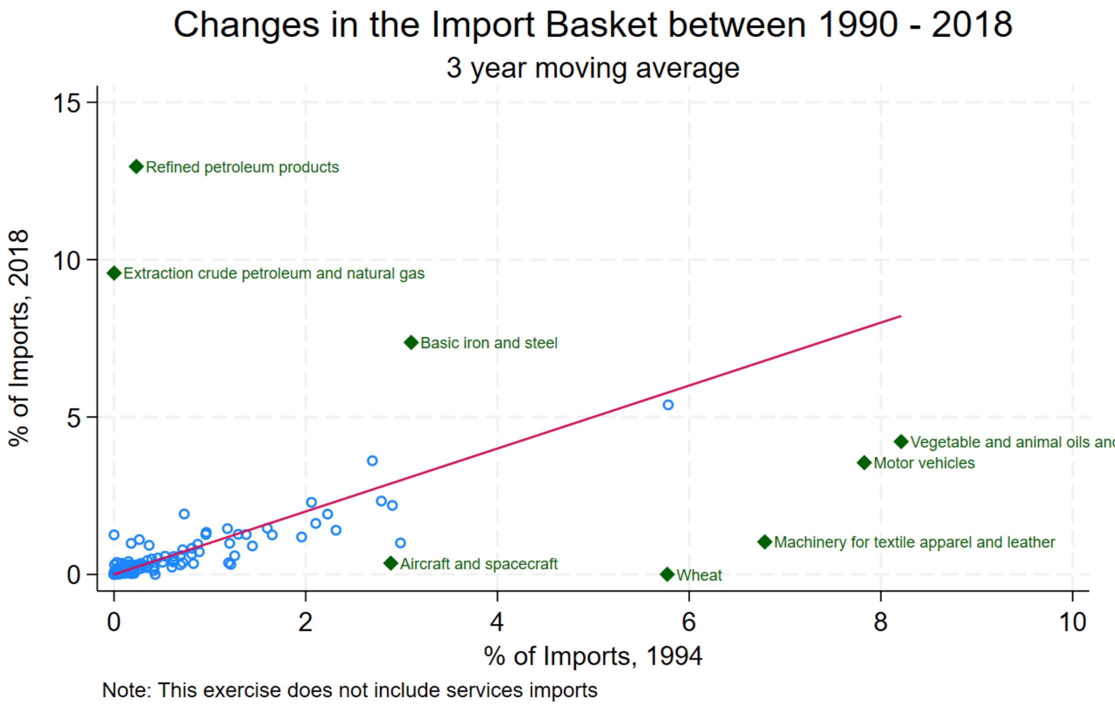

Figure 5: The figure shows the change in the composition of Pakistan's import basket between 1994 - 2018. We take three year moving average before plotting the data to smooth out changes due to business cycle fluctuations. The green diamonds show products whose share in the import basket has changed by more than 2 percentage points.

even when we look at the structure of the economy at a more micro level. In section 4.3, we show that the limited transformation that has taken place has also been towards sectors with low growth in labour productivity. While the limited scale of transformation did have a positive effect on labour productivity, the nature of transformation has not been conducive for high growth in the future.

4 The role of dismal growth in labour productivity

Section 3 demonstrated that Pakistan's economy has undergone limited transformation and that too at a very slow speed compared to other fast growing developing countries. This raises a critical question: what prevents transformation from happening in the case of Pakistan? The discussion in section 1 and 2 already points to the role of improvements in labour productivity in driving the transformation process. However, it is important to keep in mind that the focus on growth in labour productivity as the source of transformation implicitly assumes that markets are perfectly competitive, and labour is perfectly mobile. What this implies is that an increase in labour productivity in any given sector will lead to an increase in wages in the sector and cause labour to relocate to that sector until wages are once again equal. If, however, an increase in labour productivity is matched by an increase in market power of the firms within the sector, the transmission channel will break down. The increase in labour productivity will not translate in higher wages for the sector which in turn will prevent the transformation from taking place. Alternately, if labour cannot relocate due to geographical barriers, loss of social networks and poor social security, or high cost of living in places where production takes place, higher wages will once again not lead to transformation. In section 6 we consider to what extent frictions in labour market or elsewhere can explain the missing transformation in Pakistan.

4.1 A simple model

We use the framework in Duarte and Restuccia (2010) to motivate the discussion on how improvements in productivity affect structural transformation. The model assumes three sectors: agriculture, manufacturing, and services. Firms within each sector i use labour to produce sector-specific good such that, $Y_{i,t} = A_{i,t}L_{i,t}$. Firms also face a sector-specific productivity process, A_i. They hire labour in a perfectly competitive market where wages equal the value of the marginal product of labour. Likewise, the model also assumes the goods market to be perfectly competitive such that prices for each sector-specific good equal their marginal costs. On the household side, a representative household supplies fixed labour, L, but chooses how much to consume from each sector so as to maximise their lifetime utility subject to the lifetime budget constraint. However, since the model abstracts from physical capital and other savings instruments, households' problem is reduced to maximising current utility subject to current income in every period. Critically, households' preferences take the form such that income elasticity is less than one for agriculture goods, equal to one for manufacturing goods, and is greater than one for services. The assumption of non-homotheticity is crucial for the model to capture stuctural transformation observed in data. Equation 1 reproduces households' preferences for convenience,

$$\sum_{t=0}^{\infty} \beta^t u(c_{a,t}, c_t), \quad \beta \in (0,1), \tag{1}$$

where

$$u(c_{a,t}, c_t) = alog(c_{a,t} - \bar{a}) + (1-a)log(c_t), \quad a \in [0,1],$$

and

$$c_t = \left[bc_{m,t}^{\rho} + (1-b)(c_{s,t} + \bar{s})^{\rho} \right]^{1/\rho}, \quad b \in (0,1)$$

where $c_{a,t}$, $c_{m,t}$, and $c_{s,t}$ represent consumption of agriculture, manufacturing, and services, respectively. a is the weight assigned consumption of agriculture relative to manufacturing, whereas b is the weight assigned to consumption of manufacturing relative to services. ρ

determines the elasticity of substitution between manufacturing and services consumption. Finally, $\bar{a}$ is the minimum level of agriculture which households must consume. We assume $\bar{a}, \bar{s} > 0$ and $\rho < 1$.

Solving the model where households choose c_i to maximise their utility and firms choose L_i to minimise their costs give the following expression for the share of labour working in the agriculture sector,

$$L_a = (1-a)\frac{\bar{a}}{A_a} + a\left(L + \frac{\bar{s}}{A_s}\right) \tag{2}$$

With L fixed, equation 2 makes explicit that the share of labour working in the agriculture sector decreases both when there is an improvement in productivity in the agriculture or the services sector. The reason for why an improvement in productivity in the agriculture sector will also result in the reallocation of labour away from the agriculture sector is because an increase in productivity will increase wages which will result in households increasing their demand for services by disproportionately more. This stems from the assumption that income elasticity with respect to services is greater than one whereas income elasticity with respect to agriculture is less than one. It is also useful to note that any improvement in productivity, no matter how small, will always result in some degree of transformation. We later show that this is indeed the case for Pakistan.

In what follows, we look at how labour productivity has changed in Pakistan both over time and across sectors, and how it compares with other developing economies. Since both productivity improvements in the agriculture sector and the rest of the economy are important for the transformation process, we continue to report statistics on both wherever we can. Finally, it is worth emphasising that the model in Duarte and Restuccia abstracts from capital. Thus, the notion of labour productivity (Y_i/L_i) and TFP (A_i) are synonymous. We drop this simplifying assumption in section 5 where we attempt

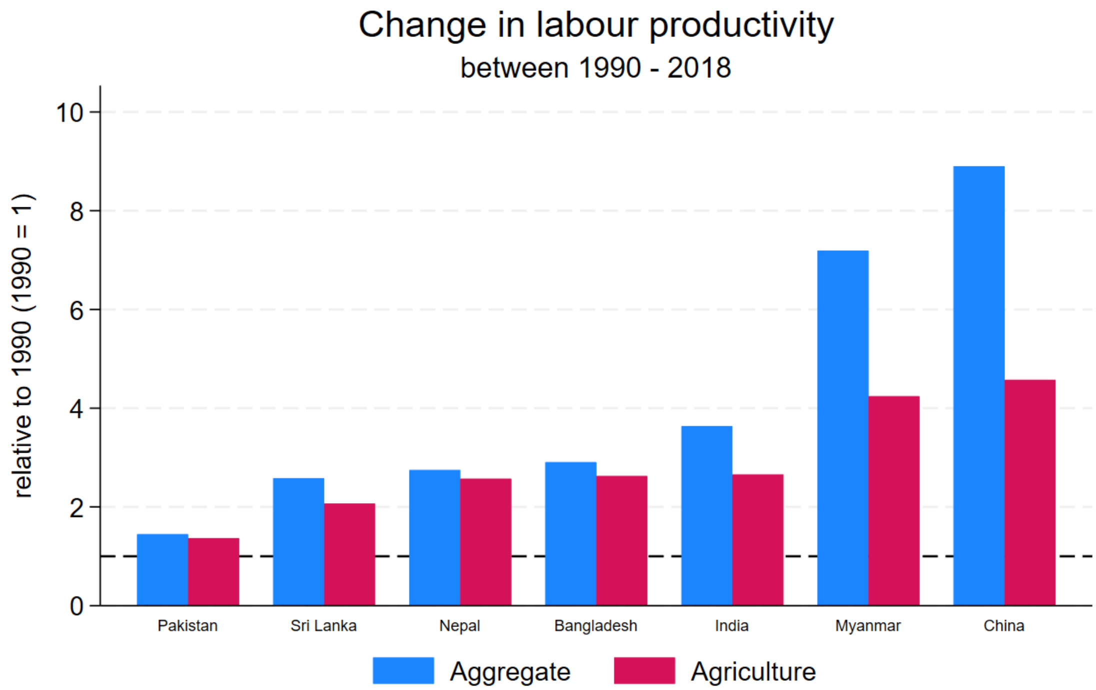

Figure 6: The figure plots the change in labour productivity for the South Asian economies. A ratio of 1 means that labour productivity in 2018 is the same as in 1990.

to understand the drivers of labour productivity in Pakistan and across other developing countries.

4.2 Trends in labour productivity

Figure 6 reports how labour productivity has changed between 1990-2018 relative to labour productivity in 1990 for all the South Asian economies. The figure reports the change in labour productivity both at the aggregate level and for the agriculture sector. The horizontal dash line represents a ratio of 1 which means that labour productivity has not changed over the relevant period. In contrast, a ratio of 2 means that the labour

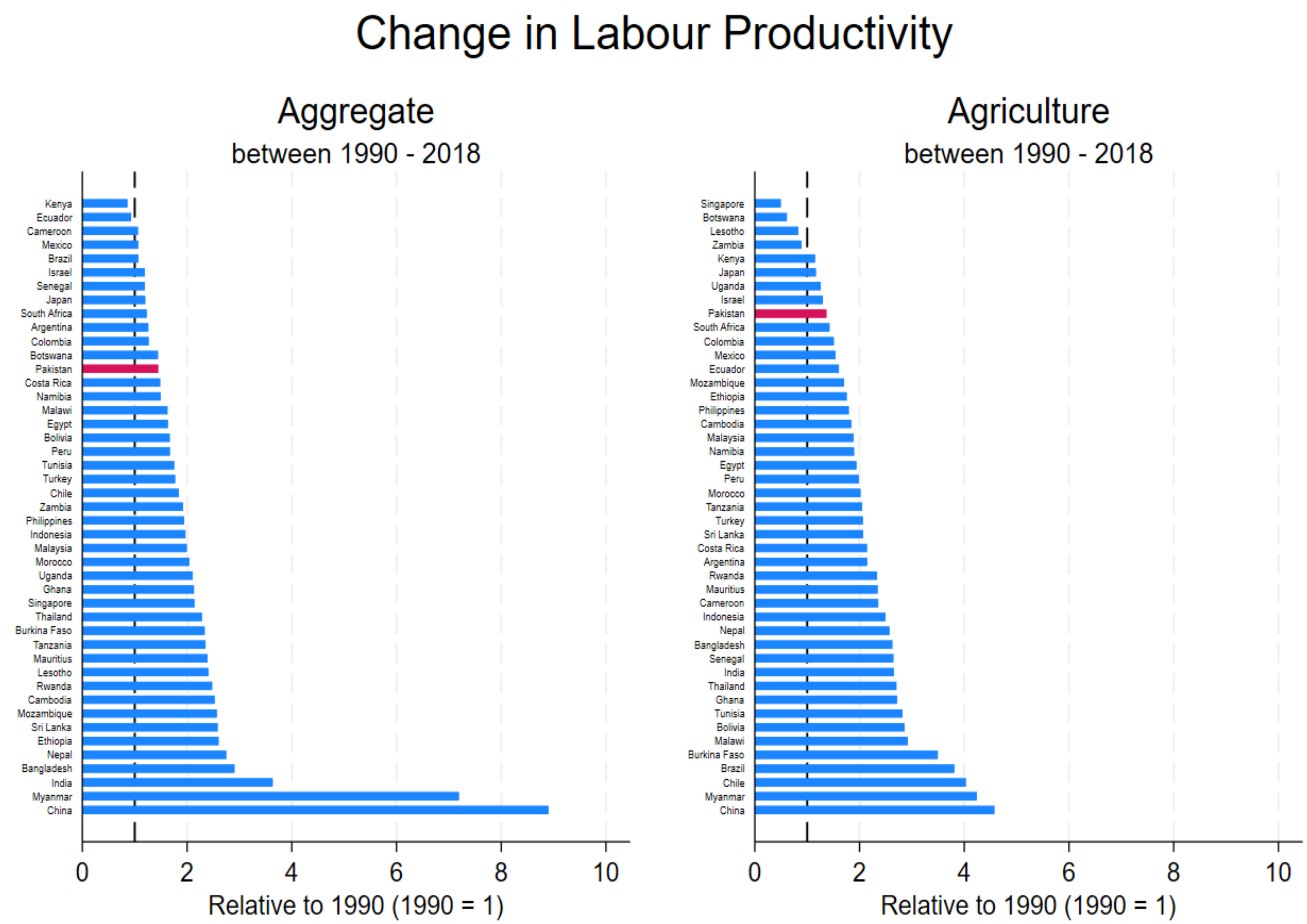

Figure 7: The figure plots the change in labour productivity for all the countries in the ETD database. The left panel plots this for the whole economy whereas the right panel plots this for the agriculture sector.

productivity has doubled over the same period.

Figure 6 makes clear that labour productivity has changed by the least in the case of Pakistan, increasing by only 45% between 1990 – 2018. This is equivalent to an average annual growth rate of only 1.33%. In contrast, labour productivity in all other South Asian economies has more than doubled. Specifically, labour productivity in Bangladesh and India has increased by 191% and 263%, respectively. Labour productivity in China has increased by more than 8 times over the same period. These numbers imply an average annual growth rate of 3.88% for Bangladesh, 4.72% for India, and 8.12% for China.

It is not just South Asia where Pakistan is falling behind in terms of improving its labour productivity. Figure 7 shows that Pakistan performs poorly compared to almost all the 54 countries included in the ETD database. This is true both for the aggregate labour productivity and labour productivity in the agriculture sector.

4.3 Decomposing labour productivity growth

While growth in labour productivity affects the process of structural transformation, it is equally important to note that structural transformation can itself influence labour productivity as well. For example, if labour relocates from sectors with low levels of labour productivity to sectors with high levels of labour productivity, the overall labour productivity in the economy will increase. This is because the sectors with high levels of labour productivity will expand, whereas those with low levels of labour productivity will contract. Note that this increase in labour productivity is driven by the process of structural transformation itself i.e., due to labour relocating from less productive to more productive sectors. Therefore, to understand how changes in labour productivity affect transformation, it is important to focus on changes which are not due to structural transformation itself. In other words, we need to focus on changes in labour productivity within sectors which are due to capital accumulation, technological changes, or changes in misallocation across plants. Following the literature, we will refer to this as within-sector changes in labour productivity.

To study the extent to which overall growth in labour productivity is driven by the transformation process, we follow the methodology in Timmer et al. (2015) and de Vries et al. (2015) and decompose the overall productivity growth into growth due to within-sector improvements and due to the reallocation across sectors. Formally, the decomposition exercise takes the following form,

$$\frac{\Delta y}{y^0} = \overbrace{\sum_i \frac{y_i^T - y_i^0}{y^0} s_i^0}^{within\ effect} + \overbrace{\underbrace{\sum_i (s_i^T - s_i^0) \frac{y_i^0}{y^0}}_{static\ effect} + \underbrace{\sum_i \frac{(y_i^T - y_i^0)(s_i^T - s_i^0)}{y^0}}_{dynamic\ effect}}^{reallocation\ effect} \tag{3}$$

where y is aggregate labour productivity, y_i is labour productivity in sector i, s_i is sector $i's$ share in total employment, and T and 0 represent the last and the first period in the sample. The left-hand side of the expression represents the growth in aggregate labour productivity over the relevant period. The first term to the right captures the growth in aggregate labour productivity due to improvements within the sectors, whereas the second and the third term to the right capture the increase in aggregate labour productivity due to the static and the dynamic reallocation effect, respectively. The sum of the static and the dynamic reallocation effect gives us the net reallocation effect which is the increase in aggregate labour productivity due to labour moving from one sector to another.

Figure 8 presents results from this decomposition exercise for aggregate labour productivity growth for each of the South Asian economy. Specifically, the figure reports the percentage points increase in aggregate labour productivity which is due to the within-

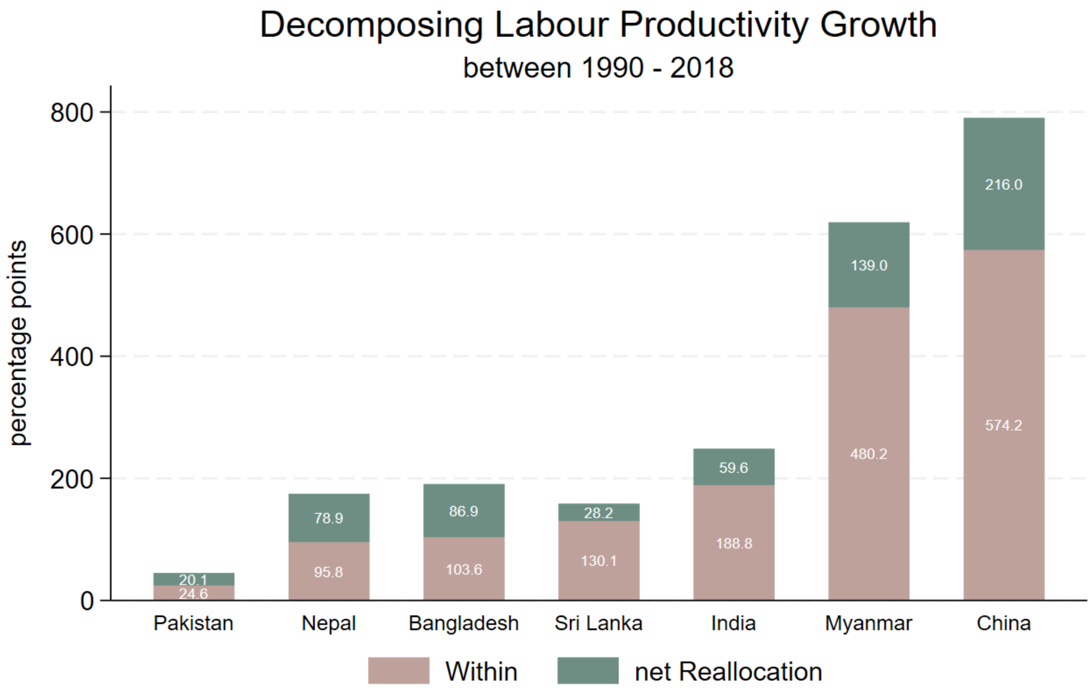

Figure 8: The figure decomposes the increase in labour productivity across South Asian economies into the increase due to within-sector improvements (rose) and the increase due to the reallocation of labour across sectors (green).

sector improvements in labour productivity and the net reallocation effect (i.e., structural transformation). The sum of the two equals the growth in aggregate labour productivity for the period 1990 – 2018.

The figure shows that the increase in aggregate labour productivity due to improvements in labour productivity within sectors is less than the overall increase in aggregate labour productivity across South Asian economies. On average, within-sector improvements in labour productivity contribute around two-third of the increase in overall labour productivity. This number is even lower for Pakistan where only 55% of the overall increase in aggregate labour productivity is due to within-sector improvements. This is equivalent to an average annual growth rate of only 0.73%. The average annual growth rate due to within-sector improvements for Bangladesh, India, and China equals 2.11%, 3.38%, and 5.90%, respectively. The disappointing growth in aggregate labour productivity due to improvements in labour productivity within sectors is critical for understanding the phenomenon of missing transformation in Pakistan.

The flip side of the discussion in this section is the contribution of structural transformation towards increasing aggregate labour productivity in the economy. The figure shows that the reallocation effect is positive for all the countries considered here. On average, one-third of the increase in aggregate labour productivity across countries is due to the labour relocating from sectors with low levels of labour productivity to sectors with high levels of labour productivity. Whether the reallocation effect is positive or negative is often presented as evidence for whether the structural transformation over the period under consideration has been growth enhancing or growth reducing (McMillan and Harttgen, 2014; McMillan and Rodrik, 2011).

However, the net reallocation effect masks important qualitative differences across countries. Specifically, it masks whether labour is relocating to sectors with high or low growth potential. To unmask this, Timmer et al. (2015) and de Vries et al. (2015) further decompose the reallocation effect into static and dynamic reallocation effects. The static reallocation effect is positive if labour is moving from sectors with low levels of labour productivity to sectors with high levels of labour productivity. Different from the static effect, the dynamic effect is positive if labour is relocating from sectors with low growth in labour productivity to sectors with high growth in labour productivity. The sectors with high growth in labour productivity generally include manufacturing and tradable services. In contrast, the sectors which are generally associated with low growth in labour productivity include non-tradable services and manufacturing activities concentrated in the informal

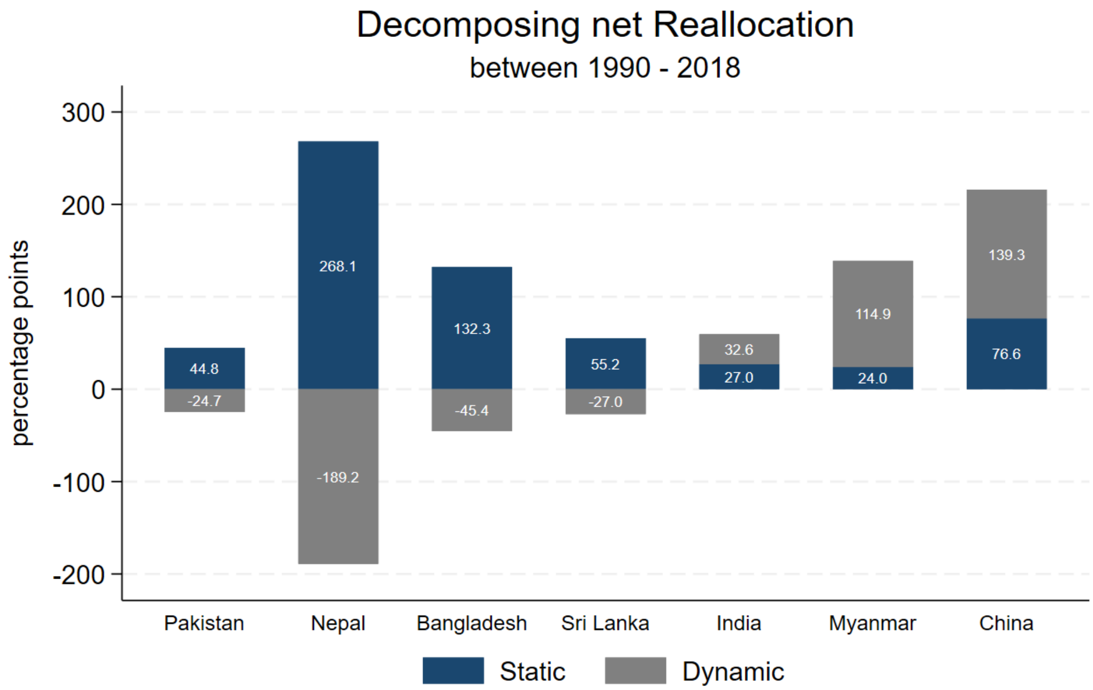

Figure 9: The figure decomposes the change in labour productivity due to the reallocation effect (see figure 8) into the change due to static effects (blue) and dynamic effects (gray).

economy. De Vries et al. find that while the static effect is positive for all the regions considered in their study, the dynamic effect is close to zero for Asia but negative for both Africa and Latin America.

Figure 9 repeats the exercise in de Vries et al. for the South Asian economies, including Pakistan. The figure reports the contribution of both the static and the dynamic reallocation effects to the growth in overall aggregate labour productivity for the period 1990 – 2018. The sum of the two equals the contribution of the net reallocation effect as reported in figure 8.

There are two key takeaways from figure 9. First, the static reallocation effect is positive for all the countries considered here. This implies that workers generally move from sectors with low levels of labour productivity to sectors with high levels of labour productivity. Therefore, as sectors with high levels of labour productivity expand, the overall labour productivity in the economy increases. Second, while the dynamic effect is positive for China, India, and Myanmar, it is negative for Bangladesh, Nepal, Pakistan, and Sri Lanka. The negative dynamic effect suggests that, while workers are relocating to sectors with high levels of labour productivity, these sectors also happen to be the ones which are experiencing low growth in labour productivity. Together, and as reported in figure 8, the net reallocation effect is positive for all the South Asian countries.

Figure 10 focuses on South Asian economies for which the dynamic effect is negative. The figure plots the change in employment share and the growth in labour productivity across sectors for each of the four countries. The sectors are sorted by the change in employment share for each country. Two key facts stand out. First, the figure once again makes clear that Pakistan has undergone limited transformation. The share of agriculture has declined by the least. Moreover, the increase in labour productivity across sectors has also been disappointing. Second, across all the economies considered here, labour has relocated to sectors where the growth in labour proudctiivty is less than the national average. For Pakistan, the figure shows that the share of labour engaged in construction, trade, transport and, to an extent, manufacturing has increased over the last three decades. Except for manufacturing, these are also the sectors where the labour productivity has either stayed the same or decreased over the relevant peirod. We observe a similar pattern across other countries except perhaps Sri Lanka. In the case of Sri Lanka, labour has relocated to sectors where labour productivity has increased since the 1990. However, the sharp increase in labour productivity in the 'other' sector result in the dynamic effect being negative.

The decomposition of the net reallocation effect into static and dynamic reallocation

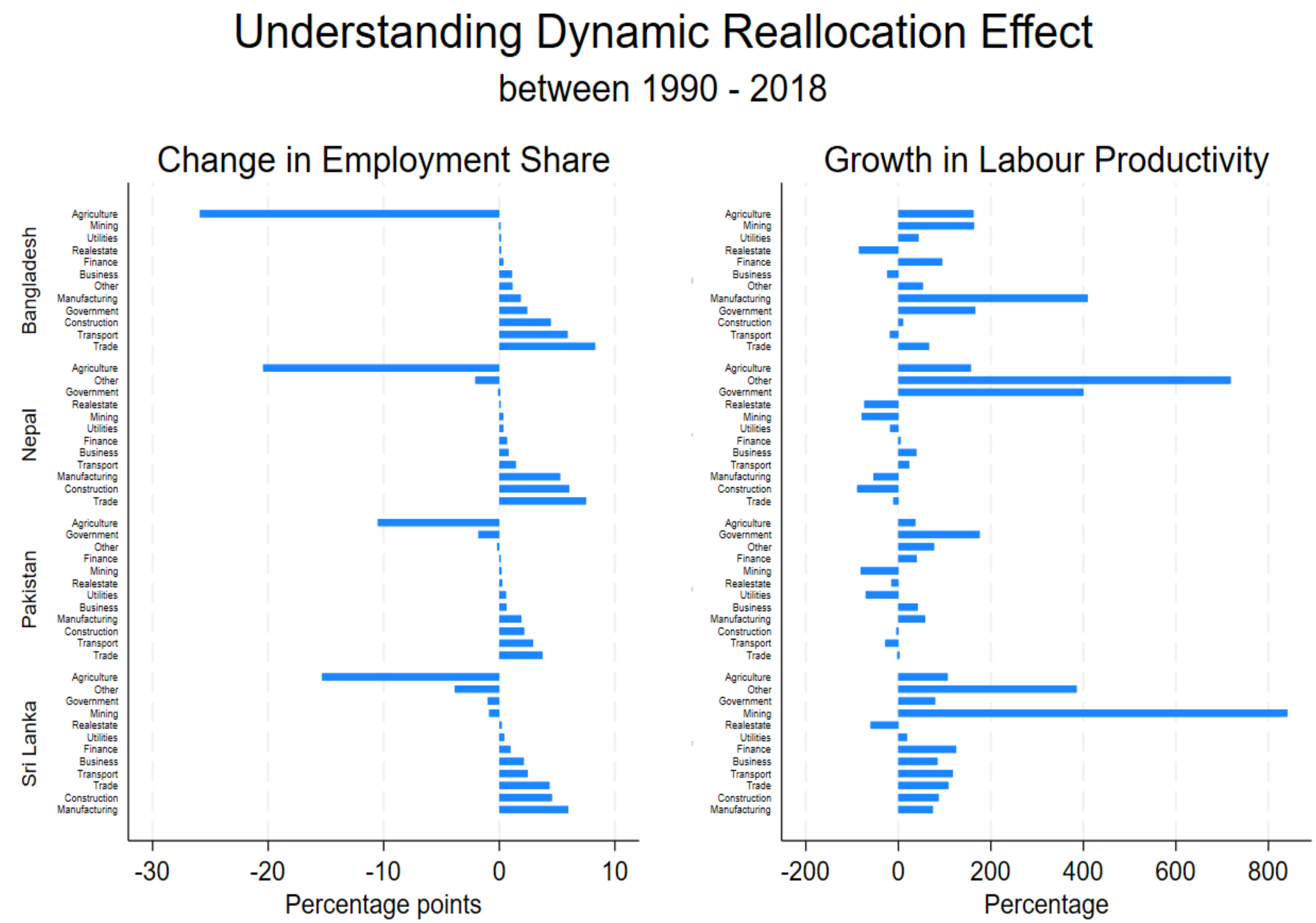

Figure 10: The figure shows the change in the allocation of labour and labour productivity across sectors for countries which exhibit negative dynamic reallocation effect (see figure 9). The sectors across both the left and the right panel are sorted according to the change in the labour share for each country.

effects is important. A combination of a positive static and a negative dynamic effect means that while there may be short term gains from the reallocation of labour from low productive to high productive sectors, these gains may not be sustained as the labour is relocating to sectors with limited potential to grow. This is indeed the case for Pakistan. While the static reallocation effect still contributed 44.8 percentage points to the overall increase in aggregate labour productivity, our decomposition exercise also suggests that this reallocation happened towards sectors such as non-tradable services and, arguably, manufacturing activities in the informal economy with limited potential to grow.

This presents a further challenge for policymakers in Pakistan. It is not just the case that the within-sector growth in labour productivity has been disappointing but the contribution coming from the limited structural transformation that has taken place is also driven by reallocation towards sectors with low productivity growth thus undermining future growth prospects. It is important to explore the underlying factors which result in the dynamic reallocation effect being negative in the case of Pakistan. We suspect that a sharp increase in remittances resulting in a disproportionate increase in demand for non-tradable goods and services may be important to explaining this result. Between 1990s to 2010s, remittances increased from close to 2% of GDP to more than 6% of GDP for Pakistan, and from 2% of GDP to more than 20% of GDP for Nepal.

The discussion in section 4 suggests that Pakistan's dismal performance in terms of increasing its labour productivity both in the agriculture and the non-agriculture sectors primarily explains the phenomenon of missing transformation documented in section 3. The average annual within-sector improvement in labour productivity at the aggregate level equals only 0.73%. To put differently, the relatively small increase in labour productivity in the case of Pakistan explains why economic resources did not get relocated out of the agricultural sector at the same speed as for other countries.

5 Determinants of labour productivity

Section 4 demonstrated that labour productivity in Pakistan has increased by significantly less when compared to regional economies. Figure 10 further shows this to be true for almost all the sectors across the economy. Why is this the case? To answer this question, we turn to the literature on growth accounting and decompose labour productivity into various components. We then reflect on each of the component and discuss how these have changed over time relative to the regional economies.

Specifically, we follow Jones (2016) in decomposing labour productivity into capital-output ratio, human capital per worker, and the level of total factor productivity (TFP). This is given by the following expression,

$$\frac{Y_t}{L_t} = \left(\frac{K_t}{Y_t}\right)^{\frac{\alpha}{1-\alpha}} \frac{H_t}{L_t} Z_t \tag{4}$$

where Y_t is GDP, L_t is labour supply, K_t is capital stock, H_t is human capital stock, Z_t is total factor productivity (TFP), and α is the output elasticity of capital. α also determines the share of income going to capital in the economy. Note that an improvement in TFP can also increase returns on investment. This in turn will increase capital stock in the economy (i.e. capital deepening). Ignoring this link between the level of TFP and capital deepening will result in overestimating the contributions of capital accumulation to labour productivity. However, the above formulation addresses this shortcoming by keeping the contributions from both changes in capital deepening and TFP separate.

In the rest of this section, we turn to data from the Penn World Table database (version 10.01) to better understand how different components of labour productivity as defined by the equation above have changed overtime.

5.1 Productivity growth

We start with analysing the role of technical efficiency, TFP. Towards this end, we use data from Penn World Table 10.01. However, the PWT dataset does not report data on TFP for Pakistan and several other economies. This is because the TFP measure in PWT 10.01 uses data on capital services and on labour share for each year to calculate the series for TFP. It turns out that the database does not have this data for several countries which presents a challenge for any meaningful analysis which is comparable with what is reported for other countries.

To overcome this, we make two simplifying assumptions which we believe should not affect the analysis as far we don't focus on any particular year. First, we use data on capital stock rather than capital services for these countries. Second, we assume the labour share to be fixed at 50%. Using capital stock in place of capital services is consequential if the researcher is interested in drawing conclusions for specific years. Instead, we focus on the broader trend in our measure for TFP for the rest of the analysis. We use the methodology in Inklaar and Timmer (2013) to estimate TFP for Pakistan. This is similar to the method used in PWT to construct the measure for TFP except that they use capital services and data on labour shares which vary over time.

Figure 11 plots the growth rate for the TFP which we obtain by following the procedure described above. On average, the productivity growth was negative during much of the 1950s and the 1960s. This resonates with the research being published at the time which pointed to the inefficiencies that were prevalent across the economy (Power, 1963; Soligo and Stern, 1965; Lewis and Guisinger, 1968). The productivity growth rate increased during 1980s; decreased to close to zero in the 90s; and turned positive for the period after except for the years spanning the 2008 financial crisis.

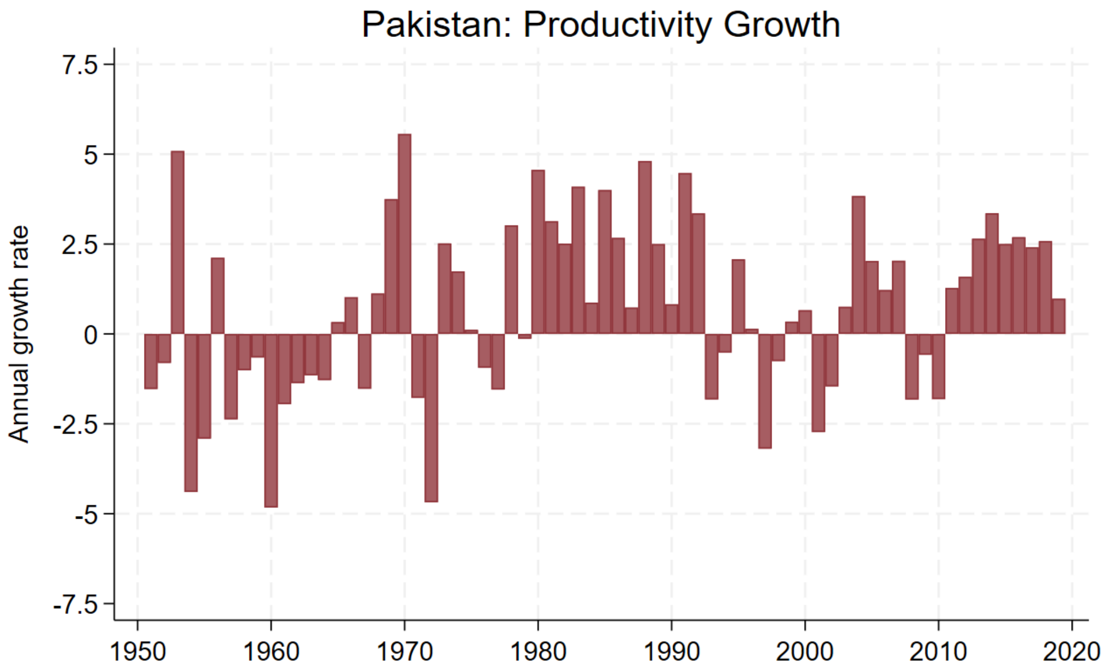

Figure 11: The figure plots the TFP growth rate for Pakistan based on the methodology in Inklaar and Timmer (2013). This is calculated using data on capital stock from the PWT 10.01 database and further assuming a labour share of 50%.

The average annual productivity growth for Pakistan for the period 1980-2019 equals 1.4%. Average productivity growth equals 0.9% and 1.13% for the period 1990-2019 and 2000-2019, respectively. These numbers are almost similar to the average annual growth rate observed in labour productivity over a similar period thus suggesting that almost all of the increase in labour productivity observed in the case of Pakistan is driven by the growth in TFP. Figure 12 plots the growth rate of labour productivity and the growth rate of TFP for Pakistan. The figure confirms what is also reported in table 5.2 below. Almost all the variation in labour productivity in the case of Pakistan is explained by variation in TFP. This also means that, without any meaningful contribution coming from the capital

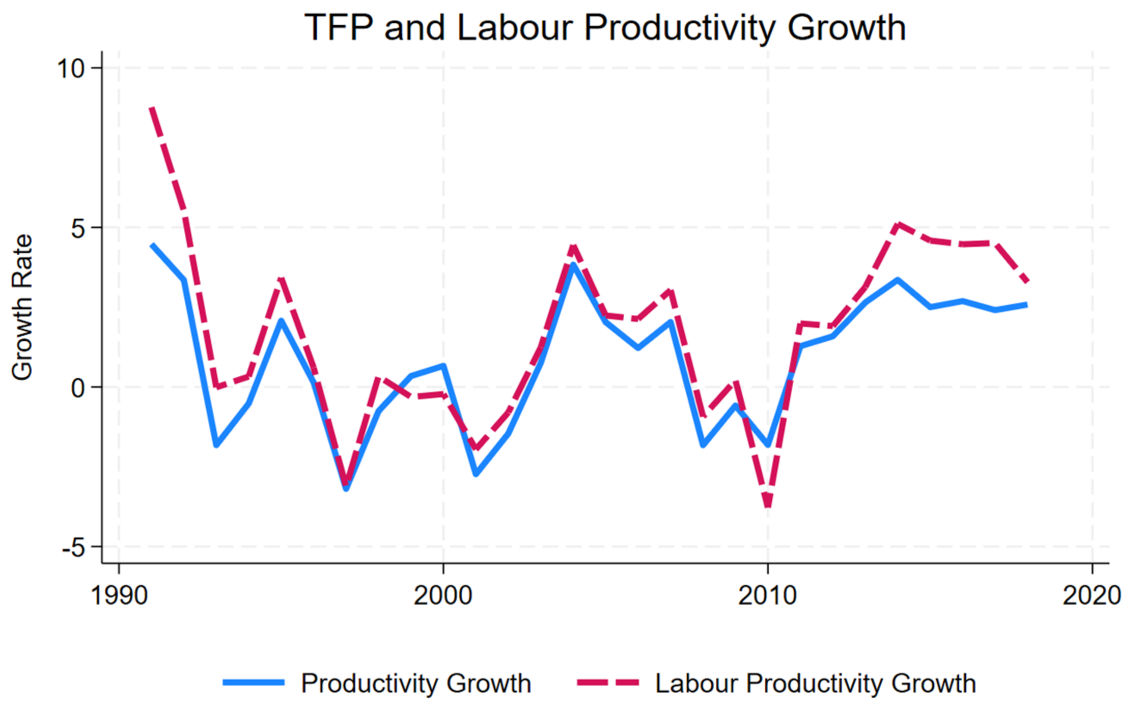

Figure 12: The figure plots the growth rate of TFP (as in figure 11) and labour productivity for Pakistan. These are calculated using data in PWT 10.01 database.

accumulation, the growth in labour productivity will continue to average below 2%.

While there is potential to implement reforms which help increase the TFP growth rate, it is important to note that a significant fraction of growth in the case of fast-growing emerging economies has come from capital deepening as illustrated in table 5.2. Importantly, as low as it might first appear, the average productivity growth in Pakistan is not too different from what is observed for the rest of the world. For example, since 1990, the average annual productivity growth in the case of India has been 1.96% according to the same dataset. A more comprehensive study for India based on the recently constructed KLEMS dataset points to an even lower annual TFP growth rate of 1.16% (Bishwanath et. al, 2017). During the high growth years of 2003 – 2015, the contribution of TFP growth

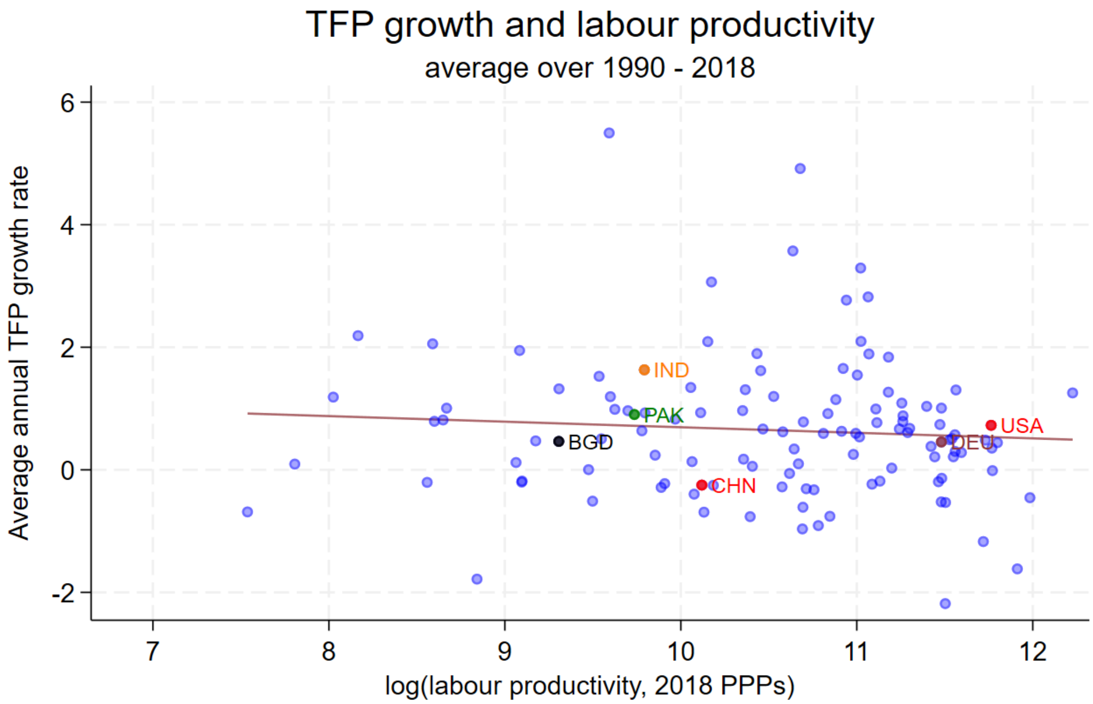

Figure 13: The figure shows the relationship between average TFP growth and the log of labour productivity across countries. These are calculated using data from PWT 10.01 database.

to the overall economic growth for India was about 23%. Figure 13 plots annual TFP growth for the period 1990-2018 across countries. While there are countries which have experienced an average TFP growth of 2% or higher, average TFP growth in Pakistan is comparable to the rest of the world.

This begs an important question: if Pakistan is comparable to the rest of the world and many of the fast-growing economies when it comes to the TFP growth then what explains the low growth in labour productivity in Pakistan? After all, labour productivity in almost all the economies we considered in section 4 increased by significantly more than what we see for Pakistan. We now turn to answering this question.

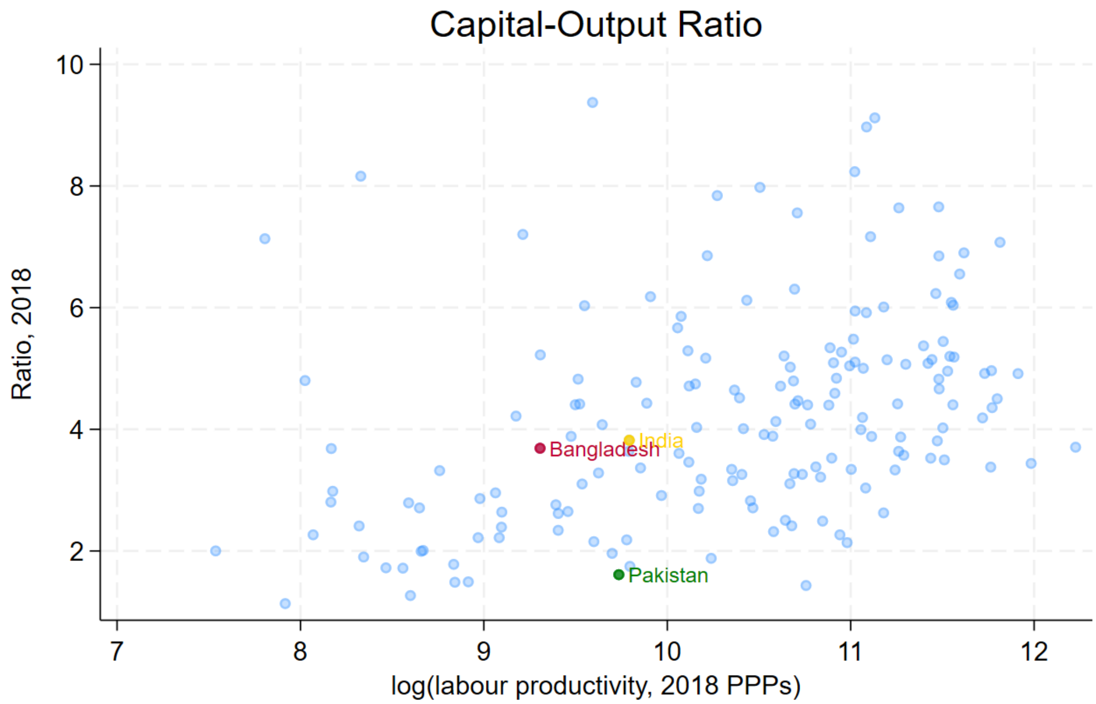

Figure 14: The figure shows that the capital-output ratio is one of the lowest for Pakistan when compared with the rest of the world.

5.2 Capital deepening and human capital accumulation

Figure 14 plots a scatter plot with capital-output ratio on the vertical axis and (log of) labour productivity on the horizontal axis for countries across the world and for the year 2018. What stands out is that the capital-output ratio for Pakistan is one of the lowest in the world. The same for India and Bangladesh is almost twice that of Pakistan. Importantly, even for similar levels of labour productivity, Pakistan exhibits lowest capital-output ratio. The figure also shows an upward trend in capital-output ratio as countries become richer.

Unlike several other developing economies, both capital-output ratio and human capital per worker have acted as a drag on Pakistan's labour productivity. Figure 15 plots how these have changed over time. The left panel of the figure plots the trend in capital-output ratio. In the case of Pakistan, the capital-output ratio has decreased from the peak of 3 at the end of 1970s to only 1.61 in 2018. In contrast, for the regional economies, the ratio has either increased or remained stable during this period. These results suggest that, unlike Pakistan, capital deepening has been an important part of the growth story for these economies. The critical question to ask here is what has prevented capital deepening in Pakistan? More precisely, what factors have disincentivised the similar increase in investment in Pakistan relative to what we observe across regional economies? Pirzada (2023) points to higher level of macroeconomic uncertainty as the primary reason for this trend.

The panel to the right of figure 15 plots the human capital index which is taken from PWT and is constructed using data on average years of schooling from Barro and Lee (2013) and an estimate for the rate of return on education based on Psacharopoulos (1994). Generally, while the level of human capital has increased in Pakistan, it has continued to remain below that of regional economies for almost all this period.

	Labour productivity, $\frac{Y}{L}$ constant 2017 PPP $	**Capital-Output ratio, $\frac{K}{Y}$**	**Human capital index, $\frac{H}{L}$**	**Variation in $\frac{Y}{L}$ due to inputs**
Pakistan	17,050	1.61	1.77	6.22
China	24,682	4.71	4.71	37.74
India	18,122	3.81	2.15	55.02
Bangladesh	11,106	3.68	3.69	79.57
Sri Lanka	34,396	2.83	2.86	33.16
Viet Nam	12,754	2.64	2.82	92.19
South Korea	79,685	5.07	3.72	49.21
Egypt	46,509	1.43	2.64	84.52
Turkey	78,785	4.42	2.48	70.09

Table 1: The second column reports data on labour productivity after adjusting for differences in prices across countries. The third and the fourth column reports data on input components of labour productivity as in equation 4. Finally, the last column reports how much of the variation in labour productivity is explained by variation in factor inputs, $\left(\frac{K_t}{Y_t}\right)^{\frac{\alpha}{1-\alpha}}\frac{H_t}{L_t}$.

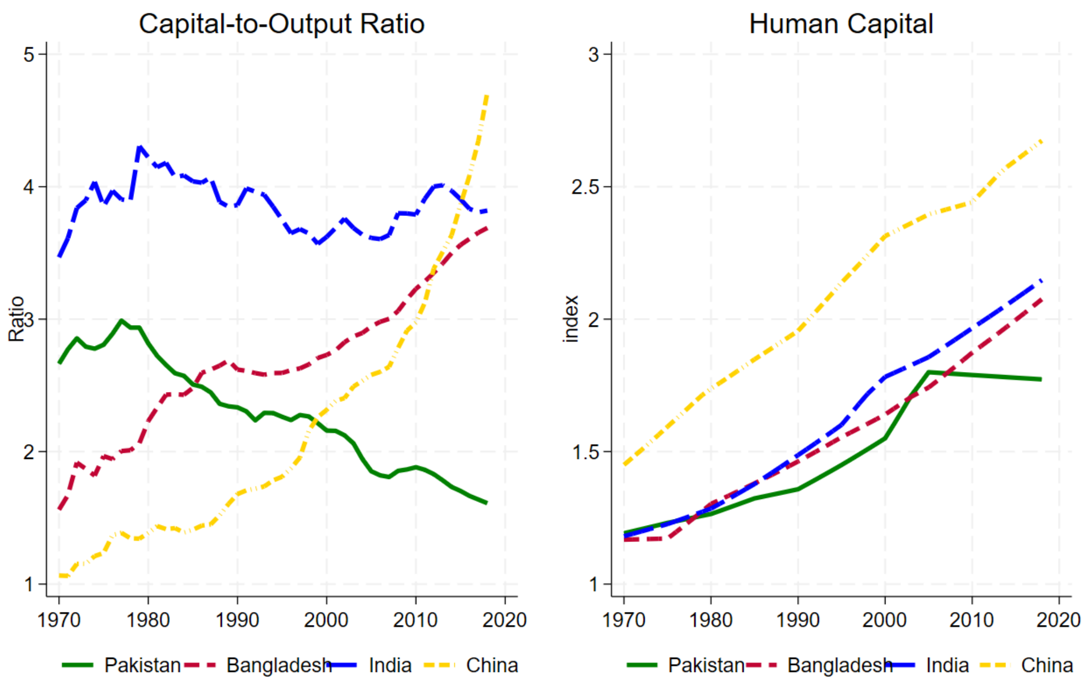

Figure 15: The figure shows how the input-determinants of labour productivity in equation 4 have changed over time. The left panel plots data for K_t/Y_t whereas the right panel plots data for H_t/L_t index.

Section 5.1 suggested that almost all the variation in labour productivity is explained by variation in TFP growth. We now quantify that claim. In other words, we ask how much of the variation in labour productivity is explained by both the variation in capital-output ratio and human capital per worker. For context, it is generally understood that a significant fraction of growth in labour productivity in developing countries comes from the growth in factor inputs i.e. both physical and human capital. In contrast, in the later stages of development, countries must rely more and more on improvements in TFP to achieve further improvements in labour productivity.

The last column of Table 5.2 reports statistics on how much of the variation in labour productivity can be explained by the variation in the input index for the period between 1980 − 2019. The input index captures both capital-output ratio and human capital and takes the form, $\left(\frac{K_t}{Y_t}\right)^{\frac{\alpha}{1-\alpha}}\frac{H_t}{L_t}$. Unsurprisingly, capital accumulation explains only 6.22% of the fluctuation observed in labour productivity in Pakistan. This suggests that the remaining 93.78% is explained by variation in TFP growth. The only other country in the list which comes close to Pakistan is the United States. However, the statistic for the US is not surprising. Since the US already has one of the highest levels of labour productivity, any further improvements in labour productivity are most likely to come from improvements in TFP. In contrast, the statistic for Pakistan is concerning. Despite having labour productivity which is only 13% of that of the US, variation in factor inputs does not explain much of variation in labour productivity.

In contrast, all the regional economies saw both physical and human capital as an important driver of changes in labour productivity over the past four decades. On the other extreme, almost all the variation in labour productivity for Viet Nam is explained by the variation in the input index. Within South Asia, all the four countries included in the table saw capital accumulation explaining more than 30% of the variation in labour productivity. Inklaar and Timmer (2013) use PWT 8.0 dataset to show that the average for the world has been close 35% for the period between 1980 − 2011.

Understanding why capital-to-output ratio has been falling in the case of Pakistan even when TFP growth is comparable to the rest of the world is critical for understanding the trend in labour productivity and designing policies to address it. However, we leave this for future research.

6 The challenge of misallocation of resources

Section 4 argued that one of the reasons for limited economic transformation in the case of Pakistan is the dismal performance in terms of improving its labour productivity both at the aggregate level and across sectors relative to other fast-growing economies. But is this the only reason for the lack of economic transformation? In this section, we explore if the misallocation of resources across sectors can itself explain the phenomenon of missing transformation in Pakistan. For example, government policies such as regulatory barriers, fiscal incentives, and trade protection may allow some sectors to consume resources by more than what is considered economically efficient. Alternately, frictions in the labour market may prevent labour from moving from less productive to more productive sectors. Market failures such as frictions in credit markets can also prevent some sectors from growing to the level which is efficient.

We focus on looking at data for the level of labour productivity and wages across sectors and ask to what extent frictions in the labour market or elsewhere in the economy may prevent economic transformation in Pakistan. The answer to this question can have significant implications for policymakers. If it is the frictions in labour market then the focus of policymakers must turn to reforming labour laws, providing affordable housing in urban area, improving public transport, expanding social security, and other such measures which may be important for facilitating the reallocation of labour from one sector (or region) to another. Pirzada (2023) uses data from the labour force survey to suggest that this may be an important factor preventing economic transformation in the case of Pakistan. However, if it turns out that labour mobility is not a critical issue then the focus must shift to other places. For example, protection from external competition through tariff and non-tariff measures can allow some sectors to grow beyond the efficient level. Likewise, agriculture support prices and restrictions on land use for certain economic activities can also result in the same.

6.1 Theoretical motivation

We start with outlining the relevant theory before using data to undertake the analysis. Consider a Cobb-Douglas production function for sector i which takes the following form,

$$Y_i = K_i^{\alpha_i} \left(A_i L_i \right)^{1-\alpha_i} \tag{5}$$

where Y_i is output, K_t is capital, L_i is labour, and A_i captures labour augmenting productivity for sector i. α_i is the sector-specific output elasticity of capital and, under the assumptions stated below, equals the share of income going to capital.

We assume that both goods and factor markets are perfectly competitive. As a result, prices equal marginal costs, and the wage rate and the rental rate of capital equals the marginal revenue product of labour and the marginal revenue product of capital, respectively. In absence of any frictions which may prevent labour from moving from one sector to another, wages per unit of labour must also be similar across all sectors. This is because, under the assumption of perfect labour mobility, whenever wages are higher in one of the sectors, labour will relocate to this sector until wages are once again equal across sectors. Later, we look at the data on wages to analyse the extent to which this assumption is true. This will inform us if it is the frictions in the labour market which explain the limited economic transformation in Pakistan.

One can use the expression for the production function in equation 5 to obtain an expression for sector-specific labour productivity, VA_i/L_i,

$$
\begin{aligned}
\frac{Y_i}{L_i} = \frac{1}{1-\alpha} MPL_i &= \frac{1}{1-\alpha_i}\frac{w_i}{p_i} \\
\frac{p_i Y_i}{L_i} &= \frac{1}{1-\alpha_i} w_i \\
\frac{VA_i}{L_i} &= \frac{1}{1-\alpha_i} w
\end{aligned}
\tag{6}
$$

where MPL_i is the marginal product of labour, p_i is the price of goods produced in sector i in terms of the aggregate consumption basket, and w is the real wage rate. VA_i is the value-added produced in sector i and $1/(1-\alpha_i)$ is the inverse of the labour share in value-added for the sector. The last expression says that, under the assumptions stated above, labour productivity in any given sector must depend on the production technology and the wage rate per unit of labour.

This sets our benchmark. If labour productivity is indeed different across sectors, then it must be due to one of the following reasons,

1. Differences in production technology such that some sectors are relatively more or less capital intensive than others;

2. Differences in wages per unit of labour across sectors due to imperfect labour mobility;

3. Distortions from government policies and market failures which lead to some sectors producing more or less than what is economically efficient.

The emphasis on *per unit of labour* in (2) is important. Even under the assumption of perfect labour mobility, wages can still differ across sectors due to differences in the composition of skilled and unskilled labour in production. However, wages per unit of labour (after adjusting for differences in human capital) must be similar under perfect labour mobility.

What do (1), (2), and (3) tell us about the (mis)allocation of resources across the economy? If labour productivity differs across sectors due to differences in production technology, there is no reason to suspect misallocation of resources. However, if differences in labour productivity are due to (2) or (3) then these do indeed point to the misallocation of resources across sectors. Specifically, differences in wages per unit of labour point to imperfect labour mobility as the primary factor driving both the difference in wages and labour productivity across sectors. Policies which remove relevant frictions and increase labour mobility will then facilitate both economic transformation and improve overall productivity in the economy. Alternately, in the case of (3), reasons such as trade restrictions, regulatory barriers, fiscal incentives and other such policies instituted for political economy reasons may incentivise production in some sectors beyond what is considered economically efficient. Market failures, especially in the credit markets, can also be critically important. Hsieh and Klenow (2009) show how distortions in general can result in misallocation of resources across firms. They show how these affect the value of the marginal product of labour and capital across firms even when they face the same wage and rental rate of capital, and have the same production technology, α.

6.2 Taking theory to data

We now turn to data to discuss which of these possibilities is more likely to be true in the case of Pakistan. We follow the literature and rewrite equation 6.1 in the form of productivity gap such that,

$$Gap\left(\frac{VA_i}{L_i}\right) = \frac{Gap(w_i)}{Gap(LS_i)} \tag{7}$$

where $Gap(.)$ represents the ratio between the sector-specific and the aggregate value for a given variable. For example, $Gap(VA_i/L_i)$ is the ratio of labour productivity in sector i and the aggregate economy. This is also true for $Gap(LS_i)$ and $Gap(w_i) where LS_i$ is the share of labour income in the value-added for sector i, $1 - \alpha_i$.

The discussion above implies that, under perfect labour mobility and no difference in human capital across sectors, $Gap(w_i)$ must equal 1 for all sectors. In other words, wages must be similar across sectors such that there is no gap between the wage rate in sector i and the average wage rate in the economy, $Gap(w_i) = 1$ for all i. If this is indeed the case, then all the variation in $Gap(VA_i/L_i)$ should only result from variation in $Gap(LS_i)$. However, if variation in both $Gap(w_i)$ and $Gap(LS_i)$ cannot explain the observed variation in $Gap(Y_i/L_i)$, we have reason to believe that differences in labour productivity across sectors is due to factors such as regulatory barriers, trade protection, and fiscal incentives due to political economy reasons. Additionally, the differences may also be due to market failures which affect some sectors more than others and measurement issues in data.

We now turn to data. First, we consider the extent of misallocation across all the sectors of the economy. Second, we focus exclusively on the extent of misallocation in a two sector economy with agriculture as one sector and non-agriculture as another sector.

6.2.1 Misallocation across the economy

For calculating productivity gaps across sectors, we use data on value-added and people engaged in each sector from the ETD database. Figure 16 plots data on labour productivity gap across sectors for the year 2018. A ratio of less than one indicates that labour productivity for the sector is less than the average labour productivity for the economy. In contrast, a ratio greater than one means that labour productivity for the sector is greater than the average labour productivity. It is clear there are significant differences in labour productivity across sectors. Labour productivity in *construction*, *agriculture* and *manufacturing* is less than the aggregate labour productivity for the country. However, labour productivity in *finance*, *business*, *mining*, and *real estate* is considerably higher. To quantify how much the productivity gap varies across sectors, we calculate the *coefficient of variation* which equals the standard deviation divided by the mean for the sample. However, before we do that, we combine the *finance*, *business* and *real estate* sectors to have a corresponding sector which maps to *financing, insurance, real estate and business services* sector for the wage gap. We also combine the *government* and *other* sectors to have a corresponding sector which maps to *community, social and personal services sector.* We find the coefficient of variation to equal 1.16.

We now analyse data for the wage gap. Specifically, we want to quantify the variation in wage gap observed across sectors. Later, we also comment on the extent to which some of the wage gap could potentially be explained by differences in human capital. However, without sector specific data on human capital per worker, the discussion on the role of human capital remains speculative. We use wage data from the 2020-21 Labour Force Survey for Pakistan to calculate wage gap across sectors. For sectors, the survey only reports data on annual income for self-employed. The survey also reports data on hours worked per week for the self-employed across sectors. However, data on hours worked is reported for 20 sectors whereas that for annual income is reported for only 9 sectors. We map the 20 sectors to the 9 sectors as closely as possible and take averages to find hours worked for each of the 9 sectors. We then use data on annual income and hours worked to calculate income per hour (our measure for wage). Finally, we use data on income per

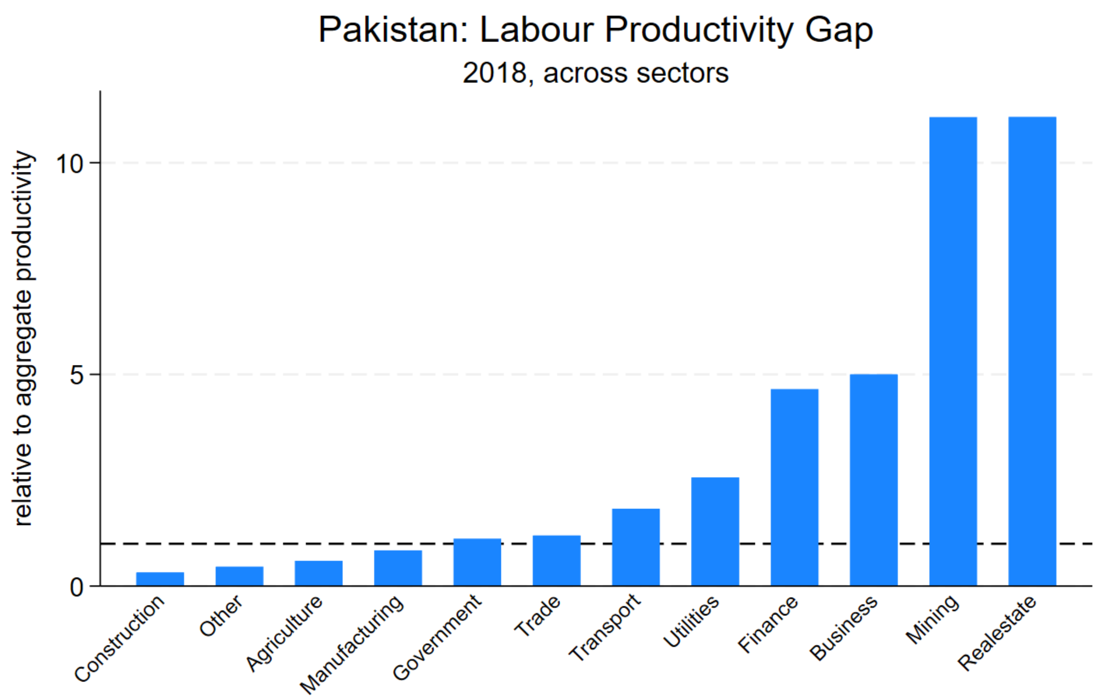

Figure 16: The figure plots labour productivity gap across sectors for Pakistan. Productivity gap for sector i is defined as the ratio of labour productivity for sector i and that for the aggregate economy. A ratio of 1 (dash line) shows that labour productivity for sector i is similar to labour productivity for the aggregate economy.

hour across sectors and income per hour at the aggregate level to calculate wage gap across sectors.[3]

Figure 17 reports the results. As in the case of productivity gap, a ratio of less than one indicates that the hourly wage for the sector is less than the average hourly wage for the economy. In contrast, a ratio greater than one means that the wage for the sector is greater than the average wage. The figure shows that wages across 4 of the 9 sectors are comparable

[3]Our measure for wage is far from perfect. The annual income reported by the self-employed may also include income from capital if the self-employed individual is also the investor in their business. This would be less of a problem if fraction of income due to capital was the same across sectors. However, this is unlikely. Future work should improve on our measure for wage across sectors and see the extent to which the conclusions in this section continue to hold.

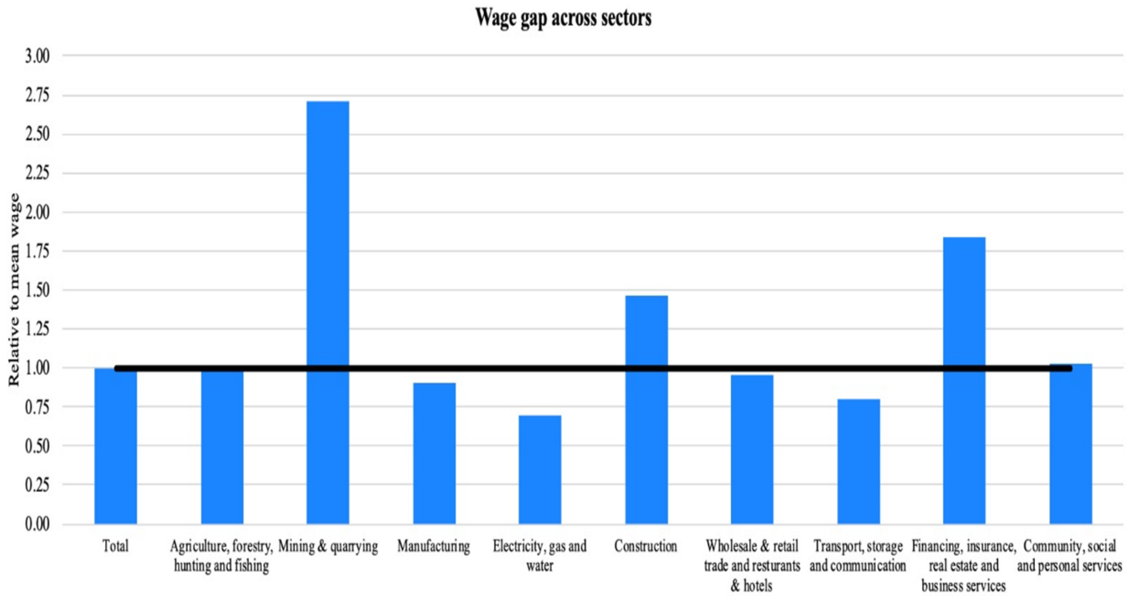

Figure 17: The figure plots wage gap across sectors for Pakistan. Wage gap for sector i is defined as the ratio of hourly wage for sector i and that for the aggregate economy. A ratio of 1 (dash line) shows that hourly wage for sector i is similar to hourly wage for the aggregate economy.

to the average wage in the economy. In the other five sectors, wage gap is close to 2.75 for *mining & quarrying*, 1.8 for *financing, insurance, real estate, and business services*, 1.5 for *construction*, and about 0.75 for both *electricity, gas and water* and *transport, storage, and communication*. To quantify how much the wage gap varies across sectors, we calculate the coefficient of variation as before. We find the coefficient of variation to equal 0.52.

The coefficient of variation for the wage gap is almost half that for the productivity gap. Moreover, some of the variation in wage gap can be further explained by differences in human capital per worker across sectors. For example, the human capital per worker in the *financing, insurance, real estate, and the business services* sector is most likely higher than the average level of human capital per worker across the economy. As a result, a significant fraction of the wage gap for the sector may be explained by differences in human capital. Differences in human capital could also explain the low levels of wage gap for both the utilities and the transport sectors. These sectors are likely to employ workers who possess less human capital than the average worker in the rest of the economy. While the discussion on human capital remains speculative, this will nonetheless lower the variability in the wage gap depending on the extent to which workers possess more human capital in the financial services sector and less so in utilities and transport.

The above discussion rules out frictions in the labour market as the predominant reason for differences in labour productivity across sectors. But what about differences in production technology across sectors? To understand the extent to which differences in production technology can explain differences in labour productivity, we use the values for the labour share across the sectors, $(1 - \alpha_i)$, from Inklaar et al. (2023) except with one change. Inklaar et al. calculate the share of labour, $(1 - \alpha_i)$, for the median economy for the agriculture sector to only equal 0.21. This is due to a significantly large share of land in total income – at 0.47. However, they also point to significant uncertainty around the share of land which ranges from 0.29 at the 25th percentile to 0.67 at the 75th percentile. Considering this uncertainty, we revise the labour share upwards from 0.2 to 0.4 to come closer to what is reported in the rest of the literature (see section 5.2 in Herrendorf and Schoellan, 2015). The coefficient of variation for $Gap(LS_i)$ equals 0.38.

The coefficient of variation for both the wage gap and the gap in production technology suggests that differences in wages and production technology across sectors cannot on their own explain the observed differences in labour productivity. However, what about the two together? To answer this question, we calculate the value for the expression to the right of equation 7 for each sector. We call this *adjusted* wage gap i.e., adjusted for differences in production technology. We then calculate the coefficient of variation as before and compare it with the coefficient of variation for the productivity gap.

Interestignaly, the coefficient of variation for the adjusted wage gap equals 1.19 which

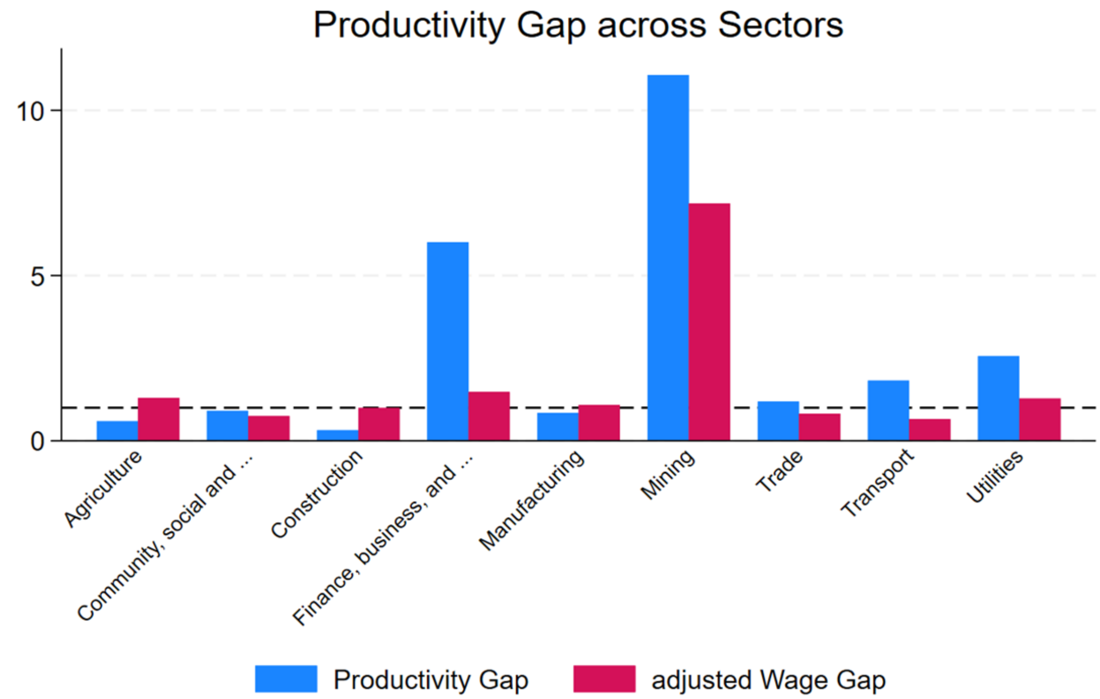

Figure 18: The figure plots the labour productivity gap and the *adjusted* wage gap across the nine sectors for which wage data is available. The *adjusted* wage gap for each sector is similar to the wage gap in figure 17 except that it has been multiplied by $\left(\frac{1-\bar{\alpha}}{1-\alpha_i}\right)$ where $(1-\bar{\alpha})$ is the labour share for the aggregate economy.

exactly equals the coefficient of variation for the productivity gap for our 9-sector economy. Figure 18 plots the productivity gap and the adjusted wage gap across sectors. While the two are not exactly similar, the differences are significantly smaller compared to when wages are not adjusted for differences in technology. A further adjustment for human capital can potentially reduce the differences between the productivity gap and the adjusted wage gap even further. This is most likely to be the case for finance, business, and other services and possibly mining.

The lack of evidence for misallocation across the economy does not necessarily mean that this was always the case. Figure 19 shows how the dispersion in labour productivity

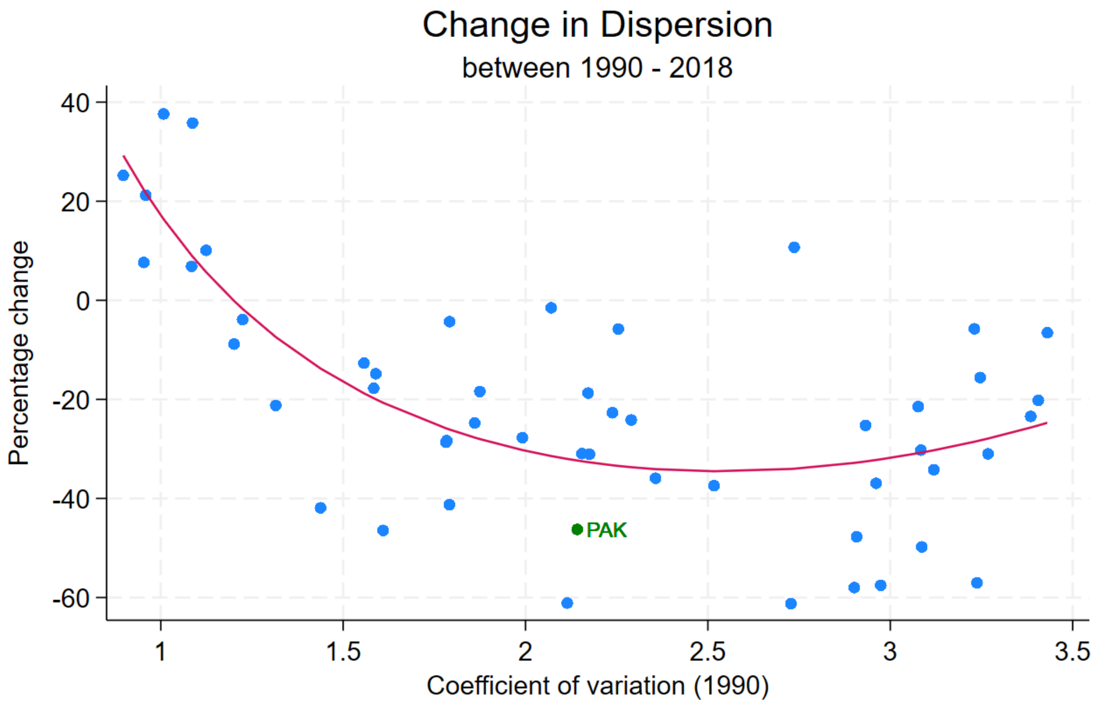

Figure 19: The figure shows how the dispersion (coefficient of variation) in labour productivity has changed for each country between 1990 - 2018. The coefficient of variation is calculated for each country-year as a ratio of unweighted standard deviation and unweighted mean of labour productivity across sectors.

has changed across countries since the 1990. The figure plots the coefficient of variation for labour productivity as of 1990 on the horisontal axis and the percentage change in the coefficient of variation on the vertical axis. The figure shows that countries which exhibited large variation in labour productivity across sectors also saw a large decrease in variation over subsequent decades. This is also the case for Pakistan. While the coefficient of variation for Pakistan was close to 2.2 in 1990, it decreased by more than 45% between 1990 - 2018. This suggests that the extent of misallocation across the economy has decreased over time for most countries in the ETD dataset. In section 7.1 we show that an increase in trade integration during this period is likely an important reason for this.

6.2.2 Misallocation across the agriculture and the non-agriculture sector

The literature studying differences in labour productivity across sectors has particularly focused on productivity gap in the agriculture sector. Gollin et al. (2014) find labour productivity in the agriculture sector to be significantly lower in the case of developing countries. They find this to be the case even after adjusting for differences in human capital across agriculture and non-agricultural sectors and measurement errors in data. The results in Inklaar et al. (2023) are also consistent with the "development literature arguing that there is surplus labor in agriculture." Several authors have used this as evidence to suggest that countries can be better off by reallocating resources out of the agriculture sector. For example, McMillan and Rodrik (2013) argue that reallocating labour from less productive to more productive sectors can increase the overall labour productivity for many countries.

Figure 20 uses data from the database constructed in Inklaar et al. (2023) to plot agricultural productivity gap for the 84 countries, including developed and developing countries, for the year 2017. On average, labour productivity in the agriculture sector is significantly lower relative to the national average for developing countries than it is for developed countries. Likewise, labour productivity in the agriculture sector is one of the lowest in Pakistan when compared with the rest of the world.[4]

We now consider the extent to which differences in labour productivity between the agriculture and the non-agriculture sector can be explained by frictions in labour market or differences in production technology. Specifically, we repeat the exercise in the previous section. To do so, we reduce the number of sectors in the previous section from nine to

[4]In figure 20, agriculture productivity gap for Pakistan is greater (i.e. further away from 1) than what we get from the ETD database. This is because data in Inklaar et al. (2023) adjusts for differences in prices both across sectors and across countries thus allowing for better cross-country comparison. In contrast, the ETD database includes data going back to 1990 which allows for detailed analysis over time.

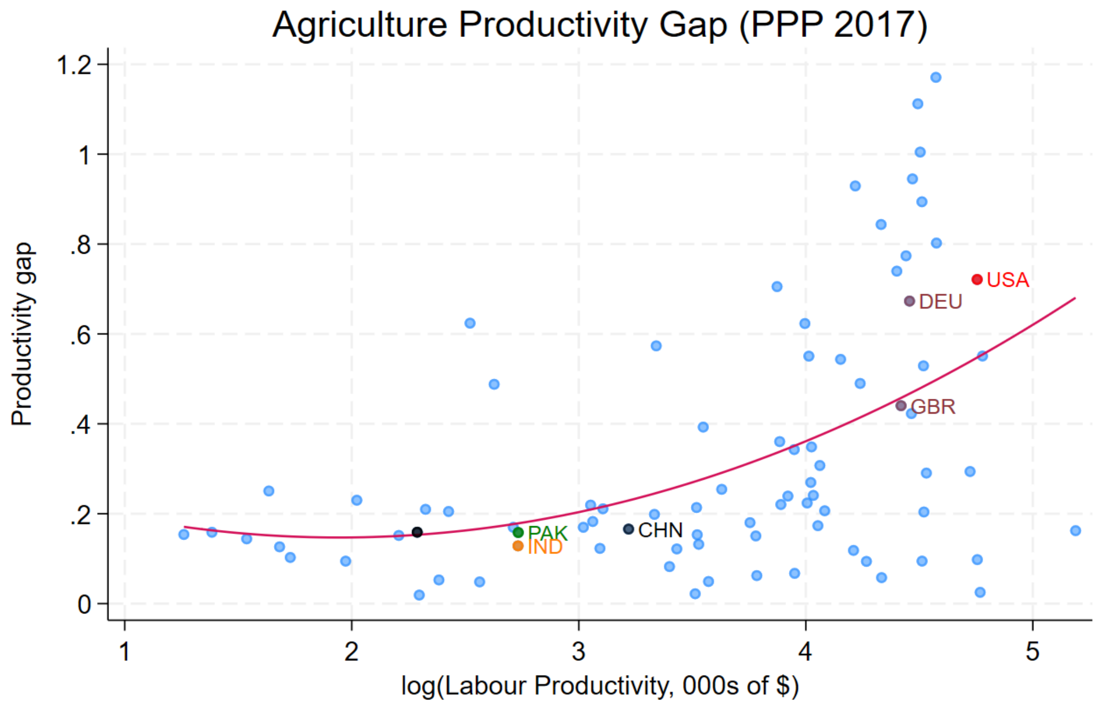

Figure 20: The figure plots labour productivity gap in the agriculture sector for each country against the log of its labour productivity for the year 2017. The figure uses data from Inklaar et al. (2023) dataset which extends the ETD database to OECD countries and also provides data on sectoral PPPs.

two. One of the nine sectors include agriculture. For the non-agriculture sector, we take a weighted average of productivity and wage gaps for the remaining eight sectors. The weights are based on employment share for each of the sector taken from the ETD database. We find that wages in agriculture sector equal 94% of that in the non-agricultural sector. In contrast, labour productivity in the agriculture sector is only 47% of that in the non-agriculture sector. In absence of distortions such as those due to government policies and market failures, explaining the difference in labour productivity between the agriculture and the non-agricultural sectors will require the labour share of income in the agriculture sector to be twice that of the share in non-agriculture sector. However, if anything, Herrendorf and Schoellan (2015) report the labour share for the agriculture sector to be less than that for the non-agriculture sector. Studies focusing on developing economies such as those cited in Herrendorf and Schoellan find the labour share to equal 0.4. Inklaar et al. (2023) estimate the labour share in total income to be even lower at only 0.21.

Figure 21 uses data from the ETD database and plots how the agriculture productivity gap has changed between 1990 - 2018 across countries. The negative value implies that the agriculture productivity gap has decreased, whereas a positive value implies that the agriculture productivity gap has increased. The figure shows considerable heterogeneity in how agriculture productivity gap has changed over time across countries. In the case of Pakistan, agriculture productivity gap has stayed almost unchanged over this period. This suggests that the misallocation across the agriculture and the non-agriculture sector continues to persist. In contrast, in the pervious section, we found that the misallocation across the economy had decreased considerably over the similar period.

The evidence presented above suggests that there is significant misallocation of resources across the agriculture and the non-agriculture sector. We rule out that the productivity gap between agriculture and non-agriculture is due to differences in production technology or due to frictions in the labour market. Instead, government policies which continue to incentivise production in the agriculture sector and market failures such as frictions in the credit market which are understood to affect the manufacturing sector more than the non-manufacturing sector are key to understanding the overallocation of resources in the agriculture sector. In absense of these barriers, the share of labour in agriculture would have declined by more than it did and, as a result, the increase in labour productivity due to the reallocation effect would have been significantly higher. We conclude that misallocation across the agriculture and the non-agriculture sector play an important role in hindering structural transformation in the case of Pakistan.

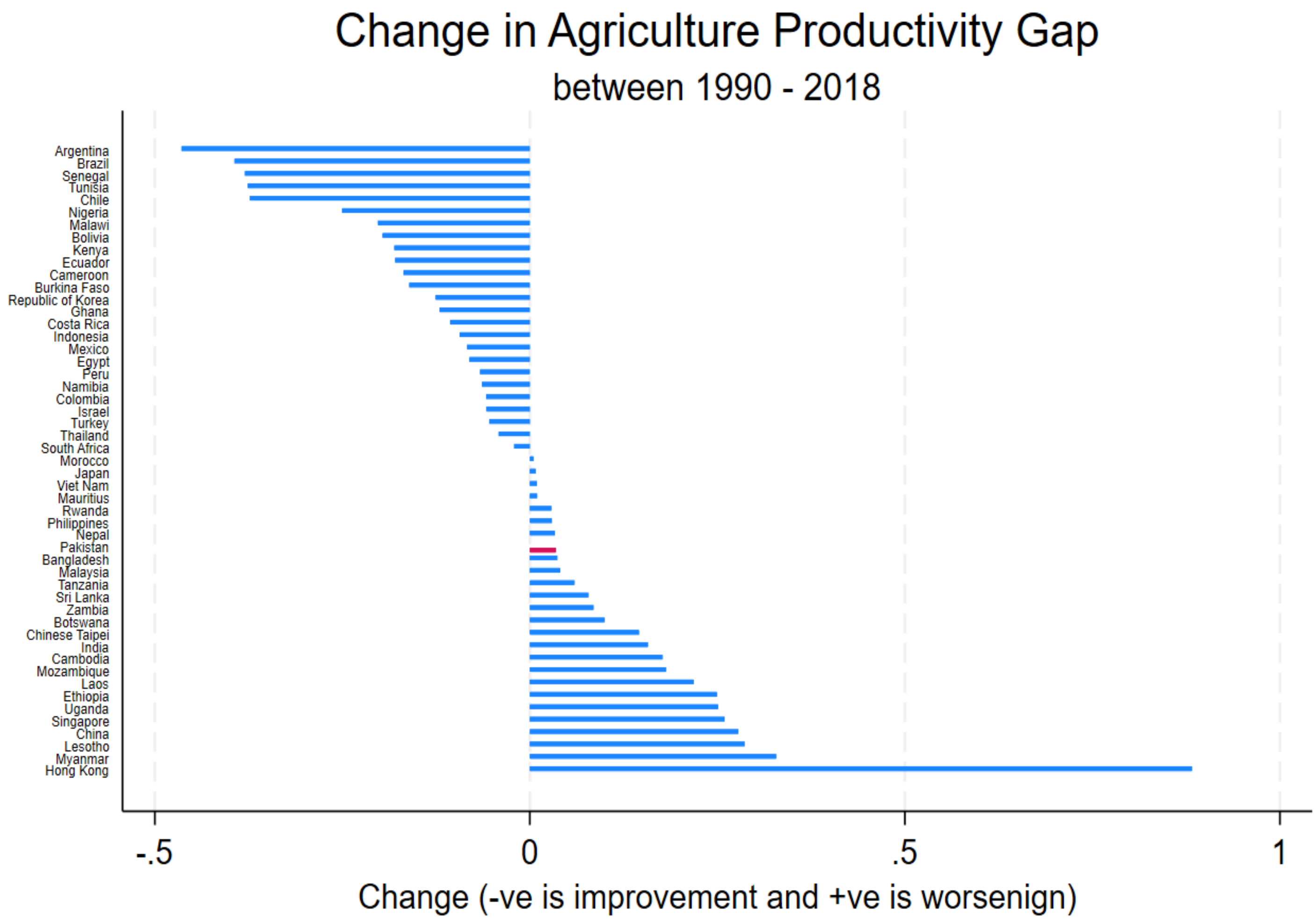

Figure 21: The figure shows how labour productivity gap for the agriclture sector has changed (absolute) between 1990 - 2018. In almost all cases, a negative value means the agriculture productivity gap has decreased i.e., labour productivity in agiculture sector has converged to the national average.

7 GVCs: Trade integration and productivity

The discussion around structural transformation in previous sections has abstracted from any serious discussion on the role of international trade in the transformation process. In the presence of international trade, production is no longer tightly linked with domestic consumption. Instead, countries' comparative advantage becomes an important factor in determining the structure of the economy. A country with comparative advantage in the non-agriculture sector will see transformation happening at a much faster rate when it opens up its economy to international trade. Alternately, a country with comparative advantage in agriculture may find it difficult to reallocate resources from agriculture to non-agriculture sectors even when the increase in income levels at home result in a disproportionately large increase in the domestic demand for non-agriculture goods than for agriculture goods.

The discussion on international trade as a mechanism for structural transformation is important for Pakistan as it continues to protect its dominant sectors from international competition. Varela et al. (2020) document the high levels of effective tariff protection which most of the dominating sectors enjoy in Pakistan. These range from agricultural products, processed food, textiles, automobiles, manufactures n.e.c. and others. Table 2 reproduces the table from the EAG Vision Document which gives the effective rate of protection for various production sectors from Varela et al. (2020). Malik and Duncan (2022) show that trade protection in Pakistan has increased to the same levels as last observed in the year 2000.

In what follows, we start with showing that barriers to international trade are important for understanding the extent of misallocation across the economy. We then document Pakistan's lack of openness to international trade and its limited participation in Global Value Chains (GVCs). Finally, we ask if an increase in participation in GVCs can increase

Sectors	Effective Rate of Protection, 2019
Dairy Products	165%
Sugar	123%
Food products n.e.c.	245%
Beverages and tobacco products	167%
Textiles	77%
Wearing apparel	185%
Leather products	77%
Wood products	76%
Petroleum, coal products	79%
Motor vehicles and parts	143%

Table 2: Effective Rate of Protection across Sectiors (Source: Varela et al., 2020)

overall productivity in the economy and facilitate the transformation process.

7.1 Trade barriers and misallocation

We start with establishing an empirical relationship between the extent of misallocation across the economy and a country's participation in GVCs. The two measures of misallocation were discussed in detail in section 6. Specifically, the two measures include the dispersion of labour productivity across sectors and the agriculture productivity gap. We define GVC participation as the sum of foreign value-added in home exports (backward linkage) and the home value-added in foreign exports (forward linkage) divided by home gross exports.

The measure for GVC participation is calculated for each country using data from the

UNCTAD-Eora GVC database. The Eora database includes data on 190 countries for the period from 1990 to 2018. However, since the ETD database only includes data for 54 countries, we are left with a panel of 45 countries for the period 1990 - 2018. We use the panel data to estimate the following two-way fixed effect model,

$$Y_{i,t+h} = \alpha + \mu_i + t + GVC_{i,t} + \epsilon_{i,t} \tag{8}$$

where $Y_{i,t}$ is one of the two measures of misallocation, $GVC_{i,t}$ is the measure for GVC participation, μ_i is the country fixed effect, t represent time dummies, and $\epsilon_{i,t}$ is the i.i.d. error term. We estimate this model for each of the two measures of misallocation and over the horizon, h, from 0 to 10. Figure 22 plots the response of the dispersion in labour productivity (left) and the agriculture productivity gap (right) to a one percentage point increase in GVC participation at each of the horizon from 0 to 10.

The figure shows that an increase in GVC participation decreases both the extent of misallocation across the economy and the misallocation between the agriculture and the non-agriculture sectors. While the contemporaneous effect of GVC participation on misallocation is small, the cumulative effect is quantitatively significant. A one percentage point increase in GVC participation today decreases dispersion in labour productivity and agriculture productivity gap by 0.15 and 0.03 points, respectively, over a 10 year period. For dispersion in labour productivity, this is equivalent to a reduction in misallocation which is 9.9% of the mean dispersion for the year 2018. Likewise, for agriculture productivity gap, this is equivalent to a reduction in misallocation which is 5.9% of the mean agriculture productivity gap for the year 2018.

The discussion in this section makes clear how barriers to international trade can exacerbate the extent of misallocation in the economy. This is true both when we consider

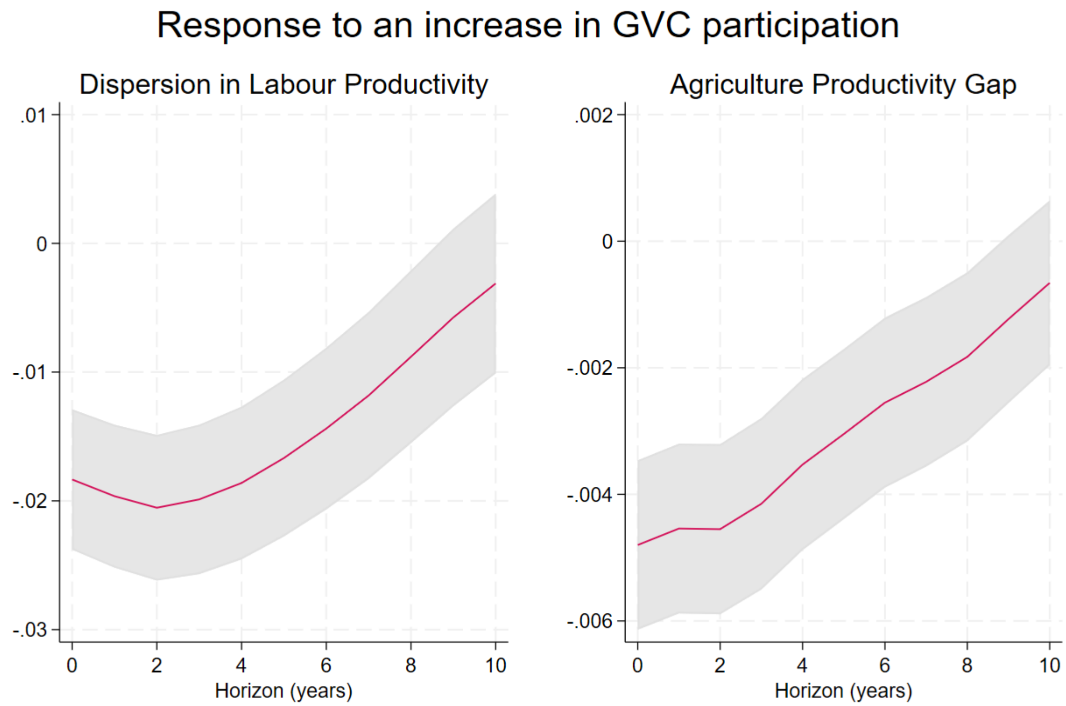

Figure 22: The figure shows how the dispersion in labour productivity across sectors (left) and the agriculture productivity gap (right) responds to an increase in GVC participation at different horizons.

misallocation across the economy or when we restrict our attention to misallocation across the agriculture and the non-agriculture sectors.

7.2 One of the least integrated economies

We now turn our attention to how Pakistan compares with the rest of the world in terms of trade openness and integration in GVCs. Throughout, we report results both for the export and the non-export sectors. We use data from Asian Development Bank's Multiregional Input Output (MRIO) database to calculate the level of GVC participation and the GVC position for each country. While this data is only available for 62 countries and is limited to the period 2007 - 2022, it has the advantage as it covers 35 sectors compared to the 26 sectors in the EORA MRIO database. Since we make a distinction between the export and the non-export oriented sectors, ADB data is more appropriate for our purpose in this section.

Before proceeding with the analysis, we define few concepts which are useful to keep in mind. The GVC participation rate is calculated as the sum of foreign value-added in home exports (backward linkage) and the home value-added in the exports of other countries (forward linkage) divided by home gross exports. The GVC position is calculated as the difference in forward participation and backward participation, where countries reporting a positive value participate in GVCs more through the forward linkages than through the backward linkages. The export-oriented sectors are defined as sectors that account for more than 10 percent of the share of a country's exports. For example, the textile sector is considered export-oriented in the case of Pakistan as, on average, it accounts for more than 10 percent of the country's total exports between 2007 – 2022.

Figure 23 plots the scatter plot with GVC participation on the horizontal axis and GVC position on the vertical axis. The figure plots this for both the export and the non-export oriented sectors for each country for the year 2022. The observations for Pakistan are marked in green. The figure makes clear the negative correlation between GVC participation and GVC position across countries. In words, higher GVC participation is associated with higher backward integration. This is true both for the export and the non-export oriented sectors. In the case of Pakistan, the GVC position is close to zero thus suggesting similar degree integration both in terms of forward and backward linkages.[5] However, the low levels of GVC participation points to Pakistan being one of the least integrated econ-

[5]The Eora dataset suggests otherwise. In Eora, the level of forward linkage is significnalty higher relative to the level of backward linkage for Pakistan.

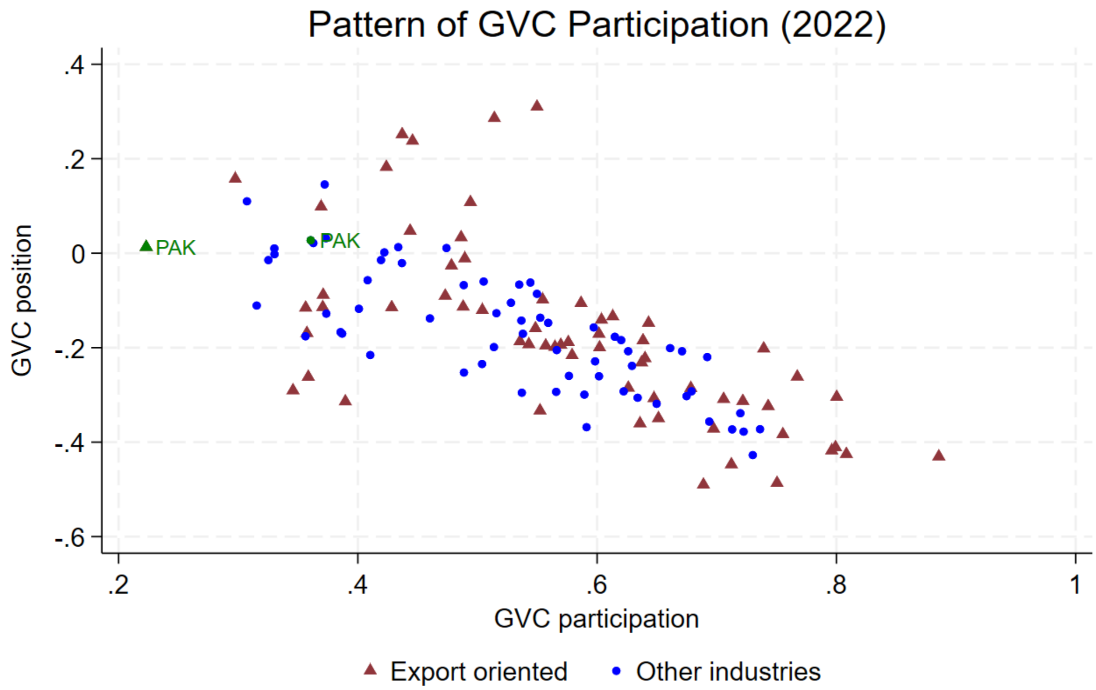

Figure 23: The figure shows the cross-country relationship between GVC participation and GVC position for the year 2022. The red triangles show this for the export oriented sectors whereas the blue circles show this for the non-export oriented sectors. GVC position is the difference in the measures for forward integration and backward integration.

omy in the dataset. Interestingly, the level of GVC participation is lower for the export oriented sector relative to the non-export oriented sector.

Figure 24 plots a scatter plot between the two measures for GVC integration and trade openness. There is a clear positive correlation between GVC participation rate and trade openness and a negative correlation between GVC position and trade openness. Countries that are more open to trade are not only more likely to participate in GVCs but their GVCs are likely to be dominated by backward linkages. Pakistan fits well the pattern observed across countries.

Figure 25 shows how GVC participation and GVC position has changed over time

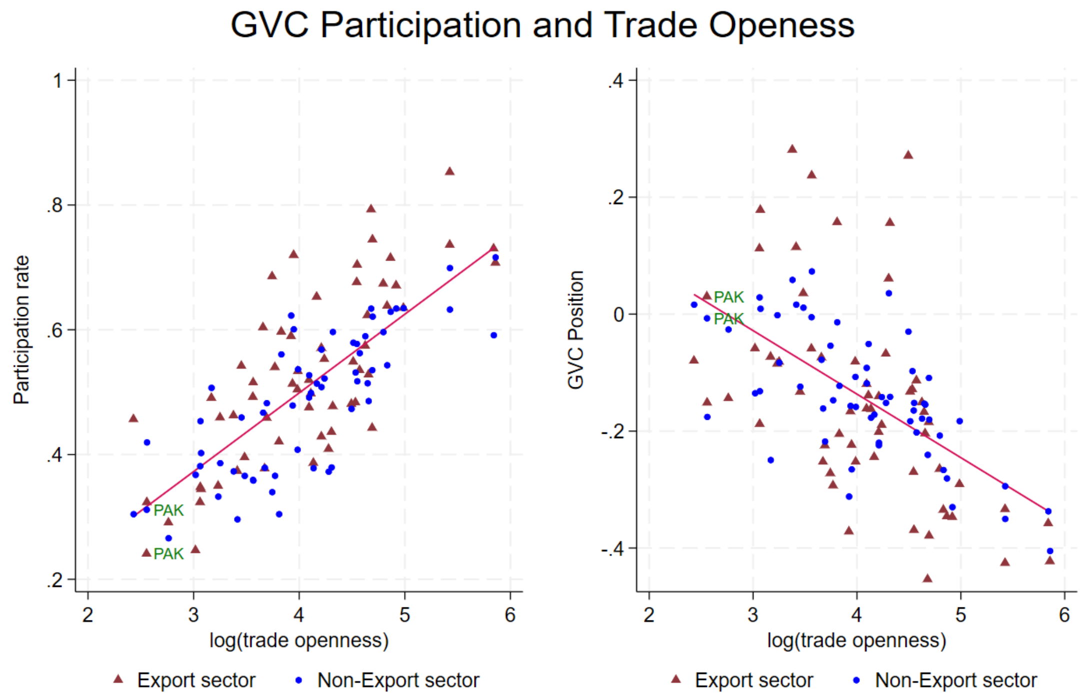

Figure 24: The figure shows the cross-country relationship between trade openness and the two measures of GVC integration i.e., GVC participation (left) and GVC position (right). The red triangles show this for the export oriented sectors whereas the blue circles show this for the non-export oriented sectors.

across several of the developing countries, including Pakistan. Once again, the figure plots this both for the export and the non-export sectors. Several facts stand out. The level of GVC participation has remained low for Pakistan throughout the period when compared with other regional economies. Worse still, and unlike other countries, the level participation is lower for the export sector and has declined further since 2011. In contrast, GVC participation for Bangladesh and Viet Nam has increased considerably during this period. At the aggregate level, GVC participation for Bangladesh increased from close to 0.22 in 2007 to close to 0.4 in 2022. The same for Viet Nam increased from less than 0.5 to close to 0.7 over the same period. GVC participation rate for Bangladesh has increased

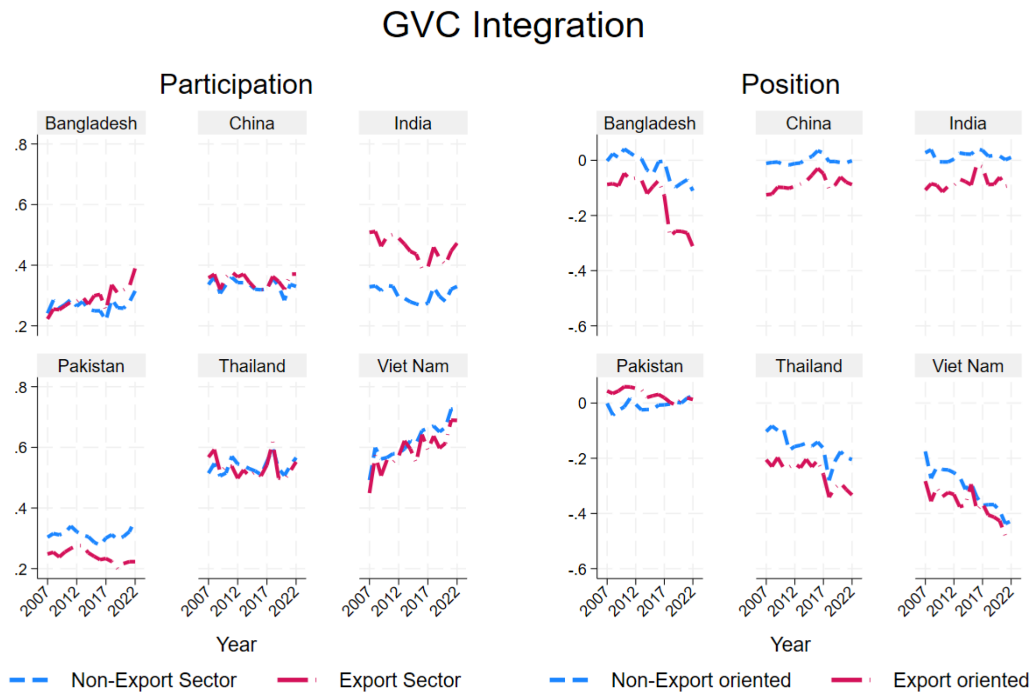

Figure 25: The figure shows how the GVC participation and GVC position has changed over time for the selected developing countries, including Pakistan. The figure shows this both for the export oriented and the non-export oriented sectors.

from a similar value to that for Pakistan in 2007 to a level comparable to China and India. The GVC participation for the other four countries has remained stable but is significantly higher than that for Pakistan. The number is close to 0.4 for both India and China whereas it is close to 0.55 for Thailand. This clearly suggests that Pakistan is a laggard in comparison to its regional counterparts when considering its participation in GVCs.

The right panel of figure 25 plots data on GVC position for similar countries. GVC position has been close to zero or slightly positive for Pakistan, except in 2019 when it turned slightly negative. For the export sector, GVC position has been positive for most of this period. In all other countries, export sector's participation in the GVC is dominated by backward linkages. The contribution of backward linkages to the export sector's GVC participation increased further for Bangladesh, Thailand, and Viet Nam. At the aggregate level, the GVC position for Bangladesh has changed from minus 0.03 to approximately minus 0.3. For Viet Nam, the number has changed from minus 0.23 to minus 0.46. This shows that the increase in GVC participation for the two countries was driven by an increase in participation through backward linkages i.e., processing imported inputs for exports. The GVC position for Thailand has also changed from minus 0.16 to minus 0.3, suggesting a change in the nature of GVC participation over this period. However, both China and India have maintained a steady GVC position of minus 0.08.

The earlier version of this paper presents further evidence on the relationshop between trade openness and the measures of GVC integrations (Pirzada et al., 2023a).

7.3 GVC participation and productivity growth

We now turn to understanding the relationship between productivity growth and integration in global value chains. To put this into perspective, we follow the exercise in Jones (2013) and calculate the output multiplier for improvements in productivity for Pakistan. Using the input-output table for Pakistan provided by the ADB, we find that a 1% increase in TFP will increase Pakistan's GDP by 2.52% over the long run. This is one of the highest amongst the group of countries for which Jones reports values for the multiplier. Additionally, the role of productivity improvements in driving transformation has already been discussed at length in previous sections and is at the core of the analysis in this paper.

Theoretically, Meza et al. (2019) show how an increase in barriers which affect firms access to intermediate inputs used in production decrease aggregate productivity. The discussion in previous section points to Pakistan being the least integrated economies thus implying significant barriers to trade. This provides motivation for the exercise in this section. More precisely, we start with considering if an increase in backward linkages will increase a country's productivity. If the low level of backward integration is due to factors other than trade barriers and instead driven by a country's comparative advantage, then backward integration *may* not affect aggregate productivity. However, if trade barriers indeed affect the level of backward integration, then we expect to find a positive relationship between backward integration and productivity. We also consider the role of forward integration which is defined as a fraction of country's exports which are reexported by the importing country to the rest of the world. However, we find that forward integration plays a limited role in improving a country's productivity and, moreover, its effect becomes insignificant once we control for international capital flows and governance quality.

To study the effect of GVC integration on productivity, we use the panel data on global value chains from the UNCTAD-Eora GVC database and the aggregate productivity data from the Penn World Table (PWT) version 10.01. The Eora database includes data on 190 countries for the period from 1990 to 2018. For this section, we prefer this to the ADB's MRIO database due to EORA's wider coverage both across countries and over time. The PWT database includes data on 183 countries for the period from 1950 to 2019. However, the PWT database only provides data on aggregate productivity for 118 countries. This is due to the missing data on capital services and labour income share. To overcome this, we use data on capital stock and assume a labour income share of 0.5 to calculate a series for TFP growth for the remaining countries.

7.3.1 Two-way fixed effects model

We estimate the following two-way fixed effects model to study the relationship between GVC participation and the current and future productivity,

$$TFP^{gr}_{i,t+h} = \alpha + \mu_i + t + \beta_1 bgvc_{i,t} + \beta_2 bgvc^2_{i,t} + \theta_1 fgvc_{i,t} + \theta_2 fgvc^2_{i,t} + \delta bgvc_{i,t} fgvc_{i,t} + \gamma X_{i,t} + \epsilon_{i,t} \quad (9)$$

where $TFP^{gr}_{i,t+h}$ is aggregate TFP growth in country i at time $t+h$ such that $h \geq 0$. $bgvc_{i,t}$ and $fgvc_{i,t}$ are our measures for backward and forward linkages in the global value chains, respectively. $X_{i,t}$ is a vector of control variables. μ_i and t are the country and time fixed effects. Finally, $\epsilon_{i,t}$ is the error term. The model allows for the interaction between forward and backward linkages and includes the quadratic terms to allow for the marginal effect to change conditional on the level of integration in the value chains. In the baseline exercise we do not control for any other variables. However, in the robustness exercise, we include different measures of international capital flows from Alfaro et al. (2014) database and governance indicators from the World Bank's governance indicators database as control variables. We show that while the results for the effect of backward integration on TFP growth are robust to including these control variables, the results for forward integration are not.

Before proceeding, we do emphasise that the results in this section may be interpreted with caution. This is because it is also likely that an increase in productivity will increase a country's participation in global value chains. However, the exercise in this section mostly consider the effect of GVC participation on future TFP growth. While expected changes in TFP can still influence firms' decision to participate in the GVCs today, we assume this

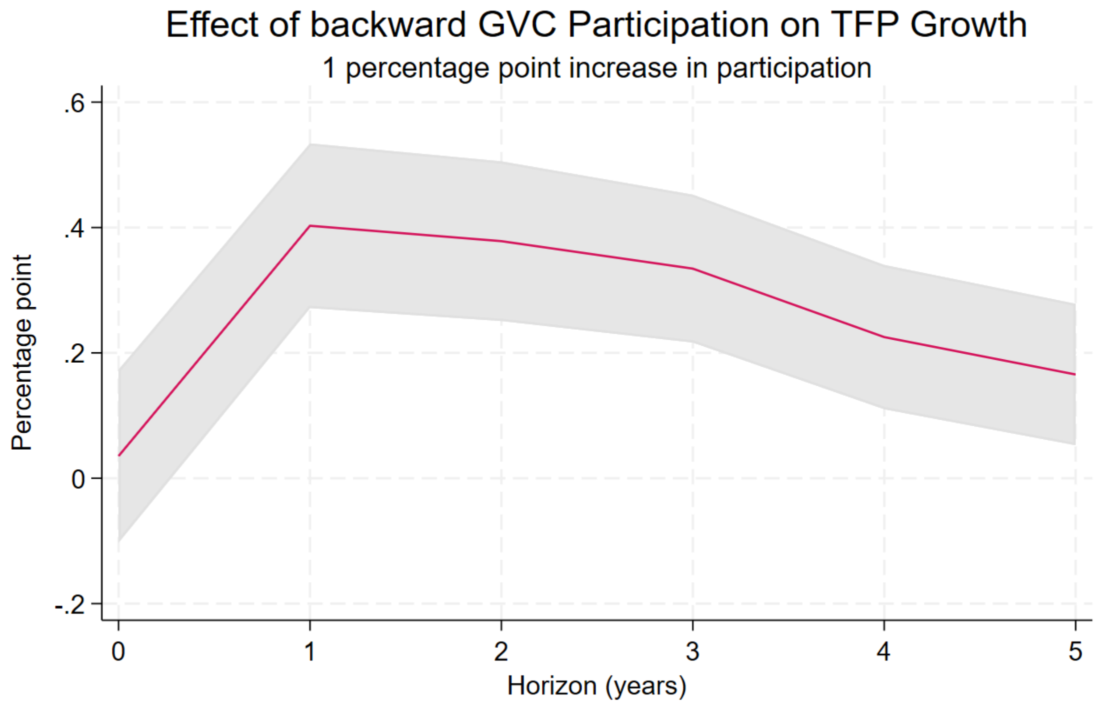

Figure 26: The figure shows how a 1 percentage point increase in backward linkages will affect TFP growth at different horizons. The figure assumes the level of backward and forward linkage which is similar to Pakistan i.e., 5.4% and 27.9% of gross exports, respectively.

is less likely the case. Nonetheless, caution is warranted.

7.3.2 Backward linkages

Figure 26 reports the effect of a 1 percentage point increase in backward linkage on TFP growth at different horizons, and when the current level of backward and forward integration equals that of Pakistan i.e., 5.4% and 27.9% of gross exports, respectively.[6] The figure shows that the relationship is statistically insignificant for the same year. However, the relationship becomes statistically significant in the subsequent year suggesting that a 1

[6]Note that the value for forward and backward integration for Pakistan is different in the Eora database than in the ADB database.

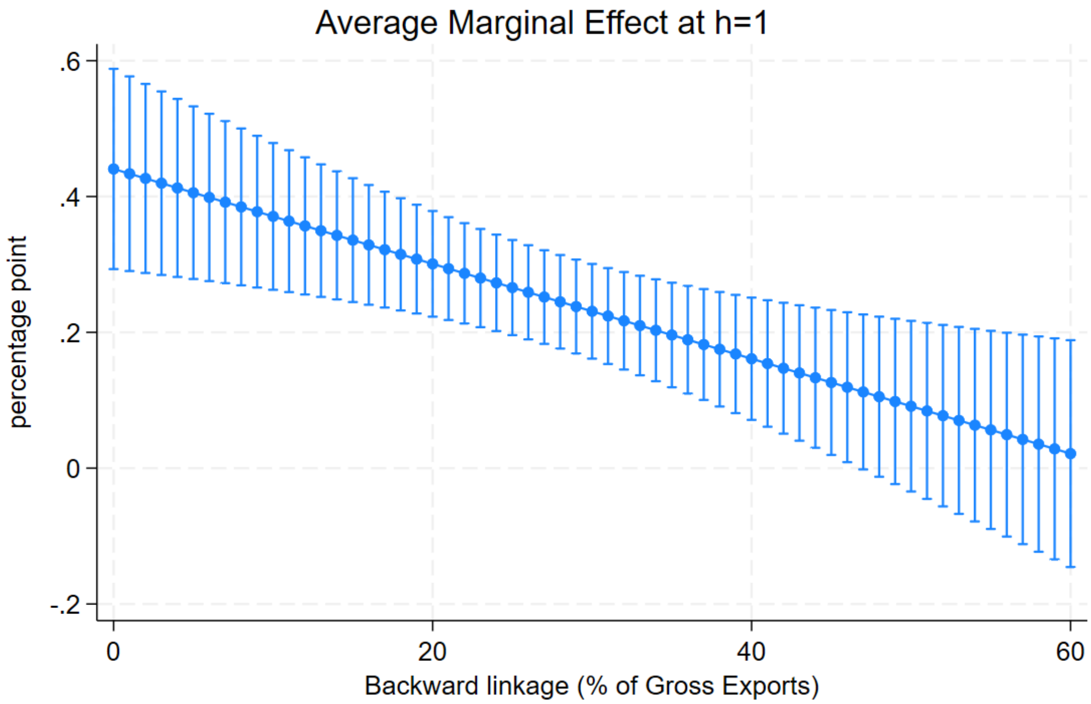

Figure 27: The figure plots the marginal effect of an increase in forward integration on TFP growth in the subsequent year at different levels of forward integration.

percent point increase in backward linkages is associated with an increase in TFP growth of 0.36 percentage points. The relationship persists for few years but becomes insignificant again from year 5 onwards. Nonetheless, the effect on the level of TFP is permanent.

The finding lends support to the hypothesis that barriers to trade which limit firms' access to imported inputs may be an important reason for low levels of backward GVC linkages in Pakistan. This is also supported by the discussion in section 7.1 where we show that the level of GVC participation is associated with the extent of misallocation in the economy. Other potential explanations for why backward integration increases productivity growth may also include firms not internalising the benefits of trade integration in the form of learning by doing. As a result, the level of backward integration remains low, and the

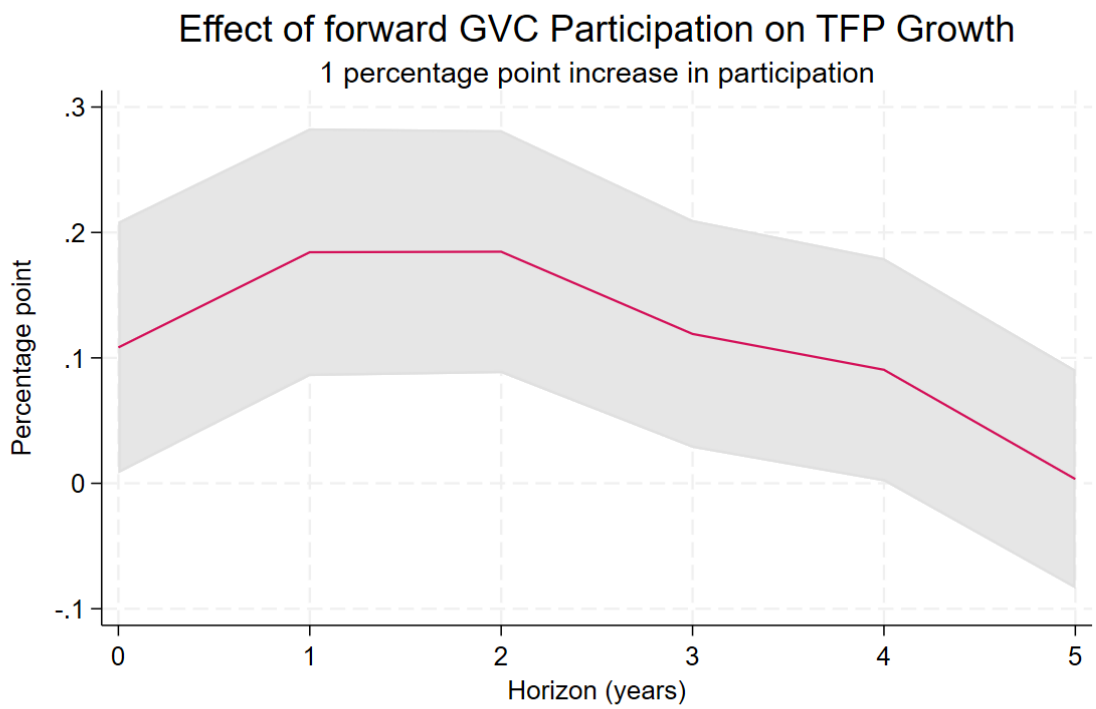

Figure 28: The figure shows how a 1 percentage point increase in forward linkages will affect TFP growth at different horizons. The figure assumes the level of backward and forward linkage which is similar to Pakistan i.e., 5.4% and 27.9% of gross exports, respectively.

productivity benefits are not realised.

Figure 27 turns to studying how the benefits of backward integration depend on the level of backward integration. The figure shows that the effect on TFP growth is the highest when the level of backward integration is low to begin with. However, the effect becomes insignificant as the level of backward integration increases to 50% or higher.

7.3.3 Forward linkages

We now turn to exploring the relationship between forward linkages and productivity growth. Figure 28 is similar to figure 26 except that it reports results for when there is a 1

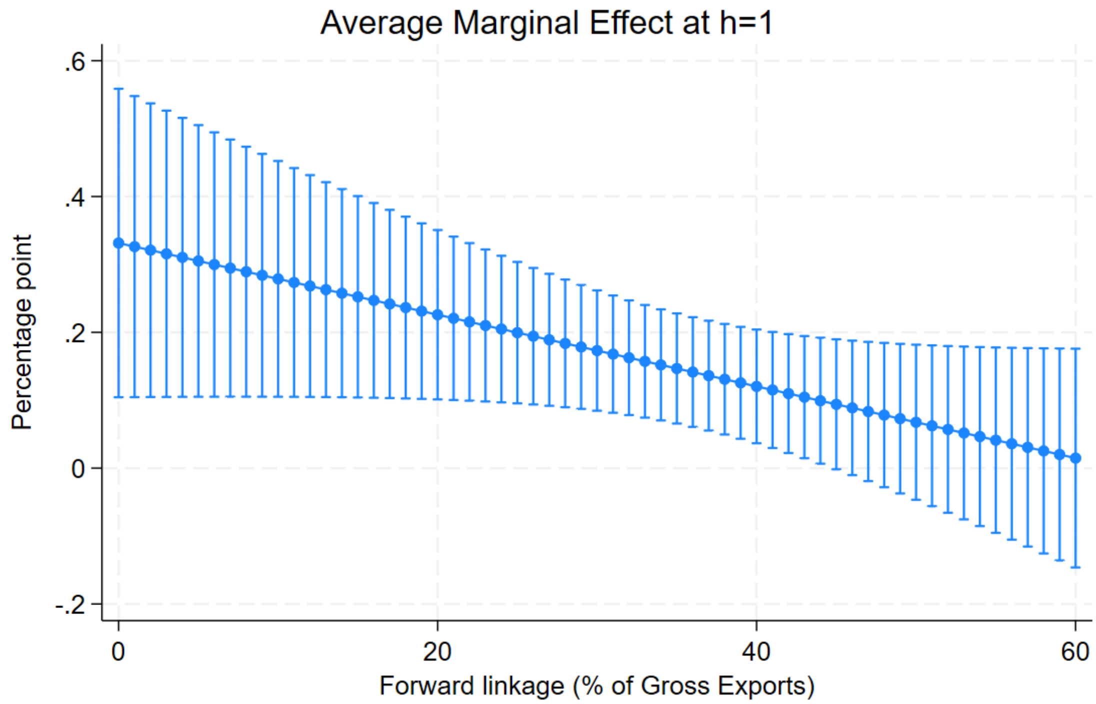

Figure 29: The figure plots the marginal effect of an increase in forward integration on TFP growth in the subsequent year at different levels of forward integration.

percent point increase in forward linkages. As before, the figure assumes that the current level of backward and forward linkages is similar to that for Pakistan. The results show that an increase in forward linkages is associated with an increase in TFP growth both in the current and the subsequent years. However, as in the case of backward linkages, the maximum effect materialises in the subsequent year. The effect persists before becoming insignificant from year 4 onwards. It is important to note that the effect is generally smaller than in the case of backward linkages.

Figure 29 plots the marginal effect for different levels of forward linkages. The effect is both smaller and becomes statistically insignificant much sooner than in the case of backward linkages. In the case of Pakistan where the forward linkage already equals 27.9%

of gross exports, the marginal effect of an increase in backward integration is indeed greater than the marginal effect of an increase in forward integration.

7.3.4 Robustness

Finally, figure 30 plots the effect of GVC integration on TFP growth after controlling for variables which may be a potential source of omitted variable bias. These include variables on capital flows which are taken from the database constructed as in Alfaro et al. (2014) and the variables on governance quality which are taken from the World Governance Indicators database constructed as in Kaufmann and Kraay (2023). The variables on capital flows include net FDI flows, net equity flows, and reserves accumulation. All these variables are represented as percentage of GDP. The variables on governance quality include government effectiveness, regulatory quality, rule of law and control of corruption.

The left panel of figure 30 plots the response for an increase in backward integration whereas the right panel plots the response for an increase in foward integration. As before, the responses are plotted for a country where the current level of backward and forward integration is similar to that for Pakistan. The results show that the relationship between backward integration and TFP growth continues to remain postive and statistically significant even after we control for a variety of variables which are likely related to both the TFP growth and GVC participation. However, this is not the case when it comes to forward integration. While the point estimate is still positive, the relationship between TFP growth and forward integration is no longer statistically significant.

The results from the robustness exercise emphasise the potential role an increase in backward integration can play in increasing productivity in Pakistan. The cumulative increase in TFP due to a one percentage point increase in backward integration is close to 0.65 percent. Given the TFP multiplier of 2.52% for Pakistan, a one percentage point

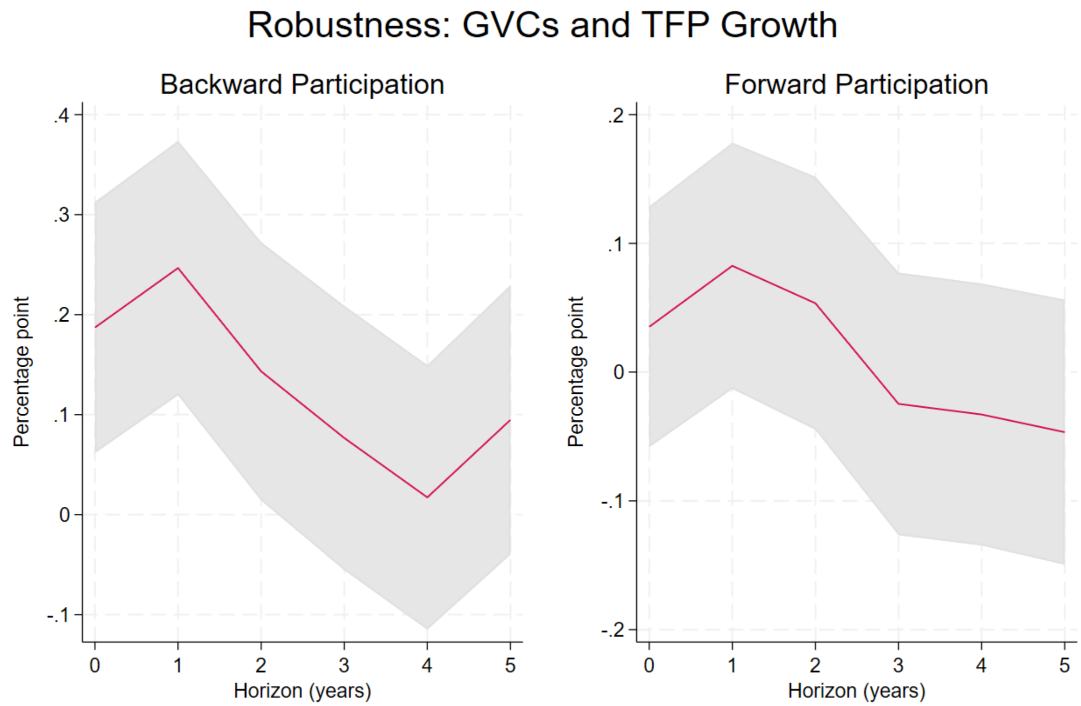

Figure 30: The figure shows how a 1 percentage point increase in backward (left) and forward (right) linkages affect TFP growth at different horizons. We control for different measures of international capital flows and governance quality. The figure assumes the level of backward and forward integration which is similar to Pakistan i.e., 5.4% and 27.9% of gross exports, respectively.

increase in backward integration implies an increase in GDP of 1.6% over the long-run.

To conclude, both backward and forward linkages have important implications for the TFP growth. However, these effects crucially depend on the prevailing levels of backward and forward linkages. In the context of Pakistan which ranks higher on forward linkages than on backward linkages, the productivity improvements from increasing backward integration can be significantly higher and, thus, important for facilitating structural transformation.

8 Reflections

The discussion in sections 6 and 7 brings to the forefront the role of government policies which prevent an efficient allocation of resources and, in the process, hinder economic transformation. Going further, the discussion in section 5 can also be linked back to macroeconomic policies pursued by subsequent governments. Section 5 noted that the predominant factor underlying low growth in labour productivity in Pakistan is the declining capital-output ratio. Pirzada (2023) points to high macroeconomic uncertainty as one of the key reasons behind this trend.

We reproduce the figure in Pirzada (2023) which shows net private capital inflows and reserve accumulation for some of the South Asian economies. Figure 31 shows that Pakistan received more private inflows (% of GDP) over the thirty-year period relative to Bangladesh. In some of the years, the inflows are also comparable to that for India. However, while policymakers in other South Asian economies accumulated these inflows in the form of foreign reserves to insure their respective economies against the risk of *sudden stops*, policymakers in Pakistan preferred to use the inflows to incentivise consumption. It is easy to appreciate how an increase in risk will reduce risk-adjusted returns on investments and, thus, hinder if not reverse capital deepening. In an interesting paper focusing on investment decisions by farmers in Ghana, Karlan et al. (2014) show how reducing risk through providing insurance against climatic shocks increased farm investment.

This begs the question on why do policymakers implement policies which undermine long-term prosperity? Put another way, why do policymakers continue to pursue policies which not only prevent reallocation of resources in a way which improves productivity but, moreover, repeatedly inflict economic and social costs on the citizens in the form of frequent crises? The answer to this lies beyond the scope of this paper. However, it is

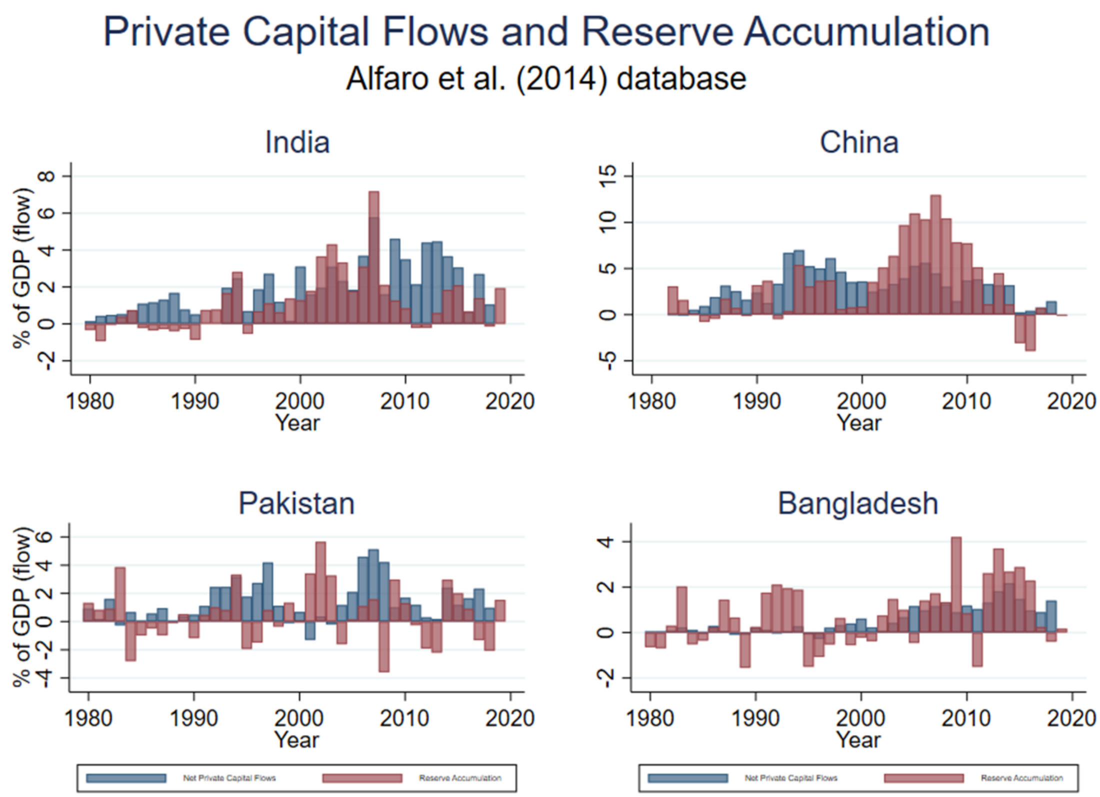

Figure 31: The figure plots data on net private capital flows and reserve accumulation for some of the South Asian economies. Data is presented as % of GDP and is taken from the database based on Alfaro et al. (2014).

closely tied to the process which directly or indirectly gives individuals or groups access to corridors of power. To recall, Jones (2013) points to the economic interests of the ruling elite as an important factor behind why a country's resources are not used efficiently. He notes, "misallocation is the equilibrium outcome of a political process interacting with institutions and the distribution of resources (including physical capital, human capital, ideas, and natural resources)."

Malik and Duncan (2022) document this phenomenon in the context of Pakistan. They show how, at the onset of the 2013 crisis, organised sectors and businesses linked to powerful families successfully lobbied to increase trade protection in the form of non-tariff measures to protect themselves from international competition. Likewise, the 2018 crisis saw a sharp increase in import duties in sectors linked to powerful families. The 2022 crisis has proven to be no different. These examples are telling as these reveal how elite groups which dominate Pakistan's economic and political landscape continue to influence policies to prevent reallocation of resources which could potentially undermine their economic interests. Importantly, this is true even when the market forces continue to signal that the prevailing economic structure is ill-suited for delivering prosperity for the broader society. And yet again the policies which repeatedly fail to deliver for the masses continue to persist.

In a paper on political transitions, Acemoglu and Robinson (1999) put forward a framework which sheds light on the interrelation between policies which continue to benefit the ruling elites and the prevalence of the non-democratic institutions. Specifically, in societies with large gaps between the elites and the masses, a transition from non-democratic institutions to democratic institutions is too costly for the elites. This is because any such transition will leave them worse-off by shifting significant proportion of economic resources away from them. However, it is possible for the "disenfranchised poor" to "contest power by threatening social unrest or revolution, and this may force the elite to democratize." Acemoglu and Robinson develop this argument in more detail in their book on Economic Origins of Dictatorship and Democracy.

Without going in detail, these reflections aim at emphasising to the reader that the challenge of resource misallocation as discussed in this paper is not just a challenge of technical knowledge and administrative expertise but also has power relations between the ruling elites and the effectively disenfranchised masses at the core of it. We are unlikely to achieve much progress without bringing these to the forefront of any discourse on reforms.

9 Conclusion

This paper documents the phenomenon of missing transformation observed in Pakistan relative to other countries and explores potential reasons for this. We start with providing an overview of the nature of economic transformation and how it compares with regional economies. We then consider the role of labour productivity as one of the key factors that may explain the limited transformation in the case of Pakistan. While doing so, we particularly focuses on the role of capital accumulation and the TFP growth. The second half of the paper turns its focus to the role of misallocation across sectors as another potential reason for the missing transformation. We ask if there is an over or under allocation of resources across sectors which cannot be explained by differences in human capital and production technology. We particularly focus on the extent of misallocation across the agriculture and the non-agriculture sectors. The paper concludes with detailed discussion on Pakistan's position in Global Value Chains (GVCs) and how increased participation in GVCs may help increase overall productivity in the economy and facilitate the transformation process.

Results from the first half of the paper make clear that Pakistan has seen one of the lowest declines in the share of agriculture in total employment when compared with the 51 developed and developing countries included in the ETD database. Part of the reason for this is also that labour productivity in both the overall economy and the agriculture sector has increased by the least in the case of Pakistan relative to the regional economies. As a result, unlike in most other countries, there is limited incentive for labour to move from agriculture to non-agricultural sector.

But what is behind the dismal increase in labour productivity in the case of Pakistan? We find that a critical reason for this is the lack of capital deepening. In fact, capital-output ratio has been declining since late 1970s such that today Pakistan has one of the lowest levels of capital-output ratio across the list of 183 countries included in the PWT dataset. While Pirzada (2023) point to higher level of macroeconomic uncertainty as the primary reason for this trend, future work must explore this in more detail.

We further decompose growth in labour productivity into labour productivity due to improvements within sectors and due to the process of structural transformation itself. We find that the average annual growth in labour productivity due to improvements in labour productivity within sectors equals only 0.73%. On the flip side, the process of structural transformation explains 45% of the average annual growth in aggregate labour productivity for Pakistan. This suggests that the limited structural transformation that Pakistan has undergone during the relevant period has been growth enhancing. However, when we decompose the reallocation effect into static and dynamic effects, we find that the structural transformation in Pakistan has shifted resources to sectors with low growth in labour productivity thus undermining the country's future growth prospects.

The second half of the paper starts with documenting productivity gaps across sectors. We find that the agriculture sector has one of the lowest levels of labour productivity across the economy. When we aggregate the sectors into agriculture and non-agriculture sectors, we find that labour productivity in the agriculture sector is 47% that of the non-agriculture sector. We consider if differences in wages and production technology across the agriculture and the non-agriculture sector can explain the difference in labour productivity across the two sectors. However, we find that these factors cannot explain the productivity gap for the agriculture sector. This points to an overallocation of resources in the agriculture sector which is economically inefficient. The results point to the combination of government policies motivated by political economy reasons such as pricing regimes, import restrictions, and land-use regulations, and market failures which incentivise production in some sectors more than others as key reasons for the overallocation.

Finally, we explore how an increase in integration in the Global Value Chains can help increase productivity and transform the economy. Using panel data, we first show that the level of GVC integration is associated with the extent of misallocation across the economy. This finding suggests that trade barriers may play in important role in preventing transformation and exacerbating misallocation. We then document that the level of participation in the GVCs is one of the lowest for Pakistan when compared with other fast growing economies. Moreover, the limited participation in the GVC comes from exporting raw materials and intermediate inputs which are processed in importing countries for further exports. We also note that, unlike regional countries, the export oriented sector in Pakistan scores even worse than the non-export oriented sector in terms of both the level and the nature of GVC participation. We conclude with showing that an increase in GVC participation can go a long way towards increasing productivity growth in Pakistan and, as a result, facilitate the transformation process. A one percentage point increase in backward GVC integration is estimated to increase GDP by 1.6% in the long-run.

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