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Structural Reforms and Productivity Growth in Developing Countries

Intra- or Inter-Reallocation Channel?

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Abstract

This paper investigates the effects of financial sector, product market, and trade reforms on labor productivity growth and its two components—the intra-sectoral (within) and inter-sectoral (between) components—in a sample of developing countries over 1975–2005. The paper finds that most of the past trade, product, and financial sector reforms have increased the growth rate of labor productivity. In particular, countries that are further away from the technology leader tend to benefit more from structural reforms than countries closer to the technology frontier. Looking at the subcomponents of labor productivity growth, the paper finds that structural reforms work mostly through the intra-allocative efficiency channel but not through the inter-allocative efficiency channel. The intra-sectoral component is the main driver of the impacts of reforms on labor productivity growth, with a contribution between 76 and 96 percent.

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Structural Reforms and Productivity Growth in Developing Countries: Intra- or Inter-Reallocation Channel?

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1. Introduction

A long-standing observation in economics is that large differences in productivity are the dominant source of the differences in living standards across countries (Restuccia & Rogerson, 2017). A recent study suggests that labor productivity is the most important source of GDP per capita in some developing countries (Foster-McGregor & Verspagen, 2016). The rate at which labor productivity grows at the aggregate level depends on two components: the intra-sectoral component (within effect) and the inter-sectoral component (between effect), also known as structural change. The former indicates the average growth rate of labor productivity within the sectors of an economy, and the latter measures the growth rate of labor productivity due to the movement of labor across the sectors of an economy. Differences in patterns of structural change explain much of the variation in total labor productivity growth among developing regions. For instance, many Asian countries have successfully undergone a deep structural change that boosted labor productivity while most African and Latin American countries have recorded relatively low labor productivity growth, mostly driven by within-sector productivity growth (McMillan, Rodrik, & Verduzco-Gallo, 2014). This raises the question of why some countries have higher labor productivity growth, higher within-sector productivity growth, and a more dynamic shift of labor across sectors than others.

This paper uses data for developing countries to draw lessons on how different types of structural reforms implemented during the period 1975-2005 affected cross-country aggregate labor productivity growth differences, and how these effects are distributed between the intra-sectoral component and inter-sectoral component of labor productivity growth. It is often argued that the persistent inter-sectoral productivity gaps across countries (Duarte & Restuccia, 2010; Gollin et al., 2014) and within countries (McMillan et al., 2014) are caused by structural rigidities that prevent the efficient allocation of resources within and across sectors. Also, differences in sectoral productivity relate to market failures or government failures, such as observable policy distortions introduced in many developing countries during the import-substitution era. Therefore, structural reforms are expected to improve inter and intra-sectoral allocative efficiency, hence productivity growth, more rapidly in developing countries (see, for example, the Berg's report, World Bank, 1981). A related literature has also identified structural reforms as important determinants of economic performance and labor productivity growth by engendering an efficient reallocation of resources such as labor, reducing rigidities that exist in markets and helping liberalize capital flows and boosting international trade (Adamopoulos & Restuccia, 2019; Dabla-Norris et al., 2016; Bourlè et al., 2013; Casu et al., 2013; Prati et al., 2013). Yet, most of these studies do not assess how these effects are distributed between the intra and inter-sectoral components of the aggregate growth rate of labor productivity, masking the allocative efficiency channels through which reforms affect labor productivity growth.

This paper fills the gap in the literature by analyzing the impact of financial sector, product markets, and trade reforms on labor productivity growth and exploring whether these reforms affect labor productivity growth by inducing a more efficient reallocation of resources either within sectors or across sectors or both. In doing so, this paper is the first attempt to quantify how labor productivity growth effects of financial sector, product markets, and trade reforms are distributed between the within and the between components in developing countries. Theoretically, trade reforms induce

a more efficient allocation of resources within sectors à la Melitz (2003) and between sectors in response to changes in relative prices à la Ricardo and Heckscher–Ohlin models. Product market reforms increase competition in product markets, reduces mark-ups, and generate allocative, dynamic, and productive efficiencies (Nicodeme & Sauner-Leroy, 2007). Financial sector reforms affect productivity through the efficient allocation of financial resources (Schumpeter, 1912) (see Section 2).

For our analysis, we merge the structural reform data set from Prati et al. (2013) with labor productivity data computed from sectoral data from the GGDC 10-Sector Database and the Expanded Africa Sector Database.[2] The three sectors considered in our analysis are agriculture, industry, and services. The data cover the period 1975-2005 and includes all the developing countries for which data on reforms, value-added, and employment are available. We employ the shift-share method used in McMillan & Rodrik (2011) to decompose labor productivity growth into the intra-sectoral and the inter-sectoral components. To minimize possible causality bias between reforms and labor productivity growth, we measure reforms at the beginning of each period. We control for country and time fixed-effects and cluster standard errors within countries. We run several robustness checks adding various control variables, estimating a dynamic panel data model to correct for possible endogeneity bias, estimating a five-year labor productivity growth model, and testing for heterogeneity effects using distance to the technological frontier.

We find that product markets and trade reforms—in particular trade, the current account, and electricity and telecommunications (henceforth network) reforms—are positively associated with the growth rates of labor productivity. Similarly, financial sector reforms—such as domestic finance, banking, and securities reforms—have positive and statistically significant effects on the growth rate of labor productivity. However, the magnitude of the coefficients decreases as the country reduces the productivity gap with the technology leader. Thus, countries that are further away from the technology leader tend to benefit more from structural reforms than countries closer to the technology frontier. This evidence corroborates the empirical findings of Dabla-Norris et al. (2016), who found that the positive impact of reforms on productivity growth increases with productivity distance from the technology frontier.

Looking at the different components of labour productivity growth, structural reforms affect the within and the structural change components differently. Most of the financial sector, product markets, and trade reforms positively affect the within component but have no significant effects on the structural change component of labor productivity growth. In terms of the distribution of the contribution of the effects of reforms on the growth rate of labor productivity, we find that the contribution of the effects of structural reforms arising from the within component accounts for between 76 percent and 96 percent of the overall productivity effect[3] depending on the measure of reforms we consider. The contribution that comes from the structural change component thus varies between 4 percent and 24 percent, with a negative contribution observed in most cases. This implies that structural reforms work mostly through the intra-allocative efficiency channel but not through the inter-allocative efficiency channel. That is, structural reforms induce an efficient

[2] Countries are classified as developing based on the World Bank country classification.

[3] The only exception is agricultural reform, for which the contribution is equally distributed between the within and the structural change components, but its effect on the growth rate of labor productivity is not significant.

reallocation of resources within sectors but not across sectors. Our results are consistent with the argument that many developing countries had structural adjustment programs without structural change (Page, 2012).

The paper adds to the limited literature on the impact of reforms on productivity. A growing literature has identified misallocation as an important source of aggregate productivity differences across countries (e.g., Bartelsman et al., 2013; Restuccia & Rogerson, 2008). Misallocation arises from frictions or structural rigidities that prevent the efficient allocation of resources. The frictions that drive cross-country differences in productivity and allocative efficiency include, among others, entry barriers (Ciccone & Papaioannou, 2008), labor market distortions (Haltiwanger et al., 2014), trade restrictions (Revenga, 1997; Wacziarg & Wallack, 2004), credit frictions (Bai, Carvalho, & Phillips, 2018), financial market distortions (McKinnon & Pill, 1998; Shaw, 1973), market power (De Loecker et al., 2020)and monopoly power (Cheremukhin et al., 2017). Most of these studies did not investigate the effects of these reforms on productivity growth in developing countries. To the best of our knowledge, Dabla-Norris et al. (2016) is one of the few papers examining the impact of reforms on productivity in 108 emerging markets and developing countries at the macroeconomic level. The authors find that the positive impact of reforms on productivity growth depends on the distance to the productivity technology frontier. However, they did not explore the distributional effects of reforms between the within and the between components. ElFayoumi et al. (2018) focus on structural reforms and sectoral labor reallocation, neglecting the impact of reforms on intra-sectoral allocative efficiency. There are also existing studies at the firm-level that assess the impact of structural reforms on productivity growth in developing countries (Kouamé & Tapsoba, 2019; Amiti & Konings, 2007; Arnold et al.,2016; Eslava et al., 2004; and Topalova & Khandelwal, 2011). Our paper differs from those papers mentioned above by focusing on the impact of reforms on productivity growth in developing countries at the macroeconomic level, where existing evidence is needed, but limited. Second, to the best of our knowledge, this study is the first to examine how structural reforms affect both within and structural change components of productivity growth and evaluate the relative importance of reforms on both components.

The remainder of the paper is structured as follows. Section 2 discusses the theoretical mechanisms through which reforms may affect the between and within effects differently. Section 3 describes the data sets. Section 4 discusses descriptive statistics and the empirical strategy. Section 5 reports and discusses the estimation results. Section 6 presents concluding remarks.

2. Theoretical mechanisms

In the literature, the link between reforms and productivity are indirect and often act through specific channels. In this section, we discuss some of these channels, particularly, how trade reforms, product market reforms, and financial market reforms may affect productivity growth either through the within effect or between effect.

Trade reforms

Trade reforms are reforms that reduce or eliminate frictions and costs that affect the free movement of goods and services across countries. From classical models of trade such as Ricardo's

theory of comparative advantage to 'new' new trade theory (NNTT), such as the seminal work of Melitz (2003), increasing the degree of openness to trade has implications for the allocation of resources within and across sectors. In classical models, a country gains from trade by moving resources to the sector that the country has a comparative advantage in. Countries specialize in different economic activities based on their relative differences in technology – in Ricardo's model – and factor endowments – in the Heckscher–Ohlin model. In both models, trade liberalization induces a reallocation of resources across sectors in response to changes in relative prices. In new trade theories (NTT) with increasing returns to scale, trade liberalization leads to the agglomeration of production in certain geographic locations, which can act as growth poles because of the existence of agglomeration economies in these locations leading to observable sectoral change at the country level (Wacziarg & Wallack, 2004). This is especially the case when there are existing complementary spatial industrial policies that influence the location choice of firms (Newman & Page, 2017). In the endogenous growth models with increasing returns to scale where trade openness facilitates the transmission of technology and impacts long-run growth (Grossman & Helpman, 1991), reductions in trade frictions may affect the intersectoral shifts of resources if the transfer of technology affects the modern and traditional sectors differently. By inducing the reallocation of resources across sectors, trade reforms can affect labor productivity growth through the structural change component.

Another set of models demonstrates how trade liberalization affects intra-industry productivity growth without necessarily changing the specialization patterns of countries and hence structural change. In NNTT and NTT models with heterogeneous firms, differentiated products, and increasing returns to scale, trade occurs within narrowly defined sectors, inducing a reallocation of resources towards more productive firms within the same industry. For example, Melitz (2003) specifies a model with imperfect competition and heterogeneous firms in which trade liberalization leads to a shift of resources towards more productive firms within industries. In this model, more competitive and productive firms expand in the domestic market, and some enter the international market. Trade compels less productive firms to exit the market, reallocating market shares to the internationally competitive firms. The process leads to an increase in intra-industry productivity, even when productivity does not grow within firms. To be clear, if the traded goods are labor-intensive, then increased intra-industry trade may induce structural change or even changes in the international organization of production (see Antras, 2003, for example). However, the immediate implication of the model is increased intra-industry productivity growth. Consistent with these theoretical predictions, Pavcnik (2002), in a study of Chilean manufacturing plants, found that trade liberalization improves within-plant productivity for the plants in the import-competing sector. From the study, aggregate productivity improvement is mostly due to the reallocation of resources from less to more efficient plants.

Furthermore, pro-competitive models have shown that trade liberalization can be beneficial to a country without necessarily involving the pattern of specialization. This is known in the literature as the pro-competitive effects of trade liberalization. For example, Melitz & Ottaviano (2008), integrating the different modeling structures under NTT, demonstrated that trade liberalization reduces mark-ups, at least in the short run, highlighting the potential pro-competitive effects associated with trade liberalization. For a particular sector where high-mark-up firms are many, and low-mark-up firms are few, a reduction in mark-ups decreases the inefficiency in the allocation

of resources within that sector and hence the within component of aggregate productivity growth. In similar models based on imperfect competition within a dynamic Cournot-Nash framework, trade liberalization can have a pro-competitive effect on output without necessarily relying on changes in the pattern of comparative advantage (Wacziarg,1997; cf Wacziarg & Wallack, 2004). The key implication of the pro-competitive models of trade is that gains from trade are possible without necessarily inducing structural change.

Product market reforms

Product market reforms remove impediments to the proper functioning of product markets by increasing competition among producers of goods and services. Nicodeme & Sauner-Leroy (2007) argue that product market reforms affect productivity through three indirect mechanisms: allocative efficiency, productive efficiency, and dynamic efficiency. First, product market reforms such as deregulation of agricultural markets and liberalization of the telecommunication sector, eliminate unnecessary government interventions, barriers to entry, and open up markets. This will increase competition in the market and reduce economic rents such as mark-ups. For example, it is expected that agricultural reforms improve price incentives, affecting farm profitability, inducing a supply response, and hence productivity growth and sometimes agricultural commercialization if the land tenure system permits. While the immediate supply response generates productivity growth within the agriculture sector, the commercialization of production, which often involves mechanization and adoption of new farming technologies, rapidly increases agricultural productivity. Since agricultural productivity is inversely related to the share of the labor force in agriculture, agricultural commercialization may reduce the number of people employed in the agriculture sector, inducing an intersectoral movement of labor. We expect agricultural reforms to have a stronger effect on the within component, rather than the structural change component, especially in developing countries where the supply response to changes in price incentives is immediate but agricultural commercialization happens in the medium to long term and often depends on land and labor market institutions.

Second, product market liberalization increases competition, forcing firms to allocate available resources efficiently by reducing or eliminating underutilization of factors of production such as labor and capital. By removing entry barriers and costs, product market competition supports the creation of new enterprises and business growth and increases diffusion of new technologies and production techniques. By increasing the intensity of competition, product market reforms actively encourage the spread of ideas, the adoption of better production techniques, technology spillovers, increasing technical and productive efficiency, and hence productivity growth. Another channel through which product market reforms increase productive efficiency relates to agency costs. Competitive pressures incentivize managers and workers to reduce slack and increase worker efforts, increasing production efficiency. Finally, product market reforms affect productivity through dynamic efficiency or the Schumpeterian engine of growth. Schumpeterian models emphasize that competition reduces economic rents. It is natural for individual firms to accrue rents and market power. Due to the fear of losing economic rents, firms have great incentives to innovate. Conversely, new endogenous growth models find that competition increases the incentives to innovate to escape competition. There is evidence that at lower and higher levels of competition, innovation activity is low (Aghion et al., 2005). The empirical relationship between

competition and innovation is an inverted U-shape. Also, the absorptive capacity and the type of industry will influence the incentives for innovation (Nicodeme & Sauner-Leroy, 2007).

In summary, agricultural reforms such as the dismantling of agricultural marketing boards, privatization of state-owned companies that monopolized agricultural trade, the removal of price controls, and the removal of exchange rate restrictions to promote exports may create price incentives and induce productivity growth within the agriculture sector. However, this may also lead to agricultural commercialization and mechanization if the land tenure system permits. With the inverse relationship between mechanization and the share of the labor force in agriculture, agricultural reforms can generate a between effect conditional on land and labor institutions. Similarly, we expect network reforms to increase efficiency and reduce mark-ups in electricity and telecommunications markets. Depending on the heterogeneity of mark-ups across sectors and interconnectedness of the deregulated sector to other sectors of the economy, the allocative efficiency effect of product market reforms will increase aggregate productivity growth either through the reallocation of resources across or within sectors. With the rise of mobile money services in many developing countries, a competitive telecommunication sector will have effects beyond its boundaries. However, we expect a stronger within effect from product market reforms. This is because product market reforms may generate allocative and productive efficiency in the short term and dynamic efficiency in the long term. We expect dynamic efficiency to induce structural change. On balance, product market reforms will generate stronger within effects than structural change, at least in the short run.

Financial market reforms

The main role of financial institutions is to facilitate the efficient allocation of resources in an economy. Schumpeter (1912) argued that financial institutions have the ability to identify entrepreneurs with prospects and can, therefore, help channel resources to their most productive uses. A well-functioning financial system can identify and fund firms with the highest probability of initiating new products and processes, boosting the rate of technological innovation in an economy. Therefore, it has been recognized that a well-functioning financial sector is a precondition for the efficient allocation of resources and potential long-run economic growth (Levine, 1997, 1999). Allocative efficiency is often associated with a more unfettered – liberalized, and deregulated – financial system. However, financial sectors of developing countries are often described as repressive, with excess control and interference from the state. Financial sector reforms – mostly through structural adjustment loans – aim to remove the systemic repressions and restrictions on the price and quantity of credit, boost productivity growth by generating higher levels of domestic investment and encourage a more efficient allocation of capital within and across sectors (Dabla-Norris et al., 2016; Graham, 1996). Notably, there is an indication that financial liberalization improves allocative efficiency by allowing investment funds to go to firms with a higher marginal return to capital (Galindo, Schiantarelli, & Weiss, 2007). For within-sector productivity growth, financial reforms lower the cost of credit, allowing financially constrained firms to access capital and produce at a more efficient level. Furthermore, it enables the financing of new machinery, the adoption of new production techniques, and innovation within industries. For example, evidence at the firm level indicates that financial reforms in Eastern European

countries increased aggregate productivity through a more efficient allocation of capital within-industry by 10 percent to 16 percent (Larrain & Stumpner, 2017).

Conversely, financial reforms affect structural change by inducing the reallocation of capital and investment to more productive industries. For instance, there is an indication that well-developed financial systems increase investment more in growing industries and decrease investment more in declining industries compared to less-developed financial systems (Wurgler, 2000). The efficiency with which capital is allocated across industries is also inversely related to the extent of state ownership in the economy (ibid). Furthermore, there is evidence that countries with well-developed financial markets have relatively high correlated intersectoral growth rates (structural change) and respond better to global opportunities (Fisman & Love, 2004). This evidence implies that by removing restrictions and state interference, financial reforms may also boost productivity growth through structural change.

3. Data

Structural reforms data

To measure structural reforms, we employ the data set on real sector reforms and financial sector reforms from Prati et al. (2013).[4] Compared to existing structural reforms data sets in the literature, this database has the advantage of covering more than 90 countries across the world with a long-time series dimension. For trade reforms, we employ indicators related to the openness to international trade and product market liberalization. Openness to international trade is measured over two dimensions: (i) the average tariff rate and (ii) the restrictions on current account transactions that include payments and receipts on exports and imports of goods and services. Restrictions on current account transactions measure restrictions on the proceeds from trade transactions, rather than on the underlying transactions as several countries use in practice restrictions on trade proceeds as a type of trade restriction. In the context of theoretical discussions, we expect trade reforms to affect productivity growth positively, but whether this will work either through the within effect or between effect or both cannot be determined, a priori. We use each dimension of the openness to international trade individually in the regressions.

Product market reforms are agriculture sector reforms and the degree of liberalization in the telecommunication and electricity markets (network sector reforms). Agriculture sector reforms measure the extent of public intervention in the market of the country's main agricultural export commodity, the presence of export marketing boards, and the incidence of administrated prices. The degree of liberalization in the telecommunication and electricity markets accounts for the existence of an independent regulator and the extent of competition in the provision of the services. The regressions will include the indexes of agriculture sector reforms and liberalization in the network sector separately.

The indicators of financial reforms derived from Abiad et al. (2008) include two main indexes. The first index measures the degree of domestic financial liberalization, which is an average of six sub-

[4] See the online supplemental materials of Prati et al (2013) for the list of countries covered by this database and the detailed information on the methodology employed.

indices: (i) credit controls accounting for subsidized lending and directed credit, (ii) interest rate controls such as floors and ceilings, (iii) competition restrictions related to entry barriers and limits on several bank branches, (iv) the importance of state ownership, (v) the quality of banking supervision and regulation, and (vi) the degree of legal restrictions on the development of domestic bonds and equity markets and the existence of independent regulators. Of the six sub-indices, the first five sub-indices document reforms in the banking system while the sixth index captures securities sector reforms. Our strategy will consist of introducing the aggregate domestic financial liberalization index and two separate indexes of reforms in the banking system and securities sector.

The second index of financial sector reform captures the degree of external capital account liberalization. This is an average of two sub-indicators measuring the intensity of restrictions on residents and nonresidents in moving capital in and out of a country. The external capital account liberalization index captures a broad set of restrictions on financial transactions for residents and nonresidents and the use of multiple exchange rates. In the regressions, we include the aggregate index of external capital account liberalization and two separate indices of capital account liberalization for residents and nonresidents. As in the original database, all (normalized) reform indicators range between 0 and 1, with a higher value corresponding to a higher degree of liberalization in the associated sector. Consistent with the theoretical discussion, we expect the domestic financial liberalization variable to affect both between and within effects through the efficient allocation of capital and investments. Financial openness may also affect productivity by improving domestic allocative efficiency, by allowing countries to share risks and invest in riskier but effectively high-return firms/sectors (e.g., see the model of Obstfeld, 1994). We expect external financial liberalization to affect productivity through both the between and within channels.

Sectoral indicators data

To analyze the effect of reforms on productivity growth, and the within and structural change components, we use the Groningen Growth and Development Center (GGDC) 10-sector database (Timmer, de Vries, & de Vries, 2015) and the Expanded Africa Sector Database (EASD) (Mensah and Szirmai, 2018; Mensah et al., 2018). These data sets have been widely used to analyze productivity across time and space because of their coverage and reliability. The GGDC 10-sector database provides long-run harmonized sectoral data on nominal value-added, real value-added, and employment for ten broad sectors of the economy in 42 countries, mostly from the 1960s to 2010. Of the 42 countries, 11 countries are in Africa, 11 countries are in Asia, 2 countries in MENA, 9 countries are in Latin America, and 8 countries are in Europe and the USA. We complemented this data set with the EASD, which updates value-added and employment data for the 11 existing African countries. EASD also extends the coverage of the data to 7 new countries in Africa, increasing our sample to 49 countries. Of the 49 countries, 8 countries in Europe, along with Hong Kong SAR, China; Japan; Singapore; the Republic of Korea; and the United States, are classified as developed countries. Our analysis is based on the 36 developing countries covered in the GGDC 10-sector database and EASD.

Using this data set, we apply the shift-share methodology to decompose labor productivity growth in developing countries. As mentioned above, labor productivity in a country can grow in two

ways; either within sectors due to innovation, capital accumulation, and more efficient allocation of resources across plants or through the movement of workers from low-productivity sectors to high-productivity sectors.

Aggregate labor productivity growth at time t is defined as the weighted sum of sectoral productivity, with the weights being the employment shares, that is:

$$q_t = \sum_i q_{it} s_{it} \qquad (1)$$

where q_{it} is labor productivity of sector i in time t given by $q_{it} = {}^{Q_{it}}/_{l_{it}}$, with Q_{it} being sector i's real value-added and, l_{it} being the number of persons employed in sector i at time t. Real value-added (volume) is used to measure the growth of output per worker because the nominal value added conflates movement in quantities and prices. s_{it} is the sectoral employment share defined as the ratio of each sector's employment to the total employment of the economy at time t. Given the above, many researchers have decomposed labor productivity growth between time $(t-1)$ and (t) using variant forms of the shift-share method.[5] In this paper, we take inspiration from McMillan and Rodrik (2011) to decompose aggregate labor productivity growth. The approach is given as:

$$\dot{q} = \frac{\Delta q}{q^{t-1}} = \sum_{i=1}^{N} \left[\frac{(q_i^t - q_i^{t-1})}{q_i^{t-1}} \right] s_i^{t-1} + \sum_{i=1}^{N} \left[\frac{(s_i^t - s_i^{t-1})\, q_i^t}{q^{t-1}} \right] \qquad (2)$$

Where N is the number of sectors that exist in the economy. The first term on the right-hand side is the within effect, and the second term is the reallocation effect (structural change). The within effect measures average productivity growth within sectors of an economy due to the adoption of new production techniques, innovation, increment in intra-sectoral allocative efficiency, and productive efficiency. The reallocation effect measures productivity growth mainly due to the improvement in the intersectoral allocative efficiency, i.e., the movement of labor from lower productivity sectors to higher productivity sectors.

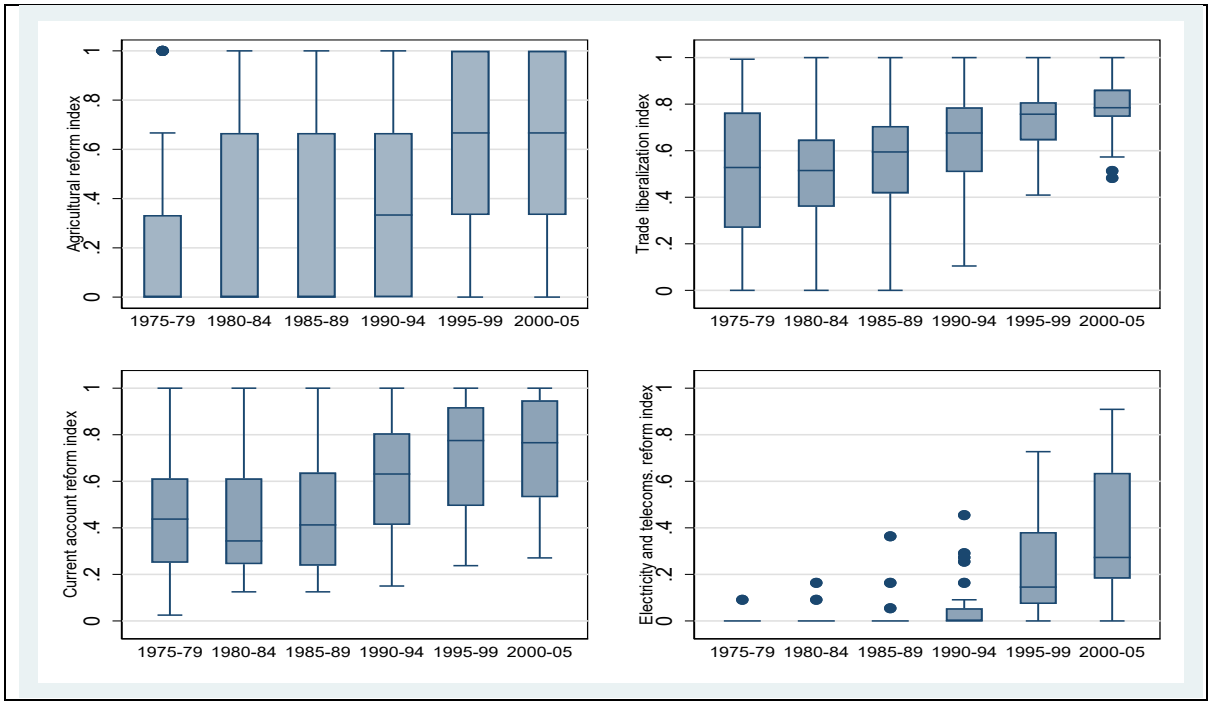
Descriptive statistics

This section discusses the variation in reform indices, the patterns of labor productivity growth, and structural change in developing countries over time. Figures 1 and 2 show the evolution of the (five-year average) indices of real sector reforms and financial markets reforms, respectively, since 1975. For the real sector, reforms related to trade has been more pronounced than reforms related to agriculture and electricity and telecommunications. This is consistent with the observation that structural adjustment programs in product markets were mostly preoccupied with trade openness. In addition, we observe that the distribution of the trade liberalization index narrows over time, indicating that most countries further liberalized their trade regimes. Countries in the sample also underwent deep financial liberalization. We observe a strong variation over time in the domestic financial sector reforms and its two components – banking and securities markets, as well as the financial openness index (capital accounts index). The strong financial liberalization observed in developing countries may be explained by the fact that the structural adjustment

[5] See for example Fabricant, 1942; McMillan, Rodrik & Verduzco-Gallo, 2014; Vries, Timmer, & Vries, 2015.

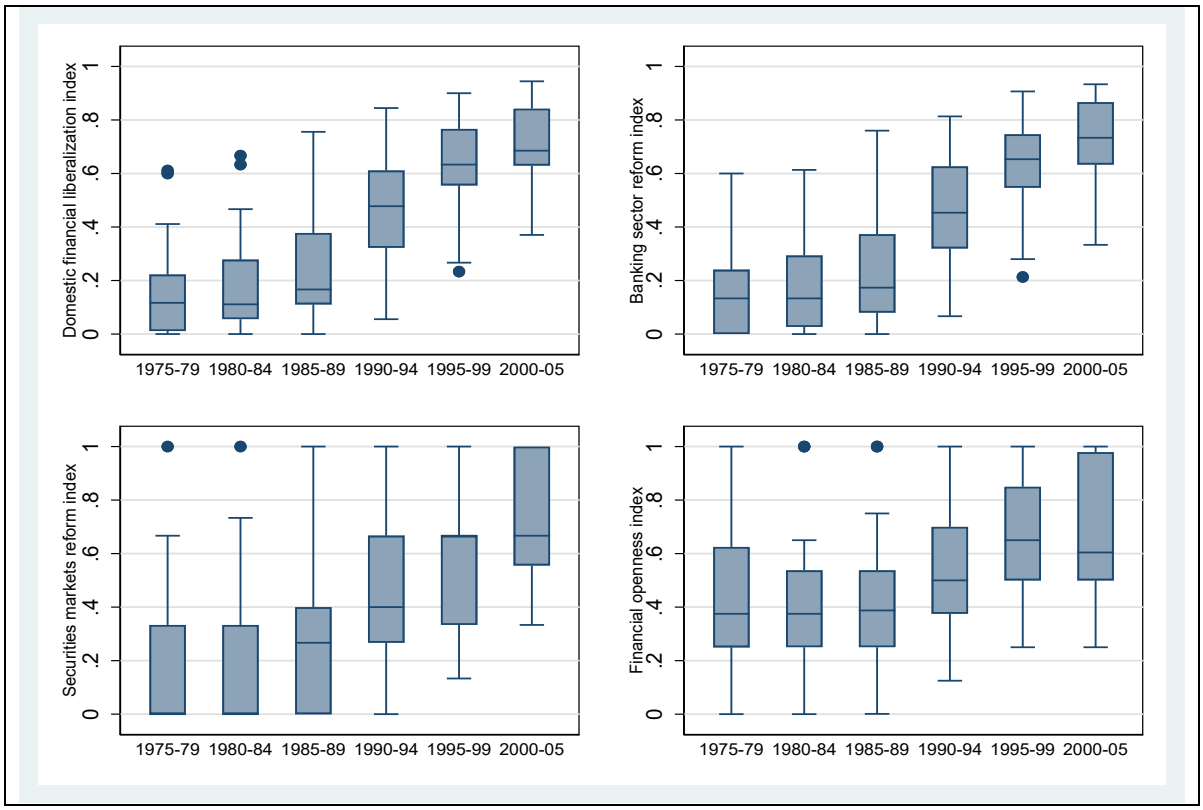
programs or most IMF programs are highly contingent on the recipient's commitment to financial and fiscal reforms.

Figure 1: Real sector reforms



Source: Authors' calculation based on Prati et al. (2013). Higher values indicate a higher degree of liberalization.

Figure 2. Financial markets Reforms



Source: Authors' calculation based on Prati et al. (2013). Higher values indicate a higher degree of liberalization.

Table 1 shows the results of the productivity decomposition exercise by region, respectively. Table 1 confirms regional differences in labor productivity growth, highlighting the potential differences in allocative and productive efficiency. For example, the highest labor productivity growth is observed in Asia, where productivity grew by about 3.5 percent per annum on average. In contrast, productivity growth decreased by about 0.2 percent per annum on average in Latin America due to weak productivity growth within sectors. Productivity grew by 1.4 percent in SSA, with structural change contributing as much as the within effect. There is heterogeneity in productivity growth of the countries within each region. The highest heterogeneity is observed in Africa, with a standard deviation of 6.5 percent. For example, productivity growth is as high as 4.6 percent in Botswana but as low as -0.1 percent in Ethiopia during the same period (see Table A.1 in the appendix).

Table1: Annual Labor Productivity Growth by Region (percent), 1975-2005

Region	Mean (Within)	Mean (Structural Change)	Mean (LP Growth)	SD (LP Growth)
SS Africa	0.7	0.7	1.4	6.5
Asia	2.9	0.6	3.5	1.8
Latin America	-0.8	0.7	-0.2	4.8
MENA	1.5	0.7	2.2	5.2

Source: Authors' calculation based on the GGDC 10-sector database and Expanded Africa Sector Database. Figures are unweighted averages across countries within each region. Due to rounding, the components may not be exactly equal to total productivity growth in this table.

The observed levels of productivity between Asian and non-Asian developing countries are well-documented in the literature. For example, Timmer et al. (2014) find similar productivity patterns and show that while structural change in Asia is characterized by reallocation of labor towards sectors that experience both above-average productivity level and above-average productivity growth, in Africa and Latin America, resources move toward sectors with above-average productivity, but below-average productivity growth, resulting in dynamic productivity loses. McMillan et al. (2014) find a similar productivity difference and argue that the difference in aggregate labor productivity growth between Asian economies and non-Asian economies is due to different patterns of structural change. Relating these findings to the speed of transition from one income level to another, Foster-McGregor and Verspagen (2016) show that the high level of labor productivity growth helped Asian countries to transition faster from one income level to another, compared to non-Asian countries.

4. Estimation model

Our estimation strategy follows the empirical strategy of Prati et al. (2013) closely. The main difference between our paper and the paper of Prati et al. (2013) is that our dependent variable is the growth rate of labor productivity, whereas their dependent variable is the growth rate of GDP per capita. Our main baseline model is an OLS model where we control for country and time fixed-effects and cluster standard errors at the country level. In some of the estimations, we control

for several variables that have been previously identified in the literature as determinants of labor productivity growth. Our three main dependent variables are the growth rate of labor productivity and both the within and structural change components of labor productivity growth. We first estimate the effects of the financial sector, product markets, and trade reforms on the aggregate growth rate of labor productivity between time t-1 and t. The estimating equation is given as follows:

$$Ln(Productivity_{it}) - Ln(Productivity_{it-1}) = \beta_0 + \beta_1 Reforms_{it-1} + \beta_2 Ln(Productivity_{it-1}) + \beta_3 X_{it-1} + \sigma_i + t + \in_{it} \quad \textbf{(3)}$$

The dependent variable $Ln(Productivity_{it}) - Ln(Productivity_{it-1})$, is the annual growth rate of labor productivity for country i at time t. The key parameter of interest is β_1 which measures the effect of a given reform on the growth rate of labor productivity. Because different types of reforms may yield different outcomes, it is important to use the disaggregated indicators. We introduce financial sector, product markets, and trade reforms separately in the model because of the high correlation between the reform variables. We also control for the one-year lag of labor productivity, $Ln(Productivity)_{it-1}$ to test for convergence across countries. In some of our specifications, we include additional control variables that include the initial level of labor productivity growth to test for convergence across countries, the growth rate of the population, endowments of physical and human capital, as well as an indicator of the quality of institutions. Vector t includes period dummies.

The novelty in this paper is to analyze the effect of reforms on the within and the structural change components of the growth rate of labor productivity. The linear OLS model allows us to effectively regress reforms on the within component and the structural change component as a means of decomposing the effect of reforms into an intra-sectoral allocative efficiency channel and an inter-sectoral allocative efficiency channel, respectively. The estimating equations are given as follows:

$$Within_{it} = \alpha_0 + \alpha_1 Reforms_{it-1} + +\alpha_2 Ln(Productivity_{it-1}) + \alpha_3 X_{it-1} + \sigma_i + t + \mu_{it} \quad \textbf{(4)}$$

$$Structural\_change_{it} = \delta_0 + \delta_1 Reforms_{it-1} + \ +\alpha_2 Ln(Productivity_{it-1}) + \ \delta_3 X_{it-1} + \sigma_i + t + \vartheta_{it} \quad \textbf{(5)}$$

Because the estimation models are linear and that the dependent variable in equation (3) is the sum of the dependent variables in equations (4) and (5) and that the control variables are the same across the equations, the effect of a given reform on the aggregate labor productivity growth, β_1, is the sum of the effects of the reform on the two components of the aggregate labor productivity growth. In terms of contribution, the fraction of the effect of a reform on labor productivity growth that comes through the within component is $\left(\frac{|\alpha_1|}{|\alpha_1|+|\delta_1|}\right)$ and the fraction that comes through the between component is $\left(\frac{|\delta_1|}{|\alpha_1|+|\delta_1|}\right)$. The sign of α_1 (δ_1) indicates whether the within (between) component has a negative or a positive contribution on the total effect of reforms on labor productivity growth.

For robustness checks, we employ the dynamic panel method proposed by Arellano & Bond (1991) to correct for possible endogeneity in estimating the effects of reforms on labor

productivity growth. The use of the lagged dependent variable as a regressor in equation (3) may violate the strict exogeneity assumption if the lagged dependent variable and the general error term correlated. The Arellano-Bond (AB) GMM estimator deals with the endogeneity by taking the first difference of equation (3) to remove country-specific unobserved heterogeneity and using lags of the dependent variable as instruments. However, the GMM does not allow us to quantify the distributional effect of structural reforms between the within effect and the structural change effect because, with the GMM, the dependent variable in equation (3) is labor productivity in level, which cannot be decomposed into within and between components. Furthermore, we also estimate a five-year labor productivity growth model to account for the fact that some of the reforms may take longer to affect labor productivity growth.

5. Results and discussion

Reforms and aggregate labor productivity growth

Our baseline results are reported in Table 2, where we regress financial sector, product markets, and trade reforms on the growth rate of labor productivity controlling for the lagged level of labor productivity to test for convergence and country and time fixed effects. We also cluster the standard errors at the country level to correct for the correlation that may occur among observations within countries.

The results show that trade reforms and electricity and telecommunications liberalization have positive effects on the growth rate of labor productivity, and the estimates are statistically significant at the 5% significance level. The result of trade reforms is consistent with expectations of classical trade theory or 'new' new trade theory where trade liberalization could increase labor productivity growth either through specialization according to comparative advantage or provides new opportunities for profits only to the most productive firms, allowing them to pay the entry costs of exporting. As the productive firms expand due to new market opportunities from trade, they increase demand for labor, rising real wages and forcing the least productive firms to exit, inducing a more efficient allocation of resources within sectors. Similarly, electricity and telecommunications liberalization could increase productivity by increasing competition, leading to a reduction in marks-ups and market power, hence a more efficient allocation of resources within or across sectors. The statistically insignificant effect of agricultural reforms is consistent with existing findings that showed that the impact of agricultural reforms on key outcomes such as agricultural production and modern input usage had not met expectations in some developing countries. For example, Kherallah et al. (2000) find that following reforms in the agriculture sector, the average growth rate of agricultural production per capita and modern input use was negative in Africa in the 1980s and 1990s.

For financial sector reforms, we find that reforms in domestic finance, banking, and securities have positive and statistically significant at the 5% or 1% significant levels depending on the reform considered. These positive effects of the financial sector refomrs on the growth rate of labor productivity, confirm the intermediary role that the financial sector plays in the efficient allocation of productive investments (Schumpeter, 1912). Contrary to domestic financial reforms, external capital account liberalization does not significantly affect labor productivity growth in the linear

model. Our results are similar to Rodrik (1998), who found no growth effect of general capital account liberalization. While it is possible that capital account openness could lead to an inflow of investible funds, a lower cost of capital, and increases in productive investments, there is also the risk of the Dutch disease effect, which could render the tradable sector uncompetitive.

Overall, the findings in Table 3 highlight that in general financial sector, product markets, and trade reforms have increased the growth rate of labor productivity in developing countries. This result is in line with previous research that showed a positive relationship between structural reforms and economic growth (Prati et al., 2013), labor productivity growth (Dabla-Norris et al., 2016), and firm productivity growth (Kouamé & Tapsoba, 2019). The estimated coefficient on the logarithm of the initial level of productivity (LnProd(t-1)) is negative and statistically significant across the columns, indicating a convergence process in our data where countries with a lower level of labor productivity growth tend to grow faster and therefore are likely to catch up to countries with a higher level of productivity.

To quantify the sizes of the estimated effects of reforms on labor productivity growth, we follow the approach in Prati et al (2013) by computing the long-term multipliers. The estimated coefficient on a given reform is multiplied by the inverse of (minus) the estimated coefficient on the log of the one-year lag of labor productivity (LnProd(t-1)). This approach captures each reform's dynamics by computing the size of its effect when it moves up from its lowest value (0) to its highest value (1). It also allows us to compare the sizes of the effects of the different reforms on labor productivity growth. Using the baseline results reported in Table 2, we find that for trade reforms, a full tariffs liberalization (i.e a discrete jump from 0 to 1) is associated to an increase of labor productivity by 36% in the long run. A full liberalization of the current account would yield an increase of labor productivity by 70%. These estimates are sizably comparable with the estimates in Prati et al. (2013) that find that a full tariffs liberalization is associated with an increase of 39% of the output per capita in the long term. This value goes up to 65% for a full liberalization of the current account. For a full financial liberalization (domestic finance), we find that a discrete jump from 0 to 1 is associated with an increase of labor productivity by 55% in the long run. This value is less than half of the estimate for the output per capita in Prati et al(2013).

Table.2: Reforms and labor productivity growth

Dependent variable: LnProd(t)-LnProd(t-1)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Trade reforms										
Tariffs(t-1)	0.024**									
	(0.011)									
Current account(t-1)		0.028**								
		(0.013)								
Product market reforms										
Agriculture(t-1)			0.005							
			(0.009)							
Network(t-1)				0.019**						
				(0.008)						
Financial sector reforms										
Domestic finance(t-1)					0.022**					
					(0.009)					
Banking(t-1)						0.020**				
						(0.009)				
Securities(t-1)							0.022***			
							(0.008)			
Capital(t-1)								0.014		
								(0.010)		
Capital resident(t-1)									0.007	
									(0.009)	
Capital nonresident(t-1)										0.013
										(0.008)
LnProd(t-1)	-0.066***	-0.040**	-0.032	-0.024	-0.040***	-0.039***	-0.040***	-0.037**	-0.036**	-0.036**
	(0.015)	(0.018)	(0.019)	(0.016)	(0.012)	(0.012)	(0.013)	(0.016)	(0.017)	(0.016)
Constant	0.661***	0.393**	0.326	0.242	0.400***	0.395***	0.401***	0.373**	0.367**	0.367**
	(0.146)	(0.178)	(0.199)	(0.164)	(0.122)	(0.121)	(0.136)	(0.166)	(0.172)	(0.167)
Observations	1,025	1,075	1,034	1,051	913	913	913	1,075	1,075	1,075
No. of countries	34	32	31	31	28	28	28	32	32	32
R-squared	0.193	0.161	0.163	0.128	0.152	0.152	0.154	0.154	0.152	0.154
Country FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Period FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Notes: Robust standard errors cluster within countries in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table A.2 in the appendix reports findings from the AB GMM estimation. The results further emphasize that the financial sector, product markets, and trade reforms have positive and statistically significant effects on the growth rate of labor productivity. Also, the estimated coefficients of the AB GMM model are higher than the ones obtained with our baseline model. In Table A.3, we include additional control variables to our baseline model. These variables are the growth rate of population, a measure of human capital, and the stock of physical capital as a share of GDP. All these variables are in the natural logarithm. We also include the measure of constraints on the executive from Polity IV to capture the quality of institutions. The estimation results show that most of the reform variables that were significant in the baseline model are still significant in this model. However, the level of significance of product markets and trade reforms has decreased. It is worth noting that many of the additional controls are highly correlated. We add them to test the robustness of the results. However, for the rest of the analysis, we will follow Prati et al. (2013)

to use our baseline model that only controls for initial productivity level and country and time fixed effects. Furthermore, Table A.4 in the appendix shows the estimation results where we replace the annual growth of labor productivity with the five-year growth of labor productivity. We find that most of the reforms have positive effects on the growth rate of labor productivity except for agriculture reform, for which the estimated impact is not statistically significant. These results are consistent with the results obtained with our baseline model using the annual growth rate of labor productivity.

Intra-sectoral or intersectoral reallocation?

The key question we are interested in this paper is whether structural reforms affect labor productivity growth by inducing a more efficient reallocation of resources within sectors, across sectors, or both. We investigate the effects of reforms on these two channels of labor productivity growth using our baseline specification, which controls for country and time fixed-effects, and the initial level of labor productivity. The estimation results using the within component as the dependent variable are reported in Table 3. Trade reforms have a sizable and significant effect on within-sector productivity growth, confirming some of the predictions of "new' new trade theory and pro-competitive models of trade, particularly the idea that countries can still gain from trade without necessarily changing their specialization patterns. Electricity and telecommunications liberalization have positive and statistically significant effects on within-sector productivity growth. By increasing the intensity of competition, product market reforms may have encouraged the spread of ideas, the adoption of better production techniques, technology spillovers, increasing technical and productive efficiency, and hence productivity growth within sectors. Again, agricultural reforms do not affect the within effect, in contrast to the expectation that agricultural reforms will create price incentives, induce a supply response, and increase agricultural productivity growth. The lack of productivity growth within the sector may affect essential input supply to other industries. As demonstrated by Gollin (2009), agricultural productivity growth is necessary for aggregate productivity growth, hence the insignificant effect on the aggregate within effect. Another way to think about the result is that agricultural reforms may not be relevant beyond the agriculture sector itself, hence the limited aggregate within-sector productivity.

Table 3: Reforms and within component of labor productivity growth

Dependent variable: Within component	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Trade reforms										
Tariffs(t-1)	0.028***									
	(0.010)									
Current_account(t-1)		0.027**								
		(0.011)								
Product market reforms										
Agriculture(t-1)			0.003							
			(0.007)							
Network(t-1)				0.022***						
				(0.008)						
Financial sector reforms										
Domestic_finance(t-1)					0.025***					
					(0.008)					
Banking(t-1)						0.023***				
						(0.008)				
Securities(t-1)							0.025***			
							(0.008)			
Capital(t-1)								0.020*		
								(0.010)		
Capital_resident(t-1)									0.010	
									(0.008)	
Capital_nonresident(t-1)										0.019**
										(0.009)
LnProd(t-1)	-0.069***	-0.040**	-0.033	-0.025	-0.044***	-0.043***	-0.044***	-0.038**	-0.036*	-0.037**
	(0.015)	(0.019)	(0.021)	(0.017)	(0.012)	(0.012)	(0.013)	(0.017)	(0.018)	(0.017)
Constant	0.690***	0.397**	0.340	0.259	0.445***	0.440***	0.446***	0.381**	0.374**	0.374**
	(0.147)	(0.187)	(0.212)	(0.171)	(0.125)	(0.123)	(0.136)	(0.173)	(0.181)	(0.173)
Observations	1,025	1,075	1,034	1,051	913	913	913	1,075	1,075	1,075
No. of country	34	32	31	31	28	28	28	32	32	32
R-squared	0.196	0.162	0.164	0.131	0.165	0.164	0.166	0.157	0.155	0.157
Country FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Period FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Notes: Robust standard errors cluster within countries in parentheses. *** p<0.01, ** p<0.05, * p<0.1

For example, Table 4 reports the effect of all reform indices on sectoral labor productivity growth. It shows that while all other reform indices are relevant beyond agriculture, agricultural reforms have no significant impact on the labor productivity of industry and services. This result may reflect how agricultural reforms are measured in the Prati et al. (2013:948) database. In the database, agricultural reform is narrowly defined as "the extent of public intervention in the market of each country's main agricultural export commodity. It includes the presence of export marketing boards and the incidence of administered prices." For example, the main agricultural export commodity of Ghana is cocoa. Structural reforms in the cocoa sector may not have any effect on other sectors, such as the textile industry and telecommunications. A broader measure that includes input and output markets of agricultural products and agricultural land reforms, may capture the agricultural effect on the aggregate within effect more precisely.

All the domestic financial sector reforms are significant and have the expected sign on the within effect. There are many ways through which financial sector reforms may have positively affected within-sector productivity growth. Financial liberalization improves allocative efficiency by allowing investment funds to go to firms with a higher marginal return to capital (Galindo et al., 2007). For within-sector productivity growth, financial reforms lower the cost of credit, allowing financially constrained firms to access capital and produce at a more efficient level. Furthermore, it enables the financing of new machinery, the adoption of new production techniques, and innovation within industries. Our results are consistent with the empirical findings and theoretical

predictions of Larrain & Stumpner (2017). However, easing restrictions on external capital has little effect (nonresidents) or no effect (resident) on within-sector productivity growth. The weak effect of financial openness relates to the benefits and costs of internal capital flows. Easing capital account restrictions could generate inflows such as FDI that can facilitate the transfer of foreign technological knowledge, encourage competition and financial sector development. It also helps firms to insulate themselves against risk by diversification, potentially generating growth within sectors. Conversely, there are increasing risks associated with the fluctuations of internal capital flows such as sudden reversals associated with investor sentiments and the Dutch disease effect.

Table 4: Reforms and sectoral productivity growth

	Agriculture	Industry	Services
Trade Reforms			
Tariffs	0.00451	0.00962*	0.0101*
	(0.00387)	(0.00550)	(0.00538)
Current Account	0.00680	0.00857	0.0131**
	(0.00467)	(0.00515)	(0.00555)
Product market reforms			
Agriculture	0.000685	0.00140	0.00329
	(0.00286)	(0.00458)	(0.00354)
Network	-0.000378	0.00748**	0.0118***
	(0.00258)	(0.00328)	(0.00397)
Financial Sector Reforms			
Domestic Finance	0.00490	0.00673*	0.0104***
	(0.00311)	(0.00369)	(0.00371)
Banking	0.00478	0.00566	0.00985**
	(0.00315)	(0.00382)	(0.00367)
Securities	0.00370	0.00939***	0.00932***
	(0.00274)	(0.00322)	(0.00335)
Capital	0.00246	0.00442	0.00744
	(0.00390)	(0.00419)	(0.00461)
Capital Resident	0.000737	0.00290	0.00375
	(0.00306)	(0.00401)	(0.00441)
Capital Non-Residents	0.00268	0.00236	0.00766*
	(0.00349)	(0.00438)	(0.00425)

Notes: Robust standard errors cluster within countries in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 5 shows the results of the effects of reforms on the structural change component. The estimated coefficients on both financial sector, product markets, and trade reforms are all insignificant. While these insignificant effects on structural change are expected from reforms such as agricultural reforms, at least in the short run, for some reforms such as trade reforms, the zero effect on structural change is surprising. Traditional trade theory predicts that countries gain from trade liberalization through specialization in areas of comparative advantage and through changes in relative prices, which induce structural change. However, our results should be interpreted with caution since some structural change effects of reforms are conditional on land and labor market institutions and may also be realized in the long term. For example, if trade liberalization allows firms to import cheaper capital and intermediates inputs, but firing and hiring costs are still high, firms will adopt more capital intensive methods of production and favor a process of creative destruction (Pariboni & Tridico, 2019), where the Schumpeterian engine of innovation generates productivity growth within sectors but not structural change due to lack of labor flexibilization. However, we do not have data on land and labor market reforms to test some of these

mechanisms.[6] As a second-best solution, we examine the long-run effects of reforms on labor productivity growth and its two components. Presumably, in countries where land reforms and labor market reforms are complementary to the reforms we have considered, the structural change effects of the various institutional reforms should be realized after five years.

Table 5: Reforms and structural change

Dependent variable: Between component	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Trade reforms										
Tariffs(t-1)	-0.004									
	(0.006)									
Current_account(t-1)		0.001								
		(0.006)								
Product market reforms										
Agriculture(t-1)			0.003							
			(0.005)							
Network(t-1)				-0.003						
				(0.006)						
Financial sector reforms										
Domestic_finance(t-1)					-0.003					
					(0.006)					
Banking(t-1)						-0.003				
						(0.006)				
Securities(t-1)							-0.003			
							(0.006)			
Capital(t-1)								-0.006		
								(0.008)		
Capital_resident(t-1)									-0.003	
									(0.006)	
Capital_nonresident(t-1)										-0.006
										(0.007)
LNProd(t-1)	-0.029	-0.004	-0.014	-0.017	-0.045	-0.045	-0.045	-0.009	-0.007	-0.007
	(0.056)	(0.049)	(0.053)	(0.051)	(0.061)	(0.061)	(0.061)	(0.049)	(0.049)	(0.047)
Constant	-0.029	-0.004	-0.014	-0.017	-0.045	-0.045	-0.045	-0.009	-0.007	-0.007
	(0.056)	(0.049)	(0.053)	(0.051)	(0.061)	(0.061)	(0.061)	(0.049)	(0.049)	(0.047)
Observations	1,025	1,075	1,034	1,051	913	913	913	1,075	1,075	1,075
No. of countries	34	32	31	31	28	28	28	32	32	32
R-squared	0.081	0.079	0.079	0.078	0.075	0.075	0.075	0.081	0.080	0.082
Country FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Period FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Notes: Robust standard errors cluster within countries in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Overall, the results of the analysis have shown that structural reforms have increased the growth rate of labor productivity, mainly through the within component. Structural reforms work by increasing dynamic efficiency, productive efficiency (i.e., operating at a more efficient level due to competition, and allocative efficiency (i.e., inducing a more efficient reallocation of resources within sectors). However, reforms do not induce structural change in developing countries.

In Table 6 we decompose the contribution of the effect of reforms on the growth rate of labor productivity that comes through the within component and through the structural change component. Among trade reforms, current account reform is the one that has the highest effect on labor productivity growth arising through the within component. More than 96 percent of the

[6] In the revised version of this paper, we assess the role of labor market institutions using a new dataset on labor market rigidity.

effect of current account reforms on the growth rate of labor productivity comes through the within component, with just 3.6 percent coming from the structural change/between component. These values are around 88 percent and 12 percent for trade and electricity and telecommunications reforms. Agriculture is the only product market reforms for which there is an equal contribution through the within and structural change components. Still, the previous table has shown that agriculture reforms did not significantly affect any of the dependent variables.

Table 6: Decomposition of the effects of reforms between the within and between components

	Within component	Between component	Total
Tariffs reforms			
Trade	+87.5***	|-12.5|	100
Current Account	+96.4**	+3.6	100
Product market reforms			
Agriculture	+50.0	+50.0	100
Network	+88.0***	|-12.0|	100
Financial sector reforms			
Domestic_finance	+89.3***	|-10.7|	100
Banking	+88.5***	|-11.5|	100
Securities	+89.3***	|-10.7|	100
Capital	+76.9*	|-23.1|	100
Capital_resident	+76.9	|-23.1|	100
Capital_nonresident	+76.0**	|-24.0|	100

Turning now to the financial sector reforms, we find that domestic finance, banking, and securities reforms have roughly 89 percent of their effects on the growth rate of labor productivity coming from within component and only around 11 percent from the structural change/between component. Looking at reforms on capital and resident and nonresident capital reforms, we find that they also record higher contributions through the within component than the structural change.

In the next Table 7, we replicate the same exercise, decomposing the effects of the different reforms on the five years growth rate of labor productivity. Consistently to the previous table, most of the reforms work mainly through the within-sector effect but not through structural change. In fact, between 81 percent and 98 percent of the effect of product markets and trade reforms come through the within component dependent on the indices of reforms used. These values are 84 percent and 99 percent for the financial sector reforms.

Table 7: Decomposition for the 5-year growth of labor productivity

	Within component	Between component	Total
Trade reforms			
Tariffs	+81***	19	100
Current_account	+97***	3	100
Product market reforms			
Agriculture	98	|-2|	100
Network	+86***	|14|	100
Financial sector reforms			
Domestic_Finance	+95***	|5|	100
Banking	+94	|6|	100
Securities	99.5***	0.5	100
Capital	+97***	|-3|	100
Capital_resident	+90***	10	100
Capital_nonresident	+84***	|-16|	100

Distance to the frontier

The Schumpeterian theory argues that the level of development of a country can be measured by its distance to the technological frontier. As such, the types of policies needed as well as their degree of effectiveness may depend on the stage of development of a country or its closeness to the technological frontier. One of the key findings of the nascent literature on the effects of reforms on economic performance is that the effect may depend on the distance to the technological frontier. For instance, Prati et al. (2013) have shown that closeness to the technological frontier shapes the effects of reforms on GDP per capita growth differently depending on the types of reforms where trade products markets reforms benefit more countries that are far more the frontier while financial reforms are more effective for countries that are close to the frontier. Using labor productivity growth as a dependent variable, Dabla-Norris et al. (2016) have shown that countries far from the technological frontier benefit more from structural reforms than others. The obvious reason is that the closer a country is to the frontier, the closer its allocative efficiency, dynamic efficiency, and productive efficiency are to the frontier. As a result, reforms that aim to improve these productivity mechanisms may not positively affect countries closer to the frontier than countries that are far away from the frontier. Using interaction terms, we modify our baseline model to test if closeness to the technological frontier increases or decreases the effect of reforms on the growth rate of labor productivity and its sub-components. Following the literature, we consider the US as the country with the highest technology. For each country and year, we compute the technology distance as the ratio of the labor productivity of the country to the labor productivity of the US for the same year. A ratio lower than one indicates that the country is below the technological frontier, and an equal ratio one means that the country has reached the technological frontier.

Let us denote by $frontier_{it-1}$ the distance to the technological frontier at time t-1:

$frontier_{it-1} = \frac{Ln(Productivity_{it-1})}{Ln(Productivity_{it-1}US)}$ where $Productivity_{it-1}US$ is the labor productivity level of the technological leader, i.e., the US.

Our modified model of specification is given by:

$$Ln(Productivity_{it}) - Ln(Productivity_{it-1}) = \beta_0 + \beta_1 frontier_{it-1} + \beta_2 Reforms_{it-1} + \beta_3 (Reforms_{it-1} \times frontier_{it-1}) + \beta_4 X_{it-1} + \sigma_i + t + \in_{it} \quad \textbf{(6)}$$

The observations included in our sample are all below the frontier, and the total effect of reforms on labor productivity growth is then given by:

$$\beta_2 + \beta_3 \times frontier$$

Table 8 presents the results using the growth rate of labor productivity as the dependent variable. For product markets and trade reforms, we find positive signs on the estimated coefficients of the variable reforms and negative signs on the interaction terms, but they are statistically significant only for the current account reform variable. This indicates that current account reforms have a

positive effect on the growth rate of labor productivity, but this effect reduces when the countries get closer to the technological frontier. This is because the closer the country's productivity is to the US, the freer its trade regime may be; therefore, easing restriction on the current account may not generate significant any trade grains compared to countries far away from the productivity level of the US. For financial sector reforms – domestic finance, banking, and securities reforms – the results show positive and statistically significant effects on labor productivity but negative and statistically significant coefficients on the interaction with the distance to the frontier. Results for current account reforms are found to be similar. Generally, financial sector reforms positively affect labor productivity growth, but that diminishes with proximity to the technology leader. From this table, we can conclude that countries far from the technological frontier benefit more from structural reforms than countries closer to the technology leader.

Table 8: Reforms and labor productivity growth with distance to the technological frontier

Dependent variable: Labor productivity growth	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Dist_front(t-1)	-0.797***	-0.381*	-0.469	-0.357	-0.529***	-0.527***	-0.515***	-0.383	-0.420*	-0.376
	(0.180)	(0.206)	(0.279)	(0.217)	(0.139)	(0.140)	(0.135)	(0.226)	(0.228)	(0.239)
Trade reforms										
Tariffs(t-1)	0.138									
	(0.091)									
Dist_front(t-1)*Tariffs(t-1)	-0.154									
	(0.111)									
Current_account(t-1)		0.313***								
		(0.110)								
Dist_front(t-1)*Current_account(t-1)		-0.361***								
		(0.128)								
Product market reforms										
Agriculture(t-1)			0.124							
			(0.086)							
Dist_front(t-1)*Agriculture(t-1)			-0.152							
			(0.097)							
Network(t-1)				0.152						
				(0.243)						
Dist_front(t-1)*Network(t-1)				-0.165						
				(0.280)						
Financial sector reforms										
Domestic_finance(t-1)					0.279***					
					(0.087)					
Dist_front(t-1)*Domestic_finance(t-1)					-0.322***					
					(0.103)					
Banking(t-1)						0.255***				
						(0.083)				
Dist_front(t-1)*Banking(t-1)						-0.297***				
						(0.098)				
Securities(t-1)							0.338***			
							(0.097)			
Dist_front(t-1)*Securities(t-1)							-0.380***			
							(0.113)			
Capital(t-1)								0.282		
								(0.209)		
Dist_front(t-1)*Capital(t-1)								-0.332		
								(0.241)		
Capital_resident(t-1)									0.196	
									(0.148)	
Dist_front(t-1)*Capital_resident(t-1)									-0.233	
									(0.172)	
Capital_nonresident(t-1)										0.252
										(0.195)
Dist_front(t-1)*Capital_nonresident(t-1)										-0.297
										(0.225)
Constant	0.721***	0.354*	0.436*	0.324	0.484***	0.483***	0.468***	0.356*	0.388*	0.350
	(0.162)	(0.185)	(0.255)	(0.197)	(0.127)	(0.128)	(0.121)	(0.202)	(0.204)	(0.214)
Observations	983	1,032	991	1,008	871	871	871	1,032	1,032	1,032
No. of countries	33	31	29	29	27	27	27	31	31	31
R-squared	0.202	0.177	0.174	0.130	0.169	0.168	0.173	0.165	0.162	0.163
Country FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Period FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Notes: Robust standard errors cluster within countries in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Finally, we investigate if the distance to the technological frontier also matters for the impacts of reforms on the within and structural change components. The results for both components are reported in tables A.5 and A.6 A in the appendix, respectively. Like the previous estimations, we find that current account, domestic finance, banking, and securities reforms all have positive effects on the within component (Table A.5). Still, these effects decline as the productivity gap with the technological frontier reduces. Table A.6 repeats the same exercise using the structural change component as the dependent variable. Most of the estimated coefficients are not significant. Still, we find, in a few cases, a positive sign on the coefficient of reforms and a negative sign on the interaction term between product markets and trade reforms and technological distance to the US, although the level of significance is 10 percent.

6. Concluding remarks

It is widely recognized that productivity is an important determinant of countries' economic performance in the long run. Understanding which policies raise productivity growth in developing countries is essential, given the low level of productivity and a limited number of studies. This paper adds to the limited literature on the impacts of structural reforms on productivity growth in low-income and lower-middle-income countries. It pays particular attention to how reforms affect the movement of labor across sectors of the economy, i.e., structural change. The empirical analysis combines the data set on structural reforms from Prati et al. (2013) with a sectoral database from the GGDC 10-sector database and EASD to compute productivity growth and structural change. Our findings show that financial sector reforms have greater effects on the growth rate of labor productivity than product market and trade reforms. However, reforms affect the within and the structural change contributions differently. Financial sector reforms have positive effects on the within component of the productivity growth rate.

In contrast, the different reforms have either a negative effect or no effect on structural change. The results show that reforms affect growth in developing countries mostly by inducing within-sector productivity growth but not structural change, further providing empirical support for the argument that many developing countries had structural adjustment programs without structural change (Page, 2012). Our analysis demonstrates that market-oriented reforms alone will not be able to deliver structural change in developing countries; therefore, there is a prima facie rationale for complementary industrial policies.

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7. Appendix

Table A.1: Average Annual Labor Productivity Growth by Country (percent), 1975-2005

Region	Country	Within Effect	Structural Change	LP Growth
1. SSA	Botswana	4.2	0.3	4.6
	Burkina Faso	2.6	1.0	3.6
	Cameroon	0.6	1.6	2.2
	Ethiopia	-0.8	0.7	-0.1
	Ghana	0.3	0.1	0.5
	Kenya	-1.5	0.9	-0.6
	Lesotho	1.1	0.9	2.0
	Malawi	-0.7	0.8	0.2
	Mauritius	2.4	0.7	3.1
	Mozambique	2.6	0.1	2.7
	Namibia	1.4	0.2	1.6
	Nigeria	1.6	-0.1	1.5
	Rwanda	0.5	1.4	1.9
	Senegal	-1.8	1.1	-0.7
	South Africa	0.1	0.6	0.7
	Tanzania	0.4	1.1	1.6
	Uganda	-0.7	1.8	1.1
	Zambia	-0.2	-0.9	-1.0
2. Asia	China	5.5	1.1	6.6
	India	1.4	1.1	2.5
	Indonesia	1.3	1.1	2.4
	Malaysia	4.6	-1.1	3.5
	Philippines	0.6	0.3	1.0
	Taiwan, China	4.7	-0.3	4.4
	Thailand	2.2	1.7	3.8
3. Latin America	Argentina	0.4	-0.5	-0.1
	Bolivia	-1.4	1.3	-0.1
	Brazil	-1.2	1.1	0.0
	Chile	1.7	0.4	2.0
	Colombia	-0.6	0.6	0.0
	Costa Rica	-1.0	1.0	0.0
	Mexico	-1.5	1.0	-0.5
	Peru	-1.7	0.8	-0.9
	Venezuela, RB	-2.3	0.4	-1.9
4. MENA	Egypt, Arab Rep.	2.6	0.7	3.3
	Morocco	0.4	0.6	1.0

Source: Authors' calculation based on the GGDC 10-sector database and Expanded Africa Sector Database. Due to rounding, the components may not be exactly equal to total productivity growth in this table.

Table A.2: Reforms and labor productivity growth, Dynamic-panel data estimations

Dependent variable: LnProd(t)-LnProd(t-1)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Trade reforms										
Trade(t-1)	0.051**									
	(0.025)									
Current_account(t-1)		0.082***								
		(0.022)								
Product markets reforms										
Agriculture(t-1)			0.041**							
			(0.019)							
Network(t-1)				0.059**						
				(0.026)						
Financial sector reforms										
Domestic_finance(t-1)					0.100**					
					(0.041)					
Banking(t-1)						0.097**				
						(0.039)				
Securities(t-1)							0.070***			
							(0.027)			
Capital(t-1)								0.079***		
								(0.022)		
Capital_resident(t-1)									0.062***	
									(0.017)	
Capital_nonresident(t-1)										0.074***
										(0.023)
LnProd(t-1)	0.932***	0.921***	0.936***	0.924***	0.750***	0.756***	0.830***	0.941***	0.957***	0.948***
	(0.048)	(0.029)	(0.031)	(0.047)	(0.070)	(0.066)	(0.063)	(0.028)	(0.028)	(0.027)
Observations	991	1,043	1,003	1,020	885	885	885	1,043	1,043	1,043
No. of countries	34	32	31	31	28	28	28	32	32	32
Country FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Period FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
AR (1) Test P-value	0.013	0.005	0.000	0.001	0.001	0.001	0.005	0.005	0.005	0.005
AR (2) Test P-value	0.700	0.341	0.166	0.218	0.276	0.281	0.151	0.394	0.385	0.404
Hansen Test P-value	0.644	0.727	0.806	0.776	0.815	0.821	0.789	0.680	0.736	0.657

Robust standard errors cluster within countries in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table A.3: Reforms and labor productivity growth with additional control variables

Dependent variable: LnProd(t)-LnProd(t-1)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Trade reforms										
Tariffs(t-1)	0.022*									
	(0.012)									
Current_account(t-1)		0.030*								
		(0.017)								
Product markets reforms										
Agriculture(t-1)			-0.004							
			(0.011)							
Network(t-1)				0.022						
				(0.014)						
Financial sector reforms										
Domestic_finance(t-1)					0.049**					
					(0.018)					
Banking(t-1)						0.041**				
						(0.017)				
Securities(t-1)							0.046***			
							(0.013)			
Capital(t-1)								0.011		
								(0.014)		
Capital_resident(t-1)									0.004	
									(0.011)	
Capital_nonresident(t-1)										0.008
										(0.012)
LnProd(t-1)	-0.070***	-0.038**	-0.037	-0.017	-0.030**	-0.030**	-0.031**	-0.039**	-0.039**	-0.039**
	(0.016)	(0.018)	(0.022)	(0.018)	(0.014)	(0.014)	(0.015)	(0.018)	(0.019)	(0.019)
lnpop_growth(t-1)	0.030	0.004	-0.672	-0.517	-0.490	-0.537	-0.292	0.015	0.009	0.017
	(0.199)	(0.233)	(0.556)	(0.473)	(0.693)	(0.687)	(0.640)	(0.235)	(0.239)	(0.236)
ln_humanCapital(t-1)	0.014	-0.005	0.032	-0.020	-0.081	-0.069	-0.071	0.016	0.022	0.018
	(0.028)	(0.031)	(0.031)	(0.040)	(0.061)	(0.060)	(0.052)	(0.030)	(0.027)	(0.030)
ln_capital/GDP(t-1)	-0.011	0.001	-0.035*	-0.028	-0.030	-0.030	-0.031	-0.004	-0.005	-0.005
	(0.032)	(0.027)	(0.018)	(0.019)	(0.025)	(0.025)	(0.024)	(0.029)	(0.029)	(0.029)
Xconst(t-1)	0.001	0.000	-0.000	0.001	0.000	0.000	-0.000	-0.000	0.000	0.000
	(0.002)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Constant	0.735***	0.375	0.550**	0.346	0.535**	0.526**	0.535**	0.403*	0.407*	0.402
	(0.203)	(0.235)	(0.263)	(0.236)	(0.206)	(0.208)	(0.218)	(0.237)	(0.239)	(0.240)
Observations	985	1,038	980	995	874	874	874	1,038	1,038	1,038
No. of countries	34	32	31	31	28	28	28	32	32	32
R-squared	0.195	0.159	0.179	0.139	0.166	0.163	0.166	0.153	0.152	0.153
Country FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Period FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Robust standard errors cluster within countries in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table A.4: Reforms and 5-years growth of labor productivity

Dependent variable: LnProd(t)-LnProd(t-5)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Trade reforms										
Tariffs(t-5)	0.226***									
	(0.0674)									
Current Account(t-5)		0.236***								
		(0.0587)								
Product markets reforms										
Agriculture(t-5)			0.0685							
			(0.0551)							
Network(t-5)				0.156***						
				(0.0463)						
Financial sector reforms										
Domestic Finance(t-5)					0.191***					
					(0.0517)					
Banking(t-5)						0.179***				
						(0.0514)				
Securities(t-5)							0.189***			
							(0.0438)			
Capital(t-5)								0.183***		
								(0.0456)		
Capital Resident(t-5)									0.169***	
									(0.0501)	
Capital nonresident(t-5)										0.117**
										(0.0429)
LNProd(t-5)	-0.254***	-0.176*	-0.103	-0.0897	-0.194**	-0.189**	-0.193**	-0.148	-0.139	-0.136
	(0.0759)	(0.101)	(0.106)	(0.0955)	(0.0873)	(0.0871)	(0.0916)	(0.0910)	(0.0935)	(0.100)
Constant	2.466***	1.658	1.027	0.899	1.918**	1.876**	1.903*	1.437	1.342	1.362
	(0.776)	(1.021)	(1.088)	(0.971)	(0.889)	(0.887)	(0.930)	(0.934)	(0.962)	(1.017)
Observations	213	214	206	209	186	186	186	214	214	214
R-squared	0.475	0.467	0.393	0.329	0.389	0.384	0.394	0.434	0.429	0.417

Robust standard errors cluster within countries in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Country fixed effects are included in all the estimations

Table A.5: Reforms and within component of labor productivity growth with distance to the technological frontier

Dependent variable: Within component	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Dist_front	-0.853***	-0.409*	-0.485	-0.363	-0.564***	-0.562***	-0.556***	-0.382	-0.426*	-0.362
	(0.190)	(0.224)	(0.294)	(0.224)	(0.131)	(0.133)	(0.124)	(0.229)	(0.234)	(0.238)
Trade reforms										
Tariffs(t-1)	0.055									
	(0.095)									
Dist_front(t-1)*Tariffs(t-1)	-0.047									
	(0.112)									
Current_account(t-1)		0.243**								
		(0.099)								
Dist_front(t-1)*Current_account(t-1)		-0.276**								
		(0.117)								
Product markets reforms										
Agriculture(t-1)			0.034							
			(0.066)							
Dist_front(t-1)*Agriculture(t-1)			-0.046							
			(0.075)							
Network(t-1)				0.162						
				(0.172)						
Dist_front(t-1)*Network(t-1)				-0.173						
				(0.201)						
Financial sector reforms										
Domestic_finance(t-1)					0.212***					
					(0.076)					
Dist_front(t-1)*Domestic_finance(t-1)					-0.238**					
					(0.088)					
Banking(t-1)						0.192**				
						(0.073)				
Dist_front(t-1)*Banking(t-1)						-0.217**				
						(0.085)				
Securities(t-1)							0.273***			
							(0.092)			
Dist_front(t-1)*Securities(t-1)							-0.300***			
							(0.106)			
Capital(t-1)								0.284		
								(0.187)		
Dist_front(t-1)*Capital(t-1)								-0.328		
								(0.216)		
Capital_resident(t-1)									0.179	
									(0.118)	
Dist_front(t-1)*Capital_resident(t-1)									-0.210	
									(0.139)	
Capital_nonresident(t-1)										0.276
										(0.188)
Dist_front(t-1)*Capital_nonresident(t-1)										-0.319
										(0.217)
Constant	0.766***	0.380*	0.449	0.333	0.517***	0.515***	0.506***	0.357*	0.395*	0.340
	(0.172)	(0.200)	(0.268)	(0.204)	(0.119)	(0.121)	(0.112)	(0.204)	(0.210)	(0.213)
Observations	983	1,032	991	1,008	871	871	871	1,032	1,032	1,032
No of countries	33	31	29	29	27	27	27	31	31	31
R-squared	0.203	0.174	0.173	0.134	0.177	0.175	0.181	0.169	0.164	0.169
Country FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Period FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Robust standard errors cluster within countries in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table A.6: Reforms and structural change with distance to the technological frontier

Dependent variable: Structural change	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Dist_front	0.055	0.028	0.015	0.006	0.035	0.035	0.041	-0.001	0.006	-0.014
	(0.065)	(0.053)	(0.064)	(0.064)	(0.067)	(0.067)	(0.067)	(0.049)	(0.053)	(0.045)
Trade reforms										
Tariffs(t-1)	0.083*									
	(0.045)									
Dist_front(t-1)*Tariffs(t-1)	-0.107*									
	(0.054)									
Current_account(t-1)		0.070								
		(0.041)								
Dist_front(t-1)*Current_account(t-1)		-0.086*								
		(0.048)								
Product market reforms										
Agriculture(t-1)			0.089*							
			(0.046)							
Dist_front(t-1)*Agriculture(t-1)			-0.105*							
			(0.053)							
Network(t-1)				-0.010						
				(0.125)						
Dist_front(t-1)*Network(t-1)				0.008						
				(0.145)						
Financial sector reforms										
Domestic_finance(t-1)					0.066					
					(0.041)					
Dist_front(t-1)*Domestic_finance(t-1)					-0.084					
					(0.050)					
Banking(t-1)						0.063				
						(0.037)				
Dist_front(t-1)*Banking(t-1)						-0.080*				
						(0.045)				
Securities(t-1)							0.066			
							(0.050)			
Dist_front(t-1)*Securities(t-1)							-0.080			
							(0.059)			
Capital(t-1)								-0.002		
								(0.065)		
Dist_front(t-1)*Capital(t-1)								-0.003		
								(0.073)		
Capital_resident(t-1)									0.017	
									(0.058)	
Dist_front(t-1)*Capital_resident(t-1)									-0.023	
									(0.066)	
Capital_nonresident(t-1)										-0.024
										(0.057)
Dist_front(t-1)*Capital_nonresident(t-1)										0.022
										(0.065)
Constant	-0.045	-0.025	-0.014	-0.008	-0.032	-0.032	-0.039	-0.001	-0.008	0.011
	(0.059)	(0.048)	(0.058)	(0.058)	(0.061)	(0.061)	(0.061)	(0.044)	(0.048)	(0.041)
Observations	983	1,032	991	1,008	871	871	871	1,032	1,032	1,032
No of countries	33	31	29	29	27	27	27	31	31	31
R-squared	0.091	0.088	0.092	0.080	0.085	0.085	0.083	0.083	0.082	0.085
Country FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Period FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Robust standard errors cluster within countries in parentheses. *** p<0.01, ** p<0.05, * p<0.1