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Rethinking African Paths to Industrial Development

Firms, Productivity Dispersion and Reallocation

Some Implications for Industrial Policy in Developing Countries

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Abstract

A recent, dynamic research programme has uncovered the extent to which the misallocation of factors of production can reduce aggregate productivity. The evidence suggests that the incidence of misallocation is greater in developing countries, although there is a lively debate on the best methods for calculating it, and on how data mismeasurement can affect the results. In this paper, we survey contributions estimating the size of the productivity shortfalls resulting from misallocation and discuss some of their possible causes. Among them, we give special emphasis to the quality of management practices, which have also been the subject of recent research. We then consider the main implications of the misallocation literature for thinking about growth, before concluding with policy implications for developing countries. Although it is still too early in the research programme to derive strong policy recommendations, we argue that it has already provided new angles for thinking about firm-related policies, as it reveals the firm dynamics most likely to be consistent with aggregate productivity growth, and spells out some of the mechanisms through which this growth is likely to come about. For the modal African economy, the implication is that policy should focus on improving capabilities among the larger, more productive firms, while also encouraging the movement of factors of production towards them.

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1. Introduction

The correlation between income levels and economywide productivity is one of the main stylized facts of economic development. Much early work ascertained this fact by comparing macro data, but a recent literature has uncovered the extent to which resources are misallocated between the firms in an economy. While structuralists (eg. Lewis 1954) have for long called attention to inter-sectoral differences in productivity, there is reason to believe that *within*-sector productivity dispersion is also substantial. These findings have stimulated the growth of a research programme aimed at measuring the size of misallocations and discovering its causes, which is at the frontier of academic research on industrial economics and growth. While Hopenhayn (2014a) and Restuccia and Rogerson (2017a) provide excellent research-oriented surveys, our aim in this piece is to explore the policy implications of these findings, particularly for low-income countries.

We start by presenting the results of papers documenting the extent of misallocation, followed by a discussion of its possible causes. Among these, we emphasize the quality of management practices, which has been the subject of a substantial body of research in the past decade. We then discuss some papers that estimate the potential productivity gains from reallocation, and assess the dynamic implications of productivity dispersion. Subsequently, in the final section, we conclude that despite being too early in the research programme to confidently derive policy implications, the productivity dispersion literature alerts us to the firm dynamics most likely to be consistent with aggregate productivity growth, and spells out some of the mechanisms through which this is likely to occur. As such, it provides new angels for thinking about firm-related policies, suggesting economic policy in African countries should focus on improving the capabilities of larger, more productive firms, while encouraging the movement of factors of production towards them, thus generating growth-promoting structural change.

2. Evidence of Misallocation

The research on misallocation centres on how the distribution of factors of production – primarily labour and capital, but also including land when dealing with agriculture – affects aggregate productivity levels. There is plenty of microeconomic evidence indicating that modern economies can sustain substantial productivity variations. Syverson (2004), for example, finds that within four-digit manufacturing industries in the USA, "the plant at the 90th percentile of the productivity distribution makes almost

twice as much output with the *same measured inputs* as the 10th percentile plant." Similarly, Criscuolo, Haskel and Martin (2003) find that in the UK in 2000, the plant at the 90th percentile of the productivity distribution was 1.5 times as productive as the plant at the 10th percentile. While these results document the extent to which factors are combined more or less efficiently at different points of the productivity distribution, they cannot tell us how much *aggregate* productivity is reduced by misallocation. Restuccia and Rogerson (2008) suggest that these effects could be sizeable. They show theoretically that policies that distort the input prices faced by heterogeneous producers, leading to an inefficient factor allocation, can result in reductions in aggregate TFP in the range of 30%-50%.

Hsieh and Klenow (2009) respond to this finding with an innovative methodology (more on it below) that allows them to estimate how much aggregate Total Factor Productivity (TFP) is lost through factor misallocation. They use plant-level data from the USA, China and India to measure the dispersion in the marginal products of capital and labour within individual four-digit manufacturing sectors in each country. They find that there is a much wider distribution of marginal revenue productivity levels in China and India compared to the USA, and that moving to a distribution of marginal products like that of the USA (taken to be a relatively undistorted economy) would increase aggregate TFP by 30%-50% in China and 40%-60% in India. If capital were to accumulate as a response to the increase in TFP, so as to keep the rental rate of capital constant, the increase in TFP would be even higher, at 67% for China and 153% for India. These are undoubtedly large magnitudes. In fact, according to the authors' estimates, resource misallocation might be responsible for roughly 49% of the TFP gap between the USA and China and 35% of the TFP gap between the USA and India.

Subsequent papers use similar methodologies to Hsieh and Klenow to find further evidence of productivity dispersion. Garicano, LeLarge and Van Reenen (2013) build a counterfactual model for the productivity distribution in French plants and find that an inefficient allocation of labour results in a deadweight loss of 5% of GDP, while in the case of Chile, Petrin and Sivadasan (2011) find that an efficient allocation of inputs would have resulted in a 0.5% increase in aggregate value added between 1982 and 1994. There is also evidence of misallocation in African countries. Kalemli-Ozcan and Sorensen (2016) find that capital misallocation is greater for firms in a set of ten African countries than in comparators such as Germany, Ireland, Spain and South Korea, though not in India. Similar results were found for ten Latin American countries (Busso, Madrigal and Pagés 2013).

The results reported above all come from the manufacturing sector, on which the research has focused. But there is reason to believe that productivity dispersion in

other sectors may be even higher (Duarte and Restuccia 2010; Gollin, Lagakos and Waugh 2014). Restuccia and Santaeulalia-Llopis (2017), Adamopoulos, Brandt, Leight, and Restuccia (2017), and Chen, Restuccia, and Santaeulalia-Llopis (2017) all document substantial misallocations of land limiting the productivity of the agricultural sector in Malawi, China, and Ethiopia, respectively. They trace this misallocation to the lack of properly-functioning land markets, which limits the expansion of the most efficient producers. There also is evidence of misallocation in the retail sector (De Vries 2014; Dias, Marques, and Richmond 2016).

2.1 Measurement and Methodological Issues

Although the productivity dispersion literature offers fresh insights on the drivers of productivity in developing countries, it is important not to lose sight of measurement issues. For example, the dispersion in firm productivity could well be a consequence of random measurement error, meaning that inputs and outputs are measured with error and that these errors are not correlated. If, as one would expect, measurement error is more prevalent in developing countries, then this could explain their higher productivity dispersion.[1] In response to this possibility, Bils, Klenow and Ruane (2017) come up with a way of using panel data on US and Indian manufacturing firms to obtain estimates of measurement error and calculate lost productivity due to misallocation. They find that the dispersion of marginal revenue products is much lower once we account for measurement error, and that the contribution of measurement error has been rising in the USA. Still, even when accounting for measurement error, differences in productivity dispersion continue to explain 40-60 percent of the TFP differences between India and the USA, a similar magnitude to that found in Hsieh and Klenow (2009).

The results of White, Reiter and Petrin (2017) are less reassuring. They find that methods commonly used to impute missing data in the US Census Bureau's Census of Manufactures reduce the the true underlying variance of the imputed variables. Using an alternative method of mean imputation (classification and regression trees), they find that using this method actually *increases* TFP dispersion relative to the mean-imputed data – and even relative to the non-imputed data – and that the results are even starker with regards to physical productivity and unit prices. Rotemberg and White (2017) go further and investigate the consequences of data cleaning strategies for the results of the productivity dispersion literature. They note that several strategies used for editing outliers and imputing missing values in the US Census of Manufactures dramatically reduce measured productivity dispersion, but are not feasible in other datasets. Applying the Hsieh and Klenow (2009) method to data

[1] We thank Douglas Gollin for making this point.

cleaned with methods that are feasible for both US and Indian data, they find no evidence of greater productivity dispersion in India compared to the USA.

Similar concerns with the misattribution of misallocation to what actually consists of measurement error are echoed by Gollin and Udry (2017), who build a theoretical framework that, when applied to panel data on agricultural production in three African countries, allows them to distinguish between heterogeneity, measurement error and misallocation. They find that misallocation plays a relatively small part in accounting for productivity differentials across farms (3 percent in Ghana and 6 percent in Uganda) and cannot account for much of the cross-country income differences. Although these results are not directly comparable with the bulk of the productivity literature, which is concerned with manufacturing, they do alert us to the importance of measurement.

Methodological issues also impinge on the findings of the research on productivity dispersion. As highlighted by Restuccia and Rogerson (2017a), any attempt to estimate the extent of misallocation requires a counterfactual on the optimal allocation of inputs, or at least some kind of structure for how inputs are expected to be allocated. They distinguish between "direct" and "indirect" methods of calculating factor misallocation. The direct approach consists of measuring the consequences of specific sources of misallocation, with the prior provided by a structural model. Of course, the details of the model can deeply impact the results. Restuccia and Rogerson also note that the direct approach is often made difficult by the need to quantify the underlying sources of misallocation. For example, if the source of misallocation is some kind of discretionary provision, or a highly complex regulation, then quantification is near impossible.

Partly due to these difficulties, the indirect approach is the most popular in the literature. This is the approach followed by Hsieh and Klenow (2009), and it starts by assuming that producers differ in the amount of output they can produce for given inputs. They also assume that markets for capital and labour are perfect, while each firm is monopolistically competitive (ie. has some market power). Importantly, Hsieh and Klenow make the "knife-edge" assumption of a Cobb-Douglas production function with constant returns to scale and iso-elastic demand (ie. with constant elasticity). This allows them to draw the conclusion that differences in TFRP (total factor revenue productivity, which equals productivity times price) across firms amounts to factor misallocation, since any increase in firm productivity should be exactly offset by a reduction in prices (Haltiwanger 2016).

These assumptions are quite strong, as any deviation from the knife-edge property invalidate the interpretation of the results. It is also possible to imagine that production functions vary across producers, so that capital-labour ratios differ in equilibrium (Restuccia and Rogerson 2017a). Moreover, it is may be misleading to rely entirely on

TFPR to measure misallocation. Haltiwanger (2016) argues that a priori, there is no reason to prefer total factor revenue productivity (TFPR), a measure that combines both physical productivity and prices, over total factor productivity (TFPQ), a measure of pure technical efficiency. However, he notes that the TFPR measure is also likely to reflect demand-side factors, so it is advisable to distinguish between TFPQ and and demand-side factors when reporting results based on TFPR (see also Foster, Haltiwanger and Syverson 2008). In fact, Haltiwanger argues that demand-side factors such as product differentiation, building a customer base, and learning about demand could be very important, but neglected, drivers of firm dynamics, and urges further work along these lines. Nonetheless, given that most datasets do not provide information on firm-specific prices, this is often not possible, and most studies are therefore only able to report TFPR.

A second issue raised by Hopenhayn (2014a) and Restuccia and Rogerson is the possibility that misallocation is only observed due to the presence of adjustment costs to transitory firm-specific shocks, which hinder changes in capital or labour in the short term. For this reason, Hsieh and Klenow discuss their results in comparison to a relatively undistorted economy like the USA, positing that some baseline level of observed misallocation is expected in any setting. However, Asker, Collard-Wexler and De Loecker (2014) argue against this point, noting that in the presence of adjustment costs, transitory firm-level revenue shocks can result in different degress of misallocation according to their variability. If we believe that these revenue shocks are more common in developing countries, then this could lead to the observed dispersion in TFPR, without implying an inefficient allocation of inputs. The question is whether these transitory shocks are indeed more prevalent in developing countries. David and Venkateswaran's (2017) analysis using panel data from China suggests this is not the case, but Restuccia and Rogerson note that more research is needed to better understand this issue.

3. Causes of Misallocation

With these notes of caution in mind, this section discusses the main causes for misallocation proposed by the literature. Almost any real-world policy or institution that leads to imperfections in either input or output markets can lead to factor misallocation. As a general theme, the early literature on productivity (discussed in Tybout 2000) presupposed that these imperfections tended to favour the larger, well-connected firms, at the expense of smaller ones. In contrast recent research has found the opposite: policy distortions limit the growth of the larger and more

productive firms at a cost for aggregate productivity. Below we list some factors that have been found relevant in the literature[2]:

• **Size-dependent policies:** this includes policies that apply differently according to the number of employees in a firm, such as restrictions on firm size (Garcia-Santana and Pijoan-Mas 2014) and size-dependent labour regulations (Gourio and Roys 2014; Garicano, LeLarge and Van Reenen 2016). This accords with Hsieh and Klenow's (2009) finding that TFPR dispersion in India is associated with licensing and size restrictions.

• **Financial constraints:** in countries with poorly functioning financial sectors, capital is not allocated to its most productive uses, contributing to productivity dispersion (Amaral and Quintin 2010; Buera, Kaboski and Shin 2011; Caselli and Gennaioli 2013; Midrigan and Xu 2014; Gopinath, Kalemli-Ozcan, Karabarbounis and Villegas-Sanchez 2017).

• **Informality:** some kinds of regulation can inhibit the formalization of firms, with attendant consequences for participation in input and output markets, contributing to productivity dispersion (Busso, Fazzio, and Levy 2012; Leal Ordóñez 2014).

• **Barriers to reallocation across space:** housing regulation (Hsieh and Moretti 2015), tax discrepancies across states (Fajgelbaum, Morales, Suárez Serrato, and Zider 2015), or other obstacles to mobility (Tombe and Zhu 2015) can hinder the reallocation of workers across space in response to where their marginal productivity, and hence wages, would be higher.

• **State ownership of firms:** if state-owned enterprise respond imperfectly to market incentives, then factors will be misallocated (Song, Storesletten, and Zilibotti 2011; Brandt, Tombe, and Zhu 2013). In fact, Hsieh and Klenow's (2009) study finds that Chinese state-owned enterprises are allocated more inputs than would be economically efficient.

• **Poor property rights:** in the absence of well-enforced property rights, input markets will not function adequately, leading to misallocation, as in the research on the agricultural sector mentioned above.

• **Trade and competition:** trade tariffs alter the relative prices faced by producers, leading to a deviation from the market equilibrium in which resources are allocated to their most productive use (Pavcnik 2002; Trefler 2004; Khandelwal, Schott, and Wei 2013)

[2] Readers should consult Hopenhayn (2014a) and Restuccia and Rogerson (2017a) for a more in-depth treatment.

• **Access to technology:** some firms are more successful than others in adopting ICT and other innovations to increase their productivity. In the presence of labour market frictions, even identical workers assigned to different firms will display differences in productivity (Faggio, Salvanes and Van Reenen 2010; Bartelsman, Gautier and de Wind 2010).

• **Imperfect information:** when firms make their input choices, they have imperfect information on the demand conditions in the market, which can lead them to misallocate factors (David, Hopenhayn and Venkateswaran 2017)

• **Political favouritism:** in most developing countries, policies tend to affect firms in firm-specific ways, depending on state capacity and the informal relations between firms and those responsible for implementation (Hallward-Driemeier and Pritchett 2011; 2015)

Restuccia and Rogerson comment that no one cause taken individually has been found to account for the 'excess' productivity dispersion of developing countries in its entirety, but that the key could be in the accumulation of such distortions. In the next section, we look at management practices, a source of productivity dispersion that has received a lot of attention in the literature, and which merits a brief digression.

3.1 The Role of Management Practices

The discussion so far has highlighted the role of external distortions in producing a suboptimal factor allocation among firms. The underlying assumption was that, in the absence of such distortions, firms would be able to maximize their profits, thus equating the marginal (revenue) product of labour and capital across firms. However, this view treats the details of how a firm operates as a 'black box', neglecting the role of internal factors in determining productivity. The evidence suggests that the most important among them is the quality of management (Bloom et al. 2017). Despite its centrality in business research, the study of management was long neglected within economics due to the difficulty in quantifying it, and due to the belief that changing management is a relatively straightforward process (Bloom and Van Reenen 2010). Recent research by Nicholas Bloom, John Van Reenen and their co-authors has uncovered the degree of variation in management practices, both within particular markets and between different countries.

Their data collection process consists of asking managers about their firm's practices, assigning them a score from 1 to 5 across 18 management areas, and aggregating

them to come up with an overall management score.[3] This score is found to be strongly associated with firm-level productivity, profitability, Tobin's Q, and survival rates (Bloom and Van Reenen 2007). At the country level, management scores are strongly correlated with income and productivity differences; Bloom, Sadun, and Van Reenen (2016) estimate that they account for 30% of the TFP gaps between the USA and other countries. Management practices can also explain TFP dispersion within countries: they estimate that management accounts for a third of the differences between the 90th and 10th percentiles of the TFP distribution within the USA and the UK. Moreover, it is found that the much lower average management scores in China, India, and Brazil are mostly driven by a large left tail of very poorly managed firms, indicating that management can be a contributor to the higher levels of productivity dispersion found in developing countries.

More direct evidence on the importance of management comes from Bloom et al.'s (2013) managed field experiment, where they provide free consulting on management practices to randomly chosen large Indian textile firms and compare their performance with a set of control plants. They find that adopting these management practices raised productivity by 17% in the first year through improved quality and efficiency and reduced inventory, leading to the opening of more plants within three years. In a follow-up paper eight years after the end of the intervention, Bloom, Mahajan, McKenzie and Roberts (2017) find that although half of the management practices adopted originally had been dropped, treatment plants still were significantly better managed. In addition, non-experimental plants within a firm where some plants had been treated had also adopted some of the better management practices, suggesting large intra-firm spillovers.

Similar results are obtained by McKenzie and Woodruff (2016), who differ from Bloom, Van Reenen and collaborators by looking at firms with fewer than ten workers, and covering business practices in areas such as marketing, record keeping, financial planning, and stock control, which are deemed more relevant for firms of that size. Their results are in line with those of the management literature: an improvement of one standard deviation in business practices is associated with a 35 percent increase in labour productivity and a 22 percent increase in TFP. Additional papers finding a direct association between exposure to superior management practices and gains in productivity are Bruhn, Karlan and Schoar (2017) and Giorcelli (2017).

In view of the sizeable impact of good management on firm performance, one wonders why firms do not adapt the best management practices. Better management is found to be correlated with a number of factors, including product market competition, professional management (as opposed to family or government

[3] For a more detailed overview of the literature on management practices, see Bloom, Lemos, Sadun, Scur and Van Reenen (2014).

management), trade openness and multinational presence, lighter labour and business regulation, and higher human capital (Bloom and Van Reenen 2007; Bloom et al. 2014; Bloom et al. 2017). Bloom et al.'s (2013) experiment investigates why better management practices had not been previously adopted by the managers of textile firms, finding that mistaken beliefs on whether some practices would be profitable, as well as lack of information on the existence of others, were the most common causes. But even when these informational constraints were overcome, the improvement in management practices was curtailed by time constraints on managers, who were already working an average of 68 hours per week. Despite this, decentralization of firm control was discouraged by a lack of trust with non-family members and the weakness of the rule of law, which made it difficult to prosecute managers found stealing or acting against the firms' best interests. High tariff protection and very low wages for workers further reduced incentives to increase efficiency, confirming the importance of competitive pressures. Finally, in Bloom et al.'s (2017) follow-up work in India, it is found that managerial turnover and lack of director time were to blame for the discarding of previously-acquired management practices.

4. The Dynamics of Reallocation

4.1 Misallocation and Entry

Despite the attention that distortions to efficient input allocation have received in the literature, Restuccia and Rogerson (2017a) observe that the 'direct approach' has failed to reveal distortions that can account for a meaningful share of the large disparities in aggregate TFP. This accords with the findings of Hopenhayn (2014b), who shows theoretically that, in order for distortions to be more damaging to aggregate TFP, they have to be 'rank-reversing'; ie. make small, relatively unproductive firms inefficiently big, and bigger, relatively productive firms inefficiently small. However, he argues that most distortions put forward in the literature do not satisfy this condition, so they are unlikely to be very important for explaining existing TFP gaps.

In view of these results, Restuccia and Rogerson call for greater attention to the dynamic implications of distortions, which are manifested through three different channels: firm entry, firm growth, and technology adoption. The intuition behind the negative effects of distortions on firm entry is that if entry into a particular market requires an upfront investment, and if a distortion raises the cost of the investment or the lowers its expected return, then this could prevent the entry of potentially productive firms, as well as reduce productivity-enhancing investment by existing

firms (Restuccia 2013; Restuccia 2016; Bento and Restuccia 2017). Restuccia and Rogerson (2017a) cite a number of papers that support this idea in the trade liberalization literature, as well as Hsieh and Klenow's (2014) study of patterns of firm growth in India and Mexico. The latter find that the positive link between firm age and productivity is more tenuous in those two countries compared to the USA, and link this to the greater implicit taxes faced by more productive establishments in those two countries. Using a calibrated model, Bento and Restuccia (2017) find that the effect of these implicit taxes on static misallocation and reduced investment at the time of entry could be responsible for reducing aggregate productivity in India by 53 percent, and average establishment size by 86 percent, in comparison with the USA.

4.2 The Importance of Reallocation

The work reviewed so far has treated misallocation as a potentially significant contributor to lagging productivity in developing countries, even if reliable estimates of the size of this contribution are hard to get by. Another possible way of gauging the importance of allocative efficiency is by estimating the degree to which factor reallocation contributes to aggregate productivity growth. There is a relatively sizeable literature studying the contribution of factor reallocation, as compared to within-plant productivity growth, to aggregate productivity growth in the USA and other countries, of which Baily, Hulten and Campbell (1992) and Foster, Haltiwanger, and Krizan (2001) are the most important contributions. Presumably, if between-firm reallocation is an important contributor to overall growth, then we would expect growth to be slowed by barriers to reallocation. However, studies on this issue find contradictory evidence on the importance of reallocation, with results varying according to the methodology employed. For instance, while Bartelsman, Haltiwanger and Scarpetta (2004) and Pages, Pierre and Scarpetta (2009) find that within-plant productivity growth dominates, Nishida, Petrin and Polanec (2013) use an alternative methodology to find that labour reallocation also has a significant role in growth, while technical efficiency is less important that previously estimated. But Nishida, Petrin and Polanec's methodology is itself questioned by Basu, Pascali, Schiantarelli and Serven (2009), who in addition to technology and reallocation add an 'aggregate distortions' term to their decomposition. Applying this decomposition to a set of five European countries between 1995 and 2005, they find that growth in France and the UK was entirely driven by technical change, while in Spain, Belgium and Italy aggregate distortions were quite important. Factor reallocation does not appear to be an important component of productivity growth in any country.

The debate between Hsieh and Klenow (2017) and Haltiwanger (2017) on the sources of US productivity growth again brings out many of the contentious methodological issues in the field. Hsieh and Klenow (2017), building on the methodology of Hsieh and

Klenow (2009), show that contrary to what is commonly believed, most productivity growth is driven by gradual product improvements by incumbent firms, rather than entry or reallocation towards fast-growing firms. Haltiwanger (2017) responds to this finding, pointing to Hsieh and Klenow's neglect of adjustment costs (or, as he calls them, "reallocation frictions") and fixed costs, as well as the dependence of their results on knife-edge assumptions on the structure of demand and technology. They also note the arbitrariness of the calibration choices in their model, which ignore the evidence that young firms are more likely to make major innovations contributing to aggregate productivity growth. In the presence of reallocation frictions, however, these contributions only show up later in the lifespan of the firms, when they are already considered incumbents as per Hsieh and Klenow's specification. As a result, part of their ultimate contribution gets erroneously assigned to incumbents.[4]

Though occurring at a fairly high level of abstraction, this debate has important practical implications. Haltiwanger notes that Hsieh and Klenow's findings do not shed light on the increasing dispersion of TFPR and revenue labour productivity observed since 2000 in the US. Citing other papers, he tentatively ascribes these developments to factors such as a decline in the employment at will doctrine and an increase in the fraction of jobs requiring an occupational license, which create frictions to labour reallocation. Davis and Haltiwanger (2014) also show that these frictions disproportionately affect more marginally attached workers. More broadly, economies with greater reallocation frictions are more vulnerable to economic shocks, and are less likely to experience innovation through creative destruction. Nonetheless, Haltiwanger (2017) does not provide an alternative estimate of the importance of reallocation frictions for aggregate productivity growth.

[4] Haltiwanger gives the example of Amazon, a firm that took years to fully develop its business model, and would be accounted for as an incumbent as per Hsieh and Klenow's methodology.

4.3 Distortions in a Contextual Perspective

An understanding of the causes and consequences of misallocation can also be aided by contemplating distortions in interaction with other elements of the institutional environment. Buera, Moll and Shin (2013) build a model where policy interventions prompted by market failures ("well-intended policies") initially lead to a surge in output and productivity growth, which eventually peters out, and the intervention becomes a distortion causing factor misallocation. They claim that such a mechanism could be behind the frequency with which "growth miracles" are followed by "growth disasters" in developing countries. If this view were true, it would allow us to explain the greater prevalence of such distortions in developing countries, since they are more likely to suffer from market failures (Stiglitz 1989).

In fact, one can wonder whether factor misallocation constitutes a barrier to development, or is simply another symptom of underdevelopment. Ziebarth (2013) applies the Hsieh and Klenow (2009) methodology to 19th-century US manufacturing data and finds levels of productivity dispersion comparable to those of modern-day China and India, despite the absence of such distortionary institutions as state-owned enterprises or licensing restrictions. He interprets this as an indication that development levels may be coterminous with the efficiency with which resources are allocated, independent of the actual policies and institutions that cause it. Bollard, Klenow and Sharma (2013) can be seen as a challenge to this idea, however, as they find that the pick-up in India's growth starting in the early 1990's was marked by increased productivity growth within large plants, as opposed to reallocation across plants. This would contradict Ziebarth's idea that reduced misallocation occurs naturally as a byproduct of development. Nonetheless, methodological issues again come into play when we consider Nishida, Petrin, Rotemberg and White's (2017) findings, using a different methodology that accounts for the reallocation of intermediate inputs, that factor reallocation in fact accounts for almost half of aggregate productivity growth in Indian manufacturing between 1999 and 2010.

Perhaps it makes sense to talk of different 'types' of growth. For instance, India's growth acceleration starting in mid-1980's seems to have been sparked by subtle attitudinal changes in the government, rather than major policy reforms (DeLong 2003), leading to an overall increase in productivity unaccompanied by a matching improvement in allocative efficiency. In fact, Hsieh and Klenow (2009) actually find that allocative efficiency in India fell between 1991 and 1994. In contrast, Hsieh and Klenow (2009) find a reduction in misallocation in China of the order of 2% per year between 1998 and 2005, of which 39% was driven by SOE reform. In a separate estimation using a model of heterogeneous firms, Hsieh and Song (2015), find that SOE reform accounted for 21% of China's growth between 1998 and 2007, and 18% of its growth from 2007 to 2012. These results suggest that the relationship between

factor reallocation and growth is contingent on other elements of the economic environment, a theme that we discuss in greater depth in the conclusion.

5. Conclusion: Factor Reallocation and Development

5.1 Taking Stock of the Literature

The literature reviewed in this piece, taken as a whole, suggests that distortions that prevent an efficient allocation of inputs can potentially be of great import for economic performance, although the methodological issues that afflict this research programme taint its results with great uncertainty. Both the direct and indirect approaches to measuring misallocation require strong priors on the structure of the economy, particularly Hsieh and Klenow's (2009) acclaimed approach. At the same time, there are doubts concerning the true quantitative significance of productivity dispersion in explaining TFP disparities, and we still do not know to what extent issues such as measurement error and adjustment costs might be biasing results. Distortions to the economic environment can also have strong dynamic implications, although that line of inquiry has difficulties of its own. Naturally, faced with the inconclusiveness of current research, some of the main contributors to the field such as Restuccia and Rogerson (2017a) and Haltiwanger (2017) call for research using more detailed, firm-level panel data.

The results of the management literature can be interpreted with greater clarity than those of the productivity dispersion literature. Moreover, as evidenced by Bloom and Van Reenen (2007) and by Bloom et al. (2016), they can help explain a substantial portion of the dispersion in productivity levels and of cross-country TFP differences, and offers fresh insights for understanding the drivers of productivity. Experiments such as Bloom et al. (2013) and Bruhn et al. (2017) are particularly useful, as they can help uncover the precise mechanisms through which superior management practices are adopted or dropped, as well as some of the obstacles to their adoption.

5.2 Policy Implications?

From the point of view of a policymaker, it might be challenging to derive clear policy implications from this literature, lacking a clear sense of how important barriers to reallocation are to growth, or even of what the most relevant barriers are. One could argue that the importance of any distortion should be judged on a case-by-case basis, borrowing from more general ideas on diagnosing market failures in "high-bandwidth" contexts (eg. Hausmann 2008; Rodrik 2010). However, it is not clear what could be gained from an additional focus on productivity dispersion beyond current

preoccupations with productivity enhancement, especially if we consider the greater elusiveness of the concept of efficient allocation of inputs when compared to the concept of productivity growth.

In any case, the policy prescriptions implied by most contributions to the literatures on productivity dispersion and management, as well as surveys and pieces targeting a broader audience such as Restuccia and Rogerson (2017b), do not deviate much from standard, 'market-enhacing' recommendations. Simply taking these prescriptions at face value might lead us to incur in the same errors that afflicted the liberalizing policies of the 1980's and 1990's, such as a disregard for policy complementarities, their dynamic implications, and political economy issues (Rodrik 2006). Rodrik emphasizes the priority of addressing "market or government failures that affect accumulation or productivity change" over "distortions that simply affect static resource allocation" (Rodrik 2006, p. 976). Although this is a contentious issue in debates on development strategies[5], one would be hard-pressed to offer a counterargument narrowly prioritizing static resource reallocation over a more holistic emphasis on productivity growth in the absence of convincing evidence on the true importance of the former.

A similar idea is conveyed by Buera et al.'s (2013) discussion of "well-intended policies": a policy used to correct a market failure at one point in time might later on become a distortion to an efficient market allocation. We can further deduce that the reason why these well-intended policies were adopted in the first place has very much to do with the same policy complementarities and political economy issues highlighted by Rodrik, further casting doubt on the utility of context-independent economic blueprints. Hsieh (2016), for instance, commenting on the much-discussed size restriction policies common in India, notes how a firm called Teamlease developed a business model around renting out workers to firms unwilling to surpass the critical size threshold. In this case at least, a constraint on static efficiency did not constitute a *dynamic* constraint. In contrast, as documented by Adamopoulos et al. (2017) and Chen (2017), restrictions on land markets can constitute a constraint on the adoption of productivity-enhancing technologies.

What these observations suggest is that static barriers to resource allocation can also be dynamic barriers, depending on the context, but it might well be the case that the triggers of investment and productivity growth are unrelated to the distortions commonly singled out. In the next section we discuss how a consideration of the demand side of the economy could be combined with the findings of the productivity dispersion to provide new insights.

[5] See, for example, Banerjee and Duflo (2011) for an account prescribing the elimination of carefully identified market failures one at a time, regardless of their more strategic or dynamic implications.

5.3 Allocative Efficiency as a Frame of Reference

Even if the literature on productivity dispersion does not offer any new policy prescriptions per se, it is possible that the stylized facts uncovered by it can offer new perspectives on other areas of research and policy. A useful parallel is with the literature on structural change; although their causes are still unclear, there is by now overwhelming evidence on the existence of large productivity differences across sectors, and that these differences are more pronounced in developing countries (Caselli 2005; Herrendorf and Valentinyi 2012; Gollin et al. 2014). Knowing that agriculture is the least productive sectors in most countries, and that it tends to shrink as countries develop, initially leading to a growth in the manufacturing sector and then in services (Herrendorf, Rogerson and Valentinyi 2014), suggests that development strategies should be broadly consistent with this process.[6]

In similar fashion, the literature on productivity dispersion can offer a new angle from which to analyze various kinds of firm-related policies. For instance, contrary to a once widespread belief, it is not true that distortions to the economic environment necessarily favour large, politically-connected firms at the expense of smaller firms. The productivity dispersion literature provides evidence for this view, since it finds that the marginal productivity of inputs is higher among larger firms. Thus, we know that policies to boost aggregate productivity are more likely to succeed by targeting the higher end of the firm size distribution. Moreover, the theoretical insights of Hopenhayn (2014) suggest that even in the absence of hard evidence, it is generally not a good idea to introduce policies that lead to rank reversals. Similarly, studies using the direct approach raise awareness of potentially negative implications of policies.

Research on management practices can also shed light on a range of policy questions. For instance, thinking about management can help us understand one of the mechanisms through which multinationals assist in boosting the productivity of recipient country firms.[7] In addition, it provides further backing for the idea that, at least in African countries, the largest firms are qualitatively different from smaller ones, in that their owners and managers have superior management capabilities (Sutton and Kellow 2010). More generally, the management literature provides empirical evidence that firms are not profit-maximizing black boxes, but that they are subject to a host of internal agency issues that will mediate the relationship between external incentives and firm behavior.

[6] See Dercon and Gollin (2014) for an overview of the role of agriculture in African development strategies.
[7] See Dercon, Lippolis and Peel (2018).

From a broader perspective, perhaps the main insight provided by the reallocation literature is allowing us to conceptualize development as a process of reallocation of inputs from low- to high-productivity activities. In this sense, it is a counterpart to ideas on structural change, but adding a further perspective on intra-sectoral allocation. In fact, the two sets of ideas are closely related. Research in the structural change tradition, decomposes aggregate productivity growth into within- and between sector-components (Rodrik 2013; McMillan et al. 2014)[8]; however, the results of such decompositions will vary according to the level of disaggregation at which we look at the data. Taken to its most disaggregated level, such a decomposition approaches the methods used by Baily et al. (1992). In this way, the literature extends the concept of 'dualism', typically employed in the structural change literature, to encompass the continuum of productivity levels encountered in developing countries (Gollin 2014). Research on structural change provides a useful example: it is not limited to identifying obstacles to the equalization of sectoral productivity levels, but rather focusses on how income effects or differential productivity growth across sectors produce patterns of structural change (Herrendorf et al. 2014). Similarly, research on productivity dispersion should heed Restuccia and Rogerson's (2017a) call to be more dynamically-oriented, and study the mechanisms behind shifts in factor allocation.

For example, a yet relatively unexplored question is how external sources of demand interact with barriers to reallocation to shape the growth rates of particular sectors; that is, when do barriers to reallocation create more binding constraints on growth? An answer to this question can be critical in determining when distortions acquire greater or lesser relevance, as factor reallocation can be more important in more dynamic settings. Another possibility could be comparing factor reallocation before and after "growth accelerations", so as to understand the role of distortions in unlocking untapped growth potential. In any case, the productivity dispersion literature is very much at the frontier of economic research and there is a long way to go until it produces policy implications with real bite. Nonetheless, its methods, combined with constant improvements in data, can potentially be very useful in helping us understand some of the most fundamental questions of development.

[8] Keeping in mind the big caveat that as workers move across sectors they are likely to incur into diminishing marginal returns to labour, which complicates the interpretation of the results of the decompositions.

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