Policy Research Working Paper 9073

Decomposing the Labor Productivity Gap between Upper-Middle-Income and High-Income Countries

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WORLD BANK GROUP
Development Economics
Global Indicators Group
December 2019

Policy Research Working Paper 9073

Abstract

Using firm-level survey data on registered private firms collected by the World Bank's Enterprise Surveys, this paper compares the level of labor productivity in 22 upper-middle-income countries and 11 high-income countries for which comparable data are available. The results show that labor productivity in the upper-middle-income countries is about 57.5 percent lower than in the high-income countries. The productivity difference is robust and holds for firms of different sizes and industries. The analysis uses the Oaxaca-Blinder decomposition to identify the sources of the productivity gap. It finds that the endowment effect and the structural effect contribute roughly equally to the productivity gap. Several firm- and country-level variables determine the productivity gap. The biggest contributors via the endowment effect include tertiary education attainment, law and order, and quality management proxied by international quality certification. Factors that contribute most via the structural effect include market size, secondary education attainment, and law and order. Thus, the results underline the importance of human capital, institutions, and market size for closing the productivity gap between the upper-middle-income and high-income countries.

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Produced by the Research Support Team

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Keywords: Upper middle-income, High-income, Labor productivity, Oaxaca-Blinder decomposition, Middle-income trap
JEL: D24, J24, O53

We would like to thank Jorge Luis Rodriguez Meza for providing useful comments.
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1. Introduction

In recent years the term "middle-income trap" has been increasingly used in the development policy arena to refer to the phenomenon whereby rapidly growing economies stagnate at middle-income levels and fail to transition to the status of high-income countries. Several studies confirm this phenomenon. For instance, Larson et al. (2016) note that of 101 middle-income countries in 1960, only 13 countries managed to transition to the status of high-income countries by 2008 based on GDP per capita level relative to the United States. Similarly, Flaaen et al. (2013) note that among the seven countries that could be classified as middle income in 1975, only the Republic of Korea managed to reach high-income status by 2005. The present paper provides fresh and alternative evidence on the middle-income trap by focusing on the difference in labor productivity between firms in upper-middle-income and high-income countries. Firm-level survey data on 22 upper-middle-income countries (henceforth, UMICs) and 11 high-income countries (henceforth, HICs) show that labor productivity in the UMICs is 57.5 percent lower than in the HICs on average. Using the Oaxaca-Blinder decomposition technique, the productivity gap is decomposed into a part that is due to differences in the level of productivity-enhancing factors (endowment effect) and a part due to differences in the returns to the factors (structural effect). We find that the endowment effect and the structural effect contribute roughly equally to the productivity gap. Several potential firm- and country-level determinants of labor productivity are identified as significant contributors to the productivity gap.

The existing literature has largely relied on aggregated data and country-level factors in explaining the middle-income trap (see, for example, Agénor and Canuto 2015; Aiyar et al. 2013; Eichengreen et al. 2013; Flaaen et al. 2013). It is argued that long-term sustained economic growth requires a continued structural transformation of the economy, with the economy transitioning

from labor-intensive sectors to low technology sectors and ultimately to frontier technology sectors. Strategies based on factor accumulation and the benefits of cheap labor that helped a country transition from low-income to middle-income status may no longer be effective. The declining marginal productivity of capital and rising wages reduce the international competitiveness of many labor-intensive industries. Thus, the new constraints on the economy become more complex as domestic industries rely less on investment and more on innovations. As this process develops, experience has shown that the middle-income countries can become trapped – no longer able to effectively compete with low-wage competitors in poor countries while still lacking the innovative capabilities to rival high-income economies.

Going beyond the structural transformation, studies suggest other factors explaining growth slowdowns and stagnation among the middle-income countries. For example, Eichengreen et al. (2013) analyze the incidence and correlates of growth slowdowns in fast-growing middle-income countries. They find that slowdowns are less likely in countries where the population has a relatively high level of secondary and tertiary education and where high-technology products account for a relatively large share of exports. The study suggests moving up the technology ladder to avoid the middle-income trap. In another study covering 138 countries at various income levels, Aiyar et al. (2013) analyze episodes of growth (in GDP per capita) slowdowns in middle-income countries vs. the rest (low-income and high-income). The authors uncover several determinants of a growth slowdown, including trade openness, investment share, the regulatory burden on private firms, dependency ratio, and so forth.

The broader literature provides insights on why some countries grow faster and are more developed than the others. Several country- and firm-level determinants of growth and development are identified, several that may be relevant for middle-income countries. The

country-level determinants can be grouped into the following categories: macroeconomic stability; business environment broadly defined to include the quality of governance, institutions and regulatory burden on private firms; human capital or availability of skilled workers; open and competitive markets that allocate resources across firms and industries based on comparative advantage and productivity. For firm-level factors, some of these include managerial practice and talent (Bloom and Renen 2007), quality of workers and capital (see, for example, Svyserson 2011 for a review of the related literature), innovation and learning by doing (see for example, Hall 2011 and the literature cited therein), international trade and foreign investment (De Loecker 2007, Van Biesebroeck 2005, Griffith et al. 2002), firm size and age (Tybout 2000, Dhawan 2001, Bradford et al. 2001, De and Nagaraj 2014), etc. As mentioned above, how relevant these factors are for understanding the middle-income trap remains to be explored.

This study adds to the existing literature by analyzing the differences in labor productivity between the UMICs and the HICs using unique firm-level survey data that have been compiled by the World Bank's Enterprise Surveys (ES). Using this data set not only enables a more detailed and nuanced analysis of the differences in labor productivity across countries in different income groups, but also provides us an opportunity to explore the determinants of labor productivity at the firm and country levels simultaneously. Further, we employ the Oaxaca-Blinder decomposition – which decomposes the productivity gap into an endowment effect and a structural effect – to better understand the difference in the mean level of a variable between two groups and the factors that contribute to the difference. The decomposition is a two-step process. In the first step, we estimate the size and statistical significance of the mean level of labor productivity in UMICs minus the same in the HICs (henceforth, productivity gap). A positive value of the productivity gap implies higher labor productivity in the HICs than the UMICs and vice versa. We estimate the productivity

gap with and without conditioning on several potential determinants of labor productivity. The exercise helps to uncover factors that may explain, partly or fully, the productivity gap. In the second step, the productivity gap is decomposed into an endowment effect and a structural effect, and subsequently, factors that contribute to the endowment effect and the structural effect are identified.

We would like to caution that the Oaxaca-Blinder decomposition is an accounting exercise and does not necessarily imply causality. However, it is widely used in the literature and serves as a useful starting point for understanding the drivers of productivity and other gaps between the two groups.

Our results show that the labor productivity gap is about 0.86 log points (10.96 for the HICs countries vs. 10.1 log points for UMICs). This is also evident in the comparison of the kernel density estimates of the log of labor productivity for low-income and middle-income country firms (Figure 1). The significantly lower level of labor productivity among the UMICs than HICs is observed consistently across small, medium and large firms. The labor productivity gap is largest (most negative) for medium firms followed by small and then large firms. Similarly, labor productivity is significantly lower in the UMICs than HICs across manufacturing, retail and the other services sectors. The difference is largest (most negative) for retail sector firms followed by other services sector and then the manufacturing sector firms. The implication may be that a reallocation within UMICs towards larger firms or service sectors is unlikely to eliminate the gap.

Furthermore, the productivity gap is almost equally divided between the endowment effect and the structural effect. Several potential firm-level and country-level determinants of labor productivity are identified as significant contributors to the productivity gap. The biggest contribution here via the endowment effect comes from tertiary education attainment, followed by

law and order and then international certification. Similarly, the biggest contributor via the structural effect is market size, followed by secondary education attainment, and then law and order. Thus, our results underline the importance of human capital and institutions along with some of the other factors for closing the productivity gap between the UMICs and the HICs.

Interestingly, several factors fail to make a significant contribution to the productivity gap via the endowment or the structural effect. Examples include the age of the firm, foreign ownership of the firm, years of top manager experience, the gender of the top manager, regulatory burden experienced by the firms, corruption, etc. Some of these factors such as corruption and regulatory burden experienced by the firms are only poorly correlated with labor productivity in the UMICs and the HICs while others contribute roughly equally to labor productivity in the two income groups.

The rest of the paper is organized as follows. In Section 2, we discuss the data and base regression. We introduce the labor productivity decomposition methodology in Section 3. Section 4 provides a discussion of the decomposition analysis followed by robustness checks in Section 5. Section 6 concludes the paper.

2. Data and Base Regressions

Data source

The main data source we use is firm-level surveys conducted by the World Bank's Enterprise Surveys (ES). The ES are nationally representative surveys of formal (registered) private firms with five or more employees. The surveys cover manufacturing and services firms but exclude extractive industries and agriculture. The sampling methodology used is stratified random sampling with the region (within the country), sector, and size as the strata. The use of a

standardized survey instrument and methodology allows for comparisons across economies. Sampling weights are provided to correct for over-sampling and are used throughout the analysis that follows. The surveys cover a range of topics including access to finance, infrastructure, competition, crime, labor, business environment obstacles, and firm performance.[1]

The sample used below consists of a cross-section of 10,326 firms in 22 UMICs and 4,618 firms in 11 HICs for which information is available in the ES. Table 1 provides the list of countries along with the sample size by country. The year the survey was conducted varies across countries, ranging from 2009 to 2017.

We complement the ES with country-level data obtained from World Development Indicators (World Bank), Worldwide Governance Indicators (World Bank), Transparency International, and International Country Risk Guide (ICRG).

Mean differences between firms in Malaysia and the comparators

Table 2 provides the mean value of labor productivity and several of its potential determinants for the UMICs and the HICs, and whether the difference between the two income groups is significant. Labor productivity is defined as total annual sales of a firm during the last fiscal year (in 2009 USD) divided by the total number of workers at the firm at the end of the last fiscal year. The mean level of labor productivity in HICs equals USD 213,200 and USD 80,741 in UMICs. The former is about 2.6 times the latter, and the difference between them is significant at the 1 percent level. One worry here might be that the mean labor productivity may be unduly affected by extreme values. However, comparing median labor productivity provides a qualitatively similar picture. That is, the median labor productivity for firms in UMICs equals USD 25,327 compared with a

[1] Details of the methodology can be accessed through the following link: http://www.enterprisesurveys.org/methodology

much higher USD 60,056 for the firms in HICs. The latter is 2.4 times the former, and the difference between the two is statistically significant at the 1 percent level.

In the regressions that follow, we use the log of labor productivity defined at the firm-level as our dependent variable as it helps to minimize the impact of outliers and extreme values. The productivity gap or the mean difference in labor productivity between UMICs and HICs can be computed in two ways. First, it equals the mean value of the log of labor productivity of firms in the UMICs minus the same for the HICs. This is the productivity gap in log points. Second, we can compute the percentage difference in the mean level of labor productivity (in USD levels). This is obtained as the exponential of the log difference obtained in the first step minus one and multiplied by 100 to convert to percentage figures. Unless stated otherwise, all productivity gaps in percentage terms are as described here.

The mean value of the log of labor productivity equals 10.96 (log points) in HICs and 10.1 (log points) in UMICs. Thus, labor productivity in the UMICs is approximately 57.5 percent lower than in the HICs. This productivity gap is significant at the 1 percent level. Results are qualitatively similar when looking at the median level of labor productivity.

Apart from labor productivity, there are other significant differences between firms in UMICs and the HICs (see Table 2). One important difference relates to firm-size as measured by the log of the number of workers at the firm at the end of the last fiscal year (*Employment*). Firms in UMICs tend to be relatively large as compared to firms in the HICs. The mean difference in employment level (in logs) equals 0.169, implying that employment in firms located in UMICs is almost 18% higher than in firms in the HICs; the difference is statistically significant at the 1 percent level. In terms of the sectoral composition, the share of firms that belong to the manufacturing sector is significantly lower in UMICs compared to the HICs (38.6 vs. 44.3 percent,

respectively) whereas the share of firms in the retail sector is significantly higher in UMICs vis-à-vis HICs (41.7 vs. 35.2 percent, respectively). For the other services sector, however, there is no significant difference between the two income groups (19.7 for UMICs vs. 20.4 percent for HICs, respectively). Another important firm level determinant of labor productivity highlighted in the literature is the age of the firm. However, as shown in Table 2, there is no significant difference in the average age of the firms in UMICs and the HICs.

We employ three separate measures of the outward orientation of the firms in our analysis. These include the proportion of firms' annual sales that is exported (*Exports*), a dummy variable equal to 1 if private foreign individuals, companies or organizations own more than 10 percent of the firm and 0 otherwise (*Foreign*), and a dummy variable equal to 1 if the firm has internationally recognized quality certification and 0 otherwise (*Certification*). Firms in UMICs lag firms in HICs in terms of exports and certification, and the mean difference is significant and the 1 percent level. For instance, only 17.7 percent of the firms in UMICs have quality certifications compared with 25.2 percent of the firms in HICs. However, there is no significant difference in the proportion of firms with foreign ownership as defined above between UMICs and HICs.

Next, we look at two manager characteristics. First, the proportion of firms with a top female manager is higher in UMICs than in HICs (17.4 vs. 16.8 percent), but the difference is not significant. Similarly, the (log of) number of years of experience, the top manager of the firm has worked in the industry (*Top Manager Experience*) is not significantly different for the two income groups. Some of the other variables we consider include a dummy variable equal to 1 if the firm bought capital assets in the last year (*Bought Assets*), and a dummy variable equal to 1 if the firm currently has a bank loan or a line of credit and 0 otherwise (*Credit*). The proportion of firms that bought assets in the last year is significantly lower (at the 1 percent level) in UMICs than in the

HICs while the proportion of firms that have a bank loan or line of credit is significantly higher (at 10 percent level) in the UMICs. The percentage of firms' senior management's time that is spent on dealing with government regulations (*Time Tax*) is used as a broad proxy measure of the regulatory burden on the firms and the business environment in which the firms operate. *Time Tax* for a typical firm in UMICs equals 12.7 percent compared to a slightly lower value of 11.5 percent in the HICs, and the difference is significant at 5% level. This indicates that the regulatory burden on firms operating in UMICs is higher.

We also include some country-level variables in our regressions. These are intended to account for differences across countries in the level of human capital, market size, quality of governance, and institutional strength. For human capital, we use three different measures, namely: gross primary enrollment rate, gross secondary enrollment rate, and gross tertiary enrollment rate taken from World Development Indicators, World Bank. For market size, we use the log of the total population in the country. For the quality of governance, we use the Transparency International's Corruption Perception Index (*Corruption*), and to capture the institutional strength and protection of private property against expropriation by state and private agents we use the Law and Order index from ICRG. Note that higher values of all the macro-level variables described above imply a more favorable business environment from the firms' point of view. As depicted in Table 2, market size is lower in the HICs than the UMICs (by about 59 percent) and the difference insignificant at the 1 percent level. The enrollment rate in primary education is also higher in the UMICs than in HICs by about 5.7 percentage points, and the difference is significant at the 1 percent level. However, all the remaining macro-level indicators including corruption, law and order, enrollment rates in secondary and tertiary education, HICs outperform UMICs, with the difference significant at the 1 percent level.

Regressions

Tables 3 and 4 provide the regression results for the drivers of labor productivity. We explore the determinants of labor productivity in a pooled sample of all firms in the UMICs and the HICs (Table 3) and separately for firms in the UMICs and the HICs (Table 4). For the pooled sample regressions and to capture the difference in labor productivity between UMICs and the HICs, we use a dummy variable equal to 1 if the firm belongs to UMICs and 0 otherwise (UMICs). Following the existing literature, several determinants of labor productivity are considered.

We begin with firm-size as defined above (*Employment*). One view is that productivity tends to increase as firms become larger. Among other factors, the positive relationship between firm-size and productivity is often attributed to greater allocative efficiency for the relatively larger firms and the presence of fixed costs that generate economies of scale, which tend to favor the relatively larger firms (Bartelsman et al. 2013, Tybout 2000). However, the opposite case of diminishing labor productivity with firm-size is also possible due to decreasing returns to scale overall or due to diminishing returns to labor. Firm-size is also considered a vital proxy measure for several firm attributes that could potentially affect labor productivity such as access to finance, access to raw materials and product markets, tendency to innovate, exporting activity, firm-efficiency and growth (see for example, Acs and Audretsch 1988, Cohen and Klepper 1996, Diaz and Sánchez 2008, Pagano and Schivardi 2003, Söderbom and Teal 2004).

Substantial work has also been done linking the productivity and age of the firm. Age-related effects among surviving firms may be due to a number of reasons, including scale economies gained from expansion over time, vintage effect due to younger firms employing new and improved technology or equipment, selection effects which weed out inefficient firms

implying higher productivity for the surviving older firms, and of course passive learning or learning by doing (see for example, Bahk and Gort 1993, Jensen et al. 2001, Jovanovic 1982, Thompson 2005 and 2010, Zimmerman 1982).

There is a large literature documenting productivity differences between exporting and non-exporting firms, and between domestic and foreign-owned firms (directly or through FDI). There is robust evidence that exporting activity is positively correlated with productivity, although it is not certain if exporting causes firms to become more productive or productive firms self-select themselves into exporting activity (Bernard and Jensen 1999, Melitz 2003, Wagner 2007). Similarly, firms with foreign ownership have also been found to enjoy numerous benefits such as better access to modern technology and greater access to international markets, among others. These benefits translate into improved productivity. Following this body of work, we include exports and foreign ownership of the firms as defined above in our regressions.

Several studies have analyzed gaps in productivity stemming from the manager's gender and quality. Firms owned/managed by women tend to have lower productivity than those owned/managed by men (Coleman 2000, Du Rietz and Henrekson 2000, Sabarwal and Terrell 2008). This is likely to be due to differences in the size of the firms managed by women, the difficulty that women face relative to men in obtaining finance, and social attitudes that tend to discourage women's economic participation. Thus, we account for the gender of the top manager with a dummy variable indicating if the top manager of the firm is a female or not (*Female Top Manager*). Differences in the quality of management, for reasons other than the gender of the top manager, have been found to impact firm productivity (see, for example, Bloom and Van Reenen 2007, Syverson 2011, Pfeifer 2015). Differences in education and experience of the top manager could be the possible factors driving differences in management quality. We account for this in

our regressions using a proxy measure which equals (log of) the number of years of experience the top manager of the firm has working in the industry (*Top Manager Experience*).

We also consider the role of physical capital in determining labor productivity as it has been identified as one of the key determinants in the literature. The ES does ask firms about the value of their capital stock (book value as well as replacement cost), but this information is missing for more than 60 percent of the firms in our sample. Thus, we rely on an alternative proxy measure, which is a dummy variable equal to 1 if the firm bought fixed assets last year and 0 otherwise (*Bought Assets*).[2]

There is some work on the quality of the management system proxied by the international quality certificates. It is argued that these certificates can open new markets for firms, lead to better quality monitoring and management of product risks, lead to knowledge spillovers through greater international contact. Empirical evidence on the quality certificates on labor productivity or firm productivity is limited and mixed (see, Garcia-Pozo et al. 2014, Lakhal 2014, Sánchez-Ollero et al. 2015, Sıtkı İlkay and Aslan 2012). Therefore, we include a dummy variable equal to 1 if the firm has an internationally recognized quality certificate and 0 otherwise (*Certification*).

To capture the regulatory environment faced by the firms, we include a broad measure of the regulatory burden that equals the percentage of firms' senior management time that is spent in dealing with government regulations (*Time Tax*). The variable is a de facto measure of regulation and has been used in other studies (see, for example, Duvanova 2014). Several studies have underscored the importance of the business environment including the regulatory burden on firm-

[2] Information is also available in the ES on the amount of expenditure incurred by the firms on fixed assets during the last year, although it is missing for 790 of the 14,944 firms in our sample. Our main results are qualitatively unchanged if we use the (log of 1 plus) total expenditure in last year on fixed assets per unit of labor instead of the *Bought Assets* dummy. Quantitatively, there is a difference in some of the results discussed below, but this is mostly due to the decline in sample size rather than due to the expenditure on fixed assets variable per se.

productivity (see, for example, Aghion et al. 2004, Djankov et al. 2002, Djankov, McLiesh and Ramalho 2006, Gaviria 2002). Last, access to finance is captured via a dummy variable equal to 1 if the firm currently has a bank loan or a line of credit and 0 otherwise (*Credit*).

Macro-level factors such as the quality of governance, institutions, human capital, and market size have been found to be important for the overall growth and development of the private sector. Regarding market size, the general belief is that a larger market size improves firm-productivity through several channels such as increasing returns to scale in the production process, increasing returns to scale in knowledge creation, higher returns from innovation activity that often involves fixed costs, greater human capital accumulation due to externalities, better returns to public goods like physical infrastructure, greater competition in the product-markets (see for example, Aghion et al. 2005; Aghion and Howitt 1998; Lucas Jr, 1988, Romer 1986). Therefore, we proxy market size by the (log of) population of the country taken from World Development Indicators, World Bank (WDI).

For human capital, there is a rich literature discussed above documenting the importance of human capital for overall growth and development. We use three measures of human capital, namely gross enrollment rates in primary education, gross enrollment rates in secondary education, and gross enrollment rates in tertiary education, taken from WDI.

Several studies show that well-functioning institutions and good governance provide an enabling environment that makes it easier for firms to do business, improve their efficiency and growth over time. This happens through several channels such as correcting for market failures and collective action problems, protection of private property against expropriation by state and private agents, provision of physical and financial infrastructure, ensuring competitive markets that reward efficient firms and weed out inefficient ones, reducing regulatory burden on the firms,

less corruption, etc. (see for example, Acemoglu et al. 2001, Dollar et al. 2005, Hall and Jones 1999, Schmitz Jr. 2005, Syverson 2011). Following the broader literature on institutions and governance quality, we use two separate proxy measures to capture their impact on firm productivity. For the quality of governance, we use the *Corruption* measure as defined above. The data source for the variable is Transparency International. The variable ranges between 0 and 100, with higher values implying less corruption. For the quality of institutions, we use the *Law and Order* Index from ICRG. The variable ranges between 1 and 7 with higher values implying better rule of law (from the firm's point of view).

Regression results in both Table 3 for the pooled sample and Table 4 for UMICs and HICs separately, uncover several factors highly correlated with labor productivity. In the pooled sample and irrespective of the controls in place, labor productivity is lower in UMICs than in the HICs, and the difference is significant at the 1 percent level (columns 1-7, Table 3). This productivity gap is quantitatively large, although it reduces when we include the various determinants of labor productivity described above in the regressions. Specifically, the labor productivity (in USD terms) is approximately 57.5% lower in UMICs when we do not add any additional controls (column 1, Table 3) compared with 32%, our most conservative estimate so far, when all the controls are included in the regressions (column 7, Table 3).

Second, there is a negative and significant relationship between labor productivity and firm-size for the pooled sample, and for the sub-samples of UMICs and HICs. This result holds irrespective of the controls in place (see Table 3 and 4). For instance, a 1 percent increase in the number of workers at the firm is associated with a decrease in labor productivity by 0.29 percent (table 3, column 7). These results support the view that larger firm-size results in decreasing returns to scale overall or due to diminishing returns to labor hence leading to diminishing labor

productivity. Moreover, as highlighted by Söderbom and Teal (2004), large firms are likely to have allocative efficiency, as they face different factor prices compared to smaller firms, leading to diminishing labor productivity for the large firms. Table 4 further reveals that the negative relationship between labor productivity and firm-size is larger (more negative) for the case of the HICs than the UMICs. The purchase of assets, which is a proxy for capital investment, is positively and significantly correlated with the labor productivity in all the three samples.

As shown in Tables 3 and 4, labor productivity is significantly lower in the manufacturing and the other services sectors relative to the retail sector. This result is qualitatively similar for the pooled sample and the separate samples for UMICs and HICs. For instance, for the final specification in the pooled sample, labor productivity is 52% and 55% lower for the manufacturing and the other services sector as compared to the retail (Table 3, column 7). Further, the gap in labor productivity between manufacturing and retail and other services and the retail sector is relatively larger for the HICs than the UMICs.

The outward orientation of the firm as captured by exports and foreign ownership and having an internationally recognized quality certificates has a positive association with labor productivity. All three variables are significant at least at 5 percent level in the pooled sample and in the HICs sample. However, for the UMICs sample, only foreign ownership and internationally recognized quality certificates have a significant (positive) relationship with labor productivity. These results support the empirical findings of Garcia-Pozo et al. (2014) and Griffith et al. (2002) who find a positive effect of certification and foreign ownership on labor productivity, respectively.

Further, the age of the firm and years of top manager's experience show a positive and significant correlation with labor productivity in the pooled sample and for the HICs. However,

for the case of UMICs, only the firm's age is significantly positively correlated with labor productivity, and the managerial experience shows no significant correlation. On the other hand, firms with a top female manager tend to have lower labor productivity, and the association is significant in the pooled sample as well as for the sub-sample of UMICs and HICs. Regulatory environment as captured by *Time Tax* is not significantly correlated with labor productivity in any of the samples. Having a line of credit, however, has a positive and significant association with labor productivity in all the three samples considered.

For the macro-level variables, higher enrollment rate in tertiary education and better quality of institutions proxied by our *Law and Order* variable are associated with higher labor productivity, significant at the 1 or 5 percent level. This holds in all the three samples considered. The remaining macro-level variables do not show any significant relationship with labor productivity either in the pooled sample or the sub-sample for UMICs. However, for the sub-sample of HICs, the enrollment rate in secondary education and market size are significantly (at the 1 percent level) positively associated with labor productivity.

To summarize, the regressions show a significant correlation between labor productivity and several factors in the expected direction, although the results vary somewhat across UMICs, HICs, and the pooled sample. These factors include firm-size, sector of activity, age of the firm, foreign ownership, exports, gender of the top manager, top manager's experience, quality management proxied by having internationally recognized quality certificate, purchase of capital assets, having a bank loan or line of credit, market size, education attainment, and law and order.

Heterogeneity

We further investigate the productivity gap between UMICs and the HICs by splitting the sample based on firm-size and sectors. Table 5 presents the regression results by firm-size and Table 6 by sector. We follow the ES definition of small (5-19 employees), medium (20-99 employees), and large (100 or more employees) firms. For sector, we follow the broad ES classification of manufacturing, retail, and other services sectors. Note that these size and industry groupings are also used for sample stratification purposes. For brevity, results for only the final specification with all the productivity determinants discussed above included in the specification (that is, the specification in column 7 of Table 3) are provided in Table 5 and Table 6.

As Table 5 shows, labor productivity of firms in the UMICs is lower than in the HICs for the sample of the small, medium, and large firms considered separately. The difference is significant at the 1 percent level for small and medium firms and at the 5 percent level for large firms. Quantitatively, the conditional productivity gap is the largest (most negative) for medium firms, followed by small firms and then the large firms. Specifically, labor productivity (in USD levels) of a typical medium firm is 42.8 percent lower in the UMICs than in the HICs. The corresponding figures for large and small firms equal 26.8 and 28.9 percent, respectively.

As Table 6 shows, labor productivity of the firms in UMICs is significantly lower (at the 1 percent level) than in the HICs in all the three sectors. Quantitatively, the conditional productivity gap is the largest (most negative) for firms in the retail sector, followed by the other services sector and then the manufacturing sector. For the retail sector, average labor productivity in UMICs is lower by 38.7 percent than in the HICs. The corresponding figures for the manufacturing and other services sectors are 26.8 and 32.3 percent, respectively.

3. Labor Productivity Decomposition Methodology

The literature has used Oaxaca-Blinder decompositions to explore contributors to differences of gaps between groups in various factors such as wage rates, wage inequality, and productivity (Oaxaca 1973; Blinder 1973, Fortin 2008, 2011; O'Neill and O'Neill 2006; Kilic et al. 2015). We apply the same methodology to explain the labor productivity gap between firms in UMICs and the HICs. A decomposition analysis allows us to illuminate the contributions of various factors to the productivity gap. However, as mentioned above, the decomposition, just like the underlying regression analysis, cannot establish whether the relationships are causal. A brief outline of the decomposition methodology is as follows.

We estimate the log of labor productivity of a firm as follows:

$$Y_M = \beta_{M0} + \sum_{j=1}^{J} \beta_{Mj} X_{Mj} + \epsilon_M \quad (1)$$

Where Y_M is the log of sales per worker for a firm in UMICs, and X is a vector of J observable factors that encompass firm-level characteristics as well as country-level factors that can influence the productivity of firms. ϵ_M is the error term. The counterpart of equation (1) for comparator country firms is presented below in equation (2), where the subscripts M are replaced by C to connote comparator countries. It is assumed that $E(\epsilon_M) = E(\epsilon_C) = 0$.

$$Y_C = \beta_{C0} + \sum_{j=1}^{J} \beta_{Cj} X_{Cj} + \epsilon_C \quad (2)$$

Taking the expectation of the log labor productivity of firms in UMICs, equation (1) can be written as:

$$E(Y_M) = E\left(\beta_{M0} + \sum_{j=1}^{J} \beta_{Mj} X_{Mj} + \epsilon_M\right) \quad (3)$$

$$= \beta_{M0} + \sum_{j=1}^{J} \beta_{Mj} E(X_{Mj})$$

Along similar lines, taking the expectation of firms in HICs, equation (2) can be written as:

$$E(Y_C) = E\left(\beta_{C0} + \sum_{j=1}^{J} \beta_{Cj} X_{Cj} + \epsilon_C\right) \tag{4}$$

$$= \beta_{C0} + \sum_{j=1}^{J} \beta_{Cj} E(X_{Cj})$$

The labor productivity gap (D) can be expressed as $D = E(Y_M) - E(Y_C)$. Thus, the labor productivity gap can be obtained by equation (3) minus equation (4) and expressed as equation (5) below.

$$D = \beta_{M0} + \sum_{j=1}^{J} \beta_{Mj} E(X_{Mj}) - \beta_{C0} - \sum_{j=1}^{J} \beta_{Cj} E\left(X_{Cj}\right) \tag{5}$$

Rearranging equation (5) by adding and subtracting $\sum_{j=1}^{J} \beta_{Mj} E(X_{Cj})$, we obtain:

$$D = \underbrace{\sum_{j=1}^{J} \left[E(X_{Mj}) - E(X_{Cj})\right] \beta_{Mj}}_{Endowment\ Effect} + \underbrace{\beta_{M0} - \beta_{C0} + \sum_{j=1}^{J} \left[\left(\beta_{Mj} - \beta_{Cj}\right) E\left(X_{Cj}\right)\right]}_{Structural\ Effect} \tag{6}$$

Where $\sum_{j=1}^{J} \left[E(X_{Mj}) - E(X_{Cj})\right] \beta_j$ is the endowment effect and $\beta_{M0} - \beta_{C0} + \sum_{j=1}^{J} \left[\left(\beta_{Mj} - \beta_{Cj}\right) E\left(X_{Cj}\right)\right]$ is the structural effect. Within the structural component, the first part $(\beta_{M0} - \beta_{C0})$ reflects differential regression intercepts for comparator country and firms in UMICs (i.e.

unexplained differences across the two groups due to unobservables), while the second part ($\sum_{j=1}^{J}\left[\left(\beta_{Mj}-\beta_{Cj}\right)E\left(X_{Cj}\right)\right]$) reflects differences in slope coefficients, i.e. the combined effect of returns to all the covariates. In practice, equations (1) and (2) are estimated as outlined in the previous section. The parameter estimates, and sample means of each covariate are then used to compute equation (6). We can further disaggregate the endowment and structural effect using a detailed decomposition to explore the contribution of each covariate.

There are two important assumptions needed for the decomposition in equation (6) to be valid (see also Fortin et al. 2011). First is the assumption of overlapping support, and second is the assumption of ignorability. Under the assumption of overlapping support, there is an overlap in the distribution of observables and unobservables between the HICs and UMICs firm subpopulations. That is, the covariates X cannot attain a single value $X = x$ or $\epsilon = e$ such that firms in UMICs (or comparator) are identified. Ignorability assumes that conditional on controls, the assignment of firms in UMICs (or comparator) is random. In other words, we assume that the status of being a UMIC firm vs. HIC firm is random after accounting for various factors, which rules out, for example, self-selection based on unobservables. In addition, for the detailed decomposition, we must assume additive linearity (which is implicit in the linear functions of log labor productivity shown above) and zero conditional mean (as specified above).

4. Decomposition Results

Table 7 presents the decomposition results. Only the final specification with all the productivity determinants included is shown. This is done for brevity reasons.

As discussed in the previous section, unconditional labor productivity among firms in the UMICs is, on average 57.5 percent lower than among firms in the HICs (log difference of 0.857).

This unconditional labor productivity gap is decomposed into an endowment effect and a structural effect. Endowment effect refers to the attributes or incidence of certain factors experienced by the firm, whereas the structural effect refers to the returns to these attributes or factors. Take, for instance, the size of a firm. Firms in UMICs are on average larger than the firms in the HICs, and this contributes to the labor productivity gap via the endowment effect. Furthermore, the returns of a unit increase in firm-size (or marginal worker) may have differential effects for firms in UMICs vs. HICs, and this would be captured as a structural effect.

Our results show that the labor productivity gap is almost equally divided between the endowment and the structural effects. That is, the structural effect explains 49.7 percent of the productivity gap while the endowment effect explains the remaining 50.3 percent of the productivity gap. Both firm-level and country-level factors contribute significantly to the productivity gap via the structural effect and the endowment effect. These factors are discussed below.

Endowment effect

Recall that firms in the UMICs are less productive than firms in the HICs. Thus, any factor that narrows the productivity gap favors firms in UMICs over firms in HICs. As mentioned above, we focus on the final specification. The findings for the endowment effect are presented in column 2 in Table 7.

The biggest contribution to the productivity gap via the endowment effect comes from the difference between UMICs and HICs in the level of tertiary education attainment followed by law and order, international certification, firm-size, sector of activity and then the purchase of fixed assets during the last year.

Recall that higher tertiary enrollment and better institutional quality contribute positively to labor productivity. At the same time, UMICs lag HICs in both these areas. Thus, the productivity gap is increased by 24.3 percent (significant at the 1 percent level) due to differences in enrollment ratio at the tertiary level, and by 13.7 percent (significant at 1 percent level) due to differences in institutional quality as captured by the Law & Order variable. We find no significant contribution (at the 10 percent level or less) of differences in the other country-level variables to the productivity gap via the endowment effect.

As highlighted above, the number of firms having an internationally recognized quality certification is proportionately lower in the UMICs than in the HICs. International certification was also found to be significantly positively correlated with labor productivity. Thus, it is no surprise that the productivity gap is enhanced due to differences in the number of firms having quality certification by 5.6 percentage points (significant at the 1 percent level). We argued in the previous section that as firm-size increases labor productivity decreases and that firms in UMICs are larger than firms in high-income countries. This implies that difference in firm-size between UMICs and the HICs serves to increase the productivity gap by about 5.2 percent, and it is significant at the 1 percent level. Sector-wise, there are proportionately fewer manufacturing firms in the UMICs than the HICs. This difference leads to a narrowing of the productivity gap by 4.5 percent, significant at the 1 percent level.

As discussed above, the number of firms that purchased fixed assets during the last year is proportionately lower in the UMICs than in the HICs. The purchase of fixed assets was also found to be significantly positively correlated with labor productivity. Thus, it is no surprise that the productivity gap is enhanced due to differences in the number of firms that purchased fixed assets in the last year by 2.1 percentage point (significant at the 5 percent level). There is no significant

(at the 10 percent level or less) contribution of the remaining firm-level variables to the productivity gap via the endowment effect.

Structural effect

The structural effect refers to the role of the returns to production factors or attributes of firms that lead to the widening or narrowing of the productivity gap. Focusing on the variables that contribute significantly (at the 10 percent level or less) to the productivity gap through the structural effect, the biggest contribution comes from differences between the UMICs and the HICs in returns to market size followed by secondary education attainment, law and order, firm size and exports. That is, differences between the UMICs and the HICs in returns to market size serve to increase the productivity gap by 670 percent (significant at the 1 percent level); differences in returns to secondary education attainment and law and order increase the productivity gap by 590 percent and 139 percent (significant at the 1 percent level), respectively. These are extremely large effects, but they are countered by other unidentified structural effects that serve to reduce the productivity gap. This can be seen from the fact that the coefficient of the constant term in the column for structural effects (column 2, table 7) is negative, large, and significant at the 1 percent level. Thus, the overall contribution of the structural effects to the productivity gap is limited to less than 50 percent.

For the firm-level variables, the difference in the return to firms' size between the UMICs and the HICs reduces the productivity gap by 32.5 percent (significant at the 10 percent level), implying that the diminishing returns to labor is weaker in the UMICs than the HICs. On the other hand, the difference in the return to exports increases the labor productivity gap by 5.9 percent

(significant at the 10 percent level). This means that export activity in the HICs is associated with a larger increase in labor productivity than in the UMICs.

5. Robustness

The regressions in Table 3 use information on whether a firm purchased fixed assets in the last fiscal year to proxy for physical capital, which is the only variable related to capital use that is available for the full sample of firms. However, such binary data do not provide any information on the value of the firm's capital stock. The ES does collect data on the hypothetical repurchase value of machinery, which may explain part of the productivity gap if firms in UMICs face different constraints in purchasing capital than firms elsewhere.

The robustness check explores what happens to the productivity gap if we control for (log of) repurchase cost of the machinery (*Capital*). Because this type of financial data is only available for a subset of manufacturing firms, this comes at the cost of a significant decline in sample size, from 14,944 in table 3 to 5,622 in table 8. For brevity, we present results only for the final specification with all the productivity determinants discussed above included in the specification.

To separate the impact of the additional control variables from that of sample composition, table 8 column 1 re-estimates the base specification on the sub-sample of manufacturing firms with information on repurchase cost of machinery available. For this sample and without controlling for repurchase cost of machinery, labor productivity of a typical firm in UMICs is about 23.9 percent lower than in the HICs and it is significant at 5 percent level. The corresponding figure is somewhat lower at 19.6 percent (significant at the 5 percent level) when we include the control for the repurchase cost of machinery comparators (column 2). As expected, table 8 shows

that higher repurchase cost of machinery is associated with higher labor productivity, and this relationship is significant at the 1 percent level.

6. Conclusion

Nationally representative firm-level survey data for 22 UMICs and 11 HICs shows that labor productivity in upper-middle-income countries is lower by about 58 percent than in the high-income countries. The lower productivity in the UMICs holds in the full sample and also in the sub-samples of firm-size (small, medium, and large) and sector (manufacturing, retail, and industry). The Oaxaca-Blinder decomposition results reveal that the endowment effect and the structural effect contribute almost equally to the productivity gap. Several firm-level and country-level variables are found to contribute significantly to the productivity gap via the endowment effect and the structural effect. These findings provide insights into the likely reasons for why middle-income countries fail to transition to high-income status.

Several issues remain to be explored. We provide a couple of examples to illustrate the point. First, we found that a large part of the structural effect remains unidentified. Future work in this area can help shed light on the likely factors involved here. Second, the decomposition technique used above does not identify the channels or the mechanisms through which the firm-level and country-level variables impact labor productivity in UMICs and HICs. Further, the decomposition technique does not allow for any causal inferences. These remain important areas for future research.

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Figure 1: Kernel density estimates of the log of labor productivity for firms in the upper-middle-income and high-income countries

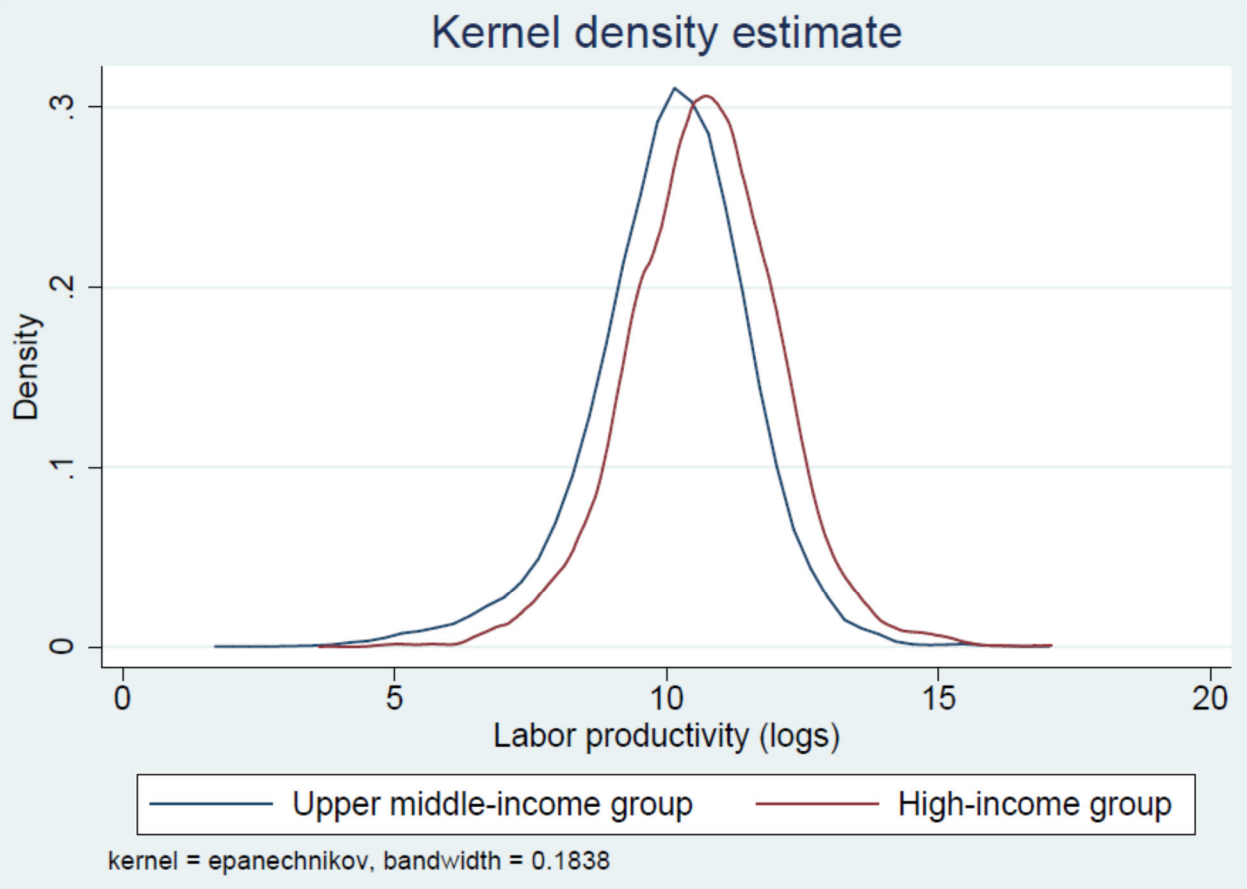

Table 1: Sample description		
Country	Number of firms	Number of firms as %
Panel A: Upper middle-income group		
Albania	203	2.0%
Argentina	502	4.9%
Belarus	248	2.4%
Botswana	203	2.0%
Brazil	983	9.5%
Bulgaria	242	2.3%
Chile	836	8.1%
Colombia	804	7.8%
Costa Rica	369	3.6%
Ecuador	322	3.1%
Hungary	139	1.4%
Jordan	388	3.8%
Kazakhstan	337	3.3%
Lebanon	398	3.9%
Malaysia	605	5.9%
Mexico	1,154	11.2%
Namibia	170	1.7%
Paraguay	235	2.3%
Peru	683	6.6%
Romania	415	4.0%
Thailand	633	6.1%
Tunisia	457	4.4%
All upper middle-income countries	10,326	69.1%
Panel B: High income group		
Croatia	276	6.0%
Czech Republic	177	3.8%
Estonia	185	4.0%
Israel	409	8.9%
Latvia	177	3.8%
Lithuania	157	3.4%
Poland	260	5.6%
Russian Federation	2,461	53.3%
Slovak Republic	137	3.0%
Slovenia	206	4.5%
Uruguay	173	3.8%
All high-income countries	4,618	30.9%
All firms	14,944	100%

Table 2: Mean differences			
	(1)	(2)	(3)
Variable name	UMICs	HICs	Difference
Sales per worker ('000 USD)	80.741	213.200	-132.459***
Labor productivity (logs)	10.102	10.959	-0.857***
Manufacturing	0.386	0.443	-0.057***
Retail	0.417	0.352	0.065***
Other Services	0.197	0.204	-0.007
Employment (logs)	3.114	2.945	0.169***
Firm's age (logs)	2.623	2.611	0.012
Exports (proportion of sales)	0.055	0.116	-0.062***
Foreign (dummy)	0.095	0.102	-0.007
Top Manager Experience (logs)	2.896	2.904	-0.008
Certification (dummy)	17.707	25.266	-7.559***
Bought Assets (dummy)	45.254	54.588	-9.334***
Female top manager (dummy)	0.174	0.168	0.005
Time Tax	12.745	11.519	1.227**
Credit (dummy)	48.253	44.606	3.647*
Tertiary education (enrollment, %)	46.356	68.857	-22.502***
Secondary education (enrollment, %)	92.451	98.571	-6.120***
Primary education (enrollment, %)	106.619	100.968	5.652***
Total population (logs)	16.542	15.658	0.884***
Corruption (Transparency International)	24.773	50.631	-25.859***
Law and Order (ICRG)	3.199	4.316	-1.117***

Table 3: Base regression results (All countries)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dependent variable: *Labor productivity (logs)*							
UMICs	-0.857***	-0.886***	-0.842***	-0.778***	-0.572***	-0.549***	-0.390***
	(0.060)	(0.056)	(0.055)	(0.053)	(0.057)	(0.060)	(0.067)
Manufacturing		-0.697***	-0.699***	-0.747***	-0.738***	-0.739***	-0.729***
		(0.065)	(0.064)	(0.061)	(0.061)	(0.061)	(0.060)
Other Services		-0.784***	-0.765***	-0.776***	-0.775***	-0.783***	-0.794***
		(0.097)	(0.096)	(0.095)	(0.095)	(0.095)	(0.096)
Employment (logs)		-0.101***	-0.178***	-0.294***	-0.291***	-0.289***	-0.292***
		(0.026)	(0.027)	(0.028)	(0.027)	(0.028)	(0.027)
Firm's age (logs)			0.303***	0.212***	0.200***	0.200***	0.195***
			(0.041)	(0.044)	(0.043)	(0.043)	(0.043)
Exports			0.477***	0.340***	0.297**	0.284**	0.245**
(proportion of			(0.126)	(0.118)	(0.119)	(0.120)	(0.121)
Foreign (dummy)			0.707***	0.633***	0.695***	0.682***	0.692***
			(0.111)	(0.107)	(0.105)	(0.106)	(0.105)
Top Manager Experience (logs)				0.143***	0.151***	0.152***	0.140***
				(0.049)	(0.048)	(0.048)	(0.048)
Certification				0.006***	0.006***	0.006***	0.006***
(dummy)				(0.001)	(0.001)	(0.001)	(0.001)
Bought Assets				0.002***	0.002***	0.002***	0.002***
(dummy)				(0.001)	(0.001)	(0.001)	(0.001)
Female top manager				-0.325***	-0.341***	-0.336***	-0.329***
(dummy)				(0.077)	(0.077)	(0.077)	(0.077)
Time Tax				0.002	0.002	0.002	0.001
				(0.001)	(0.001)	(0.001)	(0.001)
Credit (dummy)				0.004***	0.004***	0.004***	0.003***
				(0.001)	(0.001)	(0.001)	(0.001)
Tertiary education					0.009***	0.009***	0.008***
(enrollment, %)					(0.002)	(0.002)	(0.002)
Secondary education					0.002	0.002	0.004
(enrollment, %)					(0.003)	(0.003)	(0.004)
Primary education					-0.001	0.000	0.005
(enrollment, %)					(0.006)	(0.005)	(0.006)
Total population						-0.032	0.001
(logs)						(0.024)	(0.025)
Corruption							0.002
(Transparency International)							(0.002)
Law and Order							0.146***
(ICRG)							(0.031)
Constant	10.959***	11.725**	11.029**	10.839**	10.181**	10.563**	8.697***
	(0.047)	(0.089)	(0.122)	(0.161)	(0.549)	(0.665)	(0.737)
Observations	14,944	14,944	14,944	14,944	14,944	14,944	14,944
R-squared	0.069	0.136	0.177	0.234	0.242	0.243	0.249

Standard errors in brackets. Significance is denoted by *** (1%), ** (5%), * (10%)

Table 4: Results by income groups

	Upper middle-income group					High-income group				
Dependent variable: *Labor productivity* (logs)										
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Manufacturin	-0.692***	-0.689***	-0.710***	-0.683***	-0.670***	-0.698***	-0.706***	-0.833***	-0.766***	-0.782***
	(0.077)	(0.075)	(0.072)	(0.072)	(0.071)	(0.119)	(0.114)	(0.110)	(0.110)	(0.108)
Other	-0.767***	-0.745***	-0.749***	-0.751***	-0.767***	-0.815***	-0.802***	-0.842***	-0.829***	-0.805***
	(0.119)	(0.119)	(0.118)	(0.116)	(0.117)	(0.157)	(0.150)	(0.144)	(0.145)	(0.141)
Employment	-0.072**	-0.138***	-0.257***	-0.255***	-0.262***	-0.180***	-0.273***	-0.375***	-0.386***	-0.356***
	(0.031)	(0.032)	(0.035)	(0.034)	(0.033)	(0.041)	(0.044)	(0.042)	(0.043)	(0.043)
Firm's age		0.261***	0.202***	0.195***	0.193***		0.391***	0.226***	0.213***	0.177***
		(0.051)	(0.055)	(0.054)	(0.054)		(0.069)	(0.064)	(0.066)	(0.065)
Exports		0.304*	0.205	0.110	0.072		0.664***	0.490***	0.555***	0.506***
(proportion		(0.171)	(0.161)	(0.159)	(0.160)		(0.190)	(0.181)	(0.186)	(0.180)
Foreign		0.634***	0.550***	0.592***	0.602***		0.863***	0.802***	0.811***	0.819***
		(0.124)	(0.123)	(0.126)	(0.125)		(0.226)	(0.205)	(0.204)	(0.201)
Top Manager			0.078	0.088	0.084			0.293***	0.287***	0.233***
(logs)			(0.059)	(0.056)	(0.056)			(0.089)	(0.088)	(0.088)
Certification			0.006***	0.006***	0.006***			0.006***	0.006***	0.005***
			(0.001)	(0.001)	(0.001)			(0.001)	(0.001)	(0.001)
Bought			0.002***	0.002**	0.002**			0.002**	0.002**	0.003***
			(0.001)	(0.001)	(0.001)			(0.001)	(0.001)	(0.001)
Female top			-0.293***	-0.289***	-0.278***			-0.378***	-0.345***	-0.367***
(dummy)			(0.091)	(0.092)	(0.092)			(0.131)	(0.127)	(0.123)
Time Tax			0.002	0.002	0.001			0.001	-0.001	0.002
			(0.001)	(0.001)	(0.001)			(0.003)	(0.003)	(0.003)
Credit			0.003***	0.003***	0.003***			0.004***	0.004***	0.004***
			(0.001)	(0.001)	(0.001)			(0.001)	(0.001)	(0.001)
Tertiary				0.009***	0.009***				0.012***	0.010**
(enrollment,				(0.002)	(0.002)				(0.005)	(0.005)
Secondary				0.001	0.002				0.041***	0.053***
(enrollment,				(0.005)	(0.005)				(0.011)	(0.017)
Primary				0.002	0.005				-0.002	-0.000
(enrollment,				(0.006)	(0.006)				(0.011)	(0.011)
Total				-0.086**	-0.059				0.212***	0.307***

				(0.040)	(0.041)				(0.049)	(0.053)
Corruption (Transparency					0.000					0.007
					(0.002)					(0.006)
Law and Order					0.105***					0.381***
(ICRG)					(0.035)					(0.077)
Constant	10.744***	10.185***	10.157***	10.860***	9.731***	11.965***	11.053***	10.630***	2.640	-1.902
	(0.091)	(0.131)	(0.171)	(0.743)	(0.802)	(0.138)	(0.227)	(0.316)	(1.651)	(2.295)
Observations	10,326	10,326	10,326	10,326	10,326	4,618	4,618	4,618	4,618	4,618
R-squared	0.066	0.097	0.150	0.164	0.168	0.090	0.169	0.253	0.274	0.301

Standard errors in brackets. Significance is denoted by *** (1%), ** (5%), * (10%)

Table 5: Main Estimation by Size

	(1)	(2)	(3)
Dependent variable: *Labor productivity* (logs)	Small	Medium	Large
UMICs	-0.342***	-0.559***	-0.313**
	(0.094)	(0.104)	(0.151)
Manufacturing	-0.663***	-0.832***	-0.668***
	(0.079)	(0.105)	(0.110)
Other Services	-0.738***	-0.916***	-0.407***
	(0.132)	(0.157)	(0.144)
Employment (logs)	-0.536***	-0.649***	-0.560***
	(0.068)	(0.080)	(0.053)
Firm's age (logs)	0.078	0.208***	0.382***
	(0.059)	(0.066)	(0.060)
Exports (proportion of sales)	0.339	0.218	-0.245*
	(0.214)	(0.175)	(0.126)
Foreign (dummy)	0.720***	0.679***	0.520***
	(0.179)	(0.195)	(0.103)
Top Manager Experience (logs)	0.188***	0.139*	0.102
	(0.071)	(0.073)	(0.072)
Certification (dummy)	0.006***	0.006***	0.006***
	(0.001)	(0.001)	(0.001)
Bought Assets (dummy)	0.002**	0.002**	0.001
	(0.001)	(0.001)	(0.001)
Female top manager (dummy)	-0.254***	-0.329*	-0.733***
	(0.095)	(0.174)	(0.172)
Time Tax	0.001	0.003	-0.002
	(0.002)	(0.002)	(0.002)
Credit (dummy)	0.003***	0.004***	0.005***
	(0.001)	(0.001)	(0.001)
Tertiary education (enrollment, %)	0.011***	0.004	0.005
	(0.003)	(0.003)	(0.003)
Secondary education (enrollment, %)	0.003	-0.007	0.002
	(0.005)	(0.007)	(0.006)
Primary education (enrollment, %)	0.011	0.007	0.002
	(0.008)	(0.012)	(0.006)
Total population (logs)	0.008	0.015	-0.016
	(0.033)	(0.045)	(0.035)
Corruption (Transparency International)	0.005**	0.003	0.003
	(0.002)	(0.003)	(0.003)
Law and Order (ICRG)	0.156***	0.053	0.169***
	(0.041)	(0.046)	(0.052)
Constant	8.280***	11.405***	10.974***
	(1.004)	(1.595)	(0.958)
Observations	6,834	5,106	3,004
R-squared	0.277	0.303	0.269

Standard errors in brackets. Significance is denoted by *** (1%), ** (5%), * (10%)

Table 6: Main Estimation by Industry

	(1)	(2)	(3)
Dependent variable: *Labor productivity* (logs)	Manufacturing	Retail	Other
UMICs	-0.312***	-0.491***	-0.390**
	(0.099)	(0.127)	(0.186)
Employment (logs)	-0.358***	-0.241***	-0.306***
	(0.031)	(0.066)	(0.100)
Firm's age (logs)	0.230***	0.210***	0.166
	(0.061)	(0.074)	(0.191)
Exports (proportion of sales)	0.335***	-0.104	0.426
	(0.123)	(0.331)	(0.410)
Foreign (dummy)	0.578***	0.849***	0.671**
	(0.128)	(0.235)	(0.278)
Top Manager Experience (logs)	0.065	0.205**	0.205
	(0.064)	(0.095)	(0.159)
Certification (dummy)	0.007***	0.007***	0.005***
	(0.001)	(0.002)	(0.002)
Bought Assets (dummy)	0.002***	0.002	0.000
	(0.001)	(0.001)	(0.002)
Female top manager (dummy)	-0.383***	-0.339***	-0.242
	(0.119)	(0.111)	(0.211)
Time Tax	0.000	0.003	0.001
	(0.002)	(0.002)	(0.003)
Credit (dummy)	0.004***	0.003***	0.001
	(0.001)	(0.001)	(0.002)
Tertiary education (enrollment, %)	0.007***	0.010***	0.007
	(0.003)	(0.003)	(0.006)
Secondary education (enrollment, %)	-0.005	0.009	0.001
	(0.005)	(0.006)	(0.013)
Primary education (enrollment, %)	0.004	0.008	0.003
	(0.007)	(0.010)	(0.031)
Total population (logs)	0.041	-0.020	0.014
	(0.031)	(0.053)	(0.089)
Corruption (Transparency International)	0.005**	-0.002	0.007
	(0.002)	(0.003)	(0.004)
Law and Order (ICRG)	0.173***	0.166***	0.076
	(0.038)	(0.062)	(0.075)
Constant	8.391***	7.903***	8.485**
	(0.926)	(1.363)	(3.357)
Observations	8,717	4,603	1,624
R-squared	0.259	0.214	0.160

Standard errors in brackets. Significance is denoted by *** (1%), ** (5%), * (10%)

Table 7: Decomposition results

	(1)	(2)	(3)
		Endowment effect	**Structural effect**
Labor productivity (logs) in HICs	10.959***		
	(0.046)		
Labor productivity (logs) in UMICs	10.102***		
	(0.037)		
Labor productivity difference	0.857***		
(HICs minus UMICs labor productivity)	(0.059)		
Endowment effect (overall)	0.431***		
	(0.085)		
Structural effect (overall)	0.426***		
	(0.087)		
Manufacturing		-0.039***	-0.050
		(0.013)	(0.055)
Other Services		-0.006	-0.008
		(0.014)	(0.037)
Employment (logs)		0.044***	-0.279*
		(0.012)	(0.156)
Firm's age (logs)		-0.002	-0.041
		(0.006)	(0.217)
Exports		0.004	0.051*
(proportion of sales)		(0.010)	(0.028)
Foreign (dummy)		0.004	0.022
		(0.007)	(0.023)
Top Manager Experience		0.001	0.432
(logs)		(0.002)	(0.291)
Certification (dummy)		**0.048*** **	-0.021
		(0.013)	(0.036)
Bought Assets (dummy)		0.018**	0.047
		(0.008)	(0.067)
Female top manager (dummy)		0.001	-0.015
		(0.004)	(0.025)
Time Tax		-0.002	0.007
		(0.002)	(0.035)
Credit (dummy)		-0.012	0.007
		(0.008)	(0.051)
Tertiary education		**0.208*** **	0.071
(enrollment, %)		**(0.054)**	(0.352)
Secondary education		0.011	**5.059*** **
(enrollment, %)		(0.031)	**(1.650)**
Primary education		-0.027	-0.493
(enrollment, %)		(0.038)	(1.250)
Total population (logs)		0.052	**5.739*** **
		(0.038)	**(1.020)**

Corruption	0.008	0.340
(Transparency International)	(0.058)	(0.291)
Law and Order	**0.118*** **	**1.190*** **
(ICRG)	**(0.041)**	**(0.349)**
Constant		-11.633***
		(2.293)
Observations	14,944	

Note: Standard errors in brackets. Significance is denoted by *** (1%), ** (5%), * (10%). The three largest contributors to the productivity gap via the endowment effect and the structural effect are in bold.

Table 8: Capital stock control		
Dependent variable: *Labor productivity* (logs)	(1)	(2)
UMICs	-0.273**	-0.218**
	(0.118)	(0.102)
Employment (logs)	-0.201***	-0.426***
	(0.044)	(0.041)
Firm's age (logs)	-0.021	-0.070
	(0.054)	(0.052)
Exports (proportion of sales)	0.091	0.152
	(0.154)	(0.159)
Foreign (dummy)	0.497***	0.370***
	(0.146)	(0.140)
Top Manager Experience (logs)	0.117*	0.127**
	(0.064)	(0.054)
Certification (dummy)	0.008***	0.005***
	(0.001)	(0.001)
Female top manager (dummy)	-0.383***	-0.226**
	(0.114)	(0.099)
Time Tax	-0.000	-0.001
	(0.002)	(0.002)
Credit (dummy)	0.004***	0.002***
	(0.001)	(0.001)
Tertiary education (enrollment, %)	0.009***	0.005**
	(0.003)	(0.002)
Secondary education (enrollment, %)	0.001	0.008
	(0.006)	(0.005)
Primary education (enrollment, %)	0.009	0.001
	(0.007)	(0.006)
Total population (logs)	0.002	0.064**
	(0.035)	(0.032)
Corruption (Transparency International)	0.003	0.002
	(0.002)	(0.002)
Law and Order (ICRG)	0.164***	0.125***
	(0.045)	(0.038)
Capital stock (USD, logs)		0.311***
		(0.020)
Constant	8.203***	4.830***
	(1.043)	(0.995)
Observations	5,622	5,622
R-squared	0.219	0.378

Standard errors in brackets. Significance is denoted by *** (1%), ** (5%), * (10%)