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Trade, Jobs, and Inequality

by Kim Beaton, Valerie Cerra, and Metodij Hadzi-Vaskov

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Abstract

This paper examines the impact of trade on employment, wages, and other outcomes across countries and explores the conditions and policies that help spread the gains from trade more evenly throughout the population. We exploit a large global firm-level dataset to examine the impact of import competition on employment, wages, and firm performance, as well as the firm, industry, and country factors that mitigate any negative impact of an import shock. In contrast to the results of some well-known single-country studies, we find limited adverse impact of import competition. In some countries and industries, import competition actually strengthens employment growth. In addition, import competition tends to improve average wages, investment, and firm profitability. Country characteristics, such as educational attainment, can also improve employment prospects in response to trade shocks. Finally, we find that firms experiencing greater import competition start with higher average wages; thus any relatively slower employment growth in this group of firms could lead to lower inequality.

JEL Classification Numbers: F14, F15, F16, F43, I3, O1, O57

Keywords: trade, jobs, employment, labor market adjustment, inequality, import competition, firms, industries, panel data, globalization, protectionism, wages

Authors' E-Mail Addresses: beatonkimberly@gmail.com; vcerra@imf.org; mhadzivaskov@imf.org

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I. INTRODUCTION

The impact of international trade on economic growth, social welfare, and labor market outcomes has long been a topic of importance for both academic and policy analysis. While there has been broad consensus from the theoretical literature that trade provides net gains at the aggregate level, there has been much less consensus on practical mechanisms to compensate the owners of factors losing from increased trade and exposure to import competition.

In recent years, anxieties over adverse effects of globalization have risen in the public debate. Opposition to trade agreements and trade integration has featured in some past national elections, especially in advanced countries. Some segments of the population view trade agreements as providing more benefits to foreign partners and consider imports, in particular, as a threat to jobs and wages in competing domestic industries. They point to job losses that are concentrated especially in manufacturing industries, and with an uneven geographic impact. According to Pew Research Center's surveys on global attitudes, public views on trade vary across countries and is correlated with the country's economic performance.[2]

Recent academic literature has mirrored these concerns about labor market dislocations due to import competition. In an influential study, Autor et al (2013) show that rapidly increasing imports from China, arising from its high productivity growth and accession to the WTO, had a larger negative impact on those industries and communities in the US that were most exposed to this import competition shock. In addition, workers who lost their jobs at firms in industries facing import competition from China suffered significant and prolonged wage declines (Autor et al, 2014). Their mobility to other geographic regions and to other industries has been more limited, particularly that of low-skill, low-education workers.

Some studies on developing countries show that regions highly concentrated in vulnerable industries—those facing greater import competition from trade liberalization—experienced a relatively more negative impact on some social indicator. Topalova (2010) uses micro data at

[2] See chapter 7 in Cerra et al. (2021) for a discussion.

the district level in India to study the impact of trade on each location. She finds that in rural districts where industries more exposed to liberalization were concentrated, poverty incidence and depth decreased by less as a result of trade liberalization than in other districts. Baldarrago and Salinas (2017) examine the production structure and expenditure data by district in Peru. They find that districts competing with liberalized imports experienced significantly lower growth in consumption per capita, despite some emigration, in response to increased import competition. Goldberg (2015) and Goldberg and Pavcnik (2007, 2016) provide surveys of the literature on the effects of trade policy and its relationship to labor markets and the income distribution, highlighting similar findings in other studies.

The literature exploiting microeconomic data has mostly focused on trade and labor market or social outcomes in specific countries. To our knowledge, there has been limited granular analysis of these relationships for a broad set of countries, including emerging economies, with cross-countries studies confined to investigating the aggregate impact of trade. This paper seeks to fill this gap, using a large dataset on firms and industries for many countries.

II. Cross-Country Studies of Trade, Growth, and Inequality

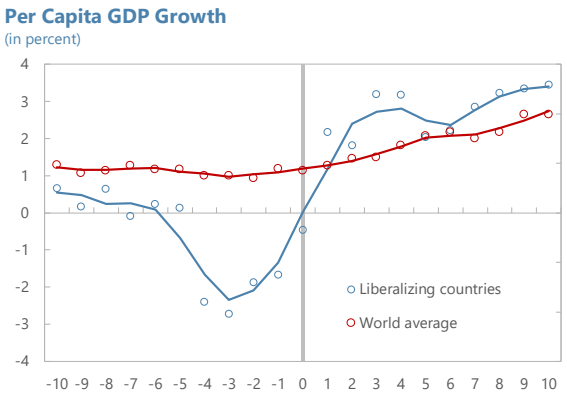
Previous work shows that trade openness improves growth without any detrimental impact on the income distribution at the aggregate country level. For example, Dollar and Kraay (2004) find that globalization leads to faster growth and poverty reduction in poor countries. Cross-country studies of long-term growth and trade across countries have nonetheless been controversial, partly due to the difficulty in controlling for all relevant country characteristics and for potential endogeneity. Frankel and Romer (1999) use measures of the geographic component of trade as instrumental variables and find that trade has a large and robust positive effect on income. Beaton, Cebotari, and Komaromi (2017; hereafter BCK) use panel data with annual GDP growth and trade openness, which permits them to control for country characteristics by including country fixed effects. BCK also address endogeneity through system GMM. They find relatively robust results that trade openness raises economic growth. The composition of trade (as constructed by Ding and Hadzi-Vaskov, 2017) and trade network indicators (as constructed in Beaton, Cebotari, Ding, and Komaromi, 2017) also impact economic growth. BCK and Jaumotte, Lall, and Papageorgiou (2013) explore the

effect of trade openness on inequality—measured by Gini coefficients. They find no evidence that trade openness leads to higher inequality at the aggregate level. The panel regressions show that trade reduces inequality in emerging markets.

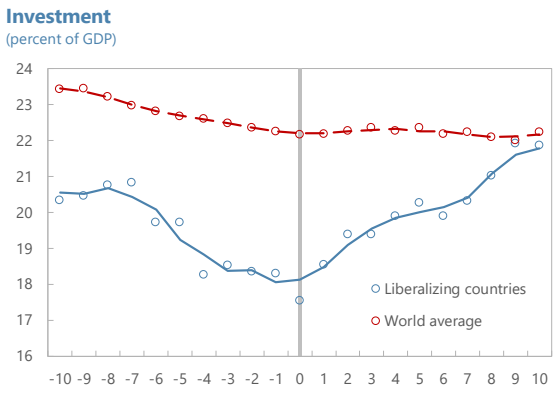
BCK also conduct event studies of liberalization episodes, mainly reflecting emerging market countries. They find that trade liberalization spurs a steep rise in per capita GDP growth and investment (Figure 1). Liberalization also leads to higher FDI inflows, lower volatility, and a shift in the composition of exports to less technologically advanced products and to higher value added in services. Income inequality in liberalizing countries, on average, followed the global trends (Figure 2). In contrast, countries that remained relatively closed to international trade experienced a pronounced increase in inequality. Cerdeiro and Komaromi (2020) use a different methodology, based on a gravity model. in which the geographic characteristics of a country (such as distance to trading partners) can be used as the exogenous component of trade. They find that trade raises income of the poorest deciles of a population more than the richest deciles and reduces inequality.

Figure 1. Trade Liberalization and Economic Performance

Growth tends to rise after trade is liberalized…

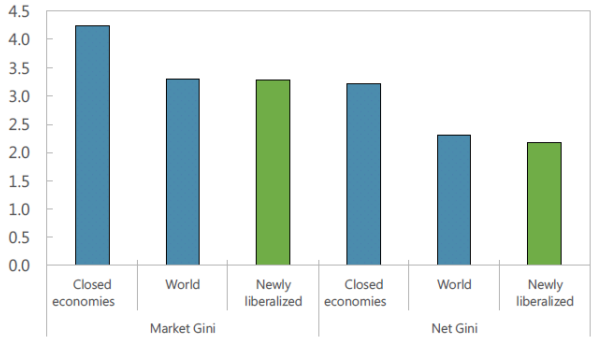


…as investment strengthens.



Sources: Beaton, Cebotari, and Komaromi (2017); WDI, Wacziarg and Welch (2008) and IMF staff calculations. Note: Cross-country averages. As several countries had varying numbers of years of data before and after their trade liberalizations, the average at each point in time is based on different samples of countries.

Figure 2. Inequality and Trade Liberalization
(Change in Gini coefficient 10 years before and after trade liberalization)



Sources: Beaton, Cebotari, and Komaromi (2017); SWIID, Wacziarg and Welch (2008) and IMF staff calculations.

This literature review uncovers starkly different inferences at the macroeconomic versus microeconomic level. In line with theory, trade generates net economic benefits at the overall country level. However, aggregate studies overlook relative impacts within each country, even if the overall income distribution improves. In contrast, single-country microeconomic studies demonstrate that some regions or industries lose in relative terms, but these studies do not determine whether they lose in absolute terms. It is possible that everyone gains from trade, but some gain more than others. In the example of Peru, for instance, *relative* losses in districts most exposed to import competition masked an impressive overall decline in income inequality and poverty. Bacchetta, Cerra, Piermartini, and Smeets (2021) provide a comprehensive survey of the literature on the relationship between trade, inequality, and growth.

In this paper, we investigate whether trade, especially import competition, generates employment gains or losses. We use a microeconomic dataset with granular data on firms and industries, which allows us to consider the relative winners and losers from trade within each country. However, we have global data with many countries, which facilitates studying the channels through which trade affects labor market indicators and the interlinkages with country characteristics and policies that lead to smoother adjustment and a greater benefit of trade at the aggregate level.

III. DATA

The firm level dataset used in this study is from the Orbis database by Bureau van Dijk.[3] Orbis is a commercial database that contains data on over 130 million firms worldwide.[4] It includes harmonized and detailed information on firm finances based on their balance sheets and income statements, including the number of employees and related costs.[5] The dataset includes information on both public (listed) and private (non-listed) firms, such that, unlike many sources of firm-level data, its coverage includes small and medium-size enterprises in addition to large listed firms. For some countries, the data covers more than 90 percent of gross output.

We use the broadest possible firm-level dataset from Orbis for our cross-country study. Our sample period covers 1981 to 2015 and 102 countries. The dataset is strongly unbalanced with significant increases in the number of observations over time (particularly in 2007). Coverage of firms also differs widely across countries. Coverage is generally broad for Europe and some EMDEs (in particular, some large EMs account for a significant share of total observations), but is more limited for the United States and many low-income developing countries. Annexes 1-2 provide an overview of the number of observations by year and country in our final dataset.

We follow the methodology of Kalemi-Özcan and others (2015) to construct our dataset based on the Orbis source data. We exclude firms that do not provide information on the number of employees (or who report negative employees) as well as firms that report negative assets, sales, or tangible fixed assets in any year. The Orbis dataset also includes information on both the consolidated and unconsolidated accounts of firms. For firms that report both consolidated and unconsolidated accounts, we use the unconsolidated accounts.

Our dataset also includes detailed information on firms' industry classification. We use the North American Industry Classification System (NAICS 2012) 4-digit industry classification

[3] For a detailed description of the dataset see Kalemi-Özcan and others (2015).
[4] For data on companies through 2015.
[5] As reported to business registers. Orbis compiles this data using various information providers.

to classify all firms in our dataset by industry. Thereafter, we group firms by the 2-digit NAICS structure, resulting in a total of 40 industries. Annex 3 provides a summary of the industries according to the NAICS classification in our final dataset. As we are interested in matching the firm-level data with country-level trade data at the industry level, we use several correspondence tables to match the NAICS industry classification with the import data. We also group the industries into the skill and technology-intensive product classifications, resulting in seven sectors (Annex 4).

The explanatory variable "trade" can be measured in different ways. Topolova (2010) and Baldarrago and Salinas (2017) base their analysis on a known period of liberalization in a specific country (India and Peru, respectively). BCK (2017) conduct an event study of liberalization episodes of a set of countries, many of the episodes happening during the mid-1980s to the mid-1990s. These papers use the liberalization episodes as an identification strategy for trade policy. The Orbis dataset does not contain a sufficient number of firms before 2000 to be representative of the population of firms. So, the dataset is not appropriate for studying these earlier liberalization events and we focus on the more recent period. Another set of papers in the literature focus on trade openness as the measure of trade, rather than trade policy. The panel regressions in BCK fall into this category. In this case, the assumption is that trade may rise due to factors other than trade policy.

Our basic objective is to trace the impact of an import competition shock on domestic firms. The construction of the import shock variable was inspired by the seminal work by Autor et al. (2013), though there are several differences. In the case of the China shock, Autor et al. (2013) were looking only at the shock from China to the US, in particular the growth of imports by industry from China to the US. Within the US, they had locational data by commuting zone and the relative importance of each industry for each zone. Hence, for those industries that had a substantial increase in imports from China to the US, they investigated whether the commuting zones most exposed to this industry would also be most affected. Instead of sub-national data for one country, we have country-level data for many industries for a large set of countries across the world. With our global sample, we are interested in broader sources of import competition shocks, not just those from China. As in Autor et al.

(2013), the import competition shock could partly reflect differences in trade policy, but it could also reflect global supply conditions, such as an increase in China's productivity. Thus, our import shock is derived from trade data outcomes rather than measures of trade policy.

The imports shocks are constructed from import values retrieved from the COMTRADE database. We use four-digit product data based on the Standard International Trade Classification (SITC4) from COMTRADE. We map the product level data through correspondence tables to construct import shocks at the industry level. First, we map SITC4 to Central Product Classification Ver. 2 (CPC2) classification. Second, we match industry categories from NAICS 2012 to International Standard Industrial Classification Rev.4 (ISIC4). Third, we map ISIC4 to CPC2, which then serves to match the product level data with the firms' industry classification. Constructed in this way, each import shock is specific to an industry-country-year combination. For example, all U.S. firms in the chemical manufacturing industry in a certain year face a common import shock, which is calculated as the percentage change in total imports into the U.S. of all products that belong to the chemical manufacturing industry for that year. COMTRADE provides the information on trade in goods, so we confine our regression analysis to the 25 matching industries, with trade in services left for future research.

We explore firms' response to import shocks across various dimensions. Our main dependent variable of interest is firm employment, measured as growth in the number of firm employees. However, beyond changes in the number of employees, an import shock could affect firms through other channels, such as wage changes. Hence, we also study alternative dependent variables that describe firms' performance, such as firms' average wages, total sales, profits, investment, spending on R&D, and costs. The percentage change of each of these variables is used as dependent variable in alternative specifications in our analysis.

Firms' response to import shocks may differ depending on their individual characteristics – like the strength of their balance sheets. We consider four balance sheet indicators as possible explanatory variables of movements in firms' employment and wages: sales growth, investment, profits, and firm leverage. Sales growth is straightforwardly measured as growth

in reported gross sales. Investment is measured as net fixed investment (or net capital formation), calculated as growth in fixed tangible assets. Earnings is measured as the ratio of EBITDA (earnings before interest, tax, depreciation, and amortization) to the firm's total revenue. Leverage is measured as the ratio of debt to assets.

We also collected country level data to investigate the importance of country characteristics. We use different data sources, with most of our country variables coming from the IMF's World Economic Outlook (WEO) database, the World Bank's World Development Indicators (WDI) database, the Fraser Institute's indicators of economic freedom, as well as data series from the International Labor Organization (ILO) and the Penn World Tables (PWT). Annex 5 provides a description of all country variables, their sources, and units of measurement.

IV. METHODOLOGY

Our analysis focuses mainly on import competition. The import competition shock is constructed as total imports in each industry for each country. Import changes reflect trade policy, but also other domestic and external determinants. In fact, many countries, especially advanced countries, had reduced tariffs to low levels by 2000 (IMF, World Bank, WTO, 2017) and yet imports grew rapidly after 2000, suggesting that factors other than tariff reductions were at work. Bilateral and plurilateral trade agreements have proliferated in recent years (IMF, 2017) and research shows that trade agreements lead to a dramatic rise in trade among partners of the agreement (Hannan, 2016). Even so, the policy debate has shifted to a broader set of concerns about import competition, regardless of whether competition stems from trade policy or some other reason. In fact, the rise in anti-trade sentiment in several advanced countries has occurred despite the limited reductions in tariffs in recent decades. Our emphasis on imports, as opposed to exports, as the trade shock of interest reflects the public debate focused on potential damage to jobs and wages from import competition. In contrast, popular sentiment is more favorable to export growth given the expectation that higher exports spur job creation and income growth, a perception that is corroborated by much academic literature (for example, see Cerra and Woldemichael, 2017, analyzing the experiences of Brazil and Peru following export acceleration episodes). Indeed,

several studies have shown relative income gains in regions exposed to an expansion of exports due to trade liberalization (McCaig, 2011; McCaig and Pavcnik, 2018). So, our main variable of interest is the import shock and its impact on various attributes of the firm such as employment, wages, investment, and sales. Even so, we are cognizant of potential general equilibrium effects of trade and will consider the interaction of import and export growth.

Our baseline specification relates (industry-differentiated) import competition to employment growth in each firm and several other firm-level decisions and outcomes, matching the industry of the import shock to the industry of the firm. An advantage of using firm-level data, including on employment and wages, is that it mitigates endogeneity problems associated with OLS. An individual firm is deemed small relative to the aggregate import competition shock, and relative to country-level variables used as regressors. However, omitted variables are a greater concern. Import growth partly reflects exogenous external factors, such as trading partners increasing their productivity or participation in the world trade regime. But domestic factors can also generate demand for imports. To address this issue within our baseline specification, we control for real GDP growth as the key source of domestic demand for imports. Real GDP growth of the country could reasonably be considered exogenous to an individual firm. As long as the firm's value-added is small compared with total GDP, the individual firm's decisions and financial outcomes are unlikely to drive real GDP. We also include employment growth at the aggregate country level to control for unobserved shocks to the demand for labor that could affect each firm but also household demand for imports. By including these domestic sources of demand for imports as regressors, we argue that the coefficient on our import shock variable better captures the impact on the dependent variable of the exogenous external component of import competition. As an alternative solution, we use an instrumental variables approach for robustness, where we instrument the import shock—import growth at the country-industry level—with the global growth in the industry imports minus the country's growth in industry imports. We also extend the baseline to include other relevant controls. Given that imports are measured as values, we include import price growth as a regressor, albeit at the country level due to limitations in constructing accurate industry level quantity and price variables

from the trade data. Lagged real GDP per capita is included to account for potential convergence of poorer countries with richer countries.

Thus, the general regression specification is as follows:

$$(1) \quad Y_{f,i,c,t} = \beta_m * M_{i,c,t} + \beta_c * X1_{c,t} + \beta_f * X2_{f,i,c,t} + \beta_z * Z_{c,t} + \beta_{zm} * Z_{c,t} * M_{i,c,t} + \delta_t + \varepsilon_{f,i,c,t}$$

where $Y_{f,i,c,t}$ is the firm-level dependent variable of interest, such as employment growth, in firm f, in industry i, in country c, at time t; $M_{i,c,t}$ is the import shock in industry i, in country c, at time t; $X1_{c,t}$ is the set of country macroeconomic controls such as real GDP growth, total employment growth, import price changes, and lagged per capita income; $X2_{f,i,c,t}$ is the set of firm-level controls in some specifications; $Z_{c,t}$ is a country variable included directly and as an interaction term to test potential mitigation of the import shock (in some cases, a firm-level variable is used instead of a country-level variable); δ_t provides period effects at the global level; and $\varepsilon_{f,i,c,t}$ is the idiosyncratic firm-level error. We do not include country fixed effects due to our interest in exploring how fixed (as well as time-varying) country indicators impact the dependent variable and the interaction with the import shock. Likewise, it would be inappropriate to include firm fixed effects, as they would absorb the industry-country variation in the dependent variable for which we are investigating for the import shock and other controls and interaction variables. However, in alternative regression specifications we control for various sets of fixed effects, such as country, year, industry, country-year and industry-year fixed effects.

V. RESULTS

As a starting point, we conduct a simple analysis of the sources of variation in firm employment changes. Table 1 presents the R^2 statistics from regressions of firm employment growth for the full sample of countries only on various country, industry, and time dummies. The share of firm employment changes explained by fixed (non-time varying) country characteristics is roughly 4.8 percent. Fixed industry characteristics and global employment fluctuations ('time effect' or 'period effect') account for less than one percent of the variation each. We also construct period effects for each country and find that country-time dummies

raise the explanation of firm employment variance only to 6.6 percent. Likewise, industry-time dummies explain only about 1.2 percent of the variance. Including both country-time and industry-time fixed effects increases the R2 only marginally, implying that they jointly explain about 6.7 percent of the total variation in employment changes. Thus, country-level macroeconomic variables and industry variables, whether fixed or time-varying, can explain only a small portion of firm employment changes. Most of the variation in employment is idiosyncratic to the firm and does not depend on aggregate fluctuations from macroeconomic or industry shocks.

A. Import competition and jobs

Next, we look at a basic regression of the import shock on firm employment changes (Table 2). The equation controls for real GDP growth, which represents the key macroeconomic variable affecting employment growth and import demand at the aggregate country level; it also includes time fixed effects. The coefficients on both explanatory variables have the expected sign and are statistically significant at the 1 percent level. Real GDP growth has an elasticity of 0.2 (column 1). The import shock is negative, with an elasticity of -0.054. This result indicates that firms in countries and industries experiencing greater competition from imports reduce employment slightly. This is in line with the results of single country studies that look at the impact of trade shocks by industry in terms of relative winners and losers, such as Autor et al. (2013). Even so, the low elasticity of employment growth to imports indicates a limited adverse impact.

The regression in column 2 of Table 2 instruments the import shock—import growth of industry i, country c (the industry and country of the firm)—with global imports of industry i into all countries except country c. This instrumental variable approach is intended to verify whether the coefficient on the import shock in column 1 is biased upward (less negative in this case) because of some unmeasured domestic demand for imports not captured by the real GDP growth control which would simultaneously lead to higher employment and import growth. The IV results produce a coefficient (-0.021) on the import shock that is less negative, not more, than in column 1. Thus, there is no obvious evidence of an omitted variable on import demand once controlling for real GDP growth.

Import competition leads to job dislocation in most industries, albeit the impact is small. Table 3 shows a significant negative elasticity for most of 25 industries, except for utilities, apparel, leather, and chemical industries. As expected, real GDP growth has a strong positive influence on employment growth for almost all industries. The response to import competition depends on the nature of the industry. High-skill and technology-intensive industries, resource-intensive industries, and industries producing unclassified products increase employment when facing higher imports of similar industries (Table 4). This result could reflect intra-industry trade or global production chains that use intermediate inputs from similar industries. In addition, the finding for high-skill and technology-intensive industries may reflect higher innovation and improved performance of such industries when faced with import competition shock, resulting in employment growth. Real GDP growth and aggregate employment growth are positive and significant for most of the industry groups, albeit with elasticities that vary considerably. Higher import prices are strongly associated with higher employment growth, with elasticities greater than unity in most cases. Higher prices for imports may induce a switch in demand to domestic producers and thereby raise employment in import competing industries.

There is heterogeneity in the results across countries. The job loss associated with import competition appears to be dominated by the behavior of firms in emerging and developing economies (EMDC) (Table 6a, columns 1-2).[6] In contrast, the import shock provides a statistically significant positive boost to firms' employment in advanced economies. Lagged GDP per capita has also been added in the equation. This variable can reflect offsetting factors. According to the literature on economic growth, poorer countries are expected to grow faster and thus converge over time to rich countries. Thus, the level of per capita GDP is expected to be negatively related to subsequent economic growth and investment, and may also exhibit convergence effects with respect to employment growth. Conversely, per capita GDP is also correlated with a range of variables on the quality of institutions and other

[6] Looking at results of individual countries (available upon request), we find that import competition actually leads to more favorable employment growth in the most affected industries, even for some AEs and EMDCs.

factors, which in turn could affect firm's employment growth. Overall, the coefficient is negative and significant, consistent with the convergence story, although this result is also dominated by the EMDCs, while AEs have a positive coefficient.

B. Wages

Contrary to popular belief and anti-globalization sentiment, import competition is associated with higher average wage growth across the global sample of firms (Table 5, column 2), driven by the EMDEs (Table 6a, columns 3-4). The Orbis data does not track individual employees, so it is not certain if the higher average wage reflects an increase in the returns to hours worked or, alternatively, an increase in skills of the workforce with commensurate payments. In EMDEs, the firms may target lower productivity workers for layoffs, with the remaining higher productivity workers receiving higher average wages. Taking employment and wages together, import growth in an industry leads to a rise in the wage bill of domestic firms in the same industry. Thus, while import competition generates some job dislocations, the overall impact on earnings of workers in the same industry is positive.

C. Other Channels

The import shock can affect firms' employment and wage decisions through various channels. To the extent that an increase in imports in an industry reflects successful import competition against domestic firms in the same industry, it could lead to a loss in domestic firms' sales revenue. However, the data do not support that hypothesis. Instead, firms' sales increase in industries most affected by import growth (Table 6b, columns 1-2). Some imports are intermediate or capital goods that serve as inputs to production. Thus, rising imports could in principle reflect greater access to these products, a decline in their price, or an improvement in their quality, all of which should lower the cost of production. The dataset does not contain information on the volume of sales of firms or the unit costs of intermediate inputs. At best, we can view the costs of materials, which rise in value (Table 6b, columns 3-4). Despite higher material costs, the profits of the firms increase in industries facing greater imports (Table 5, column 3 and Table 6c, columns 5-6). The rise in profitability may therefore help explain the relatively favorable performance of workers' earnings in the face of the import competition shock.

Firms also respond to an import shock along other margins besides their employment and wage decisions. They may invest and/or innovate to remain competitive (Wood, 1995). Indeed, investment rises in firms more exposed to the industry-differentiated import shock (Table 5, column 4 and Table 6c, columns 1-2). R&D spending is not significant, except for EMDCs, where it falls after import competition (Table 6c, column 4), but the sample size is severely limited for this variable, so the results may not be reliable.

Aside from firm's decisions, the import shock may be associated with general equilibrium effects at the macroeconomic level. Indeed, firms that export sustained higher employment growth over the sample than non-exporters (Table 7a, columns 1-2) and had a positive employment response to the import shock. An increase in the firm's share of revenues from exports also generates jobs (Table 7a, column 3). Using export values from COMTRADE matched to the same industries as the import values used to construct the import competition shock, we examine the relationship between exports and imports. Table 7b provides the results from a balanced panel regression of country-industry export growth from 1963-2016 on import growth. Export and import growth in the same country-industry-year triplet are significantly correlated, with an elasticity of 0.15. Thus, on average, import competition moves in sync with higher exports, even in the same industry. This general equilibrium tendency helps explain the fairly strong firm performance in the face of import competition.

D. Country policies and interactions

Countries' policies and characteristics can affect job creation directly, as well as indirectly by mitigating or intensifying the impact of the trade shock on employment growth. We investigate these direct relationships and interactions with the import competition shock. The direct impact of the country or firm variable on employment changes indicates how that variable helps create jobs in general, irrespective of whether or not the country or industry faces import competition. However, without data on the employee identities, we cannot know if the jobs created are being filled by those who lost their jobs in a firm exposed to import competition or by other individuals. So, we cannot directly measure the persistence of job or wage impacts of import competition on individual workers. We can only measure the impact on employment and wages of individual firms. Even so, job creation in an economy provides

some resilience to adverse shocks. The interaction of the explanatory variable with the import shock measures whether the variable helps mitigate job or wage losses associated with import competition.

Some country policy variables are measured infrequently across time, significantly reducing the sample size and continuity of observations. In particular, years of total, secondary, and tertiary schooling are measured after gaps of five or more years for most countries, as are several measures of social safety nets or labor market policies. In these cases, we use the average level of the policy variable for the country, converting it into a fixed country characteristic instead of time varying. Country characteristic and policy variables measured annually are maintained as time-varying regressors.

Schooling has a robust positive relationship with job creation. A country's average level of schooling—including total years, years of secondary education, and years of tertiary education—leads to higher overall employment growth, as well as in each of the seven sectors (Table 8). The total number of years of education and years of tertiary education also mitigate any adverse effect of import competition for employment overall and for several of the seven sectors. Thus, schooling acts as a shock absorber for imports' adverse implications, and adds to economic resilience, possibly by allowing easier relocation of better-educated workers to new jobs.

Other policies have complex relationships at the firm level. Lower trade costs increase investment overall and in response to import competition (Table 9). At the same time, they reduce job creation and wages, but mitigate the impact of import competition in same sector. Perhaps when experiencing a surge in imports, the ability to trade at low cost induces firm to invest and maintain employment given the possibility of accessing the export market more easily. Lower labor market regulation reduces average wage growth overall and in response to a trade shock. It amplifies the adverse impact of import competition (firms may be free to lay off employees more easily when facing the negative shock); but on the other hand, it raises overall job creation (firms more willing to hire).

Financial depth is significantly negatively related to employment creation (direct effect) and mitigation of the import shock (interaction term). This finding is robust for the time-varying specification and the country average specification (Table 8). Financial depth adversely affects the average wage and the wage bill directly, as well as the interaction with the import shock. The direct negative result holds for each of the seven UNCTAD sectors. Its interaction with imports is also negative for all the sectors, except medium-skill intensive, non-fuel primary, and mineral fuel sectors. In contrast, financial depth increases firm investment directly (Table 10) and in association with higher industry imports. These findings collectively suggest that financial depth facilitates firm investment in capital, which substitutes for labor. A surprising finding, however, is the lack of apparent complementarity of capital investment with labor in high-skill sectors.

Firm investment is also boosted by infrastructure quality and some measures of economic freedom (Table 10). Of course, there are interdependencies among various macroeconomic indicators. For example, infrastructure accumulation and its financing across countries depend on the degree of both trade and financial openness and financial market depth (Cerra and others, 2017). Economic freedom includes ratings of government size and its subcomponents including government consumption as a share of total, and transfers and subsidies, where a higher ranking is obtained by countries having lower levels of each of these indicators. These country characteristics and policies raise investment directly and in interaction with import competition.

E. Firm-level characteristics

Firm financial variables are also associated with firm employment growth, with intuitive results. Larger firms and those with higher revenue growth and profits have faster employment growth, whereas leverage reduces job growth (Table 11). Firm financial outcomes and decisions are likely jointly determined with firm employment, so we also verify the robustness of these findings with lagged values of the firm financials.[7] Of these financial variables, only the size of the firm has a robust significant interaction with the trade

[7] Inclusion of the financial variable in regressions of average wage growth, profits, investment and R&D do not change the findings of Table 5.

shock. In particular, employment growth in larger firms appears more resilient to import competition.

F. Survivorship and industry and country trends

We consider two additional robustness checks in Table 12. First, we compare results with (i) no fixed effects to (ii) those that control for all (linear combinations of) country-specific demand and supply shocks using country-time effects, (iii) those that control for secular industry-specific global demand and supply trends using industry-time effects, and (iv) those with both country-time and industry-time effects, based on the following specification:

$$(2) \quad Y_{f,i,c,t} = \beta_m * M_{i,c,t} + \delta_{ct} + \gamma_{it} + \varepsilon_{f,i,c,t}$$

where δ_{ct} captures country-time specific effects and γ_{it} stands for industry-time specific effects; as before, $Y_{f,i,c,t}$ is the firm-level dependent variable of interest, such as employment growth, in firm f, in industry i, in country c, at time t; $M_{i,c,t}$ is the import shock in industry i, in country c, at time t, and $\varepsilon_{f,i,c,t}$ is the idiosyncratic firm-level error.

Second, we verify whether the results depend on compositional changes of firms in the sample, including due to potential survivorship bias. In particular, we include a set of regressions that are restricted to a balanced set of firms over the period 2007-2015. Hence, the left panel of Table 12 reports the regression results for the balanced dataset, while the right panel reports the results for the full unbalanced dataset.

Overall, we find that import competition, by itself, explains very little of employment changes or firm performance in a global sample of firms. While studies on individual workers document long-term earnings impact for the laid-off workers, there is no evidence that trade is a significant factor overall. This indicates that fears about trade-induced job losses may be overblown. Country macro factors and global industry trends have some

explanatory power, albeit most of the variation in employment is still firm-specific.[8] The specification that includes country-time fixed effects explains about 4.2 percent of the total variation in firms' employment changes in the balanced panel. This percentage increases slightly to 4.4 percent when both country-time and industry-time fixed effects are included in the specification. In the unbalanced panel, the results are similar to those reported in Table 1, with the specification that includes country-time fixed effects explaining about 6.8 percent of the total variation in firms' employment changes. This percentage increases slightly to 7 percent when both country-time and industry-time fixed effects are included (last column of Table 12).

In the balanced panel, import competition leads to significantly stronger relative employment changes, as well as higher relative profitability, investment, and wages. This suggests some survivorship effects. Those firms that are in the sample for the whole period are established and efficient enough to survive and thrive in a competitive environment. Surviving firms may have attracted workers from firms that experienced large adverse disruptions from the import shock or they may have undertaken investment and adaptation strategies that allowed them to transform and increase their operations. In contrast, the unbalanced panel shows some relative negative effects of import competition on relative employment growth. While some of the missing observations in the unbalanced panel may reflect reporting lapses, it could also reflect firms falling out of the sample because they went out of business. Thus the employment impact of import competition is less for the full unbalanced panel than for the balanced panel. Finally, these (positive) results for the balanced panel are significant at any conventional level, while the results for the unbalanced panel turn insignificant when country-time and industry-time dummies are included, suggesting that the negative effect of the import shock may be concentrated in specific country-year and industry-year pairs.

Beyond the results for firm employment, Table 12 also reports results from regressions for the other firm-level variables of interest: profitability, investment, and average wages. The

[8] Explaining the factors that cause employment to vary across firms is beyond the scope of this paper. Instead, the objective of this paper is to investigate whether trade, especially import competition, is a substantial factor.

import competition shocks are associated with higher growth in firm profitability and investment activity. These results may reflect the firms' underlying transformation triggered by their exposure to import competition. The results are significant at any conventional level, with the exceptional of the specification for investment that includes country-time and industry-time fixed effects, suggesting that this import-triggered investment growth may be concentrated in specific country-industry-year segments of the sample.

Finally, import competition shocks are associated with higher average wage growth, at least for companies that managed to remain in business throughout the entire period. This effect is highly significant, except for the specification that includes both country-time and industry-time fixed effects, hinting at the possibility that such wage increases may be country-industry-year specific. When looking at the unbalanced panel, the evidence is less clear, with the impact going from significantly negative in the specification not controlling for fixed effects, significantly positive in the specifications with country-time or industry-time fixed effects, to insignificant in the specification that includes both effects together.

G. Inequality

Thus far, the analysis has focused on the impact of trade on employment within firms and other firm-level outcomes. But how do the results link to changes in inequality? Given data limitations, a precise estimate of individual or household level inequality is beyond the scope of the analysis. This constraint is similar to many of the individual country studies of the relative impact of trade on the most exposed localities. However, we can examine the impact of trade on inequality using the firm (rather than individual or household) as the unit of analysis. This approach has obvious caveats, namely that it does not capture wage inequality and compositional changes within firms. Nonetheless, it provides information on the firm-level channel impacting the dynamics of inequality.

Our findings suggest that larger import competition shocks tend to be associated with firms that have higher average wage levels. We divide the global sample and the 15 individual countries with the most firm-level data coverage into the sample experiencing an above-average import competition shock and a below-average one. That is, the import competition

variable is constructed with the three-dimensional panel in the global sample: industry, country, and year. These observations are divided into those above and below the global mean. Table 13 compares the average wage level for all the firms associated with the above-average and below-average industry-country-year import competition triplet. For individual countries, the import competition variable is a two-dimensional panel of industry and year. Thus, the individual country results in Table 13 compare the average wage for all firms associated with the above- and below-average import competition pair.[9] In the global sample and in 14 out of the 15 individual country results (all except Germany), the firms experiencing above-average import competition are those that have a somewhat higher average wage level than firms experiencing below-average import competition. Furthermore, the firms that exit the sample (possibly including some that go out of business) are ones with higher average wages (Table 14).

These results may help reconcile the microeconomic and macroeconomic findings on trade and inequality, but also demonstrate that the impacts are nuanced. The results of Table 12 show that higher import competition leads to relatively slower employment growth in the full (unbalanced) sample of firms, consistent with other microeconomic studies. However, these firms (i.e., those with relatively slower employment growth due to import competition) start with higher average wage levels (Table 13) and thus the higher end of the wage distribution is growing more slowly than the lower end of the distribution. This channel could decrease inequality in the overall workforce. Likewise, if there is survivorship bias due to some firms going out of business, the results of Table 14 suggest that it goes in the direction of reducing inequality since the average wage level of exiting firms is higher than that of surviving firms. On the other hand, the greater rise in average wages of firms more exposed to the shock suggests an offsetting channel that may deepen inequality. The overall impact on inequality depends on which channels dominate and the results may vary across countries and time. Even so, the analysis demonstrates how analyzing *relative* impacts of trade may be

[9] A few countries, such as Russia and China, that have many observations on employment (as noted in Annex 2) are absent from Table 13 due to missing data on wages. In addition, the number of observations is not equal because there are different numbers of firms in each industry-country-year or industry-year.

insufficient for determining the overall impact on inequality. Trade could have a leveling effect—reducing inequality—if those with below average wages levels benefit more.

VI. Conclusions

The public anxiety over adverse labor market consequences of globalization, especially import competition, has been reinforced by some recent academic literature. Much of the empirical literature relies on difference in difference specifications comparing gains or losses of workers in an industry or of communities concentrated in industries exposed to import competition relative to those in less vulnerable industries before and after an import shock. However, this literature has typically focused on a single country. Our paper exploits a large dataset of millions of firms spread across many countries to systematically examine the impact of import competition.

In addition, we aim to reconcile the contradictory findings of macroeconomic and microeconomic literatures on the effects of trade—the former showing evidence that trade openness increases growth without raising inequality, and the latter showing relative detrimental effects on workers and communities facing an import shock. Given that our dataset includes many firm financial variables and information on firm employment, wages, and investment, we can explore various channels through which the import shock unfolds.

While we corroborate the evidence that, on average, import competition causes *relatively* lower employment growth in more exposed firms, we also find considerable heterogeneity in the results across countries and industries. This suggests that the results of single-country studies using microeconomic data may not be generalizable. In addition, we find relatively positive outcomes of import competition on exposed firms, including higher sales, profits, wage growth, and investment. Moreover, the import shock to exposed firms, and the ensuing employment changes, do not take place in isolation. Import growth often goes hand in hand with export growth, which spurs job creation. Firm characteristics and country policies can also influence the effects of the shock, with education showing the most promise for creating jobs overall and mitigating any adverse employment impact of import competition. Financial

deepening has mixed consequences, amplifying job losses on the one hand while stimulating investment on the other hand.

Our results also show that firms experiencing higher imports shocks are those with higher average wage levels. Thus, to the extent that employment growth is lower in these more exposed firms, it could lead to lower inequality. The analysis demonstrates why microeconomic studies of relative impacts within a country provide only a partial picture and need to be complemented with analysis of the impact of trade at the aggregate level.

REFERENCES

Autor, D. H., D. Dorn, and G.H. Hanson, 2013, "The China Syndrome: Local Labor Market Effects of Import Competition in the United States," *American Economic Review*, Vol. 103(6), pp. 2121–68.

Autor, D., Dorn, D., Hanson, G. H., and Song, J., 2014, "Trade Adjustment: Worker Level Evidence," *Quarterly Journal of Economics*, 129.

Bacchetta, M., V. Cerra, R. Piermartini, and M. Smeets, 2021, "Trade and Inclusive Growth," IMF Working Paper No. 21/74 (Washington: International Monetary Fund).

Baldarrago, E., and G. Salinas, 2017, "Trade Liberalization in Peru: Adjustment Costs Amidst High Labor Mobility," IMF Working Paper No. 17/47 (Washington: International Monetary Fund).

Beaton, K., A. Cebotari, and A. Komaromi, 2017, "Revisiting the Link between Trade, Growth and Inequality: Lessons for Latin America and the Caribbean," IMF Working Paper No. 17/46 (Washington: International Monetary Fund).

Beaton, K., A. Cebotari, X. Ding, and A. Komaromi, 2017, "Trade Integration in Latin American: A Network Perspective," IMF Working Paper No. 17/148 (Washington: International Monetary Fund).

Cerra, V., A. Cuevas, C. Góes, I. Karpowicz, T. Matheson, I. Samaké, and S. Vtyurina, 2016, "Determinants of Infrastructure and its Financing," *Emerging Economy Studies* 3(2) 1–14.

Cerra, V., B. Eichengreen, A. El-Ganainy, and M. Schindler (eds.), 2021, How to Achieve Inclusive Growth, (Oxford University Press: London).

Cerra, V. and M. Woldemichael, 2017, "Launching Export Accelerations in Latin America and the World," IMF Working Paper No. 17/43 (Washington: International Monetary Fund).

Cerdeiro, D. and A. Komaromi, 2020. "Trade and income in the long run: Are there really gains, and are they widely shared?" *Review of International Economics*. https://doi.org/10.1111/roie.12494

Ding, X. and M. Hadzi-Vaskov, 2017, "Composition of Trade in Latin America and the Caribbean," IMF Working Paper No. 17/42 (Washington: International Monetary Fund).

Dollar, D. and A. Kraay, 2004, "Trade, Growth, and Poverty". *The Economic Journal*, Vol. 114, pp. F22–F49.

Frankel, J.A. and D. Romer, 1999, "Does trade cause growth?" *American Economic Review,* Vol. 89(3). pp. 379-399.

Goldberg, P., 2015, "Review Article: Trade and Inequality", In: Elgar Research Reviews in Economics (Cheltenham, UK: Edward Elgar Publishing Limited).

Goldberg, P. and N. Pavcnik, 2007, "Distributional effects of globalization in developing countries," *Journal of Economic Literature*, Vol. XLV (1), pp. 39-82.

Goldberg, P. and N. Pavcnik, 2016, "The Effects of Trade Policy," NBER Working Paper No. 21957 (Cambridge, MA).

Hannan, S. A., 2016, "The Impact of Trade Agreements: New Approach, New Insights," IMF Working Paper No. 16/117 (Washington: International Monetary Fund).

International Monetary Fund, 2017, "Cluster Report – Trade Integration in Latin America and the Caribbean," IMF Country Report No. 17/66.

International Monetary Fund, World Bank, World Trade Organization, 2017, "Making Trade an Engine of Growth for All: The Case for Trade and for Policies to Facilitate Adjustment," Prepared for the meeting of the G20 Sherpas, March 23-24, Frankfurt, Germany.

Jaumotte, F., S. Lall, and C. Papageorgiou, 2013, "Rising Income Inequality: Technology, or Trade and Financial Globalization?" *IMF Economic Review,* Vol, 61 (2), pp. 271–309.

Kalemi-Özcan, S., C. Villegas-Sanchez, B. Sørensen, V. Volosovych, and S. Yeşiltaş, 2015, "How to Construct Nationally Representative Firm Level Data from the ORBIS Global Database," manuscript.

McCaig, B., 2011, "Exporting out of poverty: Provincial poverty in Vietnam and U.S. market access," *Journal of International Economics*, 85(1), pp. 102–113.

McCaig, B. & N. Pavcnik, 2018, "Export markets and labor allocation in a low-income country," *American Economic Review* 108 (7), pp. 1899-1941.

Topalova, P., 2005, "Trade Liberalization, Poverty, and Inequality: Evidence from Indian Districts," NBER Working Paper No. 11614, September.

Topalova, P., 2010, "Factor Immobility and Regional Impacts of Trade Liberalization: Evidence on Poverty from India," *American Economic Journal: Applied Economics* 2 (October 2010): 1–41.

Wood, A., 1995, "How Trade Hurt Unskilled Workers," *Journal of Economic Perspectives*, Vol. 9 (3), pp. 57–8

Table 1. Variance Decomposition

Effects by	R-squared
Country	0.0483
Industry	0.0029
Year	0.0082
Country-Year	0.0656
Industry-Year	0.0116

Table 2. Instrumental Variables

	(1)	(2)
Variable	employment growth	
Import shock	**-0.0536*** **	**-0.0207*** **
	(0.000487)	(0.000927)
GDP growth	0.209***	0.120***
	(0.00367)	(0.00434)
Constant	-0.101***	0.103***
	(0.000932)	(0.000478)
Observations	15,043,610	15,043,589

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3. Industry-Specific Impacts of Import Competition

	Dependent variable: employment growth					
	Import growth	(StdErr)	real GDP growth	(StdErr)	Observations	Number of firms
Agriculture, forestry and fishing	-0.0673***	(0.00378)	0.733***	(0.0154)	1,245,380	284,760
Mining, quarrying, and oil and gas	-0.0115**	(0.00466)	0.253***	(0.0310)	175,064	52,312
Utilities	0.0254***	(0.00166)	-0.0366	(0.0227)	276,989	75,445
Food manufacturing	-0.362***	(0.00690)	0.596***	(0.0179)	748,923	186,756
Beverage and tobacco manufacturing	-0.153***	(0.0175)	0.457***	(0.0539)	96,309	22,835
Textile mills	-0.0478**	(0.0224)	0.350***	(0.0388)	125,981	40,313
Textile product mills	-0.217***	(0.0154)	0.530***	(0.0419)	105,071	28,039
Apparel manufacturing	0.0315***	(0.00570)	0.179***	(0.0228)	321,030	87,625
Leather manufacturing	0.0483***	(0.0150)	0.111***	(0.0375)	130,844	33,592
Wood product manufacturing	-0.293***	(0.00599)	1.218***	(0.0297)	351,729	87,835
Paper manufacturing	-0.127***	(0.0158)	0.304***	(0.0369)	115,777	31,022
Printing and related	-0.131***	(0.00888)	0.464***	(0.0253)	283,405	67,098
Petroleum and coal manufacturing	-0.0136	(0.00918)	0.182*	(0.0941)	19,596	5,964
Chemical manufacturing	0.193***	(0.0141)	-0.0438**	(0.0223)	284,248	82,727
Plastics and rubber	-0.0586***	(0.00879)	0.360***	(0.0242)	335,099	87,738
Nonmetallic mineral products	-0.118***	(0.00716)	0.762***	(0.0237)	373,972	99,566
Primary metals	0.0936***	(0.00947)	0.0353	(0.0458)	125,103	38,239
Fabricated metal products	-0.0658***	(0.00323)	0.514***	(0.0157)	965,524	232,320
Machinery manufacturing	-0.269***	(0.00496)	0.784***	(0.0183)	623,366	161,783
Computer and eletronic products	-0.00100	(0.00549)	0.0249	(0.0227)	293,739	80,336
Electric equipment, appliances, and components	-0.304***	(0.0117)	0.566***	(0.0275)	213,026	62,471
Transportation equipment	-0.0551***	(0.00882)	0.451***	(0.0327)	195,261	55,180
Firnuture	-0.136***	(0.0103)	0.825***	(0.0364)	246,638	56,601
Miscellanoeus manufacturing	-0.194***	(0.00422)	-0.303***	(0.0208)	396,224	103,363
Retail	-0.0186***	(0.00116)	0.400***	(0.00964)	4,288,455	1,015,763

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 4. Employment Growth by Sector

Dep var: empl gr	High skill- and technology intensive manufactures	Medium skill- and technology intensive manufactures	Low skill- and technology intensive manufactures	Resource-intensive manufactures	Non-fuel primary commodities	Mineral fuels	Unclassified products
VARIABLES	1	2	3	4	5	6	7
import growth	**0.0501*** **	**-0.131*** **	**-0.0340*** **	**0.0519*** **	**-0.0693*** **	**-0.0118*** **	**0.0218*** **
	(0.00476)	(0.00197)	(0.00217)	(0.00161)	(0.00112)	(0.00106)	(0.00348)
real GDP growth	0.0822***	0.802***	0.350***	-0.0138	0.324***	0.378***	0.699***
	(0.0164)	(0.0149)	(0.0118)	(0.0172)	(0.0105)	(0.00712)	(0.0250)
ctry empl growth	0.269***	0.305***	0.344***	0.244***	0.421***	0.317***	-0.267***
	(0.0396)	(0.0254)	(0.0271)	(0.0342)	(0.0197)	(0.0114)	(0.0357)
import price growth	0.372***	2.221***	1.548***	0.709***	1.736***	2.654***	1.272***
	(0.0351)	(0.0331)	(0.0301)	(0.0323)	(0.0210)	(0.0158)	(0.0346)
Constant	-0.268***	0.111***	0.0763***	-0.00202	-0.184***	-0.0265***	-0.0441***
	(0.000606)	(0.00524)	(0.00535)	(0.0107)	(0.00467)	(0.000387)	(0.00318)
Observations	532,854	1,281,388	1,268,704	552,251	2,225,603	5,141,108	713,487
R-squared	0.006	0.021	0.013	0.013	0.017	0.010	0.014

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 5. Firm Decisions and Outcomes

VARIABLES	(1) empl gr	(2) avg wage gr	(3) profit gr	(4) invest gr	(5) R&D gr
import growth	**-0.0224*** **	**0.0187*** **	**0.0309*** **	**0.0311*** **	**-0.00507**
	(0.000590)	(0.000661)	(0.00200)	(0.000916)	(0.0110)
real GDP growth	0.334***	0.865***	1.558***	1.060***	1.353***
	(0.00427)	(0.00767)	(0.0146)	(0.00703)	(0.147)
ctry empl growth	0.280***	0.139***	1.012***	0.521***	1.464***
	(0.00730)	(0.00898)	(0.0392)	(0.0129)	(0.274)
import price growth	2.192***	-0.129***	0.365***	-0.181***	-1.111***
	(0.00989)	(0.0161)	(0.0343)	(0.0180)	(0.170)
GDP per capita (lagged)	-5.11e-07***	1.05e-06***	2.13e-06***	4.65e-06***	1.82e-07
	(2.53e-08)	(4.31e-08)	(5.45e-08)	(4.71e-08)	(2.32e-07)
Constant	0.0922***	-0.0329***	-0.0668***	-0.0922***	0.0686***
	(0.00166)	(0.00179)	(0.00667)	(0.00241)	(0.0155)
Observations	12,823,821	7,859,345	3,290,158	11,039,735	92,048
R-squared	0.011	0.037	0.033	0.025	0.007

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 6a. Firms' Labor Decisions

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
	empl gr		avg wage gr		wage bill gr	
Country groups	AE	EMDE	AE	EMDE	AE	EMDE
import growth	**0.00978*** **	**-0.0205*** **	**-7.83e-05**	**0.0327*** **	**0.00942*** **	**0.0251*** **
	(0.000562)	(0.000828)	(0.000865)	(0.00105)	(0.00103)	(0.00153)
real GDP growth	0.308***	0.106***	0.377***	0.942***	0.746***	1.381***
	(0.0115)	(0.00572)	(0.0171)	(0.0132)	(0.0196)	(0.0168)
ctry empl growth	0.646***	0.0763***	0.116***	0.747***	0.818***	0.0253
	(0.0112)	(0.0119)	(0.0143)	(0.0152)	(0.0166)	(0.0201)
import price growth	0.00576*	0.00656***	0.00664*	0.00109	0.000734	0.0161***
	(0.00346)	(0.00112)	(0.00396)	(0.00107)	(0.00374)	(0.00178)
GDP per capita (lagged)	2.68e-07***	-4.87e-07***	2.67e-06***	-5.78e-06***	3.63e-06***	-1.52e-06***
	(3.24e-08)	(3.72e-08)	(5.03e-08)	(8.76e-08)	(5.52e-08)	(6.00e-08)
Constant	-0.00176	-0.0417***	-0.0363***	0.0920***	-0.0331***	0.0900***
	(0.00182)	(0.00302)	(0.00174)	(0.00411)	(0.00214)	(0.00449)
Observations	6,408,624	6,415,197	5,362,141	2,497,204	5,438,145	2,771,501
R-squared	0.004	0.014	0.036	0.047	0.031	0.026

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 6b. Firm's Financial Outcomes

VARIABLES	(1) sales gr	(2) sales gr	(3) material cost gr	(4) material cost gr	(5) profit gr	(6) profit gr
Country groups	AE	EMDE	AE	EMDE	AE	EMDE
import growth	**0.0203*** **	**0.0212*** **	**0.0346*** **	**-0.0671*** **	**0.0257*** **	**0.0100*** **
	(0.00107)	(0.00150)	(0.00161)	(0.00330)	(0.00409)	(0.00226)
real GDP growth	1.160***	1.785***	0.821***	4.243***	2.639***	1.373***
	(0.0188)	(0.0103)	(0.0289)	(0.0392)	(0.0680)	(0.0160)
ctry empl growth	1.098***	0.524***	1.086***	4.942***	-0.341***	1.320***
	(0.0178)	(0.0198)	(0.0252)	(0.0480)	(0.0877)	(0.0500)
import price growth	0.00148	0.0168***	0.0381**	0.0199***	-0.00380	0.0126***
	(0.00421)	(0.00172)	(0.0193)	(0.00233)	(0.00785)	(0.00272)
GDP per capita (lagged)	3.76e-06***	-1.05e-06***	4.15e-06***	-9.72e-05***	1.26e-06***	-2.08e-06***
	(5.35e-08)	(4.93e-08)	(6.39e-08)	(1.55e-06)	(9.82e-08)	(6.40e-08)
Constant	-0.0965***	-0.0811***	-0.0970***	-0.124***	-0.118***	-0.0504***
	(0.00241)	(0.00428)	(0.00340)	(0.00618)	(0.00956)	(0.00860)
Observations	5,537,557	4,442,218	4,781,661	2,415,280	640,640	2,649,518
R-squared	0.035	0.026	0.021	0.079	0.023	0.038

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 6c. Firm's Investment and Innovation Decisions

VARIABLES	(1) invest gr	(2) invest gr	(3) R&D gr	(4) R&D gr
Country groups	AE	EMDE	AE	EMDE
import growth	**0.0108*** **	**0.0275*** **	**0.0137**	**-0.198*** **
	(0.00118)	(0.00134)	(0.0144)	(0.0304)
real GDP growth	0.565***	1.178***	-0.514	-5.675***
	(0.0215)	(0.00921)	(0.371)	(0.647)
ctry empl growth	0.168***	1.447***	2.762***	1.056
	(0.0195)	(0.0206)	(0.512)	(0.716)
import price growth	-0.000785	0.0106***	-0.0829***	-0.0330
	(0.00584)	(0.00202)	(0.0131)	(0.0433)
GDP per capita (lagged)	6.48e-06***	-1.57e-06***	1.88e-06***	-3.16e-06
	(5.56e-08)	(8.00e-08)	(3.41e-07)	(1.27e-05)
Constant	-0.0637***	-0.0752***	0.0361	-0.236***
	(0.00263)	(0.00443)	(0.0226)	(0.0396)
Observations	6,045,146	4,994,589	80,981	11,067
R-squared	0.019	0.035	0.007	0.152

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 7a. Exports and Employment

	(1)	(2)	(3)
VARIABLES	employment growth		
import growth	0.00882***	-0.0386***	
	(0.00289)	(0.00229)	
interaction - exporter	**0.0185*** **	**0.0165*** **	
	(0.00363)	(0.00228)	
exporter	0.00730***	0.0280***	
	(0.000908)	(0.000562)	
Change in export rev share			**0.000137*** **
			(1.07e-05)
real GDP growth	0.385***	0.307***	
	(0.0322)	(0.00428)	
ctry empl growth	0.351***	0.334***	
	(0.0349)	(0.00751)	
import price growth	0.0165	1.978***	
	(0.0323)	(0.00917)	
Constant	-0.0197***	-0.145***	0.199
	(0.00372)	(0.00235)	(0.148)
Observations	797,468	12,829,938	2,230,637
R-squared	0.003	0.011	0.003

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Column (1) excludes missing observations (i.e. dummy=0 only for values 0 or <0), while column (2) treats the missing observations as dummy=0.

Table 7b. Export and Imports

VARIABLES	export growth
import growth	0.1541***
	(0.0066)
Constant	0.0840***
	(0.0024)
Observations	225,318
R-squared	0.030

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 8. Financial Deepening and Schooling

	Direct impact on employment							
	total	high-skill	med-skill	low-skill	resource-intense	non-fuel primary	mineral fuels	unclassified
Financial deepening	-0.000818***	-0.000423***	-0.000871***	-0.000842***	-0.000522***	-0.000592***	-0.000776***	-0.000610***
Years of schooling (total)	0.0234***	0.00786***	0.0218***	0.0166***	0.0117***	0.0124***	0.0241***	0.0119***
Years of secondary schooling	0.0261***	0.00877***	0.0215***	0.0151***	0.00881***	0.0157***	0.0304***	0.0103***
Years of tertiary schooling	0.155***	0.0703***	0.191***	0.112***	0.103***	0.113***	0.177***	0.0879***
	Interaction with import competition shock							
	total	high-skill	med-skill	low-skill	resource-intense	non-fuel primary	mineral fuels	unclassified
Financial deepening	-6.31e-06	-0.00104***	0.000868***	-0.000738***	-0.000275***	0.000218***	0.000131***	-0.00147***
Years of schooling (total)	0.00379***	0.0318***	-0.0230***	0.0196***	0.0107***	0.000618	0.00852***	0.0478***
Years of secondary schooling	-0.0110***	0.0146***	-0.0200***	0.0111***	-0.000748	-0.0400***	-0.0197***	0.0340***
Years of tertiary schooling	0.00552***	0.189***	-0.0558***	0.193***	0.0782***	-0.0576***	-0.0460***	0.240***

Coefficent estimate from baseline regression with country variable entered directly and as interaction term. *** p<0.01, ** p<0.05, * p<0.1

Table 9. Trade Costs and Labor Market Regulations

	Direct impact	
	employment	avg wages
Low trade costs	-0.0302***	-0.0113***
Low labor market regulations	0.00272***	-0.00307***
	Interaction with import competition sh	
	employment	avg wages
Low trade costs	0.00598***	0.00829***
Low labor market regulations	-0.0260***	-0.00497***

Coefficent estimate from baseline regression with country variable entered directly and as interaction term. *** p<0.01, ** p<0.05, * p<0.1

Table 10. Firm Investment

	Direct impact
Financial deepening	0.000281***
Infrastructure quality	0.00735***
Low trade costs	0.00377***
Low government size	0.00440***
Low government consumption	0.00313***
Low transfers & subsidies	0.0145***
	Interaction with import competition
Financial deepening	7.33e-05***
Infrastructure quality	0.0107***
Low trade costs	0.00377***
Low government size	0.00440***
Low government consumption	0.00313***
Low transfers & subsidies	0.0145***

Coefficent estimate from baseline regression with country variable entered directly and as interaction term. *** p<0.01, ** p<0.05, * p<0.1

Table 11. Firm Financials

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
	employment growth					
import growth	-0.00510***	-0.00313***	-0.0388***	-0.0632***	-0.0279***	-0.0220***
	(0.000687)	(0.000810)	(0.00303)	(0.00369)	(0.00200)	(0.00223)
real GDP growth	0.0553***	-0.0812***	0.0664***	-0.0556***	0.408***	0.421***
	(0.00932)	(0.0114)	(0.00936)	(0.0114)	(0.00445)	(0.00444)
ctry empl growth	0.538***	0.763***	0.538***	0.762***	1.039***	1.083***
	(0.0105)	(0.0124)	(0.0105)	(0.0124)	(0.00777)	(0.00782)
import price growth	-0.0154***	0.239***	-0.0170***	0.236***	-0.511***	-0.452***
	(0.00335)	(0.00412)	(0.00335)	(0.00413)	(0.00194)	(0.00189)
GDP per capita (lagged)	-6.39e-07***	5.82e-07***	-6.68e-07***	5.21e-07***	-2.67e-07***	5.05e-07***
	(3.65e-08)	(4.24e-08)	(3.66e-08)	(4.25e-08)	(3.06e-08)	(3.05e-08)
size	0.00486***		0.00467***		-0.00112***	
	(8.50e-05)		(8.66e-05)		(5.81e-05)	
sales growth	0.229***		0.229***			
	(0.000818)		(0.000818)			
profits (EBITDA)	0.000277***		0.000278***			
	(1.34e-05)		(1.34e-05)			
leverage	-6.92e-06		-6.98e-06			
	(4.53e-06)		(4.51e-06)			
size (lag)		0.00336***		0.00305***		-0.0108***
		(0.000102)		(0.000103)		(6.10e-05)
sales growth (lag)		0.0847***		0.0847***		
		(0.000704)		(0.000704)		
profits (EBITDA) (lag)		0.00187***		0.00187***		
		(1.69e-05)		(1.69e-05)		
leverage (lag)		-1.23e-05**		-1.24e-05**		
		(5.03e-06)		(5.17e-06)		
Interaction - size			0.00259***		0.00180***	
			(0.000223)		(0.000156)	
Interaction - size (lag)				0.00456***		0.00114***
				(0.000268)		(0.000169)
Constant	-0.0500***	-0.0710***	-0.0477***	-0.0676***	-0.0702***	0.0552***
	(0.00233)	(0.00310)	(0.00234)	(0.00310)	(0.00184)	(0.00185)
Observations	4,888,019	3,748,309	4,888,019	3,748,309	12,370,297	12,287,335
R-squared	0.097	0.028	0.097	0.028	0.017	0.020

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 12. Balanced Panels and Controls for Country and Industry Trends

	Balanced panel (2007-2015)				Unbalanced panel (2007-2015)			
	no dummies	**ct**	**it**	**ct + it**	**no dummies**	**ct**	**it**	**ct + it**
EMPLOYMENT	dln_emp	dln_emp	dln_emp	dln_emp	dln_emp	dln_emp	dln_emp	dln_emp
dln_m	0.0377***	0.00524***	0.0405***	0.00567***	-0.0340***	-0.00248***	-0.0654***	-0.000777
	(0.000459)	(0.000649)	(0.000725)	(0.000872)	(0.000306)	(0.000394)	(0.000488)	(0.000603)
Constant	0.00682***	0.104	0.101***	0.106	0.0510***	-0.0765	0.110***	-0.101
	(0.000170)	(0.0719)	(0.00986)	(0.0725)	(0.000135)	(0.336)	(0.00709)	(0.335)
Observations	4,324,870	4,324,870	4,324,870	4,324,870	13,252,722	13,252,722	13,252,722	13,252,722
R-squared	0.002	0.042	0.013	0.044	0.001	0.068	0.013	0.070
PROFIT	dlnprofit	dlnprofit	dlnprofit	dlnprofit	dlnprofit	dlnprofit	dlnprofit	dlnprofit
dln_m	0.145***	0.0294***	0.113***	0.0196***	0.106***	0.00993***	0.139***	0.0163***
	(0.00235)	(0.00314)	(0.00412)	(0.00467)	(0.00128)	(0.00164)	(0.00243)	(0.00294)
Constant	-0.0191***	0.246	0.490***	0.285	0.0457***	0.230	0.397***	0.256
	(0.00104)	(0.203)	(0.0456)	(0.207)	(0.000592)	(0.736)	(0.0262)	(0.735)
Observations	892,869	892,869	892,869	892,869	3,229,856	3,229,856	3,229,856	3,229,856
R-squared	0.004	0.061	0.055	0.071	0.002	0.042	0.033	0.046
INVESTMENT	dlninv	dlninv	dlninv	dlninv	dlninv	dlninv	dlninv	dlninv
dln_m	0.0431***	0.0145***	0.105***	0.00197	0.0370***	0.0130***	0.102***	0.00301***
	(0.000929)	(0.00129)	(0.00144)	(0.00172)	(0.000590)	(0.000786)	(0.000892)	(0.00109)
Constant	-0.0471***	0.266**	0.208***	0.266**	-0.0296***	-0.0287	0.154***	-0.0661
	(0.000332)	(0.133)	(0.0198)	(0.134)	(0.000226)	(0.521)	(0.0124)	(0.521)
Observations	3,917,227	3,917,227	3,917,227	3,917,227	11,129,187	11,129,187	11,129,187	11,129,187
R-squared	0.001	0.056	0.038	0.058	0.000	0.040	0.025	0.042
WAGES	dlnwages_avg	dlnwages_avg	dlnwages_avg	dlnwages_avg	dlnwages_av	dlnwages_av	dlnwages_av	dlnwages_av
dln_m	0.00971***	0.00465***	0.0803***	0.000910	-0.00585***	0.00209***	0.0466***	-0.000251
	(0.000596)	(0.000846)	(0.00105)	(0.00121)	(0.000469)	(0.000645)	(0.000805)	(0.000930)
Constant	0.0110***	0.213***	0.181***	0.227***	0.0133***	0.0578	0.155***	0.0736
	(0.000200)	(0.0709)	(0.0127)	(0.0720)	(0.000164)	(0.315)	(0.00878)	(0.315)
Observations	3,205,500	3,205,500	3,205,500	3,205,500	7,814,410	7,814,410	7,814,410	7,814,410
R-squared	0.000	0.094	0.061	0.095	0.000	0.054	0.030	0.054

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 13. Average Wages of Firms with Above- and Below-Average Import Shock

	above average import shock			below average import shock		
Country	Obs	Mean	Std. dev.	Obs	Mean	Std. dev.
Global (unbalanced)	23,013,683	28.5	37.5	3,947,044	27.6	29.6
Global (balanced)	6,606,458	27.2	34.2	1,594,579	26.4	27.2
Romania	1,430,594	4.4	5.5	263,601	4.0	4.2
Spain	1,185,188	39.7	28.6	345,709	37.2	22.5
Portugal	801,308	18.3	14.6	288,284	17.0	9.9
Italy	465,618	51.2	34.3	174,632	51.1	27.1
Belgium	448,009	58.1	37.5	80,253	52.5	24.9
Sweden	432,894	61.2	39.9	73,731	55.8	28.1
Ukraine	398,908	3.0	6.7	79,709	2.5	3.5
Bulgaria	368,949	4.7	7.8	78,463	3.8	4.4
Czech Republic	126,661	17.6	19.2	18,940	16.9	14.4
Slovak Republic	120,266	19.0	24.8	13,015	18.7	25.2
Korea	86,381	29.5	37.9	24,998	20.6	22.9
Serbia	68,279	10.5	15.7	12,583	9.1	12.2
Hungary	67,896	16.9	18.3	13,907	14.9	13.2
France	63,184	70.6	52.5	10,978	61.7	40.0
Germany	32,030	72.3	41.2	7,206	75.1	37.5

Note: Individual country results are based on the unbalanced panel

Table 14. Summary Statistics of Entry and Exit

	balanced		exiting[1/]		entering[1/]		entering & exiting[1/]	
Variable	Obs	Mean	Obs	Mean	Obs	Mean	Obs	Mean
ln_emp	10,737,130	2.022	11,757,399	1.839	19,386,031	1.494	9,203,410	1.326
lnwages_avg	8,127,561	2.645	7,435,470	2.841	9,416,904	2.670	3,738,019	2.850

1/ Exiting firms are in the sample in 2007 but not in 2015. Entering firms are not in the sample in 2007, but are in 2015.

Annex 1

Number of Observations	
Orbis	60,736,443
Orbis with employment data	60,736,443
Orbis with employment growth	40,909,910
Orbis match with COMTRADE imports	22,108,346
Orbis with employment data matched with COMTRADE imports	22,108,346
Orbis with employment growth matched with COMTRADE import growth	15,045,159
Included in baseline (only GDP growth as control)	15,043,218
Included in baseline (all controls)	12,684,255

Observations by year

1981	1	1993	9,927	2005	309,586
1982	2	1994	16,310	2006	384,577
1983	11	1995	21,809	2007	1,229,983
1984	22	1996	29,245	2008	1,272,407
1985	74	1997	39,860	2009	1,429,476
1986	143	1998	49,705	2010	1,189,717
1987	214	1999	69,439	2011	1,202,151
1988	367	2000	94,460	2012	1,422,618
1989	505	2001	109,225	2013	1,690,909
1990	663	2002	174,329	2014	1,796,573
1991	1,040	2003	202,451	2015	2,017,197
1992	7,844	2004	270,378		

Annex 2

Observations per country

Russia	2,566,892	Ireland	22,644	Bahrain	41
Spain	1,892,989	Denmark	13,919	Paraguay	41
Romania	1,277,519	Iceland	11,562	Peru	39
Italy	1,267,990	Kazakhstan	6,061	Panama	36
Ukraine	1,010,041	Vietnam	4,478	Iraq	35
China	870,684	Montenegro, Rep. of	4,061	Bolivia	34
Portugal	810,531	Thailand	2,256	Pakistan	27
Bulgaria	731,303	Malaysia	2,137	Sri Lanka	26
France	474,105	Israel	1,793	Iran	23
Germany	468,728	Switzerland	1,759	Albania	17
Belgium	354,887	Luxembourg	1,445	Uruguay	17
Hungary	354,365	Cyprus	1,315	Qatar	16
Korea	345,411	Australia	1,164	Kenya	13
Netherlands	289,181	Turkey	1,131	Papua New Guinea	12
Sweden	261,357	Indonesia	1,002	Morocco	11
Czech Republic	249,337	Hong Kong SAR	979	Ghana	10
Latvia	216,539	Colombia	624	Cabo Verde	9
Croatia	195,556	Malta	624	Trinidad and Tobago	9
Serbia	192,390	Singapore	553	Uzbekistan	9
Slovak Republic	170,662	Philippines	459	Zimbabwe	9
United Kingdom	103,948	Jordan	378	Zambia	7
Poland	101,327	Brazil	330	Tanzania	6
Estonia	100,424	Canada	273	Fiji	4
Slovenia	97,242	Chile	271	New Zealand	4
Norway	94,461	Nigeria	226	Tunisia	4
Bosnia and Herzegovina	82,617	Oman	225	Côte d'Ivoire	3
Finland	75,538	Mexico	177	Bahamas, The	2
Greece	75,327	South Africa	168	Kuwait	2
Macedonia	73,512	Saudi Arabia	164	Algeria	1
Austria	36,911	India	140	Argentina	1
Lithuania	36,023	Bangladesh	82	Armenia	1
Japan	28,636	Egypt	81	Mauritius	1
United States	28,556	Kyrgyz Republic	77	Uganda	1
Moldova	25,149	United Arab Emirates	50	Venezuela	1

Annex 3

NAICS 2012 Industry Classification
1 agriculture, forestry, fishing, and hunting
2 mining, quarrying, and oil and gas extraction
3 utilities: electric power generation, natural gas, water, sewage, and other systems
4 construction
5 food manufacturing
6 beverage and tobacco product manufacturing
7 textile mills
8 textile product mills
9 apparel manufacturing
10 leather and allied product manufacturing
11 wood product manufacturing
12 paper manufacturing
13 printing and related support activities
14 petroleum and coal product manufacturing
15 chemical manufacturing
16 plastics and rubber products manufacturing
17 nonmetallic mineral product manufacturing
18 primary metal manufacturing
19 fabricated metal product manufacturing
20 machinery manufacturing
21 computer and electronic product manufacturing
22 electric equipment, appliance, and component manufacturing
23 transportation equipment manufacturing
24 furniture and related product manufacturing
25 miscellaneous manufacturing
26 wholesale trade
27 retail trade
28 transportation and warehousing
29 information: publishing, movies, broadcasting, telecommunication, data processing
30 finance and insurance
31 real estate and rental and leasing
32 professional, scientific, and technical services
33 management of companies and enterprises
34 administrative and support and waste management and remediation services
35 educational services
36 healthcare and social assistance
37 arts, entertainment, and recreation
38 accommodation and food services
39 other services (except public administration)
40 public administration

Annex 4

Skill- and Technology-Intensity Product Classification (UNCTAD)	
1	High skill- and technology intensive manufactures
2	Medium skill- and technology intensive manufactures
3	Low skill- and technology intensive manufactures
4	Resource-intensive manufactures
5	Non-fuel primary commodities
6	Mineral fuels
7	Unclassified products

Note: Basu and Das (2011) and Basu (forthcoming) on the basis of UNCTAD (1996, 2002) and Lall (2000).

Annex 5. Data Sources

Variable	Data Source	Unit
Firm employment	Orbis	Persons
Firm net sales	Orbis	Current USD
Firm fixed assets	Orbis	Current USD
Firm R&D expenditure	Orbis	Current USD
Firm average wage	Orbis	Current USD
Firm wage bill	Orbis	Current USD
Cost of goods sold	Orbis	Current USD
Material costs	Orbis	Current USD
Value of imports	COMTRADE	Current USD
Real GDP	WEO	Constant prices, national currency
Total country employment	ILO	Persons
Import prices	PWT	Index
Nominal GDP per capita	WEO	Current USD
Quality of infrastructure	WEF Global Competitiveness Index (GCI)	Index (1-7; 7 is best)
Financial deepening	World Bank	Domestic credit to private sector (percent of GDP)
Access to electricity	WDI	Percent of population
Years of schooling (total)	WDI	Years
Years of secondary schooling	WDI	Years
Years of tertiary schooling	WDI	Years

Annex 5. Data Sources (continued)

Variable	Data Source	Unit
FDI	WEO	Current USD
FDI/GDP	WEO (calculated)	Percent of GDP
Unemployment rate	WDI (ILO definition)	Percent of labor force
Unemployment rate	WDI (national authorities' definition)	Percent of labor force
Economic complexity index	Observatory of economic complexity	Index
Government consumption	Fraser Institute	Percent of total national consumption
Government size	Fraser Institute	Index
Cost of importing and exporting	Fraser Institute	Index
Transfers and subsidies	Fraser Institute	Percent of GDP
Labor market regulations	Fraser Institute	Index
Adequacy of social safety net programs	WDI	Percent of total welfare of beneficiary households
Adequacy of unemployment benefits and active labor market policies (ALMP)	WDI	Percent of total welfare of beneficiary households
Government expenditure on education	WDI	Percent of GDP
R&D expenditure	WDI	Percent of GDP
Social protection coverage	WDI	Percent of population
Export revenue share	Orbis	Percent of total revenues