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Assessing the Trade-Related Sources of Productivity Growth in Emerging Economies

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Abstract

Assessing the Trade-Related Sources of Productivity Growth in Emerging Economies

This paper contributes new empirical evidence on the relationship between productivity and international trade. This is accomplished using an econometric approach that combines input-output and productivity data, which allows a more detailed tracking of the relationship between trade in intermediate and final products and productivity in countries at different stages of economic development. The results show that various forms of trade integration strongly support productivity in emerging economies. Exporting final products, importing intermediates for domestic production and re-exporting are all associated with higher productivity levels, pointing to the particular importance for this country grouping of being able to integrate into regional and global value chains. Our results emphasise also important linkages between different economic sectors and call for broad-based approaches to facilitating integration with foreign intermediate inputs and final products markets.

Keywords: International trade, productivity, developing economies, emerging economies, intermediate imports, global value chains.

JEL classification: F13, F14, F43, F63.

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Executive Summary[1]

Considerable evidence shows that open economies tend to have higher income levels and grow faster than closed economies, and that productivity is one of the main channels through which this occurs. Some of the most important mechanisms through which trade can bolster productivity include specialisation and better allocation of resources; access to a more diverse set of imported intermediate inputs at lower cost (both manufacturing and services); economies of scale; greater competition; trade and foreign investment-related technology and knowledge transfer; and (indirectly) higher investment rates. At the same time, productivity benefits from trade may be compromised if factor or product markets are not competitive, if market signals do not properly reflect social and environmental costs and benefits, or if trade distortions related to misguided industrial policy interventions are prevalent. Under these conditions, the link between productivity and trade is ultimately an empirical matter.

This paper aims to contribute additional evidence in this respect by focusing on the links between productivity and trade indicators while at the same time controlling implicitly for some of the framework conditions. This is accomplished using an econometric approach that combines input-output and productivity data, which allows a more detailed tracking of the relationship between trade in intermediate and final products and productivity in different stages of economic development. In particular, the aim is to provide additional information on the sectors where liberalisation may yield new sources of productivity growth. The presented approach uses some of the concepts elaborated in the OECD-WTO Trade in Value Added (TiVA) project and can be readily extended to incorporate the new TiVA indicators as they become available.

Our results suggest that *Agriculture*, *Manufacturing* and *Wholesale and retail* continue to be important contributors to country-level productivity and employment in emerging economies. In addition, there are significant potential productivity gains to be had from development of some of the key services sectors such as, for example, *Financial and business services* or *Transport and communication*, which are sometimes relatively underdeveloped in emerging economies. These services have the potential to become important elements in structural change that will contribute to increased income levels. The importance of these sectors is further amplified by the fact that high quality services are an important input in increasing the competitiveness of agricultural and manufacturing production.

Our analysis shows that various forms of trade integration will be of significant importance in supporting productivity growth in emerging economies. In particular, our results provide supplementary evidence for the proposition that exporting is associated with higher productivity levels. We estimate that a 10 percentage points increase in the export exposure ratio is associated with approximately 0.1% increase in labour productivity.

We also find that use of foreign inputs in key services and goods sectors in emerging economies has a particularly strong association with productivity in emerging economies; a 10 percentage points increase in the *share of imported intermediate inputs* (including inputs from all supplying sectors) is associated with approximately 0.5% increase in labour productivity. *Electricity, gas and water*, *Financial intermediation*, and *Real estate activities*

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are three examples of inputs imports which are found to be most highly associated with economy-wide productivity in this country grouping. Furthermore, there is a strong positive link between *re-exports of imported intermediates* and productivity in emerging economies. These results point to the particular importance for this country grouping of being able to integrate into regional and global value chains.

Overall, the empirical results of this study yield a strong support to the hypothesis of positive links between trade and productivity and show that this includes both exports and imports. At the same time they emphasise important linkages between different economic sectors and thus stress the need for broad-based approaches to facilitating integration with foreign intermediate inputs and final products markets.

I. Introduction

The ability of firms to access through trade a broader and less costly variety of imported inputs, along with the skills and technology embedded in them, can result in substantive productivity gains, one of the most effective ways to sustainably boost economic growth and competitiveness. Yet, the existing literature provides little information about the links between specific inputs and using sectors.

The augmented dataset used in this study allows us to determine productivity developments at the sector level, identify sectors that contribute most to aggregate labour productivity growth and track the evolution of these sectoral contributions over time. It also allows us to illustrate empirically the relationships between labour productivity and sector-level indicators of export and import penetration, the share of re-exported intermediate goods, the share of value added in output, the extent to which productivity growth is driven by structural change, and the proportion of imported intermediate inputs used in different supplying sectors.

To maximise time coverage (mid-1990s through mid-2000s) this paper uses information from the OECD Input-Output (I-O) tables[2]. It is to our knowledge one of the first attempts to econometrically explore productivity implications of various modes of trade integration with global value chains (e.g. distinguishing between importing intermediate inputs and using them for domestically-destined production and export production) using OECD I-O data. This type of analysis can eventually allow us to better understand the links between different modes of integration with global value chains and economic development. The recent joint OECD-WTO project to measure international trade flows in value-added terms (TiVA) makes extensive use of these OECD I-O tables and presents a more comprehensive set of indicators on imported inputs, value added and re-exports for the years 2005, 2008 and 2009,[3] which could be used in future updates and extensions of empirical work presented in this paper.

Following a brief review of the literature on trade and productivity, which motivates our empirical approach and a description of the methodology, the empirical part of the paper investigates the contribution of different economic sectors to economy-wide productivity growth, controlling for employment developments, distinguishing between different periods and income groups, and identifying the priority sectors in emerging economies.

2. See http://www.oecd.org/trade/input-outputtables.htm and Section 3.2 in this paper.

3. See http://www.oecd.org/trade/valueadded.

In a next step, it explores the information on input-output linkages between demanding and supplying sectors (both domestic and foreign) to estimate the degree of association between sector-level productivity and: (i) export orientation; (ii) import penetration; (iii) imported intermediate inputs originating from various supplying sectors; (iv) re-exports of imported intermediate inputs; and (v) the degree to which productivity increases originate in structural change (i.e. migration of labour between sectors). The paper concludes by outlining the policy implications stemming from the empirical results.

2. Trade and productivity in the economic literature

The link between trade and productivity is at the heart of much of trade theory and applied trade policy analysis. Among the many channels through which trade may affect productivity, the most important are: effects of specialisation and more efficient allocation of resources; higher variety of intermediate goods or services, often at lower costs; economies of scale; enhanced competition; transfer of skills and technology; and (indirectly) through higher investment rates (for recent surveys see Nordås et al., 2006; Newfarmer and Sztajerowska, 2012). It has also been posited that trade positively influences productivity by promoting indirect (foreign or domestic) investment, whereby any of the above-mentioned factors can raise the return on investment and thus increase investment itself (Nordås et al., 2006).

According to the theory of comparative advantage—one of the principal explanations of trade and specialisation—trade may boost productivity levels through better allocation of productive resources across economic sectors (Pavcnik, 2002; OECD, 2011). A mechanism similar to comparative advantage at the country level has also been posited at the firm level: firms may be able to improve their productivity by specialising in a narrower set of core activities while sourcing a range of inputs from other firms, be it domestically or internationally (Rivera-Batiz and Romer, 1991; Grossman and Helpman, 1991; Nordås et al., 2006).

A varied and more recent strand of literature aims to distinguish between the productivity effects of trade in intermediate and final goods. An influential analysis in this regard, which emphasises access to a more diverse set of imported intermediate inputs, is provided by Amiti and Konings (2007), who use plant level data from Indonesia. The authors estimate that the productivity effects of a reduction in tariffs on intermediate inputs were twice as large as the productivity effects of an equivalent reduction in tariffs on final goods. Goldberg et al. (2008; 2009) found that a substantive portion of productivity gains in India that stemmed from a reduction in tariffs on intermediate goods (which are used in approximately one-third of new, domestically produced goods there) occurred via the extensive margin (i.e. through an increase in input variety). Stone and Shepherd (2011) find evidence that intermediate inputs and capital goods imports make a significant and positive contribution to total firm factor productivity. Their results emphasise that access to skilled labour, access to finance and macroeconomic stability amplify these productivity gains. Using the OECD input-output tables, Miroudot et al. (2009) found similar results and showed that the share of foreign intermediate inputs in the production process improves productivity. Ge et al. (2011), studied the impact of imported intermediates on productivity in manufacturing firms in China, and their findings suggest that decreasing input tariffs increases productivity through various mechanisms, such as increasing product variety and learning by doing due to better access to inputs, among others.

Economies of scale that can be realised through access to foreign markets, or sourcing from suppliers that have access to foreign markets, can also represent an important source of productivity gains. Recent advances in microtheoretical foundations highlight the pro-

competitive effects of trade in final products and intermediate inputs. Competition with foreign firms in domestic markets, in exports markets or in pursuing investment opportunities abroad yield productivity gains and result in shifting resources from less to more productive firms (Eaton and Kortum, 2002; Melitz, 2003; Melitz and Ottaviano, 2008; Chaney, 2008).

Trade-related technology diffusion, particularly to countries and firms behind the technology frontier, has been identified as one of the most important sources of dynamic, long-term increases in productivity growth rates (e.g. Nordås et al., 2006). Indeed, Keller (2009) estimated that in many countries, foreign sources of technology account for approximately 90% of productivity growth. Similarly, Arnold and Javorcik (2009) provide evidence that in addition to trade and foreign investment-related technology and knowledge transfer, specialisation associated with intra-firm trade and integration into supply chains is yet another important source of productivity gains.

At the same time, productivity benefits from trade may be compromised if product or factor markets are not competitive, if market signals do not properly reflect social and environmental costs and benefits, or if trade distortions related to misguided industrial policy interventions are prevalent. In particular, the import substitution or infant industry paradigms developed in the 1950s and 1960s posited that in certain circumstances free trade would leave underdeveloped countries specialised in primary commodities and thus sentenced to persistently low productivity levels (Krueger, 1997). These paradigms thus called for import protection and supportive industrial policies in manufacturing sectors where imports competed with domestic production in order to establish a productive and economically viable industry that would not be established otherwise.

While the problems associated with the infant industry argument are well documented, in a recent survey Rodrik (2009) argued that the case against industrial policy does not address the central premise of the need or government's ability to help an industry become viable in certain circumstances, but rather rests on practical difficulties with identifying the 'winners' and the likely possibility of unwanted rent-seeking behaviour. These difficulties have been considered as particularly relevant for developing countries, which might be tempted to emulate the benefits obtained from industrial policy by some Asian economies but do not have as capable administrations and the political ability to withdraw stimulating measures at the right time (Pack, 2000).

Thus, the debate on the role of trade openness and various forms of industrial policy in the development process continues to this day (e.g. Rodrik, 2009; Lin and Chang, 2009; McMillan and Rodrik, 2011). Whereas there is already substantive empirical evidence showing a positive link between trade and productivity gains, in presence of market imperfections or distortions these gains can sometimes be compromised. Ultimately, the balance between trade-related gains and losses in productivity is an empirical matter. This paper aims to contribute additional evidence in this respect by focusing on links between productivity and various trade indicators while at the same time controlling implicitly for some of the framework conditions.

3. Methodology and data

3.1 Research questions

The empirical methodology adopted in this paper builds upon the recent literature on the relationship between productivity and trade. It combines the aggregate and sectoral productivity and employment data for the period 1960-2005 from McMillan and Rodrik (2011; henceforth McMillan and Rodrik database[4]) with the OECD Input-Output database[5] in order to shed empirical light on the following questions:

- Which sectors have contributed the most to aggregate productivity (employment) growth in recent decades?
- How have these contributions evolved over time and across income groups?
- What are the priority sectors from the point of view of improving productivity performance in emerging economies?
- What trade-related characteristics do these priority sectors have?
    - Are they import-competing sectors?
    - Are they more export oriented?
    - To what extent do they rely on re-exports of imported intermediate inputs?
    - Do the sectors rely relatively more on imported intermediate inputs and, if so, from what source sectors?
    - Can the observed productivity levels be associated with structural change or to 'within sector' changes?

3.2 Data

Productivity

The productivity literature provides a rich set of theoretical concepts and measures. Yet, the key factor determining the choice of a productivity measure in applied work is data availability. In the context of this paper, a key objective is to provide maximum time and country coverage that goes beyond OECD members and includes emerging economies. The McMillan and Rodrik database employed in this paper is a version of the Groningen Growth and Development Centre data augmented with additional information from national sources to increase country coverage. It provides labour productivity, value added and employment data at the sectoral and aggregate level for 38 countries (Annex Table A1.1). Value added is measured in USD using 2000 PPP exchange rates. The McMillan and Rodrik database allows us to cover a long time period (1950-2005), which is a prerequisite when investigating stages of development and their determinants. Sector disaggregation allows us to link productivity data to structural trade indicators for broad ISIC Rev. 3 sectors such as: *Agriculture*; *Mining*; *Manufacturing*; *Public utilities*; *Construction*; *Wholesale and retail trade*; *Transport, storage and communication*; and *Finance, insurance, real estate and business services*. The comparatively broad country coverage allows the inclusion of countries at various stages of development and from various geographical regions.

4. http://www.hks.harvard.edu/fs/drodrik/research.html.

5. See footnote 2.

While labour productivity is a less complete measure of productivity than multi-factor productivity (MFP) (see Annex Table A1.2 for an overview of different productivity measures), its key advantages are easier measurement and interpretation, as well as coverage of a larger spectrum of countries and years. Labour productivity is defined as the ratio of the quantity index of value added to the quantity index of labour input. The OECD (2001) provides a comprehensive discussion of labour productivity as a productivity measure: labour productivity "…[s]hows the time profile of how productively labour is used to generate value added. Labour productivity changes reflect the joint influence of changes in capital, as well as technical, organisational and efficiency change within and between firms, the influence of economies of scale, varying degrees of capacity utilisation and measurement errors. Labour productivity only partially reflects the productivity of labour in terms of the personal capacities of workers or the intensity of their effort. The ratio between output and labour input depends to a large degree on the presence of other inputs …. In comparison with labour productivity based on gross output, the growth rate of value added productivity is less dependent on any change in the ratio between intermediate inputs and labour, or the degree of vertical integration. For example, when outsourcing takes place, labour is replaced by intermediate inputs. This leads to a fall in value added as well as a fall in labour input. The first effect raises measured labour productivity; the second effect reduces it. Thus, value-added based labour productivity measures tend to be less sensitive to processes of substitution between materials plus services and labour than gross-output based measures. Because labour productivity measures reflect the combined effects of changes in capital inputs, intermediate inputs and overall productivity, they do not leave out any direct effects of technical change, be they embodied or disembodied. The latter operates via capital goods and intermediate inputs and so affects labour productivity; the former generally enhances production possibilities for a given set of inputs and so also affects labour productivity."

OECD INPUT-OUTPUT data

The OECD Input-Output tables provide information on the type of inputs (e.g. primary factors such as capital and labour, as well as different types of intermediate inputs) used in production by specific economic sectors. They distinguish between imported and domestically produced inputs and thus are a valuable source of information on links between productivity and different indicators of integration with global value chains such as exports, final and intermediate imports or re-exported intermediate imports. The tables are available for all OECD members, two regions (Euro area and EU27) and the following non-OECD countries: Argentina; Brazil; Bulgaria; China; Chinese Taipei; Cyprus; India; Indonesia; Latvia; Lithuania; Malta; Romania; Russian Federation; South Africa; Thailand; and Viet Nam. Sectoral classification follows the International Standard Industrial Classification (Rev. 3) and thus the tables can be merged with the McMillan and Rodrik productivity data.

One shortcoming of the OECD Input-Output data is that the time dimension is restricted to three periods (mid-1990s, early-2000s and mid-2000s). Whereas broader and more specific time coverage would be preferred, the data at hand covers the period during which some emerging economies have seen important accelerations in their economic development and thus is deemed sufficient to provide a basis for generalisations. The presented approach uses some of the concepts elaborated on in the OECD-WTO Trade in Value Added project (e.g. distinguishing between importing intermediate inputs and using them for domestically-destined production and export production) and can be readily extended to incorporate the new TiVA indicators as they become available.

3.3 Empirical strategy

Productivity growth decomposition

To establish which sectors contributed the most to productivity growth in our country sample the first regression relates changes in aggregate labour productivity (across all sectors) in country *i* from period *t* to *t-1* (ΔY_{it}) to changes in sectoral productivities in industries indexed by *k* (ΔY_{it}^{k}), controlling for country and year fixed effects.

$$(1)\ \Delta Y_{it} = \alpha_0 + \sum_k \alpha_k \Delta Y_{it}^{k} + \gamma_i + \gamma_t + \epsilon_{it}$$

The regression's coefficients give us the average percentage point impact on aggregate labour productivity growth of a 1 percentage point increase in labour productivity growth in a specific sector *k*, holding everything else equal (Annex Table A1.4). A sector can contribute to aggregate productivity either through increased sectoral productivity while the size of the sector does not change (contribution from *within* the sectors), or through increased size while the sectoral productivity does not change (contribution from *between the sectors*). This is why it is interesting to also perform two variations of this regression, one with aggregate employment growth as the dependent variable and sectoral employment growth rates as independent variables (Annex Table A1.5a), and one with productivity growth as the dependent variable and sectoral productivity and employment growth rates as independent variables (Annex Table A1.5b). All estimations are conducted for three country sub-samples (total; low and middle income countries [LMICs, interchangeably referred to as 'emerging economies' in this paper]; and high income countries [HICs]) and three different periods (total; before 1995; and 1995-and-after). Thus, the results of regression (1), as shown in the Annex Tables A1.4, A1.5a and A1.5b, allow comparing results across time and income groups.[6]

Labour productivity and trade in final and intermediate goods

In order to shed light on the relationship between trade and productivity, the second set of regressions econometrically tests for statistically significant relationships between the observed differences in labour productivity and several trade indicators measured at the country and sector level. Hence, the level of labour productivity Y_{it}^{k} (in logarithms) is regressed on a number of country and sector-specific trade-related indicators that are constructed using data from the OECD Input-Output tables, while controlling for income per capita (to control for level of development) and country and year fixed effects:[7]

$$(2)\ lnY_{it}^{k} = \beta_0 + \beta_1 lnGDPPC_{it} + \beta_2 XP_{it}^{k} + \beta_3 IMP_{it}^{k} + \beta_4 REXPINT_{it}^{k} + \beta_5 VA_{it}^{k} +$$
$$+\beta_6 INTFIN_{it}^{k} + \beta_7 WITHIN_{it}^{k} + \beta_8 IMPINT_{it}^{k,l} + \gamma_i + \gamma_t + \epsilon_{itk}$$

The regressors of interest, derived from a rich empirical literature (e.g. Pavcnik, 2002; Esleva et al., 2004; Muendler, 2004; Bernard et al. 2006; Fernandes, 2007; Verhoogen, 2008; Amity and Konings, 2007; Stone and Shepherd, 2011; Goldberg et. al, 2008; id., 2009, Van Biesebroeck 2005; De Loecker 2007), include:

6. T-statistics and p-values reported in the table are based on robust standard errors clustered around country-years.

7. For this set of regressions t-statistics and p-values reported in the corresponding Annex Tables A1.6, A1.6a and A1.6b are based on robust standard errors clustered around country-sectors.

EXP_{it}^{k} is the export exposure ratio calculated as the ratio of the value of exports from the supplying industry *k* in country *i* and period *t* and the value of total output of industry *k* in country *i;*

IMP_{it}^{k} is the *import penetration ratio* calculated as the ratio of the value of imports (destined for both intermediate and final use) of industry *k* products by country *i* in period *t* and the value of total output of this industry in country *i;*

$REXPINT_{it}^{k}$ is the *re-exported intermediates ratio* calculated as the share of re-exported intermediate inputs used by industry *k* in country *i* and period *t* in all imported intermediate inputs of this industry;

VA_{it}^{k} is the *share of value added in output* calculated as the share of the value added of industry *k* in country *i* and period *t* in the value of output of industry *k* in country *i* and period *t;*

$INTFIN_{it}^{k}$ is the *intermediate use ratio* calculated as the ratio of the value of all intermediate inputs originating from the industry *k* in country *i* and period *t* (i.e. total intermediate consumption) to the value of final demand originating from the same industry;

$WITHIN_{it}^{k}$ is the *share of 'within' productivity growth* in total productivity growth in industry *k* in country *i* and period *t* (calculated according to Shapley decomposition);

$IMPINT_{it}^{k,l}$ is the *imported intermediates ratio* calculated as the share of the value of imported intermediate inputs originating from supplying industry *l*, and being used by demanding industry *k*, in the value of total (domestic and imported) intermediate inputs used by demanding industry *k;*

$\ln GDPPC_{it}$ is the (log of) GDP per capita in constant prices in country *i* and period *t* to control for a country's level of development;

γ_i and γ_t denote, respectively, country and year fixed effects which allow us to implicitly control for some of the framework conditions.

Similarly to regression (1) estimations are conducted for three country sub-samples (total; low and middle income countries; and high income countries) (Annex Tables A1.6, A1.6a and A1.6b). While the results of regression (2) allow us to assess productivity impacts of importing specific intermediate inputs across all using sectors, they do not allow us to be more specific as to which using sectors' productivity is impacted most by specific imported intermediate inputs from supplying sectors indexed by *l*. Thus, in the third set of regressions equations equivalent to (2) are estimated separately for each of the using sector *k* in the total sample of countries.[8] The sector-specific results are reported in the Annex Tables A1.8-12.

8. For this set of regressions t-statistics and p-values reported in the corresponding Table 1 are based on robust standard errors clustered around countries.

4. Results

4.1 Priority sectors for improving productivity in emerging economies

The results of the first regression, which attempts to estimate sectoral contributions to aggregate productivity growth, are most telling when considering separately low- and middle-income country and high-income country groupings (Annex Table A1.4, Columns 4-9). The results of the corresponding regression which controls for sectoral employment growth are presented in Annex Table A1.5b, Columns 4-9.

The estimates show clearly that in HICs, the contributions to productivity growth of key services sectors such as *Construction*, *Wholesale and retail*, *Transport and communication* and *Finance and business services* have gone up significantly. For example, in the 1995 and after period, a 10 percentage point increase in labour productivity in *Finance and business services* in HICs was associated with a 1.05 percentage points increase in aggregate labour productivity, up from 0.83 percentage points in the pre-1995 period. The sectors with the largest increases in this respect are *Construction* (rising from 0.11 to 0.67) and *Wholesale and retail* (rising from 1.36 to 1.83). At the same time, the estimated contributions of more traditional sectors such as *Agriculture* and *Manufacturing* diminished in HICs (falling from 0.42 to 0.26 and from 2.24 to 1.98, respectively). This does not mean that these more traditional sectors are not important in individual HICs but rather that their contributions to aggregate labour productivity growth across the countries and periods covered in our sample declined relative to other sectors, and in some countries became insignificant. Interestingly, *Mining*, which made an insignificant contribution in HICs in the pre-1995 period, has become significant more recently.

In LMICs, other service sectors' contributions diminished or became insignificant in the period after 1995. *Finance and business services'* contribution remained statistically significant but halved in size (falling from 0.83 to 0.46). In contrast, the contribution of *Agriculture* and *Manufacturing* increased slightly, rising from 1.50 to 1.63 and from 1.88 to 2.10, respectively, in the pre- and post-1995 periods. These figures suggest that *Agriculture* and *Manufacturing* remain important sectors in LMICs. In particular, the industrial changes that clearly happened in these countries did not erode the importance of *Agriculture* in terms of these countries' economy-wide productivity. The exception to this was the *Wholesale and retail* sector, which remained a significant contributor to aggregate productivity growth both before and after 1995. LMICs recorded approximately a 2.28 percentage point increase in their aggregate labour productivity rates for each 10 percentage point increase in the *Wholesale and Retail* sector's labour productivity growth.

Overall, there is a clear distinction in the evolution of sectoral contributions to aggregate labour productivity growth between LMICs and HICs. In LMICs, the contributions of traditional sectors are increasing while those of the services sectors are diminishing. The opposite is the case in HICs. This decoupling has to be observed carefully not only because it suggests a divergence between the productive structures of the two country groupings but also because services, including foreign services, have been shown to be an important input into competitive agricultural and manufacturing production (e.g. Gonzales, Jensen, Kim and Nordås (2012)).

As foreshadowed above, increases in labour productivity, be it at the aggregate or sector level, can happen as a result of value added increases at a given employment level, a fall in employment at a given value added level or as a combination of the two. This is why it is interesting to perform a similar analysis of sectoral contributions to aggregate employment growth and our data allows us to do so. Aggregate employment growth decomposition was thus performed for the total sample, LMICs and HICs for both the pre/ and post/1995 periods (Annex Table A1.5a). Again, a comparison of trends between the two income groupings reveals some interesting differences but also, in contrast with trends in productivity, some similarities.

In HICs, *Manufacturing*, *Wholesale and retail, Financial and business services* and *Construction* are the most important contributors to employment growth; however, the contribution of employment growth in *Manufacturing* declined. Employment growth in *Manufacturing* more than halved in the post-1995 period, while the contributions of the *Financial and business services, Wholesale and retail* and, especially, *Construction* sectors increased. At the same time, *Agriculture*, which already contributed very little in the pre-1995 period, ceased to contribute significantly to employment growth in HICs.

In LMICs, *Manufacturing*'s contribution is lower than in HICs and is following a similar downward trend. As in HICs, *Construction* has dramatically increased its contribution to employment growth in LMICs and has been approaching HICs levels. However, this is where the similarities with HICs end as the contributions of the *Wholesale and retail, Transport and communication* and *Financial and business services* sectors in LMICs diminish or become insignificant. In addition, and in contrast to HICs, the *Public utilities* sector becomes a small but significant contributor to employment growth.

LMICs are also different from HICs in the sense that *Agriculture*, *Manufacturing* and *Wholesale and retail*—the three sectors that contribute the most to labour productivity growth in LMICs (Annex Table A1.1) and which have increased their productivity contributions over time—have seen falls in their contributions to employment growth. This most likely reflects a scenario where labour productivity growth occurs through rationalisation of employment rather than through growth in value added at unchanged employment levels. This can be contrasted with the trend in the *Construction* sector which, based on our estimates, has contributed much to employment opportunities in LMICs at the same time that its contributions to aggregate labour productivity growth has diminished. Somewhat more worryingly, the contributions both in productivity growth and employment growth of the *Transport and communication* and *Financial and business services* sectors—two important and growing contributors to productivity and employment growth in HICs—have fallen in LMICs.

Results of regressions of sectoral contributions to aggregate productivity growth which control for employment growth (Annex Table A1.5b) tell us what the given sectoral contribution would be had employment in this and other sectors remained unchanged. They generally support the interpretation of trends in sectoral contributions to aggregate productivity and employment growth given above.

Overall, from the point of view of emerging economies, these sectoral productivity and employment growth decompositions suggest a number of conclusions. First, it will be important to create favourable conditions to develop further traditional sectors such as *Agriculture* and *Manufacturing*, which continue to be important and increasing contributors to country-level productivity. Here, as discussed in the introduction and literature review, trade and foreign investment can be of significant importance. Some of the channels through which trade can boost productivity of these traditional sectors are explored in the next sub-section.

Second, our growth decompositions suggest a somewhat disturbing trend in several modern services sectors. We have shown that in HICs, services sectors such as *Financial and business services*, *Wholesale and retail* and *Transport and communication* are already important and growing contributors to both labour productivity and employment growth. Furthermore, the literature is unequivocal that their products provide important inputs into several other industries, particularly in those seeking to expand into foreign markets. In contrast, services sectors' contributions to aggregate productivity growth in the emerging economies covered in our sample (LMICs) have diminished or became insignificant with time. The exception to this has been the *Wholesale and retail* sector, which remained a significant contributor. This suggests that policies that stimulate productivity in services sectors will be particularly important. Some channels through which trade can help increase productivity of these sectors are explored in the next sub-section.

4.2 What are the trade-related characteristics of these high-priority sectors?

As a background to our discussion of the relationship between productivity and structural trade characteristics at the sector level, it is worth pointing out that economy-wide labour productivity is positively correlated in our dataset with changes in economy-wide trade openness. This is showcased in Figure 1 below, which juxtaposes labour productivity in 2005 (logarithmic scale) on the vertical axis and changes in the ratio of the sum of exports and imports to GDP, indicated on the horizontal axis. While for reasons of data availability the dependent and independent variables enter our regressions in levels—not in rates of change—levels and rates of change can be in fact intimately related (in general changes are differences between levels) and economic theory does not provide any clear guidance on the exact type of dynamic relationship between trade and openness that can be expected. Thus, for comparison, Figure 2 juxtaposes changes in labour productivity in 2005 and changes in the ratio of the sum of exports and imports to GDP in the preceding year. We see that the correlation between productivity growth and changes in trade openness is higher than in Figure 1.[9] Overall, Figures 1 and 2 suggest a positive relationship between productivity and trade openness but there is considerable variation across countries. This is an additional motivation for an econometric investigation of the relationship between productivity and various structural trade indicators. An econometric approach allows controlling for some of the confounding factors that cannot be controlled for when looking at Figures 1 and 2.

9. Coefficient of correlation = 0.42.

Figure 1. Labour productivity (logarithmic scale) *vs.* changes in trade openness, 2005

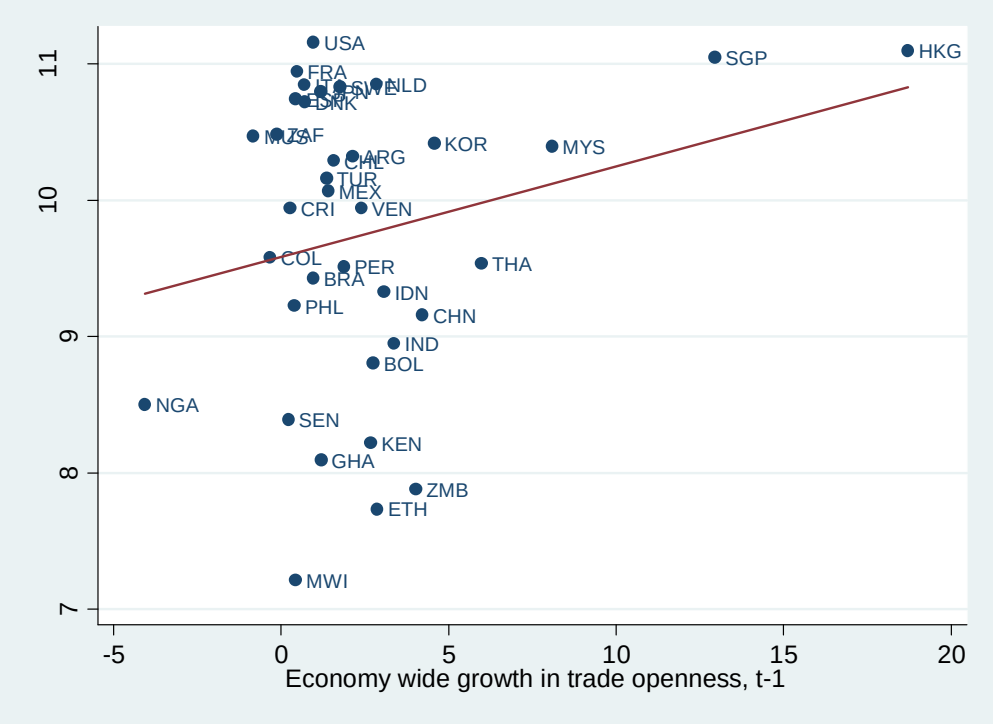
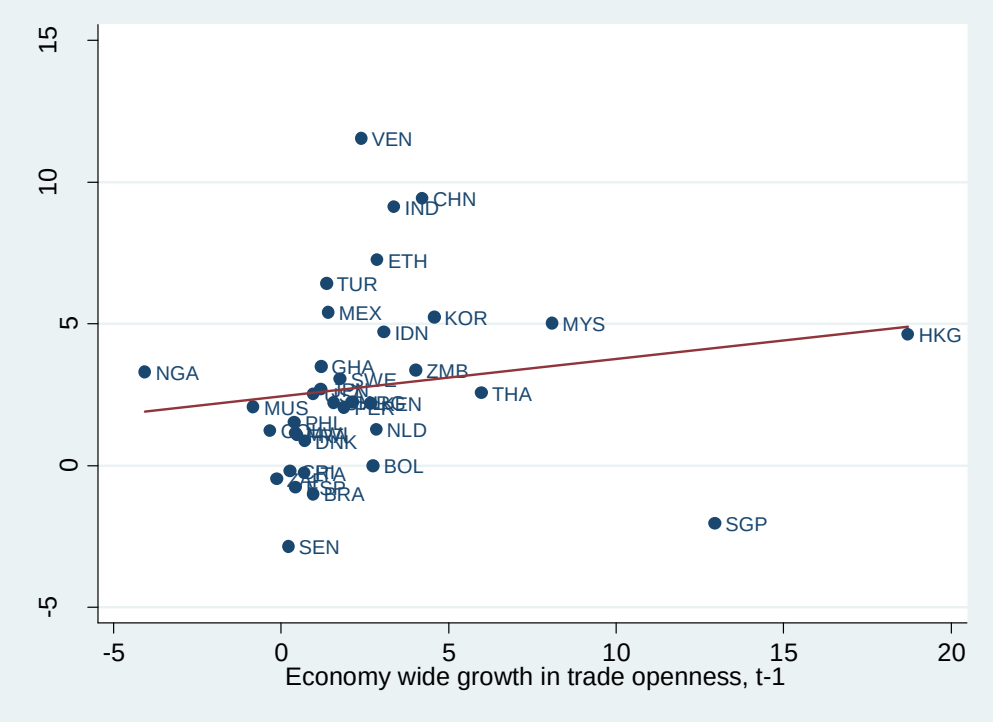


Figure 2. Changes in labour productivity *vs*. changes in trade openness, 2005



The positive relationship between labour productivity and trade illustrated in the simple graphs above is also demonstrated in our regressions relating sectoral labour productivity to sector-specific trade-related indicators derived from the OECD Input-Output tables (Table 2). However, it is worth pointing out at the outset that some caution with interpreting the results is warranted. In particular, even though the specification of equation (2) aims to prevent such a possibility, our approach might still suffer from econometric endogeneity, where the right-hand-side variables and the error term in (2) remain correlated and lead to a so-called endogeneity bias. The two possible causes of endogeneity in our case are omitted variables and simultaneity. The first possibility is minimised in our approach by including a relatively generous list of independent variables, including various measures of export and import integration, as well as the per capita income to control for the level of development, the share of value added in output to control for the value added characteristics of the sector, and the country and year fixed effects to control for unobserved country and year effects. Simultaneity—another form of econometric endogeneity—might also be relevant for some of our right-hand-side variables. This may be the case since, for example, imports and productivity may depend on each other (increase in productivity leads to an increase in income and an increase in income may lead to higher imports) although all our trade variables enter the equation as ratios (e.g. the import penetration ratio is calculated as the ratio of the value of imports and the value of total output) which in our view makes the simultaneity problem less likely. An appropriate method to control for both these forms of endogeneity would be to use an exogenous instrumental variable (IV) (e.g. Wooldridge, 2002: pp. 621).[10] However, in light of the limited number of periods in OECD Input-Output tables and the lack of evident instrumental variables to deal with potential simultaneity, endogeneity remains a caveat.[11]

Bearing this in mind, we estimate equation (2) for three country sub-samples (total; low and middle income countries and high income countries) and report result in Annex Tables A1.6-A1.6b. Considering all countries (Annex Table A1.6), we find the *export exposure ratio* to have a positively and statistically significant correlation with labour productivity, with a 10 percentage point increase in the export exposure ratio being associated with approximately 0.08% increase in the level of labour productivity. The result for the LMICs sub-sample (Annex Table A1.6a) is very similar although statistical significance is lower than for the total sample. The result for HICs is yet less precise in statistical terms although positive and of the same order of magnitude in most specifications (Annex Table A1.6b). This suggests that the positive correlation of export exposure and labour productivity is particularly significant in emerging economies. This finding is in line with, for example, the hypotheses put forward by the firm-level trade literature linking exporting to higher firm productivity levels (e.g. Melitz, 2003; Melitz and Ottaviano, 2008; Chaney, 2008).

A 10 percentage point increase in the *import penetration ratio* is associated with approximately a 0.09% increase in labour productivity when the total country sample is considered and this point estimate is highly statistically significant. It is noteworthy, however, that the results for LMICs and HICs groupings differ. In fact, coefficients for LMICs have negative signs and are statistically significant in some specifications while coefficients for

10. A multi-step IV estimation with a valid instrumental variable provides efficient and consistent results with asymptotically valid 2SLS or 3SLS standard errors and test statistics (Bergstrand and Baier, 2007: p. 82).

11. There will be more scope to control for endogeneity when more periods are available in OECD Input-Ouput and TiVA datasets.

HICs are positive but mostly statistically insignificant. These features suggest a certain econometric fragility of the results on import penetration.[12]

These results are obtained while controlling for *shares of value added in output*, which turns out to be positively and mostly significantly related to labour productivity, particularly in HICs. Depending on the specification, a 10 percentage point increase in the *share of value added* is associated with between a 0.08 and 0.16% increase in labour productivity for the total sample, raising to up to 0.21% for HICs. In contrast, we do not find a statistically significant relationship between productivity and the *intermediate use ratio* in any of the country groupings. This suggests that sectors supplying intermediate inputs and final goods are, on average, equally productive in our sample. We also do not find a significant relationship between productivity and the *share of 'within' productivity growth*—our proxy for the degree of structural change. The latter result suggests that sectors where productivity growth happens mostly within the sector, i.e. without significant changes in employment, are on average as productive as sectors where productivity growth can be ascribed mostly to changes in employment.

A number of interesting findings are established with respect to imports of intermediate inputs. The *imported intermediates ratio* has a positive and statistically significant correlation with productivity and the estimated elasticity is among the highest in the model: a 10 percentage points increase in the share of *imported intermediate inputs* (including inputs from all supplying sectors) is associated with approximately a 0.3% increase in labour productivity in the total country sample (Annex Table A1.6, Column 3). Interestingly, this estimate increases to 0.45% when LMICs are considered alone, suggesting that this association is particularly important for the emerging economies.

The association between the *re-exported intermediates ratio* and productivity is negative and statistically significant in some specifications for the total country sample but positive and highly statistically significant for LMICs. This suggests that not only is there a positive association between the share of imported intermediate inputs and productivity in this country grouping but that productivity tends to be yet higher when a large of these inputs is further processed for export. This result would confirm some of the hypotheses about the positive impact of the processing for exports model of integration into global value chains, particularly from the point of view of emerging economies. No such result is found for HICs which suggests that while there is a positive association between the share of imported intermediate inputs and productivity, this might not necessarily be associated with processing for export any more than with using these intermediate inputs for production of other intermediate inputs or final products that are destined for the domestic market. These results point to the particular

12. Coefficients on import penetration should also be interpreted in light of the fact that the imported intermediates and re-exported intermediates ratios are controlled for and that these ratios are highly and positively associated with productivity levels in LMICs. That imports of intermediate inputs and, particularly for LMICs, re-exports are positively correlated with productivity underlines the importance of being able to integrate into regional and global value chains for LMICs. Having controlled for these effects, the coefficient on import penetration ratio should be interpreted more in the context of import competition. One possible explanation of the sometimes negative sign on this variable in the LMICs sample is that the ratio of the value of imports to the value of total output may be particularly high in sectors where LMICs do not have comparative advantage which may in turn be correlated with low sector-level labour productivity. If causality was to run from import competition to labour productivity this could be due to the continued presence of some of the economic and institutional deficiencies in the LMICs grouping which might result in negative effects of import competition on productivity.

importance for emerging economies of being able to integrate into regional and global value chains.

When we distinguish between *imported intermediates* from specific supplying sectors[13] (Annex Table A1.6, Columns 3-13), positive associations with productivity are most pronounced for the following imported intermediates: *Electricity, gas and water* (ISIC Rev. 3 categories 40 and 41), *Financial intermediation* (65 through 67), *Real estate activities* (70), *Manufacture of coke, refined petroleum products and nuclear fuel* (23), *Mining and quarrying* (10 through 14) and, albeit at a lower level of statistical significance and with lower estimated coefficients, *Manufacture of office, accounting and computing machinery* (30), *Manufacture of machinery and equipment n.e.c.* (29) and *Manufacture of electrical machinery and apparatus n.e.c.* (31). For example, a 10 percentage point increase in the ratio of imported *Electricity, gas and water* and *Financial intermediation* inputs are associated with, respectively, increases of 0.6 and 0.2 percentage points in productivity.

Interestingly, these results also hold strongly when we consider LMICs only albeit the ordering of most important intermediates according to the magnitude of their positive correlation is slightly different. For example, a 10 percentage point increase in the ratio of imported *Electricity, gas and water* and *Financial intermediation* inputs are associated with as much as, respectively, increases of 1.4 and 0.4 percentage points in productivity. These magnitudes illustrate the general result that the positive association between imported intermediate inputs is particularly important for the emerging economies.

The regressions also yield some negative associations between productivity and shares of imported intermediate inputs for some of the more traditional supplying manufacturing sectors, such as *Textiles, textile products, leather and footwear* (17 through 19), *Manufacture of rubber and plastics products* (25) and *Manufacture of other transport equipment* (35), including in LMICs and HICs sub-samples.

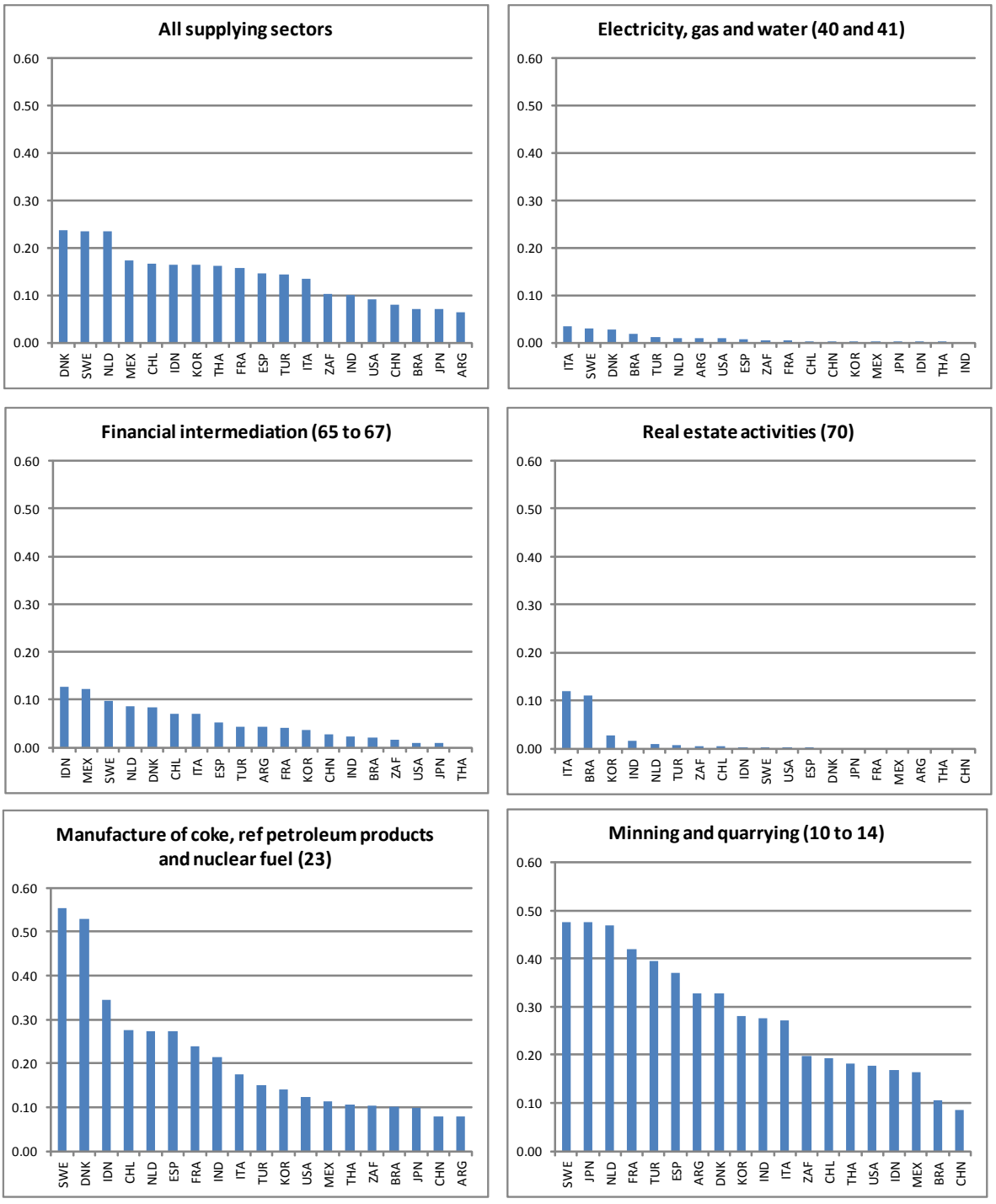
In this context, it is interesting to compare the shares of imported intermediate inputs across the countries in the sample. Figure 3 below presents these ratios for inputs from the key supplying sectors, while Annex Table A1.7 presents a 'heat chart' with imported intermediate inputs ratios plotted for all countries and sectors. Figure 3 makes clear that the extent to which intermediate inputs are imported is somewhat sector-specific. *Mining and quarrying* and *Manufacture of coke, refined petroleum products and nuclear fuel*, for example, record import ratios as high as 40%. On the other hand, the share of imported *Electricity, gas and water* typically does not exceed 5%. More importantly, however, there is a significant variation in import ratios across countries, which suggests that there is considerable opportunity to boost productivity growth by improving access to foreign intermediate inputs from key supplying sectors.

Some emerging economies, such as China or India, tend to record relatively low imported intermediates ratios, which hint at barriers to integration with international intermediate input markets. The low ratios could be driven by the low level of economic development, but in our sample this does not seem to be the case as both Brazil and Indonesia record much higher shares of imports for some of their intermediate inputs. For example, while India and China's import ratios of *Electricity, gas and water* or *Real estate activities* inputs are very low, Brazil's ratio is on par with shares in some of the high income OECD countries. Similarly, while many emerging countries' shares of imported *Financial intermediation* inputs are very low, Indonesia records the highest ratio of all countries, with more than 10% of Indonesia's

13. An overview of different sectors according to the International Standard Industrial Classification of All Economic Activities, Rev.3 is given in Annex Table A1.3.

Financial intermediation intermediate inputs being imported from abroad. At the same time, several OECD countries also use relatively few imported intermediate inputs, which also suggests that there is considerable scope for trade-related productivity growth in this country grouping.

Figure 3. Imported intermediates ratios by supplying sectors with highest association with labour productivity



Source: OECD Input-Output database, authors' calculations.

As revealed by the conclusions of our productivity growth decomposition in Section 4.1, from the point of view of emerging economies it is important to create favourable conditions to further develop the *Agriculture* and *Manufacturing* sectors, which continue to be important and increasing contributors to country-level productivity. In addition, several modern services sectors, such as *Financial and business services* and *Wholesale and retail*, as well as *Transport and communication*, are likely to become important elements in structural change in these countries that will contribute to increased income levels. Thus, our third set of regressions separately explores each of these priority sectors to determine which specific imported intermediate inputs might be associated with higher productivity. Results of these sector-specific regressions, presented in Annex Tables A1.8-12, are based on a much smaller number of observations (and thus are not further split into country sub-samples), generally have weaker statistical properties[14] and, thus, should be treated with more caution. Yet, they do reveal some interesting patterns.

For example, labour productivity in *Agriculture* has a strong, positive association with higher shares of imported intermediate inputs in the *Electricity, gas and water* (40 and 41), *Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods* (50 to 52) and *Financial intermediation* (65 through 67) sectors and, to a smaller extent, a number of other supplying sectors (Annex Table A1.8). Results for *Manufacturing* indicate that imported intermediate inputs ratios are generally insignificant; in a selected few cases where the ratios are significant, they have negative signs. Productivity in *Financial and business services* is positively and significantly correlated with imports of *Transport services* (60 to 63), *Manufacturing of machinery and equipment n.e.c.* (29) and *Manufacture of office, accounting and computing machinery* (30). In the *Wholesale and retail trade* sector, productivity is positively associated with imported intermediates of *Food products, beverages and tobacco products* (15 to 16), while in the *Construction* sector, productivity is positively correlated with imports of *Manufacture of motor vehicles, trailers and semi-trailers* (34).

While a number of methodological caveats are attached to the results of these sectoral regressions (see footnote 14), in several cases they do seem to reveal plausible links between demanding and supplying sectors. Combined with the results from regressions for all sectors, they emphasise the importance of having access to foreign inputs. In fact, the coefficients on imported intermediate inputs suggest significant magnitudes as compared, for example, with coefficients on general export and import exposure ratios. Overall, these results suggest that imports may indeed be as important as are exports in boosting productivity and they provide some specific guidance as to which imported inputs are most strongly correlated with productivity.

14. Given the number or observations and estimated parameters, the number of degrees of freedom is an issue here and this is revealed in lower statistical significance of coefficients on a number of explanatory variables.

5. Conclusions

Allowing firms to access a broader and less costly variety of imported inputs and skills through trade, as well as the technology embedded in these inputs, can result in substantive productivity gains. Therefore, trade protectionism does not only harm domestic consumers, but can also thwart productivity gains, undermining the global competitiveness of domestic industries as a result. For reasons related to the data that was used, recent work has focused mainly on specific end-use sectors or specific importing countries and has not distinguished between different supplying sectors.

This paper fills this gap and sheds additional empirical light on the links between labour productivity and various structural trade indicators using the OECD Input-Output database, combined with the recent McMillan and Rodrik data on employment, value added and labour productivity.

The augmented dataset allows us to determine productivity developments at the sector level, identify the sectors that contribute the most to an economy's total labour productivity growth in different income groups and track the evolution of these sectoral contributions over time. It also allows us to illustrate empirically the relationships between labour productivity and sector-level indicators of export and import penetration, shares of re-exported intermediate goods, shares of value added in output, the extent to which productivity growth is driven by structural change and the proportion of imported intermediate inputs used in different supplying sectors. The presented approach uses some of the concepts elaborated on in the OECD-WTO Trade in Value Added project and can be readily extended to incorporate the new TiVA indicators as they become available.

Our results suggest that sectors such as *Agriculture*, *Manufacturing* and *Wholesale and retail* continue to be important contributors to country-level productivity and employment growth in emerging economies. In addition, there are significant potential productivity gains to be had from development of some of the key services sectors such as, for example, *Financial and business services* or *Transport and Communication*, which are sometimes relatively underdeveloped in emerging economies. These services have the potential to become important elements in structural change in emerging economies--structural change that will contribute to increased income levels. This is more so since high quality services are an important input in increasing the competitiveness of agricultural and manufacturing production.

While various arguments have been made in the literature about the role of trade openness and various forms of policy interventions in the development process, our analysis focuses specifically on trade indicators. It shows that various forms of trade integration will be of significant importance in supporting productivity growth. In particular, our results provide supplementary evidence for the claim that exporting is associated with higher productivity levels. We estimate that in low and middle income countries a 10 percentage point increase in the export exposure ratio is associated with approximately 0.1% increase in labour productivity.

We also establish that the use of foreign inputs in key services and goods sectors in emerging economies has a particularly strong association with productivity in emerging economies; a 10 percentage points increase in the share of imported intermediate inputs (including inputs from all supplying sectors) is associated with approximately 0.5% increase in labour productivity. *Electricity, gas and water*, *Financial intermediation*, and *Real estate activities* are three examples of inputs imports of which are found to be most highly associated with economy-wide productivity in this country grouping. Variation in intermediate imports

ratios across countries suggests that there is considerable scope for productivity growth by improving access to foreign inputs originating from these key supplying sectors. Furthermore, we find a strong positive link between *re-exports of imported intermediates* and productivity in emerging economies. All these results point to the importance for them of being able to integrate into regional and global value chains.

Thus, the empirical results of this study yield a strong support to the hypothesis of a positive link between trade and productivity in emerging economies and show that this includes both exports and imports. At the same time they emphasise important linkages between different economic sectors and thus stress the need for broad-based approaches to facilitating integration with foreign intermediate inputs and final products markets.

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Annex Tables

Annex Table A1.1 Countries covered in the productivity database

ARG; BOL; BRA; CHL; CHN; COL; CRI; DNK; ESP; ETH; FRA; GHA; HKG; IDN; IND; ITA; JPN; KEN; KOR; MEX; MUS; MWI; MYS; NGA; NLD; PER; PHL; SEN; SGP; SWE; THA; TUR; TWN; UKM; USA; VEN; ZAF; ZMB

Annex Table A1.2. Overview of main productivity measures

Type of output measure	**Type of input measure**			
	Labour	***Capital***	***Capital and labour***	***Capital, labour and intermediate inputs (energy, materials, services)***
Gross output	Labour productivity (based on gross output)	Capital productivity (based on gross output	Capital-labour MFP (based on gross output)	KLEMS multifactor productivity
Value added	Labour productivity (based on value added)	Capital productivity (based on value added	Capital-labour MFP (based on gross value added)	-
	Single factor productivity measure		**MFP measure**	

Source: OECD 2001.

Annex Table A1.3. International Standard Industrial Classification of All Economic Activities, Rev.3

- Agriculture, hunting and forestry
  - 01 - Agriculture, hunting and related service activities
  - 02 - Forestry, logging and related service activities
- Fishing
  - 05 - Fishing, operation of fish hatcheries and fish farms; service activities incidental to fishing
- Mining and quarrying
  - 10 - Mining of coal and lignite; extraction of peat
  - 11 - Extraction of crude petroleum and natural gas; service activities incidental to oil and gas extraction excluding surveying
  - 12 - Mining of uranium and thorium ores
  - 13 - Mining of metal ores
  - 14 - Other mining and quarrying
- Manufacturing
  - 15 - Manufacture of food products and beverages
  - 16 - Manufacture of tobacco products
  - 17 - Manufacture of textiles
  - 18 - Manufacture of wearing apparel; dressing and dyeing of fur
  - 19 - Tanning and dressing of leather; manufacture of luggage, handbags, saddlery, harness and footwear
  - 20 - Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials
  - 21 - Manufacture of paper and paper products
  - 22 - Publishing, printing and reproduction of recorded media
  - 23 - Manufacture of coke, refined petroleum products and nuclear fuel
  - 24 - Manufacture of chemicals and chemical products
  - 25 - Manufacture of rubber and plastics products
  - 26 - Manufacture of other non-metallic mineral products
  - 27 - Manufacture of basic metals
  - 28 - Manufacture of fabricated metal products, except machinery and equipment
  - 29 - Manufacture of machinery and equipment n.e.c.
  - 30 - Manufacture of office, accounting and computing machinery
  - 31 - Manufacture of electrical machinery and apparatus n.e.c.
  - 32 - Manufacture of radio, television and communication equipment and apparatus
  - 33 - Manufacture of medical, precision and optical instruments, watches and clocks
  - 34 - Manufacture of motor vehicles, trailers and semi-trailers
  - 35 - Manufacture of other transport equipment
  - 36 - Manufacture of furniture; manufacturing n.e.c.
  - 37 - Recycling
- Electricity, gas and water supply
  - 40 - Electricity, gas, steam and hot water supply
  - 41 - Collection, purification and distribution of water
- Construction
  - 45 - Construction
- Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods
  - 50 - Sale, maintenance and repair of motor vehicles and motorcycles; retail sale of automotive fuel
  - 51 - Wholesale trade and commission trade, except of motor vehicles and motorcycles
  - 52 - Retail trade, except of motor vehicles and motorcycles; repair of personal and household goods
- Hotels and restaurants
  - 55 - Hotels and restaurants
- Transport, storage and communications
  - 60 - Land transport; transport via pipelines
  - 61 - Water transport
  - 62 - Air transport
  - 63 - Supporting and auxiliary transport activities; activities of travel agencies
  - 64 - Post and telecommunications

- Financial intermediation
  - 65 - Financial intermediation, except insurance and pension funding
  - 66 - Insurance and pension funding, except compulsory social security
  - 67 - Activities auxiliary to financial intermediation
- Real estate, renting and business activities
  - 70 - Real estate activities
  - 71 - Renting of machinery and equipment without operator and of personal and household goods
  - 72 - Computer and related activities
  - 73 - Research and development
  - 74 - Other business activities
- Public administration and defence; compulsory social security
  - 75 - Public administration and defence; compulsory social security
- Education
  - 80 - Education
- Health and social work
  - 85 - Health and social work
- Other community, social and personal service activities
  - 90 - Sewage and refuse disposal, sanitation and similar activities
  - 91 - Activities of membership organizations n.e.c.
  - 92 - Recreational, cultural and sporting activities
  - 93 - Other service activities
- Private households with employed persons
  - 95 - Private households with employed persons
- Extra-territorial organizations and bodies
  - 99 - Extra-territorial organizations and bodies

Source: United Nations Statistics Division.

Annex Table A1.4. Labour productivity growth decomposition

	Total	Total before 1995	Total 1995 and after	LMICs	LMICs before 1995	LMICs 1995 and after	HICs	HICs before 1995	HICs 1995 and after
Agriculture	0.127***	0.114***	0.150***	0.156***	0.150***	0.163***	0.0467***	0.0421***	0.0256*
	[0.028]	[-0.031]	[-0.032]	[-0.041]	[-0.053]	[-0.037]	[-0.009]	[-0.008]	[-0.013]
Mining	0.0079**	0.00868**	0.006	0.00767*	0.007	0.006	0.010	0.007	0.00820**
	[0.004]	[-0.004]	[-0.004]	[-0.004]	[-0.005]	[-0.004]	[-0.006]	[-0.006]	[-0.003]
Manufacturing	0.211***	0.208***	0.212***	0.214***	0.188***	0.210***	0.234***	0.224***	0.198***
	[0.017]	[-0.024]	[-0.030]	[-0.019]	[-0.026]	[-0.032]	[-0.018]	[-0.012]	[-0.026]
Public Util.	0.006	0.0128***	0.004	0.005	0.00982**	0.004	0.0442***	0.0481***	0.0304***
	[0.004]	[-0.005]	[-0.003]	[-0.004]	[-0.005]	[-0.003]	[-0.006]	[-0.008]	[-0.006]
Construction	0.005	0.0133***	-0.004	-0.001	0.0381***	-0.005	0.0117***	0.0114***	0.0674***
	[0.005]	[-0.002]	[-0.003]	[-0.005]	[-0.010]	[-0.003]	[-0.001]	[0.000]	[-0.015]
Retail & wholesale	0.228***	0.213***	0.215***	0.228***	0.223***	0.218***	0.150***	0.136***	0.183***
	[0.022]	[-0.025]	[-0.036]	[-0.024]	[-0.029]	[-0.037]	[-0.024]	[-0.026]	[-0.023]
Transport & comm..	0.041	0.0622***	0.013	0.034	0.0513**	0.011	0.0840***	0.0809***	0.0867***
	[0.023]	[-0.019]	[-0.029]	[-0.024]	[-0.022]	[-0.029]	[-0.022]	[-0.022]	[-0.022]
Fin. & bus. services	0.064***	0.0835***	0.0466***	0.0645***	0.0838***	0.0462**	0.0892***	0.0832***	0.105**
	[0.014]	[-0.014]	[-0.017]	[-0.014]	[-0.015]	[-0.017]	[-0.025]	[-0.022]	[-0.033]
Constant	0.652***	0.619***	0.648***	0.803***	0.772***	0.855***	0.327**	0.594***	-0.010
	[0.134]	[-0.139]	[-0.168]	[-0.147]	[-0.142]	[-0.182]	[-0.128]	[-0.163]	[-0.072]
Observations	1478	1044	434	1013	678	335	465	366	99
R2	0.637	0.652	0.642	0.647	0.668	0.653	0.727	0.694	0.851

Year fixed effects and country fixed effects are not reported. Statistical significance is indicated by p<0.1*, p<o.o5*** and p<0.01***.

Source: Authors' calculations.

Annex Table A1.5a. Growth decomposition – Employment growth

	Total	Total before 1995	Total 1995 and after	LMICs	LMICs before 1995	LMICs 1995 and after	HICs	HICs before 1995	HICs 1995 and after
Agriculture	0.158***	0.182**	0.124***	0.163***	0.191**	0.126**	0.0848*	0.0761*	0.0211
	[-0.0507]	[-0.0669]	[-0.0449]	[-0.0556]	[-0.0757]	[-0.0475]	[-0.0411]	[-0.0336]	[-0.0154]
Mining	0.0141***	0.0121***	0.0115**	0.0142***	0.0128***	0.0118**	0.0118*	0.00955	-0.00269
	[-0.00386]	[-0.00428]	[-0.00498]	[-0.00413]	[-0.00443]	[-0.00505]	[-0.0053]	[-0.00629]	[-0.00741]
Manufacturing	0.109***	0.119***	0.0755***	0.107***	0.130***	0.0712***	0.202***	0.233***	0.106***
	[-0.0348]	[-0.0372]	[-0.0242]	[-0.0245]	[-0.0213]	[-0.0247]	[-0.0201]	[-0.0245]	[-0.0273]
Public Util.	0.00469	0.00478	0.0157***	0.00467	0.00464	0.0161***	-0.0193	-0.0109	0.0111
	-0.00577]	[-0.0106]	[-0.00482]	[-0.00601]	[-0.0103]	[-0.00481]	[-0.015]	[-0.0215]	[-0.0109]
Construction	0.0112***	0.0104***	0.0859***	0.00636	-0.00643	0.0862***	0.0128***	0.0129***	0.110***
	[-0.00327]	[-0.00351]	[-0.0162]	[-0.0167]	[-0.0172]	[-0.0167]	[-0.00026]	[-0.0002]	[-0.0179]
Retail & Wholesale	0.173***	0.201***	0.0991**	0.169***	0.205***	0.0958**	0.174***	0.151***	0.230***
	[-0.0261]	[-0.0268]	[-0.0367]	[-0.0282]	[-0.0306]	[-0.0368]	[-0.0231]	[-0.0181]	[-0.0468]
Transport & comm..	0.0326	0.0531**	0.00427]	0.0316	0.0487**	0.00328	0.142***	0.103*	0.0784***
	[-0.0229]	[-0.0215]	[-0.0179]	[-0.0221]	[-0.0208]	[-0.0171]	[-0.0409]	[-0.0471]	[-0.0176]
Fin. & bus services	0.0391**	0.0453***	-0.00741	0.0343*	0.0396**	-0.0115	0.0882***	0.0899***	0.113***
	[-0.0159]	[-0.0134]	[-0.028]	[-0.0175]	[-0.0145]	[-0.0279]	[-0.0147]	[-0.0158]	[-0.0255]
Constant	0.877***	0.684***	1.195***	0.972***	0.733***	1.233***	0.396**	0.305**	0.339**
	[-0.136]	[-0.115]	[-0.226]	[-0.169]	[-0.141]	[-0.261]	[-0.12]	[-0.11]	[-0.12]
Observations	1,482	1,047	435	1,017	681	336	465	366	99
R^2	0.529	0.614	0.444	0.518	0.617	0.442	0.734	0.75	0.9

Statistical significance is indicated by p<0.*, p<.05** and p<0.01***. Country- and year fixed effects are not reported for brevity. Standard errors are heteroscedasticity robust.

Source: Authors' calculations.

Annex Table A1.5b. Labour productivity growth decomposition (controlling for employment growth)

	Total	Total before 1995	Total 1995 and after	LMICs	LMICs before 1995	LMICs 1995 and after	HICs	HICs before 1995	HICs 1995 and after
Agriculture	0.0893***	0.0652***	0.139***	0.113***	0.0808***	0.155***	0.0358***	0.0330***	0.0359***
	[-0.0079]	[-0.01]	[-0.013]	[-0.0111]	[-0.015]	[-0.0159]	[-0.007]	[-0.008]	[-0.0066]
Mining	0.0123***	0.0139***	0.00836**	0.0137***	0.0113**	0.00791*	0.00813**	0.00623*	0.0109**
	[-0.0025]	[-0.003]	[-0.004]	[-0.0031]	[-0.004]	[-0.0045]	[-0.003]	[-0.004]	[-0.0046]
Manufacturing	0.258***	0.246***	0.269***	0.262***	0.230***	0.272***	0.238***	0.223***	0.199***
	[-0.0124]	[-0.015]	[-0.027]	[-0.0158]	[-0.02]	[-0.032]	[-0.015]	[-0.018]	[-0.0147]
Public Util.	-0.002	0.0175***	-0.003	-0.0009	0.0164***	-0.0026	0.0533***	0.0495***	0.0353***
	[-0.0019]	[-0.005]	[-0.003]	[-0.0023]	[-0.006]	[-0.0029]	[-0.008]	[-0.009]	[-0.0113]
Construction	0.00776***	0.0122***	-0.005	0.0046	0.0493***	-0.0062	0.00937***	0.00908***	0.0655***
	[-0.0018]	[-0.002]	[-0.006]	[-0.0036]	[-0.009]	[-0.0064]	[-0.001]	[-0.001]	[-0.0171]
Retail & wholesale	0.220***	0.220***	0.202***	0.224***	0.227***	0.202***	0.167***	0.168***	0.183***
	[-0.0129]	[-0.015]	[-0.028]	[-0.0162]	[-0.019]	[-0.0338]	[-0.016]	[-0.019]	[-0.0193]
Transport & comm..	0.0592***	0.0620***	0.0447**	0.0573***	0.0646***	0.0425**	0.0656***	0.0602***	0.0874***
	[-0.0111]	[-0.015]	[-0.019]	[-0.0141]	[-0.021]	[-0.0216]	[-0.013]	[-0.014]	[-0.0164]
Fin. & bus. services	0.0868***	0.105***	0.0731***	0.0825***	0.0950***	0.0727***	0.121***	0.116***	0.142***
	[-0.0072]	[-0.009]	[-0.015]	[-0.0085]	[-0.01]	[-0.0166]	[-0.013]	[-0.014]	[-0.0247]
Constant	-0.109	-0.192*	-0.261	-0.146	-0.201	-0.227	-0.03	0.12	0.151
	[-0.0897]	[-0.113]	[-0.164]	[-0.126]	[-0.164]	[-0.209]	[-0.11]	[-0.139]	[-0.117]
Observations	1,478	1,044	434	1,013	678	335	465	366	99
R-squared	0.694	0.71	0.711	0.698	0.724	0.721	0.804	0.784	0.904

Statistical significance is indicated by p<0.*, p<.05** and p<0.01***. Country- and year fixed effects and coefficients for sector-size variables are not reported for brevity. Standard errors are heteroscedasticity robust.

Annex Table A1.6. Labour productivity and structural trade characteristics: Total sample

	I	II	III	IV	V	VI	VII	VIII	IX	XI	XII	XIII	XIV
lnGDPPC	1.441***	1.289***	1.455***	1.307***	1.620***	1.357***	1.284***	1.450***	1.309***	1.568***	1.511***	1.381***	1.497***
	[4.366]	[3.871]	[4.162]	[3.818]	[4.791]	[4.035]	[3.751]	[4.302]	[3.864]	[4.491]	[4.610]	[4.109]	[4.491]
EXP	0.800***	0.469	0.756***	0.770***	0.736**	0.868***	0.802***	0.786**	0.761**	0.876***	0.804***	0.748***	0.796***
	[2.706]	[1.602]	[2.706]	[2.758]	[2.552]	[2.960]	[2.635]	[2.555]	[2.480]	[2.894]	[2.678]	[2.802]	[2.688]
REXPINT	-0.601**	-0.533	-0.651**	-0.549*	-0.595*	-0.599**	-0.628**	-0.647**	-0.571*	-0.574*	-0.556*	-0.584*	-0.585*
	[-2.002]	[-1.626]	[-2.079]	[-1.913]	[-1.955]	[-2.010]	[-2.091]	[-2.127]	[-1.895]	[-1.857]	[-1.843]	[-1.929]	[-1.950]
IMP	0.913***	0.833***	0.976***	0.962***	1.047***	0.843***	0.905***	0.957***	0.945***	0.871**	0.948***	0.945***	0.885***
	[2.833]	[2.884]	[3.513]	[2.925]	[3.363]	[2.900]	[2.776]	[2.879]	[2.901]	[2.517]	[2.880]	[2.902]	[2.750]
WITHIN	0.00259	0.00166	0.00556	0.00212	0.00259	0.00158	0.00302	0.00268	0.00325	0.00305	0.00246	0.00253	0.00255
	[0.527]	[0.366]	[1.198]	[0.460]	[0.595]	[0.308]	[0.595]	[0.524]	[0.685]	[0.645]	[0.508]	[0.534]	[0.518]
VA	0.713	1.612***	1.217**	0.607	1.085**	0.502	0.868*	0.757	0.834*	0.63	0.862*	0.751*	0.718
	[1.543]	[3.351]	[2.592]	[1.321]	[2.324]	[1.181]	[1.911]	[1.636]	[1.762]	[1.315]	[1.856]	[1.671]	[1.551]
INTFIN	-3.79E-06	-1.53E-06	-7.56E-07	-1.84E-06	-1.23E-05	-7.65E-06	-5.25E-06	-3.22E-06	-4.01E-06	-3.79E-06	-3.83E-06	-4.20E-06	-4.07E-06
	[-0.593]	[-0.238]	[-0.133]	[-0.297]	[-1.563]	[-1.070]	[-0.786]	[-0.484]	[-0.623]	[-0.623]	[-0.604]	[-0.690]	[-0.642]
IMPINT total		3.425***											
		[3.738]											
IMPINT 10t14			0.811***										
			[3.559]										
IMPINT 17t19				-1.184***									
				[-3.199]									
IMPINT 23					1.363***								
					[3.369]								
IMPINT 25						-1.555**							
						[-2.208]							
IMPINT 29							0.592*						
							[1.907]						
IMPINT 30								0.359*					
								[1.916]					
IMPINT 31									0.587*				
									[1.941]				
IMPINT 35										-0.540**			
										[-2.014]			
IMPINT 40t41											6.715***		
											[2.937]		
IMPINT 65t67												2.295**	
												[2.494]	
IMPINT 70													1.153**
													[2.199]
Constant	-2.923	-2.255	-3.466	-1.492	-4.955	-1.783	-1.823	-3.225	-2.04	-3.88	-3.75	-2.507	-3.438
	[-0.968]	[-0.746]	[-1.081]	[-0.476]	[-1.604]	[-0.572]	[-0.586]	[-1.047]	[-0.670]	[-1.224]	[-1.251]	[-0.817]	[-1.128]
Observations	359	359	359	359	359	359	359	359	359	359	359	359	359
R2	0.447	0.502	0.485	0.463	0.468	0.461	0.455	0.453	0.453	0.459	0.459	0.457	0.452
Adjusted R2	0.402	0.46	0.442	0.418	0.423	0.415	0.409	0.407	0.407	0.414	0.413	0.411	0.405
F test	6.896	7.015	7.361	7.233	6.696	6.85	7.037	6.483	6.551	6.916	8.119	6.94	6.7

Year fixed effects and country fixed effects are not reported. Statistical significance is indicated by p<0.1*, p<o.o5*** and p<0.01***.

Source: Authors' calculations.

Annex Table A1.6a. Labour productivity and structural trade characteristics: Low and Middle Income Countries

	I	II	III	IV	V	VI	VII	VIII	IX	XI	XII	XIII	XIV
lnGDPPC	1.820***	1.401***	1.625***	1.908***	1.991***	1.816***	1.331**	1.602***	1.109**	2.194***	1.732***	1.596***	2.080***
	[-0.479]	[-0.491]	[-0.506]	[-0.526]	[-0.488]	[-0.484]	[-0.559]	[-0.51]	[-0.556]	[-0.565]	[-0.441]	[-0.494]	[-0.515]
EXP	0.814**	0.683*	0.820**	0.724**	0.814**	0.817**	0.817**	0.811**	0.733*	0.854**	0.800**	0.681**	0.794**
	[-0.361]	[-0.358]	[-0.355]	[-0.343]	[-0.367]	[-0.358]	[-0.37]	[-0.376]	[-0.372]	[-0.376]	[-0.358]	[-0.29]	[-0.361]
REXPINT	1.610***	1.650***	1.580***	1.749***	1.650***	1.612***	1.560***	1.654***	1.621***	1.596***	1.626***	1.674***	1.599***
	[-0.499]	[-0.491]	[-0.447]	[-0.508]	[-0.487]	[-0.499]	[-0.483]	[-0.518]	[-0.501]	[-0.514]	[-0.516]	[-0.497]	[-0.49]
IMP	-0.620*	-0.759**	-0.589*	-0.525	-0.559	-0.599*	-0.711**	-0.824**	-0.604*	-0.547	-0.578*	-0.522	-0.598*
	[-0.342]	[-0.365]	[-0.347]	[-0.333]	[-0.345]	[-0.349]	[-0.351]	[-0.364]	[-0.334]	[-0.364]	[-0.344]	[-0.317]	[-0.341]
WITHIN	0.00596	0.00413	0.00952	0.00606	0.00428	0.00543	0.00857	0.00695	0.0116	0.00452	0.00659	0.00728	0.00602
	[-0.0106]	[-0.008]	[-0.00993]	[-0.00986]	[-0.00952]	[-0.0106]	[-0.0108]	[-0.0115]	[-0.00952]	[-0.0101]	[-0.0104]	[-0.00996]	[-0.0106]
VA	0.0708	1.227**	0.637	-0.255	0.266	0.0115	0.343	0.148	0.397	-0.0787	0.143	0.149	0.0711
	[-0.552]	[-0.576]	[-0.565]	[-0.587]	[-0.56]	[-0.575]	[-0.545]	[-0.551]	[-0.572]	[-0.575]	[-0.557]	[-0.516]	[-0.554]
INTFIN	-2.90E-06	1.40E-06	6.36E-07	-4.61E-07	-1.35E-05	-4.08E-06	-5.17E-06	-2.03E-06	-2.74E-06	-3.21E-06	-2.68E-06	-3.48E-06	-3.57E-06
	[-6.85E-1]	[-7.29E-1]	[-5.92E-1]	[-6.09E-1]	[-8.54E-1]	[-8.51E-1]	[-7.11E-1]	[-7.04E-1]	[-7.12E-1]	[-6.77E-1]	[-6.84E-1]	[-6.32E-1]	[-6.83E-1]
IMPINT total		4.517***											
		[-1.169]											
IMPINT 10t14			0.921**										
			[-0.423]										
IMPINT 17t19				-1.684***									
				[-0.62]									
IMPINT 23					1.315**								
					[-0.643]								
IMPINT 25						-0.393							
						[-0.911]							
IMPINT 29							0.829**						
							[-0.386]						
IMPINT 30								0.589**					
								[-0.258]					
IMPINT 31									1.336***				
									[-0.444]				
IMPINT 35										-0.631*			
										[-0.363]			
IMPINT 40t41											13.57***		
											[-4.062]		
IMPINT 65t67												4.343**	
												[-1.694]	
IMPINT 70													1.241**
													[-0.597]
Constant	-6.116	-3.259	-4.794	-6.545	-7.972*	-5.981	-2.133	-4.472	-0.376	-9.271*	-5.551	-4.308	-8.491*
	[-4.38]	[-4.432]	[-4.631]	[-4.779]	[-4.483]	[-4.443]	[-5.021]	[-4.617]	[-4.905]	[-5.105]	[-4.019]	[-4.48]	[-4.707]
Observations	179	179	179	179	179	179	179	179	179	179	179	179	179
R-squared	0.325	0.403	0.36	0.346	0.337	0.326	0.345	0.345	0.354	0.345	0.347	0.35	0.332

Annex Table A1.6b. Labour productivity and structural trade characteristics: High Income Countries

	I	II	III	IV	V	VI	VII	VIII	IX	XI	XII	XIII	XIV
lnGDPPC	0.0704	0.0138	0.648	-0.587	-0.782	0.717	0.0404	0.0673	-0.0828	0.121	0.0987	-0.143	-0.172
	[-0.658]	[-0.695]	[-0.731]	[-0.734]	[-0.813]	[-0.71]	[-0.699]	[-0.659]	[-0.769]	[-0.707]	[-0.611]	[-0.712]	[-0.721]
EXP	0.897*	-0.05	0.712	0.986**	0.627	1.287***	0.899*	0.897*	0.908*	1.104**	0.978*	0.890*	0.940*
	[-0.533]	[-0.676]	[-0.528]	[-0.416]	[-0.521]	[-0.482]	[-0.536]	[-0.536]	[-0.528]	[-0.488]	[-0.517]	[-0.509]	[-0.521]
REXPINT	0.653	0.561	0.761**	0.695	0.902**	0.423	0.652	0.654	0.642	0.594	0.707*	0.668	0.593
	[-0.412]	[-0.345]	[-0.356]	[-0.42]	[-0.399]	[-0.281]	[-0.419]	[-0.411]	[-0.426]	[-0.47]	[-0.418]	[-0.415]	[-0.421]
IMP	-0.574	-0.287	-0.662	-0.52	-0.536	-0.760*	-0.574	-0.573	-0.585	-0.589	-0.508	-0.58	-0.567
	[-0.415]	[-0.439]	[-0.419]	[-0.374]	[-0.372]	[-0.417]	[-0.417]	[-0.417]	[-0.402]	[-0.406]	[-0.412]	[-0.411]	[-0.416]
WITHIN	-0.00207	-0.00344	0.000311	-0.00304	-0.00123	-0.00328	-0.00211	-0.00207	-0.00198	-0.00057	-0.00249	-0.00233	-0.00224
	[-0.00436]	[-0.0044]	[-0.00349]	[-0.00354]	[-0.00371]	[-0.00465]	[-0.00443]	[-0.00437]	[-0.00448]	[-0.00421]	[-0.00437]	[-0.00404]	[-0.00428]
VA	1.438*	2.142**	1.851**	1.535*	2.129**	1.102*	1.459*	1.441*	1.405	1.429*	1.757**	1.467*	1.451*
	[-0.831]	[-0.844]	[-0.825]	[-0.773]	[-0.804]	[-0.645]	[-0.822]	[-0.823]	[-0.859]	[-0.823]	[-0.818]	[-0.807]	[-0.821]
INTFIN	1.55E-05	2.22E-05	1.80E-05	1.77E-05	2.61E-05	2.17E-05	1.59E-05	1.56E-05	1.57E-05	1.42E-05	1.45E-05	1.54E-05	1.63E-05
	[-2.4E-05]	[-1.7E-05]	[-2.3E-05]	[-2.4E-05]	[-2.3E-05]	[-2.6E-05]	[-2.5E-05]	[-2.5E-05]	[-2.4E-05]	[-2.1E-05]	[-2.4E-05]	[-2.3E-05]	[-2.35E-05
]IMPINT total		3.426***											
		[-1.201]											
IMPINT 10t14			0.751**										
			[-0.284]										
IMPINT 17t19				-1.306***									
				[-0.469]									
IMPINT 23					1.763***								
					[-0.439]								
IMPINT 25						-2.854***							
						[-0.882]							
IMPINT 29							0.0842						
							[-0.698]						
IMPINT 30								0.0127					
								[-0.249]					
IMPINT 31									-0.168				
									[-0.458]				
IMPINT 35										-0.566			
										[-0.433]			
IMPINT 40t41											5.996*		
											[-3.063]		
IMPINT 65t67												1.269	
												[-1.194]	
IMPINT 70													1.737
													[-1.101]
Constant	9.284	8.925	2.978	16.67**	16.78**	4.07	9.547	9.305	10.93	8.836	8.644	11.36	11.75
	[-6.778]	[-7.054]	[-7.475]	[-7.681]	[-8.19]	[-7.31]	[-7.12]	[-6.793]	[-8.105]	[-7.265]	[-6.277]	[-7.372]	[-7.437]
Observations	180	180	180	180	180	180	180	180	180	180	180	180	180
R-squared	0.193	0.307	0.281	0.247	0.288	0.308	0.193	0.193	0.194	0.214	0.224	0.202	0.208

Annex Table A1.7. Imported intermediates ratios by country and supplying ISIC sector

	USA	NLD	DNK	JPN	SWE	FRA	ITA	ESP	KOR	MEX	ARG	TUR	ZAF	CHL	BRA	THA	IDN	CHN	IND
Sector 01t05	0.07	0.15	0.28	0.09	0.18	0.08	0.16	0.06	0.08	0.22	0.35	0.06	0.04	0.08	0.02	0.03	0.01	0.05	0.01
Sector 10t14	0.18	0.47	0.33	0.48	0.48	0.42	0.27	0.37	0.28	0.16	0.33	0.39	0.20	0.19	0.11	0.18	0.17	0.08	0.28
Sector 15t16	0.04	0.19	0.50	0.07	0.19	0.17	0.09	0.03	0.08	0.04	0.23	0.05	0.03	0.08	0.02	0.05	0.03	0.05	0.06
Sector 17t19	0.20	0.63	0.61	0.20	0.81	0.46	0.08	0.08	0.08	0.19	0.08	0.05	0.17	0.23	0.06	0.04	0.18	0.11	0.03
Sector 20	0.15	0.36	0.38	0.15	0.14	0.21	0.20	0.09	0.08	0.25	0.48	0.07	0.11	0.06	0.04	0.11	0.02	0.11	0.01
Sector 21t22	0.04	0.27	0.24	0.02	0.15	0.19	0.06	0.05	0.07	0.25	0.06	0.14	0.06	0.15	0.03	0.13	0.07	0.09	0.15
Sector 23	0.12	0.27	0.53	0.10	0.55	0.24	0.17	0.27	0.14	0.11	0.08	0.15	0.10	0.28	0.10	0.11	0.35	0.08	0.21
Sector 24	0.17	0.50	0.57	0.09	0.60	0.46	0.25	0.28	0.13	0.34	0.19	0.32	0.15	0.40	0.18	0.53	0.30	0.18	0.09
Sector 25	0.12	0.66	0.46	0.05	0.60	0.28	0.08	0.18	0.04	0.54	0.11	0.13	0.15	0.31	0.09	0.38	0.08	0.05	0.03
Sector 26	0.14	0.34	0.49	0.08	0.37	0.21	0.07	0.08	0.13	0.17	0.27	0.07	0.11	0.20	0.04	0.09	0.09	0.02	0.12
Sector 27	0.20	0.47	0.56	0.08	0.50	0.49	0.20	0.26	0.17	0.21	0.65	0.21	0.11	0.20	0.10	0.77	0.25	0.10	0.04
Sector 28	0.12	0.26	0.15	0.05	0.29	0.15	0.07	0.11	0.10	0.57	0.26	0.16	0.13	0.27	0.05	0.47	0.27	0.08	0.04
Sector 29	0.27	0.40	0.39	0.05	0.51	0.49	0.15	0.35	0.19	0.58	0.36	0.42	0.25	0.67	0.18	0.15	0.50	0.12	0.29
Sector 30	0.43	0.81	0.72	0.04	0.86	0.80	0.27	0.63	0.20	0.61	0.67	0.66	0.32	0.00	0.47	0.14	0.52	0.37	0.05
Sector 31	0.33	0.56	0.39	0.12	0.68	0.41	0.14	0.33	0.14	0.71	0.37	0.27	0.28	0.77	0.17	0.23	0.19	0.33	0.10
Sector 32	0.22	0.55	0.64	0.05	0.36	0.51	0.27	0.58	0.18	0.00	0.62	0.25	0.39	0.00	0.41	0.11	0.43	0.40	0.11
Sector 33	0.11	0.46	0.48	0.18	0.52	0.33	0.26	0.36	0.32	0.00	0.55	0.48	0.33	0.00	0.18	0.13	0.44	0.52	0.03
Sector 34	0.27	0.37	0.37	0.02	0.26	0.41	0.16	0.10	0.03	0.56	0.47	0.31	0.30	0.42	0.08	0.12	0.20	0.06	0.08
Sector 35	0.15	0.40	0.24	0.08	0.41	0.29	0.12	0.29	0.19	0.00	0.29	0.27	0.21	0.00	0.18	0.12	0.37	0.06	0.11
Sector 36t37	0.23	0.23	0.40	0.08	0.35	0.25	0.08	0.08	0.08	0.28	0.20	0.27	0.17	0.24	0.05	0.13	0.25	0.12	0.45
Sector 40t41	0.01	0.01	0.03	0.00	0.03	0.00	0.03	0.01	0.00	0.00	0.01	0.01	0.01	0.00	0.02	0.00	0.00	0.00	0.00
Sector 45	0.00	0.01	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.30	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Sector 50t52	0.00	0.07	0.03	0.01	0.02	0.04	0.07	0.01	0.03	0.00	0.00	0.01	0.00	0.05	0.02	0.00	0.00	0.00	0.00
Sector 55	0.00	0.38	0.00	0.00	0.01	0.00	0.15	0.04	0.01	0.01	0.00	0.03	0.12	0.01	0.06	0.00	0.16	0.04	0.05
Sector 60t63	0.03	0.10	0.20	0.05	0.15	0.11	0.07	0.10	0.14	0.00	0.02	0.09	0.12	0.09	0.02	0.00	0.18	0.02	0.03
Sector 64	0.00	0.08	0.07	0.01	0.07	0.02	0.04	0.03	0.02	0.02	0.02	0.04	0.06	0.03	0.03	0.00	0.07	0.01	0.01
Sector 65t67	0.01	0.09	0.08	0.01	0.10	0.04	0.07	0.05	0.04	0.12	0.04	0.04	0.02	0.07	0.02	0.00	0.13	0.03	0.02
Sector 70	0.00	0.01	0.00	0.00	0.00	0.00	0.12	0.00	0.03	0.00	0.00	0.01	0.00	0.00	0.11	0.00	0.00	0.00	0.02
Sector 71	0.00	0.18	0.06	0.01	0.14	0.00	0.20	0.11	0.11	0.04	0.00	0.00	0.00	0.00	0.34	0.00	0.17	0.00	0.00
Sector 72	0.00	0.13	0.11	0.02	0.09	0.02	0.03	0.02	0.06	0.00	0.00	0.02	0.00	0.00	0.10	0.00	0.18	0.00	0.45
Sector 73	0.01	0.44	0.23	0.01	0.24	0.05	0.06	0.32	0.08	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.17	0.00	0.00
Sector 74	0.00	0.20	0.09	0.03	0.24	0.07	0.12	0.17	0.06	0.06	0.04	0.01	0.05	0.04	0.09	0.00	0.35	0.04	0.27
Sector 75	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.12	0.00	0.00
Sector 80	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.04	0.00	0.10	0.00	0.00
Sector 85	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.04	0.00	0.02	0.00	0.00
Sector 90t93	0.00	0.02	0.24	0.02	0.03	0.05	0.05	0.07	0.01	0.00	0.01	0.07	0.04	0.02	0.03	0.00	0.08	0.03	0.18
Sector _total	0.09	0.23	0.24	0.07	0.24	0.16	0.13	0.15	0.16	0.17	0.06	0.14	0.10	0.17	0.07	0.16	0.16	0.08	0.10

Note: Countries are ordered by GDP per capita and original ordering of ISIC Rev 3. sectors is preserved. The shading denotes the size of the ratio with darker colours assigned to higher ratios.

Source: Authors' calculations.

Annex Table A1.8. Regression results: Labour productivity and structural trade characteristics in *Agriculture*, controlling for development levels

	I	II	III	IV	V	VI	VII
lnGDPPC	0.912***	0.921***	0.842***	0.940***	0.927***	0.924***	0.954***
	[5.891]	[6.400]	[4.822]	[6.286]	[6.697]	[6.100]	[5.740]
EXP	1.395	1.524**	1.911**	1.345*	1.556**	1.522*	1.332
	[1.630]	[2.292]	[2.716]	[1.785]	[2.568]	[2.070]	[1.517]
REXPINT	-0.686	-0.849	-0.605	-0.995	-0.966	-0.657	-0.647
	[-0.863]	[-1.118]	[-0.854]	[-1.261]	[-1.308]	[-0.794]	[-0.796]
IMP	1.222	0.507	1.982	0.272	0.603	0.937	0.842
	[0.583]	[0.235]	[0.916]	[0.123]	[0.278]	[0.478]	[0.396]
WITHIN	0.000	0.000	-0.001	-0.001	0.000	-0.001	0.001
	[-0.0310]	[-0.189]	[-0.386]	[-0.403]	[-0.208]	[-0.439]	[0.523]
VA	-0.128	0.184	-0.343	0.163	-0.173	0.371	0.055
	[-0.150]	[0.249]	[-0.359]	[0.247]	[-0.272]	[0.442]	[0.0710]
INTFIN	-0.028	-0.026	-0.033	-0.025	-0.024	-0.029	-0.031
	[-1.156]	[-1.158]	[-1.246]	[-1.082]	[-1.100]	[-1.251]	[-1.424]
IMPINT total		2.563					
		[1.595]					
IMPINT 10t14			-0.631*				
			[-1.990]				
IMPINT 17t19				0.600**			
				[2.194]			
IMPINT 23					1.107**		
					[2.492]		
IMPINT 31						0.650*	
						[1.953]	
IMPINT 32							0.398**
							[2.248]
IMPINT 33							
IMPINT 36t37							
Constant	0.822	0.382	1.604	0.333	0.597	0.320	0.294
	[0.502]	[0.273]	[0.831]	[0.221]	[0.433]	[0.198]	[0.169]
Observations	49.000	49.000	49.000	49.000	49.000	49.000	49.000
R^2	0.901	0.912	0.907	0.910	0.919	0.910	0.906
Adjusted R^2	0.879	0.889	0.882	0.887	0.898	0.886	0.881
F test	67.390	50.050	87.640	70.670	83.070	61.660	63.620

Statistical significance is indicated by p<0.*, p<.05** and p<0.01***. Country- and year fixed effects are not reported for brevity. Standard errors are heteroscedasticity robust (clustered around country-sectors).

Source: Authors' calculations.

Annex Table A1.8. Regression results: labour productivity and structural trade characteristics in *Agriculture,* controlling for development levels (continued)

	I	II	III	IV	V	VI	VII
lnGDPPC	0.856***	0.846***	0.990***	0.913***	0.794***	0.903***	0.889***
	[5.725]	[5.444]	[6.573]	[5.814]	[4.404]	[6.109]	[5.355]
EXP	1.663**	1.599*	2.089**	0.776	2.104**	1.649**	1.566**
	[2.261]	[1.963]	[2.537]	[1.167]	[2.475]	[2.317]	[2.446]
REXPINT	-0.606	-1.101	-0.818	0.170	-1.002	-0.814	-0.892
	[-0.943]	[-1.301]	[-1.015]	[0.219]	[-1.182]	[-1.148]	[-1.051]
IMP	1.867	2.214	0.139	0.086	2.934	0.649	0.761
	[0.890]	[0.971]	[0.0552]	[0.0402]	[1.163]	[0.329]	[0.366]
WITHIN	0.001	0.000	-0.001	0.000	-0.001	-0.001	-0.002
	[0.285]	[-0.172]	[-0.355]	[-0.00826]	[-0.422]	[-0.469]	[-0.762]
VA	-0.412	-0.209	0.961	-0.054	-0.074	-0.139	-0.623
	[-0.545]	[-0.260]	[0.900]	[-0.0614]	[-0.0822]	[-0.182]	[-0.653]
INTFIN	-0.031	-0.027	-0.020	-0.023	-0.034	-0.028	-0.025
	[-1.371]	[-1.226]	[-0.904]	[-1.135]	[-1.515]	[-1.192]	[-1.076]
IMPINT 33	-0.612**						
	[-2.741]						
IMPINT 36t37		0.730**					
		[2.153]					
IMPINT 40t41			10.44*				
			[1.790]				
IMPINT 50t52				10.29*			
				[2.087]			
IMPINT 55					-1.633*		
					[-2.055]		
IMPINT 60t63						1.503*	
						[1.809]	
IMPINT 65t67							5.569**
							[2.376]
Constant	1.514	1.296	-0.578	0.788	1.791	0.883	1.218
	[0.992]	[0.823]	[-0.358]	[0.492]	[1.022]	[0.583]	[0.665]
Observations	49.000	49.000	49.000	49.000	49.000	49.000	49.000
R^2	0.913	0.913	0.911	0.912	0.910	0.912	0.920
Adjusted R^2	0.890	0.890	0.888	0.889	0.886	0.889	0.899
F test	87.860	72.990	64.860	66.590	136.900	58.750	72.320

Statistical significance is indicated by p<0.*, p<.05** and p<0.01***. Country- and year fixed effects are not reported for brevity. Standard errors are heteroscedasticity robust (clustered around country-sectors).

Source: Authors' calculations.

Annex Table A1.9. Regression results: labour productivity and structural trade characteristics in *Manufacturing*, controlling for development levels

	I	II	III	IV	V	VII	VIII
lnGDPPC	0.613***	0.613***	0.678***	0.624***	0.588***	0.609***	0.595***
	[8.671]	[8.546]	[9.499]	[10.98]	[9.397]	[8.179]	[9.835]
EXP	-0.528	-0.573	-0.408	-0.186	-0.0735	-0.346	-0.419
	[-0.893]	[-0.822]	[-0.924]	[-0.263]	[-0.122]	[-0.637]	[-0.795]
REXPINT	0.105	0.136	0.332	-0.0723	-0.0953	0.118	-0.0466
	[0.367]	[0.385]	[1.370]	[-0.212]	[-0.312]	[0.437]	[-0.197]
IMP	0.474	0.274	0.679	1.546	0.967	0.442	0.737
	[0.641]	[0.164]	[1.040]	[1.619]	[1.269]	[0.657]	[1.050]
WITHIN	-0.0161	-0.0158	-0.0179	-0.0133	-0.0202	-0.0264**	-0.0166**
	[-1.413]	[-1.402]	[-1.289]	[-1.246]	[-1.625]	[-2.809]	[-2.105]
VA	0.558	0.622	0.638	0.423	0.214	0.901	0.0332
	[0.379]	[0.415]	[0.482]	[0.341]	[0.161]	[0.674]	[0.0257]
INTFIN	0.0413	0.0383	0.0749	0.0445	0.000859	0.0484	0.00844
	[0.568]	[0.547]	[1.218]	[0.673]	[0.0122]	[0.707]	[0.121]
IMPINT total		0.223					
		[0.145]					
IMPINT 20			-0.815*				
			[-1.781]				
IMPINT 25				-0.795*			
				[-1.748]			
IMPINT 26					-0.846*		
					[-1.981]		
IMPINT 65t67						-1.588**	
						[-2.470]	
IMPINT 90t93							-1.696***
							[-4.974]
Constant	4.465***	4.455***	3.851***	4.269***	4.847***	4.415***	4.819***
	[5.264]	[5.116]	[5.284]	[5.150]	[6.249]	[5.143]	[6.911]
Observations	49	49	49	49	49	49	49
R^2	0.871	0.872	0.886	0.882	0.884	0.883	0.898
Adjusted R^2	0.842	0.838	0.855	0.851	0.854	0.853	0.871
F test	46.14	45.83	49.97	52.81	81.59	26.37	58.36

Statistical significance is indicated by p<0.*, p<.05** and p<0.01***. Country- and year fixed effects are not reported for brevity. Standard errors are heteroscedasticity robust (clustered around country-sectors).

Source: Authors' calculations.

Annex Table A1.10. Regression results: labour productivity and structural trade characteristics in *Financial and business services*, controlling for development levels

	I	II	III	IV	V	VI
lnGDPPC	0.147	-3.064**	-0.171	0.595	-0.139	0.835
	[0.105]	[-2.208]	[-0.128]	[0.463]	[-0.0933]	[0.554]
EXP	0.13	0.299	-0.512	0.311	-1.084	1.347
	[0.0604]	[0.127]	[-0.214]	[0.161]	[-0.658]	[0.661]
REXPINT	0.991	-5.083	1.119	-2.766	-0.0158	-3.827
	[0.396]	[-1.079]	[0.456]	[-0.931]	[-0.00547]	[-1.221]
IMP	0.0306*	0.0306**	0.0273*	0.0263*	0.0275	0.0249*
	[2.016]	[2.243]	[1.820]	[1.772]	[1.718]	[1.967]
WITHIN	-3.710***	-1.785*	-3.420**	-3.234***	-3.335***	-3.993***
	[-3.225]	[-1.965]	[-2.825]	[-3.009]	[-3.097]	[-3.387]
VA	-0.00344	-0.00451	-0.00918	0.00331	0.00276	0.0188
	[-0.147]	[-0.273]	[-0.358]	[0.144]	[0.111]	[0.909]
INTFIN		9.021*				
		[1.954]				
IMPINT total			-1.214*			
			[-2.067]			
IMPINT 29				1.121**		
				[2.542]		
IMPINT 30					0.735**	
					[2.436]	
IMPINT 60t63						3.243**
						[2.642]
Constant	13.67***	10.55***	13.01***	13.06***	13.64***	13.66***
	[9.696]	[8.252]	[9.019]	[9.950]	[12.03]	[9.453]
Observations	42	42	42	42	42	42
R^2	0.375	0.481	0.408	0.467	0.502	0.511
Adjusted R^2	0.199	0.313	0.217	0.295	0.341	0.353
F test	4.929	21.53	4.931	61.12	8.417	13.49

Statistical significance is indicated by p<0.*, p<.05** and p<0.01***. Country- and year fixed effects are not reported for brevity. Standard errors are heteroscedasticity robust (clustered around country-sectors).

Source: Authors' calculations.

Annex Table A1.11. Regression results: labour productivity and structural trade characteristics in *Wholesale and retail trade,* controlling for development levels

	I	II	III	IV	V
lnGDPPC	0.598***	0.637***	0.399***	0.470***	0.465***
	[5.886]	[4.812]	[3.553]	[4.761]	[5.002]
EXP	2.732	4.258	0.145	1.918	1.524
	[0.983]	[1.151]	[0.0830]	[0.927]	[0.794]
REXPINT	0.438***	0.415**	0.627***	0.256	0.294*
	[3.234]	[2.598]	[3.419]	[1.465]	[1.833]
IMP	-9.64	-10.24	-15.71	-5.482	-6.112
	[-1.215]	[-1.254]	[-1.670]	[-0.884]	[-1.031]
WITHIN	0.0321	0.0398	-0.0127	0.0582	0.0771
	[0.389]	[0.489]	[-0.178]	[0.603]	[0.764]
VA	0.39	0.457	-1.002	-0.374	-0.586
	[0.262]	[0.299]	[-0.773]	[-0.227]	[-0.362]
INTFIN	-2.25E-06	-2.16E-06	-3.80E-06	-6.56E-06	-7.74e-06*
	[-0.644]	[-0.585]	[-1.021]	[-1.617]	[-1.999]
IMPINT total		-1.908			
		[-0.984]			
IMPINT 15t16			3.553*		
			[2.128]		
IMPINT 80				-6.849*	
				[-1.996]	
IMPINT 85					-8.859***
					[-3.510]
Constant	4.059***	3.706***	6.747***	5.792***	6.038***
	[4.168]	[3.148]	[5.631]	[3.746]	[4.035]
Observations	34	34	34	34	34
R^2	0.659	0.67	0.719	0.747	0.774
Adjusted R^2	0.532	0.526	0.596	0.637	0.676
F test	46.31	34.2	19.45	38.63	523.1

Statistical significance is indicated by p<0.*, p<.05** and p<0.01***. Country- and year fixed effects are not reported for brevity. Standard errors are heteroscedasticity robust (clustered around country-sectors).

Source: Authors' calculations.

Annex Table A1.12. Regression results: labour productivity and structural trade characteristics in *Transport and communication,* controlling for development levels

	I	II	III	IV	V	VI	VII	VIII	IX
lnGDPPC	0.628***	0.623***	0.668***	0.626***	0.663***	0.630***	0.586***	0.602***	0.626***
	[5.938]	[5.776]	[8.061]	[6.875]	[7.559]	[5.907]	[6.273]	[6.232]	[6.325]
EXP	0.894	1.169	0.192	0.834*	0.866*	0.771	0.703	0.84	0.77
	[1.340]	[1.345]	[0.444]	[1.979]	[1.780]	[1.181]	[1.197]	[1.320]	[1.341]
REXPINT	1.619	1.372	1.46	0.987	1.167	1.569	1.449	1.569	1.824
	[1.136]	[0.940]	[0.996]	[0.823]	[0.868]	[1.170]	[1.081]	[1.053]	[1.243]
IMP	-2.545	-1.501	-2.658*	-3.358*	-3.054*	-2.52	-2.171	-2.846	-3.538
	[-1.278]	[-0.508]	[-1.745]	[-2.016]	[-1.883]	[-1.246]	[-1.414]	[-1.510]	[-1.719]
WITHIN	-0.0782	-0.0752	-0.0915	-0.0697	-0.0753	-0.0409	-0.0702	-0.0659	-0.0912
	[-1.118]	[-1.093]	[-1.299]	[-1.068]	[-1.063]	[-0.709]	[-1.098]	[-0.987]	[-1.358]
VA	0.801	0.671	1.026	0.347	1.228	0.813	0.42	0.428	1.236
	[0.607]	[0.510]	[0.792]	[0.303]	[1.122]	[0.586]	[0.318]	[0.333]	[0.931]
INTFIN	-0.00285	-0.00208	-0.00415*	-0.00505**	-0.000447	-0.00308	-0.00329*	-0.00342	-0.000764
	[-1.221]	[-0.825]	[-1.800]	[-2.332]	[-0.200]	[-1.330]	[-1.812]	[-1.573]	[-0.320]
IMPINT total		-0.835							
		[-0.569]							
IMPINT 21t22			1.859*						
			[1.773]						
IMPINT 34				0.592***					
				[2.938]					
IMPINT 36t37					0.645*				
					[2.103]				
IMPINT 70						-1.302**			
						[-2.552]			
IMPINT 80							-2.856*		
							[-2.025]		
IMPINT 85								-3.718**	
								[-2.549]	
IMPINT 90t93									0.677*
									[1.772]
Constant	4.188***	4.314***	3.677***	4.436***	3.464***	4.175**	4.828***	4.702***	4.002**
	[2.939]	[2.968]	[3.187]	[3.593]	[3.066]	[2.878]	[3.635]	[3.570]	[2.799]
Observations	45	45	45	45	45	45	45	45	45
R^2	0.81	0.812	0.829	0.844	0.84	0.825	0.834	0.83	0.825
Adjusted R^2	0.761	0.757	0.779	0.798	0.793	0.774	0.785	0.781	0.773
F test	32.35	23.28	49.26	24.14	15.93	15.95	91.54	55.77	27.64

Statistical significance is indicated by p<0.*, p<.05** and p<0.01***. Country- and year fixed effects are not reported for brevity. Standard errors are heteroscedasticity robust (clustered around country-sectors).

Source: Authors' calculations.