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MANUFACTURING FIRST

Europe Should Do More to Promote Industrialization in Developing Countries

GIORGIO **PRESIDENTE**, GUGLIELMO **MACCARIO**

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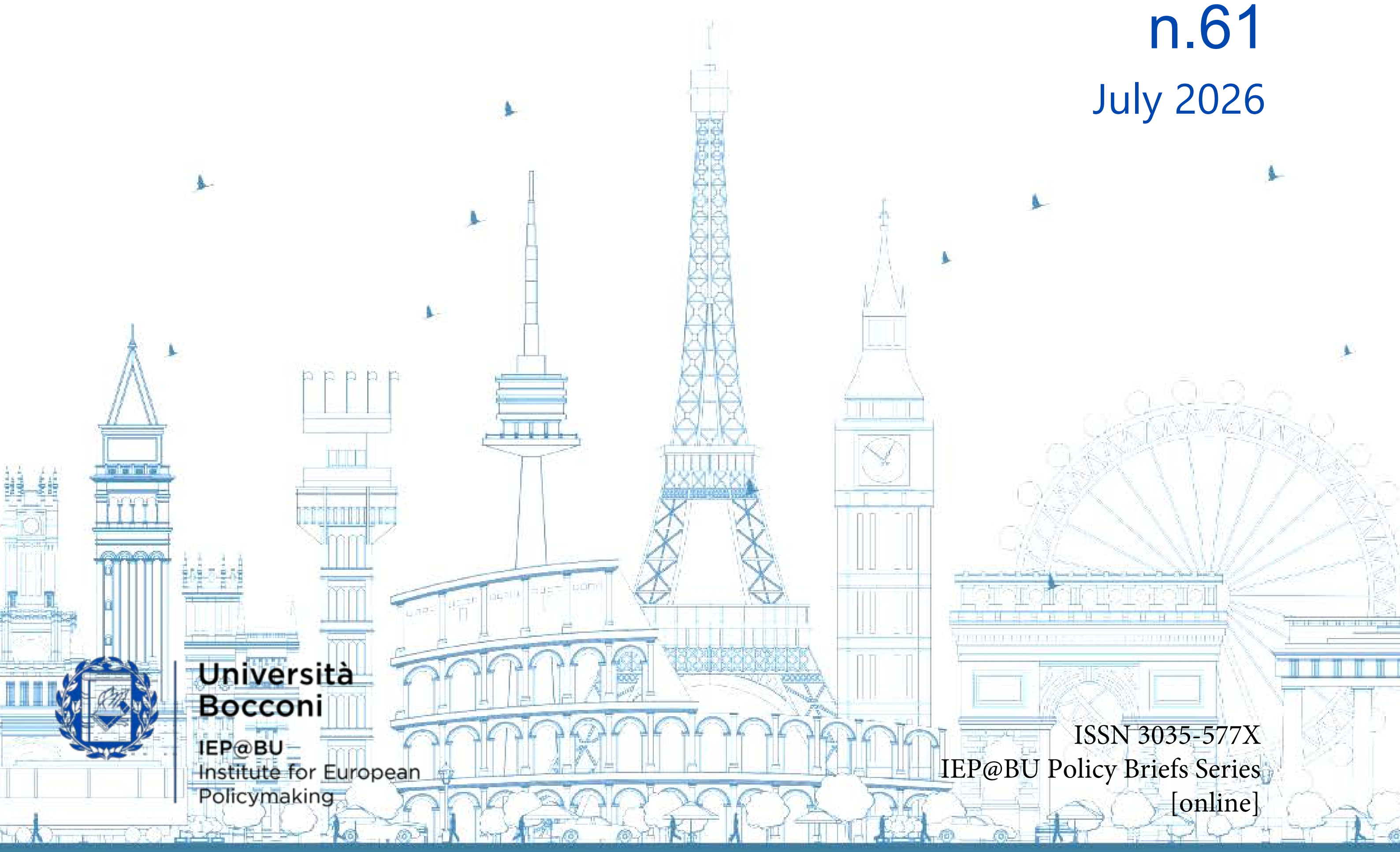

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Executive Summary

Promoting industrialization in the Global South would create new markets for EU producers, help diversify supply chains, reduce migration pressures, and strengthen EU soft power.

The European Commission has allocated €80 billion to development aid, neighbourhood policy, and international cooperation - almost as much as to Horizon Europe, its flagship research and innovation program.

Yet only a small share of these resources is devoted to fostering industrial development. Existing instruments, such as the European Fund for Sustainable Development Plus, could be redirected to incentivize the adoption of productivity-enhancing industrial technologies.

We propose a simple methodology to identify concrete cooperation opportunities that would mutually benefit the EU and partner countries.

Manufacturing development as an engine of growth and stability

Technological progress is a central driver of economic growth and development. It has allowed living standards to improve dramatically since the Industrial Revolution. Productivity growth is typically higher in manufacturing than in agriculture and non-ICT services; this raises wages and creates jobs, expands demand for products and services in upstream industries, and supports broader economic development. Industrialization has also had wider institutional effects. The labor movement that emerged from industrialization played a key role in pushing for broader voting rights and ultimately contributed to the rise of the welfare state, the creation of the middle class, and the advancement of democracy (Acemoglu and Robinson, 2009).

Four reasons to care about development

The European Union has at least four economic reasons to promote industrialization in developing countries. First, as these countries industrialize, they become more stable and prosperous, creating new markets for European exports and investment.

Second, their development can help diversify European supply chains, making them more resilient and less dependent on any single region. This is especially valuable in the context of geopolitical tensions and the fragmentation and increasing weaponization of international trade.

Third, supporting industrialization in the Global South can help the EU preserve influence and soft power in a world where other powers, including China, are expanding their reach.

Fourth, when people have access to jobs and higher living standards at home, the pressures that drive migration to Europe - such as poverty and lack of opportunity - are reduced.

EU policy tools to foster third countries' industrialization

The European Union already devotes substantial resources to supporting development and industrialization in the Global South. The Neighbourhood, Development and International Cooperation Instrument - Global Europe (NDICI) has a budget of €80 billion for 2021-2027.

This is close to the budget of Horizon Europe, the EU's flagship research and innovation program, which amounts to roughly €90 billion over the same period.

In principle, NDICI could provide incentives for industrial technology adoption, for instance through the European Fund for Sustainable Development Plus (EFSD+), its financial arm for blended finance and guarantees to de-risk private investment. These tools operate similarly to investment subsidies by reducing capital risk and cost, making investments in advanced manufacturing technologies more financially viable.

Few existing programs promote industrialization in third countries

At present, however, little emphasis appears to be placed on manufacturing, as suggested by the list of currently active programs. Some of these are funded by NDICI and are related to digital technology, but they are designed to promote adoption in the services sector.

Some service sectors, such as IT, are productive and tradable, but they require a highly skilled workforce that developing countries may not have. Other service industries may lack technological dynamism or are non-tradable, which limits their growth potential because they depend on domestic demand (Rodrik, 2016). It is therefore unclear whether promoting services alone can generate productivity gains, employment creation, and stability that developing countries need.

A few identifiable examples of manufacturing-focused technological upgrading do exist. These are implemented through loans, local financial intermediaries, and EU-funded grant incentives that support SME modernization and technological upgrading in neighboring economies.[1] Nevertheless, these interventions remain fragmented and limited in scale, rather than forming part of a broader EU strategy for industrial upgrading and manufacturing capability development in partner countries.

All such the projects involve Computer Numerical Control (CNC) technologies - automated machine tools controlled by computer programs to perform precise manufacturing operations. The adoption of CNC systems can greatly increase productivity in a variety of industrial settings. Yet they are relatively modular and do not typically involve large upfront costs that would clearly justify public support.

While the set of technologies that can boost productivity in manufacturing is large, we focus on industrial robots as a case study, because they often require large initial investments that constitute a key barrier to adoption that policy can help undertake

Robots for economic development?

Calì and Presidente (2025) find that, contrary to concerns about premature deindustrialization (Rodrik, 2016), the adoption of industrial robots in Indonesia, a large developing country, generated

[1] Examples include SANPLAST LLC in Armenia, which received support through the EU4Business-EBRD SME Competitiveness Credit Line to acquire milling and turning machines aimed at upgrading precision metalworking capabilities; in Bosnia and Herzegovina, the manufacturer GAT adopted a numerically-controlled lathe under the EBRD-EU "Go Digital" programme, enabling autonomous night operation and greater production automation; in Ukraine, ARM-EKO and Ardenz invested in advanced laser-cutting systems for the production of industrial equipment, elevator components, boilers, and metal containers through EU4Business-EBRD credit facilities, while AGROFIRMA EVRIKA modernised food-processing operations through automated sterilisation and palletising equipment; similar projects supported automated production lines in construction materials manufacturing (IM Roofart SRL) and furniture production (Dragos SRL) in Moldova.

strong productivity and employment gains. These results contrast with evidence from advanced economies with mature industrial sectors (e.g. Acemoglu and Restrepo, 2020; Dauth et al., 2019; Koch et al., 2021).

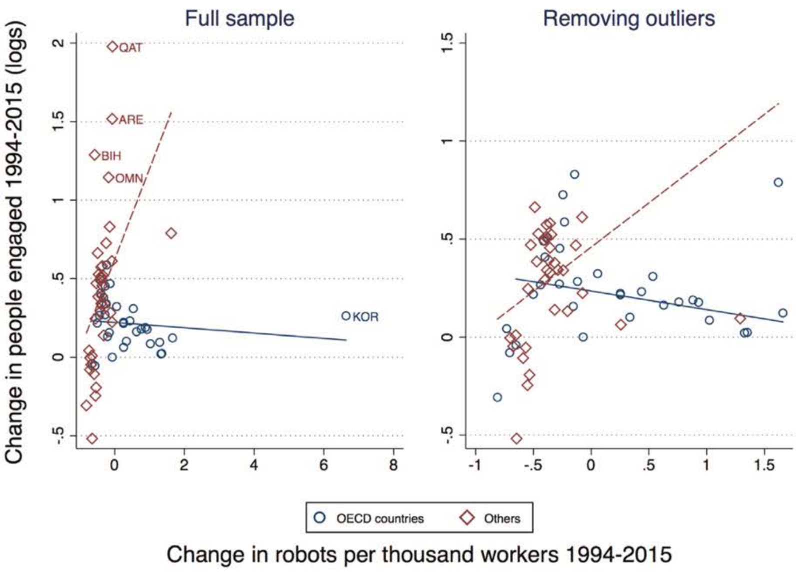
The authors argue that this difference reflects diminishing productivity returns to industrial robots. Core manufacturing tasks - such as assembly line work, material handling, and simple machine operations - are typically automated first because they are easier to mechanize and yield the largest productivity improvements. Well-established theory (Acemoglu and Restrepo, 2020) represents labor demand as the balance of two effects:

Labor demand = productivity effect - displacement effect

In a developing country, large productivity gains can offset the labor-displacing effects of automation, leading to increased demand for workers. This pattern is especially likely where robot penetration is initially low, as was the case at the beginning of the study period.

Indonesia's experience may reflect a broader trend among developing countries, as suggested by Figure 1.[2] At early stages of industrialization, the initial benefits of automation can be especially pronounced. However, as robot adoption intensifies, the productivity gains tend to diminish, and the labor-displacing effect of automation becomes more prominent—mirroring the patterns observed in industrialized economies.

Figure 1: Robot penetration and employment changes: OECD vs. non-OECD countries



[2] This figure plots the correlation between the change in residuals from a regression of log-employment on the share of population above 55 years old over population between 20 and 49 years old, and changes in robot penetration over the same period. Robot penetration is defined as the stock of industrial robots per thousand employed workers. Source: Calì and Presidente (2025).

Identifying mutual opportunities for the EU and third countries

Industrial automation technologies can be adopted in virtually all manufacturing sectors. However, it would make little sense for EU taxpayers to support technological upgrading in sectors that are of little strategic importance for the Union. Therefore, we propose a simple methodology to identify country-sector industries that present the most relevant opportunities for Europe.[3]

We focus on non-EU, low- and middle-income economies that simultaneously display strong export dynamism and substantial trade relevance for the Union. Specifically, for the years between 2020 and 2025, we compute the median value across all observations for: i) annualized export growth; ii) average export value, and iii) the absolute increase in exports. We then retain only country-sector observations above the median in all three dimensions. This excludes sectors characterized either by high growth from a very small base or by large but low export volumes.

Appendix Table 1 presents the results. Several neighboring and regionally integrated economies, including Turkey, Bosnia and Herzegovina, Tunisia, Egypt, and Ukraine, appear repeatedly across sectors, suggesting that geographic proximity and existing trade integration with the EU may support further industrial upgrading and automation-related investment.

Electric and electronic industries emerge prominently, particularly in Turkey, Thailand, India, Mexico, and Ukraine. Turkey stands out for its diversified manufacturing base, appearing across electronics, metals, chemicals, and food processing. India also shows broad-based industrial upgrading across chemicals, electronics, metals, food, and automotive manufacturing.

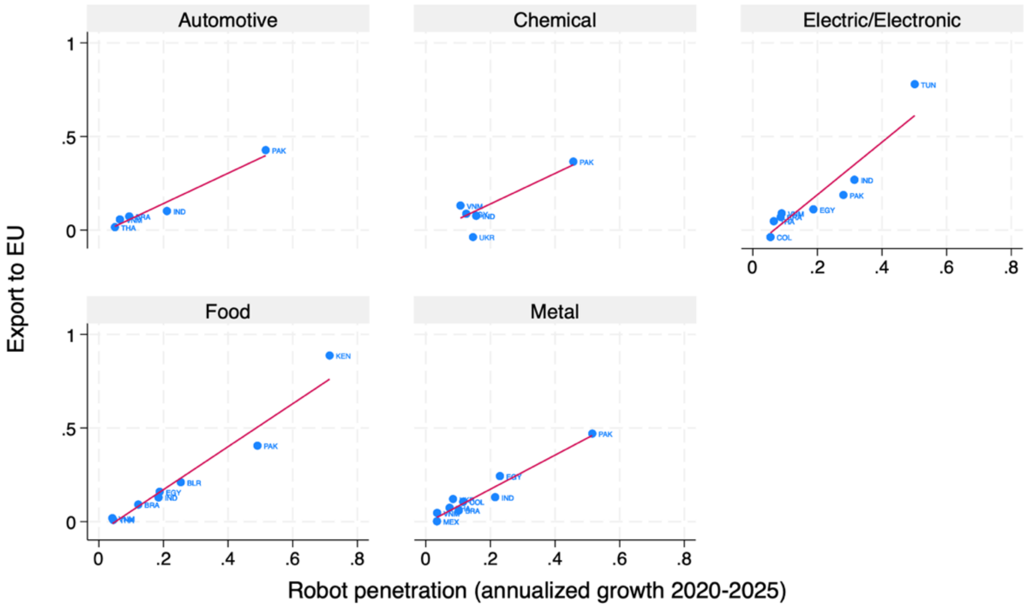
Food-related manufacturing is also an important area of opportunity. Countries such as Ukraine, Ecuador, Peru, Vietnam, Egypt, and Cambodia combine strong export growth with increasing export volumes, suggesting significant potential for technological upgrading in agri-food value chains.

Figure 2 presents the correlation between robot penetration in the five selected industries and exports to the EU27.[4] The figure does not constitute causal evidence, but the positive correlation suggests that industrial automation is associated with stronger export growth and successful export performance in these countries.

[3] A similar approach is proposed in Altomonte et al. (2023).

[4] Robot penetration is measured as the ratio between the estimated number of industrial robots in each sector and sectoral employment levels derived from ILOSTAT data.

Figure 2: Correlation between robot penetration and exports to the EU27.



Untapped automation opportunities?

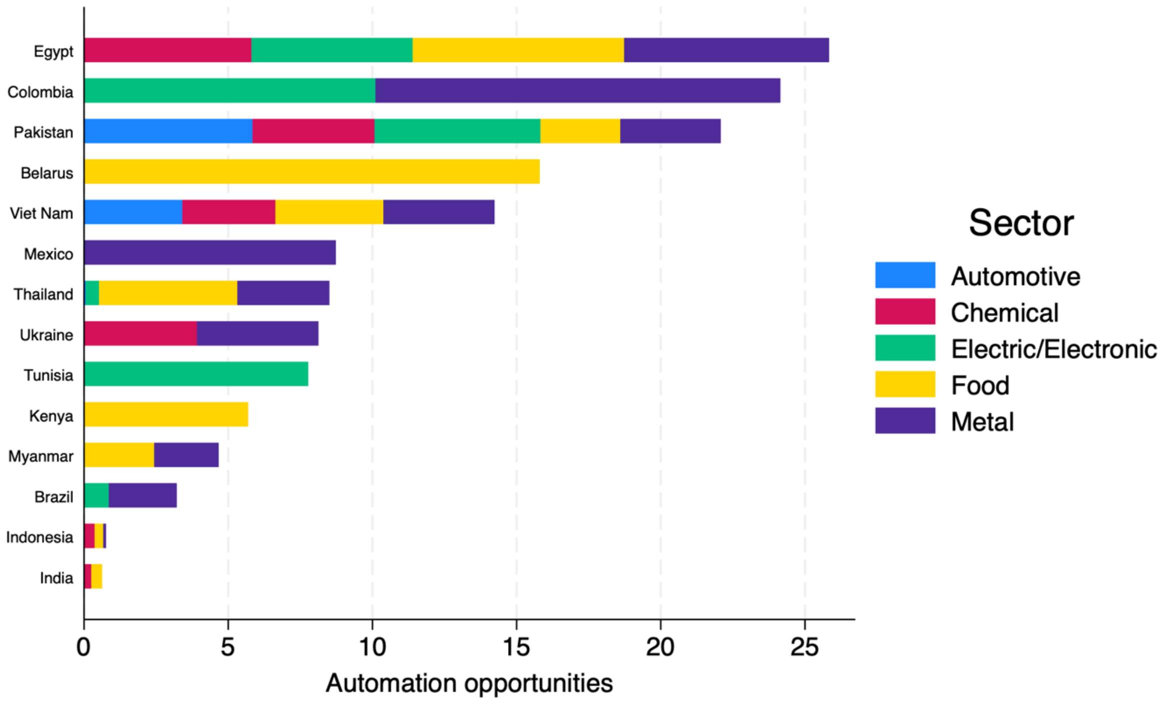
Borrowing an approach from the trade literature, we identify untapped automation opportunities by regressing log robot penetration in the country-sectors listed in Table A1 on their log exports to the EU and the share of sectoral employment in total country-wide employment, including country and sector fixed effects. The estimated coefficients are used to predict the typical level of automation a country-sector should have, given the extent of trade with the EU and the importance of the sector in the economy.[5] We then calculate residuals as the difference between actual and predicted robot penetration. Negative residuals are interpreted as automation opportunities.

Figure 3 presents the results, plotting the negative of the residual. On average, Metals and Food are the sectors with the largest residuals. Egypt shows the largest untapped automation potential, distributed relatively evenly across all sectors considered except Automotive. Colombia has a residual of similar size, concentrated in two sectors: Metal and Electric/Electronic. Pakistan also stands out, with opportunities across all five sectors considered, particularly in Electric/Electronic and Automotive industries. Other countries display more sector-specific patterns. Belarus and Kenya show opportunities concentrated entirely in Food, while Mexico's are concentrated in Metals and Tunisia's in Electronics.

[5] Clearly, we do not assume that these two variables are sufficient to fully characterize the optimal automation level; we use them only as an example for the proposed approach.

Thus, our simple approach can help formulate targeted policies to promote technology uptake in partner countries, with potential benefits for productivity, competitiveness, and employment creation. At the same time, these gains need not be confined to the countries adopting automation technologies. More productive and competitive trade partners can also benefit the EU by expanding access to higher-quality and lower-cost industrial goods, including intermediate inputs used by European firms. In this sense, automation opportunities in third countries may represent a mutually beneficial policy margin: they can support industrial upgrading abroad while strengthening the efficiency and resilience of EU value chains.

Figure 3: Untapped automation opportunities



Viability of policies promoting automation

Because of the popular narrative that machines steal jobs (Shiller, 2019) and the negative employment impacts documented in advanced economies, policymakers are often reluctant to mention robots, let alone design programs that favor their uptake.

A key concern is therefore that policies promoting industrial automation may not be politically viable. However, the productivity and employment gains associated with robot adoption in Indonesia suggest that industrial automation can help achieve Sustainable Development Goals, including SDG 8 - Decent Work and Economic Growth and SDG 9 - Industry, Innovation and Infrastructure. This may increase the political appeal of the proposed measures.

EU treaties and strategies, including the European Semester, the Green Deal, and Fit for 55, already embed sustainability and social objectives. Policies framed around the SDGs can therefore appear as natural extensions of existing commitments, reducing political resistance. Moreover, SDG-related initiatives often qualify for EU funding mechanisms, including Cohesion Funds, Horizon Europe, and NextGenerationEU, which can give them greater financial backing and political momentum.

Finally, automation is now well understood to shift labor demand toward more specialized and qualified roles such as equipment operators, maintenance technicians, and quality controllers (e.g. Autor et al., 2003; Spitz-Oener, 2006; Graetz and Michaels, 2018). More broadly, industrial development and the formation of industrial clusters depend on appropriate value chains, reliable suppliers, and complementary local conditions that allow firms to operate efficiently, specialize, and scale.

Therefore, measures promoting industrial automation may require complementary policies such as targeted vocational training to ensure that labor demand can be met, as well as interventions to strengthen supplier networks, infrastructure, logistics, and local industrial capabilities so that automation investments translate into sustained productivity gains.

Conclusions

Europe has a strategic interest in making industrialization a more explicit pillar of its development and external economic policy. A manufacturing-first agenda would not replace existing objectives on sustainability, digitalization, or social inclusion; rather, it would make them more operational by linking EU support to measurable industrial upgrading, export potential, and private investment.

The evidence reviewed here suggests that automation can raise productivity and employment where robot penetration remains low. However, these gains are not automatic. A large literature shows that the returns to new technologies depend on complementary investments in organizational capabilities, managerial quality, intangible capital, infrastructure, supplier networks, and workforce skills (e.g. Bloom, Sadun, and Van Reenen, 2012; Brynjolfsson et al. 2000). Realizing the productivity and employment benefits of automation therefore requires embedding it within viable value chains and broader firm-level and ecosystem-level capabilities.

The EU should use instruments such as NDICI and EFSD+ more systematically to identify high-potential country-sector opportunities and support them through blended finance, guarantees, training, and cluster-building interventions. Done selectively, this approach would benefit partner countries while advancing EU interests in supply-chain resilience, market creation, migration management, and geopolitical influence.

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Appendix

Table A1. High-potential country-industries identified by the proposed filter

Country-Industry	Average exports(USD million)	Absolute increase(USD million)	Annualized export growth (log points)
Türkiye - Electric/Electronic	16704,8	1599,9	0,103
Thailand - Electric/Electronic	15450,9	1750,2	0,119
India - Chemical	15211,5	2161,3	0,148
India - Electric/Electronic	13883,6	2509,7	0,216
Mexico - Electric/Electronic	13873	2214,6	0,145
Türkiye - Metal	13674,4	1479,9	0,134
Türkiye - Chemical	9518,2	1025,1	0,122
India - Metal	7948	745,5	0,134
Ukraine - Food	7385,6	1542,6	0,21
Türkiye - Food	6912,2	699	0,1
Ukraine - Metal	4948,1	3615,2	0,766
India - Food	4449,3	536,5	0,124
Ecuador - Food	4310,3	650,3	0,143
Viet Nam - Food	4232,9	421,1	0,102
Peru - Food	4199,6	532,1	0,121
Viet Nam - Metal	3223,3	665,3	0,296
Egypt - Chemical	2629,3	365,9	0,184
Ukraine - Electric/Electronic	2606,3	527,7	0,203
Brazil - Metal	2267	224,4	0,121
Viet Nam - Chemical	2060,5	303,5	0,161
India - Automotive	1918,6	270,4	0,156
Egypt - Food	1682,6	316,1	0,182
Egypt - Metal	1425,1	231,1	0,211
Bosnia Herzegovina - Electric/Electronic	1265,1	144,7	0,126
Bosnia Herzegovina - Metal	1189,3	112,5	0,126
Ukraine - Chemical	1115,1	603,6	0,555
Tunisia - Food	973,7	110,8	0,114
Egypt - Electric/Electronic	958,2	131,4	0,144
Peru - Metal	809,4	75,2	0,104
Bosnia Herzegovina - Chemical	792,4	67,9	0,097
Tunisia - Automotive	477,9	61,4	0,125
Dominican Rep. - Electric/Electronic	325,8	46	0,145
Bosnia Herzegovina - Food	252,3	22,8	0,097
Bosnia Herzegovina - Automotive	232,9	40,7	0,183
Cambodia - Food	208,6	40,7	0,174
Jordan - Chemical	195,3	46,8	0,229