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Migration, knowledge diffusion and the dynamic comparative advantage of nations

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The fact that knowledge diffusion – at least for its "tacit" component – requires direct human interaction implies that the international diffusion of knowledge should follow the pattern of international migration. The main finding of our research is that migration, and particularly skilled immigration, is a strong and robust driver of productive knowledge diffusion. We measure knowledge diffusion through the appearance of new goods in the export basket of countries and show that the appearance of new goods (at the extensive margin) or the growth of exports of certain goods (at the intensive margin) is positively affected by immigration from, or emigration to countries with a strong comparative advantage in the production of those goods. The results are robust to accounting for shifts in product-specific global demand, to excluding bilateral trade possibly generated by network effects, as well as to instrumenting for migration using a gravity model.

INTRODUCTION

For many years, the economics discussion on migration has focused on very tangible and short-term outcomes: wages in the receiving economy, remittances in the sending economy. **The long-term effects of migration have been largely neglected** except from its demographic dimension. In particular, the fact that migrants (both immigrants and emigrants) can be an asset for a country in the global economy has been nearly absent from economics textbooks and policy debates. While the idea that migrants are vectors of information and knowledge transmission is not new, it is only recently that its economic implications have started to be explored. A first strand of research has shown that migrants – by being part of an international network – can serve as a mean to reduce transaction costs associated with international trade and international financial flows. There is now strong evidence of the trade-creating effect of migration through the information channel, that is, the capacity for migrants to reduce information asymmetries across countries, and similarly for FDI and other financial flows (see Rapoport, 2016, for a review of this literature).

When thinking long term, however, the main outcome one would want to look at is productivity. And **there are many ways through which migrants can affect productivity**: through encouraging efficient specialization (Peri, 2012), innovation (Hunt and Gauthier-Loiselle, 2010), skill-complementarities arising from diversity (Alesina et al., 2016), and more. This note looks at one particular aspect of this debate by investigating how migrants can shape the composition of the export basket of countries (1).

TRADE, FDI AND MIGRATION AS VECTORS OF KNOWLEDGE DIFFUSION

Essentially, all international flows (of goods, capital and people) have the potential to transport a critical determinant of productivity: **technology and knowhow**. Through trade, for example, a country can import a product with embedded technology which makes it more productive (Coe and Helpman, 1995). A simple example being a calculator: one does not need to know how to add and subtract after acquiring one. But other examples could be tractors for farming, computers for offices or GPS equipment for taxi drivers. All these forms of capital make the users more productive in their jobs. Imported goods contain knowledge as to how they have been produced and such knowledge can under certain conditions be used to copy, improve and eventually export new goods.

Foreign direct investment can also be a form of transferring technology: when a multinational corporation establishes a branch in a new location, this tends to be accompanied by transfers of firm-specific knowhow through short term migration and/or training for local workers. However, there is a vast literature studying how these investments tend to spillover to other firms in related sectors in the same area (e.g., Javorcik 2004).

1. It is based on our working paper "Migration, Knowledge Diffusion and the Comparative Advantage of Nations", CESifo Working Paper No 5769, February 2016. See http://www.cesifo-group.de/ifoHome/publications/working-papers/CESifoWP/CESifoWPdetails?wp_id=19189951

There is less systematic evidence about migration. Yet, there are many reasons to believe that migration should actually be the most effective of these international drivers, mainly because migrants are not bounded to a particular firm or period of time and can bring a type of knowhow that cannot be embedded in goods: tacit knowledge. By definition, tacit knowledge is very hard to teach and learn, and requires direct human interaction to be transferred appropriately.

What evidence do we have to claim that tacit knowledge is important for economic processes? The one agreement in all of the literature that looks at the pattern of knowledge diffusion is that the diffusion of knowledge is highly geographically concentrated (e.g., Jaffe et al. 1993, Keller 2002, Bahar et al. 2014). For instance, patent writers tend to cite more frequently other patents originated in the same location; or firms tend to benefit from spillovers mostly from other nearby firms. This hints at the fact that a big chunk of the knowledge that makes firms grow (or that benefits innovation) is tacit, because otherwise distance would not play any role (e.g., a calculator can be exported anywhere and it is hard to believe that small transportation costs are a real barrier). Our conjecture, therefore, is that the pattern of international knowledge diffusion should relate to the pattern of international migration.

More precisely, an inflow of immigrants with specific knowhow of a particular industry might boost the productivity of this industry in the receiving country. Is this the case? One anecdotal example to answer this question takes us to South Africa of the late seventeenth century, when Franschoek Valley was founded. Franschoek ("the French Corner" in Afrikaans) is a town about 40 Km. away from Cape Town, founded by French Huguenot refugees expelled from France after the revocation of the Edict of Nantes by King Louis XIV. The French refugees –who came from a country with comparative advantage in winemaking - are believed to have played an important role in making Franschoek the home of some of the most important South African wineries, which export first-class wine to the rest of the world.

MIGRATION AND DYNAMIC COMPARATIVE ADVANTAGE

Using international migration and trade data for over 100 countries in 1990-2010, we find that indeed, the influx of immigrants coming from countries with comparative advantage in a given product, say wine, have high explanatory power in the likelihood that the receiving country will export wine in the following ten years. To be more precise, a 10% increase in the immigrant stock from countries exporters of a good can explain a 2% improvement in the probability of the receiving country exporting this same good, competitively and from scratch. That is, **the receiving country passes from not exporting the good at all to gaining an export share above the world average** (technically, having a revealed comparative advantage above one). We interpret these results as sectorial productivity shifts, because only an increase in productivity can explain a country being able to export a good to the world in a significant amount from scratch, after keeping global demand unchanged (through the use of a product-time fixed-effect).

We find that this process is strongly driven by immigrants that are considered "skilled" (i.e., have completed enough years of education to earn at least a college degree). In fact, when comparing the ability of migrants to shape the export basket of countries through sectorial productivity shifts, **we find that a skilled immigrant is about ten times more "effective" than an unskilled one**, as shown in Table 1. The Table also shows that this effect is driven mostly by instances where the receiving country is a non-OECD one (where skilled immigrants are worth about twenty times an unskilled one). Table 1 also shows that the results are not driven by a simple increase in the supply of labor because it shows positive effects for goods both above and below the average capital intensity measure; and they are also not driven by a reduction of transaction costs because the effect is there for both differentiated and homogenous goods.

Table1 : Skilled/Unskilled Immigrants and the appearance of new products

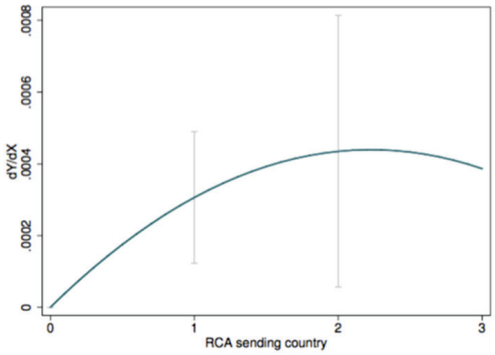
		Immigrants		
	N	$\beta_{im}^{Unskilled}$	$\beta_{im}^{Skilled}$	Ratio
All Observations	83100	0.005**	0.006***	**10.55**
Non OECD	79205	0.002**	0.003***	**19.12**
OECD	3895	0.016	0.007	**0.88**
Period 1990-2000	50143	0.008**	0.008*	**12.07**
Period 2000-2010	32957	0.002*	0.003***	**12.83**
Above Median Capital Intensity	30378	0.005**	0.004**	**9.88**
Below Median Capital Intensity	33778	0.004***	0.004***	**11.18**
Differentiated Goods	37759	0.006**	0.006**	**13.11**
Homogenous and Reference-Priced Goods	34653	0.004**	0.004**	**10.28**

Note :
Stars denote significance levels; SE clustered at the receiving country level. See Table 10 in the WP version

Three other interesting findings are worth mentioning. First, our results show that migrants play a role in explaining not only the emergence of new sectors, but also the growth of already existing sectors. Second, we find that emigrants also play a role in explaining the dynamics of the export basket of their sending countries, although at lower magnitudes (and significance levels) for emigrants. Third, if we think of the intensity with which a product is exported in the immigrant's home country as a measure of the amount of product-specific knowhow he or she brings, we find an interesting and intuitive result.

As shown on Figure 1, the appearance of a new product explained by immigration (measured in the vertical axis) is increasing in the intensity of exports of the sending country (measured on the horizontal axis), but with diminishing returns.

Figure 1 : Diminishing Marginal Returns to RCA of Partner Countries



Note :
This graph estimates the marginal effect of immigrants on the probability the receiving country exports a new product in the next ten years, as a function of the RCA value of that product in the immigrant's country of origin in the baseline year.

POLICY CONCLUSIONS: LET THEIR PEOPLE COME?

What are, if any, the policy implications of these findings? Since knowhow and technology are not readily available everywhere (because, as argued above, a big part of knowledge is "tacit"), it is often easier to move people so as to send or receive such knowledge. It might also be the only way to get access to it, as this tacit knowledge cannot be codified or embedded in goods.

However, if knowhow is important to improve productivity, why aren't firms sending their workers for training in other locations where that knowledge is present? Well, they actually do! As Ricardo Hausmann points out in a recent op-ed, business travel is a growing phenomenon. Large firms do send their employees to other locations – often abroad when they are based in developing countries - to be trained for their jobs, learn best practices and improve outcomes. But here is the catch: small firms are unable to do so. Training is expensive and difficult. Yet, if this indeed contributes to productivity, what stops them? The answer is that externalities are too high. **The costs associated with training are large and there is a good chance that small firms would not be able to appropriate this investment given** that a trained worker might leave to another firm. It is a very difficult tradeoff for a small firm even though it seems like the right investment. However, as Zig Ziglar – an American motivational speaker - puts it: "*the only thing worse than training employees and losing them is not training them and keeping them*".

As with any other externalities and market failures, public policy can provide the right incentives to achieve efficient outcomes. If small and medium firms are unable to appropriate all the investment in foreign training for their workers, but this training is optimal for society at large (i.e., a good part of this training provides general rather than specific human capital), **perhaps there is an opportunity in developing countries for public-private scholarship for professional training abroad**, which aims at "importing" knowhow to the local economy. In any event, our results suggest that on a broader scale, the knowledge embedded in immigrants (and, to a lower extent, in emigrants) can generate important knowledge-driven productivity spillovers, something that had not been considered in previous literature and should be part of the public debates on immigration.

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