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## Trade, capital adjustment and the migration of talent<sup>☆</sup>

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### ABSTRACT

To determine the total effect of trade on migration in the existence of capital accumulation asymmetries between trading partners, this paper develops, calibrates, and solves a two-country general equilibrium model of trade and migration. The model introduces an interaction between capital adjustment costs and trade costs in different sectors of production, and then pins down the direction and the size of the effect those interactions have on the gap between the returns to labor in the skilled-labor-abundant (North) and unskilled-labor-abundant (South) countries. The results indicate that at low capital adjustment costs, higher trade volumes lead to a decrease in the rate of skilled migration, though the decrease is smaller than it would be if there were zero capital adjustment costs. At high levels of capital adjustment costs, higher trade volumes lead to an increase in the rate of skilled migration.

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## 1. Introduction

International labor migration from developing to developed countries has been on the rise since the 1960s, having increased three-fold since then, and with skilled labor migration rising at an even faster rate (Docquier & Rapoport, 2012). The loss of skilled labor raises vital concerns for developing countries, and a substantial amount of academic literature and policy discussion have therefore been dedicated to understanding the drivers of skilled labor flows.

Given that the same time period was also characterized by an increase in the flow of goods, trade has often been studied as a relevant factor in understanding labor movements. Researchers have reached different conclusions, however, on the exact impact of trade on migration, with conclusions differing depending on the type of goods traded and the nature of their production processes. Under the standard Heckscher–Ohlin model, as trade in skill-intensive goods increases, skilled labor mobility decreases under certain conditions. Alternatively, in the new trade theory, an increase in production and trade in skill-intensive industries characterized by increasing returns to scale can in fact increase skilled migration, as factors move to where they are intensively used and highly rewarded.

The conclusions about the impact of trade on skilled migration can also differ depending on the initial level of tariffs and the strength of financing constraints in the trading countries. Tariffs alter the return to labor and therefore migration patterns as they are loosened (Schiff, 2006), while the increase in income which accompanies higher trade loosens the financing constraints faced by unskilled workers. The relaxation of those constraints then increases migration since unskilled workers are more able to finance migration costs, while skilled workers who do not face such constraints will be unaffected (López & Schiff, 1998).

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This paper builds on the previous literature by asserting that the efficiency of capital formation has an impact on how trade drives or deters skilled migration from developing to developed economies. In particular, the investment environment is identified as another channel that alters the trade-skilled migration relationship.

The relevance of capital formation in predicting skilled migration patterns resulting from trade stems from two documented observations. First, given that skilled labor and capital are complements in production, capital formation plays a role in determining the return to skill (Krusell, Ohanian, RiosRull, & Violante, 2000). This observation implies that when capital accumulation changes as production expands or contracts in a particular sector in response to trade agreements, the returns to skill in each of the trading economies (and in turn the skilled workers' migration patterns) will change.

Secondly, capital adjustment costs are typically higher in developing economies than developed, making the investment environment more favorable in developed economies. Capital adjustment costs describe frictions that delay or hinder investment. Cooper and Haltiwanger (2006, 07) cite several industry studies affirming the existence of such costs and both their convex and non-convex (fixed) nature. As a result, models with both convex and fixed costs best fit real manufacturing data (Caballero & Engel, 1999; Haltiwanger, Cooper, & Power, 1999). According to these studies, convex costs are typically associated with labor costs such as firing and hiring, overtime, and possibly inventory and machine set up. Non-convex (or fixed) costs are typically associated with necessary reconfigurations of the production process or management, the expansion, and the training of workers during high investment periods. Developing economies suffer from strict labor laws, uncertain conditions, and red tape, all contributing to higher capital adjustment cost than in developed economies. Tybout (2000) discusses such obstacles, while Gelos and Isgut (2001) and Bond, Söderbom, and Wu (2009) empirically estimate the capital adjustment costs associated with them.

To determine the total effect of trade on migration in the existence of capital accumulation asymmetries between trading partners, this paper develops, calibrates, and solves a two-country general equilibrium model of trade and migration. The model introduces an interaction between capital adjustment costs and trade costs in different sectors of production and then pins down the direction and the size of that interaction's effect on the gap between the returns to labor in the skilled-labor-abundant (North) and unskilled-labor-abundant (South) countries under varying levels of differences in capital adjustment costs. The general equilibrium setting is crucial, since it captures the resulting wage gap between the North and the South given an increase in trade while also taking into account the adjustment to the size and investment level of each sector in each economy.

The main results of the model are as follows. The introduction of low to medium levels of asymmetric adjustment costs decreases skilled emigration from developing economies as these economies increase their exports of capital-intensive goods. However, the decrease in skilled emigration is actually smaller in the complete absence of adjustment costs. At high levels of capital adjustment costs, on the other hand, skilled emigration actually increases in response to trade in capital-intensive goods. The main reason for this change in the pattern of skilled emigration when capital adjustment costs are high is that the North, which experiences higher incomes as a result of trade, is able to increase its investment and capital accumulation faster than the South when capital adjustment is significantly costlier in the South. With the assumption that capital and skilled labor are complements as in Krusell et al. (2000), skill will follow capital to where it's used more efficiently and is abundant in supply. However, at low levels of capital adjustment costs, the increased income from trade in capital-intensive goods helps the South accumulate enough capital to keep up with North's higher income and investment.

For unskilled workers, the results are less severe in magnitude. At medium to high levels of capital adjustment costs, unskilled emigration from developing economies increases in response to an increase in exports of unskilled-labor-intensive goods, but at a lower rate than skilled migration. The relatively lower rate of increase is due to the fact that, as adjustment costs rise, the wage gap between the North and the South widens more slowly for the unskilled workers (versus skilled) in response to increased trade in the sector in which they are employed intensively.

Although the actual link between capital flows, migration and trade has been explored before (Baldwin & Venables, 1994), this paper expands the analysis further by looking at the characteristics of the trading sectors and the types of goods traded, by including both fixed and convex costs, and by generating quantitative results in the process. The model also incorporates trade (iceberg) costs alongside capital adjustment costs, since the former have been empirically established as a significant determinant of trade (Anderson & van Wincoop, 2003) and the latter have been shown theoretically to impact the skilled–unskilled wage gap in the North (Chakrabarti & Mitra, 2010). In doing so, the model shows that the interaction between those two frictions can alter migration patterns.

In summary, this work highlights the importance of the investment environment when studying trade as a driver of international skilled migration, since it can alter the predicted size or even direction of the correlation between skilled migration flows and goods flows. Given the importance of capital formation for skilled wages, understanding the impact of different levels of costs which are associated with changing investments as a result of international goods flows can shed light on the patterns of skilled migration resulting from such goods flows.<sup>1</sup>

In Section 3 the model is introduced and solved. In Section 4 the qualitative results of the model are discussed, and in Section 4.3 the quantitative results are presented. Finally, in Section 5, an empirical model estimates the correlation between different types of goods traded and skilled migration using a panel of 61 countries over 10 years. This is done to check the sign of the correlation

<sup>1</sup> It should be noted that this paper does not attempt to answer the question of whether trade and migration are substitutes or complements once and for all. Rather, it shows that the exact nature of the economic environment and characteristics of the trading countries will determine the relationship between migration and trade. With that relationship established, it is then possible to pin down a more accurate empirical test of the impact of these characteristics on the trade–migration relationship.

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