

# **International Trade Theory and Its Methodology: Explaining the Structure of Migration Flows <sup>1</sup>**

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### **Introduction**

The objective of this chapter is to present an outline of the methodological view that is used by international economics' microeconomic branch dedicated to the pure theory of trade. It is used for explaining the causes and outcomes of the international mobility of factors, guided in this case exclusively by migrating labor. The description represents the author's own views concentrated on a specific deductive method of analysis – therefore its aim is not an overview of the existing economic theories of migration. For such purposes the reader should turn to the survey literature (see, for example, Borjas 1994, Raymer and Willekens 2003). This chapter is designed first for non-economists, even though economists not versed in international trade theory can, perhaps, find it inspirational.

We will deal with the Heckscher-Ohlin theory of trade and particularly with its Rybczynski theorem – the most fundamental economic theory of migration. Both theories belong to the core of neo-classical explanation of economic exchanges and P. Samuelson and P. Krugman received the Nobel Prize for contributing to them. The reader should be aware that pure theories rely exclusively on the axiomatic principles of deductive logic. In this case they explain formally the acts of rational behavior (given its objectives). Naturally, this cannot imply that the reality acts accordingly. Theories (as all other human thought) can never close the gap between its corroborated conclusions and the real behavior. The comparative advantage of pure theories is that they offer inspirations for constructing hypotheses for empirical quests, and for setting objectives of policies and benchmarks for their assessment.

There is one particular objective in this chapter: to offer an outline, a teaching and learning aid that, through a hands-on approach, allows the testing of how a pure theory of migration is constructed and how a change in its variables can be related to outcomes (such as the intensity of external and internal migration between industries, and its impact on economic gains). Learning by doing, through, for example, the means offered by a computer simulation, is definitely a more inquisitive approach to education than mere memorization.

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## **Methodological Issues**

The majority of social and human sciences are empirically based: sociology, anthropology or political science refer directly to the facts of history and rely in their method of analysis on surveys mapping the real behavior. Their primary aim is to describe the real social behavior – be it its perception or its pattern revealed by ex-post analysis of data. However, hardly any serious study can avoid the problem of logical benchmarks. Humans generally feel offended if they are charged of illogical thinking or behavior, even though scientific studies confirm that humans often err and their behavior is constrained by bounded rationality immersed in fuzzy and multi-criterial nature of social interaction. Human migration, guided by aims of higher pay or more pleasant living, is a typical example of social phenomena where the interplay of all social and human sciences may lead to a myriad of diverging judgments assigned to a common object. In order to avoid the resultant chaos, we have to subject the sciences to a scrutiny of logic in order to make them comprehensible and communicable. Methodology is the crucial instrument for such tasks.

“Methodology is the division of pure logic that deals with the methods of directing the means of human thinking to the end of clear and connected thinking”. “It is a system of rules to impose order in the formation of knowledge” – such are the definitions of scientific methodology offered by dictionaries. In comparison to other social and human sciences, economics aspires to be an instrument of research most rigorously based on methodology. It can be illustrated on the case of international trade with goods and factors (i.e. including the labor migration) where we can clearly recognize the influence of (neo)positivist thinking that anchors the methods of human cognition within the laws of logic and its axiomatic systems of inference based on deduction. The reason is that economics in its ideal mission is aiming at the explanation of causes (i.e. the dynamics of interdependencies) of events and resigns from mere nominal description of facts. The seminal publications by Grossman and Shapiro 1982, or Bhagwati and Feenstra 1986, are prime examples of such watershed. The methodological divide between economics and other social sciences grows sometimes so wide that it forms an impenetrable chasm to mutual understanding even among economists themselves. In this chapter we will try to bridge such an absurd gulf between disciplines.

Of course, the study of migration by the methodology of economics does not imply that the proposed search for cognition should avoid empirics, induction or statistical inference by probability estimates, which are all a part of common scientific tools. Studies of economic logic are often motivated by teleology, heuristics, analogy, value judgments or intuition, provided that wherever we detour from a "clear and connected" thinking, the methodology

(as described above) should guide us back to the anchors of rationality and order.

An applied economic study of migration implies that our observations come from a concrete (usually geographically constrained) world and our derived statements about its pattern and behavior, checked by the logic of methodology, can be relevant for the understanding of that world.

There is a warning for non-economists intending to combine or to compare their findings about the real world with those of economics. In its extreme, economics can be interpreted as a pure mathematical methodology analyzing the human rational action associated with costs and benefits that could be even completely divorced from the empirics of reality. This is, in short, both the virtue and the curse of the theoretical economics, if considered as a science explaining the real social phenomena. However, whatever you may think about economics, the excursion to its abstract reasoning can be an inspiring adventure to any thoughtful researcher because it offers a myriad of alternative outlooks at reality. This is due to its loose association with particularities that logical constructions (paradigms) purposefully abstract from.

We should keep in mind that social agents (that means the people with their free will) are much more complex and subject to more complicated processes than objects of the remaining nature. In addition, people form groups and organizations, whose dynamic properties often differ from the aggregation of individuals or contradict the objectives of individuals. For example, a person wants to improve her standard of living and moves to work abroad. Her endeavor is worthwhile both for her and the people around her. However, if too many people from the neighborhood do the same, the result can be reversed. Under some conditions all can be worse off, as the theorem of prisoner's dilemma could explain.

The complicated nature of social behavior often drives social investigators to static structural descriptions of their objects – e.g. the gathering of facts, which are proven useful for operational communication. Surprisingly (at least for the economists), such descriptive structural analyses rather ignore the decision-making proper and the issues of strategic importance. In contrast to "structural descriptions," economics has the reverse approach: it aspires to find a mechanism that describes the association of causes and effects, while the structural descriptions of reality are often considered a burden complicating the abstract model. Even though the applied model-builders in social sciences are good at explaining the past, their capacity for making predictions lags significantly behind. Nevertheless, the low reliability of predictions is a tender spot shared by all social sciences. Would any of us dare answering the question “Will the retained open policy to migration in the UK increase or decrease the welfare in England when the recession comes?” with a scientific confidence? The answer, which comes in

contrast to pretentious answers of politicians and opinion-makers is “hardly so.” Although the cooperation among social sciences aiming at multidisciplinary breeds fear, it also offers hope.

### **Migration as Qualitatively Differentiated Flows of Labor**

Now let us return from the methodological detour trying to explain and bridge the estrangement between economics and the rest of social sciences, which is to a large extent artificial, and concentrate on the migration as the social, political, demographic and economic problems it entails, as analyzed by the scientific instruments of these particular sciences. Actually the approaches of sociology, political science, demography, law or economics to the topic of migration are so intertwined that a call for interdisciplinary approach seems to be pragmatically relevant, even though its heterogeneous findings (due to different methodology) hardly add up to a better particular science.

As the topic of migration is multi-faceted, economics take various views for their subject. The approach taken by economic demography (see e.g. Krugman 1991), which deals with the estimates of stocks and flows of population and labor in time and space, is empirically the most concrete. Its findings are used as an interface between economic geography and labor economics. Migration, however, is just a partial moment of the labor dynamics, whose importance varies significantly by country. If we consider the stylized facts, the natural annual population growth for the OECD countries was approximately 7‰ in the last 30 years. If that trend would be sustained, the population in those countries would double every 100 years. However, the population growth in Europe was much lower (approximately 3,4 ‰ in average) and intensive immigration was considered to be one of the factors that could mitigate its geopolitical decline. In contrast, there are many developing countries, whose population grows at rates 20-48‰ with negligible migration. Given that, a change in migration policies can significantly vary the conditions in the national labor markets all over the world and thus shift significantly the local structure of specialization.

Looking at the migration data provided in Table 1, we can see that labor mobility is a highly significant development factor for many countries. As mentioned in the introduction to this book, there are estimates that more than 3% of the world population has the status of migrants that are not merely opportune movers. This figure is a stock accumulated in time. It is therefore evident that the openness to annual labor flows, if compared to the flows of commodities, is generally quite small. For example, approximately 30% of the world's GDP is exchanged via exports and imports, meanwhile annual “trade” with workers in the world is much less than 1% of the population. It is the result of the belief in free trade among countries, so fashionable among economists in the last 60 years that the policies of specialization and exchange of commodities based on comparative advantages is considered one of the

most important factors of prosperity and growth in the world. The policies of trade openness among developed countries thus reflect the consensus that trade is a typical win-win strategy of development where both parties gain in welfare.

**Table 1: Migration Development in Two Centuries**

Period	Net migration in the USA	Net migration in the Western Europe
1820-1913	+ 5.0 ‰	– 2.0 ‰
1914-1949	+ 1.5 ‰	– 0.7 ‰
1950-2000	+ 3.0 ‰	+ 1.5 ‰

Source: Maddison (2001 and 2003).

A similar outlook has slowly progressed in assessing the free movement of capital (notwithstanding the scourge of financial contagion and continued world-wide financial breakdowns). Nevertheless, there are hardly any economic reasons why the same economic logic should not be applied to the real flows of labor. However, such views are not a part of common wisdom, which instead is dominated by political suspicion that trading with labor has no parallel with commodities or capital. From the world's point of view, it is only in the EU where internal economic migration was taken for a guaranteed undeniable economic freedom (and even supported) by economic policies which were driven by the belief that they serve a common prosperity. However, the EU's external barriers to immigration indicate that it need not be always so beneficial. Except for cultural, religious or social objections, there could also be important economic reasons for restraining immigration. It is important that we should know much more about such phenomena.

The benefits brought by migrants in terms of their potential contribution to the GDP can vary enormously. In addition to private gains at the level of enterprises, social gains should be assessed too, as immigration can bring both positive and negative influences. As a result, a private product of a highly productive employed immigrant spouse must be compensated for by parallel social costs which must be borne by the public (e.g. because of his large illiterate family).

The human ingenuity required for running any economic venture is called "entrepreneurship". Surprisingly, entrepreneurship need not be used only in productive (i.e. public prosperity-enhancing) activities. According to Baumol (1990), ingenuity of entrepreneurship can be used with the same intensity in redistributive activities (rent-seeking, asset-stripping, theft) or in destructive activities (pillage, vandalism, terrorism, war). The switching mechanisms between them are the incentive schemes that support the productive, suppress the redistributive and prosecute the destructive "entrepreneurship," with different degrees of success. Since societies differ

widely in the efficiency of such economic incentives, their resultant outcomes concerning the "natural" selection of migrants may also vary widely.

Thus the differences in the structure of migrants and their motives rest in the institutional order that is culturally dependent and widely different among countries. That means, such an order is tailor-made for the given cultural idiosyncrasy of the domestic population, which can induce different and unexpected motivation in foreign workers. Some immigrants can therefore be attracted into clusters of virtues, enhancing the productive potential of the host country, while other immigrants can do nothing better than to form clusters of relative inefficiency because local institutions induce them to specialize in redistributive or destructive activities. Both of these very different cases can have a common denominator called "economic migration" based on private returns. Trade in commodities is definitely much less subject to such polarities of net effects (even though there is also a case of trade in narcotics that is an outcome of profit-bearing comparative advantages, whose aggregate social benefits in host countries are grossly negative).

So we see that the outcomes of exchanges of specialized commodities and international "exchanges" of specialized labor can be very different, even though the economic principles of specialization can sound similar. For example, in contrast to commodity trade between the EU-15 and the twelve new EU members, where intra-industrial exchanges of like products form a dominant pattern, the bilateral migration data in the breakdown by industries point to dominant inter-industrial labor flows, which are far from being balanced in their aggregates. In addition, labor flows may be subject to a qualitative selection bias, especially between countries at different cultural levels. The "quality" of migrants can be measured by their education, adaptability and externalities brought to host countries. Then we should distinguish between the "positive selection" of migrants (i.e. those with a socially wealth-enhancing orientation) and the "adverse selection" characterized by their redistribution or even socially destructive aims.<sup>2</sup> The latter is an economic phenomenon of failing markets analyzed first by Akerlof (1970), which definitely has a wide application in explaining the failures of labor markets associated with migration.

### **Theoretical Background Provided by International Economics**

The economics of migration, as a pure theory of factor movements, has its origin in the three fundamental theories of international trade and

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<sup>2</sup> Public media and politics concentrate on the perception of phenomena with a bias to a negative perception, in contrast to science with its stress on facts and causal links between them. We should therefore appreciate a balanced analysis of important non-academic institutions in assessing allegedly negative aspects of migration. See e.g. World Bank, 2006 or the material TUC, 2007.

specialization, which are those of Ricardo, Heckscher-Ohlin and economic geography.<sup>3</sup> Ricardian theory deals with labor as an exclusive factor that is subject to different relative efficiencies (e.g. gains) if engaged in alternative activities. Labor specializes in the domestic production of that commodity (or service) where its relative yield (e.g. marginal product per day or actually the wage) is the highest. Such a product is then produced in excess of domestic demand and must be exported. However, what if labor were to seek its optimal allocation internationally as well? Labor would then migrate across the whole world because it would raise the world's welfare to optimal conditions.

The Heckscher-Ohlin model (sometimes called the “factor proportions theory”) is more technically sophisticated than the Ricardian model. It can work with many factors (i.e. with simple labor, physical capital, natural resources and human capital), all of which should be optimally allocated in an economy perfectly open to commodity flows, while factors are not mobile. The resultant specialization leads to world’s optimal use of all resources and optimal pricing of products and factors. This is so at least at the level of the pure model, assuming that the world’s reality follows an identical logic (which is another methodological feat to prove).

The most extravagant theorem of factor proportions theory that deals with the world-wide factor price equalization, is the so-called Lerner-Samuelson hypothesis. It concludes that under free movement of products, labor migration is actually redundant because it can be fully replaced by commodity exchanges. However, its fundamental assumption about free transfers of technologies (which in reality requires the free flows of human capital) is often tacitly skipped (sic!). Thus even in that case we are back to the migration of labor, especially that of specific know-how producing positive externalities leading to policies of positive selection of migrants.

The basic approach of international economics to immigration is the Rybczynski theorem. This theory (subject to a given set of assumptions) is described as follows: an increase in the country's endowment of labor (e.g. via immigration) will increase more than proportionally the output of those products, whose technology of production is labor-intensive; the output of products intensive in other factors (e.g. capital) will have to decrease (see the relevant paragraph in any textbook of International Economics/Trade or e.g. [http://internationalecon.com/Trade/Tch60/T60- 3.php](http://internationalecon.com/Trade/Tch60/T60-3.php)). Migration is thus

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<sup>3</sup> All these topics are part of international economics’ international trade theory. For a reference look at the textbooks by such authors like Krugman/Obstfeld, Pugel, Salvatore, van Marrewijk, etc. A thoughtful description to Heckscher-Ohlin and its economic spillovers can be found in Krugman’s “Was it all in Ohlin?”, available at [web.mit.edu/krugman/www/ohlin.html](http://web.mit.edu/krugman/www/ohlin.html). However, it requires knowing some basics before this reading.

described as a mixed blessing where positive gains have a potential for compensating the losers (which in reality lacks a natural mechanism for implementation). These are logical conclusions of general economic equilibrium valid for open economies.

Thus Rybczynski's approach is based on the pure theory of specialization that deals with the indicators described below, which can be empirically measured, tested for hypotheses concerning their causal links (or more accurately correlations) and predicted. The crucial point for understanding why this approach offers greater explanatory power than standard views is that "Rybczynski" delves deeper into microeconomics where both products and labor inputs are disaggregated and subject to dynamic changes (e.g. via exports and mobility). The professional structure of migration does not evolve at random and it can lead to dramatic secondary impacts on restructuring the GDP.

First we will describe the building blocks of such a microeconomic approach to migration <sup>4</sup> :

a) Labor stocks  $L_{ij}$  as production inputs – disaggregated by activities (industries)  $i$  and skills (education)  $j$ , for  $i = 1, 2, 3, \dots, m$  and  $j = 1, 2, 3, \dots, n$ .

b) Production  $Y_i$  as the output of labor  $L_{ij}$  – disaggregated by activities  $i$  (industries).

c) The cost-benefit structures – where the resultant national structure of labor  $L_{ij}$  is ranked by productivities  $Y_i/L_{ij}$ , plus it is qualified by complementary capital requirements of labor  $K_i/L_{ij}$ , which reflect additional (capital) costs of using labor. Migration flows between countries are then supposed to be dependent on both these variables, i.e. on relative labor efficiencies and capital costs for employing migrants.

d) Wages  $W_{ij}$  – transforming the labor inputs into universal labor costs in monetary values. Wages are not uniform between industries, skills and countries. They are a natural outcome of different sectoral productivities of labor, including their skills  $j$  (represented e.g. by education). As a result, productive economic migration will depend on the gains of migrants in wages, which are constrained by the transaction costs of migrating and the transaction costs of building the skills.

e) All the previous have impacts on the specialization pattern of migrants and with it on the output in industries. The above mentioned list of indicators can be used for estimating the private effects behind the supply and

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<sup>4</sup> A remark for those less skilled in grasping the technicalities of production functions that are applied in an environment of more than two-dimensional space: Please skim this part for gaining an intuition what it is about and concentrate on the model presented by graph in Figure 1. However, those who love sophisticated empirical models of the theoretical orientation described here, please look at Boeri and Brücker, 2005.



demand for migrants. However, the social (e.g. national) net gains can differ from the sum of private gains. For a complex assessment of the net gains from migration, its private benefits and costs should be amalgamated with estimated social costs and social benefits of migration.

Previous pure models of migration can be further modified (expanded) in two points. Firstly, it can be modified by separating the factor of human capital  $H$  from labor in general. Thus, instead of working with the list of skills  $j$ , we can separate workers with high skills into a variable of human capital. Secondly, we can distinguish between the stocks and the flows of both labor and human capital by introducing exports and imports of  $L$  and  $H$  between countries of origin  $c$  and countries of destination  $d$ . Thus  $c, d = 1, 2, 3, \dots g$ . For example, data  $L_{icd}$  and  $H_{icd}$  will describe flows of simple labor and human capital located in domestic industries  $i$  migrating from country  $c$  to country  $d$  (for  $c \neq d$ ).

Technologies being given, let us assume that the following production factors are required for production  $i$  in country  $c$ :

$\{K_{ic}, L_{ic}, H_{ic}\}$

where  $K$  stands for physical capital,

$L$  for simple labor, and

$H$  for human capital.

It is natural that countries have different endowments of factors than what is required for their production satisfying the domestic consumption (e.g. more plumbers, more doctors and a shortage of car constructors). Thus workers migrate either as simple labor  $L$  or as human capital  $H$  with an option of switching abroad among industries subject to their yields (e.g. between wage differentials between home and abroad). By choosing their destination country and industry of employment, the workers produce certain products subject to the local efficiency of factors described by production function  $\Phi$  specific for industries and countries:

$$Y_{id} = \Phi_{id} (K_{id}, L_{id}, H_{id}, A_{id}),$$

where  $A$  is the total factor productivity (called also Solow residual) that describes changes in efficiency in producing  $Y_{id}$  that are additional to mere factor movements. We often speak about  $A$  as an "autonomous" source of productivity.

The model is driven by migrating  $L_{icd}$  and  $H_{icd}$  that respond to varying efficiencies in their alternative allocations by countries and industries. Factor  $A$  can be correlated with both  $K$  and  $L$  (although not fully). For example, an influx of  $H_{id}$  to a particular industry  $i$  can result in an increase of  $A_{id}$  in many other local industries. That would allow us to estimate the extent of externalities (spillovers) of migration of labor with skills defined by  $H_i$ . This model thus represents an interface between the pure endogenous growth theory and the labor market economics. By collecting the mentioned industrial

production data we can even aspire to assess both the private and some parts of the social benefits of migration.

By means of the described causal reasoning we are able to quantify the effects of migration on national economies within all studied countries c and d. We could actually compare the estimated opportunity costs of labor being employed at home or abroad, as well as the benefits of transforming L into H (e.g. via education). In addition, we could also complement our analysis with the instruments of government policies (education, migration regulation or labor-related subsidies). The effects of such policies can be then tested for enhancing the (positive) effects of migration or assessed as barriers to such effects.

### **A Review of Economic Hypotheses for Empirical Testing Inspired by the Theory of Specialization**

The following hypotheses about the economic effects of migration on the host and the home countries can be raised:

a) Are there diminishing returns on additional inflows of labor that would decrease productivity and wages? This is particularly important if the indigenous labor in a given host industry is "specific" (i.e. it is immobile and not able to be attracted for its employment in some more efficient domestic industry). The domestic incumbent workers do not lose their jobs but must accept lower wages – they cannot opt out for taking better jobs elsewhere.

b) In contrast to the previous, there is crowding out of indigenous labor by the incoming foreign labor, which is cheaper (though still equal in productivity). The result is not only a decrease in wages in that industry but also increasing unemployment if the employment absorption capacity of the economy is low.

Remark: Both mentioned cases are often thought to be intertwined because they share presumed "specificity" of jobs. Thus the problem rests in the low internal mobility and not in the causes of lower wages. Such a situation is most feared because an alternative to falling wages is no wages at all (imagine the ghost of a Polish plumber).

c) If migrating labor is associated with inflows of human capital H, then wages may even increase throughout the economy due to externality spillovers that raise the total factor productivity A. This hypothesis has been often tested in papers dedicated to the effects of foreign direct investment on the host countries (see the studies of such authors like Campos, Görg, Jaworcik or Kinoshita. An extensive list of literature about spillovers can be found in Havranek and Irsova, 2010).

d) What is the impact of labor migration on the structure of output (GDP) by industries? Which industries gain and which ones face decline? Are the expanding (declining) industries characterized by being capital or labor

intensive? (This feature actually decides who will gain and who will lose from such changes – will it be workers or the capitalists?)

e) What are the impacts of migration on the current accounts (the balances of payments) of both host and home countries? The particular question concerns the impact of labor remittances on the external balance.

f) Can we provide any empirical evidence about the validity of statements like "meanwhile free trade does not harm national interests because it has very high net positive externalities on all partner countries, the net externalities of free migration can be negative in the short-run and bring only mild net benefits in the long-run"? Said in another words, the social transaction costs of free commodity trade are assumed to be much lower than social transaction costs of free labor migration. Xenophobia would thus get its legitimacy in economic values.

g) Can we provide any empirical evidence about the statement that "free labor movement brings convergence towards wage equalization between partner countries"?

### **An Illustrative Case Study for Building Hypotheses to Be Tested Empirically**

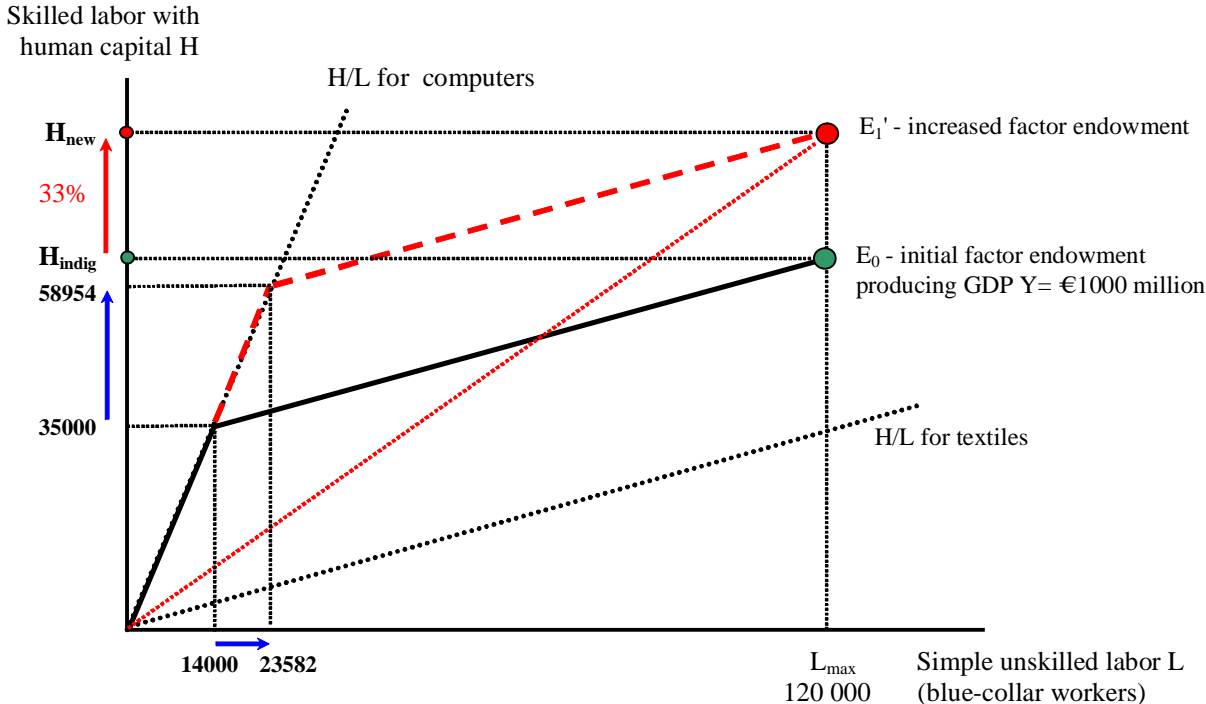
As we have already mentioned it in the introduction to this chapter, one of our objectives is to design a teaching and learning aid for comprehending how the quantitative models of migration are constructed and for testing its empirical contents by simulating various conditions and outcomes of migration by means of spreadsheets. Let us therefore start with illustrating the explanatory power of a simple model based on the Rybczynski hypothesis by means of Figure 1. Although its construction is highly abstract, the model can potentially be empirically tested for consistency with real data. However, here we will only deal with its properties that will be exemplified by stylized hypothetical data. This may sound like cheating for scoring a cheap victory. The readers often demand that theories must be proven for its validity by real data. This is not a constructive approach and not only because of its methodological fallacy <sup>5</sup>.

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<sup>5</sup> A methodological remark in case you would really decide to test this (or any other) abstract model: All empirical inquiries should commence with a theoretical hypothesis to be tested. For example, in this case we raised a hypothesis that an increase in the migration of human capital will increase productivity, employment, wages and output – which the tests of stylized or "hard" data might really reveal. Can we then say that our theory was empirically proven to be correct? No! We have uncovered only how the real economy behaved. According to the inference theory of Karl Popper, we should be aware that whenever real data are consistent with our theoretical hypotheses this is not a "proof" of the validity of the theory, although such a result may be pragmatically very useful. The only certainty we (as scientists) could have at hand is when the model is disproved (i.e. falsified) by data. This is

Our aim in this chapter is primarily methodological, pointing to certain logical constructions of economic reasoning applied to migration. Such constructions (i.e. models) are independent of the data, which can be fed into its testing procedures. The model employed here can be used for experimental assessment of various scenarios of development relevant for real open economies. In what concerns this particular model for empirical testing, we can imagine quite concretely that the data, procedures and conclusions the TUC 2008 study (in the Bibliography below) would fit well into our tests.

**Figure 1: Stylized facts describing the effects of immigration of skilled workers that increases its original endowment by 33%**



The economic development in our abstract economy will depend on the endowments of two decisive factors: simple (unskilled) labor  $L$  and human capital  $H$  (i.e. skilled labor), following the logic of the Heckscher-Ohlin theories. There are two groups of products produced whose technologies require different combinations of these factors. The first group is composed of traditional products called "textiles ( $t$ )", whose production is intensive in the usage of  $L$ . The second group is represented by more sophisticated products called "computers ( $c$ )" that are intensive in the usage of  $H$ . The different factor requirements for producing  $t$  and  $c$  are described by the different slopes of their  $H/L$  lines that point to the vertices of respective Leontief production

definitely a paradox of knowledge. Therefore the humanity can be much more self-confident about the negative knowledge (i.e. what is false and what reasoning should be avoided – for example, blind alleys leading astray) than what is practiced as a knowledge not contradicted by the reality.

isoquants (for simplicity not shown in the figure). Domestic unit prices ( $p$ ) of textiles and computers are constant and given by the world market. We will work with the following prices per a unit bundle:  $p_t = € 6,563.4$  and  $p_c = € 5,433.5$ .

The original structure of the economy is represented by the GDP of € 1,000 million in point  $E_0$ , whose structure is € 696 million produced in textiles and € 304 million produced in computers (as the readers can verify by computing it from our input data). This structure of the GDP is given by the value added generated by factor costs. We will assume that the annual wages of simple L are € 4,699 while the wages of H are € 6,814, i.e. they are 45% higher.

The structure of the original factor allocation is as follows: out of 120,000 blue collar workers (L) measured in man-years, 106,000 workers produce textiles ( $L_t$ ) and 14,000 produce computers ( $L_c$ ). Of the 64,000 indigenous skilled workers (Hindig), 29,000 produce textiles ( $H_t$ ) and 35,000 produce computers ( $H_c$ ). That means 54% of the human capital are employed in computers and 45% in textiles, while 12% of the simple labor force are employed in computers and 88% in textiles. If the production is calculated in unit bundles, there are 106,000 units of textiles produced and 56,000 units of computers. Then we can calculate the results in Table 2 that characterize the current state of productivities.

**Table 2: The Initial State of Productivity**

Factor requirements per unit :			Annual wage
	Textiles	Computers	rates:
Simple labor L in man-years:	1.000000	0.250	€ 4,699
Human capital H in man-years:	0.273585	0.625	€ 6,814

The problem to be quantified and explained starts by introducing a change in the factor endowments caused by migration: there is a sudden influx of foreign workers with human capital coming to our home country. It will be represented by an increase of human capital stock H by 33.3%, moving it from Hindig to  $H_{new}$ , which represents a shift from 64,000 workforce of H to 85,333. That will shift the location of relative factor endowments from  $E_0$  to  $E_1'$ .

The hypothesis that we are going to test is: will an increase in the migration of human capital to our economy be associated with rising productivity, employment, national average wages and output? In other words: will such a migration bring us Pareto-efficient private economic benefits if necessary reallocations of factors are made?

In order to find answers to such questions we will have to test the data subject to further assumptions that also describe the properties of the model

applied. For simplicity and higher transparency of quantified changes we will assume that:

- a) There will not be a change in the physical labor productivity (in both L and H);
- b) Therefore also the wages of workers in industries will remain unchanged;
- c) Profits are a part of the wage structure (e.g. as the implicit "wages" of capital owners);
- d) Prices are equal to expended costs in the form of value added by such wages;
- e) The initial structure of production is equal to the structure of domestic consumption;
- f) Therefore, initially there is no need to enter into international trading;
- g) Aggregate consumption is a linear function of aggregate wages – thus the structure (but not the volume) of consumption by workers will remain the same as in the initial period;
- h) Whenever the structures of production and domestic consumption commence to differ, the economy must open up and get engaged in free exports and imports.

According to the Rybczynski theorem and given the assumptions described above, an initial change in endowments will have dramatic impacts on the whole economy. The ensuing changes can be expected and quantified:

1) First of all, there will have to be a deep restructuring on both the input and the output sides. The restructuring can be painful, revealing that the *transaction costs* to a more efficient allocation of world resources can be large. Some domestic workers will have to change their job, some enterprises will have to be liquidated and some new production capacities will have to be built. The influx of foreign workers also cannot occur without pressures on the social infrastructure and without a friction with the indigenous population. All these costs are difficult to estimate. However, if the flexibility of both the markets and the economic agents is high (as we can expect at least in the EU) the sum of economic benefits should be higher than the costs. Otherwise the migration would not take place. If the information about costs and benefits can be estimated and can become free, the processes of restructuring have many natural built-in incentives for a smooth economic readjustment: complying with relocations will be rewarded by higher standard of living.

2) The most visible change will happen in the allocation of human capital. Even though both industries need qualified labor, the real increase in the demand for human capital will happen in the booming computer industry only. Actually, the textile industry will have to shed 9% of all its workers (i.e. proportionally from both  $H_t$  and  $L_t$ ) in order to satisfy the 68% increase in demand of computer industry for their services. This transfer represents the

main domestic social burden of immigration, which is politically sensitive. However, not so much economically sensitive because there will be an expansion of employment in the computer industry (illustrated by two arrows). After restructuring, 69% of all human capital stock will be employed in computers and 31% in textiles (previously it was 55 and 45%), meanwhile 20% of all unskilled labor will be employed in computers and 80% in textiles.

3) The employment restructuring after migration is motivated by the changing opportunities in production and international trade. Actually, the production of textiles will have to decrease (as is predicted by the Rybczynski theorem) in order to boost the production of computers. Its output will rise by 68.6%, which is much more than an increase in its most intensive factor by 33.3%. According to our model, the output of textiles will have to be reduced by 9.2%.

4) Wages are the crucial incentive guiding the flows of both external migration and internal cross-sectoral restructuring. The latter can hurt: a part of  $H_t$  will have to relocate to computer industry. It implies learning of new skills and commuting without getting any compensation. However, 9% of the  $L_t$  that will have to switch for a job in computer industry, will be rewarded by a pay hike of 45%. It is a compensation for the costs of readjustment. Increased employment and a rise in national average wages by 2.6% might signal a boost to aggregate spending by 14.5% – but it need not be true if migrants send a large part of their incomes home in remittances. Migration can backfire by worsening the external balance of the host economy (World Bank 2006).

5) It is obvious that a change in endowments will have to influence the openness of the economy – a move that concerns the benefits from comparative advantages. In this case an increase in endowment of human capital will strengthen its comparative advantage, thus making the industry using this factor more intensively dependent on exports. Nearly a third of the production of computers will have to be exported; meanwhile the local market for textiles will have to absorb imports in the value of 26% of their domestic production.

6) Last but not least, the GDP value will increase up to 14.5% due the absorption of new migrants. There will be also a rise in the GDP per worker, even though by only 2.6%. This is an additional growth on top of the standard growth caused by eventual increases in physical productivities or in the quality of products (for simplicity we have not included such changes in this scenario). Our simulations lead to a conclusion that labor migration can be compatible with rising prosperity and it can even potentially generate positive externalities that may enhance the standard of living of the whole society in a Pareto-optimal way.

The reader should be reminded that all the above statements were derived from the logic of a theoretical model based on a series of assumptions simplifying the real economy. If real economic agents behave consistently with

our assumptions and if the policies are able to keep transaction costs low, we could expect that migration of qualified labor is not in conflict with the wealth creation in the host country. In other words, it is a simplification to say that migrants must automatically decrease local wages or crowd out indigenous workers into unemployment. Contrary to that: they may act as an exclusive catalyst for opening-up new opportunities to local workers.

If the host is an economically advanced country, as all OECD members are expected to be, then the inflows of highly qualified labor would strengthen their existing comparative advantages in products with a high content of human capital. If migrant labor comes from developing countries, comparative advantages of these countries would be strengthened also – that means comparative advantages in products containing simple labor. Paradoxically, the gains from their mutual trade could increase afterwards (at least in the medium term) even though the technological gap between developed and developing countries would widen. However, in the long-run developing countries could lose out because the brain drain reduces their chances to upgrade their comparative advantages to technologically more advanced products, for which there is a more dynamic demand.

Our model also implies that high transaction costs of migration and frictions in employment readjustments could impair the expected positive outcomes. Such a case can be raised if the indigenous labor is "specific" (i.e. it is highly immobile, becoming a sunk cost) or if the incoming labor is not able to be employed for wealth-enhancing activities and remains mired in a political bias towards demands for wealth redistribution policies. The problem can also be found in labor market imperfections, such as a trade unions' discrimination of transient workers, professional certificate regulation, lack of retraining, language incompetence, etc.

A significant divergence between the real impacts of labor migration (such as a loss in welfare in some segments of the host economy) and the predicted favorable results raise doubts about the vindication of our model, notwithstanding that the negative results should to be explained. The model guides us to suspect market imperfections or whether the decisions about re-employment were not constrained by institutionalized incentives (e.g. welfare programs or high unemployment benefits) that act against economic rationality. Rather, the experience from massive labor migration to Britain and Ireland prior to 2008 suggests that labor markets in those countries were quite flexible and economic criteria were dominant.

Our model could be further modified if the inflows of human capital can activate additional positive externalities. For example, increased production of computers can lead to scale economies decreasing the factor requirements per unit. Another example is that the higher endowment of human capital can upgrade the quality of products (e.g. by imported know-how) and boost the export price, increasing the gains from terms of trade and/or rising total factor



productivity in all industries. As a result, comparative advantages and economic development can accelerate even further merely by implementing more flexible policies towards the migration of labor.

We have explained with the use of simulations and stylized facts how an initial influx of labor with human capital may change the industrial structure and its comparative advantages. Consequently, the new pattern of specialization can result in high growth that is long-sustained. These are theoretical considerations that contribute with a new feature to the theories of endogenous growth and the policies of FDI promotion. We can also see that pure theories of product specialization (notwithstanding their high level of abstraction) can be instrumental in directing research of factor movements towards new explanatory linkages, hypotheses for testing, data collection and cross-sectional techniques of statistical estimation.

Research motivated and methodologically guided by pure economic theory can more easily de-mystify some prejudices, wishful thinking, naïve assumptions or intuitive conclusions about economic problems that people acquire by listening to tabloid journalists, lobbyists and politicians.

### Some Final Remarks

The topic of labor movement does not have such a long tradition in economics as the trade in goods does, and quantitative studies of migration—breaking down industries or skills—are still in their infancy. As the liberalization of labor markets widens the free movement of labor and as the coverage of cross-country migration statistics increases, broken-down by skills, the number of niches for research to be filled by our research grows.

As we have been stressing throughout this article, international economics offers a highly inspirational methodology for approaching the problems of labor migration. Though economics can be an excellent servant to anyone (the non-economists included), it can become a bad master if the users rely dogmatically on its cues. No model can overcome the shortcomings of the data and the constraints that we build (often implicitly and unconsciously) into its space for feasible solutions. What may also matter is the lack of skills for interpreting the results – leading it to become more an art than a mechanical description.

Moreover, economics is only a part of social reality. It is a means and not an end of human existence. In making decisions, real people combine selfish economic objectives (e.g. being rich in a short-run) with wider social and cultural aspects of their life. Working in some town, industry or enterprise with a given group of colleagues may become too important for people to want to change their job instantly. Europeans are particularly sensitive to the non-economic aspects of life. Their space for maneuvering is rooted in the very long term expectations of individuals and it is subordinated to family considerations as well as being subject to the constraints of the prevailing

education system, traditions, prejudices, institutional (e.g. legal or procedural) regulations or religious and moral codes. Thus, understanding the migration of people requires a truly comprehensive approach for its study.

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### **Suggested electronic readings:**

Herbert Brücker:

[www.iza.org/index\\_html?lang=en&mainframe=http%3A//www.iza.org/iza/en/webcontent/personnel/photos/index\\_html%3Fkey%3D70&topSelect=personnel&subSelect=fellows](http://www.iza.org/index_html?lang=en&mainframe=http%3A//www.iza.org/iza/en/webcontent/personnel/photos/index_html%3Fkey%3D70&topSelect=personnel&subSelect=fellows)

**Tito Boeri:**

**[www.igier.unibocconi.it/whos.php?nascondi=1220&tbn=albero&id\\_doc=177](http://www.igier.unibocconi.it/whos.php?nascondi=1220&tbn=albero&id_doc=177)**

**Wilhelm Kohler: [www.wiwi.uni-tuebingen.de/cms/lehrstuhl-homepages/international-economics/team/prof-dr-wilhelm-kohler/prof-dr-wilhelm-kohler-research-and-publications.html](http://www.wiwi.uni-tuebingen.de/cms/lehrstuhl-homepages/international-economics/team/prof-dr-wilhelm-kohler/prof-dr-wilhelm-kohler-research-and-publications.html)**

**Richard Layard:**

**[mitpress.mit.edu/catalog/item/default.asp?ttype=2&tid=8955](http://mitpress.mit.edu/catalog/item/default.asp?ttype=2&tid=8955)**

**James Markusen (about the trade theories):**

**[spot.colorado.edu/~markusen/publications.html](http://spot.colorado.edu/~markusen/publications.html)**

**Dani Rodrik:**

**[rodrik.typepad.com/dani\\_rodriks\\_weblog/2007/05/more\\_on\\_immigra.html](http://rodrik.typepad.com/dani_rodriks_weblog/2007/05/more_on_immigra.html)**

**Hans-Werner Sinn: [ideas.repec.org/e/psi146.html](http://ideas.repec.org/e/psi146.html)**

**Figure 1: Stylized facts describing the effects of immigration of skilled workers that increases its original endowment by 33% (magnified graph)**

