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Free Movement, Open Borders and the Global Gains from Labor Mobility

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Free Movement, Open Borders and the Global Gains from Labor Mobility

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Abstract: Straightforward economic arguments point to the potential for large global output gains from movement of labor from less to more productive locations. Yet the politics of receiving countries seems resistant, characterized rather by efforts to limit migration, or to stop it altogether. In this paper we examine the foundations of claims of large welfare gains through free mobility, studying implications of liberalizing migration for world welfare under a variety of models, paying attention not only to overall gains but also to how gains are distributed, and reviewing attempts to quantify the benefits. We conclude by asking how far considerations beyond economics motivate keenness to impose restrictions on migration.

[1] This paper has benefitted from conversations with Cormac O'Dea, Sebastian Otten, and Stan de Ruijter van Steveninck. We are grateful for constructive comments from George Borjas, Michał Burzyński, Michael Clemens, Mette Foged, David McKenzie and an anonymous referee.

Contents

I. Introduction

Where someone is born determines his or her future opportunities and the wealth they can accumulate over their life cycle. This is true both for differences within countries and between countries. To be born in a *poorer part* of a large country is to begin life with worse economic prospects than someone born in a better off part[2]. But the option to move means that those for whom the potential gain in income exceeds the cost of moving can improve their prospects by relocating. Not only is this a gain in overall output of the country but it is also distributionally positive since those whom it principally benefits are the poorer individuals in the country.[3] Similarly those born in *poorer countries* face more restricted economic opportunity, reduced possibilities to enhance their productivity through learning, and obtain lower wages for their work than do those in richer countries. And again, one way to improve their situation is to move to richer countries where they can command a higher price for their skills, and thus improve their lifetime income and global output. That same movement may also bring benefits and losses to those born in countries where wages are higher, as it increases labor market competition but also allows their economies to fill labor demand gaps by drawing on skills and talent not available in the native workforce.

[2] See the latest work by Chetty and Hendren (2018a, b) and Chetty, Hendren, Jones and Porter (2018), for example, on the importance of neighborhood in the US.

[3] Workers at the destination might face higher competition and owners of firms may gain from the larger pool of labor from which they can recruit. Interestingly, for migrations within national borders, these gains and potential losses to nonmigrants often weigh little in consideration relative to the migrant's chances of personal economic betterment, in stark contrast to international migrations

But these two situations are not treated similarly. The gains from labor mobility within countries are largely[4] unquestioned but free movement of labor between countries is politically controversial. Possibilities of international migration are limited, due usually to immigration restrictions in those countries where the price for labor is high. For these and other reasons, such as high migration costs and credit constraints, only a small fraction of those who could benefit economically from migration do so at any point in their life cycle, and receiving countries therefore only realize a fraction of the potential efficiency gains through migration.

Some argue that therefore "barriers to emigration place one of the fattest of all wedges between humankind's current welfare and its potential welfare" (Clemens, 2011). Several papers now attempt to quantify the magnitude of these potential gains. While these are not always as big as those found in the earliest works, such as Hamilton and Whalley (1984), the conclusion that migration is generally beneficial and that greater openness would create large global economic gains is more or less universal in academic studies.

To an extent, recognition that barriers to free movement prevent economically beneficial eradication of wasteful geographic inequality in labor productivity is built in to economic modelling. Adam Smith himself noted the cost to preventing free mobility, commenting that the policy of his time "*by obstructing the free circulation of labour and stock both from employment to employment, and from place to place, occasions in some cases a very inconvenient inequality in the whole of the advantages and disadvantages of their different employments.*" (Smith 1776[5])

[4] This is not to say that internal labor mobility is always accepted. The hukou system in China is an obvious current exception (see e.g. Liu 2005, Song 2014). Ties to land which prohibited free movement of labor within countries were often part of pre-capitalist economic systems.

[5] Book I, Chapter X, Part II

Below, we review the nature of relevant economic models and the basis for claims about the benefits from migration, who are the most likely gainers and losers, and whether the economic changes implied are of a magnitude that any required policy changes can realistically be implemented. We begin (section II) by developing the most basic model to illustrate the gains in world output that can be achieved through liberalizing migration and to illustrate the distributional consequences of mobility.

We next discuss reasons for the geographic differences in factor productivity (wages) that drive migration in such models and summarize estimates of global gains in such simple settings (section III). In the sections that follow, we discuss extensions of the basic model and what these imply for quantitative assessments of the gains. We investigate the welfare consequences when labor is heterogeneous and what non-transferability of skills implies for welfare analysis (section IV), what the benefits are when there are multiple goods, traded or untraded, and migration can affect market size in sending and receiving countries (section V). We introduce a public sector and discuss its interaction with the benefits from free mobility (section VI).

Despite the large potential economic gains that emerge from many of these studies -- "trillion dollar bills on the sidewalk" as Clemens (2011) puts it – governments of destination countries persist with restrictions on migration (Ruhs 2013) and these policy choices are widely supported (though also opposed) in those countries. It must be that either belief in the size or relevance of the economic gains is not shared by all or that it is outweighed by belief that those gains will be consumed by others and offset in importance by losses (either economic or non-economic) to those with votes to prevent migration. Is it therefore that the economic benefits of free mobility are not quite as straightforward? Or is it that non-economic factors such as desire for cultural homogeneity, fear of social change and, at the more extreme end, xenophobic attitudes, (see

Dustmann and Preston (2007), Card et al. (2012)), prevent countries from realizing huge economic efficiency gains? In section VII we ask how to reconcile the political reality in most countries with the hypothetical gains from migration established in the literature. Finally, section VIII provides discussion and conclusion.

II. The Effects of Labor Mobility - The Base Model

II.1 World Output Gains

The most obvious economic benefits to free movement of labor are driven by allowing workers to move from locations where their skills are less productive to locations where they are more productive.[6] If workers are paid according to the value of what they add to production and move from locations where they are paid less to where they are paid more then free movement increases the value of global output. If workers move to locations where they are paid the most then, at least in the absence of externalities, they will allocate themselves across locations so as to maximize the value of global output.

The situation is illustrated in the upper part of Figure 1. This useful diagrammatic representation, combining the diagrams for separate countries in Hamilton and Whalley (1984), is used in Bhagwati (1984), Clemens (2011) and Kennan (2016). We suppose two locations, A and B, with homogeneous and inelastically supplied labor inputs, L_A and L_B, which produce single outputs, Q_A and Q_B, There is free movement of *goods* between the two locations and output is traded at a common price which we can set as numéraire. Technologies and levels of other factors of production can differ. Price-taking firms demand labor at wages w_A, w_B up to the point that the

[6]Sjaastad (1962) considered migration as an "investment increasing the productivity of human resources, an investment which has costs and which also renders returns". In a Roy model (see e.g. Heckman and Honore 1990) these returns consist of differences between countries or regions in skill prices affecting individuals' productive capacity, and the (country specific) return rate to human capital, see Dustmann, Fadlon and Weiss (2011).

cost of an additional worker is equal to what is added to the value of output. The figure depicts the value of the marginal product of labor (equal to the wage) at locations A and B on the left and right vertical axis, while the horizontal axis carries labor supply. The two downward sloping lines are demand for labor curves, that for *A* reading from right to left and that for *B* reading from left to right. The width of the box is world labor supply *L*, equal to the sum of native workforces L_A^0 and L_B^0 at the two locations, and any point along the lower axis represents a split of the world labor force between the two locations.

[Figure 1 about here]

At the initial split, wages are higher in A than B at w_A^0 and w_B^0. Areas under the curves, $\mathcal{E}+\mathcal{H}+\mathcal{J}$ for location *A* and $\mathcal{A}+\mathcal{B}+\mathcal{F}+\mathcal{G}+\mathcal{I}$ for location *B*, equal the total value of output. In *A* the wage bill is the sum of the areas $\mathcal{E}$ and $\mathcal{H}$ and the remainder of the value of output $\mathcal{J}$ goes to whoever has a claim on the excess, which for expositional purposes we can call the owners of capital. In *B* the wage bill is the sum of the areas $\mathcal{F}$ and $\mathcal{G}$ and the remainder of the value of output $\mathcal{A}+\mathcal{B}+\mathcal{I}$ goes to capital. Movement of $\Delta L = L'_A - L_A^0 = L_B^0 - L'_B$ from *B* to *A*, represented by the thick red arrow, raises the wage in *B* to w'_B and reduces that in *A* to w'_A. The total gain in world output is given by the two shaded areas $\mathcal{C}+\mathcal{D}$, the difference between the increase in the value of output in A of $\mathcal{G}+\mathcal{B}+\mathcal{C}+\mathcal{D}$ and the fall in the value of output in B of $\mathcal{G}+\mathcal{B}$.

If world output is all that matters then this might be as much as needs to be said on the economic impact in such a simple setting. However, world output alone does not exhaust all interesting economic effects. Behind this lies a more involved pattern of redistribution between immobile factors as the movement of labor also leads to redistribution at each location between

workers and owners of capital. The growth in labor force employed in *A* and the fall in *B* changes the marginal products of immobile workers and other immobile factors, moving the economy along the demand for labor curve at each location so that wages rise in *B* and fall in *A*[7].

These changes in factor payments[8] can all be seen in Figure 1. Immobile labor at the receiving location A sees a fall in wage receipts from $\mathcal{E}+\mathcal{H}$ to $\mathcal{H}$ while owners of capital see an increase from $\mathcal{J}$ to $\mathcal{J}+\mathcal{E}+\mathcal{D}$. The block $\mathcal{E}$ is redistributed from labor to the owners of capital while there is a net gain of $\mathcal{D}$, the so- called immigration surplus (see Berry and Soligo 1969, Kenen 1971, Borjas 1995). This surplus arises because the labor demand curves slope down and immigrating labor is therefore paid less than the value of what it adds to production in A.

Parallel to this, immobile labor in B sees wage receipts rise from $\mathcal{F}$ to $\mathcal{A}+\mathcal{F}$ while payments to capital fall from $\mathcal{A}+\mathcal{B}+\mathcal{I}$ to just $\mathcal{I}$. A block $\mathcal{A}$ is in this case transferred from owners of capital to labor and a surplus of $\mathcal{B}$ is lost as a consequence of emigration (for a different diagrammatic illustration see Kenen 1971.) Immigrants themselves see wage payments rise from

[7] A large literature studies empirically the impact immigration has on equilibrium wages in receiving countries, treating worker movement as labor supply shocks (see Altonji and Card 1991; Card 1990, 2001; Borjas 2003; Ottaviano and Peri 2012; Dustmann, Frattini and Preston 2013; Dustmann et al. 2017; Llull 2014; Monras 2015; see Dustmann, Schönberg and Stuhler 2016 for a survey). A smaller literature investigates effects on wages in sending countries (see, for example, Aydemir and Borjas 2007 and Dustmann, Frattini and Rosso 2015).

[8] Suppose the production functions at each location is $Q_i=F^i(L_i)$, $i=A,B$. For a small movement of labor from *B* to *A*, the wage bill in *A* changes by $F_{LL}^A L_A + F_L^A$, the first part $F_{LL}^A L_A$ being the decline in wages paid to immobile workers in *A* and the second part F_L^A being the payment to the immigrating labour. Correspondingly, workers remaining in *B* enjoy a higher wage bill of $-F_{LL}^B\, L_B$ while $-F_L^B$ is no longer paid to departing workers. Meanwhile, there is a rise in payments to capital in *A* of $-F_{LL}^A L_A$, exactly offsetting the fall in the wage bill of immobile workers, and a fall in payments to capital earned in *B* of $F_{LL}^B\, L_B$. In this simple world therefore migration of workers from *B* to *A* leads to an overall gain of world output of $F_L^A(L_A) - F_L^B(L_B)$.

$\mathcal{G}$ to $\mathcal{G}+\mathcal{B}+C$, a gain of $\mathcal{B}+C$. Adding together gains and subtracting losses gives the total gain of $C+\mathcal{D}$.

II.2 Effects on Social Welfare

While this simple model and diagram show migration of labor raising world output, it also shows distributional effects, which disadvantage, for instance, workers at the receiving location. If world social welfare is evaluated with indifference to the distribution of income then the gain in world output is enough to say that labor movement is socially beneficial. However this gain potentially obscures a pattern of redistribution that needs to be considered if world social welfare is sensitive to distribution.

To draw conclusions on social welfare consequences we need to know therefore how the returns to factors are distributed to people. In other words we need to understand ownership of the rights to factor returns. We can assume that wages are straightforwardly paid to workers but returns to capital are more problematic (see Berry and Soligo, 1969).

Consider some extreme cases. Firstly, suppose ownership of capital at both locations were equally spread across its native workforce, and that migrants retained ownership of capital at the location of origin rather than gaining it at the destination. If we begin by thinking about a small change, then since migration surpluses $\mathcal{B}$ and $\mathcal{D}$ are negligible in such a case, the redistribution between labor and capital within each country would simply change the way in which income was received by non-movers. As a small movement would have no impact on immobile workers' total incomes, effects on immobile workers could therefore be neglected and there would be an unambiguous gain in world welfare from the increase in output which would be captured in higher wages by the migrants (Grubel and Scott 1966).

If there are costs to migration borne by migrants then these straightforwardly count against these gains. If any of the wage gains are remitted by migrants to non-movers in the sending country then this is a progressive transfer of resources that makes the gains even greater from the point of view of any egalitarian social welfare assessment[9].

For larger movements, of the sort that might be seen under global open borders, it would be necessary to consider the migration surpluses. Workers at A would gain and share among themselves the immigration surplus $\mathcal{D}$ associated with the new arrivals. The loss of the surplus $\mathcal{B}$ would be split among the non-movers at B and migrants, while migrants would gain an additional $\mathcal{B}+C$ in improved wages. So a typical native of A would gain $\mathcal{D}/L_A$, a non-mover at B would lose $\mathcal{B}/L_B$ and a migrant would gain $(\mathcal{B}+C)/\Delta L-\mathcal{B}/L_B$. Since all types of workers enjoy both capital and labor income it is not obvious which of these groups are best or worse off to begin with so it is not possible to take distributional analysis much further.

Alternatively, we could assume that workers receive only wages and returns to capital accrue entirely to a separate class of capitalists. The lower panel of Figure 1 illustrates the distributional effects on workers using a generalized Lorenz curve representation (Shorrocks 1983). This is a curve plotting cumulative income against share of world population from the poorest to the richest. Since the least well paid are workers in country B both before and after migration an ordering of the world's workforce by income coincides exactly with the position of workers on the lower axis of the diagram. The generalized Lorenz curve is a useful graphical tool

[9] Djajić (1986) draws attention to the importance of remittances to assessment of welfare effects.

since, as Shorrocks shows, global worker social welfare will increase for all inequality-averse social welfare functions if and only if the generalized Lorenz curve is higher everywhere.[10]

Before migration the curve has a first section of length L_B^0 and slope w_B^0 and a second section of length L_A^0 and steeper slope w_A^0. After migration the first section shortens but gets steeper and therefore lies above the pre-migration curve. From that point onwards the slope is w_A', the post-migration wage of workers in A. There is a short section covering the migrating population where that slope is even greater than the pre-migration slope and where the generalized Lorenz curve therefore pulls away even further from that before migration (representing the gains of migrants). Then the remainder of the curve, covering immobile workers in A, has a slope lower than that before migration (representing the wage losses in the receiving country).

As long as the curve ends up at a point higher than that at which it ended beforehand, then it is unambiguously higher all along and global worker social welfare unquestionably increases. This condition is just the condition that global workers income does not fall which is to say that $\mathcal{A}+\mathcal{B}+C-\mathcal{E} \geq 0$ or, in other words, that gains to immobile workers in the sending country ($\mathcal{A}$) and to migrants ($\mathcal{B}+C$) at least match losses to immobile workers in the receiving country ($\mathcal{E}$).

If there were costs of migration, borne by migrants, then this would reduce the slope of the section of the post-migration generalized Lorenz curve corresponding to the migrants' incomes, though there would still be a guaranteed case of welfare dominance provided that the total migration costs, say $\mathcal{K}$, were not large enough that $\mathcal{A}+\mathcal{B}+C-\mathcal{E}-\mathcal{K}$ were negative. Remittances

[10] Davies and Wooton (1992) use Lorenz curves to analyze effects on inequality separately for different locations assuming each individual owns only one type of factor.

from migrants to origin country stayers would shift the curve up further and magnify the social welfare gain.

How to incorporate changes in capital owners' incomes into the welfare calculus is less clear. There is a deterioration in the income of capital owners in B and a gain to capital owners in A, involving not only the changing shares of output but also the gains and losses of the immigration surplus. But we have not specified how capital owners' incomes compare to those of workers or how the incomes of capital owners at one location compare to those in the other, partly because we have not specified how many individuals are in the capitalist class. If capital owners are small in number and sufficiently rich that changes in their incomes can be regarded as of small welfare significance, then considering the effects on workers' welfare might be regarded as the most pressing consideration.

II.3 Assessing the Effects of Free Movement

Free movement of labor means no restriction on the right of workers to move between locations for employment or on the rights of potential employers to recruit between locations. If locations are within the same country then free movement is simply absence of restrictions on internal geographic labor mobility. If the locations are thought of as different countries within a region with political and cultural links then free movement might be part of a geographically limited political project to reduce the economic significance of borders as, for example, with free movement within the EU or other economic areas. If the locations are thought of as all countries then free movement can be identified with the more radical idea of global open borders.

If workers have no reason to prefer one location to the other except for wages receivable and there are no costs to migration itself then migration under free movement should continue until

wages are equated at the two locations. This means that marginal products will be equated. This is, of course, a necessary condition for maximization of global output. Free movement ensures productive efficiency by directing labor to where it is most productive. Such an idealized situation is illustrated in Figure 2 in which migration is pushed to the point where inequality of wages is eliminated and the global generalized Lorenz curve for workers is therefore a straight line.

[Figure 2 about here]

If, on the other hand, workers are not indifferent to location, because of cultural preference for their society of origin or because there is a cost to migration then marginal product will stop short of being equated at the two locations. Nonetheless whatever movement of labor does happen will still be productively beneficial.

This is the simplest economic case for allowing free movement, similar to that underlying many simulations from Hamilton and Whalley (1984) onwards. It facilitates productive efficiency by allowing labor to move to where it is most economically valued. Furthermore, the case extends naturally, without the point needing to be belabored by spelling out the detail, to that in which labor is heterogeneous, with skills of different types moving to where they are most needed. As explained below, it can lead to very large estimates of potential gains, driven by very large international differences in wages. However it ignores multiple complexities associated with questions of the nature of production, whether movement might be encouraged or discouraged by other considerations inimical to productive signals and so on.

This simple model has been extended in succeeding literature in various directions. In these works, output can be a single good as above (Hamilton and Whalley 1984; Moses and Letnes 2004, 2005; Klein and Ventura 2007, 2009) or it can be many goods (Walmsley and Winters 2005; Iranzo

and Peri 2009; Kennan 2013, 2016; di Giovanni, Levchenko and Ortega 2015), and goods can be costlessly traded (Kennan 2013, 2016) or traded with costs (Iranzo and Peri 2009; Aubry, Burzyński and Docquier 2016) and some not traded at all (di Giovanni, Levchenko and Ortega 2015). The market for those goods can be competitive or not (Iranzo and Peri 2009; di Giovanni, Levchenko and Ortega 2015; Aubry, Burzyński and Docquier 2016). Labor can be of a single type (Hamilton and Whalley 1984; Moses and Letnes 2004, 2005), it can be differentiated into skilled and unskilled (Iregui 2005; Klein and Ventura 2007, 2009; Kennan 2013, 2016) or even differentiated along a continuum according to skill level (Iranzo and Peri 2009). The supply of those types of labor can be fixed or can be elastically supplied so that changes in wages induce changes in the global supply. Skills of workers can be internationally transferable or can be, to varying degrees, specific to the location of origin (Klein and Ventura 2005, 2009; di Giovanni, Levchenko and Ortega 2015; Aubry, Burzyński and Docquier 2016). Likewise, capital can be fixed (Hamilton and Whalley 1984; Moses and Letnes 2004, 2005) or mobile between locations (Iregui 2005; Klein and Ventura 2007, 2009; Kennan 2013, 2016), and there may be other immobile factors such as land (Klein and Ventura 2007, 2009). Technology could be the same everywhere but is typically assumed to differ across locations (Hamilton and Whalley 1984; Moses and Letnes 2004, 2005). If technology differs it can be through differences in total factor productivity (Klein and Ventura 2007, 2009) or specifically in labor productivity (Kennan 2013, 2016) or both. Labor income can be consumed locally by migrants or can be, in part, remitted to the location of origin and spent there (Walmsley and Winters 2002; di Giovanni, Levchenko and Ortega 2015). Factor incomes can be taxed or not and the revenue used to fund public spending (Iregui 2005; Aubry, Burzyński and Docquier 2016). Labor movement can be costless or there can be psychological or legal costs to migration which can be similar in form for similar individuals

(Iregui 2005; Iranzo and Peri 2009) or show more complex heterogeneity (Kennan 2013, 2016; Docquier, Machado and Sekkat 2015).

Besides questions about the way in which to model the economic effects, there are also questions about how those effects should be evaluated. It can be simply global GDP or it can account for distributional sensitivities, which may lead to very different conclusions, as we point out above and discuss further below. Going beyond consideration of the straightforwardly economic impact we can recognize that migration has social and cultural impacts which may well be of more importance for understanding public attitudes and the resistance to liberalizing of international labor movement than economic effects (see Dustmann and Preston, 2007; Card, Dustmann and Preston 2012), as discussed in section IX.

III. Sources of International Productivity Differences

III.1 Differences in Factor Endowments

Given the importance of differences in marginal products (and therefore wages) at different locations to the economic gains from free movement it is worth asking what possible reasons there might be for the existence of such differences. Why would marginal products differ between locations in the absence of migration? The most obvious reasons concern differences in factor endowments. The two locations may have identical production functions but differ in endowments of labor. The labor-rich location will then have a lower marginal product of labor and free movement would be economically advantageous by virtue of spreading the labor force more evenly across locations.

But typically there are also differences in other factors of production and it is international differences in the supply of labor relative to other factors that is critical. Say again that technology

at the two locations is the same and that output is produced using labor L_i and some other factor, which we will call capital K_i, wages still being denoted w_i and the price of capital being r_i, i=A,B. Suppose that production shows constant returns to scale in labor and capital so that we can write a common unit cost function $c(w,r)$, increasing and linearly homogeneous, giving the cheapest cost of producing one unit of output. Profit maximization in competitive factor markets will lead to equating of marginal products to factor prices for both factors and of unit cost to output price. Equivalently

$$c(w_i, r_i) = 1 \qquad i = A, B \qquad (1)$$

and

$$g(w_i/r_i) = \frac{K_i}{L_i} \qquad i = A, B \qquad (2)$$

where $g(w_i/r_i) \equiv c_r(w_i, r_i)/c_w(w_i, r_i)$.

Differences in the marginal product of labor between locations can be a consequence of either differences in labor employed or differences in capital. In particular, if labor is evenly divided between the locations but A has a greater immobile capital stock then labor will be attracted towards A to enjoy the higher productivity associated with its higher capital-labor ratio. If capital and labor are themselves heterogeneous then the greater complementarity between certain types of labor and certain types of capital may lead to migration so as to sort labor efficiently according to the location of particular sorts of capital.

Just as labor can be mobile so also could be other factors. The analysis of Figures 1 and 2 is based on labor demand curves taking as fixed the location of other factors But differences in factor endowments which cause differences in returns to labor will also cause differences in return

to capital and if there is free movement of capital then capital will tend to move also to where it is best rewarded. Indeed cultural barriers are less likely to inhibit capital mobility (though, to the extent that capital may be physically fixed, other considerations may do).

If capital is perfectly mobile then the price of capital will be equated between locations: $r_A = r_B = r$, say. But if this is so then it follows from (1) that $c(w_A, r) = c(w_B, r)$ and that wages must also therefore be equalised: $w_A = w_B = w$, say. From (2) it is then clear that capital-labor ratios will be equated across locations by virtue of capital movements whether labor is free to move or not, $K_A/L_A = K_B/L_B = g(w/r)$. In this case, capital moves between locations so as to spread itself proportionally to labor so that factor prices for both capital and labor are equalized, removing any economic incentive for labor to move. Free movement of labor is then unnecessary to achieve spatial productive efficiency. Constant returns to scale means that the location of production is immaterial provided that the capital-labor ratio is equal at different locations. Wherever labor is located, capital will join it in a way such as to ensure productive efficiency and a marginal product of labor which is the same everywhere. It follows therefore that, in this still simple world described by the model where capital and labor are used to produce one output good according to technology which is the same everywhere, free movement of labor is required to achieve productive efficiency only to the extent that free movement of capital is somehow restricted.

III.2 Technological Differences

The discussion above has concentrated on differences in marginal product of labor between locations as both a source of incentives to migrate and the reason why it is economically beneficial.

However – as shown above – different endowments of labor or capital, as sole causes of such differences would be nullified by capital mobility alone, without the necessity that labor moves across places. Furthermore, exercises in development accounting (Caselli 2005, McGrattan and Schmitz 1999) conclusively reject differences in factor endowments as sufficient explanations of international productivity differences under a common technology.

But what then leads to sustained differences in labor productivity, despite capital mobility and trade? Another reason for divergence in marginal products across locations is differences in technology. Technology differences can be thought of as differences in physical specification or quality of fixed infrastructure or differences in working or productive practices at different locations. We can imagine production functions differing quite generally but it is common to be more specific about the nature of difference. Suppose we return to the case of one traded good with two factors of production. If location *A* has production function *F(L,K)* then we could suppose that location *B* has production function $\alpha F(\beta L, K)$ where α and β are parameters capturing technological difference. The first (α) allows for a Hicks-neutral difference in total factor productivity. If α<1 then both labor and capital are less productive in location *B* but the ratio of marginal products is unaltered. On the other hand, if $\beta < 1$ then labor is specifically disadvantaged.

If the unit cost function in *A* is *c(w,r)* then the unit cost function in *B* is $c(w/\beta, r)/\alpha$. Hence under profit maximization and zero profits

$$c(w_A, r_A) = 1 \qquad (3)$$

$$\frac{1}{\alpha}\, c\left(\frac{w_B}{\beta}, r_B\right) = 1 \qquad (4)$$

$$g(w_A/r_A) = K_A/L_A \qquad (5)$$

$$\beta g(w_B/\beta r_B) = K_B/L_B \qquad (6)$$

Suppose either α alone or β alone or both are less than one, so there is some technological disadvantage at B. Then (3) and (4) cannot both be true with wages and rental rates equal at the two locations. Free mobility of capital and labor will tend, if allowed, to drag both factors inexorably towards the more productive location.

If capital mobility alone is unrestricted, so that $r_A = r_B = r$, then (3) and (4) imply $w_A > w_B$ so the marginal product of labor will be higher at A and workers will want to move from B to A. If capital is immobile and labor mobility is unrestricted then labor will move until allocated across locations so as to satisfy (3)-(6) with $w_A = w_B = w$ and capital-labor ratios will generally differ across locations.

To the extent that technological differences reflect immutable conditions at the two locations, such differences may persist indefinitely. However, if differences reflect differences in knowledge or customs at the two locations then migration may itself be a means of transfer of technology between them. If the two countries are subject to knowledge shocks then it may be the movement of people between the two countries that transfers productive knowledge or practice and ensures dissemination of productivity-improving innovations. During the large after-war labor migrations within and to Europe, some sending countries hoped for such knowledge transfer to help their industrializing economies with essential skills (see e.g. Mehrlaender 1980, p.82). [11]

[11] Immigration may also be an important source of innovation in itself, affecting the technology of the receiving country (see e.g. Kerr, 2018).

III.3 Quantifying the Gains to Free Movement

The earliest significant attempt to quantify the potential economic gains from liberalization of international labor mobility was Hamilton and Whalley (1984). A single traded output good is produced by homogeneous labor and immobile capital. Technology has a constant imposed elasticity of substitution covering a range of plausible values. The world is divided into seven regions with differing total factor productivity and relative factor productivity parameters, values for which are calibrated to 1977 data on GNP and factor shares.

The effects of removing immigration controls worldwide are simulated by finding the hypothetical allocation of labor across regions that equalizes marginal revenue products. There are implicitly no movement costs and equilibrium population distribution is driven by technology differences and capital location. Potential gains, though "highly speculative" are enormous. In the base case, worldwide efficiency gains vary from about three quarters of world output to over twice world output depending upon whether low or high values for the elasticity of substitution between labor and capital are assumed; for the central case of unit elasticity of substitution the gains are about one and a half times world output.

Distributional effects are also dramatic. In the central case (with unitary elasticity of substitution) wages in the most developed region (the United States) fall by almost half while those in the least developed increase more than tenfold (with large changes in return to capital in the other direction). A global Lorenz curve shows world inequality cut to a fraction of the existing level. "The incentive for labor unions in high wage countries to oppose liberalization of immigration restrictions" is noted.

While these figures are striking, they rely on reforms that take the world economy to points very far from experience (as emphasized, for instance, by Borjas 2015). The precise values for gains obviously rely heavily on extrapolability of the specification adopted but they are so large that this is unlikely to affect the conclusion that this is a reform with very big potential worldwide efficiency gains relative to other policy reforms under discussion. Interestingly, Hamilton and Whalley note that a large fraction of the efficiency gains can be realized with only partial liberalization since the concave technology assumed implies marginal product differences which come down rapidly in initial phases of migration. A closing of only ten per cent of international wage differences, for example, generates over 40 per cent of potential gains in one case which they draw attention to.

Moses and Letnes (2004, 2005) replicate Hamilton and Whalley, update the simulations from data in the late 1970s to late 1990s and consider alternative values for some parameters, including dividing the world into 3 rather than 7 regions. The point about largest gains being realizable with only moderate liberalization is confirmed with more detail, in particular about distributional effects. In their central case, a ten per cent closing up of international wage gaps realizes about 22 per cent of potential gains with wages falling by 3.1 per cent in the most developed region and rising by 11 per cent in the least (Moses and Letnes 2004). Where they are particularly informative is in giving an indication of the size of the population flows involved (something absent from Hamilton and Whalley). Whereas the simulation with complete open borders involves an astonishing 3 billion people migrating (or 60 per cent of the global workforce), the ten per cent liberalization is achieved with the smaller, though still substantial, movement of a little under half a billion.

IV. Characteristics of Labor

IV.1 Heterogeneity of Labor

So far, we have assumed that there is only one type of labor. If workers have different skill levels, however, then the simple diagrammatic exposition above is no longer adequate and indeed obscures considerations that may be relevant to assessing the distributional consequences.

Suppose L_A and L_B are vectors of labor in a variety of different types, distinguished by skills. In this case movement of a worker of any type from one location to the other motivated by difference in the wage for their skill type in the two places will still raise global output, but a full consideration of the distributional impact, in source and destination locations, will require an evaluation of the impact on labor of all types. To see that, assume that the migrant is of a particular skill type. As in the analysis above, wages of similarly skilled types will be depressed at the receiving location and rise in the sending location. However wages of other types of worker in the two locations will also be affected and in ways that will depend on the complementarity or substitutability between labor of the different skill types. In particular, those supplying labor which is closely substitutable will suffer at the receiving location whereas labor which is complementary will gain. Suppose for example that highly skilled and less skilled labor are complements. Emigration of highly skilled labor will benefit unskilled workers in the receiving location but harm unskilled workers in the sending location. This sort of phenomenon is part of the source of concern about the so-called "brain drain" effect on poorer countries.[12]

[12] Different types of labour may also have different ability to bear the costs of migration. If for instance there are fixed migration costs concerned with travel, paper work and so on or if cultural adaptation in the receiving society is easier for those with higher skills (and therefore higher incomes) then migration may be concentrated among highly skilled labour.

Welfare analysis has to take account of the heterogeneity of labor income recipients. For instance, migration from country B to country A of a labor type that is not the worst off in B may not be beneficial to the least advantaged in the world income distribution and therefore not be evidently beneficial for global social welfare. Consider for example the case of just two types of labor, unskilled and skilled, in B and A, where initial wages have an ordering such that $w_B^U < w_A^S$ and both w_A^U and w_B^S lie somewhere in between them. Here w_i^U and w_i^S stand for the wages of unskilled and skilled workers in the *i*th location respectively. Now allow for migration of skilled workers from B to A. This will depress wages of the topmost and bottommost groups, assuming complementarity between labor of different skill types, and raises wages in the middle two groups[13]. We illustrate the distributional effects among workers in Figure 3, using a generalized Lorenz Curve representation. It is obvious from the figure that in this case, although world labor income rises, the generalized Lorenz curves cross because of the losses to the worst off world citizens. If the poorest are made worse off than a sufficiently inequality-averse global social welfare functions will judge that global worker social welfare decreases even if world income rises.

The extensive literature on brain drain effects is focused on this problem and identifies several mitigating and complicating considerations (Bhagwati and Rodriguez 1975, Docquier and Rapoport 2012). Remittances from migrants to unskilled non-migrants in sending countries can more than compensate for losses (Bollard, McKenzie, Morten and Rapoport 2011). Furthermore, if the supply of skills is responsive to economic incentives then the higher wages available to the initially unskilled in poorer countries could incentivize development of human capital in a way

[13] Ruffin (1984) considers possible effects of factor flows on factor returns in models with more factors than goods and different patterns of complementarity and substitution. Davies and Wooton (1992) draw Lorenz curves for different countries under a variety of assumptions about which factors are complements and substitutes.

that also counteracts its deleterious effects (Mountford 1997, Mountford and Rapoport 2011, Beine, Docquier and Rapoport 2008). Furthermore returning migrants can bring back skills, technological knowledge and trading links that ultimately help the source country.

IV.2 Transferability of Skills

The discussion of technological differences above raised the possibility that labor might be less efficiently used at one location than another. It is possible however that the lower productivity of apparently similar labor at the two locations may be tied, at least temporarily, to the person as a result of upbringing and education rather than to the location where the labor is employed. The assumption that labor productivity can be enhanced by moving between locations is then questionable. If skills are not transferable, or not so immediately, then movement of labor cannot be obviously analyzed in the framework we have set up above. For instance, if the skills immigrants bring with them are not productive at the receiving location (for instance, because lack of language skills leads their skills to be not transferable to the host location's labor market), then migrations may still take place (because, say, technological differences lead workers' marginal products in the receiving location in unskilled jobs to be higher than in skilled jobs back home), but the gain to global worker social welfare is smaller, and there are different distributional consequences.

There are many reasons for why skills may not be perfectly transferable. For instance, skills may be specific to institutional settings at the place of origin, migrants may lack skills that allow them to make the knowledge they have more productive, such as language proficiency or cultural knowledge, or there may be informational deficiencies that create frictions. There is ample evidence that "downgrading" takes place, where workers find employment in the receiving country in jobs that are below their level of observed skills. For instance, Dustmann, Frattini and Preston

(2013) show that for the UK, workers are placed in the UK labor market at very different positions in the wage distribution than where their observed skills would typically place them if they were natives. Dustmann, Schönberg and Stuhler (2016) illustrate similar patterns for Germany and the US. Also, earnings equations estimated for immigrants usually show that education as well as experience gained in the home country have far lower returns than when obtained in the host country (see e.g. early papers by Chiswick 1978 and Dustmann 1993).

Suppose labor is heterogeneous. High skilled immigrants migrate in the expectation of eventually competing for high skilled jobs in the recipient country but initially seek employment in low skilled jobs while acquiring necessary skills or finding their way into job acquisition networks which will give them access to better jobs. In this case, even high skilled immigration could depress wages of low skilled workers in the receiving country (see Dustmann, Schönberg and Stuhler 2016 for further discussion).

Quite a complex pattern is then possible. Take an example where there is unskilled and skilled labor in B and A and the initial wage ordering has $w_B^U < w_B^S < w_A^U < w_A^S$. Assume there is migration of skilled workers in B to A where they work as if unskilled. This depresses wages of the worst off group in each country and improves the wages of the better off in each country. The unskilled in B lose out because they are working with fewer skilled workers, assuming complementarity, and the unskilled in A lose out because they are competing with an influx of skilled workers from B. On the other hand skilled workers in B gain because they have fewer competing workers locally and those in A gain because they are working with migrants in unskilled jobs. Generalized Lorenz curves can cross multiple times. This case is illustrated in Figure 4.

Borjas (2015) goes further in suggesting that not only may the skills of migrants from poorer countries fail to transfer productively but also that migrants may bring with them poor

working practices that could spill over to receiving countries. He argues that the existence of large global gains presupposes implausibly `that billions of immigrants can move to the industrialized economies without importing the "bad" organizations, social models, and culture that led to poor economic conditions in the source countries in the first place' and that the lack of evidence on such effects renders claims of large gains tenuous.

IV.3 Quantifying the Gains with Skill Differences and Imperfect Transferability

The simulations in Hamilton and Whalley (1984) and Moses and Letnes (2004, 2005) include some which allow that labor in less developed countries might transfer to developed regions with lower productivity. This reduces the estimated gains considerably even though gains remain large.

Iregui (2005) adds heterogeneity in labor by allowing for skilled and unskilled labor and a two-stage nested CES production specification. In her model each country has a single output but different goods are produced in different countries and consumers in each country have preferences between goods produced at home and abroad. Taxation is incorporated. Gains from eliminating migration restrictions are between 15 and 67 per cent of world GDP and most of the gain is associated with movement of unskilled labor (if only because this is the larger part of the workforce). Extensions to the standard model allow for capital mobility and for costs of migration.[14]

[14] Cortes and Tessada (2011) make the point that low skilled immigrants may perform household tasks that are otherwise carried out by skilled native women and, by allowing them to participate in the labor market, help increasing overall productivity of the native work force.

Walmsley and Winters (2005) develop a computable general equilibrium model in which temporary and permanent migrants have different productivities, there are multiple production sectors and remittances are modelled. Liberalization of temporary migration is beneficial to both developing and developed economies and, as in Iregui, relaxation of unskilled migration is most important.

Klein and Ventura (2007) also differentiate between skilled and unskilled labor, concentrating on the role of TFP differences in driving migration, adding land as a factor, and allowing capital to be fully mobile. Their model is intertemporal, individuals have finite lives and migration is permanent (which is to say that no return is allowed) and there are costs to migration (both psychic costs and loss of productivity through imperfect transferability). Combining cross-country data from the Penn World Tables with parametrizations from a variety of sources they assess the potential impact of liberalizing reforms. Large population movements are needed to allocate population fully efficiently but there are substantial output gains as a consequence; nonetheless even "(sub-optimal) small labor movements" can generate "fairly large changes in output". Movement of capital is found to be an important part of the story and dampens down the resulting wage losses in countries receiving large labor inflows. As with other studies, the authors conclude that "hardly any policy reform at a global scale … would deliver output gains of similar magnitude" and that it is barriers to mobility of unskilled labor that causes the worse distortion. Specific simulations in Klein and Ventura (2009) suggest large gains to free mobility of labor within both the EU and (hypothetically) NAFTA.

Docquier, Machado and Sekkat (2015) use a general equilibrium model with two worker types and nested CES production, but are distinctive mainly for using Gallup World Poll data on migration intentions to estimate costs of migration within a random utility model of migration

decisions. The high migration costs found suggest that potential flows are much smaller and gains to liberalization correspondingly reduced. Delogu, Docquier and Machado (2018) incorporate effects on education and fertility decisions of migrants and find that this magnifies the long run gains as population growth diminishes and education improves in migrant populations.

V. Trade

V.1 Trade with Multiple Goods

So far, we have assumed that there is only one (traded) output good. If we allow for multiple output goods (all traded), then it is unnecessary for even capital to move to achieve equalization of factor prices across locations. Mundell (1957) recognized that movements of goods and of factors could be regarded as substitutes. Free movement of goods across locations (and free movement of factors between production of different goods at the same location) may be enough alone to equate wages across countries (Samuelson 1948, Lerner 1952).

To see this better, suppose there are two goods Q^0 and Q^1 produced using common production functions with the usual properties. Suppose both goods are traded and let their prices be p^0 and p^1. Unit cost functions, labor, capital and so on in the two sectors are distinguished by superscripts in the obvious way. Then, so long as both goods continue to be produced at both locations,

$$c^I(w_i, r_i) = p^I \qquad i = A, B, \;\; I = 0,1 \qquad (9)$$

$$g^I(w_i/r_i) = K_i^I/L_i^I \qquad i = A, B, \;\; I = 0,1 \qquad (10)$$

$$L_i^0 + L_i^1 = L_i \qquad K_i^0 + K_i^1 = K_i \qquad i = A, B \qquad (11)$$

This is basically the Heckscher-Ohlin model of international trade. It is well-known that, even without mobility of factors, factor prices are equalized across locations in this model. From (9) $c^0(w_A, r_A) = c^0(w_B, r_B)$ and $c^1(w_A, r_A) = c^1(w_B, r_B)$ which, given appropriate regularity conditions, together require $w_A = w_B = w$, and $r_A = r_B = r$. Movement of factors between industries producing the two goods at each location ensures that capital-labor ratios within each sector are equated across locations and this brings marginal products into line everywhere. There is no need for movement of capital or labor to make this happen and therefore no economic incentive for workers to move between locations.

The result holds only however if both goods are actually produced in both countries. If capital-labor ratios are sufficiently different in the two countries then it is possible that one or other might specialize completely in production of one of the goods. If that happens then the reasoning above breaks down.

Technology differences will also destroy factor price equalization. Suppose that, in line with Section III.2 above, location *B* has production functions $\alpha F^i(\beta L^i, K^i)$ so that the parameters determining both total factor productivity differences α and labor-augmenting differences β are common to the two sectors. Then

$$\alpha c^I(w_A, r_A) = c^I(\alpha w_A, \alpha r_A) = c^I(w_B/\beta, r_B) = p^I \qquad I = 0,1 \quad (12)$$

$$g^I(w_A/r_A) = K_A^I/L_A^I \qquad I = 0,1 \qquad (13)$$

$$\beta g^I(w_B/\beta r_B) = K_B^I/L_B^I \qquad I = 0,1 \quad (14)$$

From (12) $\alpha\beta w_A = w_B$ and $\alpha r_A = r_B$ so a Heckscher-Ohlin-like factor price equalization result holds but for technology-adjusted labor and capital and, from (13) and (14), $K_A^I/L_A^I = K_B^I/\beta L_B^I$ so capital-labor ratio will be lower in B in both sectors. If technology difference is solely labor-

augmenting, $\alpha = 1$, then we find $\beta w_A = w_B$ so the price of labor is equated in efficiency units. But that still leaves an incentive to migrate.

As labor moves from B to A then global production of the more labor-intensive good will increase relative to the other good since global labor will now be located where it is more productive. Price effects can be involved. The relative price of that good will tend to fall, to the benefit of those at whichever location imports that good, and wages will tend to fall, to the detriment of labor (Kenen 1971, Rivera-Batiz 1983).

Kennan (2013, 2016) considers such a model in which productivity differences drive migration but these are specifically labor-augmenting differences rather than differences in total factor productivity. There is a distribution of psychological costs to migration within the population of potential migrants which prevents the entire population migrating to locations with the better technology. As labor moves the global supply of efficiency units increases since labor is located where it is more technically efficient and wages consequently fall everywhere for non-migrants. Nonetheless global income increases.

Using information on international wage differences from Clemens, Montenegro and Pritchett (2008) and on labor shares from Gollin (2002) and Bernanke and Gurkaynak (2002), gains from global open borders are assessed (Kennan 2013). A more recent paper extends the analysis to EU free movement (Kennan 2016). Global open borders yield gains which are "enormous", comparable to doubling the income of an average person in a less developed country. Gains from EU free movement are less dramatic, since productivity differentials are less marked, but still substantial. Depressing effects on real wages in receiving countries are surprisingly small, especially in the long run if higher returns to capital are allowed to induce higher investment.

V. 2 Non-Traded Goods and Market Size

Discussion so far has been premised on the assumption that all forms of output are traded costlessly on world markets. There is therefore no possibility that movement of labor can have any effects through changing the size of goods markets at sending and receiving locations. Migration changes the location of production but the goods produced can be consumed anywhere. If we allow instead that some or all goods might either be traded with costs or not traded at all then this is no longer so. Immigration adds to local demand for less than fully traded goods and this can be a source of local benefits (and emigration can be correspondingly harmful).

Rivera-Batiz (1982) considers a model with two locations, two factors, one traded and one nontraded good. Without full factor mobility the price of the nontraded good can differ between locations and migration can have effects through changing its price. If the nontraded good is labor intensive, for example, then it gets more expensive in the location which migrants leave and cheaper where they arrive. Emigration harms the source country by tending to reduce "any internal exchange of traded for non-traded goods existing between migrants and non-migrants".

Recent work analyzing market size effects typically makes use of the sort of monopolistically competitive model with differentiated goods and love of variety as developed by Dixit and Stiglitz (1977) and applied to trade notably in papers like Krugman (1980) or Melitz (2003). Suppose, to take a simplified example, we supplement the traded goods sector assumed above with another sector, producing a differentiated good which is either untraded or subject to significant trading costs. This good is supplied in many varieties, each version produced by no more than a single firm paying a fixed entry cost and earning zero profit. At every location,

immigrants and natives spend on both types of goods with the consequence that an inflow of workers expands the size of the local market for the less traded differentiated good, allowing consequently more varieties to be produced and local consumer welfare to gain.

Absent from models of the sort simulated by Hamilton and Whalley (1984), the introduction of effects of this type in papers by Iranzo and Peri (2009), di Giovanni, Levchenko and Ortega (2015) and other authors has shown such effects to be potentially of considerable importance. Where simple models suggest that immigration, even though globally beneficial, must harm at least some sorts of labor at receiving locations, models with market size effects show that there are countervailing benefits to receiving countries that may mean that labor mobility is not necessarily harmful even there.

The introduction of market size effects into studies of free movement goes back at least to Iranzo and Peri (2009). In their model, each country produces two goods, one undifferentiated and the second differentiated. Labor is the sole input and there is extensive worker heterogeneity in the form of a continuum of skills with TFP differences between countries. Migration has psychological costs, skill loss due to imperfect transferability and legal costs. Market size effects in the differentiated sector are central – expansion leads to greater variety in production and higher consumer welfare.[15] In the absence of trade, countries receiving inflows of labor through migration specialize more in the differentiated good, have lower prices and higher average real wages despite some workers losing through labor market competition. With trade (though assuming trade costs in the differentiated sector), market size effects spread to other countries through price falls everywhere. An application applies this to extension of free labor movement

[15] See also Mozzalari and Neumark (2012) who show that immigration is associated with an increased ethnic diversity of restaurants.

associated with EU expansion: migrants gain, prices fall everywhere and the less educated gain in all countries. The only possible losers are highly educated workers in Western Europe.

Di Giovanni, Levchenko and Ortega (2015) incorporates market size effects in a similar spirit with differentiated tradable and non-tradable sectors. A distinction is drawn between short and long runs according to whether the set of varieties produced adjust or not. There is skilled and unskilled labor and scenarios are considered with cross-country productivity differences and imperfect transferability and imperfect native-migrant substitutability. Remittances play an important role in the distribution of effects. Rather than evaluating the counterfactual of ending restrictions on migration the paper considers the possibility of ending migration and repatriating migrants (which is obviously in some sense a mirror exercise avoiding the need to model migration costs so carefully). Migration is found to be beneficial on the whole to both OECD and non-OECD countries, benefitting all labor types in the long run but particularly favoring the unskilled in the short run. High immigration countries gain from market size effects whereas high emigration countries gain from remittances.

Aubry, Burzyński and Docquier (2016) likewise consider the counterfactual of ending migration rather than liberalizing it though with a concentration on the effects on OECD countries. The model incorporates labor market and market size effects but also fiscal effects, the last of these achieved through introduction of retirees and a fiscal sector with consumption and income taxes funding age-specific transfers. Market size effects are more important than either labor market or fiscal effects. Most countries gain and some gain greatly from labor mobility. Inflows from outside the OECD are the largest source of gains, flows within the OECD being more ambiguous because of market size losses to emigration countries (though remittances are not modelled).

VI. Public Sector

The beneficial effects of freedom of movement arise principally because it allows labor to move from locations where it is less to where it is more productive. If there are other incentives to move which work counter to that then the case could be weakened or even reversed. One important such incentive could be interactions with the public sector. For instance, more generous social insurance or transfer schemes in the receiving country may have the potential to undermine the benefits of free movement by creating motivations to move which are not aligned with economic gains.

There is a large literature on fiscal federalism which deals with the allocation of public functions to different tiers of government and which points to labor mobility between locations at lower levels as an important issue. To be more concrete, we can picture a simplified public sector as providing two sorts of functions, provision of public goods and income redistribution.

Consider first the provision of public goods. The arguments for collective provision of public goods are well established and hardly need rehearsing. However, whereas market-based provision of private goods allows consumers with different tastes to consume at different levels, homogeneous public provision of public services has the disadvantage of not catering to similar diversity in tastes for public goods. Where local public goods are provided at intermediate levels of government, there is a possibility of spatial heterogeneity in levels of provision and mobility between localities that can allow people to sort themselves according to tastes, allowing for a matching of tastes to levels of provision that can mimic the market-based sorting that works with private provision of private goods (Tiebout 1956, Rubinfeld 1987, Oates 1999). The possibility of offering differing levels of provision of public goods in different localities can therefore create

another case for free movement of individuals. This is an argument typically associated with provision at a municipal level but one that also has application internationally with regard to goods provided at higher governmental tiers.

The case with redistributive functions of government is different. Well known arguments establish that differences in the extent of lower tier redistribution sit badly with mobility between districts (Musgrave 1971, Oates 1972). Poorer individuals will have reason to migrate towards more redistributive regions and richer individuals to move away from them in a way that can only compromise the intention of the policy. In the words of Stiglitz (1983), "it is clear that the power to redistribute income locally with free migration is severely limited."

To illustrate, suppose that the two locations A and B produce a single traded good with the same constant returns to scale production technology and the same endowments of the two factors. The allocation of labor between locations is therefore productively efficient and no worker will *want* to move. Suppose now that location B introduces a redistributive tax scheme. All income from labor or capital is taxed at source at a rate *t* and the proceeds used to fund a lump sum grant to labor $G = tF^B/L_B$. The income of a worker in B is raised to $(1-t)F_L^B + tF^B/L_B$ which exceeds F_L^A and tax-induced migration from A to B will occur, reducing world output. Likewise the reduction in payments to capital in B will encourage a flow of capital in the reverse direction. This movement itself undermines the purpose of the redistributive scheme introduced in B by reducing the proceeds of the tax on capital funding the grant.

This happens because of a lack of coordination of tax policies. If both locations were constrained to pursue similar schemes of redistributive taxation or redistribution were to be assigned to a tier of government above them then no migration would be induced (Wildasin 1991). However such harmonization may require a similarity of political culture or sense of social

solidarity that may be lacking in the sort of international context where free movement is being considered. Therefore, the possibility that redistributive taxation or redistributive public goods provision undermines the beneficial aspects of migration is reduced in a setting where countries attempt to harmonize tax rules and redistributive legislation, such as the EU. This is one important factor that distinguishes free movement within such well-defined groups of countries like the EU from a general open border policy.

The extensive but inconclusive literature on fiscally-induced migration is reviewed, for example, in Nannestad (2007), Giuletti and Wahba (2013) and Preston (2014). Evidence both from migration across states in the US and between countries in the EU suggests that migration flows may be associated in some contexts with welfare generosity but fails to establish that it is a serious problem. Preston (2014) also surveys attempts to quantify net fiscal impact of immigration including static analyses, such as Dustmann and Frattini (2014) for the UK or, more recently, the National Academies of Sciences, Engineering, and Medicine (2017) for the US and long-term assessments such as Chojnicki (2013) or Storesletten (2000, 2003).

VII. Culture and Politics

Migration is not only narrowly economically significant (in the sense of immediately affecting generation and consumption of material wealth). It also has broader social and cultural aspects that are of critical importance for the politics of migration. Countries do not differ only in economics and economics may be a relatively minor part of what determines the wellbeing of individuals who live in different countries.

Suppose countries differ in political institutions in such a way that in some countries the freedoms of some citizens are diminished at the expense of others or politically privileged individuals are more able to benefit from corruption. If migration between those countries is possible then, just as economic differences create incentives for population mobility, so also may the political differences. Oppressed groups in one country will have reason to migrate away, individuals exploited by the corrupt will have reason to leave to gain from better standards of governance elsewhere. Extreme cases of the reasons that induce such movements are addressed in the 1951 Geneva Convention for Refugees, and its various amendments.[16] If the threat that migration of this sort will diminish the economic base of the country of origin curtails the extent of corruption or persecution then we can see this as an important advantage of population mobility. Just as economic migration promotes efficient production, the capability of individuals to move towards countries with better political arrangements may, besides enhancing the welfare of those who move, also be encouragement to improved governance.[17] On the other hand, if departure of

[16] Grounded in Article 14 of the 1948 Universal Declaration of Human Rights, which recognizes the right of persons to seek asylum from persecution in other countries, the United Nations Geneva Convention relating to the Status of Refugees (GCR) was adopted in 1951. Originally limited to persons fleeing events occurring within Europe and before 1 January 1951, the 1967 Protocol removed these limitations and endowed the GCR with universal coverage. As of April 2015, 145 states have signed the 1951 Convention and 142 have signed both the Convention and the 1967 Protocol. See Dustmann, Fasani, Frattini, Minale and Schönberg (2017) for more detail.

[17] Efficiency of public services, quality of governance and security are important factors that determine the intent of individuals to out-migrate, see Dustmann and Okatenko (2014).

the politically active diminishes the scope for defense of the political liberties of those who remain then it has a cost similar to that with the economics of the `brain drain'.

The politics of receiving countries will also be affected. Arrival of individuals from societies with different social and cultural norms can be disturbing for some. Social, cultural, religious and linguistic homogeneity can all be diminished. While to some natives of the receiving country, enhanced diversity may be regarded as culturally enriching, through new ideas or cultural amenities brought in by immigrants which may be socially (and indeed economically) enlivening, the more socially conservative may put a positive value on homogeneity and dislike the perceived cultural change that is associated with immigration. Research by Card, Dustmann and Preston (2014) shows that considerations of cultural and social homogeneity and coherence are much more closely associated with individuals' beliefs about whether migration should be restricted than are concerns about economic advantage or disadvantage. Moreover, the better educated are supportive of liberal migration policies more because they are less concerned about homogeneity and not so much because they are less exposed to immigrant competition, as some models of the type we reviewed above suggest given that migrants predominantly allocate themselves to unskilled jobs.[18] Similarly, Dustmann and Preston (2007) find evidence that racial or cultural prejudice is an important component of attitudes towards immigration, and more so the more ethnically different immigrant populations are from natives. In line with these findings, Hainmueller and Hopkins (2014), in an extensive review of the literature, conclude that there is little accumulated evidence that citizens primarily form attitudes about immigration based on its effects on their personal

[18] A common finding of attitudinal surveys is that the less educated have more hostile attitudes towards migration, often explained by more labor market competition from immigrants, see e.g. Scheve and Slaughter (2001), Mayda (2006), and O'Rourke and Sinnott (2006).

economic situation but rather that immigration attitudes are shaped by sociotropic concerns about its cultural impacts.

This suggests that policymakers would be wrong to focus on economic considerations alone when designing and implementing policies that regulate migration, since non-economic concerns related to homogeneity, to race, and to cultural prejudice may be more impactful on the way individuals form their views about migration policy. The strength of feeling that often accompanies such concerns renders migration an ideal subject for populist political movements and means that a misplaced focus on economic arguments can be particularly counter-productive.

Social integration of immigrants may be slow and generate social tensions as communities with different ways of life discover difficulties in relating to each other. Here again we see a distinction between migration within countries, which is likely to provoke less social resistance, migration between different but culturally less distant countries, where integration and assimilation of newcomers may be easier and political resistance less marked, and migration between highly culturally distinct societies, where desires to protect existing ways of life and fears of rising social tensions may be more easily excited. In the latter case, aggravation of political tension risks fostering growth of populist political movements that may be seen as more broadly damaging. Dustmann, Vasiljeva and Damm (2018) illustrate this, using random assignment of refugees to Danish municipalities to link refugee migration to the rise of political extremism in Denmark. They find that the allocation of larger refugee shares between electoral cycles increases the vote share for parties with an anti-immigration agenda in all but the most urban municipalities, where refugee allocation has – if anything – opposite effects, which points at refugee immigration and vote share increases of anti-immigrant parties not being inevitably linked. They also show stark response heterogeneity according to municipal characteristics, such as pre-policy immigrant share, crime,

and unemployment. Other studies that use different identification strategies come to similar conclusions (see e.g., Baron, D'Ignazio, de Blasio and Naticchioni 2016; Halla, Wagner and Zweimüller 2017; Otto and Steinhardt 2014; Harmon 2017).

Cultural resistance of sections of populations in receiving countries to different sorts of immigration has been particularly potent in the recent rise of populist parties, and the willingness of established parties to move to accommodating positions that favor additional restrictions carries the potential for damaging economic consequences. The strength of feeling of those inspired by the internationalist vision of open borders has not found similarly effective political expression. Understanding and incorporating such considerations into frameworks of the sort we develop above could help produce insights that bridge the gap between predictions of economic benefits of movement with the restrictions to it that are observed in practice.

VIII. Discussion and Conclusions

Economic gains from labor mobility are associated principally with differences in labor productivity in different places. These differences are large on a global scale which hints at the existence of very big potential gains. While suggesting huge gains, early estimates such as Hamilton and Whalley (1984) also imply huge associated flows of migrants. These estimated gains are magnified by the neglect of things like costs of migration and they involve extrapolating a long way from actuality. But, even if the magnitude of potential gains can be disputed, it remains true that more or less all serious studies suggest that the benefits of moving towards liberalization are large. Authors often point out that they are probably an order of magnitude greater than those from alternative reforms like trade liberalization, for instance.

In the simplest models, gains from liberalization go mainly to citizens of origin countries, particularly to those who migrate. However, these are not the people whose votes decide the openness of destination countries. The same models suggest that labor market competition may lead to losers in receiving countries and these are the people whose votes matter. While empirical work on labor market effects in receiving countries suggests that, for example, wage effects of current levels of migration are not big, the magnitude remains controversial and the losses implied by the simplest simulations creating the largest gains from free mobility are indeed substantial. Moreover, *perceived* losses from even existing policies may be far larger than those that actually occur. Recent work on gains from labor mobility emphasizes things like capital flows and market size effects that tend to counteract losses and even lead to overall gains in destination countries but, again, arguments of this sort are unlikely to be apparent to voters or to political decision makers.

Fiscal consequences may also be an important consideration but depend heavily on the particular migration situation that is considered, and the dissimilarity of welfare institutions in sending and receiving countries. Interaction of labor mobility with fiscal considerations is less likely to compromise the case for liberalization where migration in question is between countries with similar sorts of welfare systems, such as within the European Union.

It is also important to note that unskilled migration is associated in many quantitative studies with a large part of the gains, even for receiving countries. The widespread supposition in much popular discourse that rich countries should open themselves only to skilled migrants so as to best benefit find little support in this literature. Openness to skilled migration captures part of the gains but only part.

The principal objections to free mobility from receiving countries are probably cultural not economic. Attitudinal evidence suggests that concerns about loss of cultural homogeneity and about the costs associated with social tensions arising from integration of immigrant communities has more to do with concerns about open immigration policies than do worries about narrowly economic effects. A way to look at the studies we are reviewing is that they quantify the economic costs of satisfying these cultural objections.

Many of the objections to liberal migration policies, on social or fiscal grounds for example, are at their weakest where immigration is from culturally and political similar locations. Indeed this is why these issues are not typically treated as credible objections to free labor mobility within countries. This suggests that where such similarities make establishment of free movement within regional blocs (such as the EU) a feasible project then consolidation of such projects should be economically supported. Such regional blocs generate other benefits from migration not discussed above, such as insuring workers in participating countries from adverse economic shocks by providing access to a labor market that transcends national boundaries, offering a more diverse demand for skills, and providing firms with access to a larger skill pool. The more ambitious project of global open borders seems currently politically unlikely to command support from destination countries, however credible or not the magnitude of the global gains suggested by academic research. But simulations reliably suggest that much of the large gains found in these studies could be realized by small changes so support for gradual liberalization seems well grounded. Of course, even small steps in this direction may be politically difficult, due to the cultural resistance we mention above, and the response of populist movements that exploit fears and concerns, influence the position of mainstream parties, and may further undermine institutions that characterize liberal democracies and multilateral agreements that allow openness in the flow

of capital and goods. Balancing recognition of political realities and hypothetical economic gains will remain a delicate challenge.

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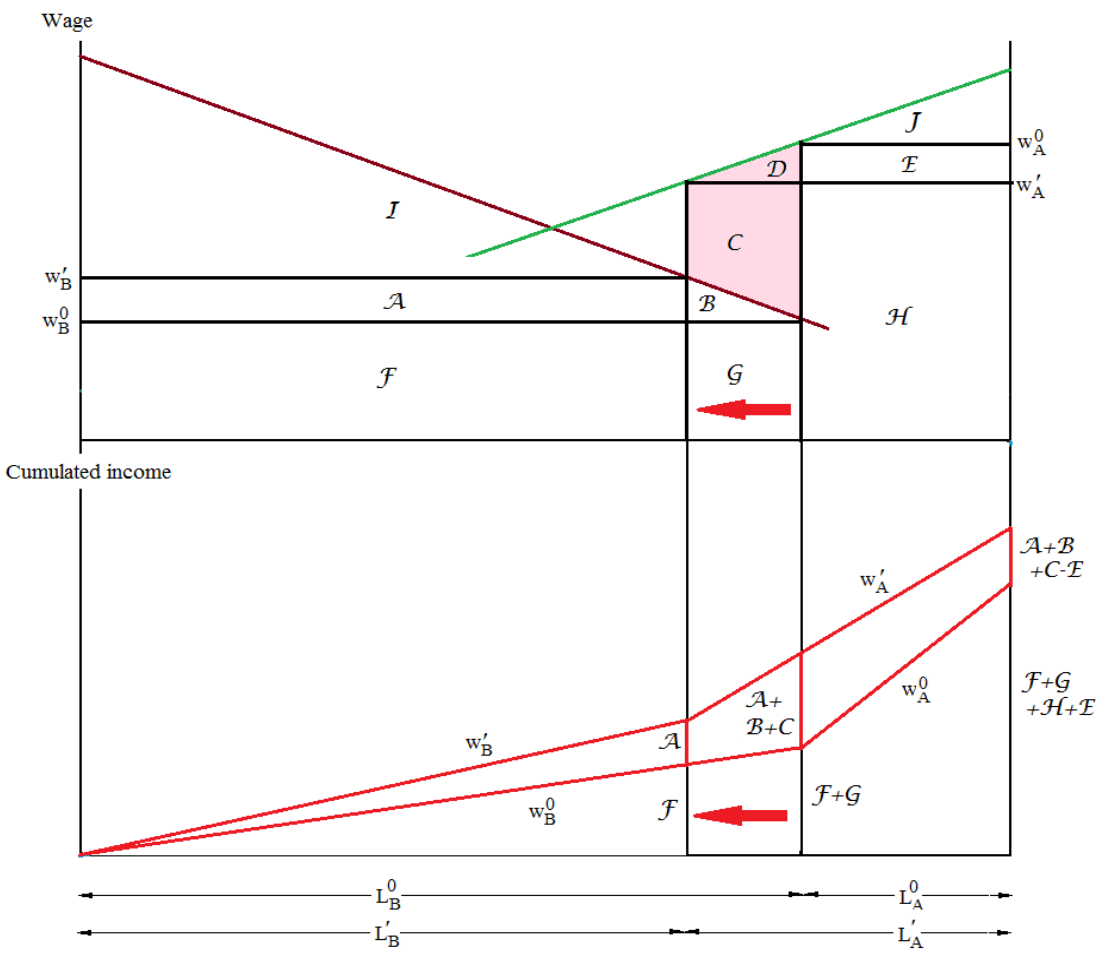
Figure 1


Wage
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Cumulated income
A+B
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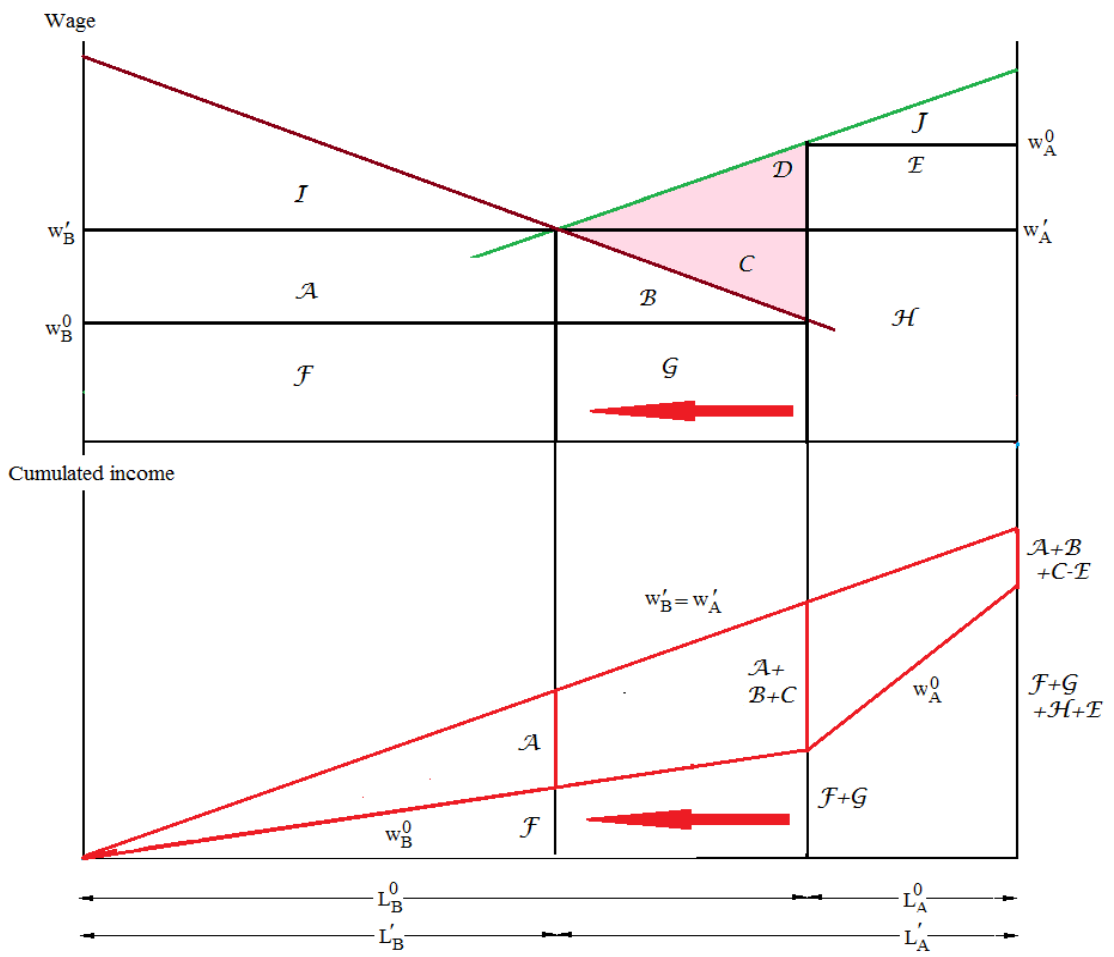
Figure 2


Wage
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Cumulated income
$w'_B = w'_A$
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$\mathcal{F}+\mathcal{G}$
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Figure 3

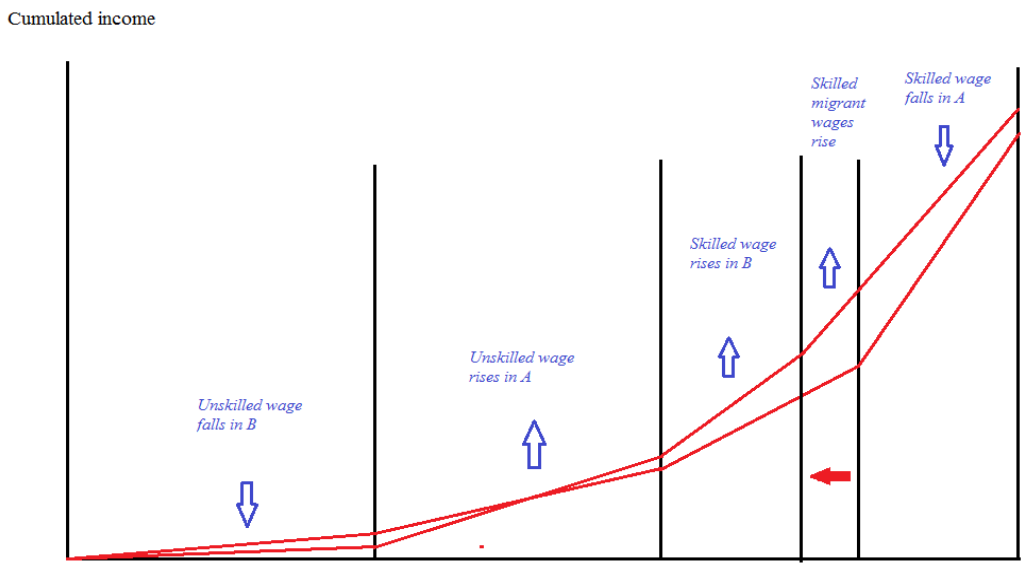
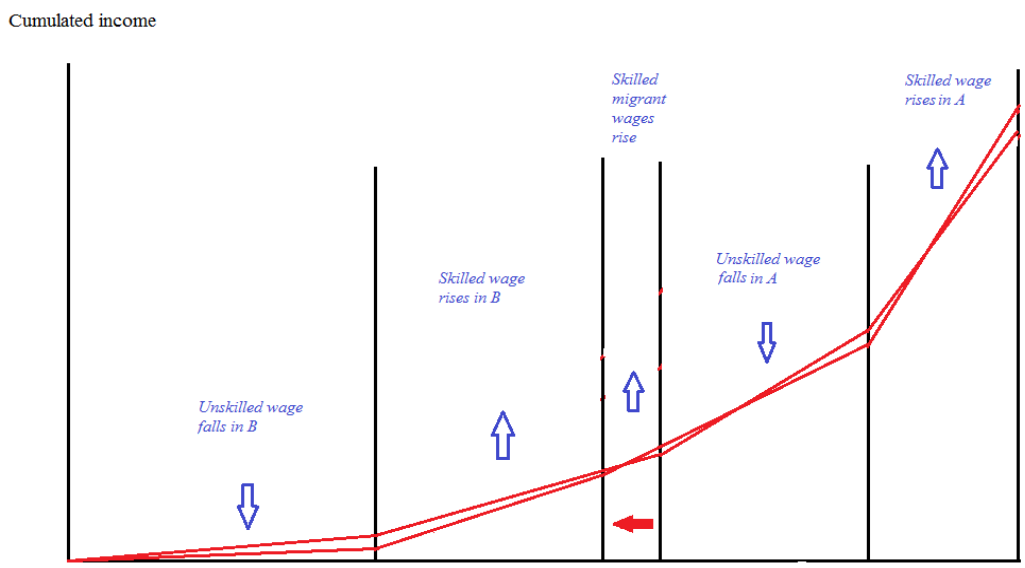

Cumulated income
Skilled migrant wages rise
Skilled wage falls in A
Skilled wage rises in B
Unskilled wage rises in A
Unskilled wage falls in B

Figure 4


Cumulated income
Skilled migrant wages rise
Skilled wage rises in A
Unskilled wage falls in A
Skilled wage rises in B
Unskilled wage falls in B