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This policy analysis paper explores the implications for the host country population of alternative immigration policies. The two immigration options considered are a policy based on admitting primarily high-skilled workers and another that has the effect of admitting primarily low-skilled workers. The implications for the native-born population for their aggregate level of income, the distribution of their income by skill level, and the size of the income redistribution system are considered. The paper was prepared for the Productivity Commission of Australia.

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Immigration: High Skilled vs. Low Skilled Labor?

Barry R. Chiswick¹

I. Introduction

The immigration policy debate in many of the current OECD countries has shifted over the past century. One hundred years ago the emphasis in the countries of overseas settlement, such as the US, Canada, and Australia, was on attracting laborers, preferably from Northwestern Europe, or more narrowly the British Isles. The skills of these workers were not of particular importance as they were intended to fill low-skilled jobs in factories, in mines, on farms, and on ranches. Some of the immigrants came in family groups to stay permanently, with no intention of returning to their origin, while among others the young men came to accumulate some money and then return home, often representing repeated cycles. The countries of origin had large rates of net emigration, with emigration seen as a solution to poverty at home.

The European countries of emigration, such as the UK, Germany, and Italy, have become areas of net in-migration. Even Ireland during its recent period of rapid economic growth experienced net in-migration, including the return of many of its citizens who had gone abroad. The migratory pressures from the poorer countries of Latin America, the Middle East, Africa, South Asia, and East Asia to the advanced industrial economies have increased. When and where the migration cannot take place legally because of barriers to entry, pressures increase for illegal migration.

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Another dramatic difference is the current recognition that there are important distinctions among immigrants on the basis of their skill levels, independent of their race and country of origin. The types of skills that constitute high-skilled immigration varies across time. While in the past artisans and craftsmen constituted the elite of the labor force, at the current level of economic development in the advanced knowledge-based economies the high-skilled are the STEM workers – scientific, technical, engineering, and high-level management workers. Even if they work as employees, many of these STEM workers are highly entrepreneurial, developing new techniques, products, markets and inventions, and new ways of using older ideas. They also often move from firm to firm, and from country to country, seeking opportunities where they can advance their skills, as well as apply their skills more fruitfully. STEM workers have become internationally mobile.

The advanced knowledge-based economies have experienced a decline in manufacturing and a shift in technologies in all sectors of their economies. This has resulted in a relative decline in demand for lower-skilled workers.

II. Production Function Approach

Although there are variations in skill levels among high-skilled workers and among low-skilled workers, for simplicity let us assume that there are only these two categories of workers and that all workers within a category are homogenous. We can then write a generic aggregate production function for an economy:

$$(1) \quad Q = f(A, H_1, H_2, K)$$

where Q is output (gross domestic product), H_2 is high-skilled labor, H_1 is low-skilled labor, K is the capital stock, A is an efficiency parameter (reflecting the level of technology). Output is

greater the more labor and capital there is in the economy and the higher the level of technology (A).

If all other factors are fixed, because of diminishing marginal product and the complementarity among factors of production, the immigration of low-skilled labor (H_1) reduces the wages of low-skilled workers, but enhances the productivity of high-skilled workers and capital. Similarly, the immigration of high-skilled or STEM workers (H_2) has the effect of reducing their earnings, but raising the incomes of low-skilled workers and the return to capital. Thus, immigration not only increases aggregate output in the economy, it also affects the personal distribution of income (across individuals and across families) and the functional distribution of income (across types of factors of production).

III. Public Policy Issues

A century ago there were relatively few public initiatives to transfer resources for helping low-income families. The poor were left to fend for themselves economically, or might benefit from assistance from better off family members, or receive meager resources from church or community welfare groups. During economic downturns in the major destinations, when jobs became scarce and unemployment increased, especially among recent low-skilled immigrants, fewer new immigrants arrived. Perhaps equally important, many recent immigrants without jobs left their destination to return to their origin or to try their fortunes in a different destination. Thus, changes in net immigration flows (immigration minus emigration) helped to moderate the effects of the business cycle on unemployment and the economic deprivation of the low-income population. In a sense, migratory flows served as a partial “automatic stabilizer” for the

economy as the labor force grew (in-migration) when job opportunities expanded, and it shrank (out-migration) when unemployment was high.

In the current period, the advanced industrial economies all have major income transfer programs that tax those with means to provide support in the form of income, housing, food, healthcare, and education (among other benefits) to the lower-income population. To the extent that immigrants, particularly recent immigrants, are eligible for these income transfers, the incentive to leave the destination during harsh economic times is diminished. This does not mean that the automatic stabilizer function of migration flows no longer exists, but it is far more muted than in the past.

This poses a policy dilemma for liberal democracies. On the one hand, there is the policy objective of helping those in economic need within one's country. On the other hand, by doing so an important "automatic stabilizer" for the labor market loses some of its effectiveness, and when jobs are scarce, native-born workers compete for employment with those who recently arrived.

An increase in the population due to low-skilled immigration does more than just increase the size of the low-income population in the short-run. By depressing wage rates for low-skilled workers, it also increases the economic deprivation of native born low-skilled workers even as it increases the economic returns to high-skilled workers and capital. It thereby increases the inequality of wages among workers and the inequality among families in the destination. In contrast, an increase in population due to high-skilled immigration decreases their wages and increases the wages of low-skilled workers. This reduces the inequality of income among workers and decreases their degree of economic deprivation by raising the wages

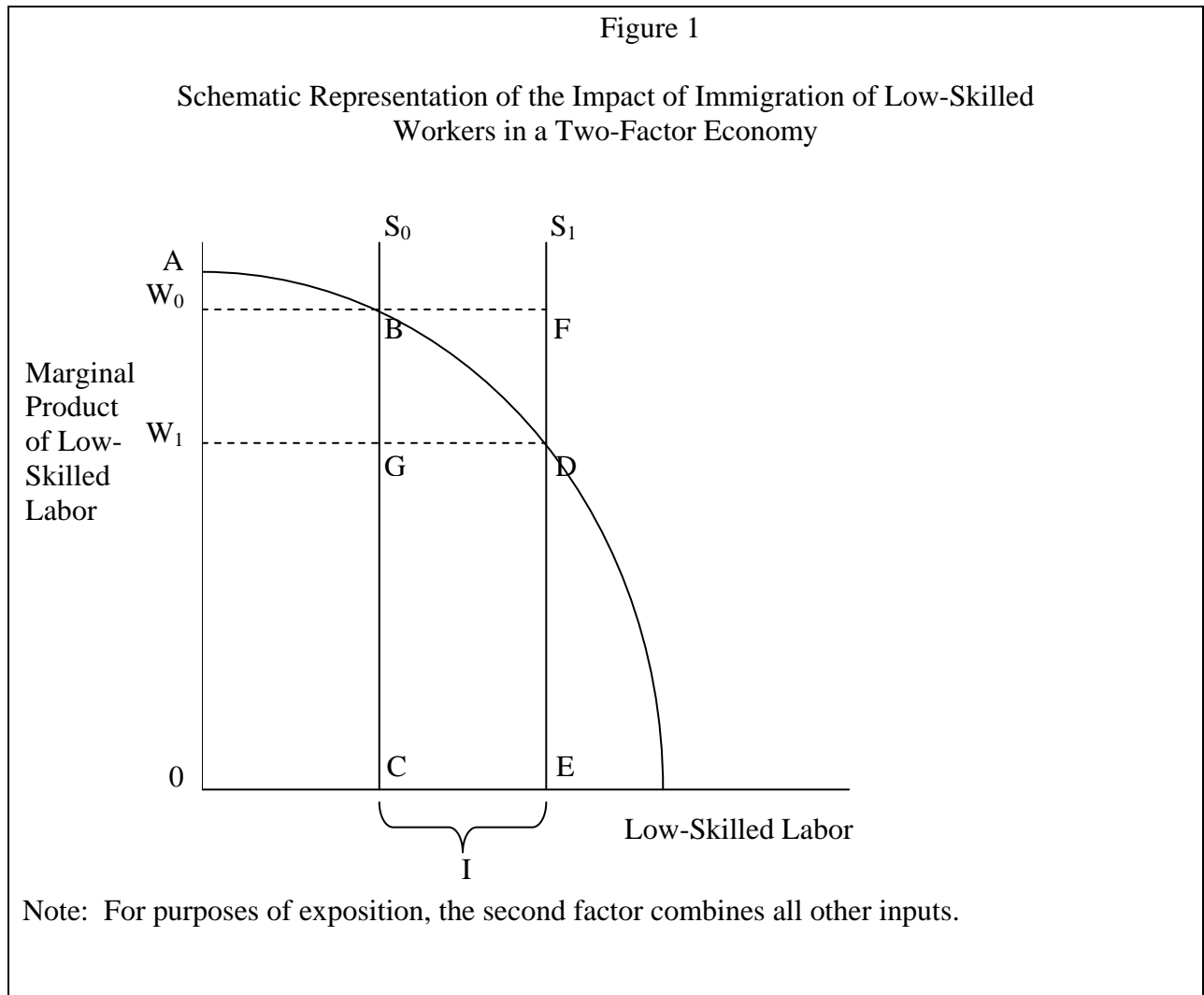
of low-skilled labor. High-skilled immigration thus decreases the burden of low-income natives on the welfare state.

Although some natives gain and other natives lose, immigration can increase the total income of the native (pre-migration) population. To simplify the exposition, consider the graph in Figure 1 showing the marginal product of low-skilled labor from the aggregate production function. The greater the amount of low-skilled labor, the lower is its marginal product (wage rate). Skilled workers and capital are aggregated into a single factor of production, referred to as all other factors, that determines the height of the marginal product curve.

Initially there are S_0 low-skilled workers, so the gross domestic product (GDP) is shown by the area OABC, of which OW_0BC is the return to low-skilled native workers (OW_0 is the earnings per worker) and W_0AB is the return to the other factors of production – high-skilled workers and capital. With the immigration of I workers, the low-skilled labor supply curve shifts from S_0 to S_1 , and the wage rate of low-skilled workers falls to W_1 . The total wages of low-skilled native workers has declined to OW_1GC and the total income of other factors of production has increased to W_1AD . Since other factors are assumed fixed in the short run, the rate of return to skilled workers and to physical capital has increased. Thus low-skilled native workers lose income and the owners of other factors gain, but the aggregate income of the native population increases by BDG . The immigrants gain; although the wage in the destination has declined, it is presumably still higher than the wage available in the origin.

Public policies may be evaluated in terms of their impacts on the level or rate of growth of income and their impacts on the personal or functional distributions of income. Social welfare is generally said to increase with an increase in the level or the rate of growth of income, and to increase with a decline in inequality in the distribution of income. Since income distribution

impacts are typically experienced more directly than the impacts on overall income or income growth, income distribution impacts of immigration may dominate political decision making, whether explicitly or implicitly.



In a democracy, whenever low-skilled workers are more numerous than high-skilled workers and the owners of capital, their economic self-interest to oppose the immigration of other low-skilled workers is likely to dominate immigration policy. But they can be “held harmless” by taxing the other factors of production, from the income area W_1W_0BG , and

transferring this revenue to low-skilled native workers. The other factors would still gain (BDG), but low-skilled natives would be held harmless and would have less cause to oppose the immigration of low-skilled workers. Note that this involves treating native low-skilled workers differently than immigrant low-skilled workers, implying that immigrants would not be eligible for all or certain transfer programs (cash, housing, medical care, education, etc.).

In principle, such a tax-transfer system limited to natives would be “Pareto Optimal” as no-one, whether immigrant or native, would end up worse off than before. Politically, however, it is very difficult for liberal democracies to maintain a public two-class system, and efforts to do so in principle fall apart in practice. What happens if low-skilled immigrants also receive public transfers that bring their wage rate to the original market wage rate (from W_1 to W_0)? The transfer BFDG to low-skilled immigrants, in addition to the transfer to low-skilled natives, more than erases the income gain to other factors of production. Now, natives as a whole lose and the total income of high-skilled workers and the owners of capital is reduced by BFD.

The consequences of high-skilled immigration can also be analyzed within the context of the production function model in Figure 1. Change the axes in Figure 1 so that they now refer to high-skilled labor, and now the other factors of production are low-skilled workers and capital. The immigration of high-skilled labor lowers its wage rate, but raises the income of low-skilled labor and the owners of capital. High-skilled workers lose in terms of their wage rates (labor earnings) but gain to the extent that they are also owners of capital, if not directly, then indirectly through their pension plans. Moreover, the relative decline in their wages is not as much of a public policy concern as is the decline in the wages of low-skilled workers with low incomes.

IV. The Welfare State

This is the crux of the policy dilemma regarding the immigration of low-skilled workers in a liberal democracy welfare state. To protect low-skilled native workers from the negative effects on their employment and income, transfer programs can be instituted or enhanced. But if low-skilled immigrants are included in these benefit programs, natives as a whole lose. One solution is to bar “new” legal immigrants from certain transfer programs. But which programs and how “new” is new? These efforts tend to fail on equity grounds.

Another solution is to keep low-skilled immigrants in a “guest worker” or “illegal (undocumented) status” that discourages them from bringing family members to the destination and bars them from these benefits. This policy, explicit or implicit, is based on the premise that while there will be a stock of foreign workers without dependent family members, it will be a revolving door, with individual workers staying only a brief period of time and being replaced by new foreign workers. For this to be efficient, the jobs would require little investment in destination-specific and firm-specific human capital. Some of the low-skilled workers in each cohort will find a way to stay, either legally or illegally, and with the passage of time the stock of these people will increase. This has its own negative consequences, including the emergence of a “separate” population within the country, often defined by their race or ethnicity. The status in the destination of the children of these families, whether born in the origin or the destination, often becomes ambiguous.

The immigration of high-skilled immigrants, on the other hand, has the effect of reducing the earnings of high-skilled workers, while raising the incomes of low-skilled workers and the owners of capital. The high-skilled workers are less numerous than the lower-skilled workers, and there is less of a public policy concern to “hold harmless” the higher income high-skilled

workers, many of whom would benefit as they are also owners of capital, if only through their pension plans. The immigration of high-skilled workers, by lowering their earnings and raising that of low-skilled workers also has the effect of reducing income inequality among those in the labor force. Reduced inequality is often viewed as beneficial.

High-skilled immigrants also have a more favorable fiscal impact than low-skilled immigrants (Holen 2009). Because they receive low wages, low-skilled immigrants pay lower taxes and receive more benefits from the public treasury. Low-skilled native-born workers also experience a decline in their wage rate, pay lower taxes, and receive greater public benefits and income transfers. Because high-skilled immigrants have higher wage rates, they pay more taxes and receive less in the way of income transfers. Because high-skilled immigration raises the earnings of other factors of production, it also has the effect of improving the net fiscal balance (taxes minus transfers) of low-skilled workers.

V. Changes Over Time in Job Opportunities

Low-skilled workers in the advanced OECD economies have been experiencing a relative decline in their wages in recent decades. Part of this is due to the computer/information technology revolution. The change in technology seems to have enhanced the earnings of high-skilled STEM workers who appear to be either permanently favored by the new technology (skill-biased technological change), or temporarily favored because they adopted it sooner or more effectively (greater allocative or decision-making efficiency).

Moreover, the economic emergence of manufacturing capabilities in many less developed countries (LDCs) has resulted in lower-skilled workers in the OECD facing greater competition for manufacturing jobs from LDCs. Thus, whereas a century ago there were expanding job

opportunities for low-skilled workers in manufacturing and extractive industries in the now developed countries, today employment in these sectors is shrinking. They are currently expanding in what had been many of the less developed countries.

On the other hand, the increase in the ratio of the earnings of high-skilled workers to the earnings of low-skilled workers, and in the rate of return on human capital, suggests that the demand for STEM workers in the OECD has continued to expand. This has had two effects – one domestic and one on migration. The higher rate of return on human capital has encouraged greater investment in higher education among the youths in the OECD countries. The other is that the increase in the skill differential in the OECD has widened the gap in earnings between the STEM-trained workers in the OECD and in the major source countries.

Why do immigrants from the LDCs keep coming to the OECD countries if job opportunities in the OECD for low-skilled workers are decreasing? Ironically, the immigration of high-skilled or STEM workers actually increases the attractiveness of a destination for low-skilled workers by increasing the wages of the latter. Moreover, the same information technology revolution that is shrinking low-skilled job opportunities in the OECD has made it easier for those in the LDCs to learn of the better life for themselves and their children in the highly developed economies. Even with downward pressure on low-skilled wages, earnings augmented by public benefits may still be significantly higher than the income that could be received in their origin.

An important determinant of international migration is personal security. Today the developed countries are relatively safe from war, insurrection, and ordinary crime while this is not the situation in many of the countries with high emigration rates for low-skilled workers.

Furthermore, even low-skilled workers are often forward looking and consider the educational and employment opportunities that will be available for their children.

VI. Patterns of Adjustment

It is important to recognize that high-skilled immigrants have a different pattern of economic adjustment than low-skilled immigrants. For those with a low occupational attainment prior to migration there is little scope for occupational mobility after migration. Although their specific or narrowly defined occupation may change, they are likely to remain at a comparable occupational level and experience little occupational upgrading with time in the destination.

Among high-skilled immigrants, however, two distinct patterns to their adjustment may be observed. If the immigrants come from countries with a similar level of economic development, the same language and similar educational systems and labor market institutions, in the absence of occupational licensing, the immigrants' skills are likely to be very highly transferable to the destination labor market. In this case the migration is likely to be between two high-income countries and is not likely to occur unless the potential migrant receives a high wage offer for work in a comparable job or occupation. Then, with the passage of time the immigrant is likely to experience a relative decline in earnings ("regression to the mean") even if there is no change in occupational status. This pattern has been found among countries for which there is a high degree of skill transferability, such as among the English-speaking developed countries (Chiswick and Miller, 2011b).

In the more common scenario, however, the high level of skills is not perfectly transferable. In this case the immigrant initially experiences downward occupational mobility compared to the origin, to be followed by upward earnings and occupational mobility as the pre-

migration skills, including destination language skills, either adapt to the destination or new skills relevant for the destination are formed. In this case, the initial labor market outcomes understate the longer term experiences. The lower the transferability of the skills across countries, the poorer would be the initial matching of educational and training qualifications to their job in the destination, the lower would be the initial earnings and occupational status of the STEM migrants, and the steeper would be their subsequent improvement as they adjust to the destination labor market (Chiswick and Miller 2011a).

Perhaps the two dominant barriers to the transferability of the skills of high-skilled immigrants are language differences and occupational licensing. Indeed, we tend to observe STEM immigrants moving to destinations that use the same language or a linguistically close language to their mother tongue. Intensive language training courses pre- and post-migration can mitigate the language barrier and speed up the matching of the immigrant's occupation to his or her schooling and job training.

The second barrier is occupational licensing. The "recognition" by the immigration and licensing authorities and the labor market of the immigrants' educational qualifications and occupational experiences can go far in establishing the high-skilled immigrant on an upward economic trajectory and a matching of immigrant qualifications to their employment in the destination. This recognition need not represent a deterioration in standards, but can be used instead to mitigate the efforts of native practitioners of the occupation to require higher educational and occupational credentials for immigrants than for themselves, or standards that are higher than necessary for the job so as to reduce labor market competition.

VII. The Distribution of High-Skills by Nativity

It should be noted that there can be a downside to the immigration of high-skilled STEM workers. As discussed above, the immigration of high-skilled workers tends to depress the earnings of high-skilled workers in the destination. This tends to depress the domestic rate of return from investment in these activities, thereby discouraging native youths from investing in these skills. This may have more of an effect on the distribution of natives and immigrants across high-skilled activities than on the aggregate number of natives investing in high-skilled occupations.

Some high-skilled occupations require skills that are highly internationally transferable. Quantitative skill is one example. Other high-level jobs have more local or destination-specific characteristics, as is the case for jobs that require linguistic skill or special occupational licensing requirements. Thus, if one could rank high-level occupations by the extent to which they require internationally transferable skills and the extent to which they require destination-specific skills, one should expect to observe high-skilled immigrants concentrating in the former (e.g., mathematics or computer technology) and high-skilled natives concentrating in the latter (e.g. law or marketing).

VIII. Capital and Technology

The discussion thus far has assumed that the capital stock is fixed or held constant. While this is a reasonable assumption for the short-run, in the long-run there is a greater return to capital from either low-skilled or high-skilled immigration. The increased return to capital raises the capital stock by attracting foreign capital, decreasing the export of domestic capital, or increasing savings and hence the overall supply of domestic capital. To the extent that the

capital stock increases, the earnings of both low-skilled and high-skilled workers can increase in spite of immigration. In terms of Figure I, an increase in the capital stock moves the marginal product of labor curve outward. The question as to whether “capital chases labor or labor chases capital” has not been solved, in part because it is likely that both phenomena exist simultaneously.

If STEM workers are a stronger complement to physical capital than are low-skilled workers, high-skilled immigration has a greater impact in stimulating the growth of capital in the destination, and hence on the growth of aggregate income. There is reason to believe that higher-skilled workers do in fact work in settings of higher capital to labor ratios. There is also evidence that the immigration of high-skilled workers increases the rate of return and stimulates the increase in the private capital stock and the investment by government in productive infrastructure and social overhead capital (Grossmann and Stadelmann, 2011). In contrast, public spending on health, on social matters, and on consumption (i.e., on income transfers) does not appear to increase in response to high-skilled immigration. Then high-skilled immigration would have a larger favorable impact on income growth through the effect on the productivity of capital.

The technology parameter “A” in the production function is not exogenous. It is a function of several factors, including incentives and institutional arrangements that encourage the development and adoption of newer and more efficient technologies. High-skilled workers in scientific, technological, engineering, and management jobs are, almost by definition, at the forefront of technological change. In the current high-technology economic environment, they are more likely to be in a job situation in which their knowledge of existing technology and management practices, combined with their analytical and decision making skills, can be used to

advance economic efficiency. Thus the size of the technology parameter, A , is likely to be larger and grow faster, the greater the share of STEM workers in the economy, whether from the native population or from immigration (Xiang 2005, Acemoglu 1998).

IX. Duration of the Visa

In designing a policy for the admission of high-skilled immigrants, one issue is the length of time for the visa. Visas for high-skilled immigrants can be permanent as long as the immigrant resides in the destination and can offer an opportunity for citizenship after a few years. Alternatively, the occupation-based visas may be valid for a relatively short period of time, such as the H1-B visas in the US which have a three-year duration renewable once for three years. There can be merit in a “probation” period during which the migrant must demonstrate employment in a high-skilled occupation before receiving a permanent visa. Beyond that, the probation period of a temporary visa for high-skilled immigrants would tend to be counterproductive.

The expectation of a long period of employment in the destination provides the incentive for a high-skilled worker to make skill and employment related investments relevant for the destination. A short-duration visa, even of a few years duration, discourages the financing of such investments by the worker and the employer. High-skilled workers tend to make greater investments in on-the-job training because of the apparent complementarities of schooling training and on-the-job training. Permanent visas, or temporary visas with a high probability of becoming permanent, encourage such investments.

If the labor market match is successful, neither the worker nor the employer would want the employment visa to expire. As the immigrant acquires family ties in the destination, perhaps

including marriage and children born or raised in the destination, humanitarian issues would come into play calling for a permanent rather than a temporary visa. If the labor market match is not successful in the destination, the high-skilled immigrant may well return to the origin.

This is not to say that there are no bases for temporary work visas. They can be useful for training periods where the expectation is that the trainee would depart. Most instances in which a short-term visa would make sense would be in highly seasonal employment where there is little training specific to the employer, occupation, or industry. While this might apply in seasonal construction or harvesting of fruit and vegetable crops in agriculture, it is not likely to apply broadly in occupations held by STEM workers.

X. Rationing by Occupation or Points?

A more difficult policy dilemma arises as to the criteria used to admit high-skilled or STEM workers. One mechanism is through a “points system,” another is a “targeted occupation system.” Under a points system the applicant’s individual characteristics matter – age at application (points for young adults), educational attainment, occupational experiences, destination language proficiency, and other criteria associated with high labor market productivity. Points might even be awarded on the basis of the spouse’s skills. Points are awarded for productivity enhancing characteristics, and if a threshold number of points are acquired a visa is issued.

A disadvantage of the points based system is that an applicant may be awarded a sufficient number of points for a visa but may not ever work in a high-skilled occupation or work at all. A person with a foreign medical degree may receive a sufficient number of points to obtain a visa but may not be able to practice medicine because he or she could not enter a

residency program in the destination or obtain a medical license (Lesky, 2011 and McDonald, Warman, and Worswick, 2011). Thus points awarded for educational qualifications should be contingent on the applicant being able to use his or her skills in the destination.

Under a targeted occupational rationing system employers petition on behalf of an applicant for a visa and must demonstrate that the applicant has occupational skills that are scarce in the destination. In principle this solves the problem of a job not being available, but once the visa is granted the applicant may elect to not work for that employer or even in that occupation. This system requires establishing a list of “favored” and “not-favored” occupations. A political tug-of-war between representatives of employer groups and of worker groups then becomes an important determinant of occupational categories that receive favorable visa treatment. Politics may dominate economics.

Under the targeted occupation regime an applicant must identify a specific employer who is willing to expend the time and financial resources to secure a visa. Yet, after securing the visa, the worker may decline to work for that employer. Moreover, how is the employer to know which potential applicant to sponsor? Most likely it would be an applicant already in the destination under a student or temporary worker visa or in an illegal status. This encourages entry into the destination for the purpose of identifying an employer willing to serve as a sponsor.

Neither mechanism in its pure form is ideal. A modified points system that considers whether the formal educational qualifications will be useful in the destination is less vulnerable to occupation-specific political maneuvering and to people coming to the US under non-immigrant visas or no visas to identify an employer willing to serve as a sponsor.

XI. STEM Workers – High Mobility

Finally, it is important to recognize that we live in a world in which information and transportation costs are very low, especially relative to the earnings of STEM workers. The cost of international migration no longer includes the prospect of never again seeing or speaking with family members and friends left behind. Many potential international migrants in LDCs have English as their mother tongue, or study English with the intention of emigrating, or to enhance employability even in their home country. High-skilled workers in most countries of origin acquire at least some proficiency in English, often through the studies that are necessary to acquire their skills. No matter where they settle in the OECD, they are also likely to work with similarly high-skilled workers with some degree of proficiency in English.

More so than ever in the past, one can view STEM workers as being part of a global labor market. High rates of inter-state and inter-provincial mobility of high-skilled workers within a country characterized labor markets in some countries of overseas settlement in the second half of the 20th century. High rates of international migration (even repeat and circular migration) are likely to characterize STEM workers in the first half of the 21st century. This is being facilitated by the trend of countries toward allowing dual-citizenship for their native-born citizens and for their immigrants. To retain their native-born STEM workers and attract immigrant STEM workers from elsewhere, nations will need to develop policies that are attractive to high-skilled, internationally mobile workers.

Countries of emigration have at times developed policies to either encourage or to discourage emigration. Countries of in-migration have developed policies to control (limit) or regulate in-migration. What is new is that since STEM workers are highly internationally mobile, countries will need to develop “migration policies” that encompass both in-migration

and emigration. While barriers to the emigration of natives or the return migration of immigrants would not be tolerated in liberal democracies, other policies will need to be developed to discourage the exit and encourage the entry of high-skilled workers. There is little point having an immigration policy to encourage the entry of high-skilled workers, without at the same time having policies in place that discourage the exit of native-born or immigrant STEM workers.

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