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The economics of mass migrations

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Overall, geographic localization is partly a result of self-citation at the level of individual firms, but it is still significant even after self-citations are eliminated.

Ongoing work will extend this research in several directions. We are preparing a survey of inventors to explore in more detail the relationships among patent citations, communication among inventors, research spillovers, and cumulative technological impact. We are also continuing to explore the finer detail of the geographic, institutional, and technological dimensions of the citation patterns. Because of the richness of the data, the potential range of research questions is large, including the following: What role do factors other than geographic distance (for example, language, culture, and economic ties) play in flows of knowledge around the globe? Do particular firms or kinds of firms play central roles in the flows of knowledge? Do particular kinds of research or technological fields generate measurably large spillovers? We are also pursuing further work linking patent citations to other economic observables, such as market value and productivity at the levels of firms, industries, and countries.

While I doubt that we will ever be able to measure "invention" or "knowledge" as well as we measure labor or even capital, I do believe that this line of research is gradually increasing our ability to give empirical content to economic constructs that play crucial roles in economic theory and economic life.

¹ M. Trajtenberg, R. Henderson, and A.B. Jaffe, "University versus Corporate Patents: A Window on the Basicness of Invention," *Economics of Innovation and New Technology*, 5, (1997), pp. 19-50. Also presented as "Telling Trails Out of School: University versus Corporate Patents and the Basicness of Invention," at the 1991 AEA Annual Meeting.

² This last idea has been carried further by Francis Narin, who has looked in detail at the citations to scientific literature in biotechnology patents and has shown close links to research funded by the U.S. National Institutes of Health and other basic research agencies. See F. Narin, *Linkage Between U.S. Patents and Public Science*, CHI Research, Inc., 1997.

³ R. Henderson, A.B. Jaffe, and M. Trajtenberg, "Universities as a Source of Commercial Technology: A Detailed Analysis of University Patenting, 1965-1988," *Review of Economics and Statistics*, LXXX, 1, (February 1998), pp. 119-27.

⁴ A.B. Jaffe, M. Fogarty, and B. Banks, "Evidence from Patents and Patent Citations on the Impact of NASA and Other

Federal Labs on Commercial Innovation," NBER Working Paper No. 6044, May 1997. Forthcoming in the *Journal of Industrial Economics*.

⁵ R.J. Caballero and A.B. Jaffe, "How High are the Giants' Shoulders: An Empirical Assessment of Knowledge Spillovers and Creative Destruction in a Model of Economic Growth" in NBER *Macroeconomics Annual*, Vol. 8, O. Blanchard and S. Fischer, eds. Cambridge, MA: MIT Press, 1993.

⁶ B.H. Hall, A.B. Jaffe, and M. Trajtenberg, "Patent Citations and Market Value: A First Look," paper presented at the NBER Program Meeting on Productivity, March 6, 1998.

⁷ For example, we found that about 6 percent of citations come from the same metropolitan area, compared to an expectation of about 1 percent based solely on the geographic concentration of inventors. A.B. Jaffe, R. Henderson, and M. Trajtenberg, "Geographic Localization of Knowledge Spillovers as Evidenced by Patent Citations" *Quarterly Journal of Economics*, Vol. CViii, (August 1993), issue 3, p. 577.

⁸ A.B. Jaffe and M. Trajtenberg, "Flows of Knowledge from Universities and Federal Labs: Modeling the Flow of Patent Citations over Time and Across Institutional and Geographic Boundaries," *Proceedings of the National Academy of Sciences*, 93, (November 1996), pp. 12671-7; A.B. Jaffe and M. Trajtenberg, "International Knowledge Flows: Evidence from Patent Citations" NBER Working Paper No. 6507, April 1998.

The Economics of Mass Migrations

Jeffrey G. Williamson*

The mass migrations that ended early in this century raise four fundamental questions: What explains them? How did they affect labor markets? Did their impact create a policy backlash? Does the experience offer lessons for today?

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Explanations for the Mass Migrations

Almost 60 million Europeans left for the New World during the half century or so prior to World War I. This impressive figure would be even higher if it included the Italians who went north, the Poles who went west, the Irish who went to England, and the other European migrants who sought better lives within Europe. Although wars, pogroms, religious discrimination, ethnic cleansing, and racist restrictions

played important supporting roles, the prime motivation for these migrations was economic fundamentals. One way those fundamentals were manifested was through self-selection. Overwhelmingly, the migrants were young male adults, the very people who are most sensitive to and who have the biggest impact on labor market events. Those economic fundamentals also were manifested by the timing of the mass migrations: when to move was driven by unemployment, business cycles, and industrial crises. But who moved and

where they moved were determined by long-run fundamentals that underlay labor markets around the globalizing Atlantic economy.

In a series of publications¹ culminating with a book recently published by the Oxford University Press,² Timothy Hatton and I have shown that the mass migrations obeyed a predictable law of motion but that the law was far more complex than an economist might guess. The poorest workers in the poorest regions of the poorest countries did not move even though the return to their move would have been highest. Furthermore, every country losing emigrants passed through a life cycle that took many decades to complete: poor agrarian countries registered very low exit rates; rapidly industrializing countries registered rising rates, not falling rates as traditional theory would have predicted; and more mature industrial countries registered declining rates as their labor market conditions improved.

What accounts for the upside of this inverted U-shaped trend? Poor migrants were income-constrained in a very imperfect capital market, but that income constraint was eased by the combination of improved conditions in their home countries and rising remittances from emigrant pioneers abroad. On the upside of the "inverted U," the demand for emigration also was driven by demographic factors at home: declining infant mortality and a delayed decline in fertility created a glut of young adults who were prime targets for emigration.

Thus, the rise and fall of emigration from Europe traced a law of motion as global labor markets became integrated. Then World War I and immigration quotas choked off European emigration abruptly; the decline would otherwise have happened, but more gradually.

Divergence and Convergence

In the first half of the 19th century, the Atlantic economy was characterized by high tariffs, modest commodity trade, very little mass migration, and an underdeveloped global capital market. Two profound shocks occurred in this environment that was still hostile to liberal globalization policy: early industrialization in Britain, which then spread to a few countries on the European continent; and resource "discovery" in the New World, set in motion by sharply declining transport costs linking overseas suppliers to European markets, so that real freight rates fell by 1.5 percent per annum between 1840 and 1910.³ These two shocks triggered a divergence in wages across countries that lasted until the middle of the century.⁴

This divergence was replaced by long-run convergence between 1846 and 1854. If we exclude Canada and the United States, two "exceptional" rich countries that bucked the convergence tide, then convergence up to 1914 is even more rapid. If we also exclude Portugal and Spain, two countries that failed to play the globalization game, convergence is faster still. The measure of wage divergence drops by more than a third from 1870 to 1900, and divergence drops by perhaps two thirds between 1854 and the end of the century. Gross domestic product (GDP) per capita converged as well,⁵ but real wage convergence was much faster. The globalization arguments that follow offer some explanations for why this is so.

What a Difference Factor Prices Make

The forces of convergence that seem to be so pronounced in the real wage data lead to different conclu-

sions from those often reached by prominent studies that have focused on GDP per capita or per worker-hour.

There are at least four good reasons that it is a mistake for the convergence debate to have ignored wages and other factor prices. First, the pre-World War II real wage data are probably of better quality than are the GDP data. Second, income distribution matters, and wage rates (when compared with other factor prices) offer a window through which to view distribution issues. Real people earn wages or profits or rents—they don't earn that statistical artifact known as GDP per capita. By averaging all incomes, macroeconomists exclude valuable information. Third, factor price movements help us understand the sources of convergence. For example, rapid technological catch-up in a poor country is more likely to increase all factor prices equally than is mass emigration or an export boom in labor-intensive manufactures. The open economy mechanisms that were important in driving late-19th-century convergence—trade, migration, and capital flows—operated directly on factor prices⁶ and thus only indirectly on GDP per capita. Focusing on GDP per capita alone misses a large part of this story. Fourth, economic change nearly always involves winners and losers, a fact that is crucial in accounting for the evolution of policy. Changes that increase GDP per capita and cause losses to the politically powerful often are successfully resisted, and examining the behavior of factor prices helps us understand such political resistance.

Impact of the Mass Migrations

Heckscher and Ohlin argued that integration of global commodity mar-

kets would lead to convergence of international factor prices, as countries everywhere expanded the production and export of commodities that used their abundant (and cheap) factor intensively. If so, mass migration should have helped along the process of factor convergence. The poorest European countries tended to have the highest emigration rates, while the richest new world countries tended to have the highest immigration rates. The correlation between the two wasn't perfect, but it was still very strong.⁷ Certainly the labor force impact was very big: mass migration after 1870 augmented the 1910 New World labor force by 49 percent and reduced the 1910 labor force in the emigrant countries around the European periphery by 22 percent. These big labor supply effects can be converted easily into a real wage impact in both sending and receiving countries. My colleagues and I estimate that effect in a series of papers and conclude that mass migration alone can explain about 70 percent of the real wage convergence observed in the late 19th century Atlantic economy.⁸

Mass Migration, Globalization, and Inequality

Because the migrants tended to be unskilled, and became increasingly so as the late 19th century unfolded, they tended to flood labor markets at the bottom in destination countries, thus lowering the unskilled wage relative to the skilled wage, to white-collar incomes, to entrepreneurial returns, and to land rents. Mass migration implied increasing inequality in rich, labor-scarce countries. Emigration implied declining inequality in poor, labor-abundant countries.

How did the typical unskilled worker near the bottom of the income distribution do relative to the

typical skilled blue collar worker, or the educated white collar employee near the middle of the distribution, or relative to the landowner and the capitalist near the top? Two kinds of evidence can be used to document late-19th-century inequality trends: changes in the ratio of the unskilled wage to farm land values per acre; and changes in the ratio of the unskilled wage to GDP per worker hour.

In the four decades prior to World War I, the wage/rental ratio plunged in the New World. One study reports that the Australian ratio fell to one quarter of its 1870 level by 1913, the Argentine ratio fell to one fifth of its mid-1880 level, and the U.S. ratio fell to less than half of its 1870 level. In Europe, the wage/rental ratio surged up to the beginning of World War I. The British ratio increased by a factor of 2.7 over its 1870 level, while the Irish ratio increased by even more. The Swedish and Danish ratios both increased by a factor of 2.3. Not surprisingly, the surge was less pronounced in protectionist countries: the ratio increased by a factor of 1.8 in France, 1.4 in Germany, and not at all in Spain.⁹ The evidence that the wage/rental ratio was dropping in the rich, labor-scarce New World is consistent with the hypothesis that inequality rose there, while the rising wage/rental ratio was consistent with the belief that inequality was falling in poor, labor-abundant Europe. There is also some evidence that globalization mattered: European countries staying open to trade absorbed the biggest distributional hit; European countries retreating behind tariff walls absorbed the smallest distributional hit.

What about the ratio of the unskilled worker's wage to the returns on all factors per laborer as measured by Maddison's estimates of GDP per worker-hour? Changes in this ratio measure changes in the economic

distance between the working poor near the bottom of the distribution and the average citizen in the middle of the distribution. It turns out that this ratio is highly correlated with more comprehensive measures of inequality in the few cases in which both are available. In any case, the ratio rose by more than 1.5 times between 1870 and 1913 in Denmark and Sweden—two countries setting the egalitarian upper bound—and it fell by half in Australia and the United States, two countries setting the inegalitarian lower bound. When this measure of inequality change is plotted against the 1870 real wage, it offers strong confirmation of the globalization hypothesis: inequality rose dramatically in rich, labor-scarce New World countries such as Australia, Canada, and the United States; inequality fell dramatically in poor, labor-abundant countries such as Norway, Sweden, Denmark, and Italy; inequality was more stable in European industrial economies, such as Belgium, France, Germany, the Netherlands, and the United Kingdom, and in poor European economies that failed to globalize, such as Portugal and Spain.

Globalization Backlash: Immigration Restrictions

American doors did not suddenly and without warning slam shut on European emigrants when the U.S. Congress overrode President Wilson's veto of the immigrant literacy test in February 1917 or when it passed the Emergency Quota Act of May 1921. Over the half century prior to the enactment of the Literacy Act, the United States had been imposing restrictions on what had been free immigration—including contract labor laws, Chinese exclusion acts, excludable classes, head taxes, and so on—and had long been debating

more severe restrictions. The Quota Act of 1921 was preceded by 25 years of active Congressional debate, and 86 percent of Congress favored more restriction according to the first vote on this issue in 1897. The United States was hardly alone. Argentina, Australia, Brazil, and Canada enacted similar measures, although in these countries policy change more often took the form of an enormous drop in or even disappearance of immigrant subsidies rather than their outright exclusion. Contrary to conventional wisdom, therefore, the United States did not make an abrupt regime switch around World War I, but rather it evolved toward a more restrictive immigration policy.

The empirical literature on the determinants of immigration policy is very new, but two recent papers by Timmer and me suggest some outlines.¹⁰ First, immigration policy has been slow to change, but it is worth noting that countries with the strongest historical persistence also exhibited the biggest policy switch at the end of the period of quiescence, from wide open to tightly closed, and these policy switches usually required long periods of debate. Second, labor market conditions also have influenced immigration policy consistently. Deteriorating living standards of unskilled workers mattered, but so did rising inequality. Both were associated with increasingly restrictive immigration policy.

The evidence just summarized speaks to the indirect impact of immigration on policy by looking at labor market performance. What about the direct impact of immigration on policy? Low and falling immigrant quality seems to have precipitated more restrictive immigrant policy, even after other forces are controlled for. To some extent, therefore, New World policy anticipated the impact of low quality immigrants on unskilled wages and moved to shut it down.

While the absolute size of the immigrant flow did not seem to have any consistent impact on New World policy up to 1930, its low and declining quality certainly did, which provoked restriction. Global competitors' policies mattered even more. Labor market conditions mattered most, with deteriorating conditions provoking a restrictive policy reaction. New World countries acted to defend the economic interests of unskilled labor.

The Lessons of History¹¹

There was a deglobalization implosion after 1914, driven by two world wars, two periods of fragile peace, the Great Depression and the Cold War. The last few decades of the 20th century have marked a successful struggle to reconstruct that pre-World War I global economy. Conventional wisdom has it that these spectacular changes in global policy were regime switches that were pretty much independent of economic events; thus they can be taken as exogenous.

This view ignores the fact that immigration policy in labor-scarce parts of the global economy became increasingly restrictive prior to 1914 and that much of this retreat from open immigration policies was driven by a defense of the deteriorating relative economic position of the working poor. It also ignores the fact that liberal attitudes toward trade were brief and that protection rose sharply almost everywhere on the European continent from the 1870s onwards. Most of this retreat from free trade was driven by a defense of the relative economic position of both the landed rich and the landless poor.¹²

Thus, a more accurate narrative of globalization experience in the decades prior to the World War I would read like this: A spreading technology revolution and a transportation breakthrough led first to a divergence

of real wages and living standards between countries; the evolution of well-functioning global markets in goods and labor eventually brought about a convergence between nations; this factor price convergence, however, planted seeds for its own destruction because it created rising inequality in labor-scarce economies and falling inequality in labor-abundant economies. The voices of powerful interest groups who were hit hard by these globalization events were heard, generating a political backlash against immigration and trade.

A late-19th-century globalization backlash made a powerful contribution to interwar deglobalization. Is this history likely to repeat? Maybe not. After all, the migration from poor to rich countries today is a pretty trivial affair compared with the mass migrations of a century ago. And governments today have far more sophisticated ways to compensate losers than they had a century ago. Yet, history does supply a warning: a backlash against globalization can be found in our past, so it might reappear in our future.

¹ T.J. Hatton and J.G. Williamson, "After the Famine: Emigration from Ireland 1850–1913," *Journal of Economic History* (September 1993), pp. 575–600; "What Drove the Mass Migrations from Europe in the Late Nineteenth Century?" *Population and Development Review* (September 1994), pp. 1–27; "Late-Comers to Mass Migration: The Latin Experience," in *Migration and the International Labor Market 1850–1939*, T.J. Hatton and J.G. Williamson, eds. New York: Routledge, 1994; and "International Migration and World Development: A Historical Perspective," in *Economic Aspects of International Migration*, H. Giersch, ed. New York: Springer-Verlag, 1994.

² T.J. Hatton and J.G. Williamson, *The Age of Mass Migration: An Economic Analysis*. New York: Oxford University Press, 1998.

³ K. O'Rourke and J.G. Williamson, *Globalization and History*, chapter 3, Cambridge, MA: MIT Press, forthcoming.

⁴ J.G. Williamson, "The Evolution of Global Labor Markets Since 1830," *Explorations in Economic History* (April 1995), pp. 141-96.

⁵ J.G. Williamson, "Globalization, Convergence and History," *Journal of Economic History* (June 1996), pp. 1-30; J.G. Williamson, "The Evolution of Global Labor Markets Since 1830"; K.O'Rourke and J.G. Williamson, *Globalization and History*, chapter 2.

⁶ K.O'Rourke and J.G. Williamson, "Open Economy Forces and Late 19th Century Swedish Catch-Up: A Quantitative Accounting," *Scandinavian Economic History Review*, 2 (1995), pp. 171-203; "Education, Globalization, and Catch-Up: Scandinavia in the Swedish Mirror," *Scandinavian Economic History Review*, 3 (1996), pp. 287-309; "Around the

European Periphery 1870-1913: Globalization, Schooling and Growth," *European Review of Economic History*, 1 (1997), pp. 153-90. See also A. Taylor, K. O'Rourke, and J.G. Williamson, "Factor Price Convergence in the Late Nineteenth Century," *International Economic Review* (August 1996), pp. 499-530.

⁷ T.J. Hatton and J.G. Williamson, *The Age of Mass Migration*, chapter 3.

⁸ A. Taylor and J.G. Williamson, "Convergence in the Age of Mass Migration," *European Review of Economic History*, 2 (1997), pp. 27-63. See also "Globalization, Convergence and History" and "Around the European Periphery 1870-1913."

⁹ A. Taylor, K. O'Rourke, and J.G. Williamson, "Factor Price Convergence in

the Late Nineteenth Century."

¹⁰ A. Timmer and J.G. Williamson, "Racism, Xenophobia or Markets? The Political Economy of Immigration Policy Prior to the Thirties," NBER Working Paper No. 5867, January 1997; A. Timmer and J.G. Williamson, "Immigration Policy Prior to the Thirties: Labor Markets, Policy Interactions and Globalization Backlash," *Department of Economics, Harvard University* (March 1997).

¹¹ J.G. Williamson, "Globalization, Labor Markets and Policy Backlash in the Past," *Journal of Economic Perspectives* 1998, forthcoming.

¹² K. O'Rourke and J.G. Williamson, *Globalization and History*, chapters 6 and 12.



NBER Profile: Campbell R. Harvey

Campbell R. Harvey, the J. Paul Sticht Professor of International Business at Duke University, has been a Research Associate in the NBER's Program on Asset Pricing since 1993. He received his B.A. from the University of Toronto in 1981 and his Ph.D. from the University of Chicago in 1988.

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Harvey lives in Chapel Hill, North Carolina with his wife Susana and their three children, Cassandra, Catriona, and Campbell II. In his leisure time, he enjoys playing the piano and spending time with his family.

