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Volume Title: High-Skilled Migration to the United States and Its Economic Consequences

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Volume Publisher: University of Chicago Press

Volume ISBNs: 978-0-226-52552-5 (cloth); 978-0-226-52566-2 (e-ISBN)

Volume URL: <http://www.nber.org/books/hans-4>

Conference Date: July 10-11, 2016

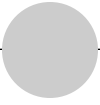
Publication Date: May 2018

Chapter Title: Introduction to "High-Skilled Migration to the United States and Its Economic Consequences"

Chapter Author(s): Gordon H. Hanson, William R. Kerr, Sarah Turner

Chapter URL: <http://www.nber.org/chapters/c13839>

Chapter pages in book: (p. 1 – 5)



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# Introduction

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High-skilled immigrants represent an increasing share of the US workforce, particularly in science and engineering fields, while the global pool of workers with collegiate and advanced degrees has also increased markedly. The share of foreign-born workers in science, technology, engineering, and mathematics (STEM) occupations in the United States has expanded from 6.6 percent in 1960 to 28.1 percent in 2012 (Hanson and Liu, chapter 1, this volume). These workers play an ever more prominent role in the US innovation ecosystem by raising the quality and quantity of basic science performed in US universities and contributing to the creation of new ideas, designs, and patents that are commercialized by US industries.

The potential economic impact of high-skilled immigration depends on market conditions and policy choices, particularly visa policies affecting the temporary and permanent flow of workers to the United States. Questions that permeate US policy debates include: Would expansion (or contraction) of the number of visas for skilled workers from abroad reduce the wages of US citizens? Do high-skilled immigrants contribute to economic growth through enhancing prospects for innovation? Will technological progress,

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For acknowledgments, sources of research support, and disclosure of the authors' material financial relationships, if any, please see <http://www.nber.org/chapters/c13839.ack>.

including increased capacity to utilize high-skilled workers abroad, substitute for immigration?

Answering these questions requires a complete economics tool kit. Indeed, these questions demand integration of multiple subfields in economics, drawing on the insights of international trade, industrial organization, labor economics, and macroeconomics. To understand the complete process of market adjustment to inflows of high-skilled workers from abroad requires thinking beyond a static, partial-equilibrium context, which tends to dominate current empirical research on immigration. In order to measure who benefits—and who does not—from high-skilled immigration, it is important to account for multiple margins of adjustment including worker educational choices, firm market-entry decisions, and business selections over product mix, which together combine to determine the level and growth of aggregate productivity.

This volume takes an important step to integrate research advances connecting high-skilled immigration, scientific innovation, and market adjustment. While the study of immigration and immigration policy has a long history, a disproportionate share of the research has focused on low-skilled immigrants and their impact on labor market outcomes for low-skilled US workers. To be sure, low-skilled immigration is an important area of inquiry and there remain unresolved questions regarding its causes and consequences. Yet, the economic dynamics that follow from high-skilled immigration—and the more general expansion of the global scientific workforce—are likely to be distinct from those of low-skilled immigration and arguably more consequential. Given the potential link of immigrants to productivity-enhancing innovation, the flow of high-skilled workers between countries is a first-order determinant of the pace of global economic growth. Although there is an established line of economics research on the importance of scientific innovation for productivity growth, there have been only limited connections between this work and studies of high-skilled immigration.

The full impact of high-skilled immigration and a globalized market for talent depends on the state of technology, the structure of markets, and policies that impact the flows of goods, capital, and labor across borders. What is clear from the work presented in this volume is that the heterogeneity of talent flows across countries, sectoral distinctions in the utilization of high-skilled labor, and the dynamics of adjustment affect our capacity to predict how changes in policy can affect economic growth and the distribution of earnings. An aim of this volume is to clarify the links among talent flows, migration policies, and economic outcomes by identifying the mechanisms of adjustment that are operative.

Markets for skills in the global economy operate at a microeconomic level that depends on country of origin, visa policies, and the state of technology. The opening three chapters take on particular empirical puzzles

and observations including country-specific variation in specialization, the distinct use of alternative visa mechanisms among multinational enterprises, and the alternative of “offshore” employment in the hiring of skilled labor.

To provide context for the detailed analyses to come, Gordon H. Hanson and Chen Liu, in “High-Skilled Immigration and the Comparative Advantage of Foreign-Born Workers across US Occupations,” demonstrate the differential sorting between natives and immigrants—as well as among immigrants from different countries—across high-skilled occupations. These patterns are broadly stable across time, within countries of origin, and among both foreign educated and US educated of the same nationality. It thus appears that by opening immigration to particular countries, such as China and India, the United States implicitly chooses the occupational composition of its high-skilled immigrant labor force.

In his chapter, “The Innovation Activities of Multinational Enterprises and the Demand for Skilled-Worker, Nonimmigrant Visas,” Stephen Ross Yeaple draws attention to how the structure of firms affects access to the pool of talent from abroad. Multinational firms have the capacity to use the relatively unconstrained L visas (which permit companies to bring their foreign employees to the United States for temporary job assignments), while firms without this global reach must draw on foreign-born workers through the oversubscribed H-1B program. Yeaple places these facts in the context of firms making decisions about how to source differentiated intermediate inputs. A theoretical implication of his model is greater access to foreign workers, through whichever existing high-skilled visas, can increase firm-level demand for native-born, high-skilled workers.

Shifting attention to how the digital economy creates alternatives to immigration, John Horton, William R. Kerr, and Christopher Stanton, in “Digital Labor Markets and Global Talent Flows,” provide the insight that employers’ access to the global talent pool is not limited by the physical migration of workers. Digital markets and contests increasingly provide an alternative platform for the identification and utilization of skills from abroad. Intriguingly, these online employment exchanges appear to complement, not substitute for, immigration. The authors also provide some novel evidence on the elasticity of cross-border demand for labor with wage adjustments.

An explicit objective of the last three chapters is to address questions about how high-skilled immigration affects economic growth and the distribution of earnings. Models that account for aggregate dynamics explicitly provide an opportunity to assess different channels of adjustment, while also permitting counterfactual policy simulations. While these three chapters emphasize somewhat different facets of the labor market and impacts of immigration, each generates a significant insight about the nature of adjustment and potential trade-offs.

In their chapter, “Understanding the Economic Impact of the H-1B Program on the United States,” John Bound, Gaurav Khanna, and Nicolas Morales consider a model with endogenous technical change in the information technology (IT) sector in the context of a general-equilibrium model of the US economy. They quantify the effect of high-skilled foreign workers on the earnings of high- and low-skilled workers, total consumption, and economic growth. Assessed over the period from 1994 to 2001, the authors find that immigration increased the overall income of US native-born workers, while also lowering prices and raising output in the IT sector. At the same time, there are substantial distributional consequences to high-skilled immigration. US-born workers shift out of computer science, as wages in this occupation also fell relative to the expected outcome in the absence of immigration. Owners of factors of production that complement computer scientists see increased wages.

Moving to an explicitly dynamic context, Nir Jaimovich and Henry E. Siu, in “High-Skilled Immigration, STEM Employment, and Nonroutine-Biased Technical Change,” consider high-skilled immigration in the framework of endogenous nonroutine-biased technical change. Their calibrated model captures the tendency of the foreign born to work in innovation-related activities, the polarization of employment opportunities across occupations for native- and foreign-born labor, and the evolution of wage inequality. A striking result of their analysis, which covers the US economy since 1980, is that the inflow of high-skilled immigrants attenuates increases in skill-based inequality in the distribution of earnings.

Michael E. Waugh continues the emphasis on macroeconomic dynamics in his chapter, “Firm Dynamics and Immigration: The Case of High-Skilled Immigration.” He takes the study of the impact of immigration to a dynamic model of heterogeneous firms in a monopolistic-competition framework. The innovation of Waugh’s model is to allow the skill intensity of production to vary with a firm’s productivity, which impacts the path of relative wages. The short-run impact of immigration is to reduce the wage premium of high- to low-skilled workers more than in conventional models, while output increases over the longer run. In the short run, it is also the case that immigration begets firm entry, which generates increased capital investment, thereby producing a near-term drop in consumption until the economy converges to its new stationary equilibrium at higher income and consumption levels.

While these models differ in what they assume about the competitive nature of markets and the mechanisms behind market adjustment, they embody a common set of themes. First, in all three cases, there is a positive role for immigration in generating aggregate economic growth. At the same time, high-skilled immigration—particularly in the presence of endogenous growth and skill-biased technical change—actually places downward pressure on the wage gap between high- and low-skilled workers.

In bringing these authors together, our aim is to seed a fertile area of research with methods and models from different fields, along with the empirical insights and outstanding puzzles that will stimulate additional innovation in this domain. There is no question that the global pool of high-skilled workers is increasing; yet, the extent to which visa policies and market structure encourage integration across borders is less clear. Even as there is abundant evidence of overall gains from high-skilled immigration and associated innovation, many questions remain to be answered about market adjustments, distributional consequences, and the impact of immigration policies.

This volume is certainly not the last word on high-skilled immigration. Rather, it is our hope that it is a starting point for a rich path of research inquiry that brings together frontier methods and models of economics with new data sources. The completion of this volume, along with a broader investment in fostering research on high-skilled immigration, owes a debt of gratitude to the Alfred P. Sloan Foundation and Danny Goroff. In addition, we appreciate the encouragement provided by Jim Poterba along with the broad-based infrastructure support provided by the National Bureau of Economic Research.