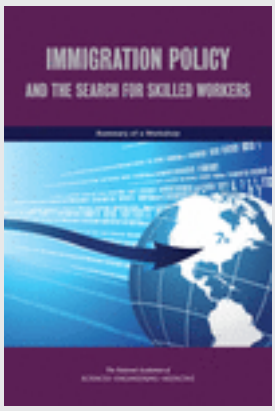

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DETAILS

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Gail Cohen, Aqila Coulthurst, and Joe Alper, Rapporteurs; Committee on High-Skilled Immigration Policy and the Global Competition for Talent; Board on Science, Technology, and Economic Policy; Policy and Global Affairs; National Academies of Sciences, Engineering, and Medicine

IMMIGRATION POLICY
AND THE SEARCH FOR SKILLED WORKERS

Summary of a Workshop

Gail Cohen, Aqila Coulthurst, and Joe Alper, Rapporteurs

Committee on High-Skilled Immigration Policy
and the Global Competition for Talent

Board on Science, Technology, and Economic Policy

Policy and Global Affairs

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Gail Cohen, Executive Director (Study Director, from Fall 2014)
David Ammerman, Financial Officer
Aqila Coulthurst, Associate Program Officer
Cynthia Getner, Financial Officer (through Spring 2014)
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Preface and Acknowledgments

The market for high-skilled workers is becoming increasingly global, as are the markets for knowledge and ideas. While high-skilled immigrants in the United States represent a much smaller proportion of the workforce than they do in countries such as Australia, Canada, and the United Kingdom, these immigrants have an important role in spurring innovation and economic growth in all countries and filling shortages in the domestic labor supply. As this workshop summary report will show, "high-skill" is defined differently in different countries but is often used as a proxy for highly educated. This workshop report summarizes the proceedings of a Fall 2014 workshop that focused on how immigration policy can be used to attract and retain foreign talent. Presenters covered immigration policy in specific countries including Australia, Canada, Israel, New Zealand, and the United Kingdom; they also looked at trends in Organisation for Economic Co-operation and Development (OECD) countries, in the Middle East and in Southeast Asian countries. Workshop participants compared policies on encouraging migration and retention of skilled workers, attracting qualified foreign students and retaining them post-graduation, input by states or provinces in immigration policies to add flexibility in countries with regional employment differences, among other topics. The panelists also discussed how immigration policies have changed over time in response to undesired labor market outcomes and whether there was sufficient data to measure those outcomes.

STATEMENT OF TASK

The project was approved by the Governing Board Executive Committee of the National Academies of Sciences, Engineering, and Medicine with the following charge:

> An ad hoc committee under the Board on Science, Technology, and Economic Policy (STEP) will organize a workshop to examine the effects of changes in selected industrialized countries' treatment of temporary and permanent immigrants with advanced training and skills, especially in the sciences, engineering, and software development, in an effort to understand the effects of

the policy changes, in relation to other factors, on entry and retention and domestic labor markets and educational patterns. The workshop will also compare these countries' administrative mechanisms (e.g., commissions and point systems), methods of integrity assurance, and data collection and evaluation. The committee will develop the agenda, select and invite speakers and discussants, and moderate the discussions. An individually authored workshop summary will be prepared by a rapporteur.

As a part of the study charge, the planning committee commissioned the following policy briefs which are available on the STEP website at http://sites.nationalacademies.org/PGA/step/PGA_146763.

- *Trade-Offs Within a Skilled Immigration Policy: Lessons from Canada, Summary of a Presentation* by Charles Beach
- *A Comparison of the U.S. and Canadian Immigration Systems* by Pia Orrenius and Madeline Zavodny
- *The UK Experience of Immigration Policy* by Jonathan Wadsworth
- *High-Skilled Migration to Asian Nations: Summary Version* by Graeme Hugo
- *A Comparison of Skilled Migration Policy: Australia, Canada, and New Zealand* by Lesleyanne Hawthorne
- *Paper on Global Demand for International Students as Skilled Migrants* by Lesleyanne Hawthorne
- *Flows of Students, Computer Workers, and Entrepreneurs* by Lindsay Lowell
- *High-Skilled Immigration and Imperfect Labor Markets: Theory and Cross-Country Evidence* by Herbert Brücker
- *International Migration and U.S. Innovation* by William Kerr

THIS REPORT

This workshop report has been prepared by the rapporteurs as a factual summary of what occurred at the workshop. The committee's role was limited to planning and convening the workshop, and serving as panel moderators. The views contained in the report are those of individual workshop participants and do not necessarily represent the views of all workshop participants, the committee, or the Academies.

ACKNOWLEDGMENTS

On behalf of the National Academies of Sciences, Engineering, and Medicine, we express our appreciation and recognition for the insights, experiences, and perspectives made available by the participants of this meeting. We would particularly like to recognize Joe Alper for his help in preparing the first draft of this workshop summary, and Radiah Rose-Crawford of the Academies' staff for her assistance in preparing this report for publication.

ACKNOWLEDGMENTS OF REVIEWERS

This report has been reviewed in draft form by individuals chosen for their diverse perspectives and technical expertise, in accordance with procedures approved by the National Academies of Sciences, Engineering, and Medicine's Report Review Committee. The purpose of this independent review is to provide candid and critical comments that will assist the institution in making its published report as sound as possible and to ensure that the report meets institutional standards for quality and objectivity. The review comments and draft manuscript remain confidential to protect the integrity of the process.

We wish to thank the following individuals for their review of this report: Erik Antonsson, Northrop Grumman Corporation; David Card, University of California, Berkeley; Janette Haughton, Australian Embassy, Washington DC; Neil Ruiz, Brookings Institution; and Philip Webre, Congressional Budget Office.

Although the reviewers listed above have provided many constructive comments and suggestions, they were not asked to endorse the content of the report, nor did they see the final draft before its release. The review of this report was overseen by Julia Phillips, Sandia National Laboratories (Retired), appointed by the Academies, she was responsible for making certain that an independent examination of this report was carried out in accordance with institutional procedures and that all review comments were carefully considered. Responsibility for the final content of this report rests entirely with the rapporteurs and the institution.

Contents

1

Introduction and Overview

The current political impasse with respect to comprehensive immigration reform, and the status of undocumented immigrants in particular, has prevented legislative actions that would increase the ability of foreigners with advanced training and skills to remain and work in the United States. At the same time, other countries that are a part of the Organisation for Economic Cooperation and Development (OECD) have adapted their immigration policies to improve their ability to attract and retain skilled migrants. It is important for U.S. policymakers to understand the long-term impact of current immigration policies and to implement the necessary changes to make this a favorable destination for highly skilled workers. Immigration policy and investments in the current workforce have long-run implications for economic growth and productivity. This is especially clear when looking at the demographics of the U.S. labor market.

There has been little quantitative analysis comparing the effectiveness of measures taken by advanced economies in attracting highly skilled migrants and few studies on the impact of immigration on domestic wages, the supply of native-born citizens with similar qualifications, and other labor market conditions, let alone a review of their implications for the United States. In 2009, the German Marshall Fund (GMF) issued a report, *The Battle for the Brains*, comparing American, Canadian, and Australian high-skilled immigration policies.[1] However, this report is mainly a legal analysis of policy changes, reporting the number of foreign-born immigrants with college and advanced degree credentials entering each country in the year 2001. It offers no empirical evaluation of outcomes over a period of time. Based on this qualitative analysis, the authors of the GMF report conclude that immigration policy changes have less effect on migration patterns than do other factors, such as the economic climate and

[1]Doomernik, Jeroen, D. Thranhardt, R. Koslowski. 2009. The Battle for the Brains: Why Immigration Policy is Not Enough to Attract the Highly Skilled. Washington, DC: The German Marshall Fund of the United States. Available at http://trends.gmfus.org/doc/Battle%20final.pdf [Accessed on October 21, 2015].

social attitudes of the destination country's population. Similarly, the OECD's 2009 working paper, *Managing Highly Skilled Labour Migration: A Comparative Analysis of Migration Policies and Challenges in OECD Countries*, provides descriptions of immigration programs, reports data from 2006 on the percentages of foreign-born workers aged 30-39 in OECD labor pools and the percentages of employed immigrants with tertiary degrees, but does not evaluate the outcomes of policy changes over time.[2]

Some recent reports have argued that a liberalized immigration policy for students and skilled workers would improve economic welfare in the United States by adding to the pool of those that are trained in key academic disciplines and by fueling the creation and growth of new technology-based companies.[3] A 2001 NRC[4] report, *Building A Workforce for the Information Economy*[5], recommended that the green card process be streamlined and that foreign workers be given flexibility to change jobs. Specifically, the 2001 report recommended more portable H1-B visas and a reduction in the amount of time needed to obtain permanent resident visas. More recently, the NRC's 2007 report, *Rising Above the Gathering Storm: Energizing and Employing America for a Better Economic Future*[6], called for providing automatic work permits and expedited residence status to visa-holders who have secured U.S. employment.

STATEMENT OF TASK

To better understand how changes in immigration policy impact the ability to attract and retain high-skilled immigrants, the NRC appointed a committee to organize a workshop with the following statement of task:

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[2]Chaloff, J., and G. Lemaître. 2009. *Managing Highly-Skilled Labour Migration: A Comparative Analysis of Migration Policies and Challenges in OECD Countries*. OECD Social, Employment, and Migration Working Paper No. 79. Paris, France: Organisation for Economic Co-operation and Development. Available at http://www.oecd.org/els/mig/46656535.pdf [Accessed October 21, 2015].

[3]Hunt, J. and M. Gauthier-Loiselle. 2010. How much does immigration boost innovation? *American Economic Journal: Macroeconomics*, 2(2): 31-56.; Kerr, W., and W. Lincoln. 2010. The Supply Side of Innovation: H-1B Visa Reforms and U.S. Ethnic Invention. *Journal of Labor Economics* 28(3):473-508.

[4]Effective July 1, 2015, the institution is called the National Academies of Sciences, Engineering, and Medicine. References in this report to the National Research Council are used in an historic context identifying programs prior to July 1.

[5]National Research Council, *Building a Workforce for the Information Economy*. Washington, DC: The National Academies Press, 2001, p. 17.

[6]National Research Council. *Rising Above the Gathering Storm: Energizing and Employing America for a Better Economic Future,* Washington, DC: The National Academies Press, 2007, p. 9-10.

> An ad hoc committee under the Board on Science, Technology, and Economic Policy (STEP) will organize a workshop to examine the effects of changes in selected industrialized countries' treatment of temporary and permanent immigrants with advanced training and skills, especially in the sciences, engineering, and software development, in an effort to understand the effects of the policy changes, in relation to other factors, on entry and retention and domestic labor markets and educational patterns. The workshop will also compare these countries' administrative mechanisms (e.g., commissions and point systems), methods of integrity assurance, and data collection and evaluation. The committee will develop the agenda, select and invite speakers and discussants, and moderate the discussions. An individually authored workshop summary will be prepared by a rapporteur.

As an initial matter, the ad hoc committee considered defining "high-skill" immigration but decided against an explicit definition for several reasons. First, there is no consensus among countries on how to define high-skill immigrants. For example, the OECD defines a high-skill immigrant as one who has a post-secondary degree or certificate.[7] Other countries define high-skilled immigrants by occupation, as is the case with the H-1B visa program in the United States. Furthermore, defining high-skill immigrants is itself a policy choice and may change over time, depending on countries' needs. Changing this definition may be an easier policy lever for changes in immigration policy than many other policy changes would be.

ORGANIZATION OF THE SUMMARY

The purpose of this workshop was to collect information on how other countries have changed their temporary and/or permanent resident programs in order to meet employer needs and fuel growth in new enterprises. Presenters made a number of key points during the workshop which are covered in Chapter 8 of this summary. The workshop (see Appendix A for the agenda) was organized by an independent planning committee in accordance with the procedures of the National Academies of Sciences, Engineering, and Medicine. The planning committee was comprised of Edward Alden, the Bernard L. Schwartz senior fellow at the Council on Foreign Relations; Ellen Dulberger, managing

[7]Chaloff, J., and G. Lemaître. 2009. *Managing Highly-Skilled Labour Migration: A Comparative Analysis of Migration Policies and Challenges in OECD Countries*. OECD Social, Employment, and Migration Working Paper No. 79. Paris, France: Organisation for Economic Co-operation and Development. Available at http://www.oecd.org/els/mig/46656535.pdf [Accessed October 21, 2015].

partner at Ellen Dulberger Enterprises; Jennifer Hunt, professor of Economics at Rutgers University; David McKenzie, lead economist in the Development Research Group, Finance and Private Sector Development Unit, at the World Bank; Subhash Singhal, Battelle Fellow Emeritus at the Pacific Northwest National Laboratory; and Paula Stephan, Professor of Economics at Georgia State University (see Appendix B for biographical information).

This publication summarizes the presentations and discussions that occurred throughout the workshop and highlights some of the key points made. The majority of the presentations at the workshop compared immigration policies in the United States, Canada, and Australia. Highlights from these presentations are presented in Table 1-1.

TABLE 1-1 Snapshot of Immigration Policy in the US, Canada and Australia

	COUNTRY		
ISSUE	**UNITED STATES**	**CANADA**	**AUSTRALIA**
Composition of immigrants	70% family-based 15% employment-based (including temporary workers) 15% humanitarian	25-30% family based 60-65% employment-based 9-10% humanitarian	30-40% family or humanitarian 60-70% employment based (skilled workers)
Temporary workers	Small number of first-come, first served employment-based H1-B visa for skilled workers (capped at 85,000 workers); smaller amounts for unskilled workers; specific to employer; no wage restrictions; employer must show within 6 years of hiring worker that no native worker was available.	Temporary workers might need a positive "labour market opinion" showing offered wages consistent with prevailing local wages; however, many people or jobs are exempt including a growing number of workers (260,000) in the International Mobility Program.	Frequently used – 68% of migrants getting a permanent employer sponsored visa were temporary visa holders; Wage must confirm to Market Salary Rate; renewal of Labour Market test.
Post-study work permits for students	Yes, 12 months optional practical training plus additional 17 months for qualified STEM graduates (20,000 H-1B visas available for foreign students)	3 year work permit as long as study in Canada at least 2 years	2 year work permit for students graduating with a bachelor's degree; 4 years for PhD recipients.
Regional Elements	No	Yes, Provincial Nominee Program can be used to bypass the federal system	Yes, state governments review the applicant pools ; SkillSelect pools for nomination
Language Proficiency Requirements	No	Yes	Yes

Data collection	No	Canadian Longitudinal Immigration Database tracks labor market performance of all post-1982 immigrants	Longitudinal Survey of Immigrants to Australia (LSIA), The Continuous Survey of Australia's Migrants (CSAM); Longitudinal Continuous Study of Migration

In addition, there was a presentation on the immigration system in the United Kingdom which focused on the role of the U.K. Migration Advisory Committee (MAC), a nongovernmental public body created to provide evidence-based advice to the government on immigration issues, whose role is comparable to the role of the National Academies of Sciences, Engineering, and Medicine in providing scientific and technical advice to the government. A presentation on New Zealand showed similarities between the Australian and New Zealand immigration systems, although one difference between the two countries is that New Zealand has had greater difficulty attracting skilled migrants and has had difficulty retaining native-born and migrant STEM workers. Changing immigration policies in Israel, Southeast Asian countries, and the Middle East were also discussed. Although immigration policy was the main focus of the workshop, many participants stressed that a country's immigration policy is only one component in determining its attractiveness to migrant skilled workers. Economic strength, the quality of the research institutions, and the nature and amounts of funding available for research are all other important components.

The rest of this summary proceeds as follows: Chapter 2 examines how the worldwide expansion of education and knowledge impacts the migration of high-skilled labor in the modern global economy. Chapter 3 provides a broad overview of recent trends in high-skilled migration to the United States and other OECD countries and discusses some of the policy questions that arise from those trends. Chapter 4 compares the U.S. immigration system with those in a select group of countries with the objective of drawing important lessons that the United States might apply as it tries to reform its immigration system and attract high-skilled workers. Chapter 5 discusses global competition for entrepreneurs and international students to fill domestic STEM jobs, and Chapter 6 describes some of the effects that immigration has on innovation and labor markets. Chapter 7 recounts the wide-ranging discussion that the panel of experts had on the policy implications of what had been discussed at the workshop to that point. Chapter 8 provides a summary of some of the key points raised by participants during the workshop.

2

High-Skilled Immigration and Ideas in a World of Global Education and Research Collaborations

Dr. Richard Freeman, professor of economics at Harvard University and Director of the Science and Engineering Workforce Project at the National Bureau of Economic Research, opened the workshop with a keynote address that discussed how the worldwide expansion of education and knowledge affects the migration of high-skilled labor in the modern global economy. He emphasized the role that migration plays in the development and dissemination of ideas and knowledge on a global scale. The development and dissemination of science and engineering-based knowledge is critical to maintaining a competitive advantage in today's economy. Moreover, international collaborations and dissemination of knowledge are more likely to occur when foreign-born researchers spend time in the United States, either as students or visiting faculty.

Collaborations among researchers in science and migration of ideas have increased over time, highlighting the need for decision makers to rethink high-skilled immigration policy in the United States. There has been rapid growth in the number of international students and authorship of scientific papers, especially among immigrants from China and other emerging economies. Given the importance of international students to fill domestic STEM jobs, Freeman focused on a number of areas that could improve U.S. competitiveness in the global talent arena, including maintaining the attractiveness of U.S. universities and re-aligning research funding toward physics, chemistry, and engineering. Increased university enrollments of both native- and foreign-born students drive knowledge creation, and international students who return to their home country aid in the dissemination of knowledge. Additionally, Freeman recommended incentivizing "translational research" to ensure that basic knowledge is translated into innovative activities that will spur economic growth. This chapter provides additional details from Freeman's keynote address and the ensuing discussion.

The modern global economy depends on the production and dissemination of knowledge. University-based basic research and development work provides the stock of science and engineering knowledge that serves as the

foundation. Firm-based research and development uses this stock to create innovative products and process, and engineering and technology work by university graduates then turns this research and development into things that work, generating economic output.

In a knowledge economy, Freeman explained, globalization's main impact is through the spread of knowledge via higher education, via the migration of students and highly skilled workers, and cross-border collaborations, rather than through trade and capital flows. Despite the "obsolete vision of the Washington consensus, World Bank, and International Monetary Fund," the dissemination of knowledge is what is fundamentally changing the global economy according to Freeman.

One of the key factors in the global dissemination of knowledge is the huge increase in university enrollments worldwide. In 1970, 29.4 million students were enrolled in universities, with emerging markets accounting for 54 percent of that total and U.S. universities making up another 29 percent. By 2010, global university enrollment increased more than six-fold, to 177.6 million students, with emerging markets accounting for 76 percent of that total and the U.S. share shrinking to 11 percent. By 2025 university enrollments are expected to increase to more than 262 million students, with nearly all this growth from students in emerging markets. More than half of the growth will be from students in China and India. Between 1970 and 2010, the number of Chinese students getting a university education jumped from under 100,000 to 30 million, while the number of university students in India rose from 2.5 million to 20.7 million.

Accompanying this overall growth has been a jump in the number of students seeking to study abroad, a number that could rise from 4.5 million in 2012 to as many as 8 million by 2025. As the number of foreign students educated at universities in advanced economies rises, so too will the transfer of knowledge from advanced economies to emerging markets. Globalization of companies is also contributing to the spread of knowledge and ideas. It is uncertain whether it is more beneficial for countries to send more of their students overseas or to have companies like IBM come to your country, noted Freeman.

Modern technology spreads globally along three avenues. One is through consumption—the use of cell phones and the Internet being two examples. This is trade-related dissemination that is not connected to education or knowledge. A second avenue is via global chains of production, which again do not depend that much on education. Most of the assembly work in China, for example, is performed by rural migrants who are the country's most poorly educated people. Although those products are assembled by poorly educated factory workers in China and elsewhere, the bulk of the value-added produc-

tion comes from efforts of high-skilled individuals, who are usually located in advanced economies.[1]

The third avenue for the spread of modern technology is via knowledge. The growth in world spending on research and development has increased more than the growth in the world's gross domestic product (GDP). Much of this increase is due to China's increase in research and development expenditures relative to its GDP which led to the corresponding increase in the number of science and engineering papers being published. China's annual output of scientific and engineering papers more than quadrupled between 2001 and 2011, increasing at an annual rate of over 15 percent. In contrast, the global annual rate of increase in published science and engineering papers was 2.8 percent and the U.S. annual rate of growth was only 1.1 percent. While more than one-quarter of the world's science and engineering papers are still published by U.S. researchers, China now accounts for 10.9 percent of total output. Another indicator of the growing presence of China in research and development circles is that while the United States' share of researchers, science and engineering papers, and undergraduate and graduate STEM degrees awarded fell between 2000 and 2011, China's share has increased significantly. India has also seen a substantial increase in the number of STEM degrees and scientific and engineering output. According to Freeman, the United States' share of research is on a downward trend, not because U.S. scientists and engineers are performing poorly, but because more countries are involved in the dissemination of science. Although the United States only accounts for 6 percent of the world's population, it produces 26 percent of its science and engineering papers.

One measure of China's rising role in STEM fields is its rise in the number of PhDs granted. In 1986, Chinese universities granted 228 STEM PhDs, a number that reached nearly 28,000 by 2012. The only country whose growth in educational attainment can compare to China is South Korea, which underwent an astonishing transformation after the Korean War as it went from being one of the poorest countries in the world, to one of the best educated. The growth of the education sector in emerging markets is a direct result of students from those countries having access to the higher education systems of the United States and other advanced economies.

There is a "special relationship between the United States and China with regard to education." The Chinese government has published data showing that the percentage of international students in the United States from China rose from 11.6 percent in 2007 to 28.7 percent in 2013. Of all Chinese students studying abroad, 59 percent study in the United States. In addition to post-

[1]See also National Academy of Engineering, *Making Value for America: Embracing the Future of Manufacturing Technology, and Work*, Donofrio, N and K. Whitefoot, eds., Washington, DC: The National Academies Press, 2015.

baccalaureate degrees, there is some initial evidence that the Chinese government is now supporting undergraduates interested in studying in the United States.

International students, including those from China, make up an increasingly large fraction of graduate students, particularly in engineering fields. The U.S. National Science Foundation estimates that 63 percent of all post-doctoral STEM students working in U.S. universities are international students, and that 49 percent of international post-doctoral fellows received their PhDs in the United States. There has been a corresponding increase in the number of scientific papers coming from U.S. laboratories that have Chinese co-authors or co-authors from other emerging economies. These international students are not merely getting an education in the United States—they are also becoming U.S. STEM workers after graduation. In 2005, over a third of all STEM workers with PhDs were foreign born, with 64 percent receiving their PhD from U.S. universities. Over a quarter of U.S. STEM workers with Master's degrees were born in another country and 15 percent of foreign-born STEM workers with Master's degrees received that degree in the United States.

According to a different dataset, the percentage of foreign-born workers in U.S. STEM jobs increased from 11 percent to 19 percent between 1990 and 2011 for those with Bachelor's degrees, from 19 percent to 34.3 percent for those with Master's degrees, and from 24 percent to 43 percent for PhDs. International students are becoming an increasingly important source of workers needed to fill STEM jobs in the United States.

Freeman then discussed whether the increasing shares of international students in STEM fields represent a positive or negative development for scientific production. On the one hand, many of the most talented students from emerging economies are staying in the United States and other advanced economies after getting their degrees and advanced training, which could be considered a brain drain to their home country. On the other hand, many foreign students return to their home countries with new ideas, knowledge, and expertise that can increase innovation and economic growth. Even if they return to their home country, foreign-educated researchers are more likely to collaborate with international colleagues than domestically educated researchers. Even when they do stay in the country where they received their degrees, immigrants are likely to pass information and expertise back to their countries of origin through family and other connections and collaborations.

Returning to the U.S.-China relationship, Freeman noted that U.S. researchers accounted for 47.5 percent of China's international collaborations in 2012, up from 35 percent in 1997, while Chinese researchers accounted for 16 percent of U.S. collaborations, up from 3.2 percent in 1997, as measured by the share of STEM articles that have international co-authors. China-based authors with U.S. experience are also more likely to co-author a paper with researchers

in the United States, suggesting that experience in the United States is a driving force for the increase in China's STEM productivity. He said that Chinese scientists and engineers are surpassing their British and Canadian colleagues as the most common collaborators for U.S. researchers. He noted that the U.S. share of the world's international collaborations has remained steady between 1997 and 2012 even as the rest of the world has been publishing more papers, producing more scientific research, and catching up to the United States in terms of productivity. "We are in a sense favored as collaborators," said Freeman.

To better understand how international collaborations form, Freeman and his colleagues asked U.S. researchers about their collaborations. In the case of U.S.-based collaborations, nearly 75 percent are with former mentors/mentees and another 15 percent are collaborations with former colleagues. For collaborations with researchers based outside of the United States, 40 percent of U.S. researchers collaborate with former mentors/mentees while 37 percent met their foreign collaborators in conferences or while their collaborator was a visiting scholar. Meeting at a conference or when one researcher is a visiting scholar is much more important in establishing collaborations when one researcher is based abroad (Figure 2-1).

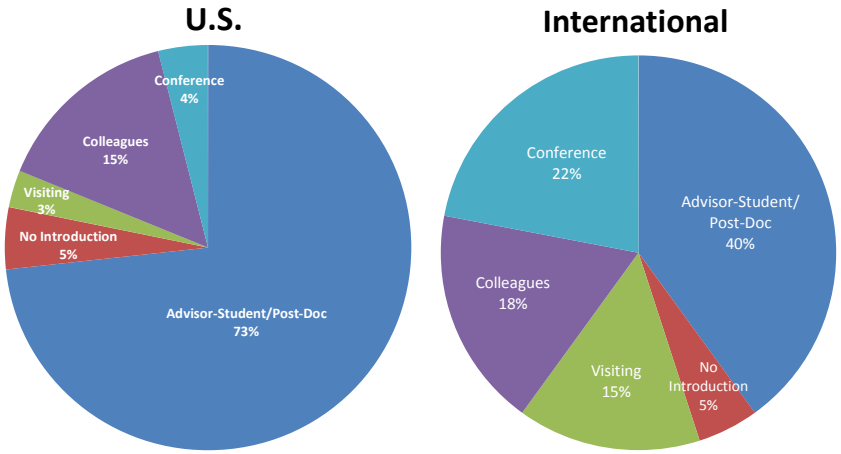

FIGURE 2-1 How collaborators first met. SOURCE: Online Survey of Corresponding Authors Published in 2004, 2007, and 2010 in the Web of Science Nano, Biotech, and Particle Physics subject categories with at least one U.S. coauthor, August 2012.

China's rise as an important producer of STEM knowledge is also evident in the increase in citations from Chinese researchers. In 1998, the share of papers from researchers based in China was 2.5 percent and China's share of citations in the literature was 1 percent. By 2007, Chinese researchers accounted for 9.1 percent and China's share of citations in the literature had risen to 6.2 percent, even as the total number of papers rose from 667,000 to 900,000 papers. Over that same period, U.S. researchers' share of the literature fell from 28.8 percent to 24 percent, and the share of U.S. citations fell from 42.1 percent to 34.7 percent. However, the quality of U.S. papers, as measured by average citations, remained high during this period. In addition, the impact factor for papers from Chinese authors who have spent time at either U.S. or other overseas institutions was higher than those from Chinese authors with no overseas experience.

The number of international students enrolled at U.S. institutions of higher education is sizeable and will continue to grow. These students produce a great deal of scientific knowledge, fill high-level positions, and make up a large proportion of STEM workers. To the extent that U.S.-trained students do better work and are more likely to get jobs in the United States than those trained in their home countries, it makes sense for the United States to adopt immigration policies that attract and retain international students.

Freeman also commented that unlike in other countries, biomedical research dominates the research portfolio in the United States. In 2011, for example, the United States spent 50 percent of its research funding on life sciences compared to 43.3 percent in the EU, 42 percent in Japan, and 26 percent in China.[2] "The rest of the world is much more into physics, chemistry, and engineering," said Freeman. There may be some value in shifting immigration policy toward students and workers in non-biomedical areas.

Finally, Freeman commented on the challenge of ensuring that U.S. taxpayer-funded research produces domestic economic benefits. To that end, Freeman proposed that the United States create new fellowships for students with advanced degrees or doctoral graduates specializing in the transformation of knowledge into improving U.S. productivity. For example, the U.S. might consider additional funding for scientists and engineers who specialize in translating basic research into transformative innovations and inventions, bridging the gap between fundamental and applied sciences.

[2]U.S. data is available in the NSF publication, Federal Funds for Research and Development: Fiscal Years 2013-2015. See e.g., Table 33. Federal obligations for basic research by detailed field of science and engineering FYs 2013-2015 showing 51.4% of basic research funding in the U.S. is spent on basic life sciences. Available at www.nsf.gov/statistics/2015/nsf15324/#ch2 [Accessed December 11, 2015].

DISCUSSION

Clarifying some of the data he presented on Chinese students, Freeman said that 6 million out of 30 million Chinese college students earn Bachelor's degrees each year. Philip Webre from the Congressional Budget Office then asked Freeman if he has any data on how well returnees to China fare in terms of competing for positions in academia. Webre was referring to the fact that there are more post-doctoral fellows in the United States than there are academic slots to fill. Freeman said that there are no data that he knows of to answer that question, but he did note that 75 percent of Chinese university presidents have been trained outside of China, with the bulk of them receiving their education in the United States. At the same time, individuals educated outside of China do not usually rise to very high positions in the Chinese government.

Ayse Alpay, an international PhD student from Northwestern University, asked Freeman if he had any data on what areas of research various countries are focusing on. Freeman said that he has recently started looking at that information for China, a country that is clearly putting an emphasis on chemistry, material sciences, and physics. He noted that Chinese funding for students is subject specific. In other words, a Chinese student studying in the United States that wants to switch fields cannot do so without permission from the Chinese government. Most other countries, except for the United States, follow this practice.

Peggy Wilson, from the Research Associateships Program at the National Research Council, asked Freeman if he had examined how research and development in federal labs is affected by scholars visiting from other countries. He replied that he has not and in return asked Wilson if she thought the proportion of research conducted by such scholars was larger than it is for students. It was Wilson's guess that visiting scholars contribute less than graduate students. She added that Chinese participants in the NRC's program, which has existed for about 55 years, say that they are more marketable at home once they have had a U.S. postdoctoral position, particularly at one of the national laboratories. Freeman said that studies at Oak Ridge National Laboratory indicate that 90 percent of the Chinese and Indian scientists who received their doctorates in the United States, still lived in the United States 7 years later.[3] In contrast, only about 30 percent of Europeans remained in the United States in the same time frame. The Chinese students that Freeman has spoken to report

[3]Finn, M. January 2014. Stay Rates of Foreign Doctorate Recipients from U.S. Universities, 2011, Science Education Programs, Oak Ridge Institute for Science and Education. Available at http://orise.orau.gov/files/sep/stay-rates-foreign-doctorate-recipients-2011.pdf [Accessed on November 24, 2015].

that securing employment in the United States is a sign of prestige and success back in China.

Michael Clemens, from the Center for Global Development, asked Freeman if he could comment on how highly skilled migrants influence the productivity of less-skilled migrants. Freeman said he could only comment with regard to outcomes as measured by scientific papers. Data indicate that when individuals from different backgrounds collaborate, it is mutually beneficial and has greater impact than when individuals from similar backgrounds collaborate on a project. In the case of scientific papers and citations, Freeman hypothesized that papers published out of an international collaboration reach researchers in a broader range of social networks and disseminate knowledge more effectively. Another hypothesis would be that researchers from different countries, as opposed to those in close geographic proximity to one another, would have to engage in more conversation to reach a common ground and therefore be exposed to new ways of thinking about their research.

The final question in the discussion session came from Brad Wible of *Science Magazine* who asked if Freeman had seen any evidence that the Chinese government is starting to shift its focus from supporting applied or translational research to encouraging more curiosity-driven, investigator-initiated basic research that could lead to Chinese scientists winning the Nobel Prize, for example. Freeman said that was a difficult question to answer but that he has heard that in mathematics the Chinese are pushing to study more abstract concepts that could lead to Chinese scientists winning prestigious academic awards.

3

Skilled Migration Trends and Policy Evolution: A Multilateral Overview

The first panel session of the workshop focused on immigration trends and provided a brief summary of changes in immigration policies in Canada and Australia. Jean-Christophe Dumont, head of the International Migration Division in the Directorate for Employment, Labor, and Social Affairs at the Organisation for Economic Co-operation and Development (OECD), gave a broad overview of recent trends in high-skilled immigration to the United States and other OECD countries. Despite challenges with its immigration policy, the United States still attracts the most talented migrants, although there are signs that other countries might be becoming more attractive for high-skilled immigrants. High-skilled immigration is growing faster in other parts of the OECD compared to the United States and United States' share of international students has been shrinking. Moreover, high-skilled immigrants represent a small fraction of the U.S. workforce, in contrast to Canada, Australia, and the United Kingdom. Mark Giralt, Minister-Counsellor for Immigration at the Embassy of Canada, and Miranda Lauman, Acting Regional Director at the Embassy of Australia, provided their perspectives on Canadian and Australian immigration policy reforms, respectively. Unlike the United States, Canada and Australia have made their immigration systems more flexible and continually adjust their immigration policies. That flexibility may be the result of the recognition that regional issues matter: Canada's immigration system looks at prevailing wages and regional unemployment and Australia has a no-disadvantage test to ensure that its policies do not harm the native population. In addition, both Canada and Australia have collected more extensive data on the outcomes of immigration than the United States. This includes longitudinal studies of immigrants. There is evidence that the increased flexibility in immigration policies has paid off. In Australia, the wait time for a visa has decreased drastically and the unemployment rate of immigrants who were not sponsored by an employer is lower than the native-born unemployment rate. An open discussion, moderated by session chair and workshop planning committee chair Jennifer Hunt, followed the three presentations.

RECENT TRENDS AND FUTURE CHALLENGES IN THE GLOBAL COMPETITION FOR SKILLS

According to Jean-Christophe Dumont, while the number of high-skilled workers migrating to the United States is growing, it is growing less rapidly than in other parts of the OECD. There has been a huge increase in the number of highly skilled migrants in OECD countries overall. The OECD classifies high-skilled individuals as those who have completed tertiary education that culminates in the receipt of certificates, diplomas, or academic degrees.[1] According to a 2010-2011 census, 11.3 million migrants, or 28 percent of all migrants aged 15-64 in the European Union (EU), had completed tertiary education—a 92 percent increase over a 10-year span from 2000 to 2010. This number is somewhat misleading given that migrants in the EU include those moving between countries within the EU. The number of highly skilled immigrants in Australia doubled over the same ten-year period and increased by 72 percent in Canada. In contrast, 11.1 million migrants, or 31 percent of all migrants in the United States, have completed tertiary education, which is only a 47 percent increase over the same period. In Europe, about half of all high-skilled migrants come from other European countries, and another 20 percent come from Asia. In the U.S., approximately 45 percent of the high-skilled migrants come from Asia and 20 percent come from Europe. The share of highly skilled migrants coming to the United States from Europe is falling while the share from Latin America is increasing (Figure 3-1). Asia is also the main region of origin for highly skilled migrants in Australia and Canada.

While the overall educational level of individuals entering the labor market in OECD countries increased rapidly between 2000 and 2010, the share of migrants with tertiary degrees is over-represented in the entire labor force and has risen faster than the number of migrants overall. Dumont noted that migrants have accounted for 14 percent of the growth of tertiary degree holders between 2000 and 2010 in European OECD countries, 21 percent of the growth in the United States, and 31 percent of the growth in Canada.

There is no doubt, stated Dumont, that the United States gets the most talented and skilled migrants, with over 7,000 EB-1-1 or EB-1-2 visas granted for outstanding researchers or extraordinary[2] individuals. In addition, 57 per-

[1] Chaloff, J., and G. Lemaître. 2009. *Managing Highly-Skilled Labour Migration: A Comparative Analysis of Migration Policies and Challenges in OECD Countries*. OECD Social, Employment, and Migration Working Paper No. 79. Paris, France: Organisation for Economic Co-operation and Development. Available at http://www.oecd.org/els/mig/46656535.pdf [Accessed October 21, 2015].

[2] According to the Department of Homeland Security, a person with "extraordinary ability" is an individual that can demonstrate extraordinary ability in the sciences, arts,

cent of the world's migrant inventors live in the United States. Some 650,000 migrants in the United States have PhDs, accounting for a third of all migrant PhD holders in the entire OECD. Forty percent of all OECD migrants with the highest levels of literacy and numeracy reside in the United States.

In relative terms, high-skilled migrants represent a small fraction of the U.S. workforce, compared to the workforces in Canada, Australia, and the United Kingdom, for example. U.S. migrants who came under work visas account for a small fraction of the U.S. population. The fraction of migrant workers is much higher in Canada, Australia and New Zealand (Figure 3-2). Moreover, the percentage of migrants to the United States with tertiary education has fallen over the past decade and now represents 41 percent of all tertiary educated immigrants in the OECD, compared to 46 percent in 2000-2001. In 2010-2011, more than half of recent immigrants to Australia, Canada, and the United Kingdom had tertiary degrees, compared to less than 35 percent of recent immigrants to the United States. Over 20 percent of recent tertiary-educated immigrants to OECD countries come from China, India, or the Philippines.

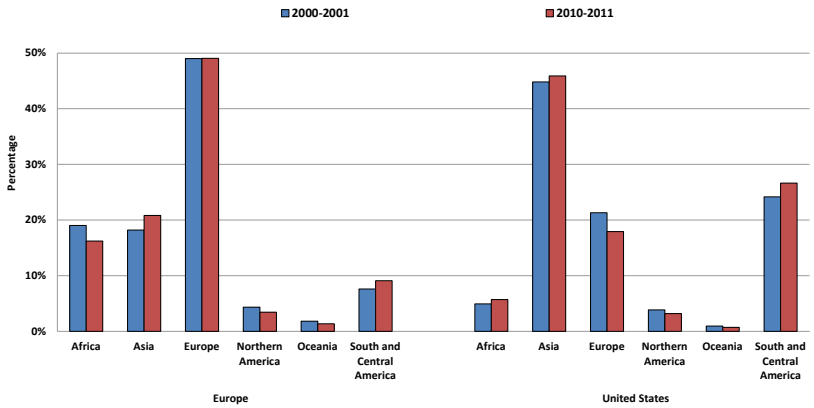

FIGURE 3-1 Share of highly educated migrants in the OECD aged 15-64 by region of birth, 2000-2001 compared to 2010-2011. Country of origin for high-skilled migrants in Europe (left) and the U.S. (right). SOURCE: Database on Immigrants in OECD and non-OECD Countries (DIOC) 2010/2011.

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education, business, or athletics through sustained national or international acclaim. The achievements of these individuals must be recognized through extensive documentation. No offer of employment is required but the applicant must meet three of ten pre-defined criteria or provide evidence of a one-time achievement such as a Nobel Prize, Pulitzer, Oscar, or Olympic Medal. Definition available at http://www.uscis.gov/working-united-states/permanent-workers/employment-based-immigration-first-preference-eb-1 [Accessed on November 23, 2015].

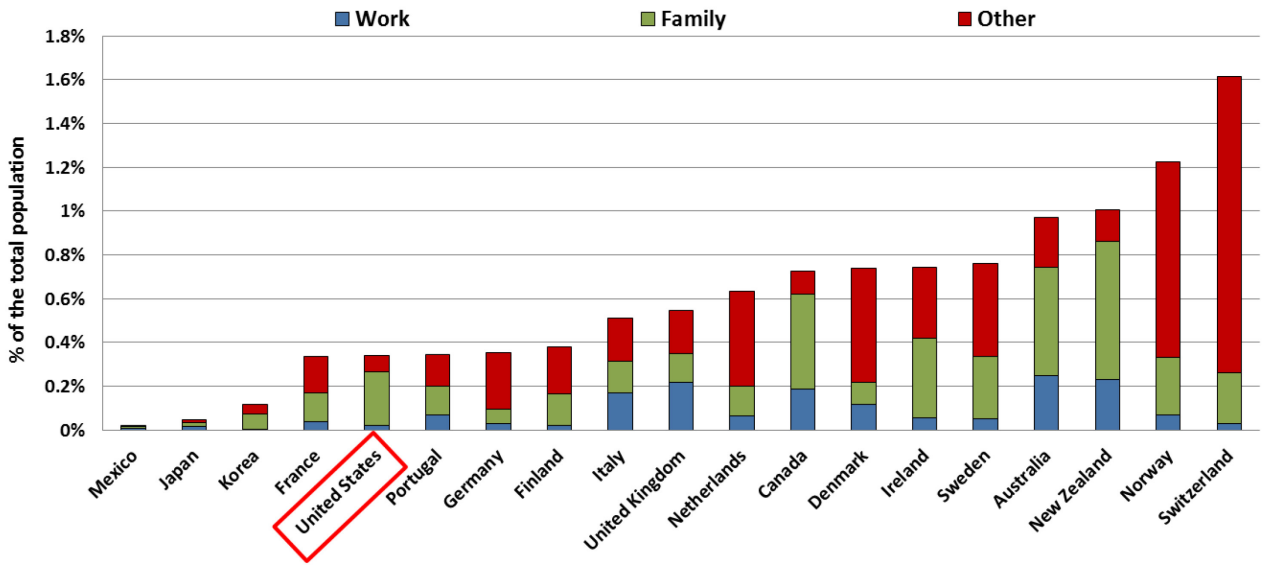

FIGURE 3-2 Legal permanent migration flows by category of entry as a percentage of the total population in selected OECD countries, 2012. SOURCE: OECD International Migration Outlook 2014.

In addition, there are concerns that the U.S. H-1B visa program, which was designed for high-skilled applicants, is not very selective. Currently, the H-1B program accounts for about 25-30 percent of all temporary high-skilled migrants in the OECD, but only 25-50 percent of H-1B visa recipients would qualify for the analogous Blue Card in European OECD countries. In addition, the entry wage for H-1B visa holders without previous professional experience is low, which may indicate that this program is being used to recruit lower-skilled workers.

Across the OECD, international students account for an increasing number of high-skilled migrants. The number of foreign students worldwide and in OECD countries more than doubled between 2000 and 2012, but the United States is getting a smaller share of international students. While the United States is still the predominant destination for international students in absolute terms—some 710,000 students in 2011—its share has been steadily shrinking over the past 12 years with 25 percent of all foreign students going to the U.S. International students account for 3.4 percent of U.S. university students, about the same share as in Japan. The OECD average is nearly twice as high. By way of comparison, international students make up 20 percent of the university student body in Australia, 17 percent in the United Kingdom, and 7 percent in Canada. On the other hand, despite more stringent requirements for transitioning from student visas to work permits or permanent resident status, the United States has higher retention rates for PhD students than other OECD countries.

According to Dumont, there are five main channels to attract high-skilled migrant workers. Some countries rely on a "supply-driven system" that selects migrants who then look for a job that matches their specific qualifications. The United States and most European countries use a "demand-driven system" that requires an applicant to have a job offer before securing a work visa. Australia and New Zealand—and soon Canada—have adopted a points-based system or expression of interest model. The two other channels for migration are student visas and intercompany transfers.

However, countries are starting to use hybrid immigration management models that merge these channels. Some countries are using systems that reward applicants for having a job offer in a supply-driven system or are placing increasingly complex conditions on demand-driven systems. One illustration of this trend is the increasing number of two-step processes that first require an applicant to have a temporary visa before applying for a permanent visa. In Australia, for example, 50 percent of permanent migrants were previously on temporary visas. In New Zealand, 70 percent of permanent migrants were initially issued temporary visas. This hybrid approach comes with stronger enforcement mechanisms that include risk monitoring, evaluation, and dynamic management.

In closing, Dumont explored the following three policy questions: (1) why aren't highly skilled migrants doing well in the labor market; (2) should immigration policies be focused on attracting the most talented individuals; and (3)

should immigration policies be focused on particular degrees or on skills in high demand.

Highly skilled migrants do not always fare well in the labor market. The gap in employment rates between native-born and foreign-born individuals increases in all countries as the level of education rises (Figure 3-3). According to Dumont, this may be due to migrants with tertiary degrees having difficulty getting jobs in line with their level of education.

Not all companies need PhD-educated employees. An OECD survey in Germany, for example, found that while large companies are seeking high-skilled employees, medium- and small-sized companies have a greater need for individuals with technical skills but not necessarily PhDs (Figure 3-4). Current immigration systems are not designed to respond to that kind of demand, and Dumont cautioned that countries need to be careful when revising their immigration policies to reflect the demand for individuals with medium skill levels.

Finally, while the level of education in origin countries is increasing, the quality of that education and the skill sets that students acquire during their education may differ from country to country, so immigration policies should not necessarily focus on attracting migrants with particular degrees. The global workforce has become increasingly mobile, particularly for the highly skilled, so countries may do better by shifting the focus from attracting migrants to retaining them. Some countries, such as Germany and Portugal, which have problems retaining native-born workers, may do better by focusing on retaining high-skilled natives. Finally, immigration policy may be tied to what domestic companies are doing with regards to outsourcing, especially with regard to the services sector.

TRANSFORMING THE CANADIAN IMMIGRATION SYSTEM

Mark Giralt of the Embassy of Canada, made a presentation on the transformation of Canada's immigration system. He first noted that there are many parallels between Canada's approach to high-skilled immigration and Australia's. Immigrants are a bigger share of Canada's overall population than in most OECD countries. About 60 percent of its immigrants fall into the economic category, which includes the primary applicant as well as his/her dependents. Another 10 percent are admitted for humanitarian reasons, and the remaining 30 percent come from family-based reunification categories. In the past, Canada's foreign skilled worker category relied on a points-based process valuing education, language ability, and work experience, with some points for potential economic contributions from family members. However, qualified individuals entered a first-in, first-out queue that puts some applicants in limbo for 5 or more years as they waited in the queue, by which time the opportunities that were present when they applied for a visa no longer existed.

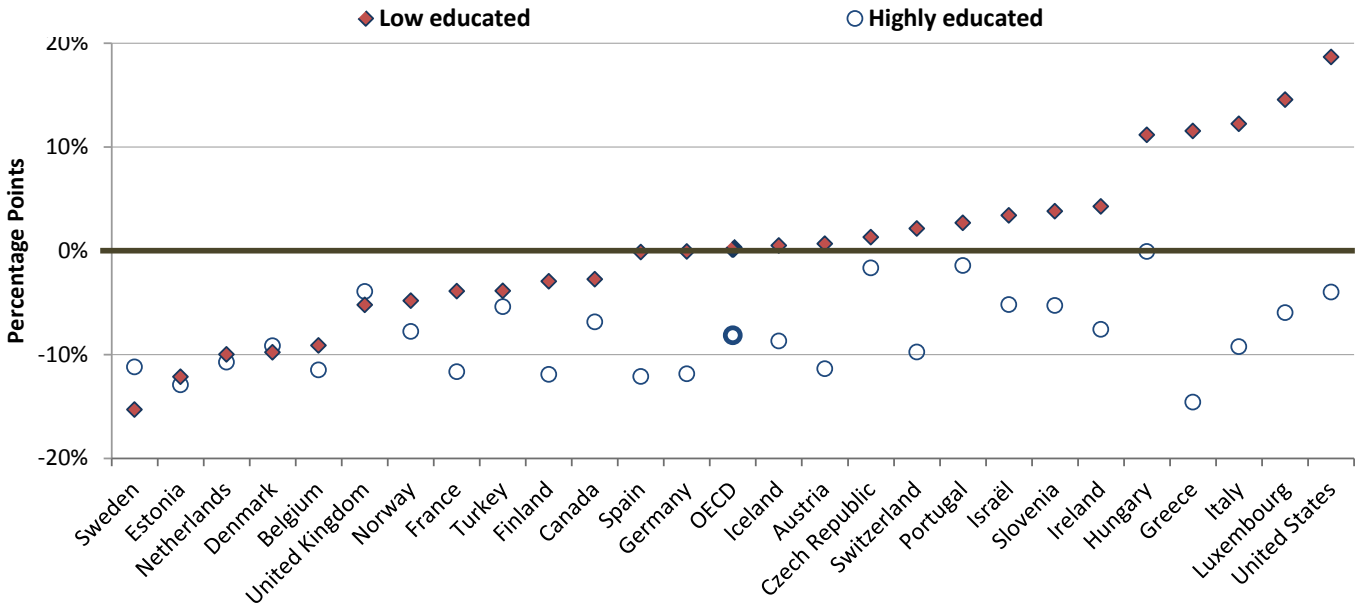

FIGURE 3-3 Differences in employment rate for foreign- and native-born populations aged 15-64 by education level, 2010-2011. SOURCE: OECD Factbook 2013.

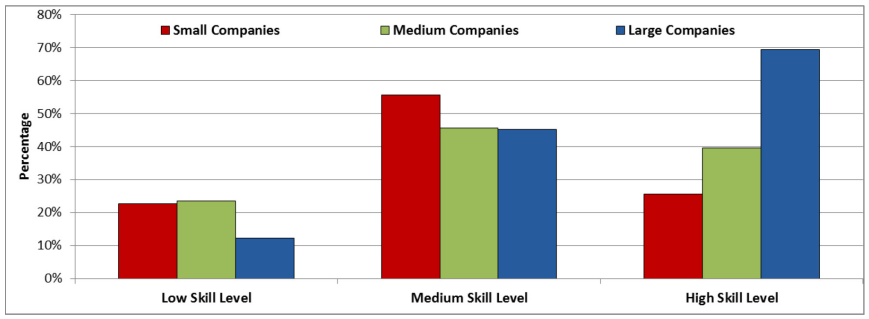

FIGURE 3-4 Percentages of German employers who reported unfilled vacancies at the respective skill level, out of all employers with unfilled vacancies, by company size and skill level, 2011. The skills levels in the survey have been defined according to the qualifications required for the job. "Low-skilled" refers to jobs requiring at most lower secondary education; "medium-skilled" to jobs requiring upper secondary and post-secondary non-tertiary education; "high-skilled" to jobs requiring tertiary education. SOURCE: OECD, Recruiting Immigrant Workers: Germany, 2013.

In response to this problem, Canada introduced a number of policy changes, such as capping applications for certain occupations and building in preferences for others, and moved to an "expression of interest" immigration system. The important characteristic of such a system is that individuals meeting certain requirements are invited to enter into a pool that gives them greater opportunities to find employment and obtain the appropriate visa. Applicants will remain in that pool for one year after which they will have to reapply in order to reenter the pool. While that approach may seem harsh, it creates a system that is better prepared to respond to Canada's economic needs with a just-in-time level of service.

Giralt then described other innovations that Canada has introduced. One is a skilled trades program that recognized that the country's points-based system was unable to develop the right formula to attract the types of skilled trades needed in specific sectors in the Canadian economy, such as Alberta's oil industry. This program had an initial goal of attracting 3,000 potential immigrants out of Canada's total economic migrant allotment of 80,000 individuals; that number has since been raised to 5000 individuals.

Canada has also introduced a start-up visa program that aims to match venture capital and individuals with ideas that can be transformed into new engines of economic growth. So far, Canada has approved the first two candidates from this program. In addition, the skilled-worker program now includes provisions for 500 foreign PhD students to bypass existing caps for specific occupations. "What we are trying to do is move from a system where anybody that meets the basic requirements ends up in a queue to systems where we are

really trying to engineer a little bit more responsiveness so that we can respond to specific labor market needs," said Giralt.

Another new category for migrants, the Canadian experience class, recognizes Canadian work experience and education. This category has been growing substantially and enables individuals who have been in Canada with temporary worker status for a certain amount of time, or who have graduated with a post-secondary degree from a Canadian educational institution, to apply for permanent residence status. At present, the criteria for eligibility have been limited to managerial, highly technical, and technologist positions, but Canada is considering broadening the eligibility for this immigration class.

Canada recently suspended its immigrant investor program, which had been in place since the 1970s. "What we were finding was that the investments that were coming in were mostly based on bank loans being completed in Canada and where the immigrant was putting up very little of their own money," Giralt explained. The government felt it necessary to take legislative action given that the program was not meeting its needs; this action eliminated a significant number of applicants.

Canada also recently reformed its temporary foreign worker program to make it more responsive to market needs. The program was increasingly being used to attract workers who could fill lower-skilled non-agricultural positions. To reform this program, Canada tied access to low skilled foreign workers to regional unemployment rates and changed the way it counted low-skilled workers from one based on job classifications to a system that looks at wages and classifies jobs based on whether they pay below or above the regional median wage.

In conclusion, Giralt said that the changes to Canada's immigration system are meant to respond to the challenge and frustration of running an inventory-based system that has not been agile or responsive enough to meet the nation's need for high-skilled immigrants. Canada's hope is that this new system will incentivize employers to look first to its recently arrived permanent residents or persons on the path toward permanent resident status for skilled workers rather than turning to temporary foreign workers. Finally, Giralt said that significant changes need to be implemented to create a system that deals with applicants in a more up-to-date and responsive manner.

AUSTRALIA'S APPROACH TO HIGH-SKILLED IMMIGRATION

Miranda Lauman presented Australia's approach to high-skilled immigration. She agreed with Giralt's earlier comment about the similarities between the Australian and Canadian immigration systems, noting that Australia adopted the Canadian points-based system many years ago. In Australia's case, however, the points-based system takes into account factors beyond skill-set and

work experience and includes "settlement attributes" (e.g., age, English proficiency levels) that have improved the success of its immigration policies for skilled migrants.

Over the past 15 years, there has been a distinct shift in Australia's approach to immigration policy, from a system that was supply driven to one that is demand driven and meets the needs of employers. Under the old system, Australia had a surplus of people who wanted visas. As a result, the Australian government implemented a capped migration system which was based largely on national economic concerns, albeit with some industry input. Like Canada, Australia's old first-come first-served policy ended up with long queues of up to 5 years for high-skilled individuals while less skilled applicants were able to quickly obtain visas.

One of the most significant recent changes to immigration policy in Australia was the creation of the "expression of interest" program or "Skilled Select Program." This program was formally introduced on July 1, 2012. Because of the legislative landscape in Australia, it took several years to implement this program which focuses heavily on employer-sponsored migration. According to Lauman, "We are really getting to the point now where we can start to evaluate the value of those changes and whether they are delivering for migrants and for the Australian economy." Since the implementation of the Skilled Select Program, there has been a significant reduction in the long queues associated with the first-come first-served approach. This system is better managed and targeted to meet industry skill needs than others.

Australia faces many of the same challenges in attracting skilled migrants as other OECD countries. On the one hand, the country needs to employ local people and to train them to do skilled jobs. On the other hand, the country wants people who already have the skills to come in to fill gaps. She added that Australia, like Canada and the United States, has a federal immigration program, which means that local issues and local shortages can be difficult to address; however, as described below, Australia has made significant changes to its policies to respond to regional or local needs. Another tension exists between selecting those individuals who fill today's skill gaps versus choosing individuals who meet longer term needs or solve the demographic challenge of an aging native population. Furthermore, Australia must balance between skilled migrants and family migrants, although a policy that restricts family migration can make a nation less attractive to high-skilled individuals. Finally, there may be public perceptions of economic or national security risks associated with migration.

The first change Australia made was to alter its processing priorities to meet industry demands. Instead of a system in which those who met the bare minimum requirements would eventually get a visa if they waited long enough to rise to the top of the queue, Australia moved to one in which applicants demon-

strated their skill sets and government issued invitations based on the nation's projected medium- to long-term skill needs. The country also allowed state governments to review the applicant pools in an attempt to bridge the gap between national objectives and local needs. For example, Lauman said that a state that has a particular need for mining can focus on individuals with mining-related skill sets without the need for the national government to change its priorities. Meanwhile, the federal government sets quotas for specific occupations to make sure that no one occupation dominates the selection process. This new system has reduced processing time for applicants from about five years to a matter of months.

In Australia, 37 percent of skilled migrants come from employer-sponsored requests. These requests are split between region-specific programs that require individuals with certain skill sets and more general employer programs. In addition, a large share (68 percent) of individuals who receive employer-sponsored visas previously held a temporary visa in Australia, with some employer-sponsored visa recipients having lived in Australia for more than three years. Many employers are using the temporary migration option to determine whether an individual is suitable for a particular position and whether the migrant and family members adjust to living in Australia.

Australia's "Temporary Skilled Migration Program" has a number of skill requirements as well as a language requirement, but the key element is that an applicant needs to first have a job offer. Lauman noted that one challenge associated with this program is achieving the right balance between the desire to quickly process applications in order to fill specific jobs, and ensuring that migrants are not put into vulnerable positions in which they are beholden to employers. An independent panel recently issued a number of recommendations for reforming this system, which are necessary as the labor market changes and as people's knowledge about the system changes.[3] Many of the current recommendations would increase the transparency of the program in a way that simplifies sponsorship while also ensuring that migrants are not captive to a single employer.

The country's student visa program is another important avenue into permanent migration. Australia's student visa program underwent changes in the late 1990s to make it easier for foreign students educated in Australia to become permanent residents. At the time, those changes largely entailed alter-

[3]In 2014, Australia's Assistant Minister for Immigration and Border Protection announced an independent review of the temporary work (skilled) visa (Subclass 457) programme. The final report, Robust New Foundations – A Streamlined, Transparent, and Responsive System is available at https://www.border.gov.au/ReportsandPublications/Documents/reviews-and-inquiries/streamlined-responsive-457-programme.pdf [Accessed on November 23, 2015].

ing the points system to award additional points to individuals who had graduated from Australian institutions. Over time, however, this approach produced unintended consequences. Of particular concern, said Lauman, was the fact that foreign students were choosing courses and majors based on occupations that were given priority processing. This resulted in an increase in students in those particular fields, but it did not translate into an increase in workers in those fields. Today, the student visa program allows students to work in Australia for 4 years after graduation regardless of the field of study. This work experience then plays an important role in the permanent resident application.

Finally, Australia has reinstituted its longitudinal survey, the Continuous Study of Migration. This study indicated that 80 percent of skilled migrants surveyed came from non-English language speaking countries, and they are outperforming Australian natives in the nation's labor market. With the first 6 months of immigration, skilled migrants who were not sponsored by an employer had an unemployment rate of 5.7 percent, compared to 6.2 percent for the population as a whole.

DISCUSSION

Ron Hira, a workshop attendee from Howard University, started the discussion by asking about the policy levers that Australia and Canada have implemented to ensure that their temporary work visa programs are being used appropriately in terms of selectivity and not adversely impacting the domestic labor force. In particular, he asked the panelists to comment on the use of wage floors, the recruitment of domestic workers prior to hiring a foreign workers, and non-displacement of a domestic worker with a temporary worker. According to Giralt, the changes that Canada made during the summer of 2014 to its temporary foreign worker program responded to all three of these concerns. Instead of using skill level as the primary classification, Canada now looks at prevailing wage and regional unemployment levels. For example, for a low-wage occupation in a region with an unemployment rate of 6 percent or greater, there are strict caps in terms of employers' ability to have foreign workers fill more than a specific percentage of a their workforce. He noted that Canada's experience prior to these changes was that foreign workers were being used to prevent wages from rising naturally. He cited data from the oil fields in Alberta showing that while there had been a 3 percent increase in overall wages, restaurant workers had only seen a 1 percent wage increase. Another new feature of the approval process is that employers are required to complete an 18-point evaluation at their expense to ensure that they have gone through the effort of recruiting someone from the local market.

Lauman said that Australia has a "no-disadvantage" test in place for temporary skilled workers that has been extended to individuals coming to Austral-

ia even for very short periods of time. In addition, there is a requirement now for employers to implement training programs for Australians in areas where there is a projected long-term gap that is currently being filled by foreign workers. She also noted that a wage calculation process is in place for temporary skilled workers who are seeking what is known as a 457 visa. The 457 visa requires companies to pay foreign workers at least the median wage for that occupation (for jobs paying up to $180,000 per year). Dumont added that the most effective way to ensure that there are no negative impacts on the domestic labor market is to ensure that recruiting foreign workers is always more costly than recruiting a domestic worker. As an example, he cited the case of Sweden, which has a demand-driven system in which the only thing that is checked is that the job offer comes with the prevailing wage and work conditions. The key here is that Swedish trade unions are making sure that employers are complying with this requirement, and as a result, employers will only hire foreign workers when there are no local applicants available because of the higher costs of recruiting foreign workers.

Ellen Dulberger asked the panelists to comment on the importance of databases in monitoring the performance of high-skilled immigrants. Giralt and Lauman both replied that their respective countries do not have formal procedures in place for monitoring and collecting data but rather collect data as part of field research projects. Lauman added that over the past five years, Australia has created formal consultative councils around skilled migration to provide feedback to the government on how policy changes are affecting the economic performance of high-skilled migrants.

Bill Kamela, from Microsoft, asked Giralt and Lauman how their countries garnered buy-in from employers vis-à-vis their points-based systems, given that such systems are picking winners and losers by determining which occupations are more or less valuable. He also asked how these systems remain up-to-date in terms of how points are assigned for given occupations. Lauman said that Australia is trying to not be too prescriptive when it comes to defining occupations, which provides some built-in flexibility. She also said that the process of determining which occupations should be on the priority list has been completely revamped to account for the number of students, both domestic and international, that are moving through different fields of study, and on the short-term needs of various industries in Australia as determined through consultation with industry. In closing, she noted that Australian businesses have embraced the new temporary work program.

4

Comparative System Design and Effects

The workshop's next two panel sessions explored the effects of the various system designs that countries are using to attract and retain high-skilled migrants. The first panel focused on Canada and Europe and featured three presentations. Charles Beach, emeritus professor at Queen's University, discussed some of the challenges faced by Canada when it was developing its immigration policy for high-skilled labor. Madeline Zavodny, professor of economics at Agnes Scott College, then compared the U.S. and Canadian immigration systems, and Jonathan Wadsworth, professor of economics at Royal Holloway College, University of London, described the United Kingdom's experience regarding its immigration policies. The three presentations were followed by comments from Francis Cissna, director of Immigration Policy at the U.S. Department of Homeland Security (DHS).

The second panel explored the design of immigration systems in Australia, the Middle East, and Asia and featured two presentations. Graeme Hugo,[1] former ARC Australian Professorial Fellow, professor of Geography, and director of the Australia Population and Migration Research Centre at the University of Adelaide, discussed the migration of high-skilled labor to Asian countries, and Lesley-anne Hawthorne, Professor of International Workforce at the University of Melbourne, compared the skilled migration policies and outcomes in Australia, Canada, and New Zealand. These two presentations were followed by comments from Anna Maria Mayda, associate professor in the School of Foreign Service at Georgetown University. An open discussion, moderated by workshop planning committee member Subhash Singhal, followed these panels.

[1]The National Academies of Sciences, Engineering, and Medicine appreciates the contributions of the late Dr. Graeme Hugo to this workshop summary. Dr. Hugo passed away while this report was being drafted.

FIVE SETS OF CHALLENGES FOR SKILLED IMMIGRATION POLICY: LESSONS FROM CANADA

The first presenter, Charles Beach, focused on Canada's immigration policies. The Canadian Constitution of 1867 called for federal and provincial governments to share the responsibility of developing and implementing immigration policy, a system that is still in place today. Federal and provincial governments in Canada also have the flexibility to change policy in response to economic conditions. The current immigration policy was determined in large part by the Immigration and Refugee Protection Act of 2002. Within the objectives and framework established by this Act, the Minister of Citizenship and Immigration has a significant amount of latitude and flexibility to make changes to relevant policies. Beach noted that the changes described by Mark Giralt in the preceding panel session have been enacted entirely through ministerial instructions.

Canadian immigration policy includes a few broad immigration classes: economic class, family class, and refugee class. The economic class has accounted for between 60 and 65 percent of the approximately 260,000 immigrants annually, or 0.7 percent of Canada's population, over the past several years. The family class accounts for about 25 percent of the total, while the refugee class makes up about nine percent of the total.

Within the economic class there are a number of different programs under which migrants are granted visas. The largest of these programs is the supply-driven Federal Skilled Worker Program, which accounts for about 57 percent of all economic class admissions. The demand-driven Provincial Nominee Program, which was created to make immigration decisions more responsive to differences in regional needs, accounts for 25 percent of all economic class admissions. In this program, employers indicate to the provincial governments that they have needs for specific individuals to fill specific jobs, and the provincial governments then forward those names to the federal government. After a federal security check is completed, those individuals are prioritized for admission. The Canadian Experience Class represents about 6 percent of the total economic admissions and has been growing since it was created in 2009. One subgroup within this class consists of skilled temporary foreign workers who have been employed in Canada for a certain amount of time, while the other subgroup includes post-secondary students. Both subgroups are eligible to be converted into permanent immigrant status subject to certain background and security checks. The current minister recently stated that the goal is to grant permanent immigration status to 20,000 individuals in the Canadian Experience Class within a year or so. Two other smaller programs are aimed at increasing the number of live-in caregivers, immigrant investors, and the self-employed, each of which accounts for about 6 percent of the total economic admissions.

Canada's Federal Skilled Worker Program uses a points system to determine admission. Canada was the first country to move to points-based admissions, which other countries have adopted and refined. Canada is now trying to implement a program similar to Australia's program. Applicants receive points based on their skills and adaptability, as well as on the needs of the economy and workforce. Approximately 80 out of 100 possible points are based on long-term factors such as education, age, work experience, and language fluency, with the remaining 20 points based on short-term items such as arranged employment, person suitability, and whether the applicant's occupation is in demand. Approximately 17 percent of all applicants are screened using the points system.

Over the past 20 years, and particularly over the past 7 years, the mix of the various classes has changed and Canada has moved toward an active employer-driven immigration system. The family and refugee classes have shrunk while the economic class has grown. The target for the economic class is now 70 percent of all immigrants. Within the economic class, the number of visas granted under the Provincial Nominee Program and the Canadian Experience Class has increased substantially, while the number of Federal Skilled Worker Program visas has fallen.

There are a number of challenges confronting Canadian policy makers. One challenge is how to set the overall level of immigration recognizing immigrants' contributions to the nation beyond economic factors, such as nation building and demographic changes. Immigrants bring skills to fill gaps and, more generally, increase the stock of human capital in the system and provide flexibility in the labor market. Additionally, immigrants tend to be more mobile than non-immigrants in the first 5 years after arriving in a new country. Immigrants also boost economic activity through activities such as home building. Beach noted that immigrants are playing an important role in the economic growth of select provinces in Canada. Manitoba, in particular, has worked aggressively and successfully to attract immigrants to accomplish regional economic goals.

On the other hand, immigration may come with a variety of costs, such as those associated with resettlement and language training. In some parts of Canada, such as Toronto, Vancouver, and Montreal, large numbers of immigrants have placed a financial burden on school districts that must accommodate children who are not fluent in either English or French. In addition, immigration can lower wages and employment for workers already in Canada, although the impact may not be readily understood. For example, while immigrants may, at least for a while, be paid less than native-born or less-recent immigrant workers with similar skills, lower wages can translate into higher profits for employers who might then choose to increase production which would expand employment opportunities for both immigrant and domestic

workers. In addition, immigrants often come with financial resources and ideas to start new businesses, which can also increase overall employment.

According to Beach, the main lesson from the literature is that immigration's impact on the domestic workforce depends on the skill level of immigrants. High-skilled immigrants bring with them ideas and social networks, and provide a slight positive effect overall. Middle-skilled immigrants have a more or less negligible impact on wages and employment of domestic workers, while the evidence shows that low-skilled immigrants have a negative impact on domestic wages and employment. He noted that Canada's attempts to balance immigration numbers with the business cycle were not successful, and that other countries—such as Australia and the United Kingdom—have been more successful at adjusting immigration levels based on their economic growth.

In addition to setting overall immigration levels, Canadian policy makers need to determine the share of economic class immigrants, and among those economic class immigrants, the share of skilled workers. As far as setting goals for the fraction of the economic class that should be skilled versus unskilled labor in order to to generate the largest positive effect on the economy, the focus should be on attracting skilled workers while reducing the number of low-skilled immigrants. However, some positions, such as live-in caregivers or slaughter house workers in western Canada, have failed to attract native-born workers.

The Canadian Longitudinal Immigration Database (IMDB) provides information on the labor market performance of the broad admission classes. This database contains data on every immigrant that has moved to Canada since 1982, and studies using this database have monitored hundreds of thousands of immigrants over the course of a decade or more. According to Beach, the evidence from these studies is clear cut. Economic class immigrants doing better than those in all of the other classes. The trajectory of their earnings over the time that they have been in Canada rose far faster than that of other classes of immigrants and native-born Canadians.

Canadian policy makers also need to determine how skills should be identified and evaluated for the point system screening process. An important consideration is assessing language fluency. Both Canada and Australia now employ a third party to assess language skills rather than simply asking applicants if they are fluent in English or French. When Australia tightened its language fluency requirements, applications from China dropped while those from the United Kingdom increased. Beach noted that countries need to make these decisions in the context of national strengths. Another important consideration for policy makers is determining the appropriate model for immigration policy. Should policy be based on a general human capital perspective, as is the case with Canada's Federal Skilled Worker Program, or on immediate specific occupational needs, which is the goal of the Provincial Nominee Program? How

should economic immigrants be selected? Should it be through a supply-driven points system or an employer demand-driven expression of interest system? According to Beach, studies have shown that immigrants who arrive to fill specific demand-driven jobs do better economically over the first 4 to 5 years, but that after that time, the earning trajectories for migrants admitted under the points system exceed that of their demand-driven counterparts, perhaps because of the general adaptable skills of the supply-driven immigrants.

Finally, Canadian policy makers need to determine the proper time frame for evaluating economic and social outcomes of immigration. For example, are proper evaluation criteria short-run, such as the immediate performance of immigrants in the labor market, or longer-term, such as their career earnings or success of the children of immigrants in school? Beach also emphasized that it is important to remember that while businesses always want workers that can succeed today, a nation wants successful citizens for the future.

Beach concluded with a few suggestions for U.S. policy makers. The first was to keep the design of an immigration system simple, transparent, and fair. It is possible to gain flexibility and timeliness by vesting an arms-length agency with decision-making power. Congress can set a framework of objectives rather than setting the number of immigrants each year. Sound immigration policy should include a mix of different admission classes and programs to provide the flexibility to meet changing needs of the economy, something no single program can accomplish easily. Immigration policy should include a points system based on a small number of criteria, particularly age, education, key market skills, and English language fluency. Finally, he suggested that the United States should monitor Canada's planned "expression of interest" or "expressed entry model" for skilled immigration. "I think this is a great idea that gives employers real input into choosing the best people," said Beach, adding that the success of this program will depend on operational details.

COMPARING THE U.S. AND CANADIAN IMMIGRATION SYSTEMS

According to Madeline Zavodny, the United States and Canada have very different admission policies, and these differences have generated markedly different outcomes for immigrants in the two countries. In particular, Canada has better-educated and younger immigrants, although there are concerns about how well these immigrants have fared in Canada. These concerns have been the motivating factor behind the changes that Mark Giralt described in the first panel session. Early indicators suggest that these changes have been quite positive for Canada and Canadian immigrants.

In terms of the big picture, Canada has a larger share of foreign-born residents and admits more permanent residents relative to its population than the United States (Figure 4-1). One difference between the immigrant populations

of the two countries is that almost all of the immigrants in Canada are permanent legal residents or naturalized citizens whereas at least a quarter of the immigrants in the United States are unauthorized. This difference may arise because Canada is further north or because of differences in admissions policies. Canada's immigration policies, which are based on employer demand and skill, particularly for low-skilled workers, may be the reason for fewer unauthorized workers.

While U.S. immigrants are slightly more likely than natives to have a graduate degree (Figure 4-2), Canadian immigrants are much more likely to have a graduate degree than the general Canadian population. Canada's new immigration policies that emphasize economic class migrants may be the reason for Canada's success in attracting relatively higher numbers of graduate degree holders, compared to U.S. immigration policies that emphasize family-based admissions (Figure 4-3). Canada's emphasis on economic class migrants also results in a greater percentage of immigrants being employed in managerial and professional occupations, and a lower percentage being employed as tradesmen and laborers, or being unemployed or not seeking employment (Figure 4-4).

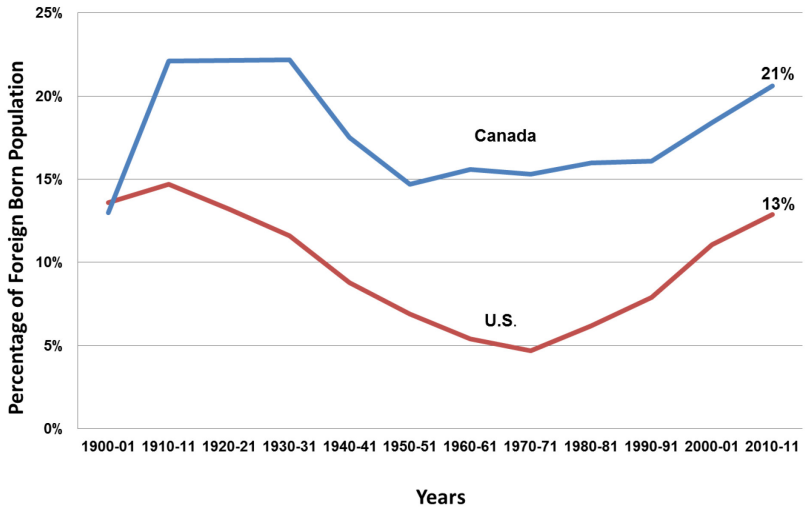

FIGURE 4-1 The share of foreign born individuals as a percentage of total population. SOURCE: US Census Bureau, Census of Population, 1850-2000, and the American Community Survey, 2010; Statistics Canada; Canadian data correspond to the year after the U.S. Census.

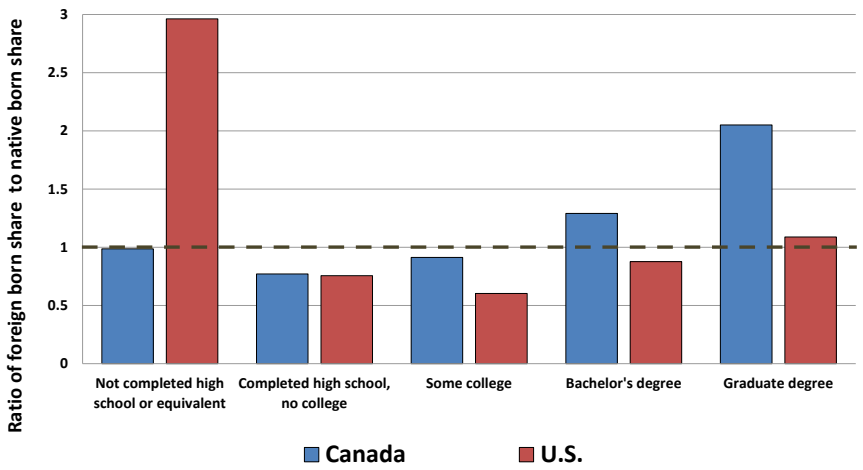

FIGURE 4-2 Immigrants to Canada are more educated compared to those in the United States. SOURCE: Calculations based on 2011 American Community Survey (U.S.) and 2011 National Household Survey (Canada); only includes people aged 25 and older.

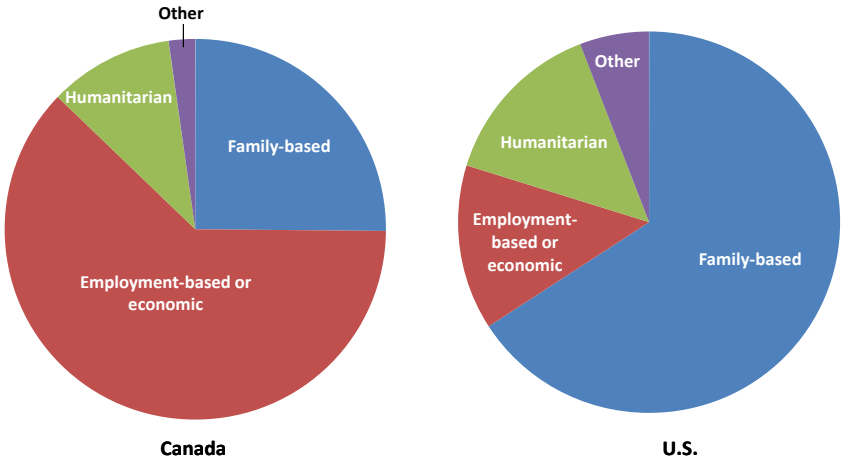

FIGURE 4-3 Employment-based immigration is more important in Canada than in the United States. SOURCE: U.S. Department of Homeland Security; Citizenship and Immigration Canada; average of new permanent residents over 2009-2013 for both.

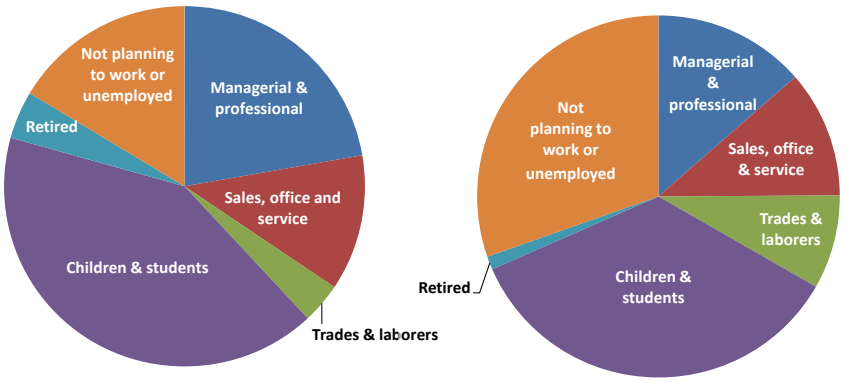

FIGURE 4-4 More new immigrants are in managerial and professional occupations in Canada than in the United States. SOURCE: U.S. Department of Homeland Security; Citizenship and Immigration Canada; average of new permanent residents over 2008-2012 for both; does not include unknown occupation or "new workers" or entrepreneurs.

One of the biggest differences between migrants to Canada and the United States is age distribution. This difference can be tied to immigration policy, with Canada's point system for economic migrants resulting in a greater percentage of younger individuals being granted visas. However, including illegal immigrants would reduce the differences in age distributions; the majority of illegal immigrants in the United States are of working age.

There are two main concerns with Canada's immigration policy. The first is that Canadian immigrants are highly concentrated geographically and are less mobile than U.S. immigrants. As recently as 2011, about 75 percent of Canada's immigrants lived in Toronto, Vancouver, or Montreal. While there are states in the United States where immigrants tend to concentrate, the immigrant population is much more concentrated in Canada. The Eastern provinces in Canada are struggling in terms of economic growth and their ability to attract migrants, which led to Canada's expansion of its Provincial Nominee Program. Mobility within Canada is far lower than in the United States, both among natives and immigrants, which is a problem when the goal is to match people to where job opportunities exist.

A second concern is whether the skills that immigrants have, including those admitted through the economic class, actually match employers' needs. Evidence suggests that the education and experience that immigrants have acquired abroad are not highly valued by employers in Canada. Similarly, Canadian migrants' language skills have not been as good in practice as they are on

paper, a finding that triggered Canada's use of third parties to test language fluency as part of the admissions process.

For science, technology, engineering, and math (STEM) occupations, migrants to the United States with post-secondary degrees are more likely to be employed in STEM fields than are those in Canada, a difference that is even more pronounced for PhD holders. However, Canada relies more heavily than the United States on migrants to fill STEM positions because it is not producing as great a share of STEM workers from its native-born college graduates and PhD holders (Figure 4-5). "This is an interesting finding that might suggest some changes that Canada might want to consider or some benefits that the United States is getting out of its policy," said Zavodny.

As Giralt and Beach had already noted, Canada has changed its economic class immigration policy in response to these concerns. In the 1990s, Canada created its Provincial Nominee Program, which allows the provinces to essentially bypass the federal system, although there are still some federal security checks. As this program has evolved, the provinces have exhibited substantial diversity in terms of the kind of migrants they are trying to attract. Some provinces require migrants to be relatively skilled and to have a job offer. Other provinces, particularly the eastern provinces, are desperate for immigrants and have much broader admission criteria. As a result, many of the Provincial Nominee Program migrants to the eastern provinces are not highly educated or highly skilled. Zavodny noted that cities in the United States that are looking to immigration to stimulate their economies, such as Detroit, have discussed turning to this type of immigration model.

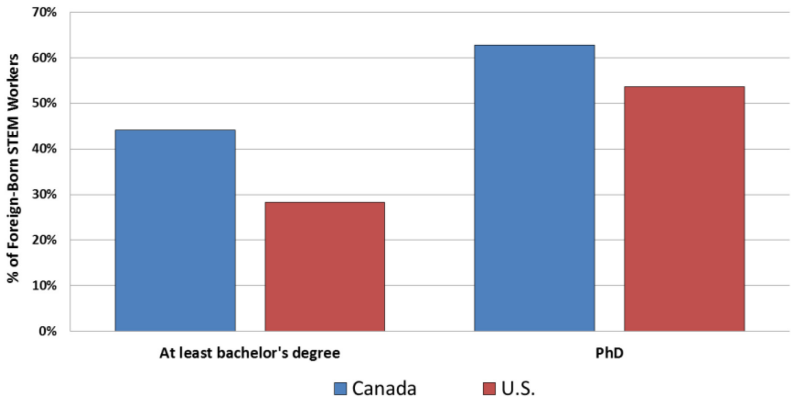

FIGURE 4-5 Canada relies more than the United States on immigrants to fill STEM jobs. SOURCE: Author's calculations from 2011 American Community Survey and 2011 National Household Survey.

Canada also created the Canadian Experience Class in 2009 to address the mismatch between the skills migrants have and those employers want. Both of these programs have grown substantially in importance since their creation, and the Provincial Nominees Program, in particular, is helping to address the geographic distribution problem in Canada.

There has been tremendous growth in the use of temporary foreign worker visas in Canada over the past decade, far more than in the United States (Figure 4-6). However, the number of temporary work visas granted in the United States is heavily biased towards skilled workers, much more than in Canada. In addition, a larger share of permanent residents in the United States converted from temporary work visas than in Canada. One concern that economists have raised about Canada's temporary worker program is that provinces that receive a larger inflow of temporary foreign workers experience a reduction in the number of Canadian natives who move to that province possibly resulting in long-run displacement of Canadian natives. In addition, some research shows that the expansion of the Temporary Foreign Worker Program in Canada has exacerbated regional differentials in unemployment rates, raising another concern at the geographic level.

Early indicators suggest that these new programs are working well for Canada. There have been good retention rates for immigrants in the Provincial Nominees Program and immigrants in this group have high initial earnings and employment rates. Migrants in the Canadian Experience Class also have high initial earnings and employment rates, and there appears to be a high rate of return in terms of education and experience.

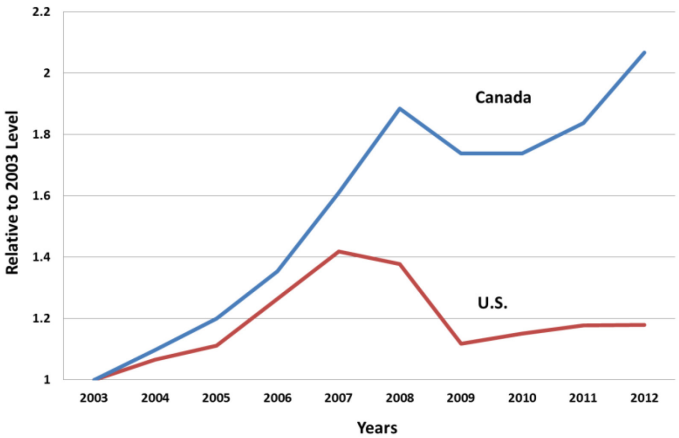

FIGURE 4-6 The growth of temporary foreign worker visas. SOURCE: U.S. State Department; Citizenship and Immigration Canada; does not include TN (NAFTA) visas or entries.

Zavodny concluded her presentation with a few examples of how Canada has changed its immigration system over the past decade including:

- increased point systems' emphasis on age, language ability, and job offers; reduced emphasis on education;
- shifted in admissions from points system to Provincial Nominee Programs;
- created the Canadian Experience Class;
- created the Federal Skilled Trades Program;
- overhauled the temporary foreign worker program;
- eliminated federal immigrant investor and entrepreneur programs; and
- launched the Express Entry system in 2015.

While Canada has introduced a wide range of changes that have made its immigration system more fluid and flexible, the United States has not made similar reforms. Instead, recent reforms have been limited to the Deferred Action for Childhood Arrivals (DACA) program and proposed relaxing rules for spouses of H-1B visa holders if a green card application is in process.[2] Canada's temporary visa programs are also much more flexible than those in the United States. For example, Canada has an open temporary work visa that allows skilled workers to work for any employer. Spouses of skilled temporary workers in Canada receive work visas as well. However, both countries have a backlog of applicants. Zavodny did not endorse a points system as the solution to attracting high-skilled migrants; instead she endorsed a policy based on flexibility and willingness to change.

THE UNITED KINGDOM'S EXPERIENCE WITH IMMIGRATION POLICY

According to Jonathan Wadsworth, although immigration to the United Kingdom has increased substantially over the past 20 years, the country is still in the "middle ranking" for immigration among OECD countries. Currently, immigrants represent about 13 percent of the U.K.'s population. The rate of increase over the past 20 years has made immigration a hot topic in the United Kingdom. Indeed, public opinion polls show that immigration is overtaking the economy as the issue that most concerns people in Britain, and the governing

[2]The U.S. Citizenship and Immigration Services agency did not begin accepting requests for the expansion of DACA on February 18, 2015 as initially planned and had suspended implementation of Deferred Action for Parents of Americans and Lawful Permanent Residents as of October 21, 2015. Available at http://www.uscis.gov/immigrationaction#3 [Accessed on October 21, 2015].

coalition of liberals and conservatives that came to power in 2010 has stated their intent to reduce immigration to the tens of thousands by the end of the Parliament in 2015. This would be a drastic cut from the current level of immigration, which is hovering between 200,000 and 250,000 immigrants per year.

What makes this huge reduction particularly challenging is that Britain is a member of the European Union, which means that the nation must allow virtually unrestricted movement of EU citizens into and out of the country. This being the case, the entire reduction in net immigration will need to come from restricting immigration from outside of the EU. Britain is attempting to accomplish this by restricting work permits to skilled workers and students, and for family reunification, with some provisions for asylum seekers.

The U.K. migration system is a points-based system that was introduced to manage work- and study-related migration of citizens of countries in the European Economic Area, which includes the 28 countries in the EU plus Iceland, Liechtenstein, and Norway. The system consists of five tiers, plus provisions for family reunification:

- Tier 1: highly skilled (postgraduate/PhD) migrants coming for work reasons without a definite job offer
- Tier 2: skilled migrant workers with a definite job offer
- Tier 3: low-skilled migrant workers
- Tier 4: students
- Tier 5: youth mobility schemes and temporary workers

This system is demand-driven. Both students and migrants seeking employment must have a sponsor and that sponsor has to be licensed by the government and obtain a certificate of sponsorship. The unique feature of the U.K. points-based system is that the points are applied to jobs broadly rather than to specific individuals. However, Britain is currently moving away from a points-based system towards explicit requirements, which include that a job is a "graduate job" and that there is a minimum pay threshold. One of the duties of the U.K. Migration Advisory Committee (MAC), of which Wadsworth is a member, is to define graduate jobs. The MAC is a non-governmental public body created in 2007 to provide evidence-based advice to the government on immigration issues only upon request of the Home Office.[3] The five members of the MAC are all academic economists appointed for a 5-year period by the Minister

[3]The U.K.'s Home Office is the government department responsible for immigration and passports, drug policy, crime policy and counter-terrorism and works to ensure visible, responsive and accountable policing in the UK. Information available at https://www.gov.uk/government/organisations/home-office [Accessed on November 23, 2015].

of Immigration through an open and fair competition. They are supported by a secretariat of economists, researchers, and policy officials. The MAC produces and publishes reports with recommendations, but it cannot decide policy. The government can accept or reject the MAC's recommendations, and it can and does implement immigration reforms without consulting the MAC.

One MAC responsibility is to produce "Shortage Occupation Lists," or those occupations that are skilled, in shortage, and could be filled by immigrants. Employers submit evidence that their shortages or vacancies satisfy those three criteria. The challenge for MAC has been to determine how to measure shortages. The MAC developed a list of 12 potential measures of shortages using data on wages, vacancies, and employment changes. These measures are supplemented by consultations with stakeholders. At the end of the analysis, if a job passes the majority of the indicators, the MAC deems the occupation to be in shortage.

Another task assigned to the MAC has been to develop quotas that will enable Britain to meet the targets of reducing net immigration inflows to the tens of thousands. For skilled workers, the MAC set the target at 20,700. Wadsworth noted that Britain has not met this target in part due to the recent economic downturn which has reduced demand. Meeting the nation's long-term needs for skilled workers may test this quota in the near future.

In summary, the MAC's independence, along with its perceived expertise and evidence-driven reports, are seen as key features in the role of the decision-making process with regard to immigration policy. The U.K. has been a world leader in developing this type of independent advisory committee as an integral component of the decision-making process.

A U.S. PERSPECTIVE

In commenting on the three panel presentations, as well as those in the first panel, Francis Cissna agreed that the Canadian and Australian systems are more nimble than the U.S. system. He noted, however, that the United States can make some administrative reforms to its system, and that there may be a few changes coming over the next several months that might help improve the situation. While Canada can enact a provincial level immigration system, the United States cannot, he noted as was recently reaffirmed by a U.S. Supreme Court decision that blocked most of what Arizona was trying to enact on its own in terms of immigration policy.[4]

Several years ago, DHS received independent inquiries from a few western states interested in establishing their own private temporary worker pro-

[4] *Arizona et al v. United States, No.11-182, Supreme Court of the United States (June 25, 2012).*

grams. "They were fed up with the slowness and inefficiency of the existing temporary worker programs, especially for agricultural workers," said Cissna. "They said they had this whole system ready to go. They were going to recruit the workers. They were going to get the employers lined up. They were going to enforce it. They were going to give them all identity cards and make sure they lived in proper housing. They were even going to make sure the workers would leave." One of the states, he added, had even drawn up a state law that the legislature was poised to pass contingent on receiving the department's cooperation on letting the workers into the country. While Cissna acknowledged that this was an interesting idea, he did not think these proposals were feasible, especially in light of the Supreme Court's decision on Arizona's immigration laws. In the end, DHS Secretary Michael Chertoff denied the request and that ended the effort.

Cissna agreed with Zavodny's statement that Canadian immigrants are, on the whole, much better educated than the immigrant pool in the United States. The reason for this is that the majority of U.S. immigrants are admitted under family-based programs while the majority of Canadian immigrants are admitted on employment-based visas. While many family-based immigrants, who account for 700,000 to 800,000 out of the 1 million immigrants entering the United States annually, are highly educated, they come to this country without benefit of any job offer or other systematic assistance that employment-based immigrants have. One area that needs to be addressed is how to better take advantage of the highly-educated and high-skilled immigrants that enter the country in the family pool. He noted that there are a number of organizations, associations, and other entities that work on immigration issues, particularly within the OECD, that have many good ideas about how to address this issue, but the United States has not acted on any of this ideas in any kind of concerted manner so far. He was heartened to see a small section devoted to high-skilled immigration issues in the Senate-passed immigration bill in 2013.

Referring to the earlier presentation by Charles Beach, Cissna acknowledged the challenge the U.S. faces when trying to determine the breakdown between skilled and unskilled employment-based immigration. He said that he believed that the number of green cards issued for low-skill or no-skill immigrants not in the family stream is limited to around 5,000 annually, and fewer than that are actually issued in any given year. The remaining 140,000 green cards are issued to people with college and advanced degrees. Cissna said that if comprehensive immigration reform ever makes it back onto the legislative agenda, an important policy decision will be determining whether the country should create more opportunities for low-skill individuals to get green cards, an issue of particular interest to the agricultural community. Today, workers who come to fill agricultural jobs would not qualify for any of the employment-based visa categories that exist. Lacking such a mechanism for these workers to

become permanent residents would create a permanent cycle of temporary agricultural workers, which Cissna believes would not be the most desirable situation as a matter of national policy.

Cissna agreed with Beach's suggestion that the United States should closely monitor the "expression of interest model." He cautioned that even if that program is successful, it would be difficult to draw lessons for the United States given the way the legislative process works in this country. He did see a place to consider a number of creative ideas should comprehensive immigration reform ever make it back onto the legislative agenda but noted that the United States has a "bad record" when it comes to learning lessons from other countries' immigration models. As an example, he recounted the story of attending a conference and showing an Australian colleague the new comprehensive immigration bill that was before the Senate. Her comment was that the approach that the U.S. bill offered to attract more STEM workers was similar to Australia's failed approach. However, Cissna has noticed that draft U.S. immigration bills since then have eliminated the provision found in Australia's policy change that let sham schools and visa mills result in unqualified immigrants getting green cards.

He noted that Britain's creation of the MAC is one instance where U.S. policy makers are paying close attention and are attempting to draw important lessons to inform the creation of a commission that would establish caps on immigrant visa categories or even set wage levels. The legislation passed by the Senate last year contained some language to create a similar commission.

The United States has also taken note of Canadian actions to tighten and crack down on intercompany transfers in the wake of a number of incidents over the past few years that brought those programs into the spotlight. Cissna said that the United States has not yet followed suit, in large part because most of the steps that Canada took would require legislation in this country, but DHS is following what is happening in Canada in this area with keen interest. Similarly the United States is tracking the impact of Canada ending its investor visa program and replacing it with a startup visa program and a recently published report from the MAC suggesting that the investment amounts required to procure an investor visa should increase in the U.K.

With respect to temporary visa programs, Cissna agreed with Zavodny that those entering Canada with temporary visas were less skilled than those with U.S. temporary work visas. He said that one reason for this difference is that the H-2A and H-2B programs for temporary seasonal workers in the United States are either capped at a very low level relative to what U.S. businesses need or are underutilized. Legislative reform addressing those two programs in particular, or replacing them with another program that is functional and easy to use by employers, could change these numbers. In 2014, well over 90 percent of H-2A and H-2B visa holders were from Mexico, but if those programs

were reformed in a way that made them more attractive to U.S. employers and to workers from all over the world, the profile of people coming to work in those programs would likely change.

As far as steps that the United States has taken, Cissna explained that the proposed rule change that would allow spouses of H-1B visa holders who had applied for green cards to obtain work visas, should be finalized within the next few months. A related U.S. proposal would let spouses of student visa holders study part-time, but not work. He also listed steps that the United States took in 2008 allowing foreign students with STEM degrees to continue working in the country for 29 months after graduation, a seminal regulation that has attracted on the order of 10,000 individuals annually, said Cissna.[5] In addition, in 2008, DHS extended the time that Canadians can work in the United States from one year to three years.

COMPARISON OF SKILLED MIGRATION POLICIES AND OUTCOMES IN AUSTRALIA, CANADA, AND NEW ZEALAND

Building on the earlier talks on Canada's immigration system by Beach and Zavodny, Lesleyanne Hawthorne provided a comparative analysis of how Canada, Australia, and New Zealand compete for and collaborate to attract skilled migrants. "We are hugely influenced by each other's policies, we share our data with each other in a very transparent way, and the degree of replication of whatever works is striking, particularly recently where I think Canada is moving much closer to the Australian and New Zealand models," said Hawthorne.

A decade ago, the Canadian and Australian governments commissioned Hawthorne to compare the two countries' degree of reliance on migrant professionals by field. Even in 2001, it was clear that both countries relied heavily on migrant professionals in a wide range fields, including engineering, computing, medicine, science, commerce and business, architecture, accounting, the arts and humanities, nursing, and education. In engineering and computing, for example, around half of the professionals in both countries were migrants. In Australia—she did not present 2011 data for Canada—the proportion of for-

[5]The Optional Practical Training (OPT) is a temporary employment program that is directly related to an F-1 student's major area of study. Under the prior rules, an F-1 student could be authorized to receive up to a total of 12 months of practical training either before (pre) and/or after (post-) completion of studies. Under the new rule, certain students will be eligible to receive a 17-month extension of post-completion OPT. U.S. Citizenship and Immigration Services, Department of Homeland Security, available at http://www.uscis.gov/archive/archive-news/questions-and-answers-extension-optional-practical-training-program-qualified-students [Accessed on November 23, 2015].

eign-born professionals in these fields increased between 2001 and 2011, and over 25 percent of these migrant professionals had arrived in Australia within the past 5 years. "There has been an extraordinary intake of degree-qualified professionals, and so the big challenge for these three governments with proactive skilled migrant policies is to decide which of the pathways [they] wish to prioritize and which mechanisms [they] wish to select," said Hawthorne.

Noting that she was not going to discuss policies related to two categories of immigrants—dependents of labor migrants and family and humanitarian migrants—and acknowledging that many of the individuals in these categories can also be skilled, Hawthorne focused on three groups that each government proactively selects: temporary labor, permanent skilled labor, and migrants who enter via the study-migration pathway (with the option of converting status to become skilled migrants). Canada, Australia, and New Zealand do not set annual caps, though each country does set quotas for permanent skilled migrants. Canada and Australia set quotas annually while New Zealand sets its cap on a yearly basis.

In the decade prior to 2010, all three countries shared a comparable strategy for attracting skilled migrants, both for economic and population growth, and all three defined a successful skilled immigrant as one who quickly integrated into the labor market in a job utilizing their skills. Australia also added the metric that successful migrants are the ones that are making a positive fiscal contribution in the early settlement period. In addition to this overarching measure of value, the three countries shared a number of strategies. The first was to reserve between 60 and 70 percent of permanent intakes for skilled individuals. Second, the individuals were increasingly selected based on employer, state, or territorial sponsorship rather than points, a prioritization process that Hawthorne called the new paradigm in high-skilled immigration policy. Third, each country had placed increasing importance on demand-driven temporary worker flows, which were not capped and substantially increased the scale of labor migration. Most importantly, in the past decade first New Zealand and then Australia introduced new selection paradigms based on a two-step "expression of interest" mechanism strategy that Canada is about to adopt. It is essential to note all three counties have been increasing their use of data and analysis to constantly fine-tune immigration policy so that it emphasizes those pathways that work best in terms of meeting national employment goals.

Although the three countries, Canada, Australia, and New Zealand, shared a number of features in their immigration policies, there were also significant policy differences among them. Canada's migration policy in the 2000s produced a cohort of highly skilled immigrants that were disproportionately degree-qualified compared to Australia and particularly New Zealand (which

attracted lower skilled migrants through all pathways). The source countries for Canada were highly diverse, with very few individuals coming from major English-speaking countries. In fact, Canada did not have a mandatory requirement for independent language testing in either English or French as a condition of eligibility. Canada also lacked a pre-migration assessment of whether a migrant's skill qualifications would be recognized in Canada, and the country did not have a study-migration pathway until the Canadian Experience Class was created in 2008. Finally, the wide range of processing times lags (between 6 and 10 years), was an issue of major concern to successive governments. One of the challenges that Canada faced, as a consequence of these issues, was its relatively poor success at getting economic category migrants into high-skilled professions at speeds relative to Australia and New Zealand. In 2001, fewer than one in five high-skilled migrants were employed in such professions, and for migrants from many countries, including India, Hong Kong, Malaysia, Singapore, China, and the Philippines, fewer than one-third of all skilled migrants were employed in other professional or managerial positions. Hawthorne noted that data from both Canada's and Australia's sponsored temporary foreign workers program indicated that except for agricultural positions (which for Canada are filled largely by temporary workers from Mexico), employers have a definite preference to sponsor workers from OECD countries and/or those who are native English or (in Canada) French speakers. After many years of interviewing employers in multiple STEM fields, Hawthorne says that it is clear that strong communication and technological skills are critical in the global knowledge economy for migrants to be attractive as potential employees.

The demand for high-skilled individuals with language and technical proficiency is a problem that Canada, Australia, and New Zealand are grappling with, given that many contemporary immigrant source countries are at a different stage of educational resourcing and technological development. Hawthorne has been following global educational sector rankings data annually in relation to China and India. According to the Shanghai Jiao Tong Ranking in 2015[6], India has just one institution in the world top 500 despite its enormous growth in skilled migrant flows and the rapid development of the Indian econ-

[6]Academic Ranking of World Universities (ARWU) is released by the Center for World-Class Universities at Shanghai Jiao Tong Universities. Universities are ranked by several indicators of academic or research performance, including alumni and staff winning Nobel Prizes and Fields Medals, highly cited researchers, papers published in *Nature and Science*, papers indexed in major citation indices, and the per capita academic performance of an institution. For each indicator, the highest scoring institution is assigned a score of 100, and other institutions are calculated as a percentage of the top score. Available at http://www.shanghairanking.com [Accessed on November 23, 2015].

omy. This stands in stark contrast to the rapid scientific and rankings progression of China, which has over 25 institutions in the top 500 ranking.[7]

In addition, different countries have different requirements to recognize foreign degree holders, which may affect the ability of the highly skilled migrant workers to obtain a job in his or her field. Only 19 percent of Indian medical school graduates who had migrated to Canada from 1996 to 2001 were working in medicine by 2001, while 66 percent were working in Australia. The difference is that Australia has established multiple pathways to recognition, and migrants were pre-tested for language and technical proficiency before securing a visa. Technical recognition in the host country may be burdensome—for example, foreign-educated engineers could have to take as many as 24 exams, in addition to acquiring a year of Canadian experience, to demonstrate competency and secure full recognition for their skills.

Because Canada, in the decade prior to 2010, treated all human capital the same, employment outcomes were worsening for skilled migrants. According to a Statistics Canada analysis, they were worse for skilled migrants in the early settlement period than for individuals in the family category who were unscreened for human capital attributes. Research showed that it could take 20 years on average for skilled migrants to reach wage parity with native Canadians, with many individuals never achieving this.

Australia, by contrast, changed the selection criteria used in 1999 based on labor market integration evidence, and has continued to fine-tune this policy in the 15 years since. This was associated with immediate benefits. In 2001, around 60 percent of skilled migrants were employed 6 months after arrival in Canada, compared to 83 percent in Australia.

There are many ways to assess skills and proficiency of foreign-educated workers, for example, through mandating "vocational" levels of English language proficiency (the standard required for registration in select fields). Since 2009, the Australian government has required temporary and permanent migrant professionals to have an International Language Testing System minimum score of Band 6 on reading, writing, speaking, and listening (or equivalent test), and higher where it is required by regulatory bodies as a condition of professional practice. This strategy has had a demonstrable impact. In terms of migrants in health-related occupations, an analysis of 30,000 candidates from 2007-2011 found that 52 percent of physicians met Australia's language proficiency requirement, while in nursing only 17 percent of applicants met the language proficiency requirement, with nurses from the Philippines doing particu-

[7]As of 2015, the Shanghai Ranking shows 32 Chinese universities in the top 500. Available at http://www.shanghairanking.com/ARWU2015.html [Accessed on November 23, 2015].

larly poorly. Now, Canada has also instituted mandatory speaking, listening, reading, and writing proficiency tests.

Like Canada, Australia prioritizes selection based on skills, so that two-thirds of intakes are skilled and of those, two-thirds are professionals. Source countries are also highly diverse, but unlike Canada, Australia placed a greater emphasis on native and near-native English speakers. This did not reduce diversity of immigrants to Australia. From 2004-2005 to 2009-2010, just 17 percent of Australia's skilled migrants were native English speaking professionals, and 80 percent of its skilled migrants came from Asia. Processing times in Australia were relatively short compared to those in Canada.

By 2011, Australia had positive employment outcomes in global terms. According to Hawthorne, over 90 percent of those who were selected by employers were working full time and of those, 90 percent were working in a job that was skilled or categorized as professional or managerial. Even those individuals selected while abroad (offshore) were doing well, with 76 percent of this cohort employed full time and the bulk of those individuals working in high-skilled occupations. Overall, implementing stringent selection criteria did not reduce the supply of skilled migrants nor did it eliminate migrants from non-English speaking countries. It did, however, produce much better outcomes. This also improved total migration outcomes (across skilled family and humanitarian categories). For example, according to the 2011 Census, 63 percent of medical professionals from sub-Saharan Africa, 60.8 percent from India, and 57.6 percent from Sri Lanka and Bangladesh, were employed in the medical field, while nearly half of all medical professionals from the Philippines, who were considered relatively disadvantaged, were employed in their field. At this time, India, Sri Lanka, and Bangladesh had supplanted the U.K. and Ireland as the major countries of origin for medical migrants.

For Australia, STEM migrants are extremely important, with most of the STEM migrants entering the country via temporary entry pathways that are driven largely by employer and state demands. This is the preferred mechanism, because the selection process is fast-tracked, the applicants are coming for pre-arranged work, the location can be mandated, and the pathway can be fine tuned or even discontinued depending on the economic cycle. Employers prefer to select both permanent and temporary skilled migrants who are already in Australia. As a result, employers are looking at former international students as well as temporary foreign workers.

The employment outcomes for skilled migrants are largely positive as a result of these policy changes. Now, 68 percent of skilled migrants have a job in their field within 6 months, and 73 percent have a field-related job within a year, far exceeding family and humanitarian migrants, with the skilled migrants earning a far higher salary. However, international students who stayed in Aus-

tralia after graduation were far less likely to have high-skilled jobs and earned far lower initial wages than the government had presumed.

For New Zealand, immigration is considered essential for demographic survival. In a 50-year period after World War II, some 2 million migrants moved to New Zealand, with an associated net population gain of just over 200,000 people. Today, New Zealand gets far fewer degree-qualified immigrants than Australia at every level of intake, whether they are permanent skilled migrants, temporary migrants, or former international students. This may not have been a problem when New Zealand's economy was more dependent on agriculture, but is a challenge today with the growth of the country's high-tech industries.

Like Australia, New Zealand has instituted English language proficiency testing, but has set a higher bar for demonstrating proficiency. In 2004, it mandated an International English Language Testing System (IELTS) score of Band 6.5 (compared to Band 5 at that time in Australia, rising to Band 6 in 2007). As a result, nearly half of all skilled migrants to New Zealand are native English speakers, and beyond that there is a clear bias towards OECD countries such as France and Germany. New Zealand has established a study-migration pathway, but most of the international students who came through this program through 2010 were enrolled in non-degree courses, with residency via the study-migration pathway taking around 10 years.

One of New Zealand's challenges is retaining its migrant and native STEM workers. For example, a third of New Zealand's new engineering graduates leave the country within 3 years. The same is true for the country's medical workforce, which loses a third of its foreign-born doctors within a year and two-thirds within 3 years, typically to Australia. Moreover, those who are most likely to leave are also the most likely to pass professional registration examinations, are relatively young, and are trained in programs with standards comparable to those of OECD countries. Out-migration from New Zealand, however, has dropped in the past year, reflecting a stronger economic growth.

There has been a major policy convergence between the three countries based on analysis of data and the ability to fine tune policy in response to the research findings made possible with those data. Canada plans to reform its immigration policy to adopt all the key measures implemented by Australia or New Zealand. As of January 1, 2015, the Express Entry immigration selection or "expression of interest" system is in operation.[8] In terms of maximizing labor market outcomes, the three countries are committed to a two-step migration process that includes pre-migration English screening and qualifications assessment, and greater levels of sponsorship. The three countries have all been

[8]See www.canadavisa.com/express-entry.html [Accessed on November 23, 2015].

refining their assessments of occupational needs by level of experience, with the goal of competing globally for the most talented individuals.

Although each country still has significant challenges to address, the differences among the three have largely vanished. Canada has set a goal to get improved skilled migration outcomes in terms of early employment, and key selection mechanisms the country has adopted has been modeled on those developed by Australia or New Zealand. While the Canadian Experience Class is small so far, policymakers have expressed interest in increasing the size of this group. Also, there is still a need to secure higher-level value from major temporary programs such as the live-in caregiver program. Australia has to deal with the student migration challenge and is looking to refine its temporary labor migration program. For New Zealand, on the other hand, the big challenges are going to be attracting enough people at the right skill level in an increasingly competitive global OECD environment, and retaining people with the right skill level to match the industry needs of the future.

HIGH-SKILLED MIGRATION TO ASIAN NATIONS

According to Graeme Hugo, Asia is increasingly becoming a destination for skilled migrants rather than just a source of them. Asia is undergoing rapid growth as well as significant structural changes. In 1990, Asia represented 21 percent of the global economy, a figure that has already risen to 29 percent and that is projected to account for one-third of the global economy by the 2020s. As Asian countries grow, they are attempting to steer their economies into high-end technology fields by emphasizing innovation. Some Asian nations are making concerted efforts to improve the quality of their best universities so that they are ranked in the top tier of universities around the world. For these reasons, skilled migration into and within Asia has become more significant. This trend is being amplified by the fact that some countries, such as Japan and Singapore, have a growing labor deficit that they need to fill via immigration.

Discussions about the key structural changes occurring in international migration within Asia and about the broad trends in skilled migration in this region are constrained by a lack of data. Unlike in the OECD, there are no comprehensive data sets on migration for most of the countries in Asia. Since most of the migration that is occurring is temporary, very little of it is captured in census data. Furthermore, Asian countries are reluctant to classify migrants as either skilled or unskilled because they are reluctant to show their dependence on skilled migration.

Given the data limitations, Hugo noted that he has been studying international migration in Asia for four decades and that the past few years have been the most dynamic with respect to changes in the immigration systems among the Asian nations. In 2013, the United Nations reported that Asia has the fast-

est growing number of immigrants, particularly in the Middle East and Southeast Asia, with immigrant populations growing by 4.5 percent per year. Increasingly, inter-Asian immigration is dominating immigration within the region, with south-to-south migration now surpassing that of south-to-north migration. The United Nations has also reported that between 2005 and 2013 the number of Asian countries with policies aimed at increasing the number of skilled migrants has more than doubled from 8 to 17, which is an indicator of the great interest within the region with respect to skilled migration.

Today, however, migration in Asia is still overwhelmingly low-skilled. Countries with a labor surplus—predominantly China, Indonesia, and India—are sending significant numbers of low-skilled workers to countries with labor deficits, leading to substantial movement of low-skilled workers, particularly to the Middle East. There has always been an element of "expatriate high-skilled migration with a post-colonial flavor" to it, but it has been tiny, in large part because most countries in Asia had restrictive migration policies for much of the post-colonial period. In addition, many Asian countries have feared losing their national identity due to an influx of immigrants. As a result, immigration is tightly restricted and most Asian countries have no avenues for people to become citizens if they are not natives of the country.

These attitudes are changing, however, and several countries believe that they need to adjust their migration policy to attract the high-skilled labor needed to compete in the global economy. Hugo noted there is a stealth component to immigration via marriage migration: young people are traveling more throughout the region and returning home with spouses from other countries. In Korea, for example, some 16 percent of all births are from mixed marriages, a departure from the cultural homogeneity of the past.

One factor driving the demand for skilled migrants is that the local education systems are not teaching students the skills that are needed to participate in the global economy's labor market. In Southeast Asian countries, there is not enough emphasis on the sciences, technology, and engineering, perhaps due to the impact of colonialism on higher education systems. There are also significant concerns about the quality of education in some areas.

There are a number of distinctive features of skilled migration within Asia. First, migration is overwhelmingly temporary, with only Singapore being favorably disposed to grant skilled immigrants ready access to permanent residency and citizenship. Second, whereas in earlier generations the expatriate population was overwhelmingly from OECD countries, the new generations of skilled migrants are predominantly from Asia, and in particular from India and the Philippines. Because larger scale migration in Asia is in its infancy, it operates at a low level of capacity with a lack of governance.

While governments are thinking about how to boost migration for economic reasons, there is a growing anti-migrant sentiment amongst the general

public, particularly towards skilled migrants. This anti-migrant sentiment arises because of high unemployment among native youth and university graduates. There is an increasingly strong nexus between high-skilled immigration and student migration. Several Asian countries, for example, are now significant players in the student migration arena. Several of these countries have policies meant to encourage students to stay and work once they have completed their degree. Return migration is a major part of the skilled migration flows into these areas, with many Asian natives returning to their home countries after gaining work experience or finishing their college or graduate degree abroad. "These countries are becoming very competitive when it comes to salaries," said Hugo. "Asian cities are now vibrant, exciting places, and for young people very attractive destinations."

There are four regions in Asia that are experiencing large inflows of migrants: Japan, Singapore, China, and the Middle East. Despite the belief that Japan is totally anti-migrant, the country has been open to skilled migration since 1990. While language and culture are significant barriers to entry, developments in immigration policy have taken place, including the institution of a points system. Firms in Japan are now directly recruiting skilled workers.

In Singapore, 36 percent of the population is officially documented as foreign-born, but the actual rate may be much higher, with a significant proportion being skilled migrants. Skilled migrants in Singapore have a relatively easy path to permanent residence, although there has been a lot of opposition from the local community. Nonetheless, the Singaporean government is determined to continue issuing some 20,000 to 25,000 new permanent residence visas to skilled migrants each year. If this current trend continues, migrants will make up 46 percent of the total population of Singapore by 2020. The migration policy is closely aligned with Singapore's efforts to transform its economy as a global hub for knowledge-intensive industries with an emphasis on high-end technology and innovation.

Emerging economies with labor surpluses are struggling with high unemployment rates for recent graduates and highly educated natives. However, there is a significant mismatch between the skills and quality of many of these graduates and the demands of these countries' economies. This is particularly true in Southeast Asia, where shortages of high-skilled labor have been well-documented. While China is a huge supplier of skilled migrants to OECD countries, the 2010 Chinese census also listed 220,000 foreign registered workers and 480,000 temporary registered workers. The number of foreign-born workers is small relative to the population but is growing. In 2013, Chinese Premier Wen Jiabao made a definitive statement about developing a skilled migration policy for China that will depend heavily on increasing the number of foreign students studying at Chinese universities from about 265,000 in 2010 to over a half million by 2020.

Immigrants from the Middle East currently account for about 14.6 percent of immigrants worldwide and has dominated global migration along with the United States for a considerable period of time. "The Middle East," Hugo said "has the overwhelming characteristic of having an amazingly liberal immigration system dominated by the caliphate sponsorship system, but a watertight process of not giving citizenship or naturalizing the population. There are no ways of migrants becoming citizens." In the aftermath of the civil unrest in Tunesia, Egypt, Libya, Yemen, and other Arab countries, there is a growing concern among the governments in the region about the high numbers of unemployed young people, and several governments, including those of Saudi Arabia, Bahrain, and Qatar, have instituted quotas for employers to hire locals.

Return migration has a long history in Asia, but with very little data, it is hard to draw specific conclusions about the role that it is playing in meeting Asia's demand for high-skilled labor. Using extensive Australian data on migration to track Asian migrants over a decade-long period suggests that there is significant return migration, particularly to East Asia. One-third of Australia's Chinese immigrants of the past two decades have returned to China. However, even after they return to China, these return migrants continue to interact with people back in Australia. China has recently developed policies that encourage its emigrants to remain in their new countries and has facilitated engagement with this diaspora, particularly those in universities. A survey of over 300 Chinese scientists in Australia found that all of them had faculty assignments at Chinese universities in addition to their Australian positions.

In conclusion, south-to-north migration may be entering a period of significant slowdown following the global financial crisis. Skilled migration within Asia is relatively small scale today, but there are signs that there will be significant growth in the years ahead, particularly within the university sector. Student migration is already increasing. Still to be determined is whether Asia will become a competitor with OECD countries for skilled migrants or if the large-scale development of a middle class in the region will increase Asia's attractiveness to high-skilled individuals. This may also have a potential impact on OECD countries' abilities to recruit high-skilled migrants from Asia.

THE POLITICAL ECONOMY OF SKILLED MIGRATION POLICIES

Anna Maria Mayda started her comments and review of the preceding two talks with a broad overview of the kind of skill-selective immigration policies that countries have adopted, particularly those analyzed by Hawthorne and Hugo. There are two types of skill-selective immigration policies: immigrant-driven and employer-driven. Under immigrant-driven systems, an immigrant can be admitted to the country without having a job offer. In this case, the most important factors are human capital attributes. These immigrant-

driven systems have usually been referred to as points-based systems, and were introduced in Canada in 1967, in Australia in 1989, and in New Zealand in 1991. Two different economic models underpin the attribution of points; one is based on a short-term perspective in which there is a need to fill gaps in the labor market. This is the case in Australia. There can also be a longer term perspective in which education is the main focus and there is less of a need to fill specific gaps. This is the case for Canada. Under an employer-driven system, an employer has to make a job offer in order to grant admission to a high-skilled foreign worker. The U.S. H-1B visa is one example of an employer-driven system, and it appears that Canada, Australia, and New Zealand are moving to a certain extent towards such a system. In Asia, while the old view was that allowing foreign workers to enter was harmful to domestic workers and should be restricted, there is a new view emerging that skilled migration does benefit the receiving country. In fact, Asian countries have initiated strategies targeting skilled migrants.

In addition to these two strategies, there are others that countries can use to attract skilled migrants. In some settings, immigration reform is not the best policy instrument. One effective policy instrument is to first attract university students or faculty. A merit-based university rewarding scientific achievement both in the recruitment of professors and in their pay and teaching load may be more successful than the points-based system in attracting high-skilled workers. "That is basically what the United States has done besides the H-1B visa program," said Mayda, who characterized U.S. institutions of higher education as highly successful attractants for skilled individuals. While it is true that it is not always easy for foreign students to remain in the United States after graduation, many of them do stay and contribute to the pool of skilled migrants in the United States.

The U.S. business community agrees that universities are important for attracting skilled migrants. Bill Gates testified to the U.S. House of Representatives Committee on Science and Technology in March 2008 that we must reform our education system and our immigration policies to address the shortage of scientists and engineers in this country. If this doesn't happen, American companies will not have the talent they need to innovate and compete. This is consistent with Hugo's presentation that a key element in the effort of Asian countries to raise skilled immigration levels involves improved student mobility, sending natives overseas to return as skilled workers, and attracting students from other countries.

The governments of Australia, Canada, and New Zealand have, to a certain extent, been able to overcome the political opposition to recruiting skilled migrants, and some Asian countries are starting to do so as well. In general, skilled migrants are likely to increase the receiving country's income through higher output, investment, and employment. Moreover, the contribution of

immigrants to the fiscal balance of the country improves with their skill level, although only a few countries have devised policies aimed at selecting immigrants on the basis of their skills. The share of governments around the world with policies aimed at attracting skilled migrants increased between 2005 and 2013, but the absolute numbers remained low. "Skilled migration has positive impacts on productivity, on patenting, on also very strong knowledge spillover effects, and yet you don't see this opening up countries to skilled migrants," she said. "At the same time, there are some countries that have been successful from this point of view, such as Australia, Canada, and New Zealand, so that raises the question of what political economy determinants are behind this [success]."

Two major factors driving the political economy of skilled migration policies are public opinion and interest group dynamics. While it may be natural to think that public opinion is only resistant to unskilled migrants, this is not necessarily the case, especially among skilled natives. If you are a U.S. doctor, for example, you may not welcome foreign doctors, said Mayda, although there are huge barriers to entry for foreign doctors to immigrate and practice here. Canada's steps to limit temporary foreign workers are, at least in part, in reaction to public opinion. In fact, these responses are exactly what Mayda has found in her research on public opinion. Her research shows that the higher the education level of an individual, the lower the likelihood that an individual will be in favor of skilled migration. However, the richer an individual gets, the more likely they are to be pro skilled migration. Education and income may have opposite effects on public attitudes toward skilled migrants. Those with higher education and those with lower incomes are often against skilled migration.

DISCUSSION

Jennifer Hunt opened the discussion by commenting on the fact that within Canada, Quebec runs a completely separate immigration system with different criteria than the rest of the country, a fact that none of the presentations or discussions so far had highlighted. She explained that skilled migrants from Haiti and French-speaking countries in Africa have been able to immigrate to Quebec and find employment, take English classes, and then move elsewhere in Canada without restriction. Quebec's immigration system also awards points for spouses under the same criteria as the skilled migrant and that the decision to issue a work visa depends on the combined score of the skilled migrant and spouse. Points are also awarded if the potential migrant has family in Quebec or even spent time in Quebec. Students in Quebec are eligible for an expedited procedure to gain a work visa. Hunt said that although all applications approved in Quebec have to go through the Canadian government for

final approval, the federal government never rejects the applicants that Quebec accepts.

Stephen Merrill, former board director at the National Academy of Sciences, Engineering, and Medicine, noted that the MAC operates similar to the Academies where the government asks a question of experts, has no control over the selection of those experts, and can then accept, reject, or ignore the advice given by the experts. In that regard, he asked Wadsworth if the U.K. government queried the MAC as to how to reduce the net number of immigrants in the least disruptive way. Wadsworth replied that the MAC was not consulted; however, the MAC was asked to examine the role that skilled work permits could play in meeting the reduced target for immigration. The MAC provided a calculation of net fiscal contribution of immigrants, showing that skilled migrants contributed more to the British economy than other immigrants.

Merrill also asked what the MAC thinks about alternatives to immigration as a way to meet skill shortages given that there is a significant difference between the timeframe for admitting an immigrant and the timeframe for rescaling or retooling the workforce. More specifically, Merrill asked if the MAC's analysis extended beyond immediate needs to longer term considerations, such the effect that immigration would have on the desire or attractiveness for natives to prepare for a job in a particular field. Wadsworth said the MAC was asked whether it would be sensible to introduce sunset clauses into the shortage occupation list, with the idea being that employers would have to do something about the shortage besides relying on immigration after some period of time. However, the MAC concluded that having a blanket sunset period was probably too restrictive given that certain occupations have more skill shortages than others and to impose an economy-wide sunset period would be too prescriptive. He explained that what employers have to do now, if they have been on the list for a certain number of years, is to submit information that says they have tried to do something to alleviate those shortages through means other than immigration.

Hawthorne then asked Beach to comment on the reasons for the low uptake to date in the Canadian Experience Class. Beach replied that he has heard that there has been substantial and growing use of this class by foreign students who have graduated with degrees from Canadian institutions of higher education. As for the temporary foreign worker component of that program, he hypothesized that many of these workers may be applying through the Provincial Nominee Program instead. Hawthorne also asked Beach to comment on the argument that the Canadian Live-in Caregiver Program is really a de facto Filipino family reunification program rather than one that is genuinely attracting people to fill live-in caregiver positions. Beach responded by noting that the majority of individuals admitted under this program are in fact from the Philippines and that many of them are related to earlier Filipino migrants. He did not

know, however, whether the government is planning to do something about this situation. Beach did say that over the next 20 years, he expects the program will change from one used by people who can afford to have someone from the Philippines help around the house and take care of the children, to one used by the elderly who need help in order to continue living at home. Given the high cost of living in a nursing home or long-term care facility as opposed to living at home, Beach said he expects the Canadian government to be sympathetic to this idea.

Matt Graham, from the Bipartisan Policy Center's Immigration Task Force, asked the panel members to comment on what they thought was a lesson, either positive or negative, that the United States could learn from other countries' immigration systems. Beach said that on the positive side, the MAC might serve as a good model for looking seriously at specific aspects of immigration reform. He noted that the Congressional Budget Office is well respected by democratic nations worldwide and could serve as a model to develop a nonpartisan mechanism that would be nimble and take some of the politically loaded decisions out of the hands of elected officials. On the negative side, Beach said that Canada's track record with entrepreneurs and investors has not been good and those programs can serve as cautionary tales. Wadsworth added that the MAC's independence and acceptance by both government and the media as a nonpartisan source of information has been a key to its success. He noted that one thing that is important not to do is to set arbitrary targets for immigration over which there is no real control.

Cissna said that one thing that the United States should never do, given the lack of flexibility or nimbleness of the immigration system here, is to put anything in a statute that will lock the nation into any one approach for many decades. He said that it will be important in the next round of comprehensive immigration reform, whenever that comes, to include a mechanism that will enable the government to change course more easily than is currently the case. "We see all of the countries trying various programs and we might try to copy parts of them but we can't," said Cissna. "They are able to change quickly and we are not."

In terms of what the United States can learn from other countries' experiences with immigration reform, he singled out the various entrepreneur programs that countries are implementing under the assumption that the United States is likely to follow suit in some manner. "We need to see what successes these other countries have and perhaps copy or take the best parts of them," said Cissna. Another area where other countries' experiences will be useful is learning how to protect native workers while responding to the needs of U.S. businesses. "We have a very complicated way of doing that now, but maybe there are more efficient ways of doing it that other countries are pulling off

without diminishing the level of protection for American workers that we currently have," said Cissna.

Pia Orrenius, from the Federal Reserve Bank of Dallas, asked Wadsworth if he could comment on why the British government's position on immigration has changed so dramatically over the past 10 years from one that was very pro-immigrant to one that aims to be far more restrictive. Wadsworth's answer was that there was a change of government. "To be fair, I think the U.K. position is not hostile to immigration," he said, noting that both pro- and anti-immigration voices are being heard, just as they are in any other economy, and that there has been more of a shift in emphasis rather than in overall policy. It might also be the electoral challenges emanating from the rising support for U.K. Independence Party and other Euroskeptic parties. According to Wadsworth, politicians in the U.K. acknowledge the importance of immigration policy issues and understand the potential economic benefits of immigration at least as far as students are concerned. He added that most employers focus on recruiting the best talent regardless of their country of origin. While policy makers have realized that while their rhetoric may be stridently anti-immigration, they have to make sure that the U.K. economy is not damaged by restrictive policies.

When asked to clarify his comments about the Middle Eastern countries having liberal immigration policies, Hugo said that these countries have a flexible system that gives employers great power over immigrants given that an immigrant's work visa is tied to a specific employer, as is the case with the U.S. H-1B visa. At the same time, there are potential abuses in the Middle East as far as wages, working conditions, etc. for workers.

Edward Alden, from the Council on Foreign Relations, then asked Hugo if he knew whether the Chinese government encourages Chinese students who get their PhDs in the United States to return to China or if the government was satisfied with the type of arrangement Hugo had described for Chinese PhDs in Australia, where in effect they have joint appointments. Hugo said that it is his understanding that there was a "seismic shift in overall policy at the national and regional level in China," about 4 to 5 years ago. Today, while China does encourage its PhDs to return, it now has in place a range of initiatives that facilitate the flow of information, ideas, and technologies that these expatriates produce. "The Chinese government was one of the first to realize that these diaspora linkages can be used in both directions," Hugo said. He also noted that the Chinese academics that he interviewed in Australia were all engaged in joint projects with Chinese colleagues and made regular visits to China. One-third of Chinese academics had definite intentions to return to China full time at some point.

Referring to the challenge of credentialing migrants, Dulberger asked the panelists if they could explain how credentialing works in various countries. Hawthorne responded that the key thing to remember about credentialing is

that it is controlled largely by regulatory bodies that are still using systems designed in the 19th century and are not fit for 21st century mobility patterns. For the most part, credentialing is used as a form of protectionism, but if the goal is to attract high-skilled migrants, such protectionism has the effect of driving skilled migrants away given that they may not want to invest the time that it will take to get full certification in a host country with restrictive credentialing. In a study in which she looked at international medical school graduates, Hawthorne found that 60 percent of these doctors had made six or more major geographic moves, often staying only 3 or 4 years in a particular host country. Governments of Canada, Australia, and New Zealand incur huge financial burdens associated with securing full professional certifications for high-skilled immigrants.

These factors are driving the demand for conditional licensing provisions. Conditional licensing is happening in select countries in health care, accounting, engineering, and other fields but these countries seem reluctant to document the extent to which it is happening. They are also prompting countries to better select skilled immigrants from the applicant pool because there may be a significant need for training once people migrate and find that they cannot get find full-time employment in their field of expertise.

Michael Teitelbaum, of the Harvard Law School, asked Hawthorne if demographic survival plays a role in creating public opinion about immigration in Canada, Australia, and New Zealand. Hawthorne reiterated Mayda's comment that public opinion about migration is very complex and said that each of those three countries could undergo massive population growth by expanding refugee flows, but none of these countries is interested in doing that in part because of the fiscal demands associated with refugees, but also because of a negative public opinion about refugees. The Australian government, for example, changed its immigration policies in 1988 after realizing that those policies were out of synch with popular opinion. Australia addressed the public's concerns by changing its policies to select migrants who were seen as being fit for Australia's immediate and longer-term economic interests. "I think that catalyzed the major shift toward skilled migration which we've persisted with since," said Hawthorne, referring to Australia's current immigration policies. She also said that every time Australia's government has conducted a major review of those policies, it looked at how it can ensure better outcomes for its immigrants so that the public tolerance of an increasingly diverse population does not become problematic. "Certainly, in the past 15 years as the skilled migration program had a very positive story to tell about economic benefit, early employments, diminished welfare dependence, etc., the anti-migration lobby which had become very vociferous about 10 or 15 years back, has been muted," said Hawthorne.

Hunt noted that Quebec's pro-immigration policies are at least in part a response to public concern that Quebec's population is decreasing relative to Ontario's. Beach added that every survey conducted over the past 20 to 30 years has shown that the Canadian public in general is strongly supportive of immigration, at least at current levels. He attributed Canadian's attitude toward immigration as one that reflects the extent to which multiculturalism is valued and supported in Canada and not as a reaction to a fear that Canada will be overwhelmed by its much larger neighbor to the south. Hugo added that one factor that drives public opinion in Australia is the concern over the country's limited resources. Australia may be large, he said, but has only as much arable farmland as Iowa and Illinois. He explained that Australia has had quite sophisticated discussions about immigration and sustainability issues.

In Jean-Christophe Dumont's opinion, public attitudes about high-skilled migration in most OECD countries are mostly positive, with the United States being an exception. As a result, almost all OECD countries have routes for high-skilled migrants that are fairly open. Mayda agreed with Dumont and said that on average, people in Europe are in favor of policies that attract skilled migrants. However, there are some powerful groups that still oppose the arrival of skilled migrants and that have undue influence on immigration policies.

Turning to the subject of data and the need for data to develop evidence-based immigration policies, Merrill asked the panelists to identify the minimum data requirements needed to support evidence-based immigration policies. Hawthorne said that she would like to see more data regarding the mobility of temporary migrants and how policies that increase the number of temporary migrants impact the stability of the workforce, given that temporary migrants are the ones who are most likely to leave the country. Hugo said that evidence is important not just to sharpen policy but to combat myths that adversely impact public support for migrants. He said, too, that there need to be new ways of measuring migration that reflect the fact that migration is much different today than it was in the 1960s and 1970s, when many of the measures used today were developed. In particular, the migration models used for data collection today are strongly biased toward permanent immigration and do not capture enough of the non-permanent migration that is taking place and that is relevant to discussions about skilled migrants. He applauded the efforts of organizations such as the OECD that are making the best out of the data that are available, but he called upon the community to develop new approaches to data collection that would better reflect the actual patterns of migration that are occurring in today's global economy.

5

Competing for Students and Entrepreneurs

This panel session focused on the global competition for university students, entrepreneurs and STEM workers. The panel had three presenters. Lesleyanne Hawthorne, professor of International Workforce at the University of Melbourne, discussed the role that international students can play in meeting a country's needs for skilled migrants. She stressed the importance of language proficiency and ensuring that students obtain degrees in areas where jobs are in demand in order to ensure good employment outcomes for the study-migration pathway. Jean-Christophe Dumont, head of the International Migration Division in the Directorate for Employment, Labor, and Social Affairs at the Organisation for Economic Co-operation and Development (OECD), discussed differences in investor visa programs in OECD countries. Lindsay Lowell, director of Policy Studies at Georgetown University's Institute for the Study of International Migration, discussed the international competition for STEM workers. He showed that although the United States has remained the top destination for STEM workers, reduced funding for research and development may reduce the United States' attractiveness. An open discussion, moderated by workshop planning committee member Paula Stephan, professor of Economics at Georgia State University, followed the presentations.

DESIGNER IMMIGRANTS? INTERNATIONAL STUDENTS AS POTENTIAL SKILLED MIGRANTS

Lesleyanne Hawthorne's talk focused on study-migration pathways in which international students become skilled permanent workers in the country in which they are studying. When Australia opened its skilled migration pathway to international students, the country had approximately 150,000 foreign students enrolled in its universities. A decade after the new policy was implemented, there were 630,000 international students enrolled, making tertiary education Australia's fourth largest industry and the top industry for the state

of Victoria. Foreign students are an attractive target for many countries, which can be seen in the way countries have developed, prioritized, and facilitated pathways by which foreign students can both study abroad and remain in their host country after receiving their degrees. Students' young age, the fact that they are often self-financed and proficient in the host country's language at graduation, make them attractive candidates to fill immigration spots. In addition, on graduation international students are likely to be acculturated and have training that matches the professional requirements of local employers.

One of the key benefits of attracting and retaining international students is the long length of their future productivity. The length of future productivity is potentially quite long for international students, especially if they can avoid spending 3 to 5 years on retraining themselves to work in their field. Temporary labor migrants average between 35 to 45 years of age. Skilled migrants may be younger, although it depends on the selection mechanism. For example, Canada has been admitting migrants with ages into their 50s. Countries that have conflicted or ambiguous views about immigration are often more open to admitting students.

OECD countries have been fortunate to attract the majority of international students; the majority of those students have come from Asia. Typically, the policy measures that OECD countries have adopted over the past decade or so have had the effect of expanding the scale at which international students, and particularly STEM students, come to OECD countries, but also to become more flexible about students' right to work and their right to stay in the country after obtaining a degree and seek employment in their fields. According to Hawthorne, international students want this opportunity. In a 1995 survey of about 8,000 international students in Australia, Hawthorne and her colleagues found that up to 78 percent of foreign students had come to Australia hoping to remain there after graduation, even though Australia's policies at the time did not facilitate them remaining as migrants. The largest group of students who wanted to migrate at that time were from China, she added. The British Council student insight survey found that the option for migration was built into decisions about where to enroll in school, and the United Kingdom's decision to shrink its study-migration pathway is reducing international student enrollment in British universities.

A decade ago, some 2 million students were studying abroad, a number that has likely grown significantly in recent years. The United States pioneered the study-migration pathway to increase the number of PhDs in STEM fields, and Australia's study-migration programs began some 15 years ago. Australia's program has had substantial variation in the number of students in the program, and the country has now learned how it has to change the pathway to continue producing a more consistent number of skilled migrants.

Other countries have followed the path set by the United States and Australia. Canada introduced its Canadian Experience pathway 5 to 6 years ago, but the issue today is to determine how large it should be. New Zealand also liberalized this pathway and now one-third of the international students who graduate in New Zealand remain there, although the process in New Zealand has many steps: students study, have work rights while they study, go through a study-to-work transition period, and then a temporary work-to-permanent resident transition. Singapore has been recruiting Australia's international medical students in their final years of schooling. In particular, Singapore recruits Malaysian students who graduate from Australian medical schools.

Though most host countries assume that there are tangible benefits associated with boosting the numbers of international students, there have been remarkably few empirical, quantitative studies conducted to demonstrate and quantify those benefits. There has also been minimal research on former students' outcomes relative to migrants selected offshore and new domestic graduates. Researchers have recently investigated the value of international students in countries where there have been greatly expanded flows, such Malaysia and the Netherlands. Policy discussions include whether students are opportunists, if they are really backdoor migrants, or if they are "dumbing down" skilled migration pathways.

Within 5 years of Australia opening its study-migration pathway, the country was able to select over half of its skilled migrants onshore. The bulk of these hires were students with a Master's degree, and while in theory they were professionally qualified, many had gone into fields such as accounting and information technologies where they could add a lucrative two-year course on top of all sorts of other underlying degrees. From 2007-2011, this pattern changed. Vast numbers of international students were selected based on completing Bachelor's as well as Master's degrees. Their employment outcomes were excellent in fields with high demand (such as medicine, dentistry and pharmacy), but far weaker in fields which were over-supplied (such as business, IT, and accounting).

The scale of demand for entry into the study-migration pathway was large by the time Hawthorne and her colleagues were commissioned in 2006 to conduct a review of Australia's skilled migration program.[1] At the time of the study about one-third of all students from China who came to Australia migrated permanently and two-thirds of all students from India settled in Australia after graduation. Australia's immigration department told her that internation-

[1]Birrell, Bob, Lesleyanne Hawthorne, and Sue Richardson, Evaluation of the General Skilled Migration Categories, March 2006, Commonwealth of Australia Canberra. Available at www.flinders.edu.au/subs/niles-files/reports/GSM-2006_full_report.pdf [Accessed on November 23, 2015].

al students had a 99 percent chance of being selected as skilled migrants unless they failed a character or health test.

When Hawthorne and her colleagues conducted their study in 2006, they found that onshore former overseas students appeared to be doing quite well, with 83 percent of them employed in skilled positions within 6 months of graduating, about the same as for migrants selected from offshore, although there were differences based on the level of degree attained and field of study (Table 5-1). Surprisingly, migrants that arrived through the study-migration pathway whose language skills might lead to inferior labor market outcomes were actually doing well in Australia. For example, the employment rate for Chinese migrants selected onshore was 75 percent compared to 55 percent for those selected offshore. The same was true for migrants from other Asian countries, North Africa, and the Middle East. Indian migrants were doing very well regardless of whether they were selected onshore or offshore; fewer than 10 percent were unemployed. The same was true for students from English-speaking and European countries.

However, a key finding from this review was that despite their better outcomes in terms of employment, migrants selected via the study-migration pathway had salaries that were nearly $20,000 less than those of offshore arrivals. Also, study-migration pathway migrants reported lower job satisfaction than did their offshore compatriots and were less likely to be employed in their field of qualification.[2] These findings, said Hawthorne, catalyzed a great deal of policy investigation and refinement.

Additional analysis identified a few important issues such as language proficiency and a large increase in enrollments without a corresponding increase in the quality and quantity of professors. The first key problem was related to English proficiency. While in theory, most universities required a specific level of proficiency on the International English Language Testing System exam to enroll, in practice some 40 to 43 percent failed to meet the stated cutoff. “Clearly, there was some conflicted selection going in by very profit-driven training organizations,” said Hawthorne. A second issue was the skewing of enrollments, where business and commerce, followed by accounting, dominated the enrollments. There were very large enrollments at private colleges that had only minimum quality assurance. At the time of the study, the state of Victoria had only five quality assurance inspectors for the entire state. According to Hawthorne, nobody anticipated the explosion of international students or the number of private colleges that would be interested in guiding people through a skilled migration pathway.

[2] Ibid.

TABLE 5-1 Full-time Employment Outcomes by Fields and Qualification Level, Year after Course Completion

Full-Time Employment by Qualifications Field	Bachelors	Master's	PhD
Medicine:			
Domestic	99.7%	93.0%	91.8%
International	98.8%	46.2%	80.0%
Dentistry:			
Domestic	93.5%		93.9%
International	95.5%	*	60.0%
Pharmacy:			
Domestic	97.6%	93.5%	84.8%
International	96.1%	92.6%	64.3%
Nursing:			
Domestic	94.0%	95.2%	
International	66.2%	62.5%	*
Physiotherapy:			
Domestic	93.7%	93.4%	
International	66.7%	84.4%	*
Business and Commerce:			
Domestic	76.4%	91.5%	88.5%
International	39.7%	41.4%	68.2%
Accounting:			
Domestic	82.7%	83.3%	94.7%
International	35.2%	36.0%	66.7%
Information Technology:			
Domestic	78.0%	85.9%	77.2%
International	42.3%	38.6%	74.6%
Engineering:			
Domestic	86.4%	88.2%	86.7%
International	43.6%	37.6%	79.3%
Education:			
Domestic	76.0%	83.6%	92.0%
International	55.4%	42.1%	71.0%
Law:			
Domestic	83.9%	91.5%	84.9%
International	50.3%	41.2%	71.4%

Domestic compared to former international student residents in Australia (2009-2011).
Note: * = Omitted field, given minimal response rates.
SOURCE: Analysis of Graduate Destination Survey Data, 2007-2011.

Hawthorne recounted what she called her favorite story from the many interviews she conducted as part of this study. A college in Melbourne that had a large number of Indian and Chinese students was producing electrical linesmen when that occupation was removed from Australia's in-demand job list. Overnight, that college changed its course offerings and started producing chefs, but with the same staff, the same students, and no kitchen. Due to the shortage of quality assurance inspectors, it took long time for the immigration department to catch on to what this school had done. In response to the proliferation of for-profit institutions with dubious credentials and poor student employment outcomes, Australia fine-tuned its study-migration program.[3,4] The program now mandates higher language proficiency skills and allows fewer exemptions from testing. There was an improvement in quality assurance and removal of the poorly conceived migration incentives in the skilled occupation list, among others. The key changes involved greater reliance on employer or state sponsorship, increasing the number of points for greater English proficiency, and increasing the level of qualification needed for the study-migration pathway. The government also introduced a guaranteed right to stay and work after course completions for degree-qualified international students, with lengths of stay ranging from two years for those with Bachelor's degrees to four years for PhD qualifications, in order to give those migrants time to position themselves for sponsorship by gaining work experience or improving their English proficiency, for example.

Hawthorne said that the initial decline in international student enrollment was significant, with the private vocational sector experiencing the biggest drop as expected. "But being the intelligent people they are, international students did a global scan, realized there were still excellent study-migration pathways, and they recalibrated enrollment decisions so that they moved back into the university sector aligned with areas such as nursing that are constantly in demand," she explained. While it is too early to determine the full impact of the policy changes that occurred between 2009 and 2011, the salaries paid to onshore migrants and those who pass through the study-migration pathway were on par with each other.

To assess how employers regarded international students compared to domestic graduates in identical fields, Hawthorne and her colleagues analyzed data from 2007 to 2011 from Australia's Graduate Destination Survey and looked at fields where there was sustained demand, an over-supply of labor, variable

[3]Birrell, R., Healy, E., 2010. The February 2010 reforms and the international student industry, *People and Place,* 18(1):65-80.

[4]Koleth, E. 2009. Overseas students: immigration policy changes 1997–May 2010. Canberra: Australian Parliament, Department of Parliamentary Services. Available at http://www.aph.gov.au/binaries/library/pubs/bn/sp/overseasstudents.pdf [Accessed October 25, 2014].

demand, and modest demand. One key finding from this analysis was that employers prefer native or near-native speakers of English, regardless of whether they were domestic or international students. For both native Australians and international students with Bachelor's degree qualifications, there were "extraordinarily strong outcomes" in high-demand fields such as medicine, dentistry, and pharmacy. Hawthorne noted that international medical students and nurses are proving to be a huge asset in building Australia's medical workforce. However, for fields such as accounting, business, and information technologies, where there is a surplus of labor, international students are experiencing lower employment rates and lower salaries compared to native students. Outcomes for Master's degree qualified international students in over-subscribed fields were even worse (see Table 5-1), with non-native English speakers experiencing far higher unemployment rates than for Master's degree holders from English-speaking countries.

PhD holders, on the other hand, do well regardless of their country of origin, though there were some significant differences between employment rates for international and domestic students in certain fields, such as business and accounting and pharmacy. By the time they graduate, most PhD students have greater English proficiency and have been in Australia for at least 3 years. About a third of STEM skilled migrants are selected in Australia, both for temporary and permanent resident status.

The take-home lesson from the "Australian rollercoaster," as Hawthorne called it, is that it is essential to be vigilant about monitoring outcomes from a study-migration pathway. This pathway is attractive to students, employers, and the education industry. In addition, to make sure the employment outcomes of students are good, English proficiency is important and employers want graduates to obtain degrees in STEM courses at a very high level. While the bulk of employers preferentially select skilled migrants who are onshore, STEM employers are more judicious about taking the most talented, no matter whether they are onshore or offshore.

INVESTOR VISAS IN OECD COUNTRIES

Discussing recent trends in investor and entrepreneur visas in OECD countries, Jean-Christophe Dumont said that it is not always easy to delineate between these two programs because investor programs often have job creation requirements, which implies that the candidate has some entrepreneurial skills. In his opinion, investor visa programs are the more interesting of the two because these programs are an active area of policy activity in OECD countries and because the number of entrepreneur visas has been fairly small in most countries.

With the exception of the United States, most of the investor visa programs in OECD countries are fairly new or have recently undergone significant

changes. There is also an emerging interest in startup visas, with Chile being the first country to introduce such a program. Though small, the Chilean startup visa program is receiving a great deal of attention worldwide because Chile not only grants the visas but also provides a small amount of capital to use in starting a business, access to local business people, and access to a startup incubator. In 2013, Canada introduced a startup visa program and recently awarded its first two visas through this program.

Countries have diverse objectives for their investor visa programs, including economic transformation, job creation, regional development, productivity gains, creating links to international markets, and stimulating local housing markets. The existing programs can be grouped into four categories. One category aims to stimulate employment and innovation and includes programs in the United States, the Netherlands, Germany, France, Chile, and Canada. The underlying idea behind these programs is that investors bring funds and commit to creating jobs. France's program, for example, was introduced in 2009 and requires the visa holder to invest $10 million and to create at least 50 jobs. The U.S. AB-5 visa requires visa holders to invest $1 million, or $500,000 if the investment will be in a target employment area, and to create jobs. The Netherlands's program requires an investment of €1.2 million, with an additional points-based selection system that assesses business skills and a number of other priority traits. In this program, selection is not based solely on the amount of capital that the investor brings but also on the capacity to manage those funds in a way that creates economic benefits for the host country.

The second category is the investment capital visa, which requires the applicant to invest money in a specific fund that invests in a country's economy. This program provides no return on the investor's money. New Zealand, Australia, Britain, Ireland, Spain, and Korea have these programs. New Zealand's program has some flexibility regarding the amount to be invested depending on the investor's experience in running a business.

A third category is the donation visa, where migrants either donate a large sum of money or make a large purchase of sovereign bonds in exchange for a visa. Ireland, Spain, and Greece are examples of countries with this type of program. Spain requires a $2 million purchase of Spanish bonds to get a visa, while Greece requires a larger purchase of public debt for its visa.

The fourth category requires the investor to make a large investment in housing or other assets in exchange for a visa. Ireland, Spain, Portugal, and Greece have programs that require the investor to build a new house rather than buying an existing house. Greece also has a program in which a €100 million investment in the country procures a visa regardless of the investor's age or experience.

While most countries are constantly refining these programs, they are doing so with few systematic evaluations. The goal of all of these programs is to

provide economic benefits for the host country; however, because no country is collecting data, it is difficult to determine whether that is the case. Since each country's program is unique, cross-country comparisons are difficult. Dumont's research has looked at the large variation in the minimum required investment, as well as the number of years it takes for the investor to obtain permanent residence in the country.

The data show differences across countries, with larger investments generally yielding shorter times until permanent residence. Some programs are flexible, such as New Zealand's, which requires 1.5 million New Zealand Dollars with a residency requirement of 140 days over three years, or 10 million New Zealand Dollars with a residency requirement of only 44 days. Estonia requires a minimal investment but it must be accompanied by an approved business plan. The United States requires an investment of under $1 million but that investment must generate at least 10 qualified jobs over a 2-year period. France is notable because it requires the largest investment, but it still takes 10 years to gain permanent residence.

There can be a mismatch between migrants' and the destination countries' expectations of investor visas. Investors may be motivated to move to a safe destination country or they may be looking for better access to tertiary education for their children. It may be that getting a different passport provides a type of insurance that will allow the migrant to move around the world more easily and safely. Making an investment may be the path of least resistance to acquiring a visa, which means that migration is driving investment, not vice versa.

In closing, Dumont posed a number of policy issues that need to be addressed with these programs. There is the issue of public perception—is the program adding value or just selling residency and citizenship? There are selection problems because immigration officers may not be qualified to assess investment plans or to monitor their successful implementation. While the point of these programs is to produce some economic benefit for the country issuing the visa, it is hard to judge the success of these programs. It may not be cost-effective for countries to conduct any cost-benefit analysis of these visas given the small number of visas awarded. There are also other externalities, particularly in the EU where a permanent residence visa provides access to every member country. In the end, a major question is whether these individuals go through this channel because they see an investment opportunity or because it is the easiest way to gain residency.

COMPETING FOR FLOWS OF STUDENTS

Lindsay Lowell discussed the global competition for international students to fill high-skilled jobs. But, before discussing competition for students, he made

several points. First, when policy makers in the United States talk about high-skilled immigration, they really mean STEM workers with graduate degrees. Evidence suggests that the United States does not restrict the number of STEM workers with graduate degrees, given that the proportion of foreign-born STEM PhD holders has doubled (to 50 percent) in two decades and the proportion of master's degree holders has increased 30-40 percent in the same period of time. Increasing the number of STEM workers may not increase innovation, demand, and economic growth when the number of immigrants rises substantially.

In addition, while some other countries are competing for workers, large competitors, such as the United Kingdom and Singapore, are scaling back their programs. Competitive policies in Sweden and Norway, for example, attract a small number of the most qualified skilled migrants. According to a 2013 United Nations survey, most countries have expressed a desire to raise skilled immigration although the United States and Canada are not among those (Figure 5-1).

According to a number of criteria used to gauge the restrictiveness of a country's immigration policies, the United States' visa policies are relatively restrictive compared to other countries (Figure 5-2). Australia, for example, had less retrictive policies for attracting high-skilled migrants while Italy had the most restrictive policies. Many nations' policies have changed over the past decade. Although the United States does not have a particularly attractive policy regime for recruiting skilled migrants, skilled migrants still want to come to the United States.

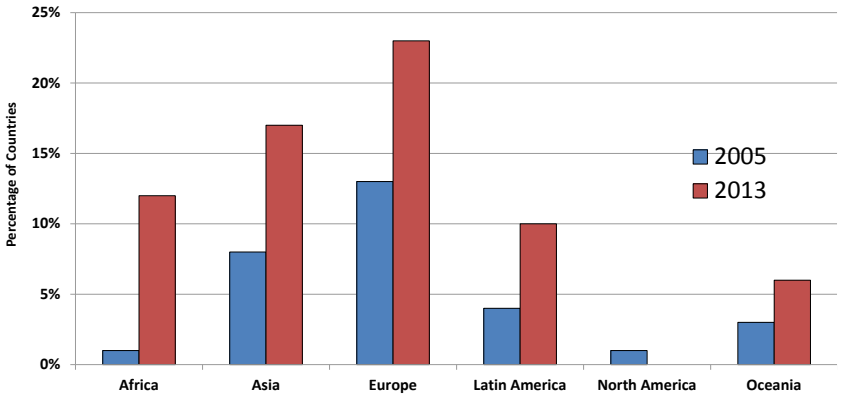

FIGURE 5-1 Percentage of nations reporting policies to raise highly skilled immigration. SOURCE: United Nations 2013, World Population Policies Report.

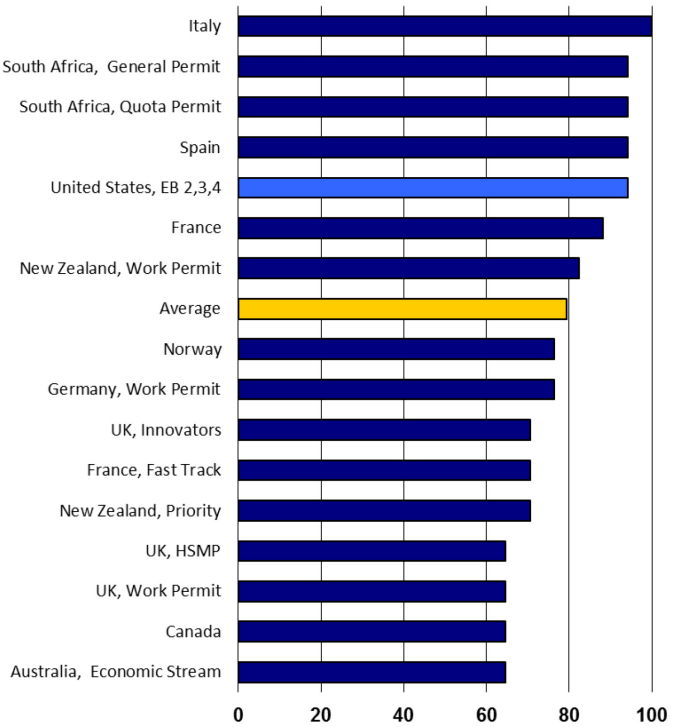

FIGURE 5-2 Ranking of the index of controlled and competitive permanent skilled worker programs, from most to least restrictive. Note: The criteria used to determine restrictiveness include: hard numerical caps, strict labor market test, extensive labor protections, enforcement mechanisms, limited employer portability, restriction on dependents/working spouse, and limited permanency rights. These criteria are converted into an index with the most "controlled" country given a value of 100. SOURCE: Policies and Regulations for Managing Skilled International Migration for Work, B. Lindsay Lowell, 2005.

Students are a major source of STEM workers, and international student enrollments in STEM subjects are increasing substantially. China and India are experiencing rapid growth in the production of STEM graduates, though quality is an issue. The U.S. share of international students has dropped from about one-quarter of all students to one-eighth, but the absolute number of enrollees has risen significantly, from 500,000 to over 800,000. "If we were to retain our share over an expanding enrollment of international students, the number of students in the United States would grow very rapidly. Do we have the capacity and can we deal with the issues that Australia dealt with?" asked Lowell, referring to the rise of low-quality diploma mills.

An analysis of OECD data on the enrollment patterns from 100 countries to the United States showed that as enrollments in tertiary education increase in a source country, the more migrants that country sends to the United States. This analysis also found that as tertiary enrollments in a different country increased, fewer migrants came to the United States. As an example, he noted that as the number of Indian students enrolling in U.K. institutions rose, the number of Indians coming to the United States fell. "So there is competition," said Lowell. "You can see it in the data."

Immigration policy is just one of a variety of factors that affects migration to the United States, but immigration policy seems to have only a marginal effect on the number of immigrants. For example, visa rejection rates have a fairly small relative impact on the number of students coming to the United States relative to differentials in economic growth. If immigration policy was an important component in determining which universities foreign students attend, the United States would not have received two-thirds of the world's college educated migrants in 1990 and 2000, and the United States would not be ranked first by a substantial margin in the number of all students and ranked third in the percentage of those students who were pursuing STEM degrees (Figure 5-3). After STEM fields, business was the most popular subject of study for international students in the United States during that period. The impact of a large number of business students may be substantial on growth, because it is often the business majors who take advantage of ideas and bring them to market, according to Lowell.

Another indication of how well the United States is competing for international STEM workers comes from data on the number of high-skilled foreign born workers in the 20 leading destination nations. From 1980 to 2010, the percentage of high-skilled migrants living in the United States relative to the other top destinations rose from 46 percent to 49 percent, even as the total number rose by more than four-fold. Similarly, data from the World Intellectual Property Organization showed that from 2001 to 2010, the flow of inventors around the world was dominated by flow into the United States,[5] while OECD data shows that the United States remains the main destination for international authors of scientific papers.[6]

[5]CDIP (Committee on Development and Intellectual Property). 2013. *Study on Intellectual Property and Brain Drain: A Mapping Exercise*. Geneva: World Intellectual Property Organization. Available at http://www.wipo.int/edocs/mdocs/mdocs/en/cdip_12/cdip_12_inf_4.pdf [Accessed October 25, 2014].

[6]OECD. 2013c. *OECD Science, Technology and Industry Scoreboard*. Paris, France: OECD Publishing. Available at http://www.oecd-ilibrary.org/science-and-technology/oecd-science-technology-and-industry-scoreboard-2013_sti_scoreboard-2013-en [Accessed October 25, 2014].

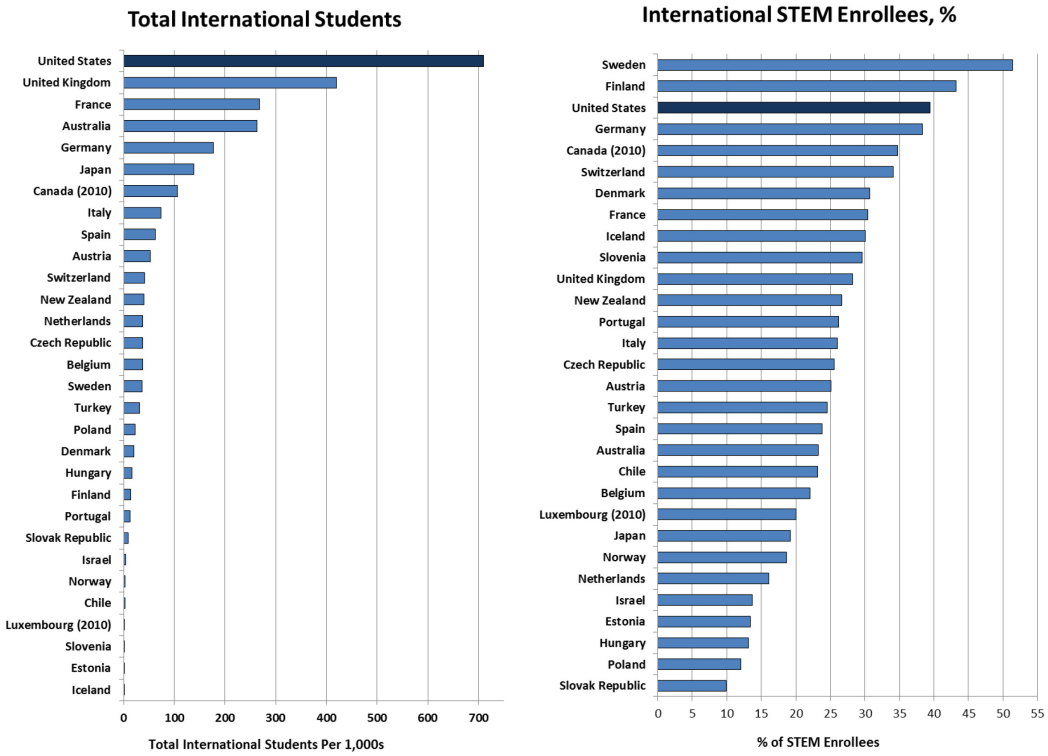

FIGURE 5-3 The number of international students in a given country in 2011 (left) and the percentage of international STEM enrollees in 2011 (right). SOURCE: OECD Science, Technology and Industry Scoreboard 2013; OECD calculations based on OECD (2013), Education at a Glance: OECD Indicators.

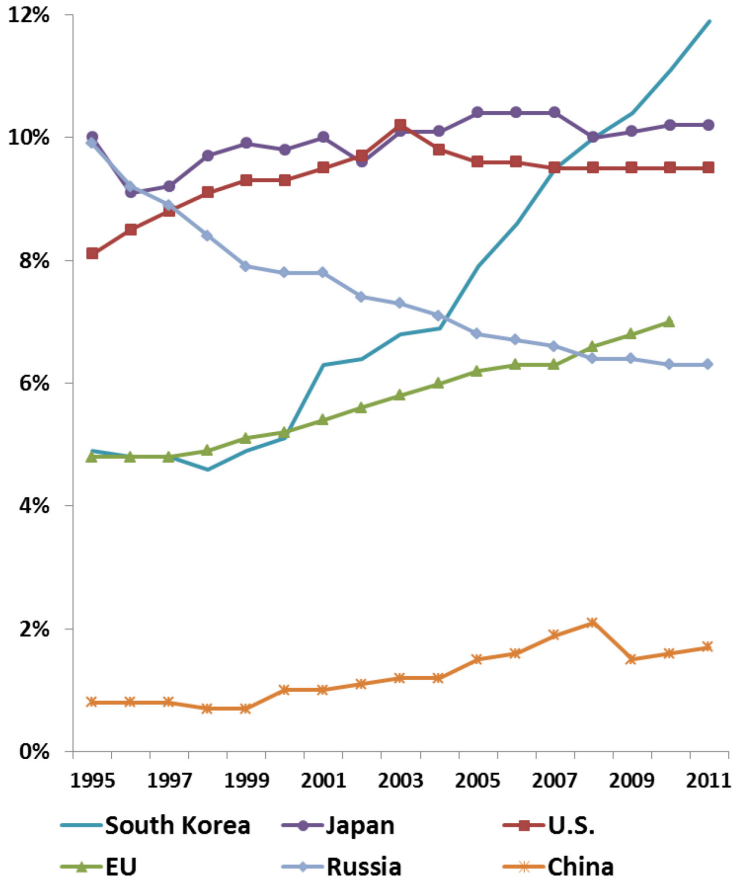

FIGURE 5-4 Researchers as a share of total employment in selected countries/regions: 1995-2011. Note: National Science Foundation, Science and Engineering Indicators 2013. SOURCE: OECD, Main Science and Technology Indicators (2013/14 and earlier years).

At present, the United States is the leading employer of researchers in terms of absolute numbers, and trails only South Korea and Japan in terms of researchers as a share of total employment (Figure 5-4). These are indicators, said Lowell, of the U.S. capacity to be competitive going forward. While wage growth in the United States for STEM workers has been fairly flat over the last 5 to 6 years, STEM wage growth in major competitor countries in Europe has not risen substantially faster over that same time period.

While the United States has done a good job of attracting a large number of immigrants, the evidence of its ability to select the best skilled migrants is

mixed. Looking at unemployment rates and employment rates of the highly skilled, the United States does better than most European countries. The United States also does well in terms of retention rates, another factor that would be important to a potential migrant. However, the share of foreign-born individuals in the United States who have gone to college is less than that of many other countries, which is a sign that the United States is not particularly selective in choosing which migrants get to work in the country. Ireland, Canada, Great Britain, and Norway, among others, are more selective than the United States in admitting migrants who are better educated than the native population, explained Lowell. In addition, migrants who come to the U.S. hold a much smaller percentage of U.S. patents than do immigrants to other countries, particularly for the top five percent of cited patents. Holders of H-1B visas, many of whom changed their status from student visa holders, earn 5 to 10 percent less than natives in the same jobs.

There appears to be a tradeoff between increasing the number of migrants from a particular country and the skill level of those immigrants. As the volume of emigrants from a country goes up, on average the proportion of professionals goes down. Similarly, every 10 percent increase in the number of H-1B visa holders is accompanied by a corresponding five percentage point drop in their relative earnings advantage. Also, as the number of foreign-born STEM workers has risen in the United States, the proportion of foreign-born Nobel Prize winners has fallen, perhaps due to globalization and a reduction in the selectivity of those who migrate. The biggest challenge for the United States to remain competitive for STEM workers going forward is the decline in research and development funding in the United States. The declining funding picture has led to a decline in potential earnings for STEM workers.

In summary, Lowell said that the global competition for high-skilled workers is not all about immigration policy and that the United States retains a competitive edge with its economy, universities, and job opportunities. The growing global supply of STEM workers means that today's competition is for the most talented individuals and that even small nations can and are competing. While immigration policy is not the only factor influencing this competition, it does have an impact and the United States needs to reform its policies in a way that favors neither a "fewer and harder" or "more and easier" approaches, but rather takes a "generous and targeted" approach in terms of numbers and selectivity.

DISCUSSION

Panel moderator Paula Stephan opened the discussion by noting that bringing in migrants as students avoids some, though not all, of the mismatch issues that Graeme Hugo discussed in the previous panel session. She also re-

marked that the United States has seen a huge influx in international self-financed Bachelor's degree candidates, in part because universities are increasingly relying on the tuition money from international students to fund their operations. The United States needs to be careful that it does not experience a corresponding growth in the types of problems seen in Australia discussed during Hawthorne's presentation. Universities can, however, play a role in selecting the most talented students.

Stephan also pointed out that the huge growth of PhDs bestowed in STEM fields did not come from the top U.S. universities but from institutions in the second and third tiers that expanded when federal funding for research was growing at a considerable rate. It is important to consider how a decline in federal funding will impact the attractiveness of U.S. institutions to the most talented students, given that one of the most important reasons that they want to come to the United States has been career opportunities.

Jennifer Hunt continued the discussion by asking Hawthorne if she could explain why it appears that so few skilled Indians are migrating to Australia. Hawthorne replied that India has been a huge source of skilled migrants for Australia for many years. Indian migrants have dominated the field of medicine for 30 years and engineering for the past 20 years, for example. Until Australia opened the study-migration pathway, there were few Indian students in Australia. Today, Indian students outnumber Chinese students.

Madeline Zavodny wondered if China's one-child policy is going to have an impact on migrants when their parents reach the age where they start depending on them for financial and emotional support. Hawthorne said that this is a very important issue and in Australia the impact is already being felt. She explained that under Australia's family reunification program, Chinese students started applying in large numbers to sponsor their parents for immigration almost as soon as the students became permanent residents.

In response to a question about immigration policies that might address the so-called "skills gap" for STEM workers who are not professors, Dumont said that assessment and recognition of qualifications prior to arrival plays an important role in this regard in both Germany and Australia. Given that degrees and technical qualifications are not always equivalent between countries, it is important to work with employers to educate them about the true value of diplomas and technical qualifications that international workers possess.

Stephen Merrill noted that the United States appears to be quite interested in various types of entrepreneurial visas, despite their well-documented issues, and asked Dumont if he anticipated that other OECD countries will have the same type of problems should these visas become more common. Dumont replied that the greatest difficulty with entrepreneur visas was assessing the likelihood of success for an entrepreneurial project. Banks have the capability to make that assessment but immigration officials do not, and as a result, the

tendency has been for countries to be fairly restrictive in issuing entrepreneur visas. Dumont said that many East European countries were granting entrepreneurial visas, but the misuse of these visas has been noted by other countries. The bottom line is that he does not expect the number of entrepreneurial visas to ever be high. Hawthorne then commented that in New Zealand, entrepreneurial visas holders have been purchasing property and inflating prices beyond the reach of locals. She also noted that when she looked at Australian data, many of the Chinese entrepreneurs entering the country had poor English skills and had difficulty finding a domestic manufacturing partner. As a final comment, Dumont added that OECD data show that while immigrants with entrepreneurial skills and business projects can be successful in developing businesses, the success rate of foreign-born entrepreneurs is less than that for native-born entrepreneurs.

6

The Effects of Immigration on Innovation and Labor Markets

This panel session discussed the impact of immigration on labor markets and innovative activity in a variety of different countries. Three speakers made presentations: Herbert Brücker, professor of Economics at the University of Bamberg and head of the Department for International Comparisons and European Integration at the Institute for Employment Research in Nuremburg, gave his perspective on how high-skilled migration can affect labor markets in Europe; Daniele Paserman, professor of Economics at Boston University, discussed the effects of high-skilled immigration on productivity and labor markets from Israel's experience; and William Kerr, professor of Business Administration at Harvard Business School, discussed the role of international migration on U.S. innovation. William Lincoln, assistant professor of International Economics at the Johns Hopkins School of Advanced International Studies, commented on the three presentations. An open discussion, moderated by planning committee member Ellen Dulberger, then followed.

HIGH-SKILLED MIGRATION AND IMPERFECT LABOR MARKETS

Herbert Brücker's presentation focused on European labor markets. Over the past decade, high-skilled migration has increased substantially in Europe, particularly in the United Kingdom, Germany, and the Scandinavian countries, and at a slightly lower rate in Italy and Spain. In Germany, the share of recent migrants with a university or equivalent degree has doubled in 10 years. Although high-skilled immigration has more public support than immigration of less-skilled individuals, there are widespread concerns that if left unchecked, high-skilled immigration could cause unemployment to increase and reduce wages of native-born workers in Germany.

Brücker's research examines the impact that high-skilled migration has on wages and employment in a setting with imperfect labor markets, using a cross-sectional approach that assumes that differences in the labor market and

workforce institutions affect how wages and employment respond to labor supply changes that accompany immigration.[1] His presentation focused on three countries: Denmark, Germany, and the U.K. as representatives of three different types of European welfare states (Table 6-1). Denmark represents the so-called Flexicurity model, which has moderate employment protection, extremely high union density, coverage of collective wage contracts and unemployment benefits, intermediate levels of product market regulation, and high trade exposure. Germany is an example of the Continental European model, which has with high employment protection, relatively low union density but high coverage of collective bargaining, relatively high unemployment benefits, high product market regulation, and high trade exposure. Great Britain and its Anglo-Saxon model, which is perhaps the most similar to the U.S. model, has low employment protection, moderate union density and low collective bargaining coverage, relatively low unemployment benefits, low product market regulation, and low trade exposure. In each of these three countries, collective wage bargaining in one way or another affects the way society overall and wages in particular respond to unemployment and labor supply shocks.

TABLE 6-1 Institutional Indicators for Denmark (DK), Germany (DE), and the United Kingdom (UK)

	DK	DE	U.K.
Employment Protection Index	1.50	2.12	0.75
Principal Bargaining Level	Industry	Industry	Firm
Collective Bargaining Coverage in %	82	63	35
Union Density in %	68	19	27
Minimum Wage	No	No	Yes
Net Income of Unemployed in % of Net Income of Employed Households			
Single, No Children	83	59	55
Married, Two Children	88	80	77
Product Market Regulation Index	1.06	1.33	0.84
Import Penetration in % of GDP	54	44	31
Export Propensity in % of GDP	50	46	29
Net Migration 1990-2010 in % of Pop	4.3	8.6	4.2

Source: OECD (2014), Venn (2009), WDI (2014).

[1]Brucker, H., Jahn, E.J., Hauptmann, A., Upward, R. 2014. Migration and Imperfect Labor Markets: Theory and Cross-country Evidence from Denmark, Germany, and the U.K., *European Economic Review*, 66:205-255.

Brücker's work examines the hypothesis that the impact of different migrant skill groups may vary across countries depending on these institutions. Most of the literature on how immigration affects wages and employment either ignores unemployment or assumes that labor supply is inelastic and that labor markets are perfect. Also lacking have been studies that consider wage and employment response to migration simultaneously in a joint framework. Brücker's theoretical approach has been to use a wage-setting framework that assumes that wages respond imperfectly to changes in the unemployment rate. In this framework, the conventional labor supply curve is replaced by a wage-setting curve. Consequently, wages can respond to "sticky" labor market shocks. He added that measuring the elasticity of the wage-setting curve can capture differences in institutions such as collective bargaining across countries. The demand side is derived from a traditional production framework.

The empirical framework that Brücker employs is to group the workforce by education, work experience, and the relative number of native and migrant workers using micro data collected by the governments of the three countries. One challenge is defining who is a high-skilled migrant, especially when using data from multiple countries. To harmonize categories, Brücker and his colleagues used characteristics such as years of schooling and degrees, and he noted that extensive testing showed these methods to be robust.

Once the labor force groups are in place, the first step in the analysis is to estimate wage-setting equations by assuming that wage-setting curves vary across education groups. Assuming that firms adjust employment once wages are fixed, Brücker's team then estimates a bundle of labor demand equations that yield the elasticities of substitution between natives and immigrants, work experience and education groups. In all of their estimates, they apply an instrumental variable approach to address the potential endogeneity of wages and employment. Putting all of these pieces together then enables Brücker and his colleagues to simulate the wage and employment response to migration.

Using this framework, Brücker found that elasticities differ across countries, with Britain having the most flexibility in setting wages for both natives and immigrants. More importantly, the analysis reveals different response patterns for the different skill groups. In the United Kingdom and Germany, the elasticity of the wage-setting curve is substantially higher in the high-skilled segment compared to the medium- and low-skilled groups, with the opposite holding true in Denmark—wage flexibility is lowest in the high-skilled group—which Brücker characterized as unusual. One explanation for the result in Denmark is that there is a large share of public sector employment filled by high-skilled workers, particularly women in the education sector. Another explanation may be that labor union density is higher in Denmark for high-skill individuals compared to other groups in the labor market, which could increase pay.

One interesting finding was that migrants and natives are imperfect substitutes for one another, which supports findings made by other researchers. Moreover, the small elasticity of substitution between natives and immigrants implies that the effects of high-skilled migration are concentrated on a very small labor-market segment. "So if the high-skilled segment of immigrants in the labor market is relatively small, and if you put a high-skilled shock on the labor market, and if you have a low elasticity of substitution, then you have a huge wage effect for high-skilled migrants in the labor market, and if you have a higher elasticity of substitution then it's more equally spread over the labor market," explained Brücker. He noted that the elasticities of substitution across experience and education groups display no country-specific patterns and are similar to those found in other studies.

With the calculated parameters in place, Brücker and his colleagues use these parameters to estimate a short-run scenario in which the physical capital stock is fixed and a long-run scenario with a fixed capital-to-output ratio. The short-run aggregate wage reduction in response to immigration is higher in the United Kingdom while the short-run aggregate unemployment rate increase is higher in Germany and Denmark. However, the degree of response depends critically on the elasticity of the capital stock. In the long run there are no wage effects because of adjustments in capital stock. Moreover, in the long run, high-skilled migration actually reduces the unemployment rate in Britain substantially, though it continues to increase the unemployment rate slightly in Denmark and Germany. In the long run, natives in all three countries benefit from high-skilled migration; earlier immigrants are the losers. In addition, compared to immigration at the average skill level of the labor force, high-skilled migration reduces the unemployment rate in Britain and Germany, but increases the unemployment rate in Denmark as a consequence of the low wage-flexibility in the high-skilled segment there.

Brücker noted that the aggregate impact of high-skilled migration is larger because of the large impact that these workers have on productivity of workers at all skill levels. More interesting, though, are the implications for native and immigrant workers. In the long-term, native workers in the United Kingdom benefit more from high-skilled migration than from average-skilled migration, while earlier immigrant workers in Britain lose more in terms of wages but less in terms of employment opportunities. In Germany, native workers benefit more from middle-skilled immigration than from high-skilled migration, while high-skilled migration mitigates the adverse impact on migrant workers. He explained the latter by explaining that in Germany, the average qualification level of the native workforce is higher than it is in the migrant workforce, so native German workers compete more with high-skilled migrants. The effects of high-skilled migration on native Danish workers of any skill level are ambiguous, but migrant workers re-

gardless of skill level lose more from high-skilled migration, both in terms of wages and employment opportunities.

"Our findings suggest that the labor market effects of high-skilled and other immigration depend on the responsiveness of wages to labor supply shocks and the elasticities of substitution between different groups in the labor market, and that the responsiveness of wages and the elasticities of substitution vary across countries, reflecting institutional differences," said Brücker in summarizing the results of these analyses. The results for the United Kingdom compared to those for Denmark and Germany suggest that higher wage flexibility increases the benefits of migration, at least over the long run. Moreover, as long as wage flexibility is higher in the high-skilled segments of the labor market, high-skilled immigration can reduce unemployment (in the best scenario) or have less of a negative impact on employment (in the worst scenario) compared to medium- and low-skilled immigration. Denmark's results are likely to be the exception rather than the rule, Brücker added.

In addition, these analyses showed that native workers do benefit from immigration as long as the elasticity of substitution between immigrants and natives is low and the skill-structure of immigrants is different from the native population. Brücker pointed out that the total gains from immigration can be enhanced and inequality reduced by developing labor market policies that attempt to increase wage flexibility, through immigration policies that target immigrants in flexible labor market segments, and by integrating policies that attempt to increase the elasticity of substitution between native and foreign workers. Overall, high-skilled immigration increases the total welfare of a country if wage flexibility is high in the high-skilled segment.

In closing, Brücker noted that this analysis has limitations, the primary one being that it is limited to three European countries; therefore, it is mere speculation to think about its implications for the United States. Assuming that the United States is more similar to the United Kingdom than to Germany and Denmark, it is likely high-skilled immigration reduces unemployment in the United States. If high-skilled immigrants increase innovation and productivity in their adopted country, all workers benefit.

THE ISRAELI EXPERIENCE WITH HIGH-SKILLED MIGRATION

According to Daniele Paserman, Israel is often known as the "startup nation" because it has outpaced every industrialized country in terms of venture capital investments per capita. Israel outranks every country except for the United States and China in terms of the highest number of companies listed on the NASDAQ stock exchange, another measure of entrepreneurial ability. The

authors of the best-selling book *Start-up Nation*[2] credit immigration as one of the two major factors that have contributed the most to Israel's economic growth.

That Israel is a nation of immigrants is clear in terms of both absolute and relative numbers (Figure 6-1). At various times in its history, Israel has taken in waves of immigrants, starting with the country's founding in 1948 through the huge wave of immigrants from the former Soviet Union following the collapse of the Berlin Wall. Around 200,000 immigrants entered the Israel between 1990 and 1991, followed by several successive years in which immigration numbers were approximately 60,000 to 70,000 per year. In relative terms, the 1990-1991 immigration wave alone accounted for 3.5 to 4 percent of Israel's entire population, and immigration over the 1990s increased Israel's population by about 20 percent overall, a level of immigration that Paserman said was comparable only to the mass migration to the United States that occurred at the turn of the 20th century.

One unique aspect of the immigration wave of the 1990s is the immigrants' high level of education compared to that of those who were already living in Israel (Figure 6-2). In the 1990s, about 12 percent of native-born Israelis had a college degree, while over 30 percent of the post-1990 immigrants had a college degree. "This was an overwhelmingly highly skilled group of migrants," said Paserman, who added that Israel's gross domestic product has grown at an average of 4.6 percent per year since the 1990s, compared to 2 percent per year in the United States.

In contrast to most countries, Israel has an almost completely open immigration policy. The Israeli Law of Return guarantees that anyone who is Jewish is free to immigrate to the country and become a citizen immediately, with Jewish defined as having one grandparent who is Jewish. Moreover, new immigrants receive generous subsidies including a cash allowance for 6 months, incentives such as rent or mortgage subsidies, access to free intensive Hebrew classes, and even tax benefits and tuition breaks. Scientists receive additional benefits, including job counseling and enrollment in an employer-employee matching program. Employers receive subsidies up to $46,000 over a 3-year period for hiring immigrant scientists or PhD researchers. These benefits apply to returning Israelis as well. "Many of these benefits are also designed to encourage return migration," said Paserman.

Many of these policies were already in place in the 1990s and they probably contributed at the margins to the huge wave of immigration that took place during that decade. The main driving force, though, was the collapse of

[2]Senor, Dan., S. Singer. 2009. Start-up Nation: The Story of Israel's Economic Miracle. New York, NY: Hachette Book Group.

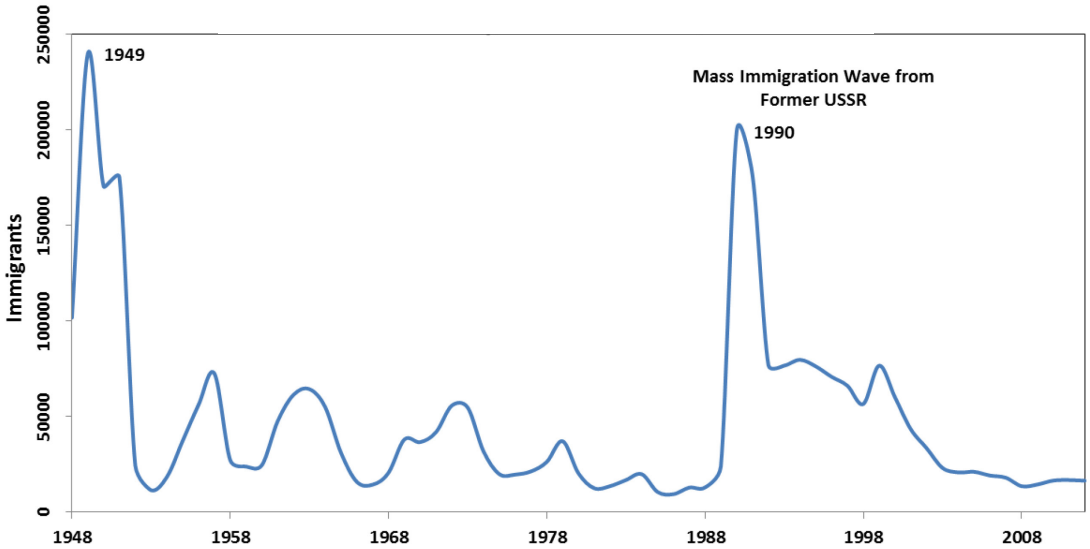

FIGURE 6-1 Immigration to Israel in absolute numbers, 1948-2012. SOURCE: Israel Central Bureau of Statistics.

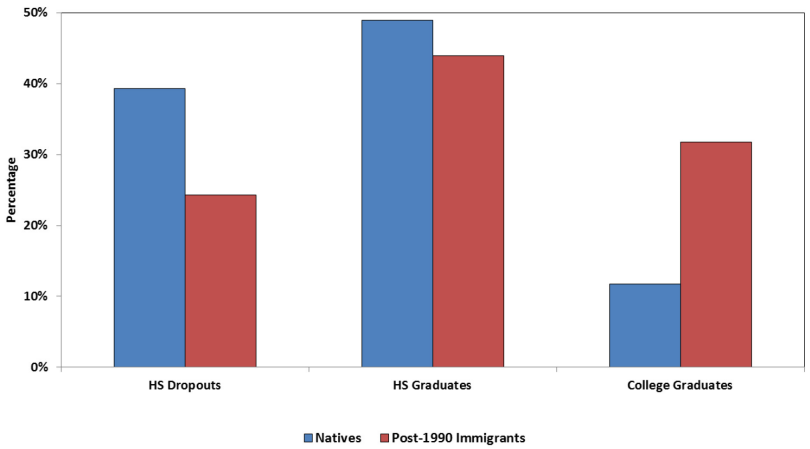

FIGURE 6-2 Educational attainment in Israel by immigrant status. SOURCE: Israel Central Bureau of Statistics.

the Soviet Union and the uncertain economic prospects and security situation in Russia. As the 1990s progressed, immigrants became less skilled, and when Israel's internal security situation began to deteriorate in 2000 while Russia's economy was improving, migration from the former Soviet Union largely came to a halt. "So I think it is interesting to look at these policies, but we shouldn't exaggerate the role that these policies have in attracting immigration," said Paserman.

Focusing on the 1990s mass migration episode, Paserman then discussed how this influx was absorbed into the Israeli economy and its effects on the labor market and productivity in manufacturing. Not surprisingly, many of the immigrants struggled to find jobs that were commensurate with their skills. One survey of Soviet immigrants that oversampled engineers found that while 84 percent of the survey sample had worked as engineers in the former Soviet Union, only 11 percent of these individuals were employed in high-skill occupations within the first year of arrival in Israel, and only 36 percent were employed in high-skill occupations 5 years later.[3] Paserman noted that natives with college degrees are overwhelmingly employed as scientists or in other white collar jobs, whereas the 1990s immigrants mainly worked in blue collar jobs.

The immigration wave of the 1990s was associated with a short-term drop in the wages of native workers in occupations with high concentrations of immigrants: a 10 percent increase in immigrant share was associated with a 3

[3]Weiss, Y., R. M. Sauer, and M. Gotlibovski. 2003. Immigration, search, and loss of skill, *Journal of Labor Economics*, 21(3):557-592.

percent drop in native wages, though the effect dissipated after five to ten years.[4] There is some debate, however, about the nature of this relationship, with some scholars arguing that there was no casual effect of immigration on native wages.[5] Output per employee in the manufacturing sector, which employed a disproportionate share of immigrants, far outpaced that for the rest of the private sector in Israel following the start of the 1990s immigration wave. This growth in output, he added, was driven largely by medium-high and high-tech industries (Figure 6-3). Again, he noted, there is a debate as to whether immigration was the cause of this increase in productivity, particularly given that manufacturing productivity was increasing elsewhere in the world during this same period. U.S. manufacturing productivity growth, for example, jumped from 2.8 percent in the 1980s to 4.7 percent in the 1990s.

Immigrants took jobs across a wide range of industries, and as the decade progressed, they shifted more toward high-tech industries in a manner that correlates to some extent with the growth of the electronic components industry in Israel. In 1993, 93 percent of the immigrants were employed as production workers, and while 13 percent of Israel's total workforce was comprised of immigrants, only 7.4 percent of Israel's scientists were recent immigrants. By 1997, that gap had closed, with the share of immigrants working as scientists within the manufacturing sector mirroring their proportion of the total population, and the percentage of recent immigrants employed as production workers falling to 81 percent.

Despite the macroeconomic impact of immigration on productivity, there was no evidence that immigrant concentration is correlated with productivity at the individual firm level. "The bottom line is that if you regress output per worker or total factor productivity or other measures of productivity against the share of immigrants in a firm or an industry, you typically find zero effects," said Paserman, who added that if anything, there might be a slightly negative correlation driven by the presence of immigrants in low-tech industries. These results are robust to different measures of productivity. One explanation is that high-skilled immigrants were largely employed in low-skilled jobs thus there would be no reason to expect a larger share of immigrants to lead to higher productivity. Another possible explanation is that cultural and language barriers impede assimilation. Finally, Paserman said that there are some general lessons to be learned from Israel's experience. One is that cultural, language,

[4]Cohen-Goldner, Sarit and Paserman, M. Daniele. 2011. The dynamic impact of immigration on natives' labor market outcomes: Evidence from Israel. *European Economic Review*, 55(8):1027-1045.

[5]Friedberg, Rachel. 2001. The impact of mass migration on the Israeli labor market, *The Quarterly Journal of Economics,* 116(4):1373-1408.

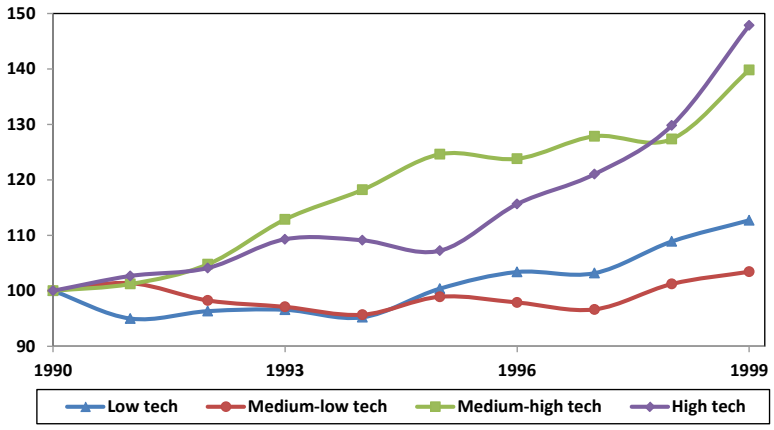

FIGURE 6-3 Manufacturing output per worker by tech sector from 1990-1999 (1990=100). SOURCE: Paserman, *IZA Journal of Migration* 2013 2:6.

and professional barriers are real challenges for immigrants. Another is that not all human capital is transferable. Immigrants are not always more driven, ambitious, and successful than the native population. As the number of immigrants increase, the probability of getting the most talented individuals decreases.

IMMIGRATION AND U.S. INNOVATION

The United States is a land of immigrants, though perhaps not to the same extent that Israel has become over the past 60-plus years, said William Kerr. Nonetheless, legal immigrants made up 16 percent of the U.S. workforce in 2008 and have accounted for 29 percent of the growth of the U.S. workforce since 1995. This is particularly true in STEM fields. The 2010 U.S. census found that 25 percent of the Bachelor's degree holders in STEM occupations are foreign born, as were just under half of all PhD holders. Moreover, his calculations show that immigrants account for two-thirds of the growth in the number of all employees in STEM occupations since 1995.[6]

One measure of the role of immigrants in U.S. innovation is the percentage of patents granted using ethnic-name techniques, an educated guess about an inventor's nationality based on the ethnicity of that person's last name.[7,8] In

[6]Kerr, William. 2007. "The Ethnic Composition of U.S. Inventors," HBS Working Paper 08-006.

[7]Ibid.

[8]Kerr, William and W. Lincoln. 2010. The supply side of innovation: H-1B visa reforms and U.S. ethnic invention, *Journal of Labor Economics* 28(3):473-508.

1975, 80 percent of patent holders living in the United States had Anglo Saxon last names, with individuals with Chinese, Indian, Hispanic, Russian, and other Asian surnames each accounting for fewer than two percent of patent holders at the time (Figure 6-4). Over the past 30 years, the share of patent holders with Anglo Saxon names fell by 10 to 13 percentage points relative to 1975, with a dramatic increase in patent holders with Chinese and Indian surnames, as well as increases in most other non-Anglo Saxon and non-European categories. These trends are also found in the patent application data.

These data do not provide a direct snapshot of immigration's impact on innovation because it is impossible to say if someone with an ethnic surname is a first generation or fourth generation American. However, census data show that the share of individuals with ethnic surnames that are first generation immigrants is large. In addition, using data from a variety of sources, including surveys of Silicon Valley firms, fast-growing companies, and recent initial public offerings, Kerr estimates that immigrants have accounted for about 25 percent of the innovation activity in the U.S. economy.

Kerr also discussed the contradictory evidence about productivity of immigrants. On the one hand, he noted Paula Stephan's work showing that immigrants make up a disproportionate share of U.S. highly cited authors, members of the National Academies of Sciences, Engineering, and Medicine, and holders of top-ranked patents. He also noted Lindsay Lowell's earlier comment that while the number of immigrants who have won these awards has declined, immigrants still represent a disproportionate share of these high-impact measures. According to Jennifer Hunt's work, education level and field of study explain why immigrants perform better than the typical native in terms of patenting, entrepreneurship, and other outcome variables. Kerr also acknowledged that immigrants are more likely to patent, publish scientific papers, and start new companies. After controlling for differences in education level and the field of study, however, most of the differences between immigrants and natives go away, although immigrants are more likely than native-born inventors to hold patents. Any difference in patenting or innovative activity between the immigrant and native-born population may be due to differences in quality or the number of students attracted to PhD programs. The quality of immigrants may be higher than natives enrolling in PhD programs, and there are some "superstar" researchers who attract clusters of immigrant students. Kerr also noted immigrants and natives who obtain a master's degree in electrical engineering appear to have similar abilities as far as producing innovations, so the immigrants' observed advantage comes from their being more likely to pursue that degree in the first place.[9]

[9]Hunt, J. 2011. Which Immigrants are most innovative and entrepreneurial? Distinctions by entry visa, *Journal of Labor Economics,* 29(3):417-457.

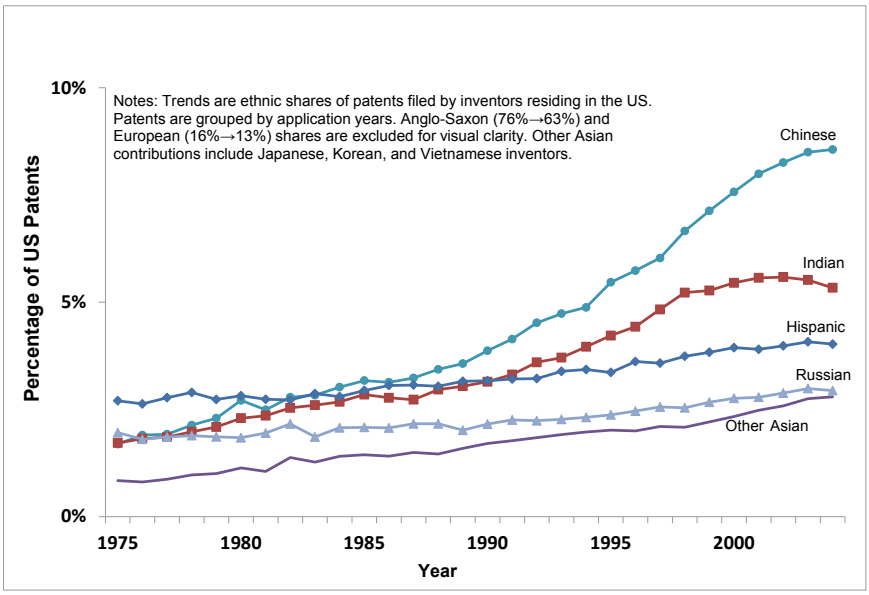

FIGURE 6-4 The percentage of U.S. patents granted to U.S. residents with ethnic surnames. SOURCE: Kerr and Lincoln, 2010.

Superstars aside, what will be the impact of high-skilled immigrants on native U.S. workers? According to Kerr, if the quality of the individuals is the same and if they make the same investments in education, the overall impact will depend on quantity and whether the number of immigrants entering a particular STEM field crowd out natives. An increase in the number of immigrants entering a given field may cause the labor supply curve to shift out and lead to lower salaries. However, if innovation and productivity increases, the result may not hold. Studies have shown that cities that have more H-1B visa holders experience increases in productivity above the national average and natives are not crowded out of occupations held by H-1B visa holders.

On the other hand, studies of specific occupations have more varied results. One study looking at the impact of the large number of Russian mathematicians who came to the United States in the 1990s found that there was a negative impact on the number of natives employed in mathematics jobs.[10] Some studies have shown that native students specialize in other educational areas if

[10]Borjas, G., and K. Doran. 2012. The collapse of the Soviet Union and the productivity of American mathematicians, *Quarterly Journal of Economics* 127(3):1143-1203.

immigrants are competing for jobs.[11,12] However, a study of immigrant chemical engineers who fled Nazi Germany found many positive effects related to the growth of the chemical industry that occurred along with that large influx.[13] Kerr also noted that he has failed to find any evidence that there is a "crowding in" effect with respect to the majors that students choose, that is, having a large number of foreign students enrolling in specific majors is not triggering an influx of native students into those majors.

There are several important research questions that focus on the impact of immigrants on U.S. native workers. One question is how well local labor markets model the decisions that firms make with regard to high-skilled migrants given that individuals can move within a country as well as between countries. Is Microsoft's labor market Seattle, the entire United States, or the world? Another question concerns the role of growth and whether there are opportunities for growth that can enable companies to hire immigrants and then build complementary resources around them. In the case of the wave of Russian mathematicians, many of them were hired by universities that were constrained in terms of further growth, which had the result of limiting opportunities for native-born mathematicians.

While much of the discussion around immigration policies looks at the issues at a national or regional level, choices regarding who gets an H-1B visa are made by individual firms, and the visas are granted on a first-come, first-served basis with a regulated cap. As a result, debates about immigration policy in the United States need to be informed by how companies are using this program and how they view immigrants in the context of all of the hires they need to make. Global firms can hire some of their workers outside of the United States without using one of the limited numbers of H-1B visas.

The economics of firms can dramatically shape the structure of U.S. immigration. Kerr noted that the H-1B program's composition is dependent on firm demand. There are large fluctuations in H-1B visas going to workers from India and to computer-related workers in general since 1995. These fluctua-

[11]Lowell, B. L., and H. Salzman. 2007. Into the Eye of the Storm: Assessing the Evidence on Science and Engineering Education, Quality, and Workforce Demand. Urban Institute Working Paper. Available at http://files.eric.ed.gov/fulltext/ED498867.pdf [Accessed October 28, 2014].

[12]Orrenius, P., and M. Zavodny. 2013. Does immigrations affect whether U.S. natives major in science and engineering? *Journal of Labor Economics*, 33(S1):S79-S108. Available at www.jstor.org/stable/10.1086/676660?seq=1#page_scan_tab_contents [Accessed December 16, 2015].

[13]Moser, P., A. Voena, and F. Waldinger. 2014. German-Jewish Emigres and U.S. Invention. *National Bureau of Economic Research Working Paper* 19962. Available at www.nber.org/papers/w19962.pdf [Accessed December 17, 2015].

tions follow the booms and busts in the information technology sector and reflect demands at the corporate level. Temporal shifts in firm and industry demands affect as much as 30 percent of the visa allocation in terms of country of origin and occupation. A system that allocates visas on a first-come, first-served basis without restrictions regarding the composition of visas to be distributed will always possess this characteristic.

A high-skilled immigration policy needs to be developed within the larger dynamics of the firm and take into consideration how these firms fill their occupational needs. Kerr's recent work has found that firms that are hiring high-skilled migrants are simultaneously expanding and creating opportunities for complementary workers.

COMMENTS ON THE PRESENTATIONS

William Lincoln started the discussion by complimenting Paserman on the approach he had taken to examine the correlation between high-skilled immigration and productivity at either the firm or industry level. He suggested that Paserman dig deeper to gain a better understanding as to why there was not much of an effect on productivity at the micro level. It may be possible to look at firm creation or economic output, depending on data availability. Another potential avenue of research on the effects of immigration at the firm level might be to look at reallocation effects, that is, the effects of changes in market shares across firms resulting from immigration. Overall, the effects of immigration at the firm level have not been widely studied yet.

Lincoln then commended Brücker for his work looking at the role that institutions play in immigration. Of particular interest were Brücker's findings that higher wage flexibility increases the benefits from immigration, and the overall benefits of high-skilled immigration increase with how well immigrants assimilate and can compete with natives of similar backgrounds. These findings are important to maximize the effectiveness of immigration policy, perhaps by encouraging assimilation of immigrants. Brücker might consider looking at the effects of assimilation by country of origin given that assimilation is likely to be different across different countries of origin. Brücker should also consider building potential productivity effects from immigration into his models.

Kerr's presentation pointed out that institutional differences can significantly affect immigration's impact on labor markets. In settings where there are constraints to growth, as is arguably the case in academia, immigration might lead to more displacement rather than additional innovation or growth. A needed area of research is to look more closely at the factors in the institutional environment correlated with higher growth and to determine the factors

encouraging displacement of native workers. For example, why did universities hire fewer native mathematicians following an influx of Russian mathematicians rather than hire fewer English literature scholars?

DISCUSSION

Panel moderator Ellen Dulberger started the discussion by asking the panelists if the degree to which a country participates openly in global trade has an impact on the elasticity of wages and its ability to attract immigrants. Lincoln responded that research has shown that more immigration leads to a greater amount of trade and vice versa, and that trade and immigration policies could be more closely intertwined. He added that the link between trade and innovation is something that researchers are exploring now.

Brücker said that a country's openness to global trade certainly has an impact on immigration, and he added that traditional models that treat local labor markets as small economies that do not trade are "certainly wrong." He also noted that research shows that a higher level of product-market competition in international markets contributes to an increase in wage elasticity. "It may also spread effects on wages and on labor markets in a way that is relatively similar to the impacts we have at the aggregate level if the capital stock adjusts," said Brücker. "If the capital stock adjusts, a large part of these effects at the aggregate level disappears, and the same is true for trade." What he and his colleagues have observed in Germany, and which he believes holds true for many other countries with a strong export position, is that being an exporter attracts migrants through what might be thought of as an advertising effect. For example, exporting automobiles is a good promotional campaign to attract migrants to the exporting country.

Paserman said that one area that needs more in-depth study is the role that large multinational firms using immigration to staff their various locations play in immigration patterns. He and a colleague have been looking at the foreign-directed investment decisions that U.S. multinational corporations are making in relationship to their U.S. STEM workforce. What they have found is very tight connections between the countries from which they draw migrant STEM workers to the United States and the direct investments in research and development that they make in those countries.

A member of the audience from the OECD asked if there was some way to factor nonlinearity into studies looking at the connection between immigration and innovation so that these studies could provide answers to policy makers that go beyond, "Yes, immigration is good. Let as many people in as possible," and "No, immigration is bad and it should go to zero." Paserman said that Brücker's structural models are headed in that direction because they provide the ability to extrapolate from current data to ask what will happen to innova-

tion as the level of immigration is increased or decreased. Brücker added that his model will only be good for looking at marginal effects of changing immigration numbers, not big shocks. Lincoln said that he believes that most of the work being done today examines various pieces of the immigration and innovation picture, but when taken as a whole they can provide a broader picture of what the costs and benefits will be.

Neil Ruiz, from the Brookings Institution, asked Lincoln how immigrant mobility is tied to innovation and whether there is more demand for temporary client-based work that serves an overarching factor in total demand. Lincoln replied that his research has found that innovation in the United States tends to cluster regionally around where an initial innovation occurs. As an example, he said that if the world's best mousetrap had been invented in a particular city, much of the subsequent innovation in mousetrap design will be in that same city. Immigrants are an important factor in driving that clustering phenomenon. In terms of immigrant mobility, Lincoln said that what he has found is that immigrants are flexible about where they first settle in the United States, but they are subsequently no more mobile than natives.

Philip Webre, from the Congressional Budget Office, asked if companies can bank H-1B applications, that is, can they apply for an H-1B visa without having identified a specific individual to hire. Jennifer Hunt responded that an H-1B visa application is person-specific, and Kerr added that in some cases, multiple firms may apply for an H-1B visa for the same individual. Webre also asked Kerr if he had any insights about why some companies eventually sponsor their H-1B visa holders for permanent residence status and others do not. Kerr replied that he did not.

An audience member asked whether any research has been conducted looking at the connection between gross expenditures on research and development as a percentage of gross domestic product and immigration, or between the existence of intellectual property rights and immigration. Lincoln replied that these would be fruitful areas of research.

Another audience member then asked Paserman if he could comment on how Israel handled the huge influx of Soviet immigrants and if Israel is seen as a natural destination for displaced people trying to find a safe haven in the world. Paserman said that the reaction of Israelis to the influx of Russian immigrants was to see it as almost a miracle that so many Jews would be free to leave the Soviet Union and come to Israel. On a more personal level, there were conflicts in areas where there was competition for jobs or where Israeli professionals felt that there Russian colleagues were not as competent or well-trained as their degrees or experience would indicate. In terms of Israel being seen as a safe haven for refugees, Paserman said that the large influx of migrants from Africa, particularly from Sudan and other war-affected countries, has not been as well-received by Israelis. Reaction has been more along the

lines of how Americans view illegal immigrants from Mexico or how Europeans react to workers from North Africa. He added that it is not a matter of Israeli policy to admit refugees from Syria or Iraq.

Dulberger noted that the workshop presented a great deal of evidence about the mixed impacts of high-skilled immigration. She also noted that the data show that there has been limited success in various countries' abilities to absorb high skilled immigrants into the professions of their first choice and in which they have been trained. That observation, she said, suggests that there may be an opportunity, especially with widening availability of information and data from around the world, to do a better job of matching immigrants' skills with job opportunities.

7

Policy Implications for High-Skilled Immigration

The workshop's final panel session featured an open discussion moderated by planning committee member Edward Alden, the Bernard L. Schwartz Senior Fellow at the Council on Foreign Relations. The five panelists participating in this discussion were Felicia Escobar, special assistant to the (U.S.) President on Immigration at the White House; William Kamela, senior federal policy lead for Workforce Readiness and Immigration at Microsoft Corporation; Pia Orrenius, vice president and senior economist at the Federal Reserve Bank of Dallas; Madeleine Sumption, director of research at the Migration Policy Institute,[1] and Michael Teitelbaum, senior research associate for the Labor and Worklife Program at Harvard University. The goal of this panel discussion was to identify policy lessons that can be drawn from the research that had been presented and discussed over the course of the workshop.

Before starting the discussion, Alden noted that efforts to pass comprehensive immigration reform had died in the U.S. House of Representatives after making it through the U.S. Senate. This Senate bill would have made some fairly significant changes to U.S. law on high-skilled immigration and it would have been the first time since 1990 that the nation made changes to its policy on skilled immigration. Commenting on the failed bill, Alden said, "It is a little hard to know where we stand now. If we had done this conference 6 months ago, we would all be debating those proposals. Now we are probably going to talk more about what is the power of the President? What can be done under executive order? Are there ways to re-think this going forward?" (Box 7-1).

PANEL DISCUSSION

Michael Teitelbaum noted that several of the presenters mentioned the tensions that are inherent in balancing family versus economic contributions

[1]At the time of this workshop, Madeleine Sumption was Director of the Migration Policy Institute. She has since moved on to become Director of the Migration Observatory.

BOX 7-1 Recent Executive Actions

On November 20, 2014, the President announced a series of executive actions on immigration. While most of those actions are not targeted towards high-skilled immigrants, the Department of Homeland Security will be issuing a series of rules and regulations geared toward improving access to visas for inventors, researchers, and founders of start-up businesses. Specifically, the Department of Homeland Security, U.S. Citizenship and Immigration Services was ordered to:

- Work with the State Department Work with the Department of State to develop a method to allocate immigrant visas to ensure that all immigrant visas authorized by Congress are issued to eligible individuals when there is sufficient demand for such visas;
- Work with the Department of State to modify the Visa Bulletin system to more simply and reliably make determinations of visa availability;
- Provide clarity on adjustment portability to remove unnecessary restrictions on natural career progression and general job mobility to provide relief to workers facing lengthy adjustment delays;
- Clarify the standard by which a national interest waiver may be granted to foreign inventors, researchers and founders of start-up enterprises to benefit the U.S economy;
- Authorize parole, on a case-by-case basis, to eligible inventors, researchers and founders of start-up enterprises who may not yet qualify for a national interest waiver, but who:
  - Have been awarded substantial U.S. investor financing; or
  - Otherwise hold the promise of innovation and job creation through the development of new technologies or the pursuit of cutting-edge research.
- Finalize a rule to provide work authorization to the spouses of certain H-1B visa holders who are on the path to lawful permanent resident status. This rule was finalized on February 24, 2015. It has been in effect since May 26, 2015.
- Work with Immigration and Customs Enforcement (ICE) to develop regulations for notice and comment to expand and extend the use of optional practical training (OPT) for foreign students, consistent with existing law.
- Provide clear, consolidated guidance on the meaning of "specialized knowledge" to bring greater clarity and integrity to the L-1B program, improve consistency in adjudications, and enhance companies' confidence in the program.

Source: U.S. Citizenship and Immigration Services, Executive Actions on Immigration, http://www.uscis.gov/immigrationaction#4.

when considering immigration policy. In particular, he recounted the observations that economic migrants do better, in general, economically, although family migrants may integrate better. Countries paid less attention than expected to the possible interactions between skilled migration and education

and employment decisions of native-born students. He was also surprised by how strong the findings were on the importance of language fluency for economic success in Canada.

In terms of policy comparisons, he noted that Canada and Australia have chosen markedly different policies with regard to allocation between economic and family visas than the United States. Based on the experiences of these countries, his conclusion was that U.S. system allocates too small a share of its total permanent immigration quota to meet economic and employment needs. While U.S. policy on temporary migration compensates in part for this imbalance, Teitelbaum noted that the U.S. system as a whole is not very well balanced. The result is that there are not enough visas in the skilled category to accommodate the large backlog of applicants who have temporary visas and are trying to become permanent residents.

The other lesson Teitelbaum gleaned from the presentations on Canada and Australia is that their systems are far more flexible and nimble than the U.S. system, which he acknowledged arises from the structure of Canada and Australia's Parliamentary system of government and something that is not likely to be duplicated in the U.S. system with its separation of powers. That flexibility enables countries to try various policies that might have positive impacts and then adjust those policies easily based on experience. Teitelbaum also reiterated Cissna's point that any policies enacted in the United States should not be too binding because of the difficulty in "tinkering at the margins" in the way that parliamentary systems can.

His last comment on Canada and Australia was that he was struck with how many of the scientists and engineers in those countries were immigrants. "What does that tell us about the trends of domestic science and engineering education and career preparation, particularly within Australia? Are such fields being defined gradually as immigrant-dominated fields that Australians don't want to go into?" He thought those were important research questions for the future.

The most important lesson that Teitelbaum learned from the United Kingdom's experiences is how effective the MAC is at helping formulate policy based on data and facts. He credited the MAC with helping the British government evolve from one that he thought was rather naïve about immigration to one that is now seeking the best independent assessments before it makes changes. The MAC has established its credibility as a nonpartisan advisor on immigration policy, so much so that the new coalition government of the United Kingdom not only kept the MAC in place, but all of its members, too. An additional benefit of the MAC's credibility is that it has lifted the quality of press coverage of immigration issues in the British media, which may improve the public's understanding of the value of immigration. "Could the MAC model be adopted in the United States?" asked Teitelbaum. "I think it's worth discussing."

Madeleine Sumption agreed with Michael Teitelbaum's takeaways from the workshop and added that something she found striking is how much more strategic and dynamic other countries are in setting their immigration policies. "I love the phrase that the Australians used about 'adjusting policy settings' as if the immigration system is this perfectly calibrated machine that responds with sensitivity to their every desire," said Sumption. She noted that these countries adjust their policies when those policies are not producing optimal results. One example of this was when Australia discovered the flaw in its student selection process. In addition, she echoed Teitelbaum's and Cissna's concerns about not making policies too rigid in the United States and about the flexibility that comes with having a parliamentary system of government versus the U.S. system with its separation of powers.

Sumption also asserted that policies in the United States can often be explained only by the history of how they were conceived and not by any substantive reason based on evidence. One example of this is the permanent labor notification process under which an employer does not have to advertise a job to domestic workers before hiring a person via the H-1B visa process. Instead, employers are only required to advertise that job within 6 years of hiring, long after they have employed and invested in an immigrant. Lessons learned from other countries' experiences often become distorted when they are translated into the U.S. situation. For example, the MAC was distorted into a commission-like entity in the failed Senate immigration reform bill. In the U.S. version, the commission would have had decision-making abilities, but the final decision would be determined through an algorithm combined with performance metrics. In addition, Sumption pointed out the lack of good data in the United States to show how well or poorly the system is working compared to other countries discussed at the workshop.

What the workshop had made abundantly clear, said Pia Orrenius, is that the U.S. system compares poorly with those of Canada and Australia and that immigration policy cannot be the only means by which the United States reaches its goals in terms of meeting its STEM-trained labor force needs. Immigration policy is just one tool of many that can result in a better, more qualified, nimble and innovative workforce. Luckily for the United States, the nation does well in other areas—the quality of our institutions of higher education, the salaries that U.S. employers pay, the flexible labor markets with many job opportunities, and the relative ease with which foreign workers integrate in the U.S. workforce, among others—that enable the country to be competitive in the international market for high-skilled workers. In that respect, Orrenius said that Canada and Australia could learn about other reforms they can make to their labor markets and other regulations that might block immigrants' access to economic opportunity.

Orrenius was also skeptical of using immigration policy for regional development. "I think if regions are otherwise failing to generate growth for natives, it is folly to think that you can bring in immigrants and somehow generate growth," said Orrenius. "Again, I think it is not only immigration policy that matters. There are all of these other policies that go into where businesses are created and where firms hire workers and immigration policy is not going to solve those types of problems." She said the same holds true for the investor programs that Jean-Christophe Dumont discussed. If a country or a region cannot attract investment on its own merit, then investor visas are not going to be a solution either.

According to William Kamela, the real challenge is to integrate proposals and recommendations from academia into the reality of the U.S. political system, particularly given the difficulty in making any major changes in our current immigration policy. De-politicizing immigration policy in the United States by creating a commission is not feasible. Instead, there must be a way to bring the right people to the table before even having the next level of discussion on immigration policy.

Companies like Microsoft will move jobs to Vancouver, Canada if they cannot access more H-1B visas. How do policy makers determine the right policy levers to bring the right employees to the United States to meet the needs of companies that have high-skilled positions to fill. He agreed with Orrenius that the U.S. system will only implement incremental changes to existing policies, despite the need for a completely new immigration policy built from the ground up, the reality is that he does not think that will be possible in the next 50 years. If that is the case, then we need to think of how to navigate the current system so that we have the correct balance between the family-based humanitarian side and the employment-based side, Kamela added as a final comment.

Felicia Escobar acknowledged how nice it was to be in a room full of people who were trying to study high-skilled immigration from a rational framework, and sounded a note of optimism in saying that the immigration debate has benefitted from the research that has been conducted over the last several years. "Research in the last several years has really generated a rich base of knowledge for those who are trying to advocate in Congress for immigration reform," said Escobar. She voiced her belief about the importance of helping people understand how much this issue really affects the U.S. economy, local communities, and the standing of the United States in the global economy. "It affects the race for talent and the people that we invest in at our institutions and whether they stay here or go elsewhere," she added.

Data

Turning the discussion to the subject of data, Alden noted that for those who work on trade policy, the International Trade Commission is a rich source of data. Given that there is no analogous source of data for immigration questions, Alden asked the panel to comment on where the biggest gaps in data are and whether it would be useful to have a richer source of information on immigration outcomes in the United States. For Sumption, the main problem is that there are no good data on who is migrating to the United States. There are some basic data on who is receiving H-1B visas, but the data are not publicly available for other types of visas.

Sumption noted, in contrast, that Australia conducts longitudinal surveys that follow immigrants over time to monitor their progress. Canada mines data from its tax system that enables it to track people who came in at different periods and via different avenues and make adjustments based on the data they receive. For example, Canada closed its investor visa program because they found out from tax data that many of these people who were supposedly high net worth individuals and who were coming to contribute to the economy were actually doing much worse than immigrants in almost any other category. The United Kingdom is reviewing its applications and attempting to track people and learn how immigrants are navigating their way through the British system. Sumption said that she believes that the United States could do many of those things if it were able to create systems within the Customs and Immigration Service to track where applications are coming from and where people go once they are in the country.

Teitelbaum noted that when the United States lacked good economic data for policy makers, the results were massive economic booms and busts, panics and bank failures, and so on. There was no Federal Reserve System, no Congressional Budget Office, and no Council of Economic Advisers. In fact, it took about 100 years to develop a Federal Reserve that has people such as Orrenius who can develop data and analyze data in an objective manner, he said. The same is true for the Congressional Budget Office, a more recent innovation. While he agreed with the earlier comment that it was unlikely that the United States would create a body akin to the MAC, he thought that the Council of Economic Advisers could do more to develop and analyze immigration data. Kamela and Escobar agreed. Escobar also agreed that additional data that is shared more publicly with researchers would be helpful, but she also cautioned that immigration policy is not just about creating jobs and increasing economic growth. The United States has a long and rich tradition regarding family reunification and accepting migrants for humanitarian reasons.

In response to a question from Stephen Merrill of the National Academies of Sciences, Engineering, and Medicine about data access, both Sumption and Orrenius noted that there are data being collected that could be used to answer important questions, but that too often they are in a format that is unusable or are not made publicly available because of political reasons. "How else can you interpret the fact that data that existed earlier has been taken away, such as the micro data on green card recipients?" asked Orrenius. Escobar noted that everyone can agree that the Department of Homeland Security needs to update its antiquated systems so that they can generate data in useable formats and in a timely manner, but that funding is the key challenge. She added that the U.S. Digital Service, a new entity within the Executive Branch, was created to help agencies deal with data questions.

Competition for Talent

The panel then considered the question of whether global competition the right way to think about high-skilled immigration. Kamela said that the competition is not just global, it is local, too. Today, he said, there are 27,000 companies participating in the H-1B visa program, and the real challenge is for the nation's startups. Microsoft, he said, will file 1,000 H-1B visa applications this year and it will get about half of those in the annual lottery. In contrast, a startup that might file one or two applications may not get any of these visas. "What happens to that company? They are competing against us and Google and the challenge is to make sure those companies get a bite of the apple," said Kamela.

Orrenius said that there absolutely is a global competition for talent, and what is needed is for there to be the same kind of liberalization in immigration policies as there has been in trade policies. She suggested that just as countries and workers have benefitted from free trade agreements in terms of creating more competitive industries and improving the well-being of workers, the same could hold true if countries were to develop free migration agreements. "There are huge untapped gains to had from migration globally," said Orrenius. The problem, she said, is that most of the gains in the short-term are likely to accrue to the migrant and not the natives.

Teitelbaum noted that the term high-skilled is itself ambiguous because it refers to anyone with a tertiary education, from an associate's degree to a PhD. What is high-skilled from an immigrant's country, he said, may be low-skilled or medium-skilled in Sweden or the United States.

Sumption said while competition between companies of the sort that Kamela noted exists, countries have made so little progress on selecting talented

migrants that even a discussion about competition between countries may be premature. People do not move because of immigration systems—they move because there are good economic opportunities. The immigration system then either allows them to pursue those opportunities or it does not. She also noted that the talent pool from which to draw is actually quite large, which makes the supposed competition really about selecting better from those pools. To consider high-skilled migration a zero-sum game at this point is not appropriate in her opinion.

Escobar pointed out that the White House uses the term "best and brightest" and does not frame the discussion in terms of a global competition. She also stressed that when this Administration thinks about a race for talent, it is thinking about the nation's investments in its domestic workforce which would limit the need to pull in high-skilled individuals from outside the United States.

Quotas

Noting that many countries are now moving beyond quotas as a means of controlling immigration, Alden asked Orrenius to comment on why the United States seems so wedded to quotas. "Is there any real possibility in the United States of moving beyond a quota system?" asked Alden. Orrenius replied that she found the Australian emphasis on an "expression of interest" system to be an interesting idea, particularly when coupled with the concept of clearing the queue every year. She said that the United States could create a system for employers or firms, rather than potential immigrants, to register their expression of interest to hire a foreign worker. Instead of using a points system, as is the case in Australia, allocation would be one using price—letting employers bid for these permits to hire foreign workers. This type of system, would do a much better job at identifying the best applicants from the pool while also generating revenue.

Sumption agreed that numerical limits are not an effective way to run an immigration system. Quotas have a political purpose and they are useful for governments to demonstrate to the public that immigration is under control, she said, but that are not an effective means for selecting people because you end up with lotteries and a huge backlog. A better approach, based on the experience of other countries, is to establish skill standards and language proficiency requirements. Instead of creating a first-come, first-served system, the United States could implement a more targeted approach. Teitelbaum expressed strong agreement with this idea.

Immigration and wage growth

Turning to the possible impact of immigration on wage growth, Alden asked Kamela to respond to the data presented at the workshop that suggests that STEM occupations have not experienced the kind of wage growth that might be expected. Kamela replied that part of the challenge in answering this question is that STEM covers a wide range of occupations and that wage growth is very occupation specific. He noted that the Senate immigration bill that failed to pass the House had many provisions that would have mitigated challenges around wages and did so in a way that he characterized as thoughtful and supportive.

Kamela added that there are already provisions in existing regulations that mandate certain wage minimums for different kinds of visas, but that enforcement is a challenge. "We are more than willing to say that we need more enforcement," he said, "We are more than willing to say that there are bad actors in this system that need to be cleaned up." He also supported the idea of allowing visa portability as a means of addressing wage challenges.

Orrenius then commented that the evidence on wage growth is mixed, and there is no evidence of an adverse effect from immigration on high-skilled natives. She also noted work using H-1B data showing that H-1B visa holders are not underpaid relative to natives and in fact are paid up to 10 percent more than natives.[2]

What can the President do?

Given that Congress is unlikely to act on immigration reform in the near future, Alden asked Escobar if she could comment on what kind of flexibility the President has to address high-skilled immigration. Escobar replied that the White House is in the process of determining what flexibility exists in the legal immigration space, and that those who are dealing with immigration issues are learning that "there are real limitations to what we can do, which is why we all need to continue to think about changing the actual law to really make the kinds of reforms that people are thinking about." She explained that the White House is looking in particular at green card and temporary worker reform, as well as at the Optional Practical Training Program, which allows graduates to stay here for a period of time after graduation depending on the type of degree that they have and if they have an employer that will give them additional

[2]Lofstrom, M., and J. J. Hayes. 2012. H-1Bs: How Do They Stack Up to US Born Workers? *IZA Discussion Paper No. 6259.* Available at http://ssrn.com/abstract=1981215 [Accessed October 28, 2014].

training. Other possible options include looking at how the Department of Labor can get involved in the immigration system.

Escobar commented that the workshop's presentations impressed her by showing how much innovation and change is going on with immigration policy outside of the United States. Kamela remarked that the White House's legal team is working on this issue which he believes will be well thought out and will withstand legal challenges. He agreed with Escobar that in the end, there is only so much the President can do and the country needs to change its entire immigration system. "These are going to be stop-gap measures because the next administration could have a difference view of these measures and could move to rescind some of these actions," said Kamela. "While we are incredibly appreciative of the President undertaking this effort, we know that in the long-run we have got to get Congress to act responsibly for comprehensive reform."

Alden added that there is substantial agreement between the Administration and both parties in Congress on the high-skilled immigration piece of immigration reform. "Substantively, we really went a long way in the process between the Senate and the House, so it was frustrating to not see something come out of it," said Alden. "Maybe there will be a chance to reengage."

OPEN DISCUSSION

Jennifer Hunt started the open discussion by asking Kamela and Orrenius to comment on a claim that she hears often in connection with the software industry. According to this claim, older workers in this industry earn more than younger workers but younger workers, because of their more recent training in the tools of the modern software industry, are more qualified. It is further claimed that since the immigration systems bring in and expand the pool of younger, cheaper, and actually more productive people, it leads to older people losing their jobs in this sector. Kamela replied that the "whole younger worker versus older worker thing is a little sensitive, and the reality is that we look for talent, period." He explained that Microsoft's older workers tend to be the company's team leaders with younger workers being part of the team, and that a blend of older and younger workers and of natives and immigrants produces the best outcomes.

Orrenius said that while she has not looked at this issue in any detail, the H-1B data show that those workers tend to be young. She did note, however, that the typical career progression in technology fields has younger workers handling the technical details at the beginning of their careers and evolving into management or the business side of the industry as they get older. Teitelbaum wondered how all of these younger workers can be so technically advanced when they are being taught by older professors. "Have the faculty at these institutions somehow stayed right up to date with all of the new technologies,

but the people in the companies haven't? That is possible, I suppose," said Teitelbaum. If that is indeed the case, it would argue for increasing the amount of internal training for corporate technical staff, he added.

The discussion then turned to the subject of skill sets and how immigration policy should reflect the fact that companies put more emphasis on skills rather than degrees when it looks for workers, whether natives or immigrants. Meredith Singer, from IBM, noted that a more flexible and mobility-based immigration system would enable companies to better meet their needs for specific skills. She challenged the economists at the workshop to figure out how to make economic determinations based on skills rather than degrees. Alden mentioned that the workshop planning committee discussed the subject of mobility, and that questions were raised as to whether policy makers need to think in terms of people moving around instead of moving in and settling in one place.

Sumption remarked that Canada's radical overhaul of its old system, which selected immigrants based on qualifications, was replaced with a system that emphasizes skills and gives companies the ability to select immigrants with the right skills. She added that even with this change, Canada's system is still based on the idea of permanent immigration and is too slow to allow for the kind of mobility that Singer mentioned. She also said that if the U.S. system actually worked and did not have a massive backlog of visa applications, it would be a system that would be well-adapted to this kind of mobility. "The U.S. has the right model, it is just falling apart," said Sumption. "We need to fix that model rather than think of something totally new." Orrenius agreed with Sumption that skills are the key attribute and that employers are the best at gauging whether an applicant has the right skills. Giving that power to companies would also take the selection burden off of the government's plate. "You can rely on employers to screen these workers and bring them in. You don't have to have to have a complicated point system, but you have to somehow adopt and change over time," said Orrenius.

According to Jean-Christophe Dumont, one lesson that OECD countries can learn from the U.S. experience is that they should build an immigration system that adapts and changes over time instead of creating an immigration policy for the next 20 years. "Flexibility and dynamic management are key elements in an efficient system," said Dumont. He then asked if it would be possible to add some flexibility to the U.S. system so that the country would not have to go through the same debate that it is engaging in now five or ten years down the road. Alden questioned whether a congressionally-mandated system would ever be flexible given Congress's tendency to micromanage.

Another attendee asked if there have been any studies on an auction system for immigration and what the market-clearing price would be. He noted that migrants from Mexico and South and Central America are paying mules to

bring family members to the United States, and that students are graduating from college with average indebtedness of around $30,000. He wondered if immigrants would be willing to go into debt to secure a U.S. work visa. Orrenius said that she and Madeline Zavodny have written about auction systems from a theoretical position, but that she did not know of an auction system in the real world in which companies could bid for permits to hire foreign workers. She noted that her work looked at a system where 3- to 5-year work permits would run between $10,000 and $15,000 per person, which she qualified by saying that was a back-of-the-envelope calculation. She did not envision a system where visas were auctioned to individuals (including family and humanitarian applicants) but rather one that was employment-based. She was looking at a system that would clear the market yearly or quarterly, eliminate queuing and backlogs, and would raise revenue for the government. This system she and Zavodny envisioned would provide subsidies to some institutions, such as small businesses and universities, so that they would not be priced out of the market.

Kamela remarked that he was involved in an initiative from the Chamber of Commerce and the National Association of Manufacturers which proposed that businesses should pay more to process visas more quickly with the money put into a fund to support STEM education. This fund would have generated close to $500 million dollars and would have been the largest STEM program in the United States. He then said that he and his counterparts in the technology world believe that the long-term solution to meeting the demand for high-skilled workers is to train them here in the United States. The challenge, he said, is that of 42,000 high schools in the United States, only 2,100 offer Advanced Placement computer science courses. He also noted that computer science today is like physics was in the 1950s—a foundational subject that will be the basis of many occupations, not just in the information technology industry. Teitelbaum agreed wholeheartedly with Kamela's assessment.

The final point of discussion had to do with immigration caps and the current labor certification process. According to Kamela, the labor certification process costs the Department of Labor $40 million annually but does little to protect American workers from being displaced by immigrants with similar skills that are willing to work for lower salaries. He also questioned the need for both a cap system and a labor certification system. Escobar commented that she does not see Congress ever eliminating caps for the green card program or for H-1B, H-2B, and other immigration programs. She also noted that legislation has been proposed that included provisions that would raise or lower caps based on several factors such as employer demand and the economic cycle, but this legislation has never made it through Congress. She did say, however, that she supported the idea of creating a commission or other advisory body to provide support for a flexible cap system, though again, she thinks it will be a difficult sell to convince Congress to provide that kind of latitude.

8

Key Points Made in the Workshop

This summary of workshop key points are those of individual workshop participants and do not necessarily represent the views of all workshop participants, the planning committee, or the National Academies of Sciences, Engineering, and Medicine.

- While the definition of high-skilled immigrants varies across countries, much of the research presented at the workshop focused on highly educated migrants as a proxy for highly skilled migrants. Two presenters made the point that "translational" skills—or the ability to bridge the gap between fundamental and applied sciences—and business skills are needed to ensure that the work of STEM-educated migrants is fully realized.
- Several panelists noted that the United States does not do as much as other countries to collect data on labor market outcomes for immigrants. Two panelists noted that there are data being collected that could be used to answer important questions, but may be in a format that is unusable or are not made publicly available. Panelists emphasized the need for better information to evaluate the impact of any policy changes and noted that other OECD countries, such as Australia and Canada, collect and make effective use of much better information.
  - Canada has the Canadian Longitudinal Immigration Database which provides labor market performance of the admission classes. Because of this database, the evidence in Canada is that economic class immigrants are doing better than all other classes of immigrants and native-born Canadians.
  - Australia has a longitudinal study as well, which has found that skilled migrants who were not sponsored by an employer had a lower unemployment rate than the general population.
- Several presenters argued that the United States should design systems for collecting and analyzing data in order to assess the effective-

ness of immigration policy in attracting high-skilled immigrants, encouraging successful outcomes for these individuals and their families, and maximizing the positive impact they have on output and productivity. Data requirements include immigration, net immigration, field of qualification, English language proficiency, the amount of time it takes foreign-educated workers to get U.S. certification in their field, and U.S. employment experience, among others.
    - Two participants said more data regarding on temporary migrants are needed, including the impact of temporary migrants on the stability of the workforce.
    - Another participant noted that improved data are needed to combat myths that adversely impact public support for immigration.
- Workshop participants noted that high-skilled workers are highly mobile and the market for high-skilled labor is global, as are the markets for knowledge and ideas, as evidenced by the large number of international collaborations. One participant noted that there is competition even within countries for talent and pointed out that in the United States, smaller companies have a harder time than larger companies getting visas for skilled workers.
- Many countries are taking a thoughtful, purposeful approach to high-skilled immigration. To be most effective, most presenters believe that a flexible high-skilled immigration policy should be part of a broader set of policies aimed at building a high-skilled labor force for the United States.
- Although evidence suggests that the United States has done well thus far in attracting highly skilled immigrants, many presenters believe that this may be largely due to factors other than the current immigration policy, for example, the high quality education and research opportunities of universities in the United States. In addition, declines in the nature and availability of funding for research and development in the United States may have a substantial negative impact on the U.S.'s ability to attract highly skilled workers.
    - Several panelists were concerned about a misplaced emphasis on the quantity rather than the quality of U.S. immigrants. They were concerned that policymakers would put undue focus on the quantity of skilled migrants rather than the alignment with the country's needs.
- Presenters noted that high-skilled migrants represent a much smaller fraction of the U.S. workforce than in Canada, Australia, and the United Kingdom.

  - A larger share of visas is set aside for economic migrants in Canada than the United States, leading to a larger share of migrants of working age in Canada. According to presenters, economic class immigrants in Canada are doing better than all of the other immigration classes as well as native-born Canadians. Similarly, skilled migrants in Australia who were not sponsored by an employer had a lower unemployment rate than the general population.
  - Conditional licensing, improved credentialing for migrants, and better filters for selecting skilled applicants may improve the employment outcomes and retention rates of skilled migrants.
- According to many panelists, U.S. competitiveness in the market for high-skilled immigrants is likely to diminish as other countries, particularly OECD countries including Canada, Australia, New Zealand, the United Kingdom, and Germany, pursue purposeful and flexible, targeted immigration policies, monitor the policies' effectiveness, and take prompt action to improve effectiveness and address unintended consequences.
  - An illustration of an unintended consequence that a presenter pointed to is an Australian example of universities completely changing their focus, as quickly as overnight, in response to changes in policy, a potential problem in a setting with inflexible rules.
- Many presenters believe that there are opportunities to adopt good practices and to apply lessons learned from other countries to increase opportunities for the United States to attract high-skilled immigrants and benefit from their impact on output and productivity. One example cited by presenters is Great Britain's adoption of a sophisticated approach in creating the MAC, an expert committee that provides advice to the UK government on immigration. Conference participants noted a number of practices from other countries which the United States could adopt to improve outcomes for immigrants.
  - Australia has an annual pool from which employers chose people to get permanent visas, including people who are currently living in other countries.
  - Australia, Canada, and New Zealand take into account demand or "interest" declared by their provinces or states and employers. These countries also give employer-sponsored immigrants greater flexibility to change employers after they arrive.[1]

[1]Under President Obama's Executive Action, there is an effort to do the same thing in the United States. This workshop took place before the President's announcement. There are several measures in the executive action that attempt to address several is-

  - Israel has a package of benefits for new immigrants that include a language immersion course. Israel provides the same benefits package to other immigrants, such as refugees, many of which are highly skilled.
  - Germany has a program that evaluates skills and facilitates successful completion of certification requirements.
  - Most workshop participants found the more flexible immigration policies implemented in other countries preferable but noted that they may be difficult to replicate in the United States. One panelist pointed to the MAC as a potential model for the U.S. because it is an arms-length agency with decision-making power.
- Barriers to successful outcomes for immigrants include lack of opportunities for spouses and families of the individual high-skilled immigrant. Some countries automatically permit spouses to work or study, and others include the spouse's qualifications in the number of points given to the candidate's application.
- Several participants argued that there is compelling evidence that China is trying to build its high-skilled workforce including exponential growth in tertiary degrees within China and government sponsorship of students to study abroad at the best universities, especially in the United States. Whether those students return to China or settle elsewhere, they maintain relationships with their research colleagues to continue building and diffusing knowledge and ideas to China.

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sues raised in the workshop such as making it easier for H-1B holders to change jobs while waiting on their green cards.

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Appendix A

Workshop Agenda

HIGH-SKILLED IMMIGRATION POLICY AND THE GLOBAL COMPETITION FOR TALENT

National Academies Keck Center
500 5th Street NW, Room 100
Washington, DC 20001

MONDAY, SEPTEMBER 22, 2014

1:00PM **WELCOME**
Stephen Merrill, Director Emeritus, STEP Board

INTRODUCTION
Jennifer Hunt, Professor of Economics, Rutgers University

1:15PM **SKILLED MIGRATION IN A WORLD OF GLOBAL COLLABORATIONS AND EXCHANGES**
Keynote speaker: Richard Freeman, Professor of Economics, Harvard University; and Director, Science and Engineering Workforce Project, National Bureau of Economic Research

1:45PM **AUDIENCE Q&A**

2:15PM **PANEL 1: SKILLED MIGRATION TRENDS AND POLICY EVOLUTION: A MULTILATERAL OVERVIEW**
Chair **Jennifer Hunt**, Rutgers University
Presentations:

- **Jean-Christophe Dumont**, Head of International Migration Division, Directorate for Employment, Labor and Social Affairs, Organisation for Economic Co-operation and Development

Discussants: **Mark Giralt**, Minister-Counsellor for Immigration, Embassy of Canada; **Miranda Lauman**, Acting Director, Americas, Embassy of Australia

3:15PM **AUDIENCE Q&A**

3:25PM **BREAK**

3:40PM **PANEL 2A: COMPARATIVE SYSTEM DESIGN AND EFFECTS: Canada and Europe**
Chair: **Subhash Singhal**, Battelle Fellow Emeritus, Pacific Northwest National Laboratory
Presentations:
- **Charles Beach**, Emeritus Professor, Queen's University
- **Madeline Zavodny**, Professor of Economics, Agnes Scott College
- **Jonathan Wadsworth**, Professor, Royal Holloway, University of London

Discussant: **Francis Cissna**, Director of Immigration Policy, Department of Homeland Security

4:50PM **AUDIENCE Q&A**

5:30PM **RECEPTION**, Keck Center, 2nd floor prefunction area

TUESDAY, SEPTEMBER 23, 2014

8:30AM **PANEL 2B: COMPARATIVE SYSTEM DESIGN AND EFFECTS: Australia, Middle East & Asia**
Chair: **Jennifer Hunt**, Rutgers University
Presentations:
- **Graeme Hugo**, ARC Australian Professorial Fellow, Professor of Geography; Director of the Australian Population and Migration Research Centre, University of Adelaide
- **Lesleyanne Hawthorne**, Professor, International Workforce, University of Melbourne, Victoria

Discussant: **Ana Maria Mayda**, Associate Professor, School of Foreign Service, Georgetown University

9:30AM **AUDIENCE Q&A**

10:00AM **BREAK**

10:15AM **PANEL 3: FLOWS OF STUDENTS, COMPUTER WORKERS, & ENTREPRENEURS**
Chair: **Paula Stephan**, Professor of Economics, Andrew Young School of Policy Studies, Georgia State University
Presentations:
- **Lesleyanne Hawthorne,** University of Melbourne, Victoria
- **Jean-Christophe Dumont,** Organization for Economic Cooperation and Development
- **Lindsay Lowell,** Director of Policy Studies, Institute for the Study of International Migration, Georgetown University

11:25PM **AUDIENCE Q&A**

12:00PM **LUNCH**

1:15PM **PANEL 4: IMMIGRATION EFFECTS ON INNOVATION AND LABOR MARKETS**
Chair: **Ellen R. Dulberger,** Managing Partner, Ellen Dulberger Enterprises, LLC
Presentations:
- **Daniele Paserman**, Professor of Economics, Boston University
- **Herbert Brücker**, Professor of Economics, University of Bamberg; Head, Department for International Comparisons and European Integration, Institute for Employment Research (Nuremberg)
- **William Kerr**, Professor of Business Administration, Harvard Business School

Discussant: **William Lincoln,** Assistant Professor of International Economics, John Hopkins School of Advanced International Studies

2:30PM **AUDIENCE Q&A**

3:00PM **BREAK**

3:15PM **PANEL 5: POLICY IMPLICATIONS: A PANEL DISCUSSION**
Chair: **Edward Alden**, Bernard L. Schwartz Senior Fellow, Council on Foreign Relations

Discussants:

- **Felicia Escobar**, Special Assistant to the President on Immigration, White House
- **William Kamela**, Senior Federal Policy Lead, Workforce Readiness and Immigration, Microsoft Corporation
- **Pia Orrenius**, Vice President and Senior Economist, Federal Reserve Bank of Dallas
- **Madeleine Sumption**, Director of International Research, Migration Policy Institute
- **Michael Teitelbaum**, Senior Research Associate, Labor and Worklife Program, Harvard University

4:30PM **AUDIENCE Q &A**

5:00PM **ADJOURN**

Appendix B

Biographical Sketches of Workshop Speakers and Planning Committee Members

EDWARD ALDEN

Edward Alden is the Bernard L. Schwartz senior fellow at the Council on Foreign Relations (CFR), specializing in U.S. economic competitiveness. In addition, Mr. Alden is the director of the CFR Renewing America publication series and co-author of the recent CFR Working Paper *Managing Illegal Immigration to the United States*. The former Washington bureau chief of the *Financial Times*, his work focuses on immigration and visa policy, and on U.S. trade and international economic policy. Mr. Alden was the project co-director of the 2011 *Independent Task Force on U.S. Trade and Investment Policy*, which was co-chaired by former White House Chief of Staff Andrew Card and former Senate Majority Leader Thomas Daschle. He was also the project director for the 2009 *Independent Task Force on U.S. Immigration Policy*. Mr. Alden is the author of the book *The Closing of the American Border: Terrorism, Immigration, and Security Since 9/11* (HarperCollins), which was named a 2009 finalist for the J. Anthony Lukas Book Prize for nonfiction writing. The judges called it "a masterful job of comprehensive reporting, fair-minded analysis, and structurally sound argumentation." Mr. Alden was previously the Canadian bureau chief for the *Financial Times* based in Toronto, and before that was a reporter at the *Vancouver Sun* specializing in labor and employment issues. He also was the managing editor of the newsletter *Inside U.S. Trade*, widely recognized as the leading source of reporting on U.S. trade policies. He has won several national and international awards for his reporting. Mr. Alden has done numerous TV and radio appearances as an analyst on political and economic issues, including *NewsHour* with Jim Lehrer, McLaughlin Group, NPR, the BBC, CNN, and MSNBC. His work has also appeared in *Foreign Policy*, *Foreign Affairs*, the *Japan Times*, the *San Jose Mercury News*, and the *Toronto Globe and Mail*. He is the coauthor, with Franz Schurmann, of *Democratic Politics and World Order*, a monograph published by Berkeley's Institute of International Studies in 1990. Mr. Alden holds a master's degree in international relations from the University of

California, Berkeley, and pursued doctoral studies before returning to a journalism career. He also has a bachelor's degree in political science from the University of British Columbia. He was the winner of numerous academic awards, including a Mellon fellowship in the humanities and a MacArthur Foundation graduate fellowship.

CHARLES BEACH

Charles Beach grew up in Montreal and earned a BA with Honors at McGill University in 1968 and a PhD at Princeton University in 1972. He has taught at Queen's University since 1972 and became Professor Emeritus in 2012. He was co-founder of the Canadian Econometric Study Group and the Canadian Employment Research Forum, Editor of Canadian Public Policy (1995-02), and Director of the John Deutsch Institute at Queen's (2001-2009). He is currently a research associate at both the C. D. Howe Institute in Toronto and the Institute for Research on Public Policy in Montreal, has been an advisor to many federal departments, and is president-elect of the Canadian Economics Association. He has published a number of research and policy papers and has written or edited 17 books including "Transition and Structural Change in the North American Labour Market" (with Michael Abbott and Richard Chaykowski, 1997), "Canadian Immigration Policy for the 21st Century" (with Alan Green and Jeffrey Reitz, 2003), "Higher Education in Canada" (with Robin Boadway and Marvin McInnis, 2005), "Retirement Policy Issues in Canada" (with Robin Boadway and James MacKinnon, 2009), and "Toward Improving Canada's Skilled Immigration Policy: An Evaluation Approach" (with Alan Green and Christopher Worswick, 2011). His current research interests are on immigration policy and income distribution and inequality.

HERBERT BRÜCKER

Herbert Brücker is professor of Economics at the University of Bamberg and head of the department for International Comparisons and European Integration at the Institute for Employment Research (IAB) in Nuremberg. Dr. Brücker studied economics, sociology and politics at the University of Frankfurt, where he received his doctoral degree in economics in 1994. He received his Habilitation degree in economics from the University of Technology (TU) in Berlin in 2005. He held the positions of a visiting professor at the Aarhus School of Business, of a senior researcher at the German Institute for Economic Research (DIW Berlin), at the German Development Institute (GDI) and of a research associate at the University of Frankfurt.

FRANCIS CISSNA

Francis Cissna is director, Immigration Policy at U.S. Department of Homeland Security. From 2006-2008, he served as deputy director. Prior to that position,

Mr. Cissna worked as Associate Counsel with U.S. Citizenship and Immigration Services. From 1999-2002, he served as a Foreign Service Officer in Sweden. Mr. Cissna earned his MA in International Security Policy from Columbia University. He earned his JD from Georgetown University.

ELLEN DULBERGER

Ellen R. Dulberger, PhD had responsibility for designing and implementing IBM's Enterprise Risk Management program from 2006 until her retirement in 2012. Dr. Dulberger became the first person to hold that position which was created at the request of the Board. The original mission continues to endure: to take advantage of the scale and scope of the company's globally integrated enterprise to improve business performance through better identification and management enterprise level risks. From the beginning, the effort engaged the senior executive team to focus on strategic and operational risk and across all dimensions of the management matrix. Dr. Dulberger participated in discussions among the CEO and his direct reports on key strategic risks with enterprise-wide implications. Her background in business strategy development, economic analysis and measurement provided business insight and methodologies to analyzing risk and measuring risk management effectiveness.

Over the preceding decade of her career, she held several strategy development roles. In 1993, she became the first strategist for the outsourcing business, ($16b in 2006) which was led by Samuel J. Palmisano who went on to become CEO and chairman of IBM. Drawing on her economics background, Dr. Dulberger was well suited to developing insights into the big picture, and using her abilities to see the forest for the trees, helped the company identify and pursue non-traditional opportunities and with non-traditional approaches. One example was called at the time, "Intelligent Infrastructure" which evolved along one branch into Cloud Computing.

The first half of her career was dedicated to economic analysis. Dr. Dulberger's innovative work on price measurement was used internally to improve demand forecasts for the company's products, and externally was adopted by the U.S. Department of Commerce and other statistical agencies to improve measures of investment in the U.S. and other major economies. As a recognized expert in economic measurement, she has served in many advisory roles to government statistical agencies (U.S. and Canada) and was a member of the CPI Advisory Commission to the United States Senate Committee on Finance. The recommendations of the commission are part of the current discussions to prevent falling off the fiscal cliff.

Since retiring from IBM in August, 2012, she has been doing consulting work. Most recently, Ellen has been engaged by Samuel J. Palmisano, recently retired Chairman of IBM, to consult for him in his new role as Chairman of the newly formed Center for Global Enterprise, a not-for-profit think tank. She has also stepped up her volunteer activities as co-chair of the Alumni Professional Development Committee at the Graduate Center of The City University of New York, and as a board member of U.S. Alliance Federal Credit Union. Dr. Dulberger earned a bachelor's degree in economics from Queens College, CUNY (1974) and then a PhD in economics from The Graduate Center, CUNY (1986) with field of specialty in human resource economics and international trade. Her published work led to improvements in economic measurement of investment in computing equipment and in prices of electronic components.

JEAN-CHRISTOPHE DUMONT

Jean-Christophe Dumont is head of the International Migration Division (IMD) of the Directorate for Employment, Labour and Social Affairs at the OECD. He is responsible for the publication of the OECD Annual Report International Migration Outlook and other OECD publications related to international migration. Dr. Dumont joined the OECD in 2000 as an economist in the International Migration Division. He has many publications on the economics of international mobility of persons, including on labor market integration of immigrants and on the management of migration flows. Recently he has published several reports on the international mobility of health workers to OECD countries, in collaboration with the WHO. Prior to joining the OECD, Dr. Dumont has worked as a research fellow in Laval University, Quebec Canada and at the European research Centre on Economic Development DIAL in Paris, France. He holds a PhD in development economics and a master degree in mathematics applied to social sciences from University Paris IX Dauphine, France.

FELICIA ESCOBAR

Felicia Escobar is Special Assistant to the president for Immigration Policy. In this role, Ms. Escobar develops the President's strategy for building a 21st century immigration system. This work involves coordinating efforts across the Executive branch to strengthen the current system and working toward passage of meaningful, comprehensive immigration reform legislation. Ms. Escobar previously served on U.S. Senator Ken Salazar's legislative team, working with him to develop his legislative agenda on a host of issues including labor, civil rights, judicial nominations and immigration. She advised Senator Salazar during the comprehensive immigration reform debates of 2006 and 2007 in which Senator Salazar was a key member of the bipartisan group pressing for reform. Prior to this, Ms. Escobar was associate director of the Senate Democratic Steering and Outreach Committee. In this role, she helped cultivate rela-

tionships between Democratic Leader Tom Daschle and key stakeholder groups, including Latino, immigration and education advocacy groups. Ms. Escobar started her career as a State Policy Analyst working for the National Council of La Raza. She represented NCLR and its network of affiliates in the Texas State Legislature, testifying before legislative committees to advocate for education, immigrant access to benefits, and hate crimes legislation. She received an undergraduate degree from Yale University, a master's in Public Policy from the Harvard Kennedy School of Government and her J.D. from UCLA School of Law.

RICHARD FREEMAN

Richard B. Freeman is the Herbert Ascherman Chair in Economics at Harvard University. He is currently serving as faculty co-director of the Labor and Worklife Program at the Harvard Law School, and is a senior research fellow in Labour Markets at the London School of Economics' Centre for Economic Performance. He directs the Science and Engineering Workforce Project at the National Bureau of Economic Research, and is co-director of the Harvard Center for Green Buildings and Cities. Dr. Freeman is a fellow of the American Academy of Arts and Science, and has served on 11 panels and boards of the U.S. National Academies of Sciences, Engineering and Medicine including the Board of Higher Education and Workforce (BHEW), the Committee on Understanding the Engineering Education-Workforce Continuum (NAE), the Committee on Assuring a Future U.S.-based Nuclear Chemistry Expertise, the Committee on National Statistics Panel on Developing Science, Technology and Innovation Indicators for the Future, the Committee on Capitalizing on the Diversity of the Science and Engineering Workforce in Industry, the Committee on National Needs for Biomedical and Behavioral Scientists, the Committee on Demographic and Economic Impacts of Immigration, and the joint NAS, NAE and IOM study on Policy Implications of International Graduate Students and Postdoctoral Scholars in the United States. Dr. Freeman received the Mincer Lifetime Achievement Prize from the Society of Labor Economics in 2006. In 2007 he was awarded the IZA Prize in Labor Economics. In 2011 he was appointed Frances Perkins Fellow of the American Academy of Political and Social Science. Dr. Freeman's research interests include the job market for scientists and engineers; the transformation of scientific ideas into innovations; Chinese labor markets; the effects of immigration and trade on inequality; and forms of labor market representation and shared capitalism. His recent publications include: *America Works* (2007), *What Workers Want* (with Joel Rogers, 2007, 2nd edition), *What Workers Say: Employee Voice in the Anglo American World* (with Peter Boxall and Peter Haynes, 2007), *International Differences in the Business Practices & Productivity of Firms* (with with Kathryn Shaw, 2009), *Science and Engineering Careers in the United States* (with Daniel Goroff, 2009),

Reforming the Welfare State: Recovery and Beyond in Sweden (with Birgitta Swedenborg and Robert Topel, 2010), *Shared Capitalism at Work: Employee Ownership, Profit and Gain Sharing, and Broad-based Stock Options* (with Douglas Kruse and Joseph Blasi, 2010), and *The Citizen's Share: Putting Ownership Back Into Democracy* (with Joseph Blasi and Douglas Kruse, Yale University Press 2013).

MARK GIRALT

Mark Giralt is a career diplomat with Citizenship and Immigration Canada. In August 2013, he was appointed as Minister-Counsellor for Immigration at the Embassy of Canada in Washington and serves as Area Director for the United States of America and Canada's offices in Haiti, Jamaica and Trinidad and Tobago. Prior to this assignment, Mr. Giralt was Minister-Counsellor for Immigration in the Federative Republic of Brazil where he served as area director for Central and South America.

Over the past 20 years, Mr. Giralt has served in a total of seven missions abroad, including as program manager for visa programs in Ghana, Mexico and Indonesia. His other diplomatic assignments include Colombo, Sri Lanka and New Delhi, India. In Canada, he has served as a senior analyst, within the Resource Management division of the International Region. Mr. Giralt graduated from the University of Guelph with a Bachelor of Commerce degree.

LESLEYANNE HAWTHORNE

Dr. Lesleyanne Hawthorne (PhD, MA, BA Hons, Dip Ed, Grad Dip Mig Stud) is professor (International Workforce) at the University of Melbourne. She is an expert on skilled migration policy, foreign credential recognition, labour market integration strategies (all major fields), and the study-migration pathway. In terms of research, Dr. Hawthorne has recently completed projects commissioned by UNESCO, the Australian, Canadian, and New Zealand governments, the International Organization of Migration and the European Union, the U.S. Migration Policy Institute, the Pacific Economic Cooperation Council/APEC, the World Health Organization, and the Global Forum of Federations. In 2005-2006 she was appointed to an Expert Panel of Three by Federal Cabinet to complete the most extensive evaluation of Australia's skilled migration program in 20 years (all fields). In 2012 she was designated Australian Expert on foreign credential recognition by the International Organization of Migration, and appointed International Expert to the Australian Qualifications Framework International Alignment Committee. Dr. Hawthorne also has significant experience related to tertiary education and workforce capacity building in immigrant source countries. As Associate Dean International at the University of Melbourne she spent 16 years liaising with governments, university and develop-

ment bodies across Asia, Africa, the Middle East, Europe, and North America. In terms of cross-national studies, Dr. Hawthorne was commissioned to complete the first detailed studies of skilled migration policy and outcomes in Canada compared to Australia (for the Canadian government from 2004 to 2007) and in New Zealand compared to Australia (for the New Zealand and Australian governments from 2009 to 2011). She was lead academic on UNESCO's nine country comparison of migration and education quality assurance, sole-authoring the Australia paper and the Nine Country comparison paper (2008). Most recently she has co-authored a WHO comparison of medical and nurse migration, followed by analysis of health workforce mobility in the Asia-Pacific region (2012-2014); co-authored the Global Forum of Federations study comparing federal and state roles in migration and integration in seven countries (2012); and prepared the Australian chapter defining assessment strategies for the foreign qualification recognition of third country nationals for the IOM (2013). Since 2011, Dr. Hawthorne has also played a key role in the Canadian and Australian First and Second Round Tables on Mutual Foreign Qualification Recognition (2011-current), including co-authorship of the policy setting background paper (2011).

GRAEME HUGO

The late Graeme Hugo was ARC Australian Professorial Fellow, professor of the Discipline of Geography, Environment and Population and director of the Australian Population and Migration Research Centre at the University of Adelaide. His research interests included population issues in Australia and South East Asia, especially migration. He authored over three hundred books, articles in scholarly journals and chapters in books, as well as a large number of conference papers and reports. In 2002, he secured an ARC Federation Fellowship for his research project, "The New Paradigm of International Migration to and from Australia: Dimensions, Causes and Implications." Dr. Hugo's more recent research focused on migration and development, environment and migration and migration policy. In 2009, he was awarded a 5-year ARC Australian Professorial Fellowship for his research project "Circular Migration in Asia, the Pacific and Australia: Empirical, Theoretical and Policy Dimensions." Dr. Hugo was chair of the Demographic Change and Liveability Panel of the Ministry of Sustainability, Environment, Water, Population, and Communities and was appointed to National Housing Supply Council in 2011. In 2012, he was named an Officer of the Order of Australia (AO) for distinguished service to population research, particularly the study of international migration, population geography and mobility, and through leadership roles with national and international organizations.

JENNIFER HUNT

Jennifer Hunt is a professor of Economics at Rutgers University, a position she has held since 2011. She was on leave as Chief Economist of the U.S. Department of Labor in 2013-2014 and as deputy assistant secretary for Microeconomic Analysis at the U.S. Department of the Treasury in 2014-2015. Dr. Hunt previously held positions at McGill University (2004-2011), the University of Montreal (2001-2004), and Yale University (1992-2001). She received her PhD in Economics from Harvard in 1992 and her Bachelor's degree in Electrical Engineering from the Massachusetts Institute of Technology in 1987. She is a research associate at the National Bureau of Economic Research in Cambridge, Massachusetts, a Research Fellow at the Centre for Economic Policy Research in London and the Institut für Arbeitsmarkt-und Berufsforschung in Nuremburg. She has done research in the areas of employment and unemployment policy, immigration, wage inequality, transition economics, crime, and corruption. Dr. Hunt's current research focuses on immigration and innovation in the United States, the U.S. science and engineering workforce, and the 2008-2009 recession in Germany.

WILLIAM KAMELA

Bill Kamela is the senior federal policy lead for the Microsoft Corporation on workforce readiness and immigration related issues. Prior to joining Microsoft, Mr. Kamela worked for over 30 years in Washington, DC in a variety of public policy related jobs, including over 10 years on the staff of the House and Senate Education and Labor Committee and 7 years in the Clinton Administration at the Department of Labor where he led the USDOL's legislative efforts on the Workforce Investment Act (WIA), Welfare to Work, employment-based immigration programs, unemployment insurance reform, the Work Opportunity Tax Credit (WOTC) and Youth Opportunity Grants. He has also spent over 10 years in the Washington, DC non-profit community at Children's Hospital and the National Urban Coalition. Bill is a native of Buffalo, NY and is a product of the SUNY system.

WILLIAM KERR

William Kerr is a professor at Harvard Business School (HBS). Dr. Kerr teaches in the MBA, executive education and doctoral programs at HBS. He is the faculty chair of HBS' Launching New Ventures program, and he recently created an MBA course entitled Launching Global Ventures. He has received Harvard's Distinction in Teaching Award. Dr. Kerr's research focuses on entrepreneurship and innovation. One research strand examines the role of immigrant scientists and entrepreneurs in U.S. technology development and commercialization, as well as their impact for the global diffusion of new innovations and ideas. A second research strand considers clusters and entrepreneurship, with special

interest in how government policies aid or hinder the entry of new firms, cluster formation, and growth. A final interest area is entrepreneurial finance and angel investments. In 2013, Dr. Kerr received the Ewing Marion Kauffman Prize Medal for Distinguished Research in Entrepreneurship, awarded annually to one scholar under age 40 whose research has made a significant contribution to the literature in entrepreneurship. He has worked with companies worldwide on projects related to entrepreneurship and launching new ventures, with particular emphasis on innovation and global dynamics. Dr. Kerr has also advised several governments about deregulation processes and their investments in the innovative capacities of their nations.

MIRANDA LAUMAN

Miranda Lauman is the principal migration officer, based in the Australian Embassy in Washington DC. She manages Australian visa and citizenship processing and integrity in North America.

In this role Miranda has overseen the introduction of electronic visa processing in the region and led an active innovation and change agenda to improve the quality and efficiency of processing operations.

The key caseloads are tourist, business, and temporary work visas. The Washington office manages around 900 partner applications each program year, together with a small number of child, other family, and RRV applications. Although the department grants nearly 400,000 visas each year to United States citizens, nearly 90 percent of applicants managed at post are third-country nationals.

With over 15 years' experience in the immigration field, Miranda has worked in a range of operational, policy and legal branches in the Australian Department of Immigration and Border Protection (DIBP). She managed the development and implementation of eVisitor, the Australian Government's response to EU visa-free reciprocity requirements and lead the legislative drafting team for the major reforms to Australia's skilled migration program 'SKILLSELECT' in 2012.

Miranda holds a Bachelor of Arts (Government) and a Bachelor of Laws from the University of Queensland and a Post Graduate Diploma of Legal Practice from the Australian National University.

WILLIAM LINCOLN

William Lincoln is an assistant professor at the The Paul H. Nitze School of Advanced International Studies (SAIS) at The Johns Hopkins University. He received a PhD in Economics from the University of Michigan and an SB in Math-

ematics from the University of Chicago. His research focuses broadly on globalization and firm performance and has been cited in *The Economist, The New York Times*, *El País*, *The India Times*, *BusinessWeek* and on CNN's *Lou Dobbs Tonight*.

LINDSAY LOWELL

Dr. Lowell is director of Policy Studies at the Institute for the Study of International Migration, Georgetown University. He was previously director of Research at the congressionally appointed Commission on Immigration Reform where he was also assistant director for the Mexico-US Binational Study on Migration. He has been research director of the Pew Hispanic Center at the University of Southern California, a Labor Analyst at the Department of Labor; and he taught at Princeton University and the University of Texas, Austin. Dr. Lowell has written over 150 articles and reports. He has published in journals such as *Demography*, *American Economic Review*, *Population and Development Review*, *Industrial Relations* and *Work and Occupations.* His research interests include immigration policy, labor force, economic development, Mexico-US migration, education and the global mobility of the highly skilled. He received his PhD as a demographer from Brown University.

ANNA MARIA MAYDA

Anna Maria Mayda is an associate professor of Economics at Georgetown University, with a joint appointment in the Department of Economics and the School of Foreign Service. She studied statistics and economics at University of Rome La Sapienza, where she received her degree summa cum laude in 1997. Before graduate school, she worked at the World Bank in the Latin America and Caribbean Region Unit. In June 2003, she completed a PhD in Economics at Harvard University, where she was also a doctoral fellow at the Center for International Development. Since 2003 she has been at Georgetown University, first as an assistant professor (2003-2009), next as an associate professor with tenure (2009-now). In the spring of 2004, Dr. Mayda held a visiting position at the International Monetary Fund where she served as a Resident Scholar at the Trade Unit of the Research Department. During the 2007-2008 academic year she was on leave at Centro Studi Luca d'Agliano, University of Milan, with a Marie Curie Fellowship within the TOM (Transnationality of Migrants) program, financed by the European Commission. Dr. Mayda's research mainly focuses on issues of trade, immigration and development economics and has been published in journals such as the *European Economic Review,* the *Review of Economics and Statistics,* the *Journal of International Economics, the Journal of Population Economics,* and the *Canadian Journal of Economics*. She has also been awarded a National Science Foundation (NSF) grant. In terms of topics, she has worked on the determinants—labor-market, welfare-state, and non-

economic determinants—of individual attitudes towards trade and immigration across countries; on preferential trade agreements; on the most-favored-nation clause in the GATT/WTO system; on international trade negotiations; and on the determinants of international migration flows. More recently, she has been working on the role played by interest groups in shaping U.S. trade and migration policy.

DAVID MCKENZIE

David McKenzie is a lead economist in the Development Research Group, Finance and Private Sector Development Unit at the World Bank. He received his B.Com.(Hons)/BA from the University of Auckland, New Zealand and his PhD in Economics from Yale University. Prior to joining the World Bank, he spent four years as an assistant professor of Economics at Stanford University. Dr. McKenzie's main research is on migration, microenterprises, and methodology for use with developing country data. He has published over 90 articles in journals such as *Quarterly Journal of Economics, Science, Review of Economics and Statistics, Journal of the European Economic Association, American Economic Journal: Applied Micro, Journal of Econometrics*, and all leading development journals. He is currently on the editorial boards of the *Journal of Development Economics*, the World Bank Economic Review, the *Journal of Economic Perspectives*, and Migration Studies. He is also a co-founder and regular contributor to the Development Impact blog.

STEPHEN MERRILL

Stephen Merrill founded the National Academies' Program on Science, Technology, and Economic Policy (STEP) in 1992 and served as its executive director until March 2014. With the sponsorship of numerous federal government agencies, foundations, multinational corporations, and international institutions, the STEP program has become an important discussion forum and authoritative voice on innovation, competitiveness, intellectual property, human resources, statistical, and research and development policies. At the same time he has directed many STEP projects and publications, including A *Patent System for the 21st Century* (2004), *Innovation Inducement Prizes* (2007), *Innovation in Global Industries* (2008), *Copyright in the Digital Era* (2013), and *Effects of U.S. Tax Policy on Greenhouse Gas Emissions* (2013). For his work on patent reform he was named one of the 50 most influential people worldwide in the intellectual property field by *Managing Intellectual Property* magazine and received the Academies' 2005 Distinguished Service Award. Dr. Merrill has been a member of the World Economic Forum Global Council on the Intellectual Property System.

Previously, Dr. Merrill served as the Academies' director of Government and Congressional Affairs (1987-1990) and executive director of Government and External Affairs (1990-1995) and was a fellow in International Business at the Center for Strategic and International Studies (CSIS), where he specialized in technology trade issues. He served on several congressional staffs including that of the U.S. Senate Commerce, Science, and Transportation Committee, where he organized the first congressional hearings on international competition in the semiconductor and biotechnology industries and contributed to the Stevenson-Wydler Technology Innovation Act of 1980 and other legislation.

He earned degrees in political science from Columbia (BA, summa cum laude), Oxford (M. Phil.), and Yale (MA and PhD) Universities. He attended the Kennedy School of Government's Senior Executives Program and was an adjunct professor of international affairs at Georgetown University from 1989 to 1996. Dr. Merrill continues to serve as a consultant to the Academies' STEP Program.

PIA ORRENIUS

Pia Orrenius is a vice president and senior economist at the Federal Reserve Bank of Dallas. Dr. Orrenius's research focuses on Mexico–U.S. migration, unauthorized immigration, and U.S. immigration policy. As a labor economist at the Dallas Fed, she analyzes the regional economy, with special focus on labor markets and demographic change. She is also adjunct professor at Baylor University and a Tower Center Fellow at The Tower Center for Political Studies at Southern Methodist University. Dr. Orrenius spent the 2004–2005 academic year as senior economist on the Council of Economic Advisers in the Executive Office of the President, Washington D.C. She holds a PhD in economics from the University of California at Los Angeles and BA degrees in economics and Spanish from the University of Illinois at Urbana–Champaign.

DANIELE PASERMAN

Daniele Paserman is a professor of Economics at Boston University (BU) and a Research Associate at the National Bureau of Economic Research. He completed a PhD in economics at Harvard University, and, before joining BU, was a Senior Lecturer at Hebrew University. His fields of interest are labor economics and public economics. His current research includes work on gender differences in cooperative behavior of U.S. Congress members, the effect of female leadership on firm and employee outcomes in German firms, and intergenerational mobility in the United States in the 19th and early 20th centuries. Previously, he has worked on the effect of the childhood environment on long term socioeconomic outcomes; search in labor and marriage markets, and the cycle of violence in the Palestinian-Israeli conflict. He has also conducted extensive research on the unique episode of mass high-skilled migration from the former

Soviet Union to Israel in the 1990s and beyond, focusing in particular on the dynamic impact migration on native Israelis' wage and employment outcomes; on the productivity of Israeli firms in response to the migration shock; and on the impact of migration on the Israeli school system. His research has been published in many top outlets in economics and political science, and has been featured in the *Financial Times*, *Foreign Policy* and the Freakonomics blog. He is currently the co-editor of the *Journal of the European Economic Association*.

SUBHASH SINGHAL

Subhash Singhal joined the Pacific Northwest National Laboratory (PNNL) in April 2000 after having worked at Siemens Power Generation (formerly Westinghouse Electric Corporation) for over 29 years. At PNNL, Dr. Singhal provided senior technical, managerial, and commercialization leadership to the Laboratory's extensive fuel cell and energy programs. At Siemens Westinghouse, he conducted and/or managed major research, development, and demonstration programs in the field of advanced materials for various energy conversion systems including steam and gas turbines, coal gasification, and fuel cells. From 1984 to 2000, he was manager of Fuel Cell Technology there, and was responsible for the development of high temperature solid oxide fuel cells (SOFCs) for stationary power generation. In this role, he led an internationally recognized group in the SOFC technology and brought this technology from a few-watt laboratory curiosity to fully-integrated 200 kW size power generation systems. He has authored over 100 scientific publications, edited 17 books, received 13 patents, and given over 315 plenary, keynote and other invited presentations worldwide. Dr. Singhal is a member of the U.S. National Academy of Engineering, a Fellow of four professional societies (American Ceramic Society, The Electrochemical Society, ASM International, and American Association for the Advancement of Science (AAAS); and a senior member of the Mineral, Metals & Materials Society (TMS). He served on the Electrochemical Society's Board of Directors during 1992-1994, received its Outstanding Achievement Award in High Temperature Materials in 1994, and continues as the Chairman of its International Symposium on Solid Oxide Fuel Cells held biennially since 1989. He served as president of the International Society for Solid State Ionics during 2003-2005. He received the American Ceramic Society's Edward Orton Jr. Memorial Award in 2001; an Invited Professorship Award from the Japan Ministry of Science, Education and Culture in 2002; and the Christian Friedrich Schoenbein Gold Medal from the European Fuel Cell Forum in 2006. He has served on the editorial boards of the Elsevier's *Journal of Power Sources*, the *Fuel Cell Virtual Journal*, and the ASME's *Journal of Fuel Cell Science and Technology*. He has also served on many national and international advisory panels including those of the National Materials Advisory Board of the National Research Council, National Science Foundation, Materials Properties Council, U.S. Department of Energy, NATO Advanced Study Institutes and NATO

Science for Peace Programs, United Nations Development Program (UNDP), United Nations Industrial Development Organization (UNIDO), International Energy Agency (IEA), and the European Commission. Dr. Singhal is also an adjunct professor in the Department of Materials Science and Engineering at the University of Utah; and serves on the Visiting Advisory Board of the Department of Materials Science and Engineering at the University of Florida and Boston University.

PAULA STEPHAN

Paula Stephan's research interests focus on the careers of scientists and engineers and the process by which knowledge moves across institutional boundaries in the economy. Dr. Stephan currently serves on the National Research Council Board on Higher Education and Workforce. She served on the National Advisory General Medical Sciences Council, National Institutes of Health, 2005-2009 and served on the Advisory Committee of the Social, Behavioral, and Economics Program, National Science Foundation, 2001-2008. She was a member of the European Commission High-Level Expert Group that authored the report "Frontier Research: The European Challenge." She has served on a number of National Research Council committees including the committee on Dimensions, Causes, and Implications of Recent Trends in the Careers of Life Scientists, Committee on Methods of Forecasting Demand and Supply of Doctoral Scientists and Engineers, and the Committee on Policy Implications of International Graduate Students and Postdoctoral Scholars in the United States. Her research has been supported by the Alfred P. Sloan Foundation, the Andrew W. Mellow Foundation, and the National Science Foundation. Dr. Stephan graduated from Grinnell College (Phi Beta Kappa) with a BA in Economics and earned both her MA and PhD in Economics from the University of Michigan. She has been a visiting scholar at Katholeike Universiteit Leuven, Belgium, spring 2005, a Wertheim Fellow, Harvard University, February 2007, and an ICER fellow, Turin, Italy, fall 2009, spring 2011, and fall 2011. She has also been a visiting scholar at the Department of Economics, Cognetti de Martiis, University of Torino, spring 2011 and fall 2011. Dr. Stephan is a research associate, National Bureau of Economic Research. She has published numerous articles in journals such as *The American Economic Review, Science, The Journal of Economic Literature, Economic Inquiry, The International Economic Review* and *Social Studies of Science*. She co-wrote, with Sharon Levin, *Striking the Mother Lode in Science* (Oxford University Press, 1992).

MADELEINE SUMPTION

Madeleine Sumption is the director of the Migration Observatory, with particular expertise in visa policy and the role of migrants in the labor market. Until late 2014, she served as senior policy analyst and director of Research for the International Program at the Migration Policy Institute (MPI)—an independent

research institute headquartered in Washington, DC, with offices in Brussels and the Philippines. Ms. Sumption oversaw the International Program's research agenda and leads MPI's work on the economics of immigration. Her research focuses on the design and implementation work-based visa policies, the role of immigrants in the labor market, and the economic impacts of immigration policies in Europe, North America, and other high-income countries. Her other areas of expertise include immigrants' labor-market integration and international cooperation on mobility (including free movement and the recognition of qualifications). Ms. Sumption is also a nonresident fellow with the Migration Policy Institute Europe. Ms. Sumption's recent publications include *Remaking the US Green Card System* (coauthor); *Rethinking Points Systems and Employer-Selected Immigration* (coauthor)*; Policies to Curb Illegal Employment; Projecting Human Mobility in the United States and Europe for 2020* (Johns Hopkins, coauthor); *Migration and Immigrants Two Years After the Financial Collapse* (BBC World Service and MPI, co-editor and author), *Immigration and the Labor Market: Theory, Evidence and Policy* (Equality and Human Rights Commission, co-author), and *Social Networks and Polish Immigration to the UK* (Institute for Public Policy Research).

MICHAEL S. TEITELBAUM

Michael S. Teitelbaum is a senior research associate at LWP. In 2010, he was a Wertheim Fellow during which he worked on his book on the U.S. science and engineering workforce: *Falling Behind? Boom, Bust, and the Global Race for Scientific Talent* (published by Princeton University Press, 2014). He is a demographer, with research interests that include the causes and consequences of very low fertility rates; the processes and implications of international migration; and patterns and trends in science and engineering labor markets in the United States and elsewhere. He is the author or editor of 10 books and a large number of articles on these subjects. Among his previous roles, he has served as Vice President and Program Directof at the Alfred P. Sloan Foundation, as a faculty member at Princeton University and Oxford University; and as vice chair and acting chair of the U.S. Commission on International Migration. He was educated at Reed College and at Oxford University, where he was a Rhodes Scholar.

JONATHAN WADSWORTH

Jonathan Wadsworth, (PhD (LSE)), is professor of economics at Royal Holloway College, University of London. He is also the deputy director of the Centre for Research and Analysis of Migration at UCL and is a senior research fellow at the LSE's Centre for Economic Performance. Since 2007 Dr. Wadsworth has been one of the five academic economists appointed to the UK Home Office Migration Advisory Committee which is tasked with providing the UK government with independent, evidence-based advice on migration related issues. His main

research interests are in applied labor market analysis in industrial and transition economies. He is the co-editor of the State of Working Britain volumes and the author of many articles examining issues dealing with unemployment, wages, inequality, migration and immigration in Britain, Europe and the U.S. He co-developed the concept and measurement of workless households, since taken up by the ONS, Eurostat and the OECD.

MADELINE ZAVODNY

Madeline Zavodny is professor of Economics at Agnes Scott College in Decatur, Georgia. She is also a research fellow of the Institute for the Study of Labor (IZA) in Bonn, Germany. Her research areas are labor and health economics and economic demography. Much of her research focuses on economic issues related to immigration, including *Beside the Golden Door: U.S. Immigration Reform in a New Era of Globalization* (AEI Press, 2010), co-authored with Dr. Pia Orrenius. She received a BA in economics from Claremont McKenna College and a PhD in economics from the Massachusetts Institute of Technology.

Appendix C

List of Participants

Ayse Deniz Alpay, Northwestern University
Stuart Anderson, National Foundation for American Policy
Jon Beamer, Cognizant
Meg Blume-Kohout, MBK Analytics, LLC
Michael Clemens, Center for Global Development
Stephanie DeLuca, American Chemical Society
Renee Dopplick, Association for Computing Machinery
Ricardo Gambetta, National Immigration Forum
Daniel Goroff, Alfred P. Sloan Foundation
Matt Graham, Bipartisan Policy Center
Melvin Greer, Lockheed Martin
Jong-on Hahm, George Mason University
Russell Harrison, Institute of Electrical and Electronics Engineers, Inc.
Tim Harrison, Migration Advisory Committee (UK)
Derek Hill, National Science Foundation
Ron Hira, Howard University
Xiaochu Hu, University of the District of Columbia
Victoria Jackson, Small Business Administration
Matthew Johnson, McBee Strategic Consulting
Eunhye Kim, American Association for the Advancement of Science
Jeff Lande, The Lande Group
Rosa Lee, George Washington Institute of Public Policy
Keri Moss, American Chemical Society
Suparna Mukherjee, George Washington University
David Raffert, Congressional Budget Office
Neil Ruiz, Brookings Institution
Kirsten Schuettler, World Bank
Edward Schumacher-Matos, National Public Radio
Meredith Singer, IBM
Al Teich, George Washington University
Patrick Thibodeau, Computerworld

Gautham Venugopalan, U.S. Department of State
Max Voegler, German Research Foundation
Philip Webre, Congressional Budget Office
Brad Wible, *Science* Magazine
Andrew Yewdell, Council for Global Immigration