

The background of the entire cover is an abstract network diagram. It features a complex web of black lines of varying thicknesses connecting numerous small black dots, representing nodes. The lines and nodes are distributed across the entire page, creating a sense of interconnectedness and complexity. The overall color palette is a mix of black, white, and light blue.

SHORENSTEIN ASIA-PACIFIC RESEARCH CENTER WORKING PAPER

From Brain Drain to Brain Circulation and Linkage

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Stanford

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International Studies

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A Shorenstein APARC Working Paper

THE WALTER H. SHORENSTEIN ASIA-PACIFIC RESEARCH CENTER

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Over the last two decades, the development community has increased its focus on higher education, recognizing that it can contribute to building up a country's capacity for participation in an increasingly knowledge-based world economy and accelerate economic growth.¹ The value added by higher education to economies—job creation, innovation, enhanced entrepreneurship, and research, a core higher education activity—has been highlighted by an important body of literature.² Figure 1 shows that official development assistance (ODA) toward post-secondary education has improved gradually over time: In 2002, the ODA of Organisation for Economic Co-operation and Development (OECD) countries toward higher education amounted to \$1.71 billion but jumped to \$3.88 billion in 2016, a 232 percent increase.

Nonetheless, experts are still concerned that investing in higher education in less-developed countries (LDCs) may lead to a “brain drain,” where highly educated students and professionals leave their home coun-

1 World Bank, *Cross-Border Tertiary Education: A Way towards Capacity Development* (Washington, DC: The World Bank, 2007).

2 David E. Bloom, Matthew Hartley, and Henry Rosovsky, “Beyond Private Gain: The Public Benefits of Higher Education,” in *International Handbook of Higher Education*, ed. James J.F. Forest and Philip G. Altbach (Dordrecht, Netherlands: Springer, 2007), 293–308.

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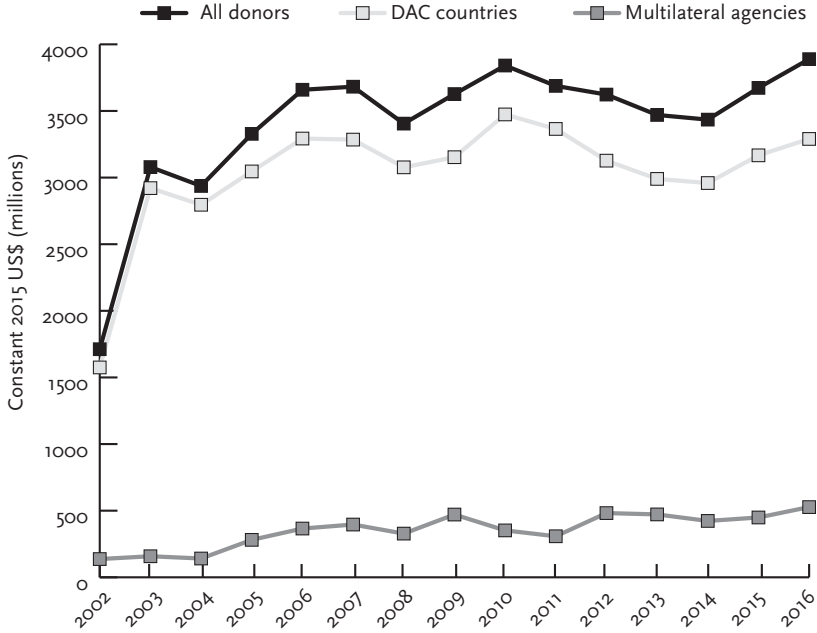


FIGURE 1. Total aid to post-secondary education disbursements, 2002–16

Source: Organization for Economic Cooperation and Development. Creditor Reporting System. Feb. 16, 2018, <https://stats.oecd.org/Index.aspx?DataSetCode=CRS1#>.

tries and never return home. In the most recent 2016 Kauffman report on international science, technology, engineering, and math (STEM) students in the United States, for instance, 48 percent among a randomly sampled survey of 2,322 foreign doctoral students in the United States wished to stay there after graduation, with only 12 percent wanting to leave and 40.5 percent being undecided.³ In fact, as table 1 shows, high percentages of foreign students in the United States with doctorates in science and engineering continue to stay in the United States, creating a brain drain problem for the sending countries.

Because students tend to move from developing to developed countries to study, brain drain is more problematic for developing countries, as shown in table 2. In addition, given accelerated talent flows around the world and the increasing integration of LDCs into global value chains, the negative impact of brain drain could be further amplified. As demonstrated by the studies reviewed in this paper, the migration of high-skilled pro-

3 Xueying Han and Richard P. Appelbaum, *Will They Stay or Will They Go? International STEM Students Are Up for Grabs* (Kauffman Foundation, July 2016).

TABLE 1. Five-year stay rates for foreign students on temporary visas receiving science/engineering doctorates, 2001–11 (select countries, percent)

Country/region	2001	2003	2005	2007	2009	2011
China	98	93	95	94	89	85
India	89	90	89	83	79	82
Europe	53	63	67	67	60	62
Canada	66	63	60	56	53	55
South Korea	22	36	44	42	42	42
Japan	24	39	41	33	40	38
Taiwan	41	48	52	43	37	38
Mexico	31	22	32	33	35	39
Brazil	26	26	31	32	33	37
All countries	58	64	67	63	62	66

Source: Michael G. Finn, Stay Rates of Foreign Doctorate Recipients from U.S. Universities, 2011 (Oak Ridge Institute for Science and Education, 2014).

TABLE 2. Brain drain index for selected developed and developing countries, 2016

Ranking	Country	Brain Drain Index
1	Norway	8.32
2	Switzerland	7.97
3	United States	7.33
...
14	Indonesia	6.24
20	Malaysia	5.72
25	Thailand	5.59
30	India	4.91
38	Mongolia	4.17
42	China Mainland	3.95
44	Philippines	3.77
45	Taipei, China	3.69
46	Republic of Korea	3.60
54	Kazakhstan	2.95

Source: IMD World Competitiveness Center, IMD World Talent Report 2016 (Lausanne, Switzerland: Institute for Management Development, 2016).

Note: Scores range from 0–10; low scores indicate severe brain drain with an absence of educated and skilled individuals, which results in a negative impact on an economy's competitiveness.

professionals from developing countries may indeed create brain drain for them, but at the same time can significantly enhance the social and economic development of their home countries, regardless of whether or not they decide to return home, thus complicating what used to be seen as a straightforward case of brain drain. Against this backdrop, this paper examines how brain drain can contribute to development for the sending countries through brain circulation and linkage (terms to be defined below).

This paper (1) provides an overview of the conceptual framework to map out high-skilled labor flows (brain retention, brain gain, brain circulation, brain linkage), (2) identifies empirical cases and policies in Asia that demonstrate high-skilled migrant professionals actually make significant contributions to their home countries beyond monetary remittances, (3) summarizes key social and economic enabling factors that are important in attracting and motivating migrant high-skilled professionals to return or engage with their home countries, and (4) concludes with policy implications and suggestions for further research based on these findings.

HIGH-SKILLED LABOR FLOWS: A CONCEPTUAL FRAMEWORK

Multiplicity of Brain Power

Nation-states seek to enhance their national brain power in multiple ways and by using various strategies. We conceptualize these strategies into four main areas:

1. **Brain train and retention.** Countries not only educate and train their own citizens, but seek to keep them within national boundaries so they can contribute to the development of their country of origin.
2. **Brain gain.** Countries are not able to produce a sufficient supply of labor for all their economic sectors; they need to import foreign labor using a range of pathways. For instance, countries may import foreign labor directly into the workforce or may choose to first educate foreign students at their higher education institutions before employing them.
3. **Brain circulation.** Most countries also send their young people for education abroad with the goal of bringing them back home. Those returning to their home country with educational or work experience obtained abroad can contribute to its development. This will facilitate the circulation of brain power both geograph-

ically and intellectually. In this report, we define brain circulation to mean permanent return migration.

4. **Brain linkage.** Despite efforts to bring talent back home, some will choose to remain in the host country after education. In the past, this was considered brain drain. However, such students and emigrants who gain footing in the host country may engage with their home countries through business visits or even short-term stays, if not returning permanently. In this report, we define these types of home-host interactions as brain linkage.

While these four areas are distinct conceptually, in reality they are interrelated and overlapping. For instance, brain retention can reduce brain drain, but at the same time might discourage brain circulation. Similarly, brain circulation reduces brain drain, but could also reduce the potential for brain linkage. One can thus gain by losing if brain drain can be converted into brain linkage. Both brain gain and brain circulation contribute human capital to a given nation, but brain drain can enhance brain linkage.

Human Capital vs. Social Capital

As noted above, those who advocate higher education aid have largely focused on its human capital value. While there is no question about the contribution of human capital to development, there has been a significant shift in conceptualizing talent flows from a conventional view that regards labor primarily as human capital, or the totality of education, skills, and experience embodied by individuals, to a new model of labor as social capital, or the productive capacity embodied in the ties and networks linking organizations or individuals. Social capital provides less tangible but equally important benefits, such as enhanced trust and cooperation, information sharing, and improved access to market information and innovations in development.⁴ In a global market economy, transnational social capital, or ties spanning geographic and cultural distance, is particularly valuable and is the focus of this paper.⁵

4 Robert D. Putnam, "Bowling Alone: America's Declining Social Capital," *Journal of Democracy* 6, no. 1 (January 1995): 65–78.

5 Rennie Moon and Gi-Wook Shin, "Aid as Transnational Social Capital: Korea's Official Development Assistance in Higher Education," *Pacific Affairs* 89, no. 4 (December 2016): 817–37.

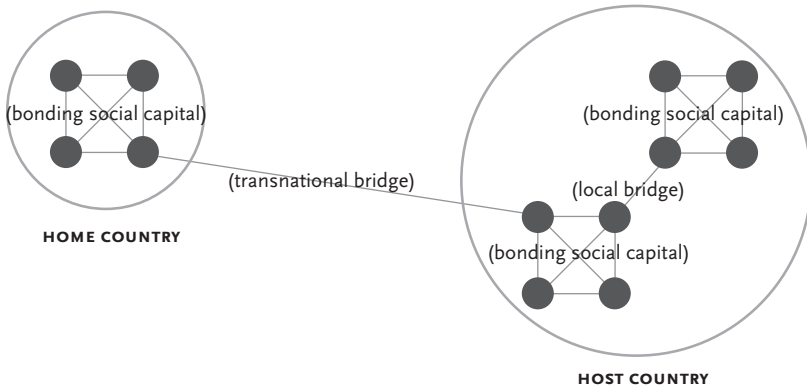


FIGURE 2. Transnational social capital

Source: Adapted from Gi-Wook Shin and Joon Nak Choi, *Global Talent: Skilled Foreigners as Social Capital in Korea* (Stanford, CA: Stanford University Press, 2015).

A Two-Pronged Approach: Brain Circulation and Brain Linkage

Under the conventional human capital approach, the migration of high-skilled professionals is considered a zero-sum game in which the host country receives a net inflow of human capital from the home country, enhancing the competitiveness of the host country at the home country's expense, commonly referred to as "brain drain" for the home country and "brain gain" for the host country. This approach underlies many, if not most, of the policies governing skilled immigration today. Policies that encourage return ethnic migration, or "brain circulation," are also premised on this framework.

In the newly emerging approach, however, mutually beneficial ties (or "brain linkages") between home and host countries create a win-win, positive-sum situation for both sides. Unlike ties linking members of homogeneous groups (bonding social capital) or ties linking members of diverse social groups in the same geographic area (local bridging), transnational social capital connects members of different countries (transnational bridging). This concept is illustrated in figure 2.

From this transnational social capital perspective, brain drain offers an opportunity for brain linkage, although this requires a country to lose first before it can gain, with a certain level of risk involved. Thus, if brain drain can be converted into brain circulation or brain linkage, it will contribute to the social and economic development of a country in areas that homegrown talent alone may not be able to satisfy.

Recently published reports by the Asian Development Bank (ADB) examining labor mobility across ASEAN countries acknowledge that brain

drain has benefits, but only insofar as it can be converted into brain circulation.⁶ For example, the ADB report states, “In a globally connected world, the departure of skilled nationals is neither necessarily permanent nor a net drain, at least in the long run. Many return with new skills, financial and social capital, and access to valuable business and educational networks.” Others also have acknowledged the positive effects of brain circulation, or skill mobility, within the ASEAN community.⁷ However, these reports do not examine in detail how there could still be benefits stemming from the permanent non-return of high-skilled individuals, as we address here.

Beyond Monetary Remittances

Earlier studies on the positive returns from emigration for source countries emphasized the role of emigrants’ monetary remittances. However, cross-national studies examining the relationship between remittances and economic performance are inconclusive, with some studies finding a positive relationship⁸ and others finding no relationship or even a negative relationship.⁹ For example, a cross-national study of seventy-one developing countries showed that a 10 percent increase in per capita official international remittances produced a 3.5 percent decline in the share of people living in poverty.¹⁰ Other research also finds that migration and remittance receipts are positively correlated with various types of household investments in developing countries, including entrepreneurship and small business investment.¹¹ Some positive examples include agricultural

6 Jeanne Batalova, Andriy Shymonyak, and Guntur Sugiyarto, *Firing Up Regional Brain Networks: The Promise of Brain Circulation in the ASEAN Economic Community* (Manila, Philippines: Asian Development Bank, 2017).

7 Demetrios G. Papademetriou, Guntur Sugiyarto, Doreen Rannveig Mendoza, and Brian Salant, *Achieving Skill Mobility in the ASEAN Economic Community: Challenges, Opportunities and Policy Implications* (Manila, Philippines: Asian Development Bank, 2016).

8 Adolfo Barajas et al. *Do Workers’ Remittances Promote Economic Growth?* IMF Working Paper WP 09/153 (Washington: International Monetary Fund, July 2009).

9 Paola Giuliano and Marta Ruiz-Arranz, “Remittances, Financial Development, and Growth,” IMF Working Paper 05/234 (Washington: International Monetary Fund, 2005).

10 Richard H. Adams, Jr. and John Page, “Do International Migration and Remittances Reduce Poverty in Developing Countries?” *World Development* 33, no. 10 (October 2005): 1645–69.

11 Christopher Woodruff and Rene Zenteno, “Migrant Networks and Microen-

investment in Pakistan¹² and China¹³ and schooling investments in El Salvador and Guatemala.¹⁴ However, other studies also argue that remittances rarely fund productive investments, and instead mainly allow higher consumption.¹⁵

With the increasing importance of high-skilled migration, research has paid growing attention to migrants' contributions to home country development beyond monetary remittances. In particular, knowledge transfer or "knowledge remittances," either directly through brain circulation or indirectly, through networks, has been an important focus of such research. To facilitate such knowledge remittances, it has been noted that countries need to send out educated and talented people abroad even at the risk of losing some of them, i.e. brain drain.

Global Value Chains and Talent Flows

With globalization, the number of international migrants worldwide has continued to grow rapidly over the past fifteen years, reaching 244 million in 2015, up from 173 million in 2000. High-income countries host more than two-thirds of all international migrants. Figure 3 shows that as of 2015, 71 percent of all international migrants (or 171 million) worldwide lived in high-income countries. Only 29 percent (or 71 million) of the world's migrants lived in middle or low-income countries. Between 2000 and 2015, Asia added more international migrants to this growth than any other major region.¹⁶ It is therefore inevitable that many countries,

terprises in Mexico," *Journal of Development Economics* 82, no. 2 (March 2007): 509–28.

12 Richard H. Adams, Jr., "Remittances, Investment, and Rural Asset Accumulation in Pakistan," *Economic Development and Cultural Change* 17, no. 1 (October 1998): 155–73.

13 J. Edward Taylor, Scott Rozelle, and Alan de Brauw, "Migration and Incomes in Source Communities: A New Economics of Migration Perspective from China," *Economic Development and Cultural Change* 52, no. 1 (October 2003): 75–101.

14 Richard H. Adams, Jr., "Remittances, Household Expenditure and Investment in Guatemala," in *International Migration, Remittances, and the Brain Drain*, eds. Çağlar Özden and Maurice Schiff (Washington, DC: World Bank, 2006); Alejandra Cox-Edwards and Manuelita Ureta, "International Migration, Remittances, and Schooling: Evidence from El Salvador," *Journal of Development Economics* 72, no. 2 (2003): 429–61.

15 Richard P.C. Brown and Dennis A. Ahlburg, "Remittances in the South Pacific," *International Journal of Social Economics* 26, nos. 1, 2, 3 (1999): 325–44.

16 United Nations, *International Migration Report 2015*, ST/ESA/SER.A/375 (New York: United Nations, 2016).

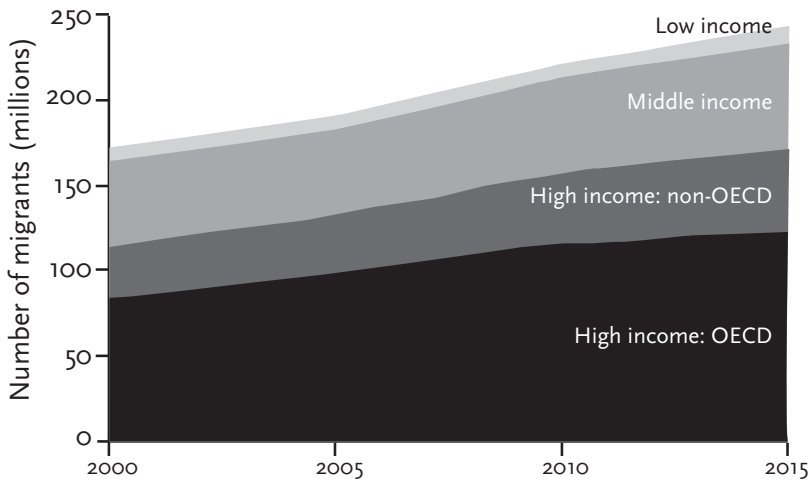


FIGURE 3. Number of international migrants by income group of country or area of destination, 2000–15

Source: United Nations, International Migration Report 2015, ST/ESA/SER.A/375 (New York: United Nations, 2016).

especially LDCs, will lose some of their talent to more advanced countries. However, the answer is not to hold domestic talent back from studying or working overseas, as this will only isolate LDCs from the global economy. Rather, what is most important is to find ways of converting possible brain drain into the kind of brain circulation and linkage that we advocate here.

Under globalization, both brain circulation and brain linkage will become more important in LDCs because what they lack in accelerating economic growth is not only human capital, but also and more importantly, ties to the center of development and integration into global value chains. In today's world of greater labor flows and mobility, developing countries have, through migration, greater opportunities than in the past to connect themselves to the most economically advanced countries of the world economy. Although brain circulation remains an important approach, brain linkage emerges as another useful concept for LDCs in the current global economy. High-skilled emigration generates positive network externalities, such as increased trade, capital flows, and technology transfers to developing countries.¹⁷

17 Frédéric Docquier and Hillel Rapoport, "Globalization, Brain Drain, and Development," *Journal of Economic Literature* 50, no. 3 (September 2012): 681–730.

EMPIRICAL CASE STUDIES

Taiwan

In the 1960s, Taiwan was a developing country suffering from severe brain drain, especially in the sciences and engineering.¹⁸ During the 1970s and early 1980s, at the peak of Taiwan's brain drain, an estimated 20 percent of Taiwanese college graduates studied abroad and few returned—in 1979, for example, only 8 percent of students who studied abroad returned.¹⁹ In the 1990s, although more Taiwanese returned home after graduation, table 1 shows that 41 percent of Taiwanese on temporary visas who graduated in 1996 were still in the United States in 2001.

The government of Taiwan played an active role in fostering the development of the semiconductor and electronics industries through, for example, the creation of a public industrial research institution (the Industrial Technology Research Institute) and establishment of the Hsinchu Science Industrial Park. In the late 1980s, many U.S.-educated Taiwanese engineers began to return home, through active government recruitment and opportunities created by such infrastructures, resulting in a reverse brain drain. By 1987, 20 percent of the executives of large Taiwanese firms were former migrants. Companies in the park employed 102,000 people and generated \$28 billion in sales in 2000. In 2000, 113 of the park's 289 companies were started by U.S.-educated Taiwanese, and 478 of the returnees held PhDs.²⁰ Returnees became important investors and entrepreneurs, particularly in the design sector.²¹

While brain circulation had been dominant, brain linkages became important as a growing cohort of highly mobile Taiwan-born, U.S.-educated engineers also began to work in the United States and Taiwan, regularly commuting across the Pacific even though they did not return permanently. Saxenian describes these "argonauts" as possessing the professional contacts and language skills to function fluently in both Silicon Valley and Taiwanese business cultures, acting as bridges between and

18 Charles P. Kindleberger, "Study Abroad and Migrations," in *The Brain Drain*, ed. Walter Adams (New York: Macmillan, 1968): 151–53.

19 Kevin O'Neil, "Brain Drain and Gain: The Case of Taiwan," Migration Policy Institute, September 1, 2003, <http://www.migrationpolicy.org/article/brain-drain-and-gain-case-taiwan>.

20 O'Neil, "Brain Drain and Gain: The Case of Taiwan."

21 Martin Kenney, Dan Breznitz, and Michael Murphree, "Coming Back Home After the Sun Rises: Returnee Entrepreneurs and Growth of High Tech Industries," *Research Policy* 42, no. 2 (March 2013): 391–407.

contributing to the reciprocal industrial upgrading of the two regional economies.²² The importance of both returnees and diaspora in the success of Taiwan's information and communication technology (ICT) industries is well documented.²³

China

When China liberalized its economy after 1978, Deng Xiaoping, under his "open door" policy, began sending three thousand students abroad annually, particularly to the United States, and overseas education expanded rapidly during the 1980s. However, less than 10 percent returned.²⁴ Among PhD graduates in science and engineering in the United States in 1995, 88 percent of those from China remained employed in the United States.²⁵ By 1997, only 32 percent (94,000) of the 293,000 Chinese who had gone abroad since 1987 had returned. Nearly 96 percent of self-funded students studying abroad remained abroad after finishing their studies.²⁶ In the 1980s, China did not have the absorptive capacity, lacking even experienced former students ready to return and catalyze growth. Overseas scholars, now with work experience, did not begin returning until the late 1990s, once economic reforms and growth as well as political stability had reached a certain level. Those with advanced degrees in science and engi-

22 Annalee Saxenian, "Transnational Communities and the Evolution of Global Production Networks: The Cases of Taiwan, China and India," *Industry and Innovation* 9, no. 3 (2002): 183–202; Annalee Saxenian and Jinn-Yuh Hsu, "The Silicon Valley–Hsinchu Connection: Technical Communities and Industrial Upgrading," *Industrial and Corporate Change* 10, no. 4 (December 2001): 893–920.

23 John A. Mathews and Dong-Sung Cho, *Tiger Technology: The Creation of a Semiconductor Industry in East Asia* (Cambridge: Cambridge University Press, 2000); John A. Mathews, "Electronics in Taiwan—A Case of Technological Learning," in *Technology, Adaptation and Exports: How Some Developing Countries got it Right*, ed. Vandana Chandra (Washington, DC: World Bank, 2006): 83–126; Annalee Saxenian, *The New Argonauts: Regional Advantage in a Global Economy* (Cambridge, MA: Harvard University Press, 2006); Yeo Lin and Rajah Rasiah, "Human Capital Flows in Taiwan's Technological Catch Up in Integrated Circuit Manufacturing," *Journal of Contemporary Asia* 44, no. 1 (June 2013): 64–83.

24 David Zweig, "Competing for Talent: China's Strategies to Reverse the Brain Drain," *International Labour Review* 145 nos. 1–2 (March 2006): 65–90.

25 Nancy Gore Saravia and Juan Francisco Miranda, "Plumbing the Brain Drain," *Bulletin of the World Health Organization* 82, no. 8 (August 2004): 608–15.

26 David Zweig and Stanley Rosen, "How China Trained a New Generation Abroad," *SciDev.Net*, May 22, 2003, <http://www.scidev.net/global/migration/feature/how-china-trained-a-new-generation-abroad.html>.

neering from U.S. universities still have high stay rates. Table 1 shows that 85 percent of Chinese on temporary visas who graduated in 2006 were still in the United States in 2011.

As in Taiwan, only once the ICT industry was established and demand for new services and businesses was created did Chinese educated and working abroad begin returning in the 1990s. By 2007, the overall rate of return had increased to 30 percent and accelerated as China's economy offered more and better opportunities for emigrants with overseas education and experience.²⁷ Of the 1.9 million Chinese who had studied overseas between 1978 and 2010, 33 percent had returned to China.²⁸ A record 409,100 Chinese students returned from overseas in 2015, bringing the total number of returnees to 2.2 million, as shown in figure 4. While the government primarily targeted brain circulation in its early policies, lack of state resources for incentivizing permanent return led the government to offer temporary, or half-time return options for its diaspora, encouraging Chinese abroad to return only for short periods of time but still contribute while living abroad.²⁹ Through such short-term stays or frequent visits, Chinese-born engineers in Silicon Valley were also actively connecting with China, accelerating industrial upgrading.³⁰ Eventually, as China underwent rapid economic growth, the government ended up investing in a changing combination of both permanent and temporary programs. A growing body of quantitative and qualitative research shows the positive and subtle contributions of China's national programs. For example, using panel data for 1,318 high-tech firms in Beijing's Zhongguancun Science Park (ZSP), Filatotchev et al. find that returnee entrepreneurs create a significant spillover effect that promotes innovation in other local high-tech firms (measured as patents per employee of a firm).³¹ Zweig, Chen,

27 Jonathan Watts, "China Fears Brain Drain as its Overseas Students Stay Put," *The Guardian*, June 1, 2007, <http://www.guardian.co.uk/world/2007/jun/02/international-education-news.higher-education>.

28 Xinhua, "More Chinese Overseas Students Return Home in 2010," Xinhua.com, 2011. Retrieved from <http://news.xinhuanet.com/english2010/china/2011-03/11/c13773804.htm>.

29 David Zweig, Chen Changgui, and Stanley Rosen, "Globalization and Transnational Human Capital: Overseas and Returnee Scholars to China," *The China Quarterly* 179 (September 2004): 735–57.

30 AnnaLee Saxenian, "From Brain Drain to Brain Circulation: Transnational Communities and Regional Upgrading in India and China," *Studies in Comparative International Development* 40, no. 2 (June 2005): 35–61.

31 Igor Filatotchev, Xiaohui Liu, Jiangyong Lu, and Mike Wright, "Knowledge Spill-

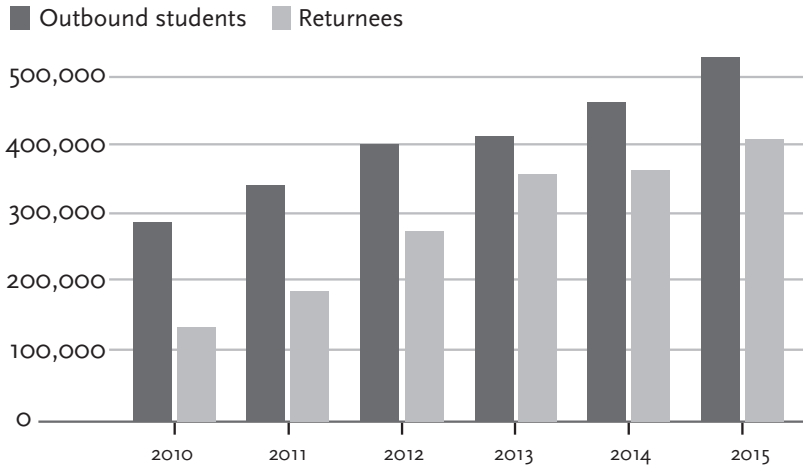


FIGURE 4. Number of Chinese outbound students and returnees, 2010–15

Source: ICEP Monitor, “A Record Number of Chinese Students Abroad in 2015 but Growth is Slowing,” April 6, 2016, <http://monitor.icef.com/2016/04/a-record-number-of-chinese-students-abroad-in-2015-but-growth-is-slowing/>.

and Rosen show that returnees in high-tech zones, compared to people in the zones who had not been overseas, were more likely to be importing technology and capital, and to be using that technology to target the domestic market.³²

India

India has experienced a brain drain of its most highly skilled over the last three decades. The number and percentage of international students from India in the United States has significantly grown over time (see table 3). India is now the second-largest provider of international students to the United States after China, with 165,918 Indian students (15.9 percent) studying in the United States in 2015–16.³³ In 2011, there were more than one million Indian-born workers in the United States, mostly working in

overs through Human Mobility across National Borders: Evidence from Zhongguancun Science Park in China,” *Research Policy*, 40, no. 3 (April 2011): 453–62.

32 Zweig, Chen, and Rosen, “Globalization and Transnational Human Capital.”

33 Institute of International Education, “International Students by Academic Level and Place of Origin, 2000/01.” *Open Doors Report on International Educational Exchange*, 2001. <http://www.iie.org/opendoors>.

TABLE 3. Top ten international student countries of origin, select years

SY 1949–50			SY 1979–80			SY 2014–15		
Country	Number	Share (%)	Country	Number	Share (%)	Country	Number	Share (%)
Total	26,400	100.0	Total	286,000	100.0	Total	975,000	100.0
Canada	4,400	16.5	Iran	51,000	17.9	China	304,000	31.2
Taiwan	3,600	13.8	Taiwan	18,000	6.1	India	133,000	13.6
India	1,400	5.1	Nigeria	16,000	5.7	South Korea	64,000	6.5
UK	800	3.1	Canada	15,000	5.3	Saudi Arabia	60,000	6.1
Mexico	800	3.1	Japan	12,000	4.3	Canada	27,000	2.8
Cuba	700	2.8	Hong Kong	10,000	3.5	Brazil	24,000	2.4
Philippines	700	2.7	Venezuela	10,000	3.4	Taiwan	21,000	2.2
Germany	700	2.5	Saudi Arabia	10,000	3.3	Japan	19,000	2.0
Colombia	600	2.2	India	9,000	3.1	Vietnam	19,000	1.9
Iran	600	2.2	Thailand	7,000	2.3	Mexico	17,000	1.7
Other countries	12,100	46.0	Other countries	129,000	45.1	Other countries	288,000	29.5

Source: Adapted from table 2 in Jie Zong and Jeanne Batalova, “International Students in the United States,” Migration Policy Institute, May 12, 2016. [http://www.migrationpolicy.org/article/international-students-united-states#Country of Origin](http://www.migrationpolicy.org/article/international-students-united-states#Country%20of%20Origin).

information technology, management, business, and finance (see table 4).³⁴ Between 1995 and 1998, Indians ran 9 percent of all Silicon Valley start-up companies, nearly 70 percent of which were in the software sector.³⁵ By the late 1990s, Indians made up 28 percent of Silicon Valley’s software and engineering talent and were founders of iconic firms, such as Sun Microsystems (Vinod Khosla), Brocade (Kumar Malavalli), Cirrus Logic (Suh-as Patil) and Hotmail (Sabeer Bhatia).³⁶ Indians with advanced degrees in science and engineering from U.S. universities also have high stay rates. Table 1 shows that 82 percent of Indians on temporary visas who graduated in 2006 were still in the United States in 2011.

As in China and Taiwan, strong government development initiatives such as the establishment of the Bangalore Software and Technology Parks

34 Monica Whatley and Jeanne Batalova, “Indian Immigrants in the United States,” Migration Policy Institute, August 21, 2013. <http://www.migrationpolicy.org/article/indian-immigrants-united-states-o>.

35 AnnaLee Saxenian, *Silicon Valley’s New Immigrant Entrepreneurs* (San Francisco: Public Policy Institute of California, 1999).

36 Amba Pande, “The Role of Indian Diaspora in the Development of the Indian IT Industry,” *Diaspora Studies* 7, no. 2 (2014): 121–29.

TABLE 4. Number of employed indian workers in the U.S. workforce (ages 16–64) by gender and industry, 2011 (number and percentage)

	Indian-born		Foreign-born	
	Male	Female	Male	Female
Number of persons ages 16–64 employed in civilian labor force	717,000	415,000	12,892,000	9,580,000
Industry breakdown				
Management, business, finance	21.4	19.2	10.5	10.6
Information technology	29.3	15.5	4.6	2.2
Other sciences and technology	9.5	5.3	3.8	2.0
Social services and legal	0.8	1.3	1.0	1.9
Education, training, media, and entertainment	4.3	8.0	3.6	7.2
Physicians, surgeons, dentists, and podiatrists	4.2	5.3	0.5	3.7
Registered nurses	0.4	5.3	0.5	3.7
Other healthcare practitioners	2.0	5.5	1.2	3.2
Healthcare support	0.4	2.1	0.8	5.9
Service and personal care	4.1	5.8	19.1	26.9
Sales	10.6	11.3	7.7	10.0
Administrative support	4.1	10.3	5.4	13.4
Farming, fishing, forestry	0.1	0.1	2.9	1.2
Construction, extraction, transportation	4.9	1.4	23.6	3.1
Manufacturing, installation, repair	3.8	3.8	14.2	7.6
Total	100.0	100.0	100.0	100.0

Source: Monica Whatley and Jeanne Batalova, “Indian Immigrants in the United States,” Migration Policy Institute, August 21, 2013, <http://www.migrationpolicy.org/article/indian-immigrants-united-states-0#19>.

of India (STPI) and waves of liberalization of regulations, along with the simultaneous takeoff of the Indian economy, were instrumental in promoting brain circulation. Several works have documented the significant role of Indian returnees in building the Indian information technology (IT) industry that took place since the 1990s.³⁷ Indians in the United States returned to India to start IT research and development (R&D) laboratories (e.g., the IBM India Research Laboratory established in 1998), and others to supervise U.S. investments and outsourcing contracts and to train and manage Indian professionals to U.S. efficiency and standards.³⁸ U.S.-edu-

37 Saxonian, *The New Argonauts*; Ramana Nanda and Tarun Khanna, “Diasporas and Domestic Entrepreneurs: Evidence from the Indian Software Industry,” *Journal of Economics & Management Strategy* 19, no. 4 (November 2010): 991–1012; Devesh Kapur, *Diaspora, Development, and Democracy: The Domestic Impact of International Migration from India* (Princeton and Oxford: Princeton University Press, 2010).

38 Abhishek Pandey, Alok Aggarwal, Richard Devane, and Yevgeny Kuznetsov, “The Indian Diaspora: A Unique Case?” in *Diaspora Networks and the International Mi-*

cated Indian engineers with companies in Silicon Valley even moved part of their operations to Bangalore, with several highly skilled expatriate Indians returning to start software services firms in Bangalore.³⁹

India's large, highly skilled diaspora played an especially active role in setting up formal networks that promoted brain linkages, such as the The Indus Entrepreneur (TiE), the Silicon Valley Indian Professionals Association, the National Association of Software and Service Companies (NASSCOM) and the America-India Foundation (AIF).⁴⁰ TiE, originally intended as a Silicon Valley organization to facilitate mentoring of promising, young, expatriate IT professionals, soon developed into a worldwide network of Indian professionals that yielded substantial influence. Saxenian's survey of 2,273 Indian immigrant professionals in Silicon Valley conducted in 2001 found that 80 percent of the Indian respondents exchanged information on American jobs or business opportunities with people in India, 67 percent served as an advisor or helped to arrange business contracts, and 18 percent invested their own money in start-ups or venture funds in India.⁴¹ Nanda and Khanna, using a survey conducted in 2004 and based on the responses ($n=218$) of the CEOs of firms of India's main software association, NASSCOM, showed that entrepreneurs who had previously lived abroad (and thus have an easier time accessing expatriate networks) relied significantly more on diaspora networks for business leads and financing, especially when their companies were based outside the software hubs—in cities with weak networking institutions, limited access to bank finance, and weak indigenous support.⁴²

Republic of Korea

Throughout the 1950s and 1960s, large numbers of highly educated Koreans left South Korea to pursue their studies abroad, with very few returning home. In 1964–65, 2,604 Korean students were studying abroad in the

gration of Skills: How Countries Can Draw on Their Talent Abroad, ed. Yevgeny Kuznetsov (Washington, D.C.: World Bank, 2006): 71–97.

39 Pande, “The Role of Indian Diaspora in the Development of the Indian IT Industry.”

40 Hillel Rapoport, “Migration and Globalization: What’s in it for Developing Countries?” *International Journal of Manpower* 37, no. 7 (2016): 1209–26.

41 AnnaLee Saxenian, *Local and Global Networks of Immigrant Professionals in Silicon Valley*, Public Policy Institute of California, April 2002.

42 Ramana Nanda and Tarun Khanna, *Diasporas and Domestic Entrepreneurs: Evidence from the Indian Software Industry*, Harvard Business School Working Paper No. 08–003, February 5, 2009.

United States.⁴³ In 1967, the percentages of non-returning students were as high as 87, 96.7, and 90.5 percent among Korean engineers, natural scientists, and social scientists, respectively. A weak industrial base, poor R&D infrastructure, and the limited capacities of higher educational institutions offered neither employment opportunities nor incentives for return.⁴⁴ It was not until the 1970s when Korea was able to attract them back, at a time when the country's economic development was taking off. Although not as high as in the past, Koreans with advanced degrees in science and engineering from U.S. universities still have high stay rates (see table 1).

The South Korean government, with strong industry development strategies, targeted premier R&D institutes to support specific industries, and hence aimed to recruit the best to return home. Through such concerted government efforts, South Korea was able to recruit back many ethnic Korean scientists living in industrial countries, especially in the United States. Between 1966 and 1975, Korea recruited about 250 Korean scientists from the United States, and some 27,000 PhD holders returned to South Korea from 1982 to 2003.⁴⁵ Among PhD graduates in science and engineering in the United States in 1995, only 11 percent of students from Korea who received their doctoral degree during the same year remained in the United States.⁴⁶ Government-endowed, public-sector R&D institutions brought another 1,002 scientists and engineers back home under their own sponsorship during the 1981–86 period.⁴⁷

Following the 1997–98 financial crisis, in what represented a departure from the traditional view of overseas Koreans as having abandoned or deserted their home country, the South Korean government supplemented their brain circulation strategies with brain linkage efforts, establishing worldwide business networks among the Korean diaspora. To engage the Korean diaspora in South Korea's development, the government established the Overseas Korean Foundation in 1997, followed in 1998 by the Overseas Koreans Law, which entitled overseas Koreans to visa-free

43 Institute of International Education, "All Places of Origin of International Students, Selected Years: 1949/50-1999/00," *Open Doors Report on International Educational Exchange*, 2009. <http://www.iie.org/opendoors>.

44 Bang-Song L. Yoon, "Reverse Brain Drain in South Korea: State-Led Model," *Studies in Comparative International Development* 27, no. 1 (March 1992): 4–26.

45 Hye-Kyung Lee, "The Korean Diaspora and Its Impact on Korea's Development," *Asian and Pacific Migration Journal* 14, nos. 1–2 (2005): 149–68.

46 Saravia and Miranda, "Plumbing the Brain Drain."

47 Yoon, "Reverse Brain Drain in South Korea: State-Led Model."

entry, longer stays, the ability to buy and sell land and other properties, and to work in Korea in high-skilled professional or managerial jobs. The government also eased restrictions for foreign direct investment by foreigners in general, and by overseas Koreans in particular.⁴⁸ Shin and Choi, from their survey of 126 Korean American and Korean Canadian students, show that many express a below-average interest in living in Korea long term or working for Korean firms, but an above-average desire to work with Koreans, suggesting their potential as transnational social capital. Through personal accounts, Shin and Choi show that Korean Americans decided to relocate temporarily for a few years and work at major Korean firms because of their unique position and desire to make an impact by contributing foreign know-how and the expertise they accumulated while working in the United States.⁴⁹

Less-Developed Economies

As table 2 shows, LDCs tend to rank low on indices of brain drain, leading to low levels of brain circulation or linkage. The impact of returnees and diasporas on economic growth in recent LDCs has been less studied but is still quite well documented. For example, Pham's study on Vietnam argues that the emergence of an integrated Vietnamese diaspora network—a combination of formal organizations and existing informal networks—has facilitated greater investment, flow, and knowledge exchange between the Vietnamese Diaspora and Vietnam. In 2007, Viet Kieu foreign direct investment totaled only \$89 million, while official financial remittances significantly exceeded investment at \$7.1 billion.⁵⁰ In the case of Afghanistan, Kuschminder finds that diasporic temporary returnees were most effective in forms of tacit knowledge transfer and that the knowledge transfer process effectively led to capacity building in Afghanistan.⁵¹ Riddle and Brinkerhoff, in their case study of Nepal, demonstrate how institutional acculturation can inspire a diasporic entrepreneur to transform institutional arrangements in his or her country of origin and generate

48 Lee, "The Korean Diaspora and its Impact on Korea's Development."

49 Shin and Choi, *Global Talent*.

50 Andrew T. Pham, *The Returning Diaspora: Analyzing Overseas Vietnamese (Viet Kieu): Contributions toward Vietnam's Economic Growth*. Working Paper Series No. 2011/20, November 27, 2010. http://depocenwp.org/upload/pubs/AndrewPham/VK%20contributions%20to%20VN%20growth_APham_DEPOCENWP.pdf.

51 Katie Kuschminder, "Knowledge Transfer and Capacity Building through the Temporary Return of Qualified Nationals to Afghanistan," *International Migration* 52, no. 5 (March 2013): 191–207.

dramatic change in society's role expectations of the government, suppliers, and buyers.⁵² Similarly, in a study of high-skilled Filipino migrants in New Zealand and Australia, Siar shows that these migrants are heavily involved in contributing "knowledge remittances" to their home country.⁵³

Cross-National Studies on LDCs

A growing body of evidence has demonstrated the impact of high-skilled migrants on development using a number of measures, including increased trade between the source and destination countries, diaspora investment (e.g., foreign direct investment, indirect [portfolio] investment through stocks, bonds, and deposit accounts), and skills and knowledge transfers.⁵⁴

Quantifying the effects of skills and knowledge transfers has been particularly difficult. A group of studies have used inventor data to capture the positive knowledge spillover effects of migration in origin countries and has revealed mixed results. Some studies show positive results, such as high-skilled migrants having a high propensity to collaborate with home country counterparts and being associated with increased trade, inventive activities, and direct investment by multinational corporations in their home country.⁵⁵ A recent study by Miguélez that focuses on developing countries found a strong positive relationship between co-patenting activities between pairs of developed-developing countries and the stock of migrants from that particular developing nation living in the host developed nation. More specifically, a 10 percent increase in the inventor diaspora in a given developed country leads to a 2.1 percent increase in international patent co-inventorship between that economy and the home economy—and these results are not driven by the U.S.-India or U.S.-China relationship.⁵⁶

52 Liesl Riddle and Jennifer Brinkerhoff, "Diaspora Entrepreneurs as Institutional Change Agents: The Case of Thamel.com," *International Business Review* 20, no. 6 (December 2011): 670–80.

53 Sheila V. Siar, "Skilled Migration, Knowledge Transfer and Development: The Case of the Highly Skilled Filipino Migrants in New Zealand and Australia," *Journal of Current Southeast Asian Affairs* 30, no. 3 (2011): 61–94.

54 Kathleen Newland and Sonia Plaza, *What We Know About Diasporas and Economic Development*, Policy Brief No. 5. (Washington, D.C: Migration Policy Institute, September 2013).

55 Rapoport, "Migration and Globalization: What's in it for Developing Countries?"; David Leblang, "Familiarity Breeds Investment: Diaspora Networks and International Investment," *American Political Science Review* 104, no. 3 (August 2010): 584–600.

56 Ernest Miguélez, "Inventor Diasporas and the Internationalization of Technolo-

Other studies, while finding evidence of close ties between migrant inventors of the same origin, find that they do not automatically translate into technology transfer to the home country.⁵⁷ This may be due to the limitations of patent data, which may not capture the direct or indirect contributions of the high-skilled diaspora. Qualitative studies, in contrast, suggest that there may be non-tangible social capital contributions of high-skilled diaspora that are not easily captured by quantitative studies. For example, Meyer and Wattiaux identify 159 networks of high-skilled emigrants from developing countries worldwide and find that having diaspora networks is highly associated with direct and indirect participation of high-skilled expatriates in their home countries' innovation activities through technology and skills/knowledge exchange platforms, such as innovation fairs, periodic summits, conferences, and workshops held in their home countries.⁵⁸ Other studies show that while returnees and diaspora do not always act as a direct source of knowledge transfer, they may still support foreign investments in their home countries through indirect activities such as references, advice, and brokerage.⁵⁹

ENABLING FACTORS

What are the economic and social factors that are important in attracting or motivating migrant high-skilled professionals from developing countries to return home or engage with their home countries while staying abroad in the host country? Research has identified the following factors as crucial.⁶⁰

gy," *The World Bank Economic Review* (2016): 1–23. doi:10.1093/wber/lhwo13.

57 Paul Almeida, Anupama Phene, and Sali Li, "The Influence of Ethnic Community Knowledge on Indian Inventor Innovativeness," *Organization Science* 26, no. 1 (September 2014): 198–217; Tufool Alnuaimi, Tore Opsahi, and Gerard George, "Innovating in the Periphery: The Impact of Local and Foreign Inventor Mobility on the Value of Indian Patents," *Research Policy* 41, no. 9 (November 2012): 1534–43.

58 Jean-Baptiste Meyer and Jean-Paul Wattiaux, "Diaspora Knowledge Networks: Vanishing Doubts and Increasing Evidence," *International Journal on Multicultural Societies* 8, no. 1 (2006): 4–24.

59 Stefano Breschi, Francesco Lissoni, and Claudia Noumedem Temgoua, "Migration and Innovation: A Survey of Recent Studies," in *Handbook on the Geographies of Innovation*, ed. Richard Shearmur, Christophe Carrincazeaux, and David Doloreux, (Northampton, MA: Edward Elgar Publishing, 2016), 382–97.

60 Kathleen Newland and Hiroyuki Tanaka, *Mobilizing Diaspora Entrepreneurship*

Economic Opportunities

Economic opportunities and incentives are key to promoting the brain circulation and brain linkage of individuals who have upgraded their skills abroad.⁶¹ Permanent return migration is more likely in countries undergoing robust economic growth with an adequate, scientific, technological, and business environment. In the cases of both Taiwan and South Korea, capacity building through domestic investment in R&D programs in turn created the demand for advances in science and technology, leading to the development of science and technological career pathways and increased employment.⁶² However, short-term programs can be more effective than permanent return programs, and require relatively fewer resources. In fact, Zweig's study shows that in the early years of Chinese economic growth, the diaspora was easier to entice as half-time returnees (a brain linkage logic) rather than as full-time returnees (a brain circulation logic), due to the lack of economic opportunities and resources.

These same cases show that brain circulation alone was insufficient or resulted in undersubscribed programs because some migrants abroad were interested in engaging their home countries but did not want to permanently return. As a result, governments supplemented brain circulation with brain linkage. The early version of the Changjiang Scholars Program under the Chinese Ministry of Education, for example, required that returnees return permanently to work in China; but facing undersubscribed programs, a part-time option was created, which immediately became popular. Of the original 501 people who joined the program by 2011, 74.7 percent were academics and researchers, among whom over 73.5 percent were part-time participants.⁶³

Good Governance

Studies show that there are strong correlations between good governance, entrepreneurship, and economic growth, and that returnees and diaspora are more likely to invest in countries with low levels of corruption and

for Development (Washington, DC: Migration Policy Institute, October 2010).

61 Leora Klapper, Raphael Amit, Mauro F. Guillen, and Juan Manuel Quesada, *Entrepreneurship and Firm Formation across Countries* (Washington, DC: World Bank, November 2007); OECD, *International Mobility of the Highly Skilled*, OECD Observer Policy Brief, 2002.

62 Saravia and Miranda, "Plumbing the Brain Drain."

63 David Zweig, Kang Siqin, and Wang Huiyao, "The Best Are Yet to Come: State Programs, Institutional Culture and Reverse Migration of High-Level Talent to China." Unpublished manuscript, 2017.

ones where there are well-functioning public institutions. Governments should, at a minimum, establish the basics of good governance, including the rule of law, property rights, and open and transparent government.⁶⁴ In a study of the contributions of diasporans to Afghanistan, China, and the Philippines, high-skilled diasporans from all three countries indicated that democracy and development in the homeland are key factors that affected their decision to not only return but also contribute from overseas.⁶⁵

A Critical Mass of Human and Social Capital

A developed indigenous scientific community is a prerequisite to brain circulation.⁶⁶ Governments such as those of China, Taiwan, South Korea, and India have invested heavily in higher education and have worked to establish economic clusters or “hot spots” of technological and educational institutions (such as advanced science and engineering colleges and research labs) that promote professional growth.⁶⁷ Higher education institutions in LDCs certainly experience brain drain in the earlier stages of their establishment, but are still crucial in building a critical mass of human and social capital necessary for brain circulation and brain linkages to catalyze economic growth. Here, too, building brain linkages in the earlier stages of higher education development may be more feasible than pushing a brain circulation approach from the outset when absorptive capacity is low.

64 Newland and Tanaka, *Mobilizing Diaspora Entrepreneurship for Development*.

65 Clay Wescott and Jennifer M. Brinkerhoff, eds., *Converting Migration Drains into Gains: Harnessing the Resources of Overseas Professionals* (Manila: Asian Development Bank, 2006).

66 Anthony R. Welch and Zhang Zhen, “Higher Education and Global Talent Flows: Brain Drain, Overseas Chinese Intellectuals, and Diasporic Knowledge Networks,” *Higher Education Policy* 21, no. 4 (December 2008): 519–37.

67 Demetrios G. Papademetriou, Will Somerville, and Hiroyuki Tanaka, *Talent in the 21st Century Economy* (Washington, D.C.: Migration Policy Institute, November 2008).

POLICIES

Policies vary depending in their relative emphases on brain circulation and linkages. Permanent return policies, for example, prioritize brain circulation, while temporary return and diaspora engagement policies focus on enhancing brain linkages.

Permanent Return Programs

Permanent return programs try to encourage high-skilled migrants to return home permanently or at least for the long-term. They are policies premised on the conventional perspective of skilled labor as human capital and thus aim primarily to enhance brain circulation. Typical incentives have included tax exemptions, interest-free or low-interest loans, and temporary salary supplements to facilitate career entry, assistance with housing, children's schooling, and spousal employment. For example, Malaysia's Returning Expert Program (REP) implemented in 2011 offers fiscal incentives and legal benefits (a flat tax of 15 percent on employment income for five years, the ability to purchase two tax-free locally assembled cars, and eligibility for permanent residency status for a foreign spouse and children within six months) to its high-skilled Malaysian diaspora to return to work in Malaysia. A recent impact assessment of the program finds that the REP has been effective in attracting migrants to fill Malaysia's skill needs and there are large net benefits to the program when measured in fiscal terms. The net fiscal benefits are about RM 27,000 (US\$9,000) per applicant. This evaluation does not assess the additional external benefits (such as job creation and raising the productivity of local workers) that may accrue as high-skilled individuals return to Malaysia.⁶⁸

The Return of the Qualified African Nationals (RQAN) program, managed by the International Organization for Migration (now the Migration for Development in Africa [MIDA] program), placed around two thousand highly skilled migrants in forty-one African countries between 1974 and 1990.⁶⁹ Existing evaluations of this program have asked participants about whether they felt the program was important in their decision to return and the perceived contribution to their home country.⁷⁰ There have been

68 World Bank, *Improving the Effectiveness of TalentCorp's Initiatives: Assessment of Returning Expert Programme & Residence Pass—Talent* (Washington, D.C.: The World Bank, June 2015).

69 World Bank, *Global Economic Prospects 2006: Economic Implications of Remittances and Migration* (Washington, D.C.: The World Bank, 2006).

70 José Pires, Ashraf El Nour, and Lindsay McMahon, *Survey among Qualified Afri-*

concerns as to whether such programs simply subsidized individuals who were likely to return anyway, or if they have had adverse effects by arousing resentment among nonmigrants⁷¹ or even by potentially encouraging more people to emigrate in order to get these benefits upon return.⁷² Such programs, however, have been found to be undersubscribed in the early stages of economic growth (as was the case with as China), when financial incentive structures are weak.

McKenzie and Yang cite several reasons why there have been very few rigorous evaluations of such policies. One is that the small size of most programs makes it difficult to measure a statistically significant impact, unless the impact is large. Second, it is difficult to find a natural comparison (control) group of people who wanted to participate in the program but were not able. Third, outcomes (such as spillovers from high-skilled emigrants, reputational enhancement, and diaspora direct investment) can be difficult to measure.⁷³ Thus, evaluating impact remains an area of further research.

Temporary Return Programs

Both international organizations as well as governments have implemented a number of temporary return programs that encourage high-skilled emigrants to engage with and contribute to their home countries on a temporary or half-time basis. Temporary return programs largely target brain linkage effects, since short-term stays allow individuals to form networks, which can later be used as brain linkages. For example, the United Nations Development Programme established the Transfer of Knowledge Through Expatriate Nationals (TOKTEN) program in 1977, aimed at reducing the adverse effects of brain drain through reverse knowledge transfer. It funds volunteers (travel costs and a small allowance) to temporarily return to their home countries to share their expertise with universities,

can Nationals under the Bridging Fund Scheme of the Programme for the Return and Reintegration of Qualified African Nationals (RQAN)—Phase III (Geneva: International Organization for Migration, 1996).

71 Jean-Christophe Dumont and Gilles Spielvogel, "Return Migration: A New Perspective," in *OECD International Migration Outlook 2008* (Paris: OECD, 2008), 161–222.

72 David McKenzie and Dean Yang, "Evidence on Policies to Increase the Development Impacts of International Migration," *The World Bank Research Observer* 30, no. 2 (August 2015): 155–192.

73 Newland and Plaza, *What We Know About Diasporas and Economic Development*.

government ministries, and non-governmental organizations (NGOs). The program has been implemented in over thirty countries in Africa, Middle East, Asia, and Europe. Assessments of this program show mixed results, with some evaluation studies showing a positive impact while others show a negative or no impact.⁷⁴

Thailand's National Science and Technology Development Agency established the Reverse Brain Drain program in 1997. After carrying out around thirty-five projects to promote permanent return migration, the program shifted its emphasis to short-term, temporary visits to facilitate technical linkages between Thai institutions and migrants abroad. There have been few published formal assessments of this program.

The Temporary Return of Qualified Nationals (TRQN) was an International Organization for Migration program, funded by the Netherlands' Ministry of Foreign Affairs, that ran from 2006 to 2016 to link diaspora with development in their countries of origin. The program's objective was to make a contribution to the national development policies and strategies of a number of selected countries by engaging their overseas communities in improving the capacity of governmental and non-governmental institutions. Assignments were on average three months but could range from as short as one week to as long as nine months or more. It was implemented in nine partner countries: Afghanistan, Armenia, Cape Verde, George, Ghana, Iraq, Morocco, Somalia, and Sudan. As of April 2015, a total of 212 experts participated in the project and 349 projects were completed and evaluated to have positive impact.⁷⁵ In Afghanistan, TRQN brought fifty-nine highly-skilled Dutch-Afghans to work with a variety of public and private institutions in Afghanistan for three months with positive results.⁷⁶ China's prominent returnee programs to revitalize Chinese higher education offer a temporary, half-time return option (in addition to a permanent return option), including the Changjiang Scholars Plan (established under the Ministry of Education in 1998) and the Thousand Talents Program (implemented under the Chinese Communist Party in 2008).⁷⁷ Zweig et al., by measuring the quality of journal publications of

74 R.D. Wanigaratne, "An Evaluation of the UNDP Transfer of Technology through Expatriate National (TOKTEN) Program," unpublished paper, June 2006.

75 Jennifer Leith and Althea-Maria Rivas, *The Temporary Return of Qualified Nationals Project III Evaluation Report*, International Organization for Migration, Netherlands, June 2015.

76 Kuschminder, "Knowledge Transfer and Capacity Building through the Temporary Return of Qualified Nationals to Afghanistan."

77 Zweig, "Competing for Talent."

those who have remained abroad, show that these programs have so far been unable to bring the best back home.⁷⁸

Diaspora Engagement Policies

Diaspora engagement policies also primarily aim to enhance brain linkages—policies premised on a social capital model—rather than brain circulation. Common policies have included enacting legislation in the form of flexible citizenship laws (e.g., dual or multiple citizenship), residence and visa arrangements,⁷⁹ legal provisions for overseas voting,⁸⁰ special property rights,⁸¹ and reduced income tax rates.⁸²

Another approach has been to establish diaspora institutions both at home and abroad at the ministry,⁸³ sub-ministry, national, and local levels. Ministry-level examples include India's Ministry for Overseas Indian Affairs, Bangladesh's Ministry for Expatriates' Welfare and Overseas Employment, and Sri Lanka's Ministry of Foreign Employment, Promotion, and Welfare. Sub-ministry-level examples include the Philippines' Overseas Workers Welfare Administration under the Department of Labour and Employment, and the Philippine Overseas Employment Adminis-

78 Zweig, Kang, and Wang, "The Best Are Yet to Come: State Programs, Institutional Culture and Reverse Migration of High-Level Talent to China."

79 The Philippines' balikbayan program grants former citizens and their immediate families visa-free entry and stay for a period of one year; Pakistan's National Database and Registration Authority issues the Pakistan Overseas Card (POC) to its diaspora members. POC holders are allowed visa-free entry into Pakistan, can stay indefinitely in the country and are exempted from foreigner registration requirements.

80 A 2007 review by the International Institute for Democracy and Electoral Assistance identified 115 states and territories with legal provisions for overseas voting. Although external voting provisions are most common in Europe, they are also found in some countries in Asia such as Afghanistan, Bangladesh, India, Indonesia, Japan, Laos, Malaysia, Philippines, Singapore, and Thailand.

81 In India, for instance, anyone who has ever held an Indian passport or whose father or grandfather was a citizen of India can acquire unlimited residential and commercial land. Individuals born in the Philippines or to a parent who was still a citizen at the time of their birth can purchase either residential or commercial land in the Philippines up to a total of 500 square meters or agricultural land of up to 1,000 square meters.

82 Malaysia's Returning Expert Program (REP) guarantees a flat tax rate of 15 per cent on employment income for five years.

83 Five countries in the region (Bangladesh, China, India, Indonesia, Pakistan, Philippines, Republic of Korea, Sri Lanka) have established ministries whose explicit purpose is to address the needs of diaspora populations.

tration.⁸⁴ An example at the national level is China's Overseas Chinese Affairs Office, which maintains databases of information categorized by city, county, and province (so that overseas Chinese can find their ancestral roots, homes, and properties), and operates two universities catering mainly to the Chinese diaspora. The Philippines' Commission on Filipinos Overseas promotes both economic and cultural ties between the Philippines and its diaspora. An example at the local level is China's expansive network of Overseas Chinese Affairs Offices, local diaspora offices, replicated in thirty provinces, as well as in some cities, and townships across China, some of which have adopted innovative methods to attract diaspora investments.⁸⁵ Some countries have adopted a collaborative, partnership approach to promote a more sustainable two-way exchange of resources and knowledge. For instance, China's recent 111 Project allows for diaspora scholars to team up with domestic researchers working in one of the 126 innovation bases located throughout China.⁸⁶

Lastly, governments have created financial instruments to attract the various financial assets of the diaspora, whether it be income, savings, retirement accounts, real property, or investments. These financial instruments have included special deposit accounts (where diaspora members can deposit their savings and can receive preferential interest rates and tax exemptions), diaspora bonds, and channels for philanthropy.⁸⁷

84 Dovelyn Rannveig Agunias, *Managing Temporary Migration: Lessons from the Philippine Model*, (Washington, D.C: Migration Policy Institute, October 2008). http://www.migrationpolicy.org/pubs/Insight_POEA_Octo7.pdf.

85 For example, since 2004, the Economic and Technology Division of the Shanghai government's Overseas Chinese Office has strengthened alumni associations in the United States for all of its universities. The goal is to let Chinese graduates living in the United States know about business and research opportunities in Shanghai. For example, see David Zweig and Chung Siu Fung, *Redefining the Brain Drain: China's "Diaspora Option,"* Working Paper no. 1, Center on China's Transnational Relations, Hong Kong University of Science and Technology, (Hong Kong: Chinese University of Hong Kong, 2005), http://www.cctr.ust.hk/materials/working_papers/WorkingPaper1.pdf.

86 Hongxing Cai, "Deploying the Chinese Knowledge Diaspora: A Case Study of Peking University," *Asia Pacific Journal of Education* 32, no. 3 (2012): 367–79.

87 For example, U.S.-registered non-profit groups such as the American Indian Foundation and the Philippine Development Foundation (PhilDev) raise tax-deductible funds that are channeled to diaspora homelands. AIF has served over 1.5 million people by implementing programs through over 115 Indian NGOs. Similarly, PhilDev encourages philanthropy among Filipino Americans and connects them to well-run non-profit organizations in the Philippines.

POLICY IMPLICATIONS AND SUGGESTIONS FOR FURTHER RESEARCH

The main policy implication from this paper is that LDCs should not be afraid of initial losses, because those often result in later gains. Holding talent back from studying or working overseas is not the answer, as it will further exacerbate LDCs' isolation from the global economy. This paper underscores that LDCs lack not merely human capital, but also lack ties to the center of global economic activity. The real question, therefore, is how to convert a possible brain drain into brain circulation and beyond that, into brain linkage. This can be accomplished by providing incentives, financial and otherwise, to make returning home, either short- or long-term, attractive to talent that has moved overseas. Another way is to maximize a diaspora's engagement with its homeland by providing incentives for transnational bridging, especially in a global context of increasing skill mobility. Higher education is key to building a base for brain circulation and linkage.

LDCs should consider a two-pronged approach to cultivating talent for national development by implementing brain circulation and brain linkage policies, either consecutively or simultaneously, depending on their needs and availability of resources. For instance, LDCs may find it more efficient and cost-effective to remotely engage with their diasporas or to encourage temporary rather than permanent return. Then, when economic opportunities and incentives become more abundant, LDCs can incrementally implement policies for greater brain circulation. Alternatively, they can pursue a certain combination of both at the same time.

We suggest that future research should include conducting more comprehensive studies that map talent flows in the Asia-Pacific region using a transnational social capital framework. Given fast-growing talent mobility in the region (e.g., influx of Asian students to Japanese and Korean universities), such mapping would be very timely and important for the policy community. In addition, more research is needed (both descriptive and prescriptive) specifically focusing on brain circulation and brain linkages in LDCs (given that prior research on the topic has been heavily skewed towards developed economies). Possible research questions include: Who returns and how do they compare to those who do not return, or to the best in the field? What are the characteristics of those who return part-time versus those that return full-time? What are the relative benefits of targeting diaspora return (brain circulation) versus diaspora engagement (brain linkage)?

Furthermore, we need to identify the institutional conditions that encourage (or hinder) greater engagement with the home country. For instance, many LDCs want to develop more in-country higher educational institutions—targeting high-tech R&D institutions, especially as higher education enrollment expands with growing young populations and this is important to create a critical mass as outlined above. Further research needs to show what kinds of development initiatives—e.g., business/industries, government initiatives, educational development—can be formidable attractive forces for brain circulation and brain linkages. Another consideration should be given to the rapidly changing labor market situations where technology advances such as automation and artificial intelligence are transforming the skills requirements (although more at the low level) in the world of work. Would this also have implications on skills mobility, and what kinds of lessons can we draw from the experiences of more developed countries?

Finally, we suggest that it would be useful to design a program geared to convert national talent from brain drain to brain circulation, and ultimately to brain linkage, which may be considered in multilateral development programs. This would involve crafting a program (in the higher education sector or other) designed from the outset to maximize social capital formation in addition to human resource development, including the systematic monitoring of student, alumni, research, and professional networks, the formation of home-host networks, the enhancement of home-country embeddedness, and programmatic support for back-and-forth skilled labor movement. Given the growing mobility of talent across the globe and multiplicity of brain power as shown here, we need a comprehensive approach toward cultivating and utilizing human and social capital for national development.

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