Skilled Immigration, Firms, and Policy

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1 Introduction

Firm demand for foreign skilled workers has played a crucial role in generating the rapid increase in the number of skilled immigrants in the U.S. labor force.[1] However, there has been a gap between firm demand, measured by the number of Labor Condition Applications (LCAs) filed by firms in the first stage of the H1-B visa process, and the actual number of H1-B visas issued to foreign skilled workers, and this gap has been growing in recent years (Figure 1). As a result, the visa cap was met in each year since 2004, and visas for foreign skilled workers have been allocated according to a random lottery process (Figure 2). Moreover, the gap between LCAs and the cap has shown a tendency to widen by more in periods of economic expansion.

Kerr et al. (2014) highlight the skewness in demand for foreign skilled workers across firms. The role of demand for foreign skilled workers by heterogeneous firms and the current allocation mechanism of foreign workers across them have implications for how an increase in skilled immigration and changes in immigration policy impact the aggregate U.S. economy. However, these implications are not fully understood in the current literature.

Motivated by this, the goal of this study is to address a set of interrelated questions: First, what are the determinants of the demand of foreign skilled workers by heterogeneous domestic firms and the effects of skilled immigration on domestic labor market outcomes and aggregate output? Second, how do changes in immigration policy (including the visa cap) impact the economy? Third, what would be the effects of moving toward a more market-driven allocation of visas (via auction of permits) for skilled foreign workers, compared to the current random lottery setup?

2 Related Literature

This research will add to the emerging literature that examines the implications of high skilled migration.[2] The contribution to the literature will be twofold. First, the study highlights the role of firm demand. This is particularly relevant when studying skilled immigration, but most studies that analyze the impact of skilled immigration view it as a supply-induced shock and ignore the role of firm demand in endogenously generating skilled immigration. Important exceptions in the empirical literature that highlight the role of firms in the context of skilled immigration are Kerr et al. (2013), and Ottaviano, Peri, and Wright (2015). Kerr et al. (2014) also stress the "need to

[1] Current Population Survey data shows that the number of foreign born with a bachelors degree in the U.S. labor force displayed the sharpest increase (42.44 percent) among all foreign born, during the last decade.

[2] This literature includes Borjas and Doran (2012), Ottaviano, Shih, and Sparber (2015), and Kerr and Lincoln (2010).

increasingly develop a better understanding of the general equilibrium effects of skilled immigration with firms as a central element."

Second, to the best of my knowledge, no previous study has tried to measure the aggregate gain from implementing an alternative immigration policy with a market driven allocation of permits for hiring foreign skilled workers.

3 Methodology

In order to study the first two questions, I propose a dynamic stochastic general equilibrium model with monopolistically competitive heterogeneous firms as in Melitz (2003). Firms produce output by employing skilled domestic and foreign labor, and unskilled domestic labor, using a nested C.E.S. technology. Skilled labor immigration is modeled as an endogenous response to an increase in firm labor demand in the receiving economy (either due to a productivity shock or an easing of immigration policy restrictions). Immigration policy restrictions mimic current U.S. policy: Firms face a hiring cost, there is a cap on the number of foreign workers that can be hired in each period, and skilled foreign workers are allocated according to a random lottery if aggregate demand exceeds the cap. Each period, firms face an ex-ante probability that the foreign skilled workers they hire would be selected in the lottery (in case the cap endogenously binds), and heterogeneous firms would make their hiring decision of skilled workers accordingly. Since a significant proportion of foreign skilled workers on the H1-B visa are temporary workers, the model allows for an exogenous probability of return to the country of origin.

I calibrate the parameters of the model that pertain to immigration to match U.S. data from the Current Population Survey (the average proportion of foreign-born workers with a bachelor degree in the total skilled U.S labor force, the U.S. skill premium, and the share of domestic workers in the U.S. with a bachelor degree), and I rely on existing literature for the values of other parameters. I then solve the model numerically to study dynamics in response to productivity shocks and changes in immigration policy, and I calculate the welfare effects of policy changes (changes in the visa cap or the cost of H1-B applications).

To highlight the intuitive mechanisms of the endogenous lottery process, I solve a baseline, simplified version of the model with symmetric firms and perfectly substitutable foreign and domestic skilled labor.[3] Preliminary results highlight some key insights. Forward looking monopolistically competitive firms are able to increase output and profits over the medium and long term by hiring foreign skilled labor. However, the lottery mechanism distorts their hiring decision: Firms submit applications for too many foreign skilled workers if they do not have to bear the full cost of workers that are eventually not selected in the lottery. This simple model is able to generate mechanisms that replicate Figures 1 and 2. The model also supports conclusions from previous studies that skilled immigration benefits domestic workers that are most complementary to foreign workers, and also that a significant proportion of the welfare gains from an increase in skilled immigration are realized only over the longer run. Moreover, the impact on the welfare of domestic workers depends on how firm profits are distributed across skilled and unskilled workers. A key new insight from modeling the role of the firm explicitly is that the magnitude of overall benefits from easing immigration policy depends on how binding the cap is, and therefore on how firms respond to policy easing. This insight is lost if we analyze the impact of an immigration cap change as a change in labor supply alone.

[2]Bound et. al (2013) develop a dynamic model that features a role for firm demand for foreign skilled workers. However, they do not analyze the implications of firm heterogeneity as their focus is on the computer science market.

[3]The steady state for this version of the model can be solved analytically.

In order to answer the third question, I model a market driven allocation of permits for hiring foreign skilled workers through an auction mechanism, as proposed by Peri (2012). A multi-unit ascending-bid auction of permits implies that the equilibrium cost of hiring foreign skilled workers endogenously responds to economic conditions. Such an auction mechanism leads to a reallocation of foreign skilled workers to more productive firms, and thus leads to gains in aggregate productivity. In order to measure the gain from adopting such an auction system, I plan to use the calibrated model to measure how much closer this alternate policy would bring the economy's equilibrium allocation to the social planner's optimal allocation.

I am currently working to refine the model with heterogeneous firms and the auction mechanism, and I will turn next to its solution and the implementation of positive and normative exercises.

4 Conclusion

The general equilibrium macroeconomic framework I propose—featuring heterogeneous firms and a realistic modeling of the current skilled immigration policy setup—facilitates a better understanding of the aggregate impacts of skilled immigration and changes in immigration policy. This has key implications for evaluating alternative policies, such as the introduction of a market-based mechanism for visa allocation. In the future, I plan to extend the model to study additional questions on the interaction between skilled immigration and firms—for instance, the relationship between skilled immigration and offshoring of jobs in the high-tech sector.

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5 Figures

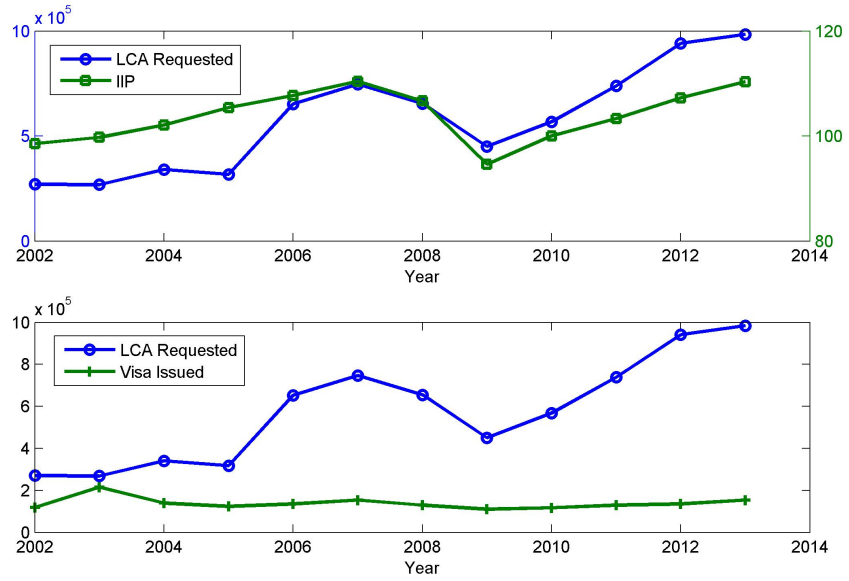


Figure 1: Demand for Foreign Skilled Labor over the Business Cycle and Visas Issued. IIP refers to Index of Industrial Production. Source: LCA database, Department of Labor. Visa data from the Department of State.

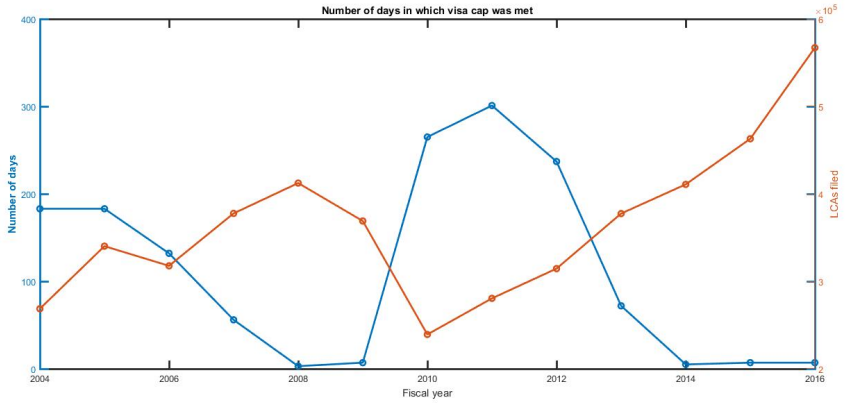


Figure 2: Firm demand for H1-B foreign skilled labor (orange line) vs number of days in which cap for H1-B visa petitions was met (blue line). The cap was met in less than a week in the years in which firm demand was higher.

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Awards	Corkery Fellowship, University of Washington	Winter 2017
	Graduate Teaching Assistantship, University of Washington	2013 - Present
	Prof. K.A. Naqvi Memorial Scholarship, Delhi School of Economics	2010
	Award for best performance, Jesus and Mary College, Delhi University	2009
Research Papers	"Skilled Immigration, Firms, and Welfare," Working Paper	
Policy Reports/Book Chapters	"Upgrading in the Indian garment industry: a study of three clusters" (with Saon Ray and Prithvijit Mukherjee), Asian Development Bank South Asia Working Paper Series No.43, April 2016	
	"Normalizing India-Pakistan Trade" (with Taneja et al.), in *India Pakistan Trade: Strengthening Economic Relations (pp. 13-45)*, Springer, August 2014	
	"India-Pakistan: Trade Perception Survey" (with Taneja et al.), in *India-Pakistan Trade: Strengthening Economic Relations (pp. 71-126)*, Springer, August 2014	
Teaching Experience	Instructor, Intermediate Macroeconomics	Fall 2016
	Teaching Assistant, Graduate Macroeconomics III	Spring 2016
	Instructor, Introductory Macroeconomics	2015 - 16
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Conference/ Seminar Presentations	MTI Brownbag, Economics Department, University of Washington	December 2016
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Other Experience	Research Assistant, ICRIER, New Delhi	2012 - 2013
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Re.: Ms. Mishita Mehra's application

December 9, 2016

Dear Colleague,

I am truly delighted to write this letter of recommendation in support of Ms. Mishita Mehra's application to the NBER Pre-Doctoral Fellowship Program on the Economics of High-Skill Immigration. I give Mishita my strongest endorsement.

Mishita is working on a very exciting dissertation on the economics of high-skill immigration. Specifically, she is studying the role of firms' demand for skilled workers as a determinant of immigration, and how the behavior of firms and the inflow of skilled migrants interact with the dynamics of the aggregate economy. Her exercise is motivated by the observation of the rising gap between demand of skilled migrants (measured by the number of Labor Condition Applications filed by firms initiating H1-B visa applications) and the number of H1-B visas issued. Rising demand has implied that the cap on the number of H1-B visas has been met every year since 2004, with visas allocated through a random lottery process. Moreover, the gap between demand and the cap has shown a tendency to widen by more during periods of economic expansion.

This evidence raises several questions: What are the determinants of the demand of skilled foreign labor? And what are the implications of firms' decisions to recruit foreign workers on the domestic labor market? What are the effects of changes in immigration policy? Would it be beneficial to move to a market-based mechanism for visa allocation rather than the current random lottery system? To study these questions, Mishita has been developing a dynamic, microfounded, general equilibrium model of the macroeconomy in which—consistent with work by William Kerr and coauthors—firms and their demand of workers are central to immigration dynamics.

In Mishita's model, heterogeneous, monopolistically competitive firms produce output using domestic skilled and unskilled labor, and skilled immigrant labor. There is a perfectly elastic supply of skilled foreign workers, but firms face sunk costs of hiring immigrant workers

(capturing the costs of H1-B visa applications and other costs that firms may incur to recruit foreign workers). In addition to the sunk cost, firms face an exogenous constraint on the number of foreign skilled workers that the aggregate economy can hire. Given inelastic supply of domestic labor, access to foreign workers is a way for firms to satisfy their demand for skilled labor. However, the presence of sunk hiring cost and the cap limits the extent to which the overall supply of skilled labor can be made elastic by recruiting foreign workers. Firms will demand migrant skilled workers only to the extent that the expected discounted value of the stream of profits that they will generate for the firm is at least as large as the sunk cost. If the demand for skilled foreign labor becomes sufficiently high, the cap on the number of visas becomes binding, and the opportunity to hire foreign workers is granted to firms through a random lottery.

Mishita embeds this mechanism in an intertemporal, general equilibrium model with optimizing households and aggregate shocks. Consistent with the evidence, the model implies that economic expansions are associated with more stringency of the cap on the number of immigrant workers. Immigration policy acts by affecting the sunk cost of hiring foreign workers and the cap on the aggregate number that domestic firms can hire. Mishita has completed the exploration of results from a simplified version of her framework—one in which firms are symmetric rather than heterogeneous in their productivity.

The simplified model is already enough to yield several interesting results: Access to foreign workers allows firms to increase output and profits in the medium and long run in response to expansionary shocks. However, the lottery allocation of visas distorts firms' incentives and causes them to file applications to hire too many foreign workers relative to the social optimum. The effect of an increase in skilled immigrant labor on the welfare of skilled and unskilled domestic workers depends on how firm profits are distributed across them, but the magnitude of the overall benefit from easing immigration policy depends on how binding the cap constraint is, and therefore on how firms respond to the policy change. This highlights the importance of modeling the demand side of skilled immigration, and the constraints facing this demand, in order to evaluate the welfare consequences of immigration policy.

In the final part of her project, Mishita is studying the effects of a market-based mechanism to allocate permits to hire foreign workers: an auction mechanism along the lines proposed by Giovanni Peri. Replacing the sunk hiring cost and lottery mechanism in Mishita's model with a multi-unit ascending-bid auction of permits implies that the equilibrium cost of hiring skilled foreign workers becomes endogenous to economic conditions. In an environment of heterogeneous firms, the auction mechanism leads to reallocation of foreign skilled workers to more productive firms, resulting in higher aggregate productivity. Mishita is currently refining her model with heterogeneous firms and auction mechanism, with the ultimate goal of evaluating the extent to which adoption of this mechanism would bring the equilibrium of the economy closer to the social optimum.

Mishita's research addresses first-order important questions, and I believe it has the potential to make very important contributions. It is high time for macroeconomists to start paying serious attention to the drivers and consequences of immigration. Federico Mandelman and Andrei Zlate made a start in this direction in a very nice 2012 *Journal of Monetary Economics* article.

They developed a dynamic, stochastic, general equilibrium model of immigration and macroeconomic dynamics in which immigration is characterized as an entry decision subject to sunk costs: Workers decide to migrate only if the expected income stream generated by relocating is at least as high as the relocation cost. Mandelman and Zlate (MZ below) show that their model does a remarkable job of capturing cyclical patterns of immigration from Mexico into the United States and the dynamics of remittances back to Mexico, along with standard international business cycle moments.

The MZ model focuses on the supply side of immigration by modeling the migrants' decision explicitly, and it focuses on unskilled immigration. More recently, Mandelman and Zlate have developed an extension of their model that allows them to study the interaction of unskilled immigration with endogenous skill upgrading by domestic workers and offshoring decisions by domestic firms.

In contrast to the MZ framework, Mishita focuses on the demand side of immigration—on the behavior of firms as key driver of immigration dynamics—and on skilled, rather than unskilled, immigration. To capture the key features of evidence, Mishita has developed a very elegant framework: The simplified version of her model without firm heterogeneity yields a number of analytical results, and the mechanisms embedded in the richer setup with heterogeneity can still be understood quite transparently by using numerical examples to substantiate intuitions.

Mishita plans to be on the job market next year. The NBER Fellowship would allow her to focus on completing and refining her dissertation without the pressure of the teaching we ask graduate students at the University of Washington to do. She is one of the very best students in her class—if not the best—and I have very high expectations for her work. International macroeconomists have begun only recently to pay attention to immigration as an important topic for positive and normative analysis in macro models. I think it is very important for the field to pay much more attention to this topic. Mishita's work can be a very important contribution to this. It can also contribute to the labor economics literature by offering theoretical tools to analyze mechanisms so far mostly explored empirically and to evaluate the consequences of policy proposals.

For all these reasons, I recommend Mishita most strongly for a Fellowship.

If you have further questions, please do not hesitate to contact me. I am based in Italy until the end of February, and email will be the best way to reach me. My address is ghiro@uw.edu.

Sincerely,



Fabio Ghironi
Paul F. Glaser Professor of Economics
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