# U.S. IMMIGRATION AND POLICY AND BRAIN WASTE

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# U.S. Immigration Policy and Brain Waste

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## Abstract

The U.S. H-1B visa for highly-skilled immigrant labor and the accompanying H-4 visa for their dependents leads to structural constraints that exclude dependents from the labor force. Identifying H-1B recipients from the U.S. Census and American Community Surveys, we find that—despite the labor force exclusion—the vast majority of married H-1B recipients is accompanied by their spouses. This is particularly the case for male H-1B recipients, making wives rather than husbands carry most of the burden. Using a matched sample of married immigrants with work authorization, we estimate counterfactual labor force participation probabilities and wages for the sample of dependent H-4 spouses. We find that the policy-imposed labor force exclusion of H-4 spouses leads to substantial losses of spouses' earnings and annual aggregate productivity loss of over US$2.1 billion.

Keywords: immigration policy, high-skilled immigration, brain waste

JEL Codes: J61, J68

## Introduction

Attracting high-skilled immigrants via skill-based selection is a pivotal part of immigration policy in many developed countries (Sana 2010; Duncan 2012), with the associated human capital gain expected to be beneficial for the host economy (Drinkwater et al. 2007; Bound, Khanna, and Morales 2017a, 2017b). Indeed, Aydemir (2011) showed that Canada's skill-based selection—the so-called point system—generates a more favorable human capital inflow than other visa categories. However, some of the gains may be underutilized due to immigrant skills' imperfect transferability across international borders, yielding less favorable labor market outcomes including lower wages (Mane and Waldorf 2013) and widespread overeducation among immigrants (Beckhusen et al. 2013).

In the US, human capital gains of skill-based immigration are even structurally underutilized because US immigration policy decouples employment authorization and admission permission for some visa categories. Most notable, the H-4 visa exemplifies these structural constraints on human capital utilization. The H-4 visa permits dependents of high-skilled immigrants with H-1B visas to join them in the US, but excludes them from the labor force.[1] Such forced exclusion has adverse consequences at two levels. At the micro-level, the—often highly-skilled—dependents forego income and valuable work experience. At the macro-level, the imposed underutilization of human capital translates into productivity losses for the US economy.

When assessing the economic impact of skill-based visa programs, the literature has—with a few exceptions (Lofstrom, Hill and Hayes 2013—neglected the impact of high-skilled immigrants without work authorizations. This paper therefore focusses on the adverse effects of structural brain waste associated with dependent visas in the US. Two broad sets of questions are addressed. The first set centers on the question: Who are the dependents choosing to enter the US although being denied labor force participation? We find that the typical idle spouse can be described as a young, highly-educated, woman who was born in Asia. Given that the pool of dependents is primarily made up of women—not surprising given that skill-based H-1B visas favor traditionally male occupations in science, technology and engineering—then US immigration policies indirectly contribute to the disadvantaged position of women in the labor force. And we assess how the pool of dependent spouses changed as dependents' educational attainment—especially among women—improved over time. The focus is on the changing female representation among high-skilled recruits with H-1B visas and the changing sex ratio in the pool of dependents. Moreover, we expect to see a rise of alternative household arrangements whereby the spouses of highly educated H-1B holders stay behind in the origin country where their careers do not come to a standstill.

Second, we ask how the human capital waste translates into productivity loss. We particularly focus on changes in productivity loss over time due to compositional changes. Assortative mating combined with increasingly higher educational attainment among the women suggests that productivity losses may rise over time. On the other hand, a dampening effect can be expected if high skilled immigrants and their dependents become more likely to originate in countries with

more traditional norms. More traditional norms are often associated with lower educational attainment and less prevalent labor force participation. That is, dependents from countries with more traditional norms and values may choose not to work even when granted a work authorization.

This article is divided into four sections. Following this introduction is the background section with a description of U.S. immigration policies for high-skilled workers and their dependents, including a brief discussion of the implicit gender biases. Next, we present the empirical analysis with subsections on research design, household arrangements, pool of dependents, and the estimation of productivity loss. The paper concludes with a summary and a critical discussion of the results.

## Background

Immigration policies influence *who* is allowed to legally enter the country and thus shape the consequences of immigration, from the degree of cultural enrichment to macroeconomic impacts to labor market outcomes. Policies based on skill selection (for example, Canada's point systems, the H-1B visas in the US, and the EU's Blue Card) are particularly influential in shaping the immigrant pool (Chemin and Sayour 2016). Immigration policies also determine for how long and under what circumstances migrants can stay in the country. Upon entry, immigrants are granted permanent or temporary residency status. While the former is highly desirable—due to the extended rights and entitlements afforded to long-term residents—the latter is prevalent. [2]

Temporary visas offer short periods of stay to migrants and their families and are predicated on the ideas of guestworker programs of the post-war era. These guestworker programs were staffed through immigration schemes/policies that facilitated labor recruitment from abroad. The central idea underpinning these programs was to fill labor shortages with international labor as a means to continue fueling economic growth. Recruited immigrants would cycle in and out of the host country on a system of rotation, thereby working and living for short periods. Workers were primarily male and most often were not accompanied by their spouses. If the absence of the spouse was policy mandated and thus families kept apart, governments sought to ensure transience and the return of immigrants back home when contracts expired. Where family reunification was allowed, spouses—in most cases wives—were dependents in the literal and technical sense as they were denied access to the job market. While the term "guestworkers" is typically applied to low-skilled seasonal workers, temporary visas offered to high skilled migrants, by-and-large, resemble these guestworker programs in spirit (Depew et al. 2016; Duncan et al. 2016; Duncan and Waldorf 2016).

In the U.S., the main routes for entry of high skilled migrants are the Economic Based (EB) Preference category and the H-1B visa. The EB and H-1B visas share some common features. For both types of visas, the recipients take up employment in "specialty occupations" in which there is no suitable American to do the job. As per the Immigration and Naturalization Act of 1990,

specialty occupations refer to "an occupation that require—(A) theoretical and practical knowledge, and (B) attainment of a bachelor's or higher degree in the specific specialty (or its equivalent) as a minimum for entry into the occupation in the United States" (Section 214(i)(1) of the INA). Both the EB and the H-1B categories are employer-demand driven, that is, international labor comes only if requested by an employer. In principle, employers select employees with a specific set of skills before they enter the US job market. Many recipients of these visas, however, are status adjusters, meaning that they already live in the U.S. under a different visa category. Commonly, many recipients of EB visas first entered with an H-1B visa and a good deal of H-1B visa holders previously held student visas. In fact, the transition from international student status to entering the domestic labor market is an important consideration in the states' competition for global talent (Hauptet al. 2016). A major difference between these two types of visa relate to residency and its attendant rights. EB visas allow for permanent residency ("Green Card"), including permanent residency for dependents. In contrasts, the H-1B visa only permits temporary residency. It is valid for three years and renewable once for an additional three years. H-1B principal applicants can apply for H-4 visas for their dependents. However, H-4 visas do not include a work authorization and thus dependents have no career options in the U.S.

It is this design that is responsible for the brain waste that is structurally embedded in the immigration policies for high-skilled labor. If men are over-represented among the recruited high skilled labor with H-1B visas, then women entering the U.S. as dependents carry most of the burden associated with the exclusion from the labor market. Purkayastha (2005) even refers to "H-1B wives" and suggests that the wife has "two options—either living in a split household in order to continue her career (i.e., she remains in the home country, while he temporarily moves to the US), or she accompanies him to the US and becoming a full-time homemaker" (p.187). Using Mincer's (1978) terminology, spouses can either become tied movers without access to the labor market, or stay in the home country.

The gendered effect of immigration policy is not surprising when looking at selection criteria vis-à-vis the occupations for which employers select immigrant workers and the country of origin of visa recipients. Selection criteria reflected in admissions policies and entry occupational requirements are integral for explaining the varied experiences between male and female high skilled immigrants (Iredale 2005). In the case of H-1B visas, a large share of visas went to high skilled migrants from India, a country with strong patriarchal structures. The percentages of visas that went to immigrants in computer-related occupations grew remarkably. Combined with other traditionally "male" occupational fields, more than 85 percent of the employment categories under which recipients are admitted are male-dominated in the US and in the main origin countries.

As such, the US immigration policies perpetuate the historical, but outdated notion that the term "migrant" is assumed to refer to men. Women enter the picture as wives and mothers, who do not participate in labor outside the home (Boyd and Grieco 2003). Thus their roles in the migration process is cast as dependent on the movement decisions of men or confined to homemaking once arrived in the destination. US immigration policy is not alone in that respect. Post-war labor

migration policies in Europe, for example, gave preference to men, but when governments implemented bans in the wake of the oil crisis in 1974, immigration by women significantly increased (Donato and Gabaccia 2015; Houstoun et al. 1984). In general, women are over-represented in family reunification immigration streams. And the public discourse continues to perpetuate such a traditional role assignment even in highly advanced countries.[3] According to (Boyd and Grieco 2003), immigration policies of many countries "implicitly assume a 'dependent' status for women and an 'independent' migrant status for men" (Boyd and Grieco 2003, p. 5). Thus, when policies deny the right to work to dependents, it is mostly women who are limited to the home rather than the labor market. Under these circumstances, women are further open to vulnerabilities when they choose to work illegally.

These gender disparities are likely reinforced by conditions governing emigration. In origin countries with dominant patriarchal structures, resources and opportunities available to women are more limited than those available to men. Emigrating independently may be difficult for women due to lack of human, social, or economic resources required to overcome the costs of migration. Moreover, societal norms regarding the place and subjugation of women deter emigration for women. In these settings, if migration occurs, women tend to be dependents (wives or daughters) of men (husbands or fathers).[4] As Man (2004) states distinctly for Chinese immigrants in Canada: "In all patriarchal societies, male education and skills are assigned more value than female education and skills. In order to maximize their opportunity for immigration admission, male family members are often designated as the principal applicant. As a result, the majority of these women came to Canada under the family immigrant status as dependents of their husbands, who are principal applicants" (Man 2004, p. 140). The influence of these gendered practices in sending countries is evinced in the small share of female emigration from regions with explicit patriarchy. Docquier et al. (2009) find that the share of women emigrating from the Middle East and North Africa and Islamic countries is only 38.2 percent and 40.4 percent, respectively, compared to close to 50 percent for the global average (UN 2006).

## Empirical analysis

The research design is comprised of four components (Figure 1). First, we use data from the US Census and American Community Surveys (ACS) to identify the pool of high-skilled married immigrants on a temporary work visa such as H-1B. This is a non-trivial task as none of the large-scale surveys of the U.S. Census Bureau asks respondents about their visa status. Second, the pool of high-skilled married immigrants on temporary visas includes those who brought along their spouses, referred to as Type-I households, and those who choose to come to the U.S. without their spouses, referred to as Type-II households. We use a probit model to describe the differences between the two groups, focusing in particular on gender gaps and changes over time. Third, we zoom in on the pool of dependents and explore its demographic composition, especially temporal changes in gender imbalance and country of origin distribution. Lastly, we estimate the productivity loss due to the exclusion of dependents from the labor market. The estimation is based on a matched pool of immigrants and takes into the account the probability of being in the labor force and the human capital-based permanent income.

—Insert Figure 1—

**Identifying Type-I and Type-II households**

Surveys conducted by the U.S. Census Bureau exclude information on respondents' visa status but they do provide a wealth of socio-economic and demographic information suitable for the identification of high-skilled immigrants on a temporary visa. We use the data from the US Census 1980, 1990, 2000 and the American Community Surveys 2001 to 2014—extracted from the Integrated Public Use Microdata series (IPUMS USA) files set up by the University of Minnesota (Ruggles et al. 2015)—to identify the households of interest.

We use several criteria to identify a sample of Type-I households (Table 1). Recall that Type-I households refer to households with married couples in which one spouse is likely to have an H-1B visa and the other spouse is likely to have an H-4 dependent visa, and thus is not allowed to work. As a first selection filter, we only include households in which the household head (*spouse 1*) is married and the other spouse (*spouse 2*) is present. We further require that both spouses are recent immigrants, that is, they entered the U.S. within the five years prior to the survey, and are not U.S. citizens. Moreover, we require that *spouse 1* is highly educated, that is, has at least a bachelor degree, and has a job. Using the overeducation definition by Waldorf and Yun (2016), we exclude those who are overeducated. *Spouse 1* is assumed to be the H-1B holder. For *spouse 2*, there is no requirement regarding educational attainment. Importantly, however, *spouse 2* does not participate in the labor force, and is the assumed H-4 dependent visa holder. Imposing an age limit of 65 or younger and restricting the sample to the years 1980, 1990, and 2000 to 2014, the total number of sampled Type-I households is $n$ = 24,009. Using the household weights, they represent almost 2.2 million households.

Type-II households are those in which the household head is married and a likely H-1B visa holder, but whose spouse does not accompany the principal applicant. Comparable to *spouse 1* in Type-I households, the household head of a Type-II household is a recent immigrant (arrival in the US within five years prior to the survey year), not a US citizen, has at least a bachelor's degree, is employed and not overeducated. Most importantly, the household head is married but, in contrast to a Type-I households, the spouse does not reside in that household (and is presumably still living in the home country).[5] Using the study period from 1980, 1990 and 2000 to 2014, the number of sampled Type-II households is $n$ = 4,281, representing almost half a million households.

—Insert Table 2—

Table 2 shows the sample characteristics of the H-1B visa holders. On average, H-1B visa holders are 37 years old and have one young child. Furthermore, the vast majority is white or of Asian origin. Their average household income is \$98,234[6] and—as required by the selection criteria for H-1B visas—they are highly educated. Over half of them has an advanced degree beyond the bachelor's degree, including 12 percent with a doctorate degree. Women form a small minority, accounting for only 11 percent. The proportional gender disparity is coupled with occupational differences. Among male H-1B visa holders, computer-related jobs dominate. Among female H-1B visa holders, traditionally female jobs—nursing and teaching—are dominant.

—Insert Table 3—

**Comparing Type-I and Type-II households**

The sample households with H-1B visa holders faced the decision to accept the employment in the US, as well as the decision of whether the spouse (and children) should join as dependents (Type-I). Type-I households constitute the vast majority in our sample, but the pool of Type-II households increased over time, almost doubling from 9.4% in 1980 to 18.8% in 2009–14. To shed light on factors influencing the decision whether the spouse should join as a tied mover we estimated a probit model of the probability to opt for a Type-I household:

$$(1) \qquad Prob(Type - I = 1) = \Phi(\alpha_1 + \alpha_2 female + X\beta + female * X\gamma),$$

where *Type-I* takes on the value 1 if the spouse joined the H-1B visa holder, and 0 otherwise. The matrix *X* includes demographic variables, education and income variables, country/region of origin dummies, and a time trend variable *t*. The model specification allows us to distinguish gender differences in the parameters. The parameters $\beta$ refer to the male subsample, and the parameters $\beta + \gamma$ refer to the female subsample; $\alpha_2$ and $\gamma$ represent the gender gaps. The results are shown in Table 4.

—Insert Table 4—

Focusing first on the male subsample, the results suggest that the preference for Type-I households is very high throughout the entire time period, but slightly declines since 1990. Such a decline is expected given the secular trend toward women's higher status, including better paid jobs in the home country. The age effect is nonlinear. Young men as well as older men are more likely to bring along their wives than middle-aged men; 54-year old men are estimated to be the least likely to be joined by their wives.

English proficiency and income have positive effects on choosing to settle in the US as a family. Clearly, given that the wife would not be allowed to work if she were in the US as well, then—in the extreme—it may not be affordable to bring the entire family along. In general, the U.S. salary earned by the H-1B visa holder must be high enough for the spouse to give up a job (wages and experience) in the home country and transition into idleness. Education has a negative effect: male H-1B holders with an advanced graduate degree are significantly less likely to have immigrated with their wives than those who only have a bachelor's degree. Under the assumption that husbands' and wives' education levels are positively correlated, this result may be related to very high opportunity costs faced by the highly educated wives resulting from labor force exclusion. With respect to variations by origin, high-skilled men from the UK, South America, and Mexico are the most likely to immigrate jointly with their wives whereas high-skilled men from China, the Philippines and in particular Africa are least likely to do so.

Turning now to the subsample of high-skilled female H-1B visa holders, the results are significantly and substantially different. To begin with, the highly significant gender gap in intercept suggest that high-skilled women are substantially more likely to immigrate without their spouse than high-skilled men. Again, this may be related to the opportunity costs of tied movers

that, given the prevailing gender gap in wages, are higher for men than for women. Large losses for the husbands if they were to follow their emigrating high-skilled wives may also be responsible for the steep education gradient and the high income coefficient for female H-1B visa holders' probability to have a Type-I household.

The estimated magnitudes of these gender differences are quite high. For example, for a female 35-year old English-proficient Chinese H-1B holder with a bachelor's degree earning $80,000 in 2010, there is a 36 percent chance that her husband is accompanying her in the US. For her male counterpart, the chance that his wife is joining him in the US is almost 1.7 times higher than the female equivalent, amounting to 62 percent.

## The Pool of Dependent Spouses (H-4 Visa Holders)

Table 5 provides selected attributes of the non-working spouses in the Type-I households. As anticipated, but nevertheless most remarkable for its magnitude, more than 90 percent of the spouses is female. Equally remarkable, the share of women barely changed over time, just slightly declining from 97 percent in 1980 to about 92.5% in the 21st century. This gender-imbalance very much fits the traditional pattern of the woman being the trailing spouse or tied mover (McKinnish 2008; Mincer 1978) who follows the husband's career opportunities at new places, including faraway countries. It also fits recent research by Nobles and McKelvey (2015) on emigration from Mexico. They argue that emigration is more likely when women have little authority over household resources which, in the terminology of this paper, would make women the idle spouses of Type-I households.

—Insert Table 5—

Turning to the specific attributes, we begin with educational attainment. The H-4 spouses are very well educated, with about 90 percent of them having at least some college education. Doctoral and professional degree holders make up seven percent of the pool, master degree holders account for almost a quarter and those with a bachelor's degree make about 46 percent. These high educational attainment levels of the dependent spouses are not surprising in light of positive assortative mating, whereby the highly educated people select highly educated partners (Compton and Pollak 2007). Notable is also that, over time, the already high education levels got even higher. In 1980, none of the spouses had a graduate degree (MS, professional or doctorate degree); since 2000, more than a quarter of the spouses have a graduate degree.

With respect to age, a proxy for stage in the life-course we observe that the dependent spouses are quite young. On average, they are only 34 years old and thus in a stage of the life course when most highly educated people are in the labor force, gaining valuable experience and contributing to their pension funds. Thus, their non-working potentially has long lasting impacts on their career development as well as their old-age security. Moreover, the average age of 34 also overlaps with the prime reproductive period of the highly educated. Yet, about one third of the dependent spouses is childless.

More than 50 percent of the dependent spouses were born in just four Asian countries. India leads the list with 34 percent, followed by China, Japan, and Korea with 9, 8, and 7 percent respectively. Note that each one of these four Asian countries is more strongly represented than the two neighbors of the U.S. Mexico's and Canada's shares only account for 4 and 3 percent, respectively. As shown in Figure 2, the total number of H-4 spouses increased over time, and most of the increase is attributed to India and China. In contrast, H4-spouses from European countries, Canada, and Japan decreased.

—Insert Figure 2—

Table 5 also shows the summary statistics separately for male and female spouse. Although the sample of male dependents is quite small, some gender differences are highly significant. Most pronounced—and reflecting the well-known gender wage gap—household income is significantly and substantially smaller in Type-I households with a male dependent spouse than in Type-I households with a female dependent spouse. The difference is large, amounting to $30,293 and matches the occupational differences between the H-1B holders in Type-I household described above (see Table 3).

Gender differences among the dependent spouse are also observed with respect to age and family formation. Women are, on average, five years younger than men, have slightly more children (1.17 compared to 0.95) and their youngest child is almost two years younger. Gender differences with respect to educational attainment are remarkably small.

## Estimated Lost Productivity

We now turn to the question of how much productivity is lost because spouses with H-4 visas are not allowed to be gainfully employed. As described in the previous section, the group of idle spouses is a highly selective group, dominated by women and persons with a college education. Thus, prior to estimating a labor force participation model and a wage model to determine the counterfactual wages, i.e., the unobservable potential wages, we first identify a matching group of individuals who do not face the work authorization constraint.

### Optimal matching

The initial pool of idle spouses is composed of $n$ = 24,009 individuals (see Table 5). Our goal is to find a well-matched group of individuals who are not legally barred from entering the labor market. A broad pool of individuals—extracted from the PUMS and ACS data—from which to select matched individuals includes $N$ = 428,064 married non-US citizens who have lived in the US for five or fewer years and whose spouse is present in the household. In the matching process we involve seven variables: survey year, sex, age, number of own children in the household, educational attainment, birth place, and English language proficiency. For all but two variables, the matching is exact. For the age variable, we allow a range of 10 years on either side. For the variable number of children, the matching is exact in most cases; however, for individuals with

many children, the matching accepts a range of plus/minus one child. In order to find the matched set, we used the SAS® macro *%match* with optimal matching algorithm developed by Bergstralh and Kosanke (1995). Optimal matching is the preferred procedure when the goal is to find a well-match group (Stuart 2010). The algorithm is based on minimizing the nearest neighbor distance within the 7-dimensional space of matching variables (Mandrekar and Mandrekar 2004). The matched pool is used to estimate models of labor market outcomes.

## Estimating labor market outcomes

A probit model is chosen to estimate the probability of immigrant spouses being in the labor force ($LFP = 1$) and a Mincer-type model[7] is used to estimate the logarithm of wages, ln $w$. Both models use a linear predictor that allow for sex differences in the parameters, i.e.: $\alpha_1 + \alpha_2 female + X\beta + female * X\gamma$. The predictor variables are made up of a time trend, socio-economic controls and immigrant characteristics. The labor force participation model is estimated using the matched pool of $n_1$=24,009 individuals. Forty-six percent of them are employed, yielding a sample of $n_2$=11,124 individuals for the wage model. The estimation results of the models are shown in Tables 6 and 7.

For the labor force participation probabilities, the results show distinct gender differences. Ceteris paribus, and not surprisingly, among the immigrant spouses, wives are significantly less likely to work than husbands. Moreover, the gender differences are also manifested in the effects of some covariates. Wives' probability of being in the labor force significantly decreased over time. In contrast, for husbands it is estimated to first decrease to a minimum in the late 1990s before increasing thereafter. The age effect is nonlinear for both men and women, with labor force participation peaking at age 38 for men and at age 42 for women. The presence of children lowers the labor force participation propensity for both men and women. However, as the children get older, it increases for women but decreases for men. South Korean men, and women from Japan have the lowest labor force participation propensity. However, for all other nationalities distinct gender differences emerge.

—Insert Table 6—

The wage model results replicate some well-known earning variations. For both men and for women, wages increase with age at a decreasing rate with the estimated maxima reached at relatively young ages, that is, for 42-year old women and 41-year old men. Returns to human capital investments (education and English language proficiency) are positive whereas wage disadvantages are associated with having children, being a black man, and being a Hispanic woman. Wage premiums are associated with residence in the Northeast and, for women only, residence in the western US. Canadians have a substantial wage advantage, and so do German and British men, and women from India and Korea.

Since all parameters vary by sex, estimating the gender wage gap requires fixing all covariates. For example, among 30-year old English-proficient bachelor degree holders from India who are

living in the western portion of the US in 1980, men earned 1.21 times as much as women or, on average, $1,841 more. The gender wage gap increased in the years there after and, by 2006, 30-year old immigrant men from India with the attributes specified above earned about 1.64 as much as their female counterpart, with an estimated gap of $16,461. Since then the gap shrank to reached $12,842 and a factor of 1.43 by the year 2014.

—Insert Table 7—

**What if …**

In this last section of the empirical analysis, we estimate the productivity loss associated with the H-4 visa condition of not being allowed to work in the US. Towards that end, we apply the estimated labor force participation parameters and wage parameters to the pool of dependents as identified and described in section 3.3. That is, the counterfactual productivity for dependent *i* is calculated as the product $P(LFP_i = 1|X_i)e^{E(lnw_i|X_i)}$. This yields an estimate for the average annual lost productivity for dependent spouses during the sample years of $\sum_1^{24,009} pweight\ P(LFP_i = 1|X_i)e^{E(lnw_i|X_i)} = \$1.9$ billion. The total is influenced by temporal changes in the pool's composition and by temporal changes in the labor force participation rates and wages earned. To get a better understanding of these driving forces, we decompose the total loss by key characteristics.

—Insert Table 8—

Table 8 shows that annual lost productivity in the 21st century—both before and after the Great recession—reached about US$2.1 billion and was substantially higher than in earlier years. A good deal of the increase can be attributed to the pool of dependent spouses being so much smaller in the early years than in the later years. But even when accounting for the size effect, the per capita lost productivity more than doubled. Some of this increase is certainly due to the increasing labor force participation trend, but compositional changes in the pool of dependents must have also played a role.

Disaggregating by gender reveals that, if H-4 visas include work authorization, only wives are expected to have an increasing labor force participation, from 46.3 percent in 1980 to 51 percent in the 2014. But even in the later years, wives' labor force participation is still expected to be very low compared to that of husbands. Since women vastly outnumber men in the pool of dependent spouses, they also outnumber them—despite substantially lower labor force participation rates—in the pool of working spouses, i.e., the pool of those who would choose to be in the labor force if H-4 visa included a work authorization. Overall, women are the main contributors to the productivity loss. However, given the male-female wage gap, their contribution is substantially smaller than their share in the pool of working spouses. After the Great Recession, for example, women accounted for 93 percent of all dependent spouses and 89 percent of all would-be working spouses. Yet, they are estimated to only contribute 82 percent of the estimated lost productivity.

—Insert Table 9—

Disaggregating by birth place (Table 9) suggests that one can distinguish between three types of countries. The first type includes India, Canada, Germany, the UK, and the Philippines. H-4 spouses from these countries are responsible for a disproportionately large share of the productivity loss. Spouses from India, for example, accounted for 41.7 percent of all H-4 spouses during the 2009 to 2014 period but are estimated to lose more than one billion dollars in wages per year or 47 percent of the total productivity loss during that same period. This disparity of 5.3 percentage points is the highest observed for all the countries and years in the sample. For Canadian H-4 spouses, the disparity was quite high during 1990—3.4 percent—but has diminished since. The second group includes China, South America, Africa, and USSR/Russia for whom the disparity switched from positive to negative. Chinese dependents share of the total productivity loss was 2.9 percentage points higher than its share of all dependents in 1990; in recent years it is 0.4 percentage points lower. The last group includes origins for which the disparity was consistently negative. Dependents from Mexico, Korea and Japan contribute less to the total wage loss than their shares in the overall pool of dependents would suggest. Lost wages for South Korean and even more so Japanese dependents are very low and is a combined outcome of their very low counterfactual labor force participation rates and above average share of women.

Women's contributions to the country-specific productivity losses are lowest for the dependents from the Philippines (41 to 50 percent)—not surprising given the large number of female Philippine nurses acquiring an H-1B visa and in many cases an H-4 visa for their husbands. The contributions are highest for Mexican dependents in 1990 (100 percent) when there were no Mexican men among the H-4 spouses. In general, variations in the female contribution to the country-specific productivity losses seem to be highest in the places with stronger patriarchal structures where men are less likely to accept their wives as sole wage earners.

## Summary and conclusions

This paper investigates the consequences of the US immigration policy that decouples work permission and admission permission for family members of high-skilled workers. This decoupling imposes structural constraints on dependent spouses. The U.S. H-1B temporary visa for highly-skilled labor and the accompanying H-4 visa for their dependents exemplify these structural constraints as they exclude dependents from the labor force. Using U.S. Census data from 1980, 1990, and 2000, as well as data from the American Community Surveys 2001 to 2014 we delineated the pool of likely H-1B recipients. We find that more than 80 percent of them brought along their spouses. Among the spouses, over 90 percent are wives, including in the samples of the 21st century. We also find that the spouses are very well educated with almost 80 percent having at least a bachelor's degree. To estimate the productivity loss due to barring dependent spouses on H-4 visas from pursuing paid work, we estimate a labor force participation probit model and a Mincerian wage equation for a matching group of individuals who do not face the work authorization constraint. The results show that the policy-imposed labor force exclusion of this highly-educated pool of H-4 spouses leads to substantial losses of spouses' earnings and annual aggregate productivity loss of over $2.1 billion. Given their numerical dominance, women are the main contributors to the productivity loss, but it is smaller than can be expected in the

absence of gender disparities in labor force participation rates and wages. For some origin countries, most notable South Korea and Japan, these gender disparities are substantial.

Taken together, the results support the notion that immigration policies that decouple work and admissions permission impose prejudicial structural constraints on dependent spouses. Specifically, we find that the employment restrictions included in U.S. immigration policies are responsible for productivity losses amounting to billions of dollars every year. They result in extensive brain waste and perpetuate immigrant dependents' vulnerable status. Most of the burden is carried by women who, because of the policy-imposed idle period, suffer substantial losses of their lifetime income, directly through extended exclusion from paid work and indirectly through their diminished work experience.

## Footnotes

[1] In 2015, the Obama Administration's Executive Actions regarding the legislation on dependents' work authorization loosened, but do not eliminate, the restrictions as dependents become eligible for work authorization only after the H-1B visa holder entered the application process for permanent residence ("Green Card").

[2] Often, there is a path from temporary residency to permanent after a specified number of years spent continuously in the host country and/or through familial or employer sponsorship.

[3] An example is the gendered symbolism used in a short video on the immigration procedure for dependents of asylum seekers in Germany. The video is available on the website of *ARD*, a German Public TV channel: http://www.tagesschau.de/inland/familiennachzug-101.html (accessed on 21 October 2016).

[4] There are exceptions such as the Philippine government facilitating the emigration of nurses. Most them are women (Castles and Miller 2009).

[5] Note that the Census and ACS are household surveys and provide information on all persons living in the household. For a spouse not residing in the household we only now the existence of the spouse (as a characteristic of a household member), but we do not know any of the attributes of the spouse.

[6] Throughout this paper, dollar values refer to 2014 US $.

[7] Note that the Mincerian wage equation does not explicitly account for whether the spouses are trailing spouses. McKinnish (2008) argues trailing spouses are a select group and finds that a college educated husband's mobility negatively affects his wife's earnings if she does not have a college degree. Interestingly, a similar effect of the wife's mobility on the husband's earnings cannot be found.

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## Tables

Table 1. Sample Selection Criteria

| Selection Criteria | US Census 1980, 1990, 2000 and ACS 2001 to 2014 | | |
|---|---|---|---|
| | Type-I Household<br>$n$ = 24,009<br>weighted $n$ = 2,218,467 | | Type-II Household<br>$n$ = 4,281<br>weighted $n$ = 466,231 |
| | Spouse 1 | Spouse 2 | Spouse 1 |
| Marital status | married, spouse present | | married, spouse absent |
| US citizen | no | | no |
| Length of stay in US | ≤ 5 years | | ≤ 5 years |
| Age | ≤ 65 | any | ≤ 65 |
| Bachelor's degree | yes | NA | yes |
| Labor force (LF) status | Employed | not in LF | Employed |
| Overeducated* | no | NA | no |

* We defined an individual to be overeducated if he /she has an occupation for which more than 50% of the married employees older than 30 do not have a bachelor's degree. Specifically, using the variable *occ1990* of the IPUMS files, we eliminated all individuals with *occ1990* = 16–19, 28–33, 35, 98, 159,175, 185, 189–194, 198, 204–225, 227–228, 233–254, 275–464, 468–905.

Table 2. Sample Statistics for H-1B Visa Holders

| Sample size *n* | 28,290 | |
|---|---|---|
| Weighted *n* | 2,752,242 | |
| % of Type-I households | 82.6% | |
| | Mean | Standard Deviation |
| ***Demographics*** | | |
| Female | 0.11 | 0.31 |
| Age | 36.5 | 7.60 |
| Hispanic | 0.09 | 0.28 |
| White | 0.31 | 0.46 |
| Asian | 0.62 | 0.49 |
| Black | 0.03 | 0.16 |
| # of children | 0.98 | 1.01 |
| Age of youngest | 4.88 | 5.08 |
| ***Education and Income*** | | |
| BS | 0.43 | 0.49 |
| MS | 0.37 | 0.48 |
| Professional | 0.08 | 0.27 |
| Doctorate | 0.12 | 0.33 |
| English Proficiency | 0.93 | 0.26 |
| Household income [$] | $98,234 | $91,336 |
| ***Birthplace*** | | |
| India | 0.34 | 0.47 |
| China | 0.10 | 0.30 |
| Japan | 0.08 | 0.27 |
| Korea | 0.06 | 0.24 |
| South America | 0.06 | 0.23 |
| Africa | 0.04 | 0.19 |
| Canada | 0.03 | 0.18 |
| Mexico | 0.03 | 0.17 |
| Philippines | 0.03 | 0.17 |
| USSR/Russia | 0.03 | 0.16 |
| Germany | 0.02 | 0.14 |
| UK | 0.03 | 0.18 |

* Results are obtained using individual level weights, with an unweighted sample size of 28,290.

Table 3. Top-Five Occupations for Men and Women, by Household-Type[a]

| Men | | Women | |
|---|---|---|---|
| *Type-I* | | | |
| Software developers | 17.2% | Registered nurses | 12.0% |
| Managers | 8.2% | Postsecondary teachers | 10.7% |
| Computer scientists, systems analysts | 7.0% | Teachers (elementary / middle school) | 5.3% |
| Postsecondary teachers | 6.4% | Software developers | 5.0% |
| Computer programmers | 4.7% | Accountants and auditors | 4.9% |
| *Type-II* | | | |
| Postsecondary teachers | 13.2% | Postsecondary teachers | 18.4% |
| Software developers | 11.7% | Registered nurses | 8.6% |
| Managers | 7.2% | Physicians and surgeons | 7.2% |
| Computer scientists, systems analysts | 5.9% | Software developers | 6.5% |
| Physicians and surgeons | 4.8% | Accountants and auditors | 5.4% |

[a] The occupation codes refer to the occ2010 classification in the IPUMS data. Results are obtained using individual level weights, with an unweighted sample size of 28,290.

Table 4: Probit Estimates of Type-I Household Choice

| | Men | | Women | | Sex Difference | |
|---|---|---|---|---|---|---|
| | $\hat{\beta}$ | SE | $\hat{\beta}+\hat{\gamma}$ | SE | $\hat{\gamma}$ | SE |
| *Intercept* | 3.204 | 0.029 | 1.411 | 0.058 | -1.793 | 0.065 |
| *t (=years-1979)* | 0.009 | 0.001 | 0.042 | 0.002 | 0.032 | 0.003 |
| $t^2$ | -0.0004 | 0.000 | -0.001 | 0.000 | -0.001 | 0.000 |
| **Demographics** | | | | | | |
| *Age* | -0.121 | 0.001 | -0.081 | 0.003 | 0.040 | 0.003 |
| $Age^2$ | 0.001 | 0.000 | 0.001 | 0.000 | 0.000 | 0.000 |
| *# of Children* | 1.137 | 0.002 | 0.396 | 0.003 | -0.741 | 0.004 |
| **Education and Income** | | | | | | |
| *MS* | -0.099 | 0.003 | -0.098 | 0.006 | *0.001* | *0.006* |
| *Professional* | -0.205 | 0.005 | -0.330 | 0.008 | -0.125 | 0.010 |
| *Doctorate* | -0.191 | 0.004 | -0.256 | 0.008 | -0.065 | 0.009 |
| *English proficiency* | 0.182 | 0.005 | *-0.018* | *0.010* | -0.201 | 0.011 |
| *Household income* | 0.001 | 0.000 | 0.002 | 0.000 | 0.001 | 0.000 |
| **Birthplace** | | | | | | |
| *India* | 0.136 | 0.004 | -0.368 | 0.008 | -0.505 | 0.009 |
| *China* | -0.200 | 0.005 | -0.436 | 0.008 | -0.237 | 0.010 |
| *Japan* | -0.110 | 0.005 | -0.478 | 0.019 | -0.368 | 0.020 |
| *Korea* | 0.156 | 0.007 | -0.471 | 0.013 | -0.627 | 0.014 |
| *South America* | 0.216 | 0.007 | *-0.017* | *0.012* | -0.233 | 0.014 |
| *Africa* | -0.533 | 0.007 | -0.721 | 0.013 | -0.188 | 0.014 |
| *Canada* | 0.139 | 0.008 | -0.090 | 0.013 | -0.229 | 0.016 |
| *Mexico* | 0.222 | 0.009 | -0.388 | 0.019 | -0.610 | 0.021 |
| *Philippines* | -0.454 | 0.010 | -0.071 | 0.009 | 0.383 | 0.014 |
| *USSR/Russia* | -0.039 | 0.008 | -0.367 | 0.013 | -0.328 | 0.016 |
| *Germany* | -0.172 | 0.009 | -0.122 | 0.024 | *0.050* | *0.026* |
| *UK* | 0.229 | 0.008 | -0.192 | 0.017 | -0.421 | 0.019 |
| **Model Statistics** | | | | | | |
| Obs. | 28,290 | | | | | |
| -2LogL | 2,478,760.7 | | | | | |

* All estimates are significantly different from zero except those in italics. Results are obtained using household level weights, with an unweighted sample size of 28,290.

Table 5. Summary Statistics for H-4 Spouses

| | All spouses $n$ = 24,009 | | Male spouses $n$ = 1,663 | | Female spouses $n$ = 22,346 | | Male-female difference |
|---|---|---|---|---|---|---|---|
| | $\bar{x}$ | $s$ | $\bar{x}$ | $s$ | $\bar{x}$ | $s$ | |
| **Demographics** | | | | | | | |
| *Female* | 0.93 | 0.26 | 0.00 | 0.00 | 1.00 | 0.00 | -1.00 *** |
| *Age* | 34.2 | 7.84 | 38.9 | 9.92 | 33.8 | 7.53 | 5.00 *** |
| *Hispanic* | 0.09 | 0.29 | 0.10 | 0.30 | 0.09 | 0.29 | 0.01 |
| *White* | 0.32 | 0.47 | 0.34 | 0.47 | 0.32 | 0.47 | 0.013 |
| *Asian* | 0.61 | 0.49 | 0.58 | 0.49 | 0.62 | 0.49 | -0.04 *** |
| *Black* | 0.02 | 0.14 | 0.04 | 0.19 | 0.02 | 0.14 | 0.02 *** |
| *# of children* | 1.15 | 1.01 | 0.95 | 1.03 | 1.17 | 1.01 | -0.21 *** |
| *Age of youngest* | 4.75 | 4.94 | 6.59 | 5.63 | 4.64 | 4.87 | 1.95 |
| **Education and Income** | | | | | | | |
| *High school* | 0.07 | 0.26 | 0.07 | 0.26 | 0.07 | 0.26 | 0.00 |
| *Some college* | 0.14 | 0.34 | 0.14 | 0.35 | 0.14 | 0.34 | 0.01 |
| *BS* | 0.46 | 0.50 | 0.41 | 0.49 | 0.47 | 0.50 | -0.06 *** |
| *MS* | 0.23 | 0.42 | 0.22 | 0.41 | 0.24 | 0.42 | -0.02 * |
| *Professional* | 0.05 | 0.21 | 0.08 | 0.27 | 0.04 | 0.21 | 0.03 *** |
| *Doctorate* | 0.02 | 0.14 | 0.05 | 0.21 | 0.02 | 0.13 | 0.03 *** |
| *English proficient* | 0.80 | 0.40 | 0.84 | 0.37 | 0.79 | 0.40 | 0.04 *** |
| *Household income* [$] | $102,532 | $93,393 | $74,438 | $69,407 | $104,732 | $94,666 | -$30,293 *** |
| **Birthplace** | | | | | | | |
| *India* | 0.34 | 0.48 | 0.19 | 0.39 | 0.36 | 0.48 | -0.17 *** |
| *China* | 0.09 | 0.28 | 0.15 | 0.35 | 0.08 | 0.28 | 0.06 *** |
| *Japan* | 0.08 | 0.27 | 0.01 | 0.10 | 0.08 | 0.28 | -0.07 *** |
| *Korea* | 0.07 | 0.25 | 0.04 | 0.19 | 0.07 | 0.25 | -0.03 *** |
| *South America* | 0.06 | 0.24 | 0.07 | 0.26 | 0.06 | 0.24 | 0.01 * |
| *Africa* | 0.03 | 0.18 | 0.04 | 0.20 | 0.03 | 0.18 | 0.01 |
| *Canada* | 0.04 | 0.18 | 0.05 | 0.22 | 0.03 | 0.18 | 0.02 *** |
| *Mexico* | 0.03 | 0.18 | 0.02 | 0.13 | 0.03 | 0.18 | -0.02 *** |
| *Philippines* | 0.03 | 0.16 | 0.17 | 0.38 | 0.02 | 0.13 | 0.16 *** |
| *USSR/Russia* | 0.03 | 0.16 | 0.04 | 0.19 | 0.03 | 0.16 | 0.01 ** |
| *Germany* | 0.02 | 0.14 | 0.01 | 0.09 | 0.02 | 0.14 | -0.01 *** |
| *UK* | 0.03 | 0.17 | 0.03 | 0.16 | 0.03 | 0.17 | 0.00 |

[*] Results are obtained using individual level weights, with an unweighted sample size of 24,009. To test whether the difference of means equals zero, we used two sample t-tests. ***, **, and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Table 6: Probit Estimates of Labor Participation

| | Men | | Women | | Sex Difference | |
|---|---|---|---|---|---|---|
| | $\hat{\beta}$ | SE | $\hat{\beta} + \hat{\gamma}$ | SE | $\hat{\gamma}$ | SE |
| *Intercept* | -1.676 | 0.089 | -4.190 | 0.021 | -2.513 | 0.092 |
| *t (=years-1979)* | -0.034 | 0.004 | *0.001* | *0.001* | 0.034 | 0.004 |
| $t^2$ | 0.001 | 0.000 | 0.000 | 0.000 | -0.001 | 0.000 |
| **Demographics** | | | | | | |
| *Age* | 0.158 | 0.003 | 0.203 | 0.001 | 0.045 | 0.003 |
| $Age^2$ | -0.002 | 0.000 | -0.002 | 0.000 | 0.000 | 0.000 |
| *# of Children* | -0.040 | 0.007 | -0.092 | 0.002 | -0.052 | 0.007 |
| *Age of youngest child* | -0.002 | 0.000 | 0.003 | 0.000 | 0.005 | 0.000 |
| **Education** | | | | | | |
| *High School* | 0.136 | 0.023 | 0.040 | 0.006 | -0.096 | 0.024 |
| *Bachelor's* | 0.100 | 0.023 | 0.130 | 0.006 | ***0.030*** | ***0.023*** |
| *Graduate* | 0.386 | 0.023 | 0.332 | 0.006 | -0.054 | 0.024 |
| *English proficiency* | 0.395 | 0.011 | 0.307 | 0.003 | -0.088 | 0.011 |
| **Birthplace** | | | | | | |
| *India* | 0.035 | 0.015 | -0.057 | 0.003 | -0.092 | 0.015 |
| *China* | -0.617 | 0.015 | -0.051 | 0.003 | 0.566 | 0.015 |
| *Japan* | 0.123 | 0.030 | -0.872 | 0.006 | -0.994 | 0.030 |
| *Korea* | -0.805 | 0.017 | -0.482 | 0.004 | 0.323 | 0.017 |
| *South America* | -0.224 | 0.019 | 0.032 | 0.004 | 0.256 | 0.019 |
| *Africa* | -0.207 | 0.020 | 0.149 | 0.005 | 0.356 | 0.021 |
| *Canada* | -0.101 | 0.022 | -0.082 | 0.006 | *0.020* | *0.023* |
| *Mexico* | *0.021* | *0.023* | -0.175 | 0.005 | -0.196 | 0.024 |
| *Philippines* | -0.538 | 0.014 | 0.303 | 0.006 | 0.841 | 0.015 |
| *USSR/Russia* | 0.164 | 0.028 | *-0.006* | *0.006* | -0.170 | 0.028 |
| *Germany* | *-0.004* | *0.040* | -0.265 | 0.008 | -0.261 | 0.041 |
| *UK* | -0.116 | 0.022 | -0.232 | 0.006 | -0.116 | 0.023 |
| **Model Statistics** | | | | | | |
| Obs. | 24,009 | | | | | |
| -2LogL | 2785721.4 | | | | | |

* Results are obtained using individual level weights, with an unweighted sample size of 24,009, which is a matching group of individuals who do not face the work authorization constraint. All estimates are significantly different from zero except those in italics

Table 7: OLS Estimates of Wage Equation

| | Men | | Women | | Sex Difference | |
|---|---|---|---|---|---|---|
| | $\hat{\beta}$ | SE | $\hat{\beta}+\hat{\gamma}$ | SE | $\hat{\gamma}$ | SE |
| *Intercept* | 2.857 | 0.755 | 4.995 | 0.307 | 2.138 | 0.815 |
| *t (=years-1979)* | 0.097 | 0.030 | 0.062 | 0.009 | *-0.035* | *0.032* |
| $t^2$ | -0.002 | 0.001 | -0.001 | 0.000 | *0.001* | *0.001* |
| **Demographics** | | | | | | |
| *Age* | 0.270 | 0.030 | 0.141 | 0.015 | -0.129 | 0.034 |
| $Age^2$ | -0.003 | 0.000 | -0.002 | 0.000 | 0.002 | 0.000 |
| *# of Children* | -0.100 | 0.035 | -0.054 | 0.015 | *0.046* | *0.038* |
| *White* | *0.192* | *0.168* | *0.036* | *0.060* | *-0.155* | *0.179* |
| *Black* | -0.843 | 0.237 | *0.126* | *0.096* | 0.969 | 0.255 |
| *Asian* | *0.300* | *0.187* | *-0.113* | *0.069* | -0.413 | 0.199 |
| *Hispanic* | *-0.047* | *0.148* | -0.171 | 0.064 | *-0.124* | *0.161* |
| **Education** | | | | | | |
| *High School* | *0.129* | *0.201* | *0.162* | *0.084* | *0.032* | *0.218* |
| *Bachelor's* | 0.514 | 0.196 | 0.427 | 0.083 | *-0.087* | *0.213* |
| *Graduate* | 0.693 | 0.198 | 0.726 | 0.084 | *0.033* | *0.215* |
| *English proficiency* | 0.315 | 0.092 | 0.454 | 0.039 | *0.139* | *0.100* |
| **Birthplace** | | | | | | |
| *India* | *0.036* | *0.129* | 0.334 | 0.059 | 0.298 | 0.142 |
| *China* | *-0.149* | *0.151* | *0.092* | *0.067* | *0.241* | *0.165* |
| *Japan* | *0.299* | *0.205* | *-0.136* | *0.109* | *-0.435* | *0.232* |
| *Korea* | *-0.130* | *0.175* | 0.273 | 0.081 | 0.403 | 0.193 |
| *South America* | *0.205* | *0.170* | *-0.010* | *0.070* | *-0.214* | *0.184* |
| *Africa* | *0.052* | *0.180* | -0.355 | 0.078 | -0.407 | 0.196 |
| *Canada* | 0.774 | 0.168 | 0.288 | 0.070 | -0.486 | 0.182 |
| *Mexico* | *-0.377* | *0.199* | *0.000* | *0.087* | *0.377* | *0.217* |
| *Philippines* | -0.572 | 0.141 | *0.049* | *0.084* | 0.620 | 0.164 |
| *USSR/Russia* | *0.079* | *0.209* | -0.398 | 0.075 | -0.477 | 0.222 |
| *Germany* | 0.640 | 0.257 | *0.135* | *0.108* | *-0.505* | *0.279* |
| *UK* | 0.631 | 0.164 | *0.099* | *0.074* | -0.532 | 0.180 |
| **Region** | | | | | | |
| *Northeast* | 0.315 | 0.104 | 0.221 | 0.036 | *-0.095* | *0.110* |
| *Midwest* | *-0.219* | *0.123* | -0.140 | 0.041 | *0.079* | *0.130* |
| *West* | *-0.001* | *0.081* | 0.171 | 0.032 | 0.171 | 0.087 |
| **Model Statistics** | | | | | | |
| Obs. | 11,124 | | | | | |
| Adjusted $R^2$ | 0.155 | | | | | |

* Results are obtained using individual level weights, with an unweighted sample size of 11,124, which is a subset of employed individuals from a matching group. All estimates are significantly different from zero except those in italics.

Table 8. Estimated Lost Wages of H-4 Spouses, by Year and Gender

| Year[a)] | Number of H-4 Spouses | Estimated LFP Rate | Estimated Lost Wage Income (expressed in 2014 $-values) | | Female spouses as a % of all spouses | Female working spouses as % of all working spouses | % of total Loss |
|---|---|---|---|---|---|---|---|
| | | | total | per worker | | | |
| 1980 | 24,540 | 47.3% | $172,991,634 | $14,908 | | | |
| 1990 | 52,861 | 47.1% | $516,740,176 | $20,756 | | | |
| 2000-08 | 141,249 | 52.7% | $2,011,952,544 | $27,034 | | | |
| 2009-14 | 143,299 | 53.5% | $2,140,630,914 | $27,936 | | | |
| ***Women*** | | | | | | | |
| 1980 | 23,880 | 46.3% | $159,155,531 | $14,407 | 97% | 95% | 92% |
| 1990 | 50,268 | 45.4% | $429,215,734 | $18,812 | 95% | 92% | 83% |
| 2000-08 | 130,492 | 50.3% | $1,583,766,412 | $24,111 | 92% | 88% | 79% |
| 2009-14 | 133,249 | 51.0% | $1,747,928,992 | $25,727 | 93% | 89% | 82% |
| ***Men*** | | | | | | | |
| 1980 | 660 | 84.4% | $13,836,103 | $24,848 | | | |
| 1990 | 2,593 | 80.2% | $87,524,442 | $42,066 | | | |
| 2000-08 | 10,757 | 81.2% | $428,186,132 | $49,009 | | | |
| 2009-14 | 10,050 | 86.4% | $392,701,922 | $45,217 | | | |

[a)] The entries for 2000-08 and 2009-14 refer to the 9-year and 6-year averages, respectively.

Table 9. Estimated Lost Wages of H-4 Spouses by Place of Birth

| Origin (Birth Place) | Year[a) b)] | Number of H-4 Spouses | Estimated LFP Rate | Estimated Lost Wage Income ($Million in 2014 values) | Share of Total Productivity Loss | | Share of all H-4 Spouses | |
|---|---|---|---|---|---|---|---|---|
| | | | | | by origin and year | women's contribution | by origin and year | women's contribution |
| India | 1990 | 4,732 | 53% | $65 | 12.5% | 85.4% | 9.0% | 96.0% |
| | 2000-2008 | 43,871 | 53% | $707 | 35.1% | 87.1% | 31.1% | 96.0% |
| | 2009-2014 | 59,733 | 54% | $1,006 | 47.0% | 88.6% | 41.7% | 96.1% |
| Canada | 1990 | 1,982 | 57% | $37 | 7.1% | 67.8% | 3.7% | 92.2% |
| | 2000-2008 | 6,077 | 59% | $144 | 7.2% | 68.1% | 4.3% | 89.9% |
| | 2009-2014 | 3,252 | 59% | $85 | 4.0% | 62.3% | 2.3% | 88.7% |
| Germany | 1990 | 1,514 | 49% | $18 | 3.4% | 93.6% | 2.9% | 98.5% |
| | 2000-2008 | 2,847 | 51% | $45 | 2.2% | 88.6% | 2.0% | 97.2% |
| | 2009-2014 | 2,457 | 53% | $47 | 2.2% | 81.2% | 1.7% | 95.6% |
| UK | 1990 | 2,811 | 48% | $30 | 5.8% | 91.3% | 5.3% | 97.7% |
| | 2000-2008 | 4,526 | 55% | $80 | 4.0% | 77.8% | 3.2% | 94.2% |
| | 2009-2014 | 3,514 | 56% | $70 | 3.3% | 71.8% | 2.5% | 90.8% |
| Philippines | 1990 | 881 | 71% | $14 | 2.7% | 49.5% | 1.7% | 58.8% |
| | 2000-2008 | 4,315 | 72% | $75 | 3.7% | 50.5% | 3.1% | 57.6% |
| | 2009-2014 | 3,554 | 74% | $63 | 3.0% | 41.4% | 2.5% | 48.0% |
| China | 1990 | 5,768 | 58% | $71 | 13.8% | 74.4% | 10.9% | 88.4% |
| | 2000-2008 | 13,421 | 59% | $209 | 10.4% | 68.3% | 9.5% | 86.2% |
| | 2009-2014 | 10,917 | 57% | $154 | 7.2% | 79.4% | 7.6% | 90.5% |
| South America | 1990 | 2,901 | 56% | $30 | 5.8% | 84.6% | 5.5% | 94.9% |
| | 2000-2008 | 9,307 | 60% | $130 | 6.5% | 72.9% | 6.6% | 91.2% |
| | 2009-2014 | 7,995 | 61% | $117 | 5.4% | 75.0% | 5.6% | 91.4% |
| Africa | 1990 | 2,074 | 62% | $21 | 4.0% | 78.4% | 3.9% | 94.4% |
| | 2000-2008 | 5,103 | 61% | $56 | 2.8% | 76.5% | 3.6% | 91.8% |
| | 2009-2014 | 4,140 | 62% | $47 | 2.2% | 78.0% | 2.9% | 89.6% |
| USSR / Russia | 1990 | 962 | 53% | $8 | 1.6% | 63.6% | 1.8% | 87.9% |
| | 2000-2008 | 4,330 | 59% | $53 | 2.6% | 70.7% | 3.1% | 89.3% |
| | 2009-2014 | 3,131 | 55% | $34 | 1.6% | 72.4% | 2.2% | 92.8% |
| Mexico | 1990 | 1,172 | 43% | $7 | 1.4% | 100.0% | 2.2% | 100.0% |
| | 2000-2008 | 4,258 | 47% | $35 | 1.7% | 90.6% | 3.0% | 96.3% |
| | 2009-2014 | 5,613 | 49% | $51 | 2.4% | 89.3% | 3.9% | 95.5% |
| Korea | 1990 | 3,660 | 33% | $26 | 5.0% | 92.6% | 6.9% | 98.1% |
| | 2000-2008 | 9,820 | 36% | $93 | 4.6% | 82.2% | 7.0% | 94.8% |
| | 2009-2014 | 8,860 | 37% | $88 | 4.1% | 92.2% | 6.2% | 97.2% |
| Japan | 1990 | 11,411 | 22% | $35 | 6.7% | 96.5% | 21.6% | 99.8% |
| | 2000-2008 | 11,510 | 24% | $49 | 2.4% | 79.3% | 8.1% | 98.7% |
| | 2009-2014 | 9,103 | 24% | $36 | 1.7% | 90.3% | 6.4% | 99.2% |

[a)] The entries for 2000-2008 and 2009-2014 refer to the 9-year and 6-year averages, respectively.

[b)] Information for 1980 is omitted because some origin-specific counts of H-4 spouses are very small.

## Figures

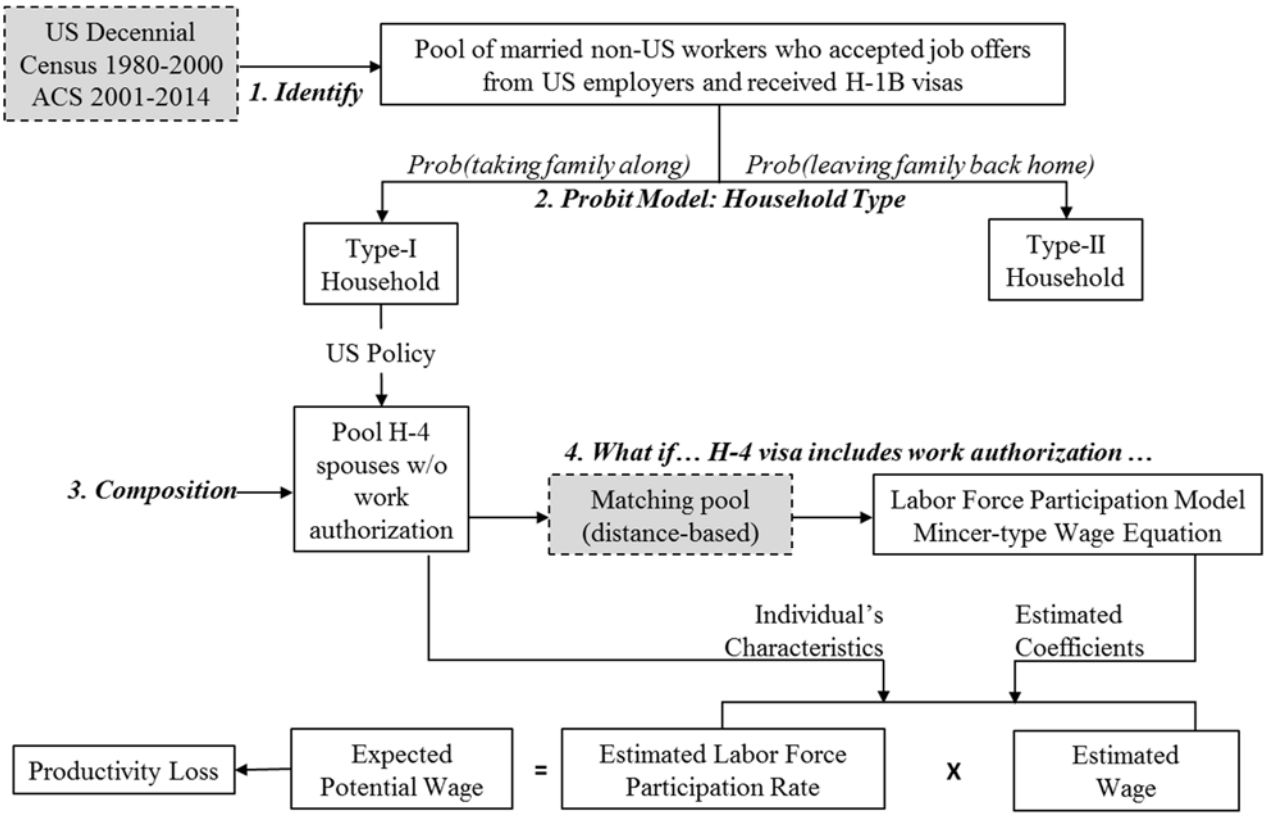


Figure 1. Research Design

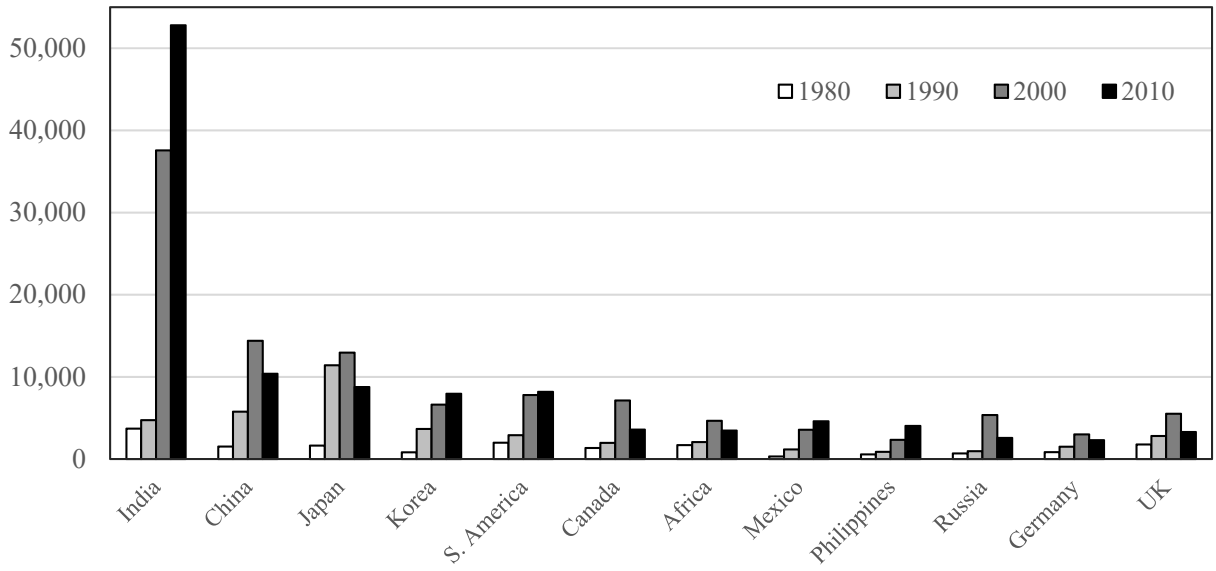


Figure 2. Birthplace of Dependent Spouses