The Globalization of Household Production[*]

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Abstract

Immigration restrictions are arguably the largest distortion in the world economy and the most costly to the world's poor. Yet, these restrictions seem firmly in place due to fears in rich countries that immigration would exacerbate inequality among natives, fiscally drain the welfare state, and change native culture. Many "new rich" countries are creating a new form of immigration that we argue may help overcome these obstacles. Foreign private household workers, primarily female, constitute more than 6% of the labor force in Bahrain, Kuwait, Hong Kong, Singapore, and Saudi Arabia, and about 1% in Taiwan, Greece, and Israel. Providing temporary visas for these workers can potentially allow high-skilled native women to enter the market labor force. This increased labor supply by native high-skilled workers can increase the wages of low-skilled natives and provide a fiscal benefit by correcting distortions toward home production created by income taxes. Calibration suggests welfare gains to natives from a Hong Kong style program may be equivalent to those from a 2.0% increase in income. However, multicultural societies with a norm of extending citizenship to long-term residents may find this type of migration inconsistent with ethical norms. Programs with temporary, non-renewable visas may be more acceptable in these countries.

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1. Introduction

Migration restrictions are arguably the most important distortion in the world economy and the most harmful to the world's poor. Klein and Ventura (2004), for example, estimate that the removal of immigration restrictions in OECD countries could increase world output by up to 172%.[2] Yet despite occasional calls for freer mobility (perhaps most notably from Mexico's President Fox) the elimination of immigration restrictions is not under consideration in rich countries. High-income countries limit migration due to concerns that immigration of low-skilled workers would (1) exacerbate inequality among natives, (2) create a burden on the welfare state, (3) change native culture and increase crime.

In this context, it seems worth examining a new form of immigration that is becoming widespread in countries that have become prosperous recently, from Saudi Arabia to Hong Kong to Greece. In this new type of immigration, foreigners, women in particular, are employed as private household workers either on temporary visas or under the table.

We argue that this type of immigration may potentially address each of the obstacles to migration cited above. It can potentially (1) equalize wages among natives, (2) provide a fiscal benefit, (3) limit the impact of immigration on culture and crime. To see the logic, note that in standard models, such as Borjas (1995), migration by low-skilled immigrants exacerbates inequality among natives. The welfare gains for the host country are Harberger triangles and are small compared to distributional effects. Borjas (1995) writes that "the relatively small size of the immigration surplus – particularly when compared to the very large wealth transfers caused by immigration – probably explains why the debate over immigration policy has usually focused on the potentially harmful labor market impacts rather than the overall increase in native income." These distributional effects may explain why in rich countries low-skilled natives are particularly likely to oppose immigration. (Mayda 2004)

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[2] Klein and Venturia assume that capital is mobile and that immigrants can take advantage of OECD levels of total factor productivity. Even without these favorable assumptions, Walmsley and Winters (2003) estimate that an increase of 3% of labor supply in immigration in developed countries could raise world welfare by 0.6%, half of the gains associated with complete trade liberalization. Williamson (1996) argues that 19th Century mass migration led to income convergence across today's rich countries by directly raising the wages of the migrants and by reducing labor supply in the sending countries.

When foreign workers perform services previously done within households, such as cooking, cleaning, and caring for children, the sick, and the elderly, new effects arise. Immigrants involved in these industries arguably displace pre-existing non-market labor. Since high-skilled natives with a higher opportunity cost of time are more likely to purchase these services, native high-skilled workers, women in particular, will spend more time working in the labor market. To the extent that foreign private household workers lead to the high-skilled increasing their labor supply to the market, they create a new effect beyond those analyzed in standard models such as Borjas (1995). By freeing up high-skilled labor for market production, immigrant private household workers can reduce wage inequality, since the increase in labor supply of high-skilled workers leads to a decline in their relative wage and an increase in the relative wage of complementary low-skilled native labor. Foreign private household workers, by allowing women to work more flexible hours, may also reduce gender disparities among high-skilled natives and help eliminate the glass ceiling. Moreover, when high-skilled women hire immigrant private household workers and transfer their labor from home production to market work, their output becomes taxable, providing a fiscal benefit for the population, even without considering the taxes paid by the migrants, themselves.

The long-run impact of foreign private household workers on native culture is limited, since immigrant private household workers are typically not allowed to bring families with them on their visas. These workers are typically female, and crime is, therefore, less likely to be perceived as a problem.

We construct a simple model to illustrate the economic impact of foreign private household workers on natives. The intuition is simplest in the case in which high-skilled native households substitute the services of foreign private household workers for their own time in childcare. We show, however, that results are qualitatively similar even in the more empirically relevant case when families use daycare centers in the absence of foreign private household workers, but private household workers provide services that daycare centers do not, such as cooking, cleaning, and childcare on holidays and during cases of child illness.

A very rough calibration of this model suggests this type of migration can cause significant equalization of native wages and substantial gains in welfare. Assuming that taxes area at U.S. rates and that each hour of time worked by a private household worker frees up

20% of an hour of employer time, immigration of 7% of the native labor force can increase welfare of low-skilled natives by the equivalent of a 3.4% increase in income. It decreases welfare of the high-skilled by the equivalent of a 0.3% change in income. Total welfare accruing to natives increases by 1.7% or more than 140 times the amount found by Borjas (1999).

While immigration by foreign private household workers avoids many of the political economy obstacles of other forms of migration, it raises a new set of ethical issues. These programs may be inconsistent with ethical norms in "old rich" multicultural societies that have a tradition of assimilating immigrants. Restricting people who have lived in a country for twenty or thirty years to private household work and preventing them from bringing their families may well be considered unacceptable. However, the ethical concerns of the "old rich" may create a paradox. Under ethical norms that place little obligations on society to those born overseas regardless of time spent in the host country, foreign domestic helpers may be admitted, making them and the host society better off. Under ethical norms that place low value on foreigners as long as they stay overseas but that consider foreigners entitled to better treatment given enough time in the host country, societies may be unwilling to admit foreigners, potentially making everyone worse off. Programs with temporary non-renewable visas might make introducing foreign private household workers more palatable. Of course some workers who enter under foreign private household worker programs will leak out of the sector and compete with native low-skilled labor in the general economy. We discuss potential measures to control this and argue that foreign private household worker programs are likely to make low-skill natives better off unless leakage rates are very high.

The rest of the paper is structured as follows: Section 2 presents some facts on foreign private household workers. Section 3 lays out a simple model designed to illustrate the impact of foreign private household workers on wages and welfare in the host country. Section 4 calibrates the model, and discusses the estimated impact of a Hong Kong or Singapore-style program in the U.S. Section 5 discusses ethical and policy issues related to the adoption of such programs in "old rich" countries, such as the United States, and section 6 concludes.

2. Foreign Private Household Workers: Some Facts

"Old rich" and "new rich" countries are pursuing immigration policies with very different implications for the developing world, and in particular for the poor in the developing world. Old rich countries are increasingly focusing on attracting high-skilled immigrants in a global competition for talent. (See Kapur 2004) Many argue that the associated "brain drain" imposes substantial costs on developing countries.

In contrast, many newly rich economies admit substantial numbers of foreign private household workers. Table 1 shows that in Bahrain, Kuwait, and Saudi Arabia around 10% of the labor force or more are foreign workers in private households. In Hong Kong and Singapore, two of the three countries other than Puerto Rico to have joined the ranks of the world's richest 25 countries in the last 40 years, about 6.8% and 7.0% of the total labor force, respectively, are foreign domestic helpers.

Among countries that have not quite reached this income category, many also have around 1% of the labor force as foreign private household workers. Foreign private household workers make up at least 0.8% of the labor force in Taiwan, and immigrant workers in private households are at least 0.8% of the labor force in Israel. Non-Greek, non-EU employees in private households constitute about 1% of the labor force in Greece.

These figures exclude illegal workers. Anecdotal evidence suggests that substantial numbers of foreign women work illegally as household employees. Authorities find it harder to enforce laws against hiring illegal workers when private households, rather than firms, are doing the hiring. Chile, Italy, and Israel are all reported to have significant numbers of foreigners working illegally as private household workers. Statistics on the number of foreign private household workers are not readily available for Chile, but 4.7% of the labor force is occupied in domestic service, and anecdotal evidence suggests substantial numbers of these workers are Bolivian and Paraguayan women (Stefoni, 2002). In the US 35% of women illegal immigrants reported that their first job was working in a private household (Cortes 2004).

Compared to "new rich" countries, the share of the labor force in "old rich" countries composed of foreigners performing domestic work is much smaller. For example, foreign workers in private households constitute only around 0.3% of the working population in the

US.[3] To the extent that some illegal workers are not captured in the census, the true percentage might be somewhat greater, but it is still likely to be much smaller than in many "new rich" countries.

While "old rich" countries once had substantial numbers of native private household workers, today there are very few. In the UK in 1990, only 0.05% of the working population was employed as domestic housekeepers. In the US, only around 1% of the entire employed population (including natives and non-natives) are employed in the personal services – private household industries.

Foreign private household worker programs have expanded rapidly among "new rich" countries. For example, from 1987 to 1996, the percentage of households employing domestic servants in Hong Kong more than doubled from 2.5% to 6.1%.[4] In Singapore in 1980 less than 0.3% of the working population were foreign private household workers whereas today one in seven households employ a live-in helper (Kolesnikov-Jessop, 2004).[5]

The high-skilled are most likely to employ domestic workers. In 1990 almost 18% of university educated mothers in Singapore hired domestic workers while only 15% of polytechnic educated mothers, 2% of secondary educated mothers and less than 0.2% of primary school educated mothers hired domestic workers (Singapore Census of Population 1990).

Table 2 shows labor force participation and fertility rates for a number of countries. One problem is that labor force participation statistics for most countries (except for Bahrain) include foreign private household workers. We estimate the female labor force participation rate without foreign private household workers for those countries with large numbers of these workers.[6] Consistent with the idea that foreign domestic workers can increase female

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[3] This figure is taken from the March 1998 CPS where the total number of non-citizens in the industry category Personal Services – Private Households is divided by the total number of people reporting to be working in an industry. The CPS supposedly contains data collected from illegal immigrants.
[4] These figures come from various Hong Kong Special Topics Report.
[5] 4,123 Singaporean non-residents were employed in domestic service out of a total working population of 1,077,090 in 1980 (Singaporean Census of Population 1980).
[6] These estimations come from assuming the age distribution from a survey of foreign private household workers in Hong Kong in 1996 applies to the population of foreign private household workers in Hong Kong in 2000, Singapore in 2003, and Kuwait in 1995. The relevant age distribution is multiplied by the number of foreign private household workers in Hong Kong in 2000, Singapore in 2003, and Kuwait in 1995. This number is subtracted from the number of women working in each country and the total number of women in each country when calculating the female labor force participation rate. (Hong Kong Census and Statistics Department 1996)

labor force participation, Hong Kong and Singapore both have high rates of female labor force participation, much higher than in Korea although similar to the US and UK (see Table 2). Female labor force participation was not high in these countries in the 1970's before large numbers of domestic workers from abroad began to enter the labor force, casting doubt on purely cultural explanations. Fertility rates for Hong Kong and Singapore are much lower and have fallen more quickly than in comparable countries, consistent with the view that women freed up from household work to participate in the labor market have fewer children.

Note, however, that in the Gulf States, fertility is high and female labor force participation is low. If social norms limit female labor force participation or if labor force households have non-wage income, then time freed up by foreign private household workers may go into leisure or increased fertility rather than into more market labor. If foreign private household workers free up time that natives devote to leisure or simply lead to more household work being done than would be done otherwise, relative wages between different classes of native workers will be unaffected by foreign private household workers. If foreign private household workers lead to higher fertility among high-skilled natives, long-run income distribution among natives' may be equalized. First, higher fertility could increase the long-run supply of high-skill labor, at least to the extent that high-skilled parents can transmit education to their children. Second, to the extent that greater fertility among high-skill workers leads them to split their bequests and attention among more children the distribution of wealth will be equalized.

3. Model

We present a model designed to illustrate the impact of foreign private household worker migration in societies where women are educated and can potentially work in the labor market, and where time freed up by these workers is likely to go into market work rather than leisure or increased fertility. Subsection 3.1 sets up the model by describing households and producers. Subsection 3.2 solves the model with zero immigration, focusing on the case in which natives use daycare centers in the absence of migration. Subsection 3.3, solves the model with immigration again focusing on this case. Subsection 3.4 discusses the case in which some natives work in private households in the absence of immigration.

3.1. Preferences and Technology

Preferences and Consumption

Native consumers in our model consume two types of private consumption goods, a general good and a domestic good like cooking, cleaning, or childcare. The domestic good can either be purchased from private household workers, or purchased from daycare centers, or produced at home. The utility function governing all native consumers is :

$U = A^\alpha (C_{hw} + C_{dc} + L_c)^{1-\alpha} + v(g)$ where A is the amount of the general good consumed, C_{hw} is that amount of domestic good consumed from private household workers, C_{dc} is the amount of domestic good consumed from daycare centers, and L_c is the amount of time invested in home production of the domestic good. The variable g is a public good provided by the government, and $v( )$ is an increasing, concave function.

We also assume that people dislike working in the private household sector and would prefer to work in the formal sector. Working conditions and social stigma associated with private household work may contribute to these preferences. Thus, if a consumer works in the private household sector, we assume that he suffers a utility penalty given by:

$U = e * A^\alpha (C_{hw} + C_{dc} + L_c)^{1-\alpha} + v(g)$ where $e < 1$. This assumption limits the extent to which low-skilled workers will work as private household workers in the absence of immigration. We could alternatively assume that households prefer or are more efficient at producing their own domestic good.

Because immigrants accepted under foreign private household programs cannot bring their own families, we assume that the utility function of foreign private household workers is slightly different from natives. We assume that their utility function is given by

$U = A^{\alpha_i} (C_{hw} + C_{dc} + L_c)^{1-\alpha_i}$ where $\alpha_i > \alpha$. We also assume that immigrants without their families do not use daycare. Immigrants can also be assumed to dislike working as private household workers as modeled for natives above.

In order to abstract from debates about whether immigrants pay more in taxes than they receive from the government in social services, we assume that immigrants are neither taxed nor enjoy the benefits of the government good. Therefore, our welfare analysis will remain largely agnostic about the direct net contribution of immigrants to the public sector.

The government taxes the labor income of all natives at tax rate, τ, and spends all tax revenue on a public good that is only enjoyed by natives.

Daycare centers only produce certain types of the domestic good. We, therefore, assume there is an upper limit denoted by $\overline{C}$ as to how much of the domestic good consumers can purchase from daycare centers. Most daycare centers are open only during limited hours, are closed on holidays, and send home sick children. Consumers employing daycare centers must still daily drop off and pick up their children, find alternative childcare on holidays, and care for sick children themselves. Daycare centers also do not do other domestic tasks like cooking and cleaning.

Consumers inelastically supply one unit of labor and face the budget constraint:
$W_i(1-\tau)(1-L_C) = P_A A + P_{hw} C_{hw} + P_{dc} C_{dc}$, where W_i is the wage of the consumer ($i \in \{H, L, I\}$ which is described later), P_A is the price of good A, P_{hw} is the price of good C produced by household workers and P_{hw} is the price of daycare. Good A will be the numeraire, and $P_A = 1$. In this setting, consumers solve the following problem[7]:

$$\max A^\alpha (C_{hw} + C_{dc} + L_c)^{1-\alpha} + \upsilon(g) \text{ such that } W_i(1-\tau)(1-L_C) = A + P_{hw} C_{hw} + P_{dc} C_{dc} \text{ and } C_{dc} \leq \overline{C}$$

Technology and Production

Producers hire three types of labor: native high-skilled workers, native low-skilled workers and immigrants. We normalize the native population to one and assume that a fraction *h* are high-skilled, leaving *1 – h* the fraction of low-skilled natives. Let *m* denote the population of immigrants making the total population in the host country *1 + m*.

The production function for good A is $A = H^\beta L^{1-\beta}$ where *H* is high-skilled native labor, *L* is low-skilled native labor, and *0 < β < 1*. Immigrants perfectly substitute for low-skilled natives, but they are excluded from working in the good A sector by assumption, since most foreign private household worker programs do not allow immigrants to seek outside employment. We consider the case in which some immigrants leak into the general economy and substitute for low-skilled workers in production of good A in section 5. Producers of good A are assumed to be perfectly competitive.

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[7] Consumers working as private household workers solve essentially the same maximization problem:
$\max eA^\alpha (C_{hw} + C_{dc} + L_c)^{1-\alpha} + \upsilon(g) \text{ such that } W_i(1-\tau)(1-L_C) = A + P_{hw} C_{hw} + P_{dc} C_{dc} \text{ and } C_{dc} \leq \overline{C}$

We assume daycare centers have the same factor intensity as good A. Kisker et al. (1991) finds that 47% of teachers in US day care centers have completed college which is higher than the 24.1% proportion of workers with college degrees in the general economy (Kominski and Adams, 1994). Daycare centers are assumed to produce good C with production function $C_{dc} = kH^{\beta}L^{1-\beta}$. Daycare centers are also assumed to be perfectly competitive,

Good C, purchased from private household workers, is produced by a linear production technology in the labor of any type: $C = Labor$. However, we have assumed that all workers would prefer not to work as private household workers given working conditions and social stigma. Therefore, in order to persuade workers to become private household workers, a premium, δ, must be paid over the wage in the formal sector. The parameter δ arises from our assumption that workers experience a disutility associated with private household work[8] Therefore, the price of the service provided by private household workers will be $P_{hw} = \delta W_i$ where W_i is the wage of workers of type i.

The assumption that immigrants and low-skilled natives are not perfect substitutes and that immigrants have a comparative advantage at producing the domestic good is necessary for our results. Imperfect substitutability of immigrants and native low-skilled workers may arise due to either differences in skills between these workers or to government policies that restrict certain immigrants' ability to work outside the domestic sector, as in the Hong Kong foreign domestic helpers program or the US and UK Au Pair programs. Some evidence that immigrants have a comparative advantage in domestic work is provided by the fact that in 1998 in the US, non-citizens were almost five times more likely to work in personal service – private household category as citizens. 3.6% of non-citizens were employed in those occupations as opposed to 0.7% of US citizens.[9] 2.7% of foreign born US residents (including naturalized citizens) work in personal service occupations.

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[8] Given the utility framework described above, it can be shown that a unique $\delta > 1$, which is a function of e, exists such that workers are indifferent between working in sector A or in daycare centers and being a private household worker. See Appendix A

[9] These figures are from the authors' calculations from the CPS March 1998. Private Household - personal service industry is defined to include private households who "employ workers that are cooks, laundresses, maids, sitters, butlers, personal secretaries, managers of personal affairs; and outside workers, such as gardeners, caretakers and other maintenance workers" as defined by OSHA US Department of Labor.

We assume that the supply of foreign private household workers is only limited by the number of visas that the host government will provide. Although immigrants experience a utility penalty when working as private household workers, we assume that their other options are even less attractive. Thus, we assume an inelastic supply of immigrants whose numbers are limited by the government's decision to admit.

In order to focus on the worst case scenario for the host country, we consider the case in which immigrants extract all surplus associated with producing the domestic good. The opposite assumption would be that employers of private household workers hold all the bargaining power and are able to negotiate wages that are equal to the reservation utility of the immigrant. As will be discussed in section 5.1, the split of surplus is likely to depend on legal institutions. Alternative sharing rules of the surplus will give qualitatively similar effects on relative wages and tax collected, but native employers of foreign private household workers will be better off.

3.2. Equilibrium without Immigration

The solution to the consumer utility maximization problem,

$\max A^\alpha (C_{hw} + C_{dc} + L_c)^{1-\alpha} + \upsilon(g)$ such that $W_i(1-\tau)(1-L_C) = A + P_{hw}C_{hw} + P_{dc}C_{dc}$ and $C_{dc} \leq \overline{C}$,[10]

depends on the relationships among the prices of daycare service, P_{dc}, prices of private household worker service, P_{hw}, and the opportunity cost of home production of the domestic good $(1-\tau)W_i$. In general equilibrium, these will depend on the supply of the low-skilled, the high-skilled, and immigrants restricted to private household work, on the utility and productivity parameters, *e*, δ, and *k*.

A variety of cases can arise. If *k* is very low and *e* is low (implying that δ is very high), in equilibrium there will be no daycare and no native private household workers. All natives will home produce their own domestic good, $\dfrac{W_L}{W_H} = (1-\beta)H \big/ \beta L$.

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[10] The same maximization is essentially solved for consumers employed as private household workers since the utility penalty *e* does not affect the consumer's optimal choice.

Increases in *k* will lower the price of daycare such that eventually high-skilled natives will employ daycare. Further increases in *k* will enable low-skilled natives to also purchase daycare.

Increases in *e* or, equivalently, decreases in δ will lead to low-skilled natives being hired as private household workers. Depending on *k*, native private household workers could coexist with the high-skilled using daycare centers, the low-skilled using daycare centers, or no one using daycare centers.

We concentrate on the case where exogenous parameters are such that $P_{hw} > W_H(1-\tau) > W_L(1-\tau) > P_{dc}$, so that all natives employ daycare centers which we believe is the most empirically relevant case. We also focus on the case where high-skilled workers earn more than low-skilled workers.

We first solve the model without immigration. In order for $P_{hw} > W_H(1-\tau) > W_L(1-\tau) > P_{dc}$ to hold without any immigration, we must assume that the fraction of high-skilled natives, *h*, lies within a range $(\underline{h}, \overline{h})$:

Assumption A1:

$$h < \overline{h} = \frac{\{\alpha + \alpha\overline{C}\}\dfrac{\beta}{1-\beta} + \dfrac{\overline{C}(1-\alpha)\left(\dfrac{\beta}{1-\beta}\right)^{1-\beta}}{k(1-\tau)(1-\beta)}}{\{\alpha + \alpha\overline{C}\}\dfrac{\beta}{1-\beta} + [\alpha + \alpha\overline{C}] + \dfrac{\overline{C}(1-\alpha)\left(\dfrac{\beta}{1-\beta}\right)^{1-\beta}}{k(1-\tau)\beta(1-\beta)}} \quad \text{and}$$

$$h > \underline{h}\,\frac{\{\alpha + \alpha\overline{C}\}\dfrac{\beta}{1-\beta}A + \dfrac{\overline{C}(1-\alpha)\left(\dfrac{\beta}{1-\beta}\right)^{1-\beta}A^{1-\beta}}{k(1-\tau)(1-\beta)}}{\{\alpha + \alpha\overline{C}\}\dfrac{\beta}{1-\beta}A + [\alpha + \alpha\overline{C}] + \dfrac{\overline{C}(1-\alpha)\left(\dfrac{\beta}{1-\beta}\right)^{1-\beta}A^{1-\beta}}{k(1-\tau)\beta(1-\beta)}}$$

where $A = \max\left\{\dfrac{(1-\tau)}{\delta}, \left[\dfrac{1}{k(1-\tau)\beta^{\beta}(1-\beta)^{1-\beta}}\right]^{\frac{1}{\beta}}\right\}$[11].

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[11] In Appendix B we show how assumption A1 ensures that no natives are employed as private household workers and all natives use daycare in the absence of immigration

For each native type we can find that the amount of labor supplied to the workforce is $\alpha + \alpha\overline{C} + \dfrac{P_{dc}\overline{C}(1-\alpha)}{W_i(1-\tau)}$, $i \in (H, L)$.[12] Intuitively, the amount of labor supplied depends on the wage because of the cap associated with the purchase of daycare. When consumers home produce their own domestic good, the income and substitution effect of an increase in wages are perfectly offset with Cobb-Douglas utility. However, when consumers can buy daycare and the consumption of daycare is capped, the income effect of an increase in wages dominates the substitution effect. With higher wages, consumers demand more of the domestic good. However, since the purchase of daycare is capped, consumers home produce more of the domestic good. Thus, labor supply falls with an increase in native wages.

Our model can be solved by the following system of equations.

(1) $\dfrac{W_L}{W_H} = \dfrac{1-\beta}{\beta}\dfrac{H_A}{L_A}$ - F.O.C. for good A producer

(2) $\dfrac{H_A}{L_A} = \dfrac{H_{dc}}{L_{dc}}$ - F.O.C. for good A and daycare centers

(3) $H_A{}^{\beta}L_A{}^{1-\beta} - W_H H_A - W_L L_A = 0$ - Zero profit condition for good A firms

(4) $P_{dc} = \dfrac{W_H H_{dc} + W_L L_{dc}}{kH_{dc}{}^{\beta}L_{dc}{}^{1-\beta}} = \dfrac{1}{k}\left(W_H\left(\dfrac{H_{dc}}{L_{dc}}\right)^{1-\beta} + W_L\left(\dfrac{L_{dc}}{H_{dc}}\right)^{\beta}\right)$ - Zero profit condition

for daycare centers

(5) $H_A + H_C = \left[\alpha + \alpha\overline{C} + \dfrac{P_{dc}\overline{C}(1-\alpha)}{W_H(1-\tau)}\right]h$ - High-skilled labor market clearing

condition

(6) $L_A + L_C = \left[\alpha + \alpha\overline{C} + \dfrac{P_{dc}\overline{C}(1-\alpha)}{W_L(1-\tau)}\right](1-h)$ - Low-skilled labor market clearing

condition

(7) $kH_C{}^{\beta}L_{dc}{}^{1-\beta} = \overline{C}$ - Daycare center market clearing condition.[13]

Solving this system of equations gives the following lemma:

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[12] See Appendix C for proof.
[13] This set of equations only hold if the solution is in the interior of the parameter space. Separate conditions apply for a corner solution. For the sake of brevity, we do not include those expressions.

Lemma 1: If assumption A1 holds, then in the equilibrium without immigration $z \equiv \dfrac{W_L}{W_H}$ can be found as the implicit solution to the following equation:

$$\{\alpha + \alpha\overline{C}\}(1-h)\frac{\beta}{1-\beta}z = [\alpha + \alpha\overline{C}]h + \frac{\overline{C}(1-\alpha)\left(\dfrac{\beta}{1-\beta}\right)^{1-\beta} z^{1-\beta}}{k(1-\tau)}\frac{h-\beta}{\beta(1-\beta)} \quad (8)$$

and $\dfrac{\partial\left(\dfrac{W_L}{W_H}\right)}{\partial h} > 0$.

Proof: , Denote $y = \left(\dfrac{H_A}{L_A}\right)^{1-\beta}$. Then, from (3) and (1), $\dfrac{1}{W_H} = \dfrac{y}{\beta}$, or $W_H = \dfrac{\beta}{y}$. Equation (5)

can be written as $H_A + H_C = \dfrac{H_A}{L_A}(L_A + L_C) = y^{\frac{1}{1-\beta}}(L_A + L_C) = \left[\alpha + \alpha\overline{C} + \dfrac{y\overline{C}(1-\alpha)}{k\beta(1-\tau)}\right]h$, and,

similarly, (6) transforms to $L_A + L_C = \left[\alpha + \alpha\overline{C} + \dfrac{\overline{C}y(1-\alpha)}{k(1-\beta)y^{\frac{1}{1-\beta}}(1-\tau)}\right](1-h)$ (since

$W_L = \dfrac{1-\beta}{\beta}W_H\dfrac{H_A}{L_A} = \dfrac{1-\beta}{\beta}\dfrac{\beta}{y}y^{\frac{1}{1-\beta}} = \dfrac{1-\beta}{y}y^{\frac{1}{1-\beta}}$). Therefore, (5) and (6) give an equation to

determine y:

$$\left[\alpha + \alpha\overline{C} + \dfrac{y\overline{C}(1-\alpha)}{k\beta(1-\tau)}\right]h = y^{\frac{1}{1-\beta}}\left[\alpha + \alpha\overline{C} + \dfrac{y\overline{C}(1-\alpha)}{k(1-\beta)y^{\frac{1}{1-\beta}}(1-\tau)}\right](1-h) = \left[\{\alpha + \alpha\overline{C}\}y^{\frac{1}{1-\beta}} + \dfrac{y\overline{C}(1-\alpha)}{k(1-\beta)(1-\tau)}\right](1-h)$$

To determine the relative wage, $z = \dfrac{W_L}{W_H}$, replace y using $y^{\frac{1}{1-\beta}} = \left(\dfrac{\beta}{1-\beta}\right)z$ by

$y = \left(\dfrac{\beta}{1-\beta}\right)^{1-\beta} z^{1-\beta}$. Then, z can be found as a solution of

$$\frac{\overline{C}(1-\alpha)\left(\dfrac{\beta}{1-\beta}\right)^{1-\beta}z^{1-\beta}}{k(1-\tau)}\left[\frac{1-h}{1-\beta}-\frac{h}{\beta}\right]+\left\{\alpha+\alpha\overline{C}\right\}(1-h)\left(\frac{\beta}{1-\beta}z\right)-\left[\alpha+\alpha\overline{C}\right]h=0 \text{ , or as}$$

$$\left\{\alpha+\alpha\overline{C}\right\}(1-h)\frac{\beta}{1-\beta}z=\left[\alpha+\alpha\overline{C}\right]h+\frac{\overline{C}(1-\alpha)\left(\dfrac{\beta}{1-\beta}\right)^{1-\beta}z^{1-\beta}}{k(1-\tau)}\frac{h-\beta}{\beta(1-\beta)}$$

At $z = 0$ the left-hand side of (8) is strictly less than right-hand side. The right-hand side is a concave function of z while the left-hand side is linear. Thus, the solution of (8) uniquely exists at $z>0$.

Rewriting equation (8)

gives $\left\{\alpha+\alpha\overline{C}\right\}(\dfrac{\beta}{1-\beta}z-\left[\alpha+\alpha\overline{C}\right]\dfrac{h}{1-h}+\dfrac{\overline{C}(1-\alpha)\left(\dfrac{\beta}{1-\beta}\right)^{1-\beta}z^{1-\beta}}{k\beta(1-\tau)(1-\beta)}\dfrac{h-\beta}{(1-h)}=0$. The derivative

of the left hand side with respect to h is clearly negative. The derivative of the left hand side with respect to z is positive since this expression is the difference between a linear function and a concave function at the point where both functions are equal. As a result, the derivative $\dfrac{\partial z}{\partial h}$ is positive by applying the implicit function theorem to (8)。

3.3. Equilibrium with Immigration

We now allow for immigration and assume that the level of immigration is local to zero. By legal mandate as is common with foreign private household worker programs, we assume that immigrants are restricted from working in sector A and from daycare. Foreign private household programs usually restrict immigrants to working for only one native household, so we assume that natives cannot hire foreign private household workers only for those hours when children are not in daycare. (Relaxing this assumption would magnify the impact of foreign private household worker migration.)

To build the basic intuition, consider first the simplest case, where δ is sufficiently high such that no natives work as private household workers and k is sufficiently low such that no natives use childcare in the absence of immigration. All natives home produce the domestic good. If a limited number of immigrants enter and are restricted from working in

the formal sector, they will find employment only as private household workers. Since high-skilled natives with higher wages can outbid low-skilled natives for immigrant services, these immigrants will free up native high-skilled labor previously devoted to home producing the domestic good. This will increase the proportion of high-skilled labor in the formal sector. Given the Cobb-Douglas production function, relative wages are given as $\frac{W_L}{W_H} = \frac{(1-\beta)H}{\beta L}$, and increases in H will increase the relative wage of native low-skilled. In addition, because domestic work is untaxed, the displacement of the high-skilled from home producing the domestic good to the formal sector will create a higher tax base and a fiscal benefit.

We could also consider the case where δ is such that natives do not work as private household workers but k is such that only high-skilled natives utilize childcare. Results are similar to the case in which we examine in detail below. We focus on the case where natives are not employed as private household workers and all natives use childcare because we believe this to be the most relevant case for our societies of interest, and we return to that case, now.

In order to be as conservative as possible about benefits to the receiving economy, we assume immigrants have full property rights in their visas, and, thus, extract all the surplus in bargaining with high-skilled employers. In equilibrium a fraction of high-skilled natives employ foreign private household workers while the rest rely on daycare. Therefore, the price of private household workers is set such that the high-skilled are indifferent between childcare service and a household worker. Formally, for high-skilled workers $U(P_{dc}, \overline{C}) = U(P_{hw}, C_{hw}^H(P_c))$ should hold where C_{hw}^H is the high-skilled consumption of good C provided by private household workers.

Lemma 2: If immigration is local to zero, assumption A1 holds, immigrants do not work in the formal good sector or at daycare centers, and immigrants extract all surplus from their

service, then $P_{hw} = \dfrac{\left[W_H(1-\tau)\right]^{1+\frac{1}{1-\alpha}}}{\left[(1+\overline{C})W_H(1-\tau) - \overline{C}\big/k\right]^{\frac{1}{1-\alpha}}}$ and high-skilled natives who hire private

household workers consume $C_{hw}^H = \dfrac{(1-\alpha)\left[(1+\overline{C})W_H(1-\tau) - \overline{C}/k\right]^{\frac{1}{1-\alpha}}}{\left[W_H(1-\tau)\right]^{\frac{1}{1-\alpha}}}$ units of the domestic

good.

Proof: From the non-immigration case, high-skilled consumers who use daycare centers

receive utility $\alpha^\alpha\left[(1+\overline{C})W_H(1-\tau) - P_{dc}\overline{C}\right]^\alpha (1-\alpha)^{1-\alpha}\dfrac{\left[(1+\overline{C})W_H(1-\tau) - P_{dc}\overline{C}\right]^{1-\alpha}}{\left[W_H(1-\tau)\right]^{1-\alpha}} + v(g)$.

The utility of high-skilled consumers who hire a private household worker is

$\alpha^\alpha\left[W_H(1-\tau)\right]^\alpha(1-\alpha)^{1-\alpha}\dfrac{\left[W_H(1-\tau)\right]^{1-\alpha}}{P_{hw}^{1-\alpha}} + v(g)$. For high-skilled natives to be indifferent

between these two options $\dfrac{(1+\overline{C})W_H(1-\tau) - P_{dc}\overline{C}}{\left[W_H(1-\tau)\right]^{1-\alpha}} = \dfrac{W_H(1-\tau)}{P_{hw}^{1-\alpha}}$ must hold or equivalently

$P_{hw} = \dfrac{\left[W_H(1-\tau)\right]^{1+\frac{1}{1-\alpha}}}{\left[(1+\overline{C})W_H(1-\tau) - P_{dc}\overline{C}\right]^{\frac{1}{1-\alpha}}}$. Given the production functions for daycare centers and

good A, the price of daycare centers $P_{dc} = \dfrac{1}{k}$. Solving for P_c and C_{hw}^H gives the required

expressions. ∘

Consumers who purchase the services of private household workers supply a full unit of labor to the market. However, an increase in wages or a decrease in P_{hw} will lead consumers to demand more services without increasing their own labor supply, With a low P_{hw}, consumers could purchase more domestic good from household workers than they would ordinarily provide for themselves. This reflects the fact that households who employ domestic workers typically have cleaner houses, better prepared meals, etc. than they would if they were to do these tasks themselves.

Given the price and demand for private household workers, we can solve for equilibrium with the following set of equations where λ is the proportion of high-skilled natives using daycare.

$$(1') \quad \frac{W_L}{W_H} = \frac{1-\beta}{\beta}\frac{H_A}{L_A} \quad \text{- F. O. C. for good A production}$$

(2') $\dfrac{H_A}{L_A} = \dfrac{H_{dc}}{L_{dc}}$ - From good A and daycare center profit maximization F.O.C.

(3') $H_A{}^{\beta} L_A{}^{1-\beta} - W_H H_A - W_L L_A = 0$ - Good A zero profit condition

(4') $P_{dc} = \dfrac{W_H H_{dc} + W_L L_{dc}}{k H_{dc}{}^{\beta} L_{dc}{}^{1-\beta}} = \dfrac{1}{k}\left(W_H \left(\dfrac{H_{dc}}{L_{dc}}\right)^{1-\beta} + W_L \left(\dfrac{L_{dc}}{H_{dc}}\right)^{\beta} \right)$ - Daycare center zero

profit condition

(5') $H_A + H_C = \left[\alpha + \alpha\overline{C} + \dfrac{P_{dc}\overline{C}(1-\alpha)}{W_H(1-\tau)} \right]\lambda h + (1-\lambda)h$ - Market clearing condition for

high-skilled native labor

(6') $L_A + L_C = \left[\alpha + \alpha\overline{C} + \dfrac{P_{cc}\overline{C}(1-\alpha)}{W_L(1-\tau)} \right](1-h)$ - Market clearing condition for low-

skilled native labor

(7') $k H_{dc}{}^{\beta} L_{dc}{}^{1-\beta} = \overline{C}\lambda h$ - Daycare center market clearing condition

(8') $C_{hw}^{H}(1-\lambda)h = \alpha m$ - Market clearing condition for immigrant labor

(9') $C_{hw}^{H} = \dfrac{(1-\alpha)\left[(1+\overline{C})W_H(1-\tau) - \overline{C}\big/k\right]^{\frac{1}{1-\alpha}}}{\left[W_H(1-\tau)\right]^{\frac{1}{1-\alpha}}}$ - Private household worker market

clearing condition.[14]

Solving this system gives $z = \dfrac{W_L}{W_H}$ implicitly:

$$\dfrac{\left[\{\alpha + \alpha\overline{C}\}\left(\dfrac{\beta}{1-\beta}\right)z + \dfrac{\overline{C}(1-\alpha)\left(\dfrac{\beta}{1-\beta}\right)^{1-\beta} z^{1-\beta}}{k(1-\beta)(1-\tau)} \right]\dfrac{1-h}{h} - 1}{\alpha + \alpha\overline{C} + \dfrac{\overline{C}(1-\alpha)\left(\dfrac{\beta}{1-\beta}\right)^{1-\beta} z^{1-\beta}}{k\beta(1-\tau)} - 1} + \dfrac{\alpha m\left[\dfrac{\beta^{\beta}(1-\beta)^{1-\beta}}{z^{1-\beta}}(1-\tau) \right]^{\frac{1}{1-\alpha}}}{(1-\alpha)h\left[(1+\overline{C})(1-\tau)\dfrac{\beta^{\beta}(1-\beta)^{1-\beta}}{z^{1-\beta}} - \overline{C}\big/k \right]^{\frac{1}{1-\alpha}}} = 1$$

(10')

This gives the main proposition of the paper.

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[14] This set of equations only hold if the solution is in the interior of the parameter space. Separate conditions apply for a corner solution. For the sake of brevity, we do not include those expressions.

Proposition 1: If assumption A1 holds, then when immigration is close to zero, the relative

wage $z = \dfrac{W_L}{W_H}$ is increasing in immigration.

Proof: For simplicity, denote the left hand side of equation (10') as $G(m,z)$.

$$\frac{\partial G}{dm} = \frac{\alpha \left[\dfrac{\beta^\beta (1-\beta)^{1-\beta}}{z^{1-\beta}}(1-\tau) \right]^{\frac{1}{1-\alpha}}}{(1-\alpha)h \left[(1+\overline{C})(1-\tau)\dfrac{\beta^\beta (1-\beta)^{1-\beta}}{z^{1-\beta}} - \overline{C}\Big/k \right]^{\frac{1}{1-\alpha}}} = \frac{\alpha}{(1-\alpha)h \left[(1+\overline{C}) - \dfrac{\overline{C}}{kW_H(1-\tau)} \right]^{\frac{1}{1-\alpha}}} .$$

Since $(1-\alpha)\left[(1+\overline{C}) - \dfrac{\overline{C}}{kW_H(1-\tau)} \right]$ is just the consumption of domestic good from the high-

skilled who use childcare, $\dfrac{\partial G}{dm}$ is positive.

At $m = 0$, $\dfrac{\partial G}{dz} = \dfrac{\partial}{dz}\left[\dfrac{\left[\{\alpha + \alpha\overline{C}\}\left(\dfrac{\beta}{1-\beta}\right)z + \dfrac{\overline{C}(1-\alpha)\left(\dfrac{\beta}{1-\beta}\right)^{1-\beta} z^{1-\beta}}{k(1-\beta)(1-\tau)} \right]\dfrac{1-h}{h} - 1}{\alpha + \alpha\overline{C} + \dfrac{\overline{C}(1-\alpha)\left(\dfrac{\beta}{1-\beta}\right)^{1-\beta} z^{1-\beta}}{k\beta(1-\tau)} - 1} \right]$. From

equations (1'), (2'), (3'), (5'), and (6'),

$$\lambda = \frac{\left[\{\alpha + \alpha\overline{C}\}\left(\dfrac{\beta}{1-\beta}\right)z + \dfrac{\overline{C}(1-\alpha)\left(\dfrac{\beta}{1-\beta}\right)^{1-\beta} z^{1-\beta}}{k(1-\beta)(1-\tau)} \right]\dfrac{1-h}{h} - 1}{\alpha + \alpha\overline{C} + \dfrac{\overline{C}(1-\alpha)\left(\dfrac{\beta}{1-\beta}\right)^{1-\beta} z^{1-\beta}}{k\beta(1-\tau)} - 1} \quad (11')$$

.Thus, $\dfrac{d\lambda}{dz} = \dfrac{\partial G}{\partial z}\bigg|_{m=0}$. Equation (11') can be rewritten as

$$H(z,\lambda) = 0 = -\left[\alpha + \alpha\overline{C}\right]\lambda h - (1-\lambda)h + \left[\left\{\alpha + \alpha\overline{C}\right\}\left(\frac{\beta}{1-\beta}\right)z\right](1-h) + \frac{\overline{C}(1-\alpha)\left(\dfrac{\beta}{1-\beta}\right)^{1-\beta}z^{1-\beta}}{k(1-\tau)}(\frac{1-h}{1-\beta} - \frac{\lambda h}{\beta}).$$

$$\frac{\partial H}{\partial \lambda} = -\left[\alpha + \alpha\overline{C}\right]h + h - \frac{\overline{C}(1-\alpha)\left(\dfrac{\beta}{1-\beta}\right)^{1-\beta}z^{1-\beta}h}{k\beta(1-\tau)} \text{ but } \alpha + \overline{C}\alpha + \left(\frac{\beta}{1-\beta}z\right)^{1-\beta}\frac{\overline{C}(1-\alpha)}{k\beta(1-\tau)} < 1$$

since it is the labor supply of high-skilled using childcare, given by (5'). Thus, $\dfrac{\partial H}{\partial \lambda} > 0$.

$$\frac{\partial H}{\partial z} = (\alpha + \alpha\overline{C})\left(\frac{\beta}{1-\beta}\right)(1-h) + (1-\beta)(1-\alpha)\overline{C}\left(\frac{\beta}{1-\beta}\right)^{1-\beta}z^{-\beta}\left[\frac{1-h}{1-\beta} - \frac{\lambda h}{\beta}\right]. \text{ This}$$

expression is a linear function of λ and is clearly positive if $\lambda = 0$. When $\lambda = 1$, this

expression is positive if $\left[\dfrac{1-h}{1-\beta} - \dfrac{h}{\beta}\right] > 0$. This is always the case given assumption A1.

Therefore, $\dfrac{\partial H}{\partial z} > 0 \Rightarrow \dfrac{\partial \lambda}{\partial z} = \dfrac{\partial G}{\partial z}\bigg|_{m=0} < 0 \Rightarrow \dfrac{\partial z}{\partial m}\bigg|_{m=0} > 0$. ∘

Intuitively, immigration displaces native labor in daycare centers as well as freeing up parents' time. However, because the skill intensity of daycare centers is the same as that of the general economy, displacing daycare workers does not change the skill ratio of sector A. Because of the cap on services provided by daycare centers, immigrants free up extra parental high-skilled labor, which lowers high-skilled relative wages and increases taxes collected.

With increased levels of immigration, eventually all high-skilled natives will employ a foreign private household worker, and prices of private household worker services will fall such that low-skilled natives will also begin to hire private household workers. This should lead to an initial increase in native low-skilled labor supply and to a decline in their wages. The level of immigration, however, such that this will be the case will most likely be so large as to be an unrealistic policy consideration.

3.4. Native Private Household Workers

Although we think the most relevant case is the one in which the main alternative to foreign private household workers is daycare centers, it is also worth discussing the situation in which without immigration, some natives are employed as private household workers. In the absence of immigrants, low-skilled natives will have the lowest wages in the economy and will be the only native type working as private household workers. If parameters are such that daycare centers and native private household workers both exist in equilibrium, high-skilled natives must be indifferent between utilizing daycare and hiring low-skilled natives as private household workers.

At levels of immigration close to zero, high-skilled natives will utilize daycare, hire native private household workers, and hire immigrant private household workers. For this to hold, high-skilled natives must be indifferent between all three options of producing the domestic good. To keep high-skilled natives indifferent between daycare and employing native private household workers, relative wages cannot change with the level of immigration over the range where all three options are used.

Intuitively, immigrants will both displace native low-skilled private household workers and increase the labor supply of the high-skilled by forcing some high-skilled natives to switch from utilizing daycare centers to hiring immigrant private household workers. The increases in both types of native labor will be exactly such that native relative wages do not change. The amount of high-skilled labor freed by natives is exactly offset by the displacement of low-skilled native private household workers. Further increases in immigration will not affect relative wages until all native private household workers have been displaced. Once all native private household workers have been displaced, the analysis of section 3.3 will apply.

The finding that immigration has no effect at all on wages when the high-skilled are using three types of domestic good production is an artifact of the two-type nature of the model, and of the assumption of no diminishing returns in home production. More generally, however, the existence of a domestic sector will stabilize wages in this range. Low-skill wages will initially decline with immigration, until all native private household workers are displaced, and then will rise as more and more high-skilled labor is released. (In a still more

realistic model, in which workers differed in more than just a single dimension, we conjecture that immigration would lower wages of native private household workers and daycare center employees, but raise wages of low-skill worker in general.)

4. Calibration

Subsection 4.1 calibrates the model outlined in section 3. Subsection 4.2 argues that even if daycare centers use only low-skilled workers, the results will be qualitatively similar. Subsection 4.3 discusses how the analysis changes with factors that may be outside our model.

4.1. Calibration of the Model

We calibrate the model with daycare centers using data from the U.S. We first attempt to find an estimate for α, the utility parameter associated with the general consumption good.

We use statistics of earnings by educational attainment in 1994 from the US Census Bureau to estimate β, the factor intensity of high-skilled workers. (Kominksi and Adams, 1994). We define high-skilled workers as those having completed a college education. This gives us an estimate of h equal to 0.24. If we assume that high and low-skilled workers supply an equal amount of labor to the formal labor force[15], we estimate $\beta = 0.39$.

To measure the fiscal impact of immigration, we calibrate the model with tax rates from Hong Kong and the US. Standard tax rates in 2002 in Hong Kong were 15%, and employees were required to make social security contributions of 5%. Because the tax rate for Hong Kong is so low, we also calibrate the model with a higher tax rate. In 2003, the top tax rate in the United States was 35%. After including 15.3% payroll taxes (Social Security and Medicare) and the population-weighted average highest marginal tax rate of the 50 states

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[15] Technically, when all workers are using daycare centers, our model predicts that the high-skilled workers will supply fewer hours to the market than low-skilled workers. This occurs because with higher wages high-skilled natives choose to consume more of the domestic good. Since the cap on daycare is equal across all natives, high-skilled natives home produce more of their domestic good. We could presumably match the contemporary positive correlation between skill and hours by allowing for various day care options, with some offering more coverage at higher prices. High-skilled workers could then supply more hours to the market.

of 5.2% high-income taxpayers who would be likely to hire personal household workers face a marginal rate of around 51.6%.[16]

According to our Cobb-Douglas model of utility, α will also be the share of time spent in market labor absent any daycare or private household workers. We assume households would spend half the time in market labor.

Because foreign private household workers do not immigrate with their own households, we assume that the time spent on domestic work for their own consumption is close to zero. This suggests that $\alpha_I = 1$.

The lowest value of δ such that assumption A1 holds, and native private household workers are not hired without immigration in the absence of taxation is 2.24. Increases in tax rates by lowering the after tax income of the high-skilled make it less likely that native low-skilled workers will be employed as private household workers. When tax rates are more realistic (near 50%), the minimum value for δ is near 1.15. We use a high value of δ in our calibration so that we can analyze cases with very low tax rates..

In order that assumption A1 holds such that all natives use childcare centers, we assume a minimum value of $k = 5.8$.

With regards to the public good, we assume that the government keeps expenditure at a constant level. Thus, any increases in tax revenue brought about by immigration will contribute to a lowering of the tax rate. In our model taxes do not distort total labor supply. To describe the distortionary effects of labor taxation through costs like tax evasion, tax collection, and labor distortion, Browning (1987) defines the marginal welfare cost as the change in total welfare brought about by a unit change in tax revenue. We assume that the marginal welfare cost is around 1.4 which implies that for one fewer dollar of taxes collected, the increase in total welfare is equivalent to an increase of $1.40.

To get some indication as to how much extra labor is freed up by employing a private household worker, Table 5 shows different female labor force participation rates for women in Israel in 2001[17]. Overall, women with youngest children aged 2 to 4 who employ

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[16] . Half of all payroll taxes are paid by the employer. Thus, effective marginal tax rates are equal to 55.5/(100 +7.65) = 51.6%

[17] Table 5 does not differentiate between foreign household workers and native household workers. Israel's foreign private household workers focus on care for the elderly but Table 5 does not include household workers hired to care for the elderly.

household helpers or care givers for more than 16 hours per week have approximately 21.6% higher labor force participation than those who do not hire care givers. Mothers with children aged 0 to 1 are almost 30 percentage points more likely to participate in the workforce if they hire a private household worker. On the other hand women without children who hire a private household worker for more than 16 hours per week have 10 percentage points lower labor force participation.

These figures could be either larger or smaller than the causal effect of hiring private household workers on labor supply. To the extent that some women hiring private household workers have an unobserved taste for work and would have chosen to work regardless, the causal effect is smaller. On the other hand, to the extent that there is variation in the amount of domestic work across households, depending on the number and ages of children, the number of elderly in the household, and the ability of other adults to participate in household production, these figures are likely to underestimate the impact of private household workers on employers' labor supply. Households with more need for domestic work are more likely to hire private household workers. The effects of this bias can be seen comparing the higher gap when disaggregating women with the gap when women are not disaggregated, for example, by age of youngest child. These effects may also be understated if private household workers free up fathers, not necessarily to enter the workforce, but to put in longer hours. It is also worth noting that the Israeli data capture only the extensive margin of labor supply and not the arguably more important intensive margin.

Many empirical studies using survey data have investigated the relationship between childcare prices and mother's workforce participation. Blau and Robins (1988) find that decreases in daycare prices measured both through individual survey data and regional wage data for daycare workers increase the likelihood of mothers entering the workforce. Connelly (1992), Ribar (1995) and Kimmel (1998) find similar results with a probit model. Most of these studies utilize selection models to control for the fact that non-working mothers usually do not report any daycare costs. Although all of these studies find that decreases in daycare costs increase the likelihood of mothers' joining the labor force, the estimated daycare price elasticities of employment range widely from -0.74 to -0.2. Khananusapkul (2004) does not find a strong correlation between female immigration and female high-skilled labor supply across U.S. metropolitan areas. This may be because unlike Hong Kong where low-skilled

immigrants are restricted to the private household sector the great majority of low-skilled immigrants in the U.S. do not work as private household workers, and the negative impact of these workers on wages for native females may swamp any positive effect in substituting for domestic production.

Ellwood, Wilde, and Batchelder (2004) give further evidence of this in the United States by finding that high-skilled women suffer especially large decreases in their wage trajectories immediately after childbirth suggesting that high-skilled women reduce their hours of work or find other occupations more compatible with childrearing.

Table 3 gives results when we assume that consumers hiring private household workers are able to increase their labor supply moderately relative to using daycare centers. This is roughly approximate, for example, to assuming that a parent (typically a mother) can go from a 40 hour a week job with a children in daycare to a 48 hour a week job with a private household worker.[18]

As a robustness test, in table 4 we present results where private household workers are able to free up a minimum amount of native labor. The level of immigration is set such that immigrants are equivalent to 7% of the native workforce. The amount of labor freed up depends on $\overline{C}$, the cap on childcare. A higher cap on childcare implies that consumers using childcare are able to devote more of their time to labor.

In table 3 we first notice that low-skilled relative wages increase by about 8.5% with immigration. We conjecture that wage effects using a CES production function would be about two thirds this number if we assume an elasticity of substitution between high and low skilled of 1.5 as the literature suggests.

The welfare effects of immigration can be sizeable. We calculate welfare as the transfer of gross income before immigration required such that natives are indifferent between immigration and no immigration. Welfare for high-skilled natives decreases by 4.6% and for low-skilled natives increases by 3.6% when we assume that taxes are zero. The welfare loss for high-skilled natives may be exaggerated since we assume in our model that

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[18] The increase in labor supply varies as this figure is determined endogenously in our model. At lower tax rates, the increase in labor supply is higher. The income effect from lower tax rates causes consumers to increase their consumption of the household good. With higher income, consumers demand more of the domestic good. Since daycare services are limited, however, with higher income from a lower tax rate consumers satisfy their demand for more of the domestic good by home production. This creates a greater increase in market hours in response to hiring foreign private household workers.

high-skilled natives receive no surplus associated with hiring foreign private household workers. The overall welfare gain is about 0.3% of GNP. Even after considering the tax benefits of immigrants, high-skilled natives lose welfare, and low-skilled natives gain. With a 20% tax rate, high-skilled workers lose the equivalent of 2.8% of pre-immigration income in welfare, low-skill workers gain the equivalent of 3.7% of pre-immigration income, and the overall welfare gain is 1.1% of GNP.[19] Welfare gains are higher for all types under the 51.6% tax rate, as a higher tax rate implies that immigrant household workers can reverse a larger preexisting distortion. High-skilled workers lose the equivalent of 0.3% of income, low-skilled workers gain 3.4%, and the economy gains the equivalent of 2.0% of income.

Borjas (1999) estimates increases in national income accruing to natives under the standard model for the US. He finds that when immigrants account for 10% of the workforce, national income at most increases by 0.01% to 0.02%.[20] Assuming that his effects are linear in immigration, 7% immigration should give at most welfare gains of 0.014%. Using the 51.6% tax rate and the *MCF = 1.4*, our estimated welfare effects are about 140 times larger than Borjas's figures.

We can also perform a back of the envelope calculation to estimate the potential magnitude of the welfare gain from the fiscal externality created when native high-skill workers move from untaxed home production of domestic goods to market production of these goods. If a high-skilled native works at home, the native pays no taxes. If he or she works in the labor market and uses the proceeds to pay for a foreign private household worker, the native is taxed and the increased taxes are a positive externality for others. The externality benefit equals the amount of high-skilled labor entering the labor market times the tax rate, times the marginal cost of funds, times the wage of high-skill workers.

For example, suppose that each private household worker frees up 16.3% of a high-skilled worker; suppose these high-skilled workers earn 1.8 times the average wage in the economy as suggested by our calibration; suppose households face a marginal tax rate of 50%, that and the marginal cost of raising one dollar in tax revenue is 1.4 dollars. Then, each

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[19] The welfare gains in the case of positive taxation rates are approximations. For welfare calculation purposes we calculate a new tax rate under immigration such that total taxes collected are equal to the non-immigration case. However, we calculate the impact of immigration on wages and labor supply using the original tax rate..
[20] Borjas (1999) estimates these gains for a variety of different assumptions. We take the estimates from his three factor model of production (capital, skilled and unskilled labor) where the supply of capital is perfectly elastic.

private household worker creates an externality benefit equal to the amount of high-skilled labor freed up times the tax rate times the marginal cost of funds times the average wage of the high-skilled: *0.16 * 0.5 * 1.4 * 1.8 = 0.20* times the average wage in the economy. This implies that it is possible to raise welfare by about 1.4% by admitting 7% of the labor force as foreign private household workers, taking into account only the benefits associated with the fiscal externality.

By freeing up natives to enter the workforce, immigration should have an even stronger positive effect on measured GDP than on welfare accruing to natives. In Table 3 we compute 'National Income', which measures how much more gross income is generated by natives with immigration, to grow by about 2.5% to 3.1% with 7% immigration.

4.2. Robustness

Even under the extreme assumption that daycare centers are fully staffed by native low-skilled workers, results should be qualitatively similar. The effect of foreign private household workers on relative wages of native low-skilled and native high-skilled depends on the proportionate increase in each type of labor supply. Consider the most pessimistic case where all workers in daycare centers are low-skilled. Suppose that each private household worker frees up 0.16 high-skilled workers.

Under this assumption, 7% of the labor force consists of foreign household workers, high skilled labor increases by *0.16 x 7% = 1.1* percentage points. Given that high-skilled natives make up about 24% of the native labor force, high-skilled labor increases by about *1.1 / 24 = 4.7%.*

For low-skilled natives, we assume that each immigrant replaces a low-skilled native daycare worker at a ratio of 1: 5. Although the usual staff to child ratios in daycare facilities is 1:9 (Blau 2003), we allow for the fact that some private household workers may be watching more than one child. We also assume that 75.1% of natives who hire foreign private household workers would utilize daycare centers in the absence of migration; this is the labor participation rate of women who do not hire household workers in table 4. For every 100 foreign private households hired, 75.1 will replace a low-skilled native child care worker but only at a rate of 5 to 1. Thus, 7% immigration displaces low-skilled labor by about *7 *0.751 *0 .2 = 1.05* percentage points which is about 1.4% of the low-skilled native

labor force. Under a Cobb-Douglas production function the elasticity of substitution is one

and $\frac{W_L}{W_H} \approx \frac{h}{(1-h)}$ This implies that the ratio of low-skilled to high-skilled wages increases

by about *4.7% - 1.4% = 3.3%*. If we assume an elasticity of substitution of 1.5, this ratio

increases by only 2.2%.

4.3. Factors outside the model

The model and calibrations are subject to a number of limitations, some of which may lead us to overestimate effects and some of which may lead us to underestimate the impact of foreign private household workers. Three factors lead to overestimation.

(1) To the extent that private household workers contribute to increased fertility or consumption of leisure, our calibration will overestimate the high-skilled labor response and will overestimate changes in wages and welfare. If we assume that half of households workers hired only contribute to increased fertility or leisure, the effects described in the calibration will be diminished by a half.

(2) The model does not allow for capital. To the extent that capital is mobile or otherwise adjusts over time, the estimates may be reasonable in the long run, but in the short run, overall increases in output will not be as sharp. The pattern in changes and returns to factors will depend on the patterns of complementarity and substitutability among skilled labor, unskilled labor, and capital.

(3) Our assumed Cobb-Douglas production function implies that the elasticity of substitution between high-skilled and low-skilled labor is one. Although this assumption may not be unreasonable, it is probably low. Katz and Murphy (1992) estimate this elasticity to be 1.41 using US data from 1963 to 1987. Krusell et al. (1997) estimate the elasticity to be 1.3 using a US dataset expanded to 1991 and an estimate of 1.67 from a model with capital-skill complementarity. Heckman, et al.(1998) estimate the elasticity to be 1.44 using a model incorporating job training. The Cobb-Douglas case provides analytical simplicity, but if the true elasticity is on the order of 1.5, we conjecture that the impact of immigration on wage differentials will be roughly two-thirds as large as those calculated in the paper. Our

calibrations on the impact of foreign private household workers on tax collection should be roughly unaffected.

(4) A final reason we may overestimate the impact of private household workers is that in our calibrations we allow native households to employ a fraction of a private household workers' time. To the extent that natives were restricted to employing integer numbers of workers, effects would somewhat smaller.

Several other factors, however, suggest that we may be underestimating the impact. (1) We assume that natives are classified discretely into two categories, high-skilled and low-skilled, and that the high-skilled earn about 2.4 times low-skilled wages. Wages fall over a more continuous distribution with some high-skilled workers earning very high wages. Although some low-skilled will hire private household workers, the typical employer of the private household workers probably will have a wage greater than this. To the extent that the employers' time freed up by foreign private household workers embodies more than the average amount of high-skill labor, the effects on wages, tax collection, and welfare will also be underestimated. Data from Hong Kong suggest that high-skilled workers employing private household workers earn closer to twice the average wage in the economy.[21] A higher wage rate for those employing foreign private household workers will increase the fiscal benefit of immigration.

(2) There may also be non-linearities associated with high-skilled labor. High-skilled natives restricted to working a forty hour work week using childcare centers may be unable to accept certain projects or, certain occupations. Some women may effectively function as low-skilled workers in the absence of foreign private household workers and high-skilled natives with them. This would lead us to underestimate both the wage and welfare effects in the calibration above.

(3) Another limitation of these calculations is that we assume that employers capture none of the surplus from hiring foreign private household workers. In fact since employers do capture some surplus, high-skilled natives are likely to be better off with immigration than suggested by the calibration.

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[21] According to the Hong Kong Census and Statistics Department, in January of 1996 median monthly household income of households hiring domestic helpers in Hong Kong was 40,000 HK dollars. In the 4th quarter of 1995, median monthly household income of all HK households was 15,700 HK dollars. Ideally, we would have data on relative wages of freed-up workers as opposed to the household as a whole, but we do not have this, yet.

5. Could the "old rich" Adopt?

Large domestic helper programs have arisen in "new rich" countries (such as Kuwait, Hong Kong, and Singapore) rather than "old rich" countries, like the United States. There are several possible reasons for this. It may simply reflect inertia, with laws in "old rich" countries reflecting the historical legacy of a time when high transport costs and low female labor force participation among elites limited the scope for this type of program. It could reflect the greater extent of government subsidization of daycare services in "old rich" countries. (This, in particular, may help explain the differences between northern and southern Europe in the number of undocumented foreign private household workers.)

Yet it is also the case that while foreign private household worker programs overcome many of the political obstacles to migration, they raise a new set of questions, and these questions may arise with particular force in "old rich" societies. "Old rich" countries are more likely to have a tradition of immigrants becoming citizens, and are therefore more likely to have a conception of national identity in which society has obligations to anyone who has lived in the country for long enough, independent of their national origin and cultural identity. Restricting long term immigrants to private household work may be inconsistent with ethical norms in some societies. Moreover, enforcement of regulations limiting foreigners to private household work may be easier in societies like Singapore or Kuwait than in societies that have greater restrictions on law enforcement and that have substantial citizen populations from the same cultural background as likely sources of private household workers.

In this section we consider the specific policy issues faced by "old rich" countries in adopting private household workers programs similar to those in Hong Kong and Singapore. Subsection 5.1 discusses the ethical paradoxes that arise under ethical norms in which obligations to citizens of other countries change depending on how much time they have spent in the host country and argues that programs with temporary, non-renewable visas might be more compatible with ethical norms in many "old rich" countries. Section 5.2 argues that low-skill natives will be made better off by foreign private household worker programs even with substantial leakage of these workers into the general economy. Section

5.3 argues that abuse of foreign private household workers could be limited by giving these workers stronger property rights over their visas.

5.1. Ethics

We have argued that the immigration of foreign private household workers addresses many of the political obstacles levied against immigration. Foreign private household workers reduce native wage inequality, contribute to a fiscal surplus, and have limited impacts on native culture. Yet, its political economy advantages, restricting immigrants to domestic work and separating them from their families raises a new set of ethical issues. Long-term domestic helper programs may be inconsistent with social norms which require people who have lived in the society for some time to be treated in the same way as citizens. This inconsistency would not arise if ethical obligations were either universalistic, independent of residence within national boundaries, or particularistic, but based on relatively immutable characteristics like race, ethnicity, or religion. However, in countries with a long history of immigration from a diverse set of countries and a multicultural conception of identity in which long-term residence within national borders conveys a type of membership in the society, independent of culture, ethnicity, or religion, restricting long-term residents to domestic service with no chance of citizenship or freedom to choose another occupation seems inconsistent with ethical norms.

Yet, this suggests a paradox. The calibration exercises suggest that immigration can create sizeable welfare gains for the host economy. If migration is voluntary, standard economic reasoning suggests migrants are also better off. If this is the case, it is difficult to frame ethical objections to programs allowing immigration of foreign domestic helpers on consequentialist grounds. It is nonetheless clear that many Americans would feel it unfair to have a class of people living in America for twenty or thirty years, permanently restricted to working only as private household workers.

This points to a basic paradox with norms that require different obligations to people depending on whether they have resided in the country for some time. Suppose Americans believe that it is unfair to restrict somebody from the Philippines, who has lived in America for twenty or thirty years, to work only in the domestic sector. Suppose also that Americans believe it is wrong to admit immigrants at the expense of the lowest-income members of

American society. America would not admit low-skilled people from the Philippines, since this would either hurt low-income Americans or involve unfairly restricting the immigrants to the domestic sector.

Suppose, on the other hand, that Kuwaitis or people from Hong Kong feel that their obligations to long-term foreign private household workers extend only to agreed employment contracts and not beyond. They would then be willing to establish a foreign domestic helper program. Paradoxically, people in the Philippines may actually be better off if other countries follow Kuwaiti/Hong Kong norms than American norms.

Economist's standard models might suggest that the ethical objections to foreign private household workers are misplaced, but rather than second-guess this, we will assume that residents of "multicultural" societies pay some large utility penalty from treating long term residents differently than citizens. Note that we this not an issue of time consistency because many people in multicultural rich societies would presumably not want to have a foreign private household worker program even if they could commit in advance to not admit foreign private household workers as citizens. This is clearest in an intergenerational context. In Singapore foreign domestic helpers are required to sign an agreement stipulating that they will not marry a Singaporean citizen or resident without permission from the Controller of Work Permits, that they will not become pregnant or deliver children during the validity of their work permit, and that they will not "engage in any relationship with a citizen or resident that will result in the birth of any child" (Singaporean Ministry of Manpower 2004). Singapore conducts inspections for foreign private household workers to ensure that they have not become pregnant. This is presumably because Singaporeans would feel a higher level of obligation to these children.

It may be possible to design programs that would not trigger the utility loss among the native population, associated with long-term residents being restricted to household work. In particular, one possibility is to provide only temporary, non-renewable visas -- for example, 3-year non-renewable visas. Obligations associated with long term residency may not arise after three years. These programs would be similar to an expanded version of

existing Au Pair programs. The US Au Pair program[22], UK Au Pair Program [23] and Canada's Live-in Caregiver Program[24] all provide temporary visas.

Restricting visas for foreign domestic helpers to be temporary and non-renewable would carry some efficiency costs but would also provide some equity benefits relative to a policy under which foreign domestic helpers could stay indefinitely. A policy requiring foreign private household workers to leave the country only to be replaced by other workers certainly would have efficiency costs in lost learning by doing. As private household workers spend more time on the job, they become more comfortable with the language, customs, and regulations of the country they are visiting; and, if they are taking care of children, they may develop a relationship with those children.

On the other hand, from the perspective of the source country, a policy of temporary migration would allow more people in the source country to earn money abroad for a period, save, and return home with enough capital to start a small business or buy a house. If visas were temporary and non-renewable, workers might be more likely to assess their well being using their status in the source country as a reference point, rather than typical consumption levels in the receiving country. They are much more likely to save a high proportion of their earnings and bring them back with them to their home country. This likely will increase the economic benefit to the sending country. Instead of a small percentage of citizens leaving on a semi-permanent basis and earning much more than they would have at home, a much larger number of citizens will leave for 2 or 3 years, make some money, and come home.

It is also possible that objections to foreign private worker programs have more to do with the high consumption of employers than the low consumption of workers. Restricting participation to only native households with compelling needs (i.e. those caring for children with special needs or for the elderly or disabled) may make these programs more politically palatable.

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[22] The US Au Pair program, administered by the Department of State, admits students between the ages of 18 to 26 into the US for one year under a J1 visa. The IRS estimates that there are around 12,000 au pairs in the US in any given year.

[23] In 2000 the UK admitted 12,900 people on Au Pair visas. Around 5,000 Au Pair's work illegally (Anderson, 2001).

[24] The Live-in Caregiver Program admits foreign immigrants as caregivers for children and the elderly for at least two years. Caregivers are required to live-in with the family. After two years, immigrant caregivers can apply for permanent residence status. In 2001 2,624 immigrants entered Canada through this program making up about 1% of the total number of immigrants.

5.2. Leakage

Some foreign private household workers on temporary, non-renewable visas would likely leak into the general economy, but below we discuss ways of limiting leakage, and we argue that even if leakage were substantial, low-skilled natives would still be better off than in the absence of private household worker migration. Temporary visas may be more enforceable in Hong Kong, Singapore, and the Gulf States than in larger, more ethnically mixed societies. Some workers on these visas would simply go underground and stay in the country illegally, performing other types of work and, thus, having much more conventional effects on wages and welfare. This concern could be partially addressed by paying part of the workers' salary into an account which the worker could not access until he or she returned home. Having workers, employers, or employment agencies post a bond which they would forfeit if the workers overstayed their visas would be another possibility. In Singapore and Hong Kong, most contracts are arranged by employment agencies, and these would presumably develop recruiting strategies and other practices, such as finding immigrants new jobs in other countries, in order to induce foreign private household workers to leave their host countries after their visa expired. Visas could be limited to people hired through a licensed, bonded intermediary agency. Certainly, however, there would be some "leakage". "Leaking" immigrants who found employment in the general economy would increase the supply of low-skilled labor and depress native low-skilled wages.

It is straightforward to calculate the largest fraction of immigrants who can leave the foreign private household program for the general economy without reducing the relative wages of the native low-skilled. If we define the variable F as the amount of high-skilled labor freed up by a private household worker, we find that, if the rate of immigrants leaking to the general economy is $\frac{(1-h)F}{h} = 3.1 * F$, then the percent increase in high-skilled labor from foreign private household workers is exactly equal to the increase in low-skilled labor from immigrants "leaking" into the general economy. If F is 0.2 as we have assumed before, as long as fewer than 0.62 immigrants leak into the general economy for each private household worker, the wage ratio would not change. Even at this leakage rate, however, low-skilled natives would experience welfare gains in the form of extra taxation.

It is also worth noting that if workers who leak become high-skilled, native low-skilled workers gain. Attila Ambrus has suggested a policy that would legally allow foreign private household workers to stay in the host country and enter the general economy conditional on their first acquiring certain educational qualifications. This program would allow low-skilled immigrants to become high-skilled labor in the host country.

5.3. Splitting the Surplus from Migration

In assessing the welfare impact on the private household worker herself, a key question is how the surplus from the relationship is divided between the foreign domestic helper, the employer, and the host country. In the model we assume that a certain number of foreign domestic helpers are admitted to the country and that once they are in the country they are free to choose their employer. In this case, wages are bid up to the reservation level for employers. However, in a number of cases, the terms of the migrants' visas require them to work for a specific employer and, in a sense, part of the property right over the visa is given to the employer. Currently, foreign domestic helper programs in Hong Kong and Singapore and the Live-in-Caregiver program in Canada require immigrants to sign a work contract before immigrating and make their legal status contingent on being employed by that specific employer. This shifts the bargaining power shifts towards the employer and reduces the welfare of the private household worker.

If governments want to improve the welfare of foreign private household workers, a key step would be to enhance the property rights over the visa held by the immigrant relative to those held by the employer. This would make it easier for these workers to change employers and to spend a period of time without an employer, searching for a job. Awarding the immigrant the property right of the visa should greatly improve immigrant bargaining position vis-à-vis employers and could be as important as minimum wage regulations in avoiding exploitation. Minimum wage rules are likely quite difficult to enforce because employers can simply pressure workers to put in more hours.

Constable (1997) reports that in Hong Kong domestic helpers are often reluctant to press charges in cases of physical abuse, since the legal process can be very long. During the legal process and because of their visa status, household workers cannot continue working for their employer and so earn no income and experience severe financial difficulty as they

are disallowed from working for any other employer. Switching the terms of the visa could be a simple way to address this problem.

Although some governments, such as Hong Kong and Singapore, create special visas for foreign private household workers, others implicitly tolerate the practice without legalizing it. Legally recognizing these workers, rather than simply implicitly tolerating them, might improve their bargaining power with employers and would certainly make them better off in other ways, making it easier for them to visit relatives in their home countries, for example.

In addition host governments extract surplus from these programs by levying taxes. In Hong Kong employers of foreign domestic helpers are required to pay a levy of about 400 Hong Kong dollars a month which goes to the training of local workers. In Singapore employers pay a levy of about 345 Singaporean dollars a month. (For comparison, the minimum wage of a domestic helper in Hong Kong is 3,270 Hong Kong dollars a month and the average basic wage in Singapore in 2002 was 1,065 Singaporean dollars a month. (*Asia Pulse, 2004; Singapore Yearbook of Manpower Statistics 2002).* In the United States certain categories of diplomats and international civil servants are allowed to obtain G-5 visas for private household workers. The G-5 visa holders are subject to social security taxes and to payroll taxes for unemployment insurance. However, workers on G-5 status are eligible to collect neither social security nor unemployment insurance. The combined employer and employee side of social security taxes is 15.3% of wages.[25].

6. Conclusion

Many countries that have recently become prosperous, recently including Bahrain, Saudi Arabia, Singapore, Hong Kong, Greece, and Israel have encouraged the migration of private household workers. Such programs arguably do more good for the world's poor than aid programs.

If the U.S. had a foreign private household worker program the size of Hong Kong or Singapore's and if each worker saved or remitted $5,000 annually, which seems conservative if the program were explicitly temporary, total savings and remittances to developing

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[25] State unemployment insurance rates are typically very low and are taxed on a very low wage base.

countries would be approximately $40 billion, four times as large as annual US official development assistance.

Foreign private household worker programs are likely to have a number of other impacts on the surrounding countries. They are likely to raise the status of women in these societies by providing them with more control over resources. In general, private household workers are somewhat more educated than the typical woman in their home societies. For example, in the Philippines, eighty percent of migrating women aged 25 – 44 have a high school education compared with only sixty percent of the general population in this demographic group.[26] So, while on the one hand it is possible that there would be some exacerbation in inequality in the extending countries due to the removal of higher skilled workers, on the other hand, this could also provide an incentive to invest in female education.

Our calibration exercise suggests that the admission of 7% of the labor force as foreign private household workers could potentially increase welfare among natives by as much as a 2.0% increase in GDP. This effect is approximately 140 times as large as the effects estimated by Borjas. Moreover, this type of immigration could increase the ratio of low-skilled native wages to high-skilled native wages by around 3 - 9%.

Poor workers in developing countries would be better off in the absence of immigration restrictions in the rich world. However, they are better off under private household worker programs than they would be either under the draconian immigration restrictions that characterized the rich world for much of the 20th century or under the current trend toward selectively encouraging migration by highly-skilled workers.

Private household worker programs may grow over time due to demographic, technological, and cultural trends. As we have argued, private household worker migration addresses the key political economy issues limiting immigration in rich countries: widening native wage inequality among natives, fear of a fiscal drain, and the perceived impact on native culture and on crime. In addition augmenting private household worker migration can relieve the demographic pressures of a low birth rate, by reducing the cost of having children and caring for the elderly. Many countries will face huge burdens of caring for the elderly, which these programs could help address. By increasing the amount and flexibility of the labor supply of high-skilled women, foreign private household workers could help women

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[26] We thank Dean Yang for this information.

more fully participate in the labor market and break the glass ceilings experienced by mothers or the tendency for mothers to engage in the "mommy track". Improvements in transportation and remittance technologies increase the supply of foreign domestic workers, and the expanding role of women in the workplace creates more demand.

While the globalization of household production may improve prospects for people in some poor countries and may be more acceptable to rich countries, particularly 'new rich' countries, than other forms of migration by low-skilled workers, it may not be consistent with ethical norms in societies where membership is defined by long-term residence. Ironically, these ethical qualms may make the poor worse off, by restricting their migration opportunities. However, it is also possible that "old rich" countries will develop temporary migration programs, along the lines of au pair programs, that are consistent with the norms.

Appendix A

A worker not utilizing childcare receives the following utility by working in the formal

sector: $U = \left(\dfrac{\alpha W_i (1-\tau)}{P_A} \right)^\alpha (1-\alpha)^{1-\alpha}$. The same individual working as a private household

worker receives utility: $U = e\left(\dfrac{\alpha \delta W_i (1-\tau)}{P_A} \right)^\alpha (1-\alpha)^{1-\alpha}$ where δ is the wage premium. In

order for the worker to be indifferent between working in the two sectors, the wage

premium $\delta = \dfrac{1}{e^{1/\alpha}}$.

A worker utilizing childcare receives the following utility by working in the

formal sector:

$U = \alpha^\alpha \left[(1+\overline{C})W_i(1-\tau) - P_{dc}\overline{C} \right]^\alpha (1-\alpha)^{1-\alpha} \dfrac{\left[(1+\overline{C})W_i(1-\tau) - P_{dc}\overline{C} \right]^{1-\alpha}}{\left(W_i(1-\tau) \right)^{1-\alpha}}$ .Working as a

private household worker gives utility of:

$U = e\alpha^\alpha \left[(1+\overline{C})\delta W_i(1-\tau) - P_{dc}\overline{C} \right]^\alpha (1-\alpha)^{1-\alpha} \dfrac{\left[(1+\overline{C})\delta W_i(1-\tau) - P_{dc}\overline{C} \right]^{1-\alpha}}{\left(\delta W_i(1-\tau) \right)^{1-\alpha}}$.

The minimum δ such that workers are indifferent between working in the formal or

private household sector is given implicitly by the following equation:

(A1) $\delta(1+\overline{C})W_i(1-\tau) = \dfrac{(1+\overline{C})W_i(1-\tau) - P_{dc}\overline{C}}{e} \delta^{1-\alpha} + P_{dc}\overline{C}$.

This is a difference between a linear and a concave function of δ. Clearly at $\delta = 1$,

the right hand side of A1 is larger than the left hand side of A1 if $e < 1$. Therefore, a

unique solution exists where $\delta > 1$.

Rewrite equation A1 as:

(A2) $\delta(1+\overline{C})W_i(1-\tau) - \dfrac{(1+\overline{C})W_i(1-\tau) - P_{dc}\overline{C}}{e} \delta^{1-\alpha} - P_{dc}\overline{C} = 0$. The derivative of the

left hand side with respect to e is positive. The derivative of the left hand side with

respect to δ is positive since (A2) is the difference between a linear and a concave

function of δ where the linear and concave terms are equal. By the implicit function theorem, $\dfrac{\partial \delta}{\partial e} < 0$.

Appendix B

Without immigration, the ratio of wages at equilibrium, z, is defined implicitly as given in equation (8):

$$\frac{\overline{C}(1-\alpha)\left(\dfrac{\beta}{1-\beta}\right)^{1-\beta} z^{1-\beta}}{k(1-\tau)}\left[\frac{1-h}{1-\beta}-\frac{h}{\beta}\right]+\left\{\alpha+\alpha\overline{C}\right\}(1-h)\left(\frac{\beta}{1-\beta}z\right)-\left[\alpha+\alpha\overline{C}\right]h=0.$$

Without immigration the assumption $P_{hw} > W_H(1-\tau)$ can be written as

$z > \dfrac{(1-\tau)}{\delta}$. $W_L(1-\tau) > P_{dc}$ at equilibrium can be rewritten as

$$z^{\beta}\beta^{\beta}(1-\beta)^{1-\beta} > \frac{1}{k(1-\tau)} \quad \text{or} \quad z > \left[\frac{1}{k(1-\tau)\beta^{\beta}(1-\beta)^{1-\beta}}\right]^{\frac{1}{\beta}}. \quad W_H(1-\tau) > W_L(1-\tau) \text{ is}$$

equivalent to $z < 1$. Note that a generic condition $z < A$ is equivalent to

$$\left\{\alpha+\alpha\overline{C}\right\}(1-h)\frac{\beta}{1-\beta}A-\left[\alpha+\alpha\overline{C}\right]h-\frac{\overline{C}(1-\alpha)\left(\dfrac{\beta}{1-\beta}\right)^{1-\beta}A^{1-\beta}}{k(1-\tau)}\frac{h-\beta}{\beta(1-\beta)}>0 \text{ (which means}$$

that solution of (8) lies to the left of A). Therefore, condition $z < A$ can be rewritten as a condition for h:

$$\left\{\alpha+\alpha\overline{C}\right\}\frac{\beta}{1-\beta}A+\frac{\overline{C}(1-\alpha)\left(\dfrac{\beta}{1-\beta}\right)^{1-\beta}A^{1-\beta}}{k(1-\tau)(1-\beta)}>\left\{\alpha+\alpha\overline{C}\right\}\frac{\beta}{1-\beta}Ah+\left[\alpha+\alpha\overline{C}\right]h+\frac{\overline{C}(1-\alpha)\left(\dfrac{\beta}{1-\beta}\right)^{1-\beta}A^{1-\beta}}{k(1-\tau)\beta(1-\beta)}h$$

or, equivalently,

$$h<\frac{\left\{\alpha+\alpha\overline{C}\right\}\dfrac{\beta}{1-\beta}A+\dfrac{\overline{C}(1-\alpha)\left(\dfrac{\beta}{1-\beta}\right)^{1-\beta}A^{1-\beta}}{k(1-\tau)(1-\beta)}}{\left\{\alpha+\alpha\overline{C}\right\}\dfrac{\beta}{1-\beta}A+\left[\alpha+\alpha\overline{C}\right]+\dfrac{\overline{C}(1-\alpha)\left(\dfrac{\beta}{1-\beta}\right)^{1-\beta}A^{1-\beta}}{k(1-\tau)\beta(1-\beta)}}.$$

The same exercise can be done for conditions $z > A$.

Appendix C

The utility maximization problem for the native household is:

$$\max A^{\alpha} (C_{hw} + C_{dc} + L_c)^{1-\alpha} + \upsilon(g) \text{ such that}$$

$$W_i (1-\tau)(1-L_C) = A + P_c C_{hw} + P_{cc} C_{cc}, C_{cc} \le \overline{C}.$$

If $P_{dc} < W_i(1-\tau)$ and $W_i(1-\tau) < P_{hw}$, then the maximization problem can be rewritten as

$$\max A^{\alpha} (\overline{C} + L_c)^{1-\alpha} + \upsilon(g) \text{ such that. } W_H (1-\tau)(1-L_C) = A + P_{dc}\overline{C}.$$

Solving this problem gives: $L_C = 1 - \alpha - \alpha\overline{C} - \dfrac{P_{dc}\overline{C}(1-\alpha)}{W_i(1-\tau)}$. Therefore, labor

supply of the native worker, who buys childcare, is $\alpha + \alpha\overline{C} + \dfrac{P_{dc}\overline{C}(1-\alpha)}{W_i(1-\tau)}$.

References Cited:

Anderson, Bridget. "Reproductive Labor and Migration" Paper given at the Sixth Metropolis Conference, Rotterdam, 26-30. WPTC-02-01, November 2001.

Asia Pulse, "HK Keeps Minimum Wage for Foreign Domestic Helpers at Current Level", May 12, 2004

Ballard, C. and Fullerton, D. "Distortionary Taxes and the Provision of Public Goods" *Journal of Economic Perspectives* Vol.6 , No.3, pp. 117-131, 1992.

Blau, David and Robins, Philip. "Child-care Costs and Family Labor Supply" *The Review of Economics and Statistics.* Vol. 70, pp. 374 – 381, 1988.

Blau, David. "An Economic Perspective on Child Care Policy" *Journal of Population and Social Security: Population Study*. Vol. I, Supplement, pp. 423 – 442, June 2003. English Language Version:
http://www.ipss.go.jp/English/WebJournal.files/Population/WebPopulation.html.

Borjas, George. "The Economic Benefits from Immigration", *Journal of Economic Perspectives*. Vol. 9, No. 2, pp. 3-22, 1995.

Borjas, George; Freeman, Richard; Katz, Larry. "How Much Do Immigration and Trade Affect Labor Market Outcomes?" *Brookings Papers on Economic Activity*. Vol. 1997, No. 1, pp. 1-90, 1997.

Borjas, George. "The Economic Analysis of Immigration" *Handbook of Labor Economics*. Edited by O. Ashenfelter and D. Card. Vol. 3A, pp. 1697 – 1760, North-Holland 1999.

Borjas, George. "The Labor Demand Curve is Downward Sloping: Reexaming the Impact of Immigration on the Labor Market" *Quarterly Journal of Economics*, Vol. 118, No. 4, pp. 1335 – 1374, 2003.

Browning, Edgar K. "On the Marginal Welfare Cost of Taxation" *The American Economic Review,* Vol. 77, No. 1 pp. 11-23, March 1987.

Commander, Simon John; Kangasniemi, Mari; and Winters, L. Alan "The Brain Drain: Curse or Boon?" *IZA Discussion Paper No. 809*, June 2003.

Connelly, Rachel. "The Effects of Child Care Costs on Married Women's Labor Force Participation" *Review of Economics and Statistics.* Vol. 74, pp. 83-90, 1992.

Constable, Nicole. *Maid to Order in Hong Kong: Stories of Filipina Workers*. Cornell University Press, Ithaca, NY. 1997.

Cortes, Patricia. "How Much does Low-Skilled Labor Increase Consumer Surplus?" *MIT Manuscript*, November 2004.

Chiswick, Barry R. "The Effect of Americanization on the Earnings of Foreign-born Men", *The Journal of Political Economy*. Vol. 86, No.5 pp. 897-921, 1978.

Davis, Steven and Henrekson, Magnus. "Tax Effects on Work Activity, Industry Mix, and Shadow Economy Size: Evidence from Rich-Country Comparison" *NBER Working Paper Series*, WP 10509, May 2004.

Economist Intelligence Unit. *Hong Kong Country Finance Report*, January 2004.

Ehrenreich, Barbara and Harlie Hochschild (editors) *Global Women: Nannies, Maids, and Sex Workers in the New Economy,* Metropolitan Books: New York, 2004.

Ellwood, David; Wilde, Ty; and Batchelder, Lily. "The Mommy Track Divides: The Impact of Childbearing on Wages of Women of Differing Skill Levels" Harvard University Working Paper, March 2004.

Freeman, Richard and Schettkat, Ronald. "Your Money or Your Time: Marketization and Work in Advanced Economies" *Harvard University Working Paper,* 2004.

Heckman, James J.; Lochner, Lance; and Taber, Christopher "Explaining Rising Wage Inequality: Explorations with a Dynamic General Equilibrium Model of Labor Earnings with Heterogeneous Agents" *NBER Working Paper* No. 6384, 1998.

Helpman, Elhanan and Krugman, Paul. *Market Structure and Foreign Trade*. MIT Press, Cambridge, MA, 1989.

Hersch, Joni and Stratton, Leslie S. "Housework and Wages" *Journal of Human Resources.* Vol. 37, No. 1, pp. 217-229, Winter 2002.

Hong Kong Census and Statistics Department. *Thematic Household Survey Report 14,* Social Services Section, September 2002.

Hong Kong General Household Survey. *Social Data Collected by General Household Survey Special Topics Report 14*. 1996.

Hong Kong Social Welfare Department "Checklist for Requirements for Registration/Operation of Child Care Centres/Kindergartens" 2004.
http://www.info.gov.hk/swd/download/childcare/pro_har_cone.pdf.

Huntington, Samuel *Who are We? The Challenges to America's National Identity* Simon and Shuster, New York, NY, 2004.

Kapur, Devesh. *The War for Global Talent: Implications for Developing Countries*. Center for Global Development and Institute for International Economics, in press, forthcoming November 2004

Katz, Lawrence F. and Autor, David H. "Changes in the Wage Structure and Earning Inequality" in O. Ashenfelter and D. Card, Eds., *Handbook of Labor Economics*, vol 3A, North-Holland, pp. 1463 – 1555, 1999.

Katz, Lawrence F. and Murphy Kevin M. "Changes in Relative Wages, 1963 – 1987: Supply and Demand Factors" *Quarterly Journal of Economics* Vol. 107, No. 1, pp. 1 – 34, 1992.

Khananusapkul, Phanwadee. "Do Low-Skilled Female Immigrants Increase the Labor Supply of Skilled Native Women?" *Harvard University Working Paper,* 2004.

Kimmel, Jean. "Childcare Costs as a Barrier to Employment for Single and Married Mothers" *Review of Economics and Statistics.* Vol. 80, pp. 287 – 299, 1998.

Kisker, E.; Hofferth, S. L.; Phillips, A.; and Farquhar, E. "A Profile of Child Care Settings: Early Education and Care in 1990." Report Prepared for US Department of Education by Mathematica Policy Research 1991.

Klein, Paul and Ventura, Gustavo. "Do Migration Restrictions Matter?" Paper presented at NBER Summer Institute July 16, 2004.

Kominski, Robert and Adams, Andrea. "Educational Attainment in the United States: March 1993 and 1992", *Current Population Reports Population Characteristics*. US Department of Commerce, Economics and Statistics Administration, Bureau of the Census. P20-476, May 1994.

Kolesnikov-Jessop, Sonia "Letter from Singapore: It's so Hard to Get Good Help" *Newsweek International Edition* May 17, 2004.

Krusell, Per; Ohanian, Lee E.; Rios-Rull, Jose-Victor; Violante Giovanni L. "Capital-Skill Complementarity and Inequality": A Macroeconomic Analysis" *Econometrica* Vol. 68, No. 5, pp. 1029 – 1053, 2000.

Lam, Kit-Chun and Liu, Pak-Wai. "Earnings Divergence of Immigrants" *Journal of Labor Economics.* Vol. 20, No. 1, pp. 86-104, 2002.

Lowell, B. Lindsey and Suro, Robert. "How Many Undocumented: the Numbers behind the US – Mexico Migration Talks" *Pew Hispanic Center* March 21, 2002.

Massachusetts Office of Child Care Services. *Group Childcare and School Age Program Licensing – Section 102 CMR 7.00*. www.qualitychildcare.org/regulations.shtml

Mayda, Anna Maria. "Who is Against Immigration? A Cross-Country Investigation of Individual Attitudes towards Immigrants" *Georgetown University Working Paper*, April 2004.

Orrenius, Pia and Zavodny, Madeline. "Does Immigration Affect Wages? A look at Occupation-Level Evidence" *Federal Reserve Bank Working Paper*, June 2003.

Palmer, Phyllis. *Domesticity and Dirt: Housewives and Domestic Servants in the United States, 1920 – 1945.* Temple University Press, Philadelphia. 1989.

Ratha, Dilip "Worker's Remittances: An Important and Stable Source of External Development Finance", *Global Development Finance I Analysis and Statistical Appendix pp. 157 – 175,* 2003.

Ribar, David. "Structural Model of Child Care and the Labor Supply of Married Women" *Journal of Labor Economics*. Vol. 13 pp. 558 – 597, 1995.

Singapore Census of Population 1990. *Religion, Childcare, and Leisure Activities*. Statistical Release 6.

Singapore Ministry of Community Development, Youth, and Sports. "Guide to Setting up a Child Care Centre" 2004.
http://www.childcarelink.gov.sg/ccls/uploads/CCC%20Guide.pdf

Singaporean Ministry of Manpower. *Singaporean Work Permit Application for a Foreign Domestic Helper Singapore Ministry of Manpower*, 2004.
www.mom.gov.sg/MOM/CDA/0,1858,961-----------,00.html

Singapore Yearbook of Manpower Statistics 2002.

Stigler, George J. "Domestic Servants in the United States 1900 – 1940". *NBER Occasional Paper 24*, April 1946.

Stefoni, Carolina. "Mujeres Immigrantes Peruanas en Chile" CIEAP/UAEM Papeles de Población No. 33, Julio / Septiembre 2002.

Walmsley, Terrie Louise and Winters, L. Alan. "Relaxing the Restrictions on the Temporary Movements of Natural Persons: A Simulation Analysis" *CEPR Discussion Paper No. 3719*, January 2003.

Williamson, Jeffrey. "Globalization, Convergence, and History" *The Journal of Economic History*. Vol. 56, No. 2, pp. 277-306, Presented at the Fifty-Fifth Annual Meeting of the Economic History Association. (Jun., 1996), Presented at the Fifty-Fifth

Annual Meeting of the Economic History Association. (Jun., 1996), Presented at the Fifty-Fifth Annual Meeting of the Economic History Association, Jun. 1996.

Williamson, Jeffrey. "Globalization, Labor Markets and Policy Backlash in the Past**"** *Journal of Economic Perspectives,* Vol. 12, No. 4, pp. 51-72, 1998.

Table 1
Foreign Domestic Helpers

Country	Year	% Labor Force
Kuwait	1995	19.9%
Bahrain	2001	10.1%
Saudi Arabia	2002	8.9%
Singapore	2003	7.0%
Hong Kong	2003	6.8%
Greece	2001	1.0%
Taiwan	2000	0.8%
Israel	2001	0.8%
USA	1998	0.3%

Kuwait: 148,637 non-Kuwaiti's were employed as domestic servants in private households out of a total working population of 747,534 and total foreign working population 604,775. Source: 1995 Census Ministry of Planning.

Bahrain: 17,701 non-Bahrainis were employed in households out of a total working population of 212,070 and total foreign working population of 134,802. Source: Statistical Abstract of Bahrain 2002.

Saudi Arabia: 516,691 non-Saudis were employed in private households out of a total working population of 5,808,617 and a total foreign working population of 3,031,633. Source: Saudi Arabia Central Department of Statistics.

Singapore: 150,000 foreigners were employed as domestic helpers out of a total labor force of 2.15 million. Source: A General Guide on Employment of Foreign Domestic Helpers Ministry of Manpower and Ministry of Manpower.

Hong Kong: 237,105 foreigners were employed as domestic helpers out of a labor force of 3,487,100. Source: Hong Kong Annual Digest of Statistics and Hong Kong Census and Statistics Bureau.

Greece: 43,623 non-Greek and non-EU citizens were employed in private households out of a total labor force of 4.3 million and a non-Greek non-EU working population of 375,579. Source: Greek Population Census 2001 and LABORSTA.

Taiwan: 79,000 foreigners were employed as domestic helpers out of a total labor force of 9.5 million. Source: Cuts in Foreign-Labor Quotas Agreed, *United Daily News* August 1, 2000 and LABORSTA.

Israel: 18.8 thousand immigrants of 1990 and after were employed as domestic personnel in private households out of a total labor force of 2,503.5 thousand and a immigrants of 1990 and after working population of 828.4 thousand. Source: Statistical Abstract of Israel 2002.

USA: This figure is taken from the March 1998 CPS where the total number of non-citizens in the industry category Personal Services – Private Households is divided by the total number of people reporting to be working in an industry.

Table 2
Female Labor Force Participation Rates in 1970's and 2000's
Ages 25-34

Including Foreign Private Household Workers

	Hong Kong	Singapore	Japan	Korea	US	UK[1]	Germany[2]	France[3]	Israel[4]	Greece[1]	Kuwait[5]
1970	39.6%	26.7%	46.1%	36.6%	47.5%	43.9%	53.5%	61.8%	44.0%	34.0%	12.5%
2000	80.1%	79.5%	63.9%	48.9%	76.3%	73.5%	73.3%	68.8%	58.7%	64.7%	61.1%
Difference	40.5%	52.8%	17.8%	12.3%	28.8%	29.6%	19.7%	6.9%	14.7%	30.8%	48.6%

Not Including Foreign Private Household Workers

	Hong Kong	Singapore	Bahrain[6]	Kuwait[5]
1970	39.6%	26.7%	7.6%	12.5%
2000	75.5%	74.6%	47.2%	23.2%
Difference	36.0%	47.9%	39.6%	10.6%

[1] Greece, UK, and Canada 1970 data is from 1971.

[2] 1970 Germany data comes from Federal Republic of Germany

[3] France 1970 data is from 1975.

[4] Israel data is from 1972 to 2000 and are participation rates for females aged 18 to 34.

[5] Kuwait data is from 1970 and 1995 and are participation rates for females aged 25 to 44.

[6] Bahrain data is from 1971 and 2001 and are participation rates for females aged 25 to 44 which do not include foreign private household workers.

Estimations not including foreign private household workers come from assuming the age distribution from a survey of foreign private household workers in Hong Kong in 1996 applies to the population of foreign private household workers in these other countries. Assuming all foreign private household workers are female allows us to subtract the number of female foreign private household workers from the number of working native women.

Data is unavailable for Saudi Arabia, Taiwan

Source: ILO Laborsta and Statistical Abstract of Bahrain 2002.

These labor force participation rates include foreign domestic helpers.

Fertility Rates (Births per Woman)

	Hong Kong	Singapore	Japan	Korea	US	UK	Germany	France	Israel	Greece	Bahrain	Kuwait
1970	3.34	3.09	2.14	4.27	2.48	2.44	2.03	2.48	3.78	2.34	6.51	7.10
2000	1.02	1.44	1.36	1.43	2.13	1.68	1.35	1.88	2.84	1.32	2.84	2.67
Difference	-69.3%	-53.3%	-36.3%	-66.5%	-14.0%	-31.1%	-33.5%	-24.3%	-24.8%	-43.5%	-56.5%	-62.4%

Source: World Development Indicators. Data from Germany is for the unified Germany.

Table 3
Effects of Foreign Private Household Workers
Moderate Amount of Native Labor Freed up by Immigrants

	No Tax	$\tau = 20\%$ MCF = 1.4	$\tau = 51.6\%$ MCF = 1.4
Labor Supply Increase From Employing FPHW	21.3%	20.1%	16.3%
Percent Change W_L/W_H	9.3%	9.1%	8.5%
High Welfare Gain	-4.6%	-2.8%	-0.3%
Low Welfare Gain	3.6%	3.7%	3.4%
Total Welfare Gain	0.3%	1.1%	2.0%
National Income	3.1%	3.0%	2.5%

Labor Supply Increase from Employing FPHW is the percentage point gain in high skilled labor supply between those employing childcare and those hiring a foreign private household worker.

Welfare gains are the increase in income as a percentage of gross income before immigration required to compensate natives after immigration so that they are indifferent between the immigration and non-immigration cases.

Proportion of native high-skilled is 24%.

National income is the percent increase in gross income accruing to natives.

Immigrants are assumed to be legally restricted to only working in the domestic sector, and each consumer with FPHW employs around 1.07 to 1.25 immigrants.

Table 4
Effects of Foreign Private Household Workers
Low Amount of Native Labor Freed up by Immigrants

	No Tax	$\tau = 20\%$ MCF = 1.4	$\tau = 51.6\%$[1] MCF = 1.4
Labor Supply Increase From Employing FPHW	14.8%	13.3%	8.9%
Percent Change W_L/W_H	5.3%	5.0%	3.3%
High Welfare Gain	-2.7%	-1.6%	0.1%
Low Welfare Gain	2.1%	2.0%	1.5%
Total Welfare Gain	0.2%	0.6%	1.0%
National Income	1.8%	1.6%	1.3%

[1] This is calculated as a corner solution as low-skilled natives supply a full unit of labor with daycare.

Labor Supply Increase from Employing FPHW is the percentage point gain in high skilled labor supply between those employing childcare and those hiring a foreign private household worker.

Welfare gains are the increase in income as a percentage of gross income before immigration required to compensate natives after immigration so that they are indifferent between the immigration and non-immigration cases.

Proportion of native high-skilled is 24%.

National income is the percent increase in gross income accruing to natives.

Immigrants are assumed to be legally restricted to only working in the domestic sector, and each consumer with FPHW employs around 0.94 to 1.14 immigrants.

Table 5
Female Civilian Labor Force Participation Rates in Israel 2001

	Age of Youngest Child				Number of Children				Total		
	0-1	2-4	5-9	10-14	1	2	3	4+	w/ children	w/o children	Total
(1) Employ household help and caregiver	78.0%	89.6%	87.4%	88.8%	85.3%	89.6%	85.6%	73.5%	86.0%	44.4%	61.5%
(2) 1-15 hours per week	73.7%	89.5%	88.4%	88.5%	83.9%	90.1%	86.2%	74.1%	85.9%	48.0%	64.2%
(3) 16+ hours per week	89.9%	96.7%	77.7%[1]		86.2%	90.6%	90.1%	95.1%[1]	89.7%	31.7%	54.2%
(4) Do not employ household help and caregiver	60.3%	75.1%	77.3%	76.6%	76.6%	75.8%		49.3%	72.0%	41.9%	54.5%
(3) - (4) Difference	29.6%	21.6%	0.4%		9.6%	14.8%	90.1%	45.8%	17.7%	-10.2%	-0.3%

[1] Estimate based on population of less than 2,000.
These are the percent of women in the civilian labor force in each cell.
Source: Statistical Abstract of Israel 2002.