# INTERMARRIAGE AND IMMIGRANT EMPLOYMENT: THE ROLE OF NETWORKS

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# Intermarriage and Immigrant Employment:
# The Role of Networks

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**Abstract:** Social networks are commonly understood to play a large role in the labor market success of immigrants. Using 2000 U.S. Census data, this paper examines whether access to native networks, as measured by marriage to a native, increases the probability of immigrant employment. We start by confirming in both least squares and instrumental variables frameworks that marriage to a native indeed increases immigrant employment rates. Next, we show that the returns to marrying a native are not likely to arise solely from citizenship rights acquired through marriage or characteristics of native spouses. We then present several pieces of evidence suggesting that networks obtained through marriage play an important part in explaining the relationship between marriage decisions and employment.

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# 1    Introduction

Social environments are known to be an important determinant of labor market success. Not only might norms enforced within networks influence people's work ethic and job search intensities, but networks play a direct role in matching workers with jobs. Given that immigrants might be less familiar with formal job search methods and less qualified for the high skill jobs that tend to use them, networks may be especially important for the labor market success of the foreign born. In this paper, we use the relationship between immigrant marriage patterns and employment rates to gain insight into the role of networks in immigrant assimilation. We first use an established identification strategy to test whether access to native networks, as measured by marriage to a native, increases the probability of immigrant employment. After establishing this relationship, we examine whether its strength varies systematically with circumstances where the employment gains from access to native networks are expected to be largest.

Although many may believe that association with natives necessarily improves the economic outcomes of immigrants, the literature suggests an ambiguous effect. For example, while Borjas (1995) finds that residence in an ethnic enclave slows earnings assimilation of the children of immigrants, Edin, Fredriksson, and Aslund (2003) as well as Damm (2009) show that after accounting for selection, residence in ethnic enclaves improves the economic outcomes of immigrants. Scholars have also found that the effect of ethnic concentration depends on the average skill-level of the group, with immigrants belonging to higher skilled groups benefiting more from ethnic concentration (Borjas, 1995).

Much can be learned from immigrant residential patterns, but residence in an enclave does not necessarily imply association with group members. Given the relatively low costs of transportation and communication, an immigrant living in an enclave may associate mainly with

natives at work and in social settings, while an immigrant residing a considerable distance from an enclave may have his social circle comprised mostly of other immigrants. Marriage to a native, however, necessarily implies association with at least one native. Moreover, since marriage to a native can be viewed both as a cause and an effect of association with natives more generally, we argue that it can be used as a measure of the proportion of natives within an immigrant's social network.

Focusing on immigrant males arriving in the U.S. at age 18 or below, we first show within an ordinary least squares (OLS) framework that marriage to a native increases immigrant employment rates even when controlling for an extensive list of human capital and assimilation variables. Then, building on the instrumental variables (IV) approach of Meng and Gregory (2005), we exploit variation in the size of the immigrant population as well as ethnicity-specific sex ratios to examine whether more employable immigrants are more likely to marry natives. A falsification test conducted on never-married immigrants points to the validity of our exclusion restrictions. Our results indicate that positive selection into marrying a native is not likely to be a problem since the IV estimates are empirically indistinguishable from the OLS estimates.

We then examine the reasons why marital assimilation increases immigrant employment rates. One potential explanation is that marriage to a native brings with it citizenship rights, and the accompanying access to formal labor markets leads to higher employment probabilities. Another possible explanation is that native spouses have characteristics which aid in immigrants' job searches. For example, they may have better job search skills or greater knowledge of the labor market, both of which would enable them to help their spouses find work. A last reason why marriage to a native may increase employment probabilities is not related to the spouse *per*

*se*, but the friends and family of the spouse. The different networks acquired through marriage may play an important role in an immigrant's job search process.

Empirically, it is difficult to distinguish between the different mechanisms through which marriage to a native may affect employment outcomes. We take several different approaches. To examine the role of citizenship, we test whether immigrants that are unlikely to have ever been undocumented workers based on their observable characteristics experience a marriage to a native premium. We also compare the returns to cohabitation with a native as opposed to marrying a native since the former does not bring with it citizenship rights. In all cases, we find that sharing a household with a native increases employment probabilities, suggesting that the relationship cannot be explained solely by citizenship acquisition. To examine the role of spouse characteristics, we add to both the OLS and IV specifications spouse employment and education variables which may enhance the ability of a spouse to aid in her husband's job search. While these characteristics do influence employment rates, the coefficient on marriage to a native remains positive and significant suggesting that there is another mechanism at play.

To examine the role of networks, we assume that when an immigrant marries, he gains access to a network with relatively more natives if he marries a native than if he marries another immigrant. This implies that marriage to a native should increase employment probabilities more for those immigrants that stand to gain more from a native network. Our main strategy involves identifying the immigrant populations with the most to gain from native networks and empirically examining whether they in fact experience greater returns to marrying a native.[1] We

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[1] We note that we are not directly measuring networks in the manner of Lee (2007) and Bramoullé, Djebbari and Fortin (2009). Instead, we provide evidence consistent with the role of networks in explaining the employment benefits of marriage to a native.

also test hypotheses relating marital exogamy to other labor market outcomes, such as type of employment and the share of natives in one's occupation.

Our network results can be summarized as follows. First, the larger is the difference between native and immigrant employment rates within an immigrant's age and metropolitan area, the larger is the increase in the probability of employment for immigrants that marry natives. Second, the gains to marrying a native are greater for people who are the most likely to use personal contacts in job search, namely, those with lower levels of education. Lastly, immigrants surrounded by other immigrants from the same country of origin do not increase their employment probabilities by as much when they marry natives. In fact, marriage to a native can decrease employment rates for immigrants living in areas with large enough same-ethnicity populations. All of these results are consistent with theoretical predictions and empirical findings established by the network literature.

We also examine the effect of marriage to a native on a different set of outcomes. Immigrants married to natives tend to work in occupations with more natives. Although not conclusive, this is consistent with network members providing referrals and sharing information about jobs. We also find that marriage to a native increases the probability of being in paid employment more than the probability of self-employment. This may not be surprising since many of the businesses owned by the foreign born cater to immigrants and so a network comprised mainly of immigrants may be relatively more useful than native networks for those considering entrepreneurial opportunities. Lastly, we find that conditional on employment, marriage to a native is associated with slightly lower commute times. We interpret this as evidence that more connections to natives allow immigrants to limit the geographic scope of their job search. Taken

together, we view our results as providing strong support for the role of social assimilation in explaining the economic assimilation of immigrants.

The remainder of the paper is organized in the following way. Section 2 reviews the related literature, while Section 3 describes the data. Section 4 examines the relationship between marriage to a native and employment rates of immigrants in both OLS and IV contexts. In Section 5, we examine the mechanisms through which marriage to a native might increase employment probabilities, focusing on the role of networks. Section 6 concludes.

## 2    Background and Literature

There is an extensive literature examining the role of social interactions on behavior, much of it focusing on residential segregation. One way the behavior of others could affect labor market outcomes is through its effects on social norms and preferences. For example, utility from leisure may be increasing in the number of a person's acquaintances that do not work (Case and Katz, 1991; Hellerstein, Neumark and McIrney, 2008). This may be true both because friends make leisure more enjoyable and because any unemployment stigma most probably decreases as the number of people not employed increases.

Social circles can also affect labor market outcomes via their role in providing referrals or transmitting information regarding job openings.[2] The literature suggests that anywhere from 30 to 80 percent of all job openings are filled using informal methods (Campbell and Marsden, 1990; Holzer, 1987, 1988; Ioannides and Datcher-Loury, 2004; Rees, 1966).  Bayer, Ross and Topa (2008) find that living on the same city block significantly increases the probability that two people work together, suggesting that neighbors exchange information about jobs. Pointing

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[2] Employers may use networks for recruiting due to imperfect information about a potential employee's future productivity and search costs in hiring (see Montgomery 1991; Bishop 1993; Fernandez, Castilla and Moore, 2000; Battu, Mwale and Zenou, 2007). By sharing job opening information with current employees, firms can save money on advertising costs and, at the same time, hire potentially more productive workers through the referral system.

to the same phenomenon, Patel and Vella (2007) find that recently arrived immigrants are attracted to the same occupations as older immigrants from the same country. In this paper, we are not able to distinguish between the different reasons why social interactions affect labor market outcomes, but we provide evidence that association with natives does increase immigrant employment probabilities.

There is some debate in the literature about whether residential ethnic concentration, one measure of association with natives, leads to improved economic outcomes for immigrants. Theoretically, the impact is ambiguous. Immigrants that reside in enclaves do not face as immediate of a need to learn the host country skills, such as language, necessary for increasing future income. Arguing that ethnicity has an external effect on skill-acquisition, Borjas (1995) finds that residence in an ethnic enclave slows education and earnings assimilation of the children of immigrants, especially for those in ethnic groups with low average skill levels.[3] Alternatively, ethnic concentration may improve labor market outcomes if ethnic networks provide more or higher quality information about job opportunities (Cutler *et al.*, 2008; Munshi 2003; Edin *et al.*, 2003, Damm 2009). Moreover, a greater number of immigrants in one location may justify the presence of group-specific community institutions which could provide assistance in the labor market.

Empirically deciphering the impact of immigrant segregation is laced with difficulties because of endogenous selection into neighborhoods.[4] In including both metropolitan statistical area (MSA) and language fixed effects in their analysis, Bertrand, Luttmer and Mullaithanan (2000) identify the role of social networks by examining whether people in language groups with

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[3] Residence in an ethnic enclave may also lead to worse economic outcomes if the enclave is located, as they usually are, in inner cities. Urban governments may not be able to provide high quality public goods such as education and crime prevention (Cutler, Glaeser and Vigdor, 2008). Moreover, ethnic enclaves may be located a distance from suburban areas of job growth (see Kain, 1968).

[4] Bayer *et al.* (2008) provide a detailed review of the various identification strategies used in the network literature.

higher welfare-use in fact use more welfare when they are surrounded by many others from their group. They present evidence that networks are related to welfare participation. Using a similar strategy, Aizer and Currie (2004) conclude that mothers are more likely to use prenatal care when other mothers of the same ethnic group have used it in the past.

Exploiting quasi-natural experiments generated from plausibly exogenous placement of refugees in host countries, several studies have found that an increase in the number of same-ethnicity immigrants living within close geographic proximity improves labor market outcomes of immigrants (Damm 2009; Edin *et al.*, 2003).[5] Beaman (2008) concludes that while an increase in the number of network members that have been in the U.S. a long time improves labor market outcomes, exogenously larger numbers of immigrants arriving in the same cohort decrease wages and employment probabilities. She explains this with a model in which immigrants arriving in the same year compete for the same scarce jobs while those arriving previously are in a better position to provide information about job openings.

Employing multiple identification strategies which make use of cross-metropolitan area variation, Cutler *et al.* (2008a) conclude that after correcting for selection, segregation has positive average effects on immigrant outcomes, but that the effect of residence in an enclave very much depends on the average human capital levels of its inhabitants.

The potential mechanisms through which marriage decisions affect immigrant outcomes closely mirror the mechanisms through which residence in an enclave affects outcomes. As described in Furtado and Theodoropoulos (2009), the theoretical impact of marriage to a native on immigrant employment rates is ambiguous. Because immigrant groups tend to be very socially cohesive (Munshi, 2003) and have more information about jobs typically held by

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[5] Aslund and Frederiksson (2009) use a similar technique to study welfare participation among immigrants in Sweden.

immigrants, the immigrant contacts gained from marriage to an immigrant may prove very useful in the job market. Furthermore, since native wives are more likely to be employed than immigrant wives, they may be able to finance lengthier job searches for their immigrant husbands. On the other hand, an immigrant's native born spouse may improve his or her English fluency as well as knowledge of local customs and labor market conditions thereby increasing employment probabilities.[6] Moreover, if marriage to a native brings with it a network comprised of relatively more natives, then immigrants may benefit from the positive spillovers generated from natives' better labor market outcomes. In terms of increasing employment rates, these spillovers may operate via cultural norms on the acceptability of unemployment or networks sharing information about job openings.

Using marriage market conditions as instruments, Meng and Gregory (2005) find that marriage to a native increases earnings of immigrants in Australia. Taking similar approaches to identification, Meng and Meurs (2009) find comparable results for immigrants in France, but Kantarevic (2004) fails to find positive earnings returns to marrying a native in the U.S. after accounting for selection. We contribute to this literature by examining whether marriage to a native increases employment rates for immigrants in the U.S. and whether networks can explain this relationship.

## 3    The Data

Our analysis employs the 5 percent sample of the 2000 U.S. Census as reported by the Integrated Public Use Microdata Series (IPUMS, Ruggles *et al*., 2004). Because of the

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[6] There may also be discrimination in the labor market for immigrants. Although spouse's nativity is not typically known when immigrants are hired, it is most likely learned once they start the job. If employers assume immigrants with native spouses are less likely to return to their home countries and more likely to become fluent in English, they may be more willing to invest in their firm-specific human capital thus increasing their probability of employment at the firm for many years.

difficulties in interpreting labor market outcomes of females and students, we restrict our sample to married[7] foreign born males between the ages of 18 and 62 that are not enrolled in school. We keep only the immigrants that arrived in the U.S. before the age of 19 since they are most likely to have been exposed to the U.S. marriage market.[8] An immigrant is defined to be anyone who is born outside of the 50 U.S. states but not born to U.S. parents. In order to minimize sampling error, we restrict our sample to immigrants residing in MSAs with more than 10 observations and belonging to ethnic groups with more than 30 observations. For ease of interpretation, we also drop from the sample unpaid family workers. Lastly, we exclude individuals that report more than one race category. The race categories used in the analysis are non-Hispanic White, non-Hispanic Black, Asian, Hispanic and other race. The final sample consists of 74,149 observations.

Our intermarriage variable takes the value of one if the immigrant is married to a native and zero if he is married to another immigrant. We concede that marriage to a native does not necessarily imply marrying someone with a different cultural background. However, as can be seen in Table 1, about 75 percent of the immigrants who marry other immigrants share the same ancestry. Meanwhile, of the immigrants who marry natives, only 30 percent share the same ancestry with their spouses. Because of its subjectivity, interpretation of the responses to the

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[7] Given that immigrant-immigrant divorce rates are typically lower than immigrant-native divorce rates (Kalmijn, de Graaf and Janssen, 2005), the results in the paper may be driven by selection into marriage. Following Qian and Lichter (2007), we conducted the analysis on immigrants younger than age 35 in order to limit the degree of selectivity. Results were robust.

[8] Readers may wonder whether the findings in this paper extend to immigrants that arrive in the U.S, as adults. For exploratory purposes, we ran the main empirical specifications in the paper on all immigrants. All of the main results in the paper were robust. It is difficult to interpret the effect of marriage to a native for this sample since there might be a correlation between traveling to the U.S. as a married couple and employment rates upon arrival which has nothing to do with native contacts. Although we would have liked to include all immigrants that arrived before marriage, information on age at first marriage is not available in the 2000 and 1990 Censuses. Some earlier Census datasets have information on age at marriage, but because the composition of immigrants in the U.S. has changed so much in the past few decades, we prefer to use the more recent data. We did, however, restrict our analysis to immigrants that arrived in the US between the ages of 16 and 18. Although there was not enough age variation to precisely estimate the IV coefficients, all other results were robust.

ancestry question in the Census is difficult (Farley, 1990), but we maintain that association of natives, regardless of their ethnic background, is a good measure of an immigrant's association with natives more generally.

Table 1 also presents descriptive statistics of the other variables used in the analysis. Immigrants married to other immigrants are less likely to be employed than immigrants married to natives. This should not be surprising given that immigrants in cross-nativity marriages are more educated, more fluent in English, and have resided in the U.S. for more years. Whites are more likely than racial minorities to marry natives. The native spouses of immigrants have more years of schooling, are more likely to work, and have higher earnings than immigrant spouses. Spouses that do not work and therefore have zero wage income were coded as having an income of 0.001 so that they would not be dropped from the analysis in specifications which control for the log of spousal earnings. In the following section, we examine the effect of marriage decisions on employment rates after controlling for observable characteristics in a multivariate context.

## 4    The Effect of Marriage to a Native on Employment of Immigrants

### 4.1    Ordinary Least Squares Analysis

Immigrants are generally less likely to be employed than natives (Chiswick, Cohen and Zach, 1997). The employment differential may be explained by immigrants' lack of U.S.-specific labor market skills, English language difficulties, discrimination in the labor market, and lower education levels. It may also be that because immigrants have less information about the local job market, they have longer job search periods. Moreover, because immigrants have lower earnings potentials, eligibility for welfare payments or disability insurance may drive them out of the labor force (see Chiswick, Cohen and Zach (1997) for more detailed explanations). Since immigrants that marry immigrants are likely to be less assimilated to the U.S., they may have

lower employment rates for all of these reasons. Thus, it is important to control for measures of human capital and assimilation when examining the effect of marriage to a native on employment rates.

Ordinary least squares analysis offers an initial look at the effect of marriage to a native on immigrant employment rates.[9] Our first specification includes the basic controls used in employment regressions. In order to capture any non-linear effects of experience on employment, a full set of 44 age dummy variables are used in the model. We also include dummy variables measuring educational attainment, and whether the immigrant is a veteran or disabled. Race and region dummy variables are also used. All of the coefficients on the controls in the baseline model shown in Column 1 of Table 2 have the expected signs, and marriage to a native is associated with a 5.6 percentage point increase in the probability that an immigrant is employed. [10]

As immigrants assimilate to the U.S., they become more likely to both marry a native and remain gainfully employed, potentially biasing the coefficient on marriage to a native. To account for this, in our second specification, we add years since migration as well as a dummy variable equal to one if the immigrant has arrived within the previous five years. Another source of bias arises if immigrants from certain countries find it easier to marry natives and find or keep jobs. For example, immigrants from Canada and Australia may have better employment outcomes in the U.S. and be more likely to marry natives than immigrants from non-English speaking countries. To deal with any bias this may cause, we include 100 country of birth

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[9] Linear probability models are used instead of probit or logit models because we later take an instrumental variables approach, and it is computationally cumbersome to use nonlinear estimation strategies when estimating IV coefficients.

[10] As discussed previously, there are many possible explanations for this result. Native spouses and their networks may increase the number of job offers, or holding constant the number of job offers, improve the quality of the offers. Using a tobit model, we found that conditional on being employed, a native spouse was associated with working an additional 28 minutes per week. This may be because native spouses increase the probability of finding full time employment.

dummy variables in the model. Not surprisingly, when this initial set of assimilation measures is added to the model in Column 2, the marriage to a native coefficient decreases in magnitude, but remains positive and statistically significant.

There are other assimilation variables available in the data which may act both as controls for the level of assimilation reached before marriage and as mechanisms through which marriage to a native affects employment rates. For example, English fluency can be a prerequisite for marriage to a native, but marriage to a native can certainly result in improved language ability. Similarly, less assimilated immigrants are more likely to reside in ethnic enclaves and therefore less likely to encounter native potential spouses. If ethnic enclaves have fewer economic opportunities, then differences in residential patterns may bias the estimated coefficient on marriage to a native. At the same time, marriage to a native may result in a move away from an ethnic enclave. This may be a mechanism through which marital exogamy increases employment rates.

In Column 3, we add to the model a measure of English fluency, the percentage of the immigrant's MSA with same country of birth, and whether the person lives in a central city. When these variables are added, the estimated exogamy coefficient falls by almost 20 percent.[11] We note, however, that controlling for these assimilation variables limits the avenues through which marriage to a native can increase immigrant employment rates in our model. Given that English fluency and residence away from ethnic enclaves increase employment probabilities, our estimates can be regarded as underestimates of the total effect of marriage to a native.

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[11] Because our English fluency variable is based on self-responses, it may not accurately measure people's speaking ability. To address this issue, we ran regressions separately on immigrants from English speaking and non-English speaking countries, defined according to Bleakley and Chin (2009). Although the effect of marriage to a native was larger for immigrants from non-English speaking countries, the coefficient was positive and statistically significant ($\beta=0.029$, $p=0.010$) even for those who most probably had little to gain from native spouses in terms of language acquisition and even cultural norms. This suggests that there must be other mechanisms through which marrying a native increases the employment probabilities of the foreign born.

Another potential concern arises if immigrants residing in metropolitan areas with worse economic conditions are less likely to marry natives. To address this issue, we control for native-born unemployment rates. By using native-born unemployment rates, we avoid a potential reverse causality problem between the dependent variable and unemployment. Because unemployment rates in an MSA could vary by experience level and thereby have heterogeneous effects on immigrants of different ages, we construct unemployment rates which vary by MSA as well as age. Although the unemployment rate is associated with lower employment probabilities of immigrants, the inclusion of the variable in the fourth column has no effect on the marriage to a native coefficient. In the final specification, shown in column 4, marriage to a native leads to a four percentage point decrease in the probability of employment. [12]

### 4.2    *Instrumental Variables Analysis*

Although an extensive list of controls precludes many of the sources of bias on the intermarriage coefficient, one may still be concerned that immigrants that marry natives have unobservable characteristics correlated with both economic outcomes and the probability of marrying a native. For example, immigrants that are more assimilated, in ways not captured by our assimilation controls, may be more likely to marry natives and have gainful employment. Alternatively, it may be that conditional on our various human capital and assimilation controls, it is the most hard-working immigrants that prefer to marry other immigrants. After all, despite lower levels of education and English fluency, immigrant males have higher labor force

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[12] We did run regressions with more extensive sets of control variables. Adding number of children in the household to the model made little difference on the exogamy coefficient, but we chose not to include it since marriage to a native may affect employment outcomes indirectly through fertility outcomes. Because immigrants from the same country but different cohorts could have very different unobservable characteristics, we added a full set of dummy variables interacted with years in the United States. The coefficient on marriage to a native remained positive and significant ($\beta=0.044$, $p<0.0001$). For simplicity, we chose not to include these interactions in our preferred specification. Given the likely importance of religion in intermarriage decisions, we would have also liked to explore the role of religion in our analysis. Although our country of birth fixed effects partially account for religion, we could not do anything further since the U.S. Census does not collect information on religion.

participation rates than native males (U.S. Census Bureau, 2000). Thus, in the marriage market, the most ambitious immigrants may match most efficiently with similarly ambitious immigrants.

Building on the identification strategy of Meng and Gregory (2005), we correct for endogeneity by instrumenting for intermarriage using two measures of marriage market conditions. Our first instrument is the share of females in the immigrant's age group residing in his MSA that is foreign born. Age groups are created in nine year intervals. Because females tend to marry males who are two years their senior, the mean age within the interval is two years less than the age of the male immigrant. For example, for an immigrant male who is 25 years old, we calculate the percentage foreign born of the females who are between the ages of 19 and 27. Theory suggests that as the percentage of immigrant females increases in an MSA-age group, immigrant males are more likely to encounter and therefore marry other immigrants regardless of person-specific characteristics.

Our second instrument makes use of varying sex ratios within ethnicity-MSA-age group cells. We define the sex ratio for a particular male to be the number of females divided by the number of males in that immigrant's ethnicity-MSA-age group. Again, we define age groups using nine year intervals taking into account the fact that wives are typically two years younger than their husbands. Thus, for a 25 year old Mexican immigrant living in Boston, we construct the sex ratio by dividing the number of Mexican females living in Boston between the ages of 19 and 27 by the number of Mexican males in Boston between the ages of 21 and 29. We expect that as the sex ratio increases, there is less competition among males for same-ethnicity foreign born females and so fewer immigrant males will marry natives. In our sample, there are a few MSA-country of birth-age cells with zero females. Concerned about measurement error, we

added to the specification a dummy variable equal to one in these instances, and this significantly improved the precision of our estimates.

Column 4 of Table 2 presents first stage regression results for the main specification used in the paper. Standard errors in all of the IV regressions are clustered on MSA-age cells. Results suggest that a ten percentage point increase in the percent of an immigrant's age-MSA group that is foreign decreases the probability that he marries a native by almost five percentage points. Also, as the number of females per male increases by one, the probability that an immigrant male marries a native decreases by almost four percentage points. The results are consistent with Angrist (2002), Bisin and Verdier (2000), Blau, Kahn and Waldfogel (2000) and Freiden (1974) for the U.S. marriage market and with Meng and Gregory (2005) for the Australian marriage market. Both instruments are individually significant at the 1% level of significance. The F statistic for excluded instruments far exceeds the commonly used threshold of 10.

Second stage IV results are shown in the last column of Table 2. The estimated coefficient on exogamy suggests that marriage to a native increases immigrant employment rates by about six percentage points.[13] With a p-value of 0.702, a Hausman test does not reject the equality of the OLS and IV estimates. Therefore, for the remainder of the paper we focus on OLS analysis. However, it is useful to think about why the IV point estimate is slightly larger in magnitude than the OLS point estimate.[14] First, as discussed above, it may be that conditional on observable characteristics such as education and language ability, the immigrants that marry other immigrants are positively selected on employment probability.

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[13] We also ran a bivariate probit model, and results were qualitatively the same.
[14] The finding that IV estimates are larger in magnitude than OLS estimates is common in the literature on social interactions (Luke, Munshi and Rosenzweig 2004; Luke and Munshi, 2006; Meng and Gregory, 2005; Meung and Myers, 2009; Furtado and Theodoropoulos, 2009).

It is also important to keep in mind that IV coefficients estimate local average treatment effects (LATE) as opposed to average treatment effects (ATE). The IV estimates only measure the effect of marriage to a native on the immigrants whose marriage choices are affected by variation in the instruments. Immigrants that would marry other immigrants regardless of the difficulty in finding an immigrant spouse, perhaps because of language difficulties or strong preferences for cultural norms, may not gain very much from marriage to a native. Most probably, their job skills do not match those required for jobs typically held by natives and so native networks would not be useful. When we conduct an instrumental variables analysis, the effect of marriage to a native on these immigrants is not taken into account.

Nevertheless, our identification strategy rests on the assumption that these marriage market variables only affect employment probabilities through their effect on marriage choice. Although a few potential problems with this assumption may come to mind, our control variables should assuage the most obvious concerns. For example, immigrants in general, but especially unmarried male immigrants, may be attracted to cities with better economic opportunities. This direct relationship between our instruments and immigrant employment rates would imply biased IV coefficients. However, we include a control for MSA-age specific native unemployment rates, thus mitigating this concern.

Potentially problematic for our first instrumental variable (percent foreign-born) is the possibility that immigrants residing around a large number of other immigrants are less assimilated and so less likely to be employed. Although we control for English-speaking ability, nonverbal forms of communication may be easier in ethnic enclaves. Also, festivals and social clubs are more likely to arise in areas with a number of same-ethnicity inhabitants. The key in all of these examples is that benefits arise when immigrants are around others *from the same*

*country of origin*. Because we include a control for the size of the immigrant's ethnic group in his MSA, identification from the percent foreign instrumental variable arises from variation in the size of the female foreign born population in the immigrant's age group and MSA, conditional on the number of immigrants from his own ethnic group in his MSA. Results from a Hansen overidentification test, shown in Table 2, suggest that that this variation is not directly correlated with employment.

For further justification of the instrumental variables, we perform a simple falsification test using reduced form specifications. If our IVs are correlated with employment rates for reasons unrelated to marriage decisions, then they will impact employment rates of both married and never-married immigrants. On the other hand, valid IVs will predominantly affect the married immigrants. Reduced form estimation results, available upon request, show that while percent foreign and sex ratios have negative and statistically significant effects on married males (p values of less than 0.0001), they have no statistically significant impacts on never-married immigrants (p values of 0.860 and 0.134, respectively). Given that the percent foreign and sex ratio variables may affect employment outcomes of single males in romantic relationships through the same mechanisms as they affect married males, we interpret this as quite convincing evidence of the exogeneity of our instruments.

## 5   Mechanisms

We turn now to the mechanisms through which marriage to a native may increase immigrant employment rates. First, we show that citizenship rights and spouse characteristics cannot explain the entire marriage to a native premium.  Next, we provide evidence of network effects by highlighting patterns in the data which are consistent with hypotheses established by the network literature.

## 5.1    *Citizenship Rights*

One may believe that returns to marrying a native arise solely from the citizenship rights unauthorized immigrants acquire through these marriages. For the approximately 9.3 million unauthorized immigrants residing in the United States--26 percent of the foreign-born population (Passel, Capps and Fix 2004)--legal status can expand employment possibilities to include stable jobs requiring genuine work authorization documentation. To examine whether this can explain the entire marriage to a native premium, we take two different approaches.

To start, we would have liked to compare the returns to marrying a native for immigrants legally allowed to work in the U.S. upon arrival, such as refugees and those with non-spousal family visas, to those who arrived in the U.S. without a valid visa. If citizenship rights were the sole mechanism through which marriage to a native increases employment rates of immigrants, we would observe no marriage to a native premium for immigrants authorized to work upon arrival but a large premium for those arriving without authorization to work. Unfortunately, this data is not available from the U.S. Census. Instead, we compare the returns to marrying a native for those immigrants whose characteristics most closely resemble the characteristics of unauthorized immigrants to those who are least likely to have ever been unauthorized.

As discussed in Passel and Cohn (2009), unauthorized immigrants in the U.S. come disproportionately from Mexico and Central America, reside in California, Texas, Florida and New York, and are significantly less likely than natives to have a high school degree.[15] Thus, as a first approach, we compare the marriage to a native coefficient for a sample of immigrants with these characteristics to the coefficient for a sample of immigrants that do not have any of these characteristics. The results shown in the first panel of Table 3 suggest that although the probable

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[15] About 70 percent of unauthorized immigrants in the U.S. are from Mexico or Central America. More than half live in California, Texas, Florida or New York and 47 percent of unauthorized immigrants have less than a high school education (Passel and Cohn 2009).

unauthorized immigrants have a greater return to marrying a native than the probable authorized immigrants, the return to a native remains positive and highly significant even for the foreign born that are least likely to have ever been undocumented.

We also compare the marriage market returns of Mexicans to Puerto Ricans since over half of all undocumented immigrants in the U.S. are Mexican (Passel and Cohn, 2009) and Puerto Ricans are legally allowed to work in the country. Again, although these two groups have similar cultures and average education levels, a Puerto Rican would not gain citizenship rights from marrying a native while a Mexican may. As can be seen in second panel of Table 3, for both groups, marriage to a native is associated with a positive and significant increase in the probability of employment.

Our next approach compares the returns to marrying a native to the returns to cohabiting with an opposite sex native. In both cases, an immigrant would have substantial contact with a native and her contacts, but only through marriage would he gain citizenship rights. The last panel of Table 3 presents estimated coefficients from regressions run on married and cohabiting couples separately. Results suggest that even though the increase in the probability of employment is higher for those marrying a native than it is for those cohabiting with one, sharing a household with a native as opposed to an immigrant results in a positive and significant increase in the probability of employment in both samples. We do not feel comfortable in interpreting the differential between the marriage and cohabitation coefficients to be entirely due to citizenship rights. Zhang and Song (2007) find that the average marriage lasts 12 years while cohabiting unions last approximately three years. The larger returns to marrying a native could simply reflect the fact that these immigrants have had many more years to accrue the benefits of sharing a household with a native. Nevertheless, the positive and significant return to cohabiting

with a native suggests that the gains to marrying a native do not simply indicate a return to citizenship. There must be another mechanism through which marriage to a native increases employment probabilities of immigrants.

### 5.2    *Spouse Characteristics*

Another potential explanation for why marriage to a native increases immigrant employment rates is related to the characteristics of native spouses. For example, since native wives are more likely to work and have higher earnings, they may be better able to support longer job searches for their husbands, thereby decreasing immigrant employment rates. On the other hand, spouses that work outside of the home may have more information about job openings, thus implying an increase in immigrant employment rates. Also, labor market participation of wives may signal greater household preferences for market goods which would be correlated with an increase in labor force participation rates of husbands.

It is also important to account for differences in spouse's human capital. If native wives have more years of schooling, they may be better qualified to aid in their husbands' job searches. Given the relationship between education and the utilization of formal job search methods (Kuhn and Skuterud, 2004), educated spouses may enable their husbands to conduct more formal job searches. Specifically, they may edit resumes and job applications thus increasing the probability of an interview. This may be especially beneficial for immigrants given that it takes approximately 12 years for immigrants in the U.S. to use the same information during job search as natives (Daneshvary *et al*., 1992).

Table 4 shows regression results for both OLS and IV models which include these spouse characteristics. All specifications include the controls used in the final specification of Table 2. OLS and IV coefficients from models without spouse characteristics are reproduced in Table 4

for convenience. In columns 2 and 4, spouse characteristics are added to the OLS and IV models respectively. Consistent with traditional labor supply models, an increase in spousal earned income-defined as income from wages, a business or a farm--decreases the probability of employment. However, conditional on earnings, spouse's employment increases employment rates of immigrants. This may be because employed wives, regardless of nationality, are better able to aid their spouses in the job search process. Spouse education also increases immigrants' employment probabilities. When interpreting the spouse human capital coefficients, caution is necessary since, because of assortative mating on education in the marriage market (see Mare, 1991), spouse's education may absorb unobserved variation in the immigrant's own ability and human capital.

When spouse characteristics are added to both the OLS and IV models, the coefficients on marriage to a native remain positive and statistically significant.[16] It is interesting to note that although the OLS marriage to a native coefficient decreases when spouse characteristics are added to the model, the IV coefficients are remarkably similar regardless of whether spouse characteristics are included. This suggests that the spouse characteristics are actually measuring unobserved ability since IV models generate consistent estimates regardless of whether controls for ability are included in the model.

Again, we conclude that there must be some other mechanism through which marriage to a native affects labor market outcomes of immigrants. In the following section, we examine the

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[16] Readers may be concerned that these spouse characteristics are just as endogenous as spouse's nativity. At least as many instruments as spouse characteristics are required in order to properly address this issue. Exploiting the same type of variation that is used to construct the instruments for nativity, we formed instruments for the other spouse characteristics in the following way. First, we compute for each MSA-age group and spouse characteristic the average values of these characteristics for immigrant and native females. Next, for each immigrant male in the sample, we construct the predicted probability that he marries a native using the estimated first stage coefficients shown in Table 2. Thus, for example, the instrument for spouse's earnings is the weighted average of immigrant and native mean earnings where the weights are the predicted probabilities of marrying an immigrant and native respectively. When this full set of instruments was used in the model, there was not enough variation in the data to precisely estimate the coefficient on marriage to a native, but the point estimate decreased only slightly to 0.044.

role of networks. Many of our measures of spouse characteristics may already capture network effects. For example, spouses that work outside of the home are more likely to have employed contacts. Given that nativity of spouse remains significant even when spouse's employment is included in the model, we argue that the proportion of immigrants in one's network has its own independent effect even conditional on the proportion of employed and educated members of one's network.

## 5.3    *The Role of Networks*

In this section, we present several pieces of evidence suggesting that the gains from marriage to a native occur at least partly because of the contacts acquired through marriage.

### 5.3.1    Network Hypotheses

Most of the network literature characterizes a person's network using some function of the number of racial, ethnic, or language minorities residing within close geographic proximity. This paper uses marriage decisions as opposed to residential decisions to study the role of networks. We assume that all people acquire new contacts upon marriage but that networks gained from marriage to a native contain relatively more natives than networks gained from marriage to an immigrant. Our main empirical approach relies on identifying the immigrants with the most to gain from native contacts and testing whether they, in fact, have larger marriage to native premiums.

As previously discussed, there are several reasons why native contacts may increase immigrant employment probabilities. Because natives have higher average employment rates, exposure to work norms within native networks may result in more job search effort among immigrants seeking employment. Potentially more important, however, is the role that native

contacts may play in providing referrals and sharing job opening information within the network.[17] Since the employed have more direct information about jobs at their place of employment, the quality of the information they share is likely to be superior. Because recommendations reflect on themselves, current employees of a firm have an incentive to recommend only applicants that are likely to be successful at their firms (Granovetter, 2005). This may be why applicants with internal references are more likely to receive job offers and accept them (Blau and Robbins, 1990). If the matches between employer and employee are particularly good when arranged through personal recommendations, we should also expect applicants with internal references to have longer firm tenures. For all of these reasons, we can expect that in markets where natives have significantly higher employment rates than immigrants, marriage to a native will lead to relatively higher employment rates for immigrants.

> *Hypothesis 1: Marriage to a native increases employment rates more when the difference between average native and immigrant employment rates is larger.*

In order to test this hypothesis, we include in the model an interaction between marriage to a native and the difference between average native employment and immigrant employment. We define markets based on the immigrant's MSA and age. If our hypothesis is correct, the coefficient on the interaction will be positive.

An often cited stylized fact established in the network literature is that more educated job-searchers are less likely to make use of personal connections in their job searches (see Ioannides and Loury, 2004; Hellerstein, McInerney and Neumark, 2009). If it is true that networks are more important for those with less schooling and native acquaintances provide more useful job

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[17] Connection to a network with a greater proportion of employed members will tend to generate more information about job openings both because the employed are less likely to apply for the jobs themselves and because fewer unemployed members of the network implies less competition for information (Calvó-Armengol and Jackson, 2004).

information, then marriage to a native should result in smaller increases in the probability of employment for those with more education. That is,

*Hypothesis 2: Marriage to a native increases employment rates less for immigrants with more education.*

To test this hypothesis, we add to our model a series of interaction terms between marriage to a native and the education dummy variables. We expect the coefficients on the interactions of marriage to a native with higher level education dummies to have negative coefficients.

For our third hypothesis, we exploit the theoretical prediction and empirical finding that the larger the size of a network, the more useful it is to its members (e.g. Gang and Zimmermann, 2000). Members of small, close-knit ethnic communities are likely to already know each other and so very few new contacts can be gained from marriage to another immigrant. Even from a simply probabilistic standpoint, larger, more established ethnic communities are more likely to have more successful members in many different occupations and so connection to these communities should prove more useful.[18] Another common feature of networks is their tendency to exhibit threshold effects, which occur when the actions of others have little impact on behavior until a certain number or percentage of others adopts the behavior (Granovetter, 1978; Calvó-Armengol and Zenou, 2005). In the context of this study, participation in ethnic networks may only be useful for generating job offers when the size of the ethnic group exceeds some specific critical value. For smaller ethnic groups, marriage to a native and the resulting participation in native networks may be more beneficial. More formally,

*Hypothesis 3: Marriage to a native has a positive effect on employment rates unless the size of the immigrant's ethnic group living within close geographic proximity exceeds a certain critical value.*

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[18] See Beaman (2008), Munshi (2003), Patacchini and Zenou (2008) for empirical analyses of the relationship between ethnic group size and labor market outcomes.

To test this hypothesis, we include in the model a set of interactions between marriage to a native and splines representing various ranges of the ethnic group's size. If threshold effects are important, then the coefficients on these interactions should be small and insignificant for low ranges, but negative and significant for high ranges.

We turn now to a set of hypotheses relating marriage to a native to a different set of outcomes. First, if members of native networks provide referrals or share information about job openings at their place of employment, then immigrants who participate in native networks should end up working with relatively more natives. That is,

> *Hypothesis 4: Immigrants that marry natives are more likely to work*
> *with a larger proportion of natives.*

Ideally, we would test this hypothesis by examining the effect of marriage to a native on the relative proportion of natives working at the same establishment, in a manner similar to the work of Hellerstein *et al*. (2009) and Dustmann, Glitz, and Schönberg (2009). Using U.S. and German data respectively, these studies find that minority workers are more likely to have colleagues from their own minority group than other groups. Unfortunately, we do not have the matched employer-employee data necessary to do this type of analysis. Instead, we calculate for each employed immigrant male in our sample, the proportion of people within his occupation and MSA that are native-born. If native networks generate more successful job matches than ethnic networks, then immigrants married to natives will be in occupations with relatively more natives.

Next, we consider how connections to natives differentially impact immigrants' gains to self-employment as opposed to wage employment. According to Borjas (1986), many of the immigrants that are self-employed own businesses which cater to their ethnic communities. Thus, connection to a predominantly native network may not be especially useful for starting a business with an ethnic focus. Also, immigrants from countries with high self-employment rates

tend to have higher rates of self-employment (Yuengert, 1995; Fairlie and Meyer, 1996), with certain ethnic communities specializing in specific types of businesses (see Patel and Vella, 2007; Munshi and Wilson, 2008 for examples). Thus, at least for certain businesses or certain ethnic groups, connection to an ethnic network as opposed to a native network may be more valuable for immigrants considering self-employment. We state the hypothesis more formally below:

> *Hypothesis 5: Marriage to a native increases the probability of paid-employment more than it increases the probability of self-employment.*

We test this hypothesis simply by comparing the effect of marriage to a native on self-employment and wage-employment.

Lastly, we consider the role that networks play on commute times. If it is true that marriage to a native increases employment rates because of the information acquired from native networks, then immigrants that marry natives should receive relatively more job offers within close geographic proximity. This in turn will lead to shorter commutes. More formally,

> *Hypothesis 6: Marriage to a native decreases average commutes.*

We test this hypothesis simply by examining the effect of marriage to a native on commute times of immigrants. If immigrants that marry other immigrants are more likely to live and work within an enclave, their commute times will be shorter making us less likely to detect a network effect even if one exists.

### 5.3.2 Network Test Results

Table 5 presents OLS results from the first three network tests, both when adding the interactions of interest one at a time and including them all at once.[19] Consistent with Hypothesis

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[19] We explored models which tested our network hypotheses within an IV framework. Unfortunately, because many of the interactions used in the tests are constructed from variables that are closely related to our instruments, there is

1, the first column of Table 5 shows that the coefficient on the interaction between marriage to a native and the difference between native and immigrant employment rates is positive and significant. This suggests that when the additional native contacts gained from marriage to a native are more likely to be employed, the gains to marrying a native are larger. More specifically, for every ten percentage point difference in the average employment rate between natives and immigrants in MSA-age group cells, immigrants that marry natives increase their probability of employment by an additional 0.9 percentage points.

Table 5 also provides support for Hypothesis 2. The results shown in Column 2 suggest that while immigrants with less than a high school degree increase their probability of employment by 3.5 percentage points by marrying a native, a college graduate experiences only a 0.6 percentage point increase. A potential explanation for this is that firms hiring college graduates typically use more formal recruitment methods and so personal connections acquired through marriage are less useful for college graduates. This is a particularly strong test because ethnic networks should prove relatively more useful for immigrants with lower education levels. Immigrants with very high levels of education relative to their groups are likely to be over-qualified for the job openings about which typical ethnic network members have knowledge. If ethnic networks are more advantageous than native networks for those with fewer years of schooling, then it is quite telling that despite this, college graduates gain less from marriage to a native than high school graduates.

Next we substitute the size of ethnic group variable with a series of splines. In this way, the effect of an increase in the co-ethnic population is allowed to differ across four different ranges: 0-10, 10-20, 20-30, and above 30. To test Hypothesis 3, we interact each of the splines with the

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not enough variation in the data to separately identify the coefficients of interest. Since a Hausman test could not reject the equality of the IV and OLS coefficients, we favor the OLS coefficients regardless.

marriage to a native variable. Results in Column 3 suggest that although marriage to a native increases employment rates for people living in areas with relatively small co-ethnic populations (67 percent of our sample resides in areas with less than 10 percent co-ethnic), it can have a negative and significant effect on the immigrants residing in MSAs with large co-ethnic populations (over 30 percent). This may be because in areas with large ethnic populations, connection to an ethnic network proves more valuable than connection to a native network. We interpret the finding that the negative effects of marriage to a native only come into play when the co-ethnic population exceeds 30 percent as suggestive of threshold effects.

In Column 4, all of the network interactions are included in the model simultaneously. Although the magnitudes of the coefficients change slightly, the main patterns in the data remain the same. There are several reasons why one may be concerned about the interpretation of the coefficients on the interactions discussed above. For example, in order to correctly interpret the coefficient on the employment interaction, it is necessary to consider what drives the variation in native-immigrant differences in employment rates. One possibility is that average immigrant skill levels in certain cities may be ill-matched with particular industry demands. If this mismatch is due to random fluctuations in either the immigrant population or industry mix within a city, this identification strategy is valid. However, it may also be that in cities where immigrants are less prone to work on average, those immigrants that marry natives are more employable, thus generating a spurious correlation between marriage to a native and employment.[20] For this reason, we turn now to a series of hypotheses with a different set of outcome variables.

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[20] It may also be that immigrants in certain locations face more discrimination in the labor and marriage markets. In line with Merton's (1941) exchange hypothesis, this could imply that those immigrants that marry natives compensate their spouses with more favourable characteristics which are unobservable to the econometrician, such as hard work and diligence in the labor market.

By Hypothesis 4, if network participants provide referrals and share information about job opportunities, then immigrants married to natives will end up working in occupations with relatively more natives. Column 1 of Table 6 shows that marriage to a native is associated with a 3.6 percentage point increase in the native born proportion of people in an employed immigrant's occupation residing within his MSA. We view this as only suggestive evidence since causality may run in the opposite direction: Immigrants in occupations with relatively more natives may be more likely to marry natives.

We test Hypothesis 5 by examining the effect of marriage to a native on paid and self-employment separately. As can be seen from Table 5, while marriage to a native increases the probability of paid employment by 2.5 percentage points, it has no significant effect on the probability of self-employment.[21] These results are consistent with Georgarakos and Tatsiramos' (2009) findings that marriage to a native decreases the probability that immigrants start a business, but conditional on having started, increases survival times of immigrant-owned businesses. Since, as discussed above, native-born friends and family are likely to be more helpful in generating paid employment probabilities than self-employment, we view our results as suggestive of the role of networks in explaining the marriage to a native premium. If the estimated premium were only a return to unobservable characteristics, then it should not matter whether we consider the effect on paid employment or self-employment. In fact, there is evidence that general ability has a larger effect on the earnings of the self-employed than on the wages of paid employees (Hartog, van Praag and van der Sluis, 2008). This implies that, if it were only a return to ability, marriage to a native should increase the probability of self-employment more than the probability of paid employment. Furthermore, if the dominant

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[21] We also ran a multinomial logit model with non-employment, wage employment, and self-employment as the potential outcomes. Relative to not being employed, marriage to a native had a positive effect on wage employment but a negative effect on self-employment.

explanation for the marriage to a native premium lay in the help provided by native-born spouses in job search, then we may expect the premium to be larger for self-employment given that familiarity with English and U.S. laws should be especially important for the paperwork involved in setting up and running a business.

Lastly, we consider the effect of marriage to a native on commute times. Because commute times in our data are bounded below at zero and above at 99 minutes, we use a tobit model. The evidence presented in Table 6 is consistent with Hypothesis 6 in that marriage to a native does decrease commute times of immigrants, but the decrease is only by about a minute. It may be that while marriage to a native generates more job offers via native contacts, immigrants that marry other immigrants are more likely to live and work within ethnic enclaves thus having very short commutes. This would bias the coefficient on marriage to a native downward. [22]

We end this section by noting that although our tests provide only indirect evidence of networks, taken together, we believe that they provide strong evidence of the role of networks in explaining why marriage to a native increases employment probabilities of immigrants. Our results suggest that native networks are more useful than ethnic networks in generating stable employment, at least for the foreign-born arriving in the U.S. before the age of 18.

## 6    Conclusions

This paper explores the relationship between marriage to a native and employment rates of immigrant men. We find, using both least squares and instrumental variables approaches already established in the literature, that marriage to a native increases immigrant employment

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[22] Caution is necessary when interpreting these results if, as suggested by the spatial mismatch hypothesis (Kain, 1968), ethnic enclaves are located a distance from jobs. Since immigrants residing in enclaves are more likely to marry other immigrants, then marriage to a native may result in shorter commute times for reasons unrelated to native networks.

probabilities. We then extend the literature by examining the mechanisms through which marriage choice affects labor market outcomes. We start by showing that citizenship rights and education and labor market characteristics of native spouses are not able to explain the entire marriage to a native premium.

Drawing on theoretical and empirical findings from the network literature, we then examine whether immigrants that stand to gain the most from native contacts in fact have greater returns to marrying a native. For example, since employed contacts are better able to generate job offers than non-employed contacts, we test whether immigrants residing in areas where the foreign born have significantly lower employment rates than natives experience larger increases in employment probability from marriage to a native. Similarly, since personal connections are more useful for generating job offers for the less skilled, we test whether marriage to a native has a smaller impact on employment rates of college graduates. Also, given that ethnic contacts may be more useful than native contacts in areas with large co-ethnic populations, we test whether marriage to a native leads to lower employment rates for immigrants in these areas. We also examine the effect of marriage to a native on the proportion of the immigrant's occupation that is native born, the probability of being self-employed, and commute times. Our results are consistent with networks playing a strong role in explaining why marriage to a native leads to a higher employment rates.

The labor market outcomes of immigrants are of considerable policy importance given that large inflows of migrants put pressure on the welfare state, especially if many are unemployed (Borjas, 1999). The findings in this paper point to the importance of social integration in the economic assimilation of immigrants. Although residence in ethnic enclaves may aid in the initial adjustment to a new country, our results suggest that on average, native contacts prove

more useful than immigrant contacts in acquiring gainful employment. Thus, policies that foster increased association between immigrants and natives may lead to improved labor market outcomes for immigrants. Policy-makers may also consider programs which aid in the job search process of immigrants, thereby acting as a substitute for native contacts. Because of the externalities resulting from the acquisition of good jobs, any improvements in immigrants' employment rates would then further improve labor market outcomes of other immigrants.

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**Table 1.** Descriptive Statistics.

| | Immigrant Male and Native Spouse | | Immigrant Male and Immigrant Spouse | | All | |
|---|---|---|---|---|---|---|
| | Mean | Standard Deviation | Mean | Standard Deviation | Mean | Standard Deviation |
| | *Immigrant male characteristics* | | | | | |
| Employed | 0.869 | 0.337 | 0.763 | 0.425 | 0.796 | 0.403 |
| Paid employment | 0.743 | 0.437 | 0.670 | 0.470 | 0.693 | 0.461 |
| Self-employment | 0.127 | 0.332 | 0.093 | 0.291 | 0.104 | 0.305 |
| Age | 39.470 | 10.476 | 35.773 | 8.861 | 36.920 | 9.546 |
| Less than or up to 12th grade | 0.238 | 0.426 | 0.487 | 0.500 | 0.409 | 0.492 |
| High school graduate, or GED | 0.209 | 0.407 | 0.186 | 0.389 | 0.194 | 0.395 |
| Some college/associates degree | 0.271 | 0.445 | 0.172 | 0.377 | 0.203 | 0.402 |
| Bachelors/Masters/PhD degree | 0.281 | 0.450 | 0.155 | 0.362 | 0.194 | 0.396 |
| English fluency | 0.821 | 0.383 | 0.467 | 0.499 | 0.577 | 0.494 |
| Veteran | 0.171 | 0.377 | 0.067 | 0.251 | 0.100 | 0.299 |
| Disability | 0.117 | 0.321 | 0.234 | 0.423 | 0.197 | 0.398 |
| White | 0.439 | 0.496 | 0.122 | 0.327 | 0.220 | 0.414 |
| Hispanic | 0.442 | 0.497 | 0.670 | 0.470 | 0.599 | 0.490 |
| Asian | 0.079 | 0.270 | 0.174 | 0.379 | 0.145 | 0.352 |
| Black | 0.037 | 0.188 | 0.031 | 0.173 | 0.033 | 0.178 |
| "Other" Race | 0.003 | 0.057 | 0.003 | 0.054 | 0.003 | 0.055 |
| Years in the U.S. | 30.100 | 12.32 | 22.196 | 9.984 | 24.647 | 11.367 |
| Recent immigrant | 0.016 | 0.125 | 0.032 | 0.175 | 0.027 | 0.161 |
| Percent of MSA with same country of birth | 0.053 | 0.087 | 0.086 | 0.091 | 0.076 | 0.091 |
| Residence in central city | 0.198 | 0.399 | 0.270 | 0.444 | 0.248 | 0.432 |
| Residence outside central city | 0.461 | 0.498 | 0.400 | 0.490 | 0.419 | 0.471 |
| Central city status unknown | 0.341 | 0.474 | 0.330 | 0.470 | 0.334 | 0.471 |
| Travel time to work (in minutes) | 28.292 | 21.427 | 28.842 | 21.189 | 28.656 | 21.271 |
| | *Spouse characteristics* | | | | | |
| Spouse employment | 0.645 | 0.479 | 0.463 | 0.499 | 0.519 | 0.500 |
| Spouse's log of income | 5.483 | 7.376 | 2.654 | 8.164 | 3.531 | 8.036 |
| Spouse with less than 12th grade | 0.146 | 0.353 | 0.469 | 0.499 | 0.369 | 0.483 |
| Spouse with high school or GED | 0.263 | 0.440 | 0.205 | 0.404 | 0.223 | 0.416 |
| Spouse with some college /Associates degree | 0.327 | 0.469 | 0.182 | 0.386 | 0.227 | 0.419 |
| Spouse with Bachelors/Masters/PhD degree | 0.264 | 0.441 | 0.144 | 0.351 | 0.181 | 0.385 |
| | | | | | | |
| Percent same ancestry | 0.305 | 0.460 | 0.746 | 0.435 | 0.609 | 0.488 |
| Number of observations | 23,034 | | 51,115 | | 74,149 | |

Notes: The sample consists of married, foreign born males between the ages of 18 and 62 who immigrated to the U.S before the age of 18, are not currently enrolled in school, and reside in an identifiable metropolitan statistical area. The English fluency variable takes the value of one if the immigrant speaks only English and speaks English very well. It is equal to zero if the immigrant speaks English well, or does not speak English well, or does not speak English at all. The variable, "disability" equals one if the immigrant has a disability which prevents, limits, or causes difficulty in working. The "recent immigrant dummy" equals one if the individual has been in the U.S. for less than 5 years. The average travel time to work is constructed only for those who are employed. Statistics are computed using the appropriate person-level weights provided by the 2000 U.S. Census.

Table 2. Ordinary Least Squares and IV Estimates.

| | OLS | OLS | OLS | OLS | IV(2SLS) | |
| | | | | | First Stage | Second Stage |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Variable | Employed | Employed | Employed | Employed | Exogamy | Employed |
| Marriage to a native | 0.056** (0.003) | 0.049** (0.004) | 0.040** (0.004) | 0.040** (0.004) | --- | 0.052* (0.025) |
| Age dummies | Yes | Yes | Yes | Yes | Yes | Yes |
| High school graduate or GED | 0.073** (0.005) | 0.066** (0.005) | 0.056** (0.005) | 0.056** (0.005) | 0.033** (0.007) | 0.055** (0.007) |
| Some college/Associates degree | 0.123** (0.005) | 0.112** (0.005) | 0.096** (0.005) | 0.096** (0.005) | 0.064** (0.007) | 0.095** (0.007) |
| Bachelors degree/Masters/PhD | 0.173** (0.005) | 0.156** (0.005) | 0.136** (0.005) | 0.136** (0.005) | 0.069** (0.006) | 0.135** (0.006) |
| Disability | -0.065** (0.005) | -0.063** (0.005) | -0.061** (0.005) | -0.061** (0.005) | -0.068** (0.005) | -0.060** (0.006) |
| Veteran | -0.007 (0.005) | -0.010+ (0.005) | -0.013* (0.005) | -0.013* (0.005) | 0.021** (0.007) | -0.013* (0.005) |
| Hispanic | -0.044** (0.004) | 0.022 (0.015) | 0.024+ (0.015) | 0.024+ (0.015) | -0.066** (0.020) | 0.025 (0.019) |
| Black | -0.047** (0.009) | -0.051** (0.017) | -0.050** (0.017) | -0.050** (0.017) | -0.117** (0.032) | -0.049** (0.012) |
| Asian | -0.010+ (0.005) | 0.013 (0.014) | 0.013 (0.014) | 0.012 (0.014) | -0.265** (0.023) | 0.015 (0.014) |
| Other race | -0.009 (0.025) | 0.007 (0.027) | 0.010 (0.027) | 0.010 (0.027) | -0.126** (0.031) | 0.011 (0.025) |
| Residence in central city | --- | --- | -0.019** (0.005) | -0.019** (0.005) | -0.012 (0.009) | -0.019** (0.005) |
| Residence outside central city | --- | --- | 0.004 (0.004) | 0.004 (0.004) | 0.012+ (0.007) | 0.004 (0.004) |
| English fluency | --- | --- | 0.055** (0.004) | 0.055** (0.004) | 0.131** (0.009) | 0.053** (0.005) |
| Years in the U.S. | --- | 0.002** (0.000) | 0.001* (0.000) | 0.001* (0.000) | 0.016** (0.000) | 0.001 (0.001) |
| Recent immigrant | --- | -0.022* (0.011) | -0.019+ (0.011) | -0.019+ (0.011) | -0.082** (0.010) | -0.018 (0.011) |
| Region dummies | Yes | Yes | Yes | Yes | Yes | Yes |
| Country of birth dummies | --- | Yes | Yes | Yes | Yes | Yes |
| Percent of MSA with same country of birth | --- | --- | -0.159** (0.029) | -0.145** (0.030) | 0.294* (0.116) | -0.143** (0.031) |
| Unemployment rates in MSA-age group cells | --- | --- | --- | -0.200 (0.142) | 0.195 (0.213) | -0.199 (0.152) |
| IV: Immigrant females over all females in MSA-age groups cells | --- | --- | --- | --- | -0.468** (0.025) | --- |
| IV: Immigrant females over immigrant males in MSA-age group-country of birth cells | --- | --- | --- | --- | -0.038** (0.006) | --- |

*Continued*

| | | | | | | |
|---|---|---|---|---|---|---|
| Dummy variable for missing sex ratio IV | --- | --- | | --- | 0.220**<br>(0.022) | --- |
| Constant | 0.765**<br>(0.060) | 0.776**<br>(0.060) | 0.763**<br>(0.060) | 0.783**<br>(0.062) | 0.522**<br>(0.041) | 0.777**<br>(0.072) |
| R-squared | 0.066 | 0.069 | 0.073 | 0.073 | 0.287 | 0.073 |
| Hansen J-statistic | --- | --- | --- | --- | --- | 2.607 |
| J p value | --- | --- | --- | --- | --- | 0.10 |
| F statistic for weak identification | --- | --- | --- | --- | --- | 197.6 |
| Number of observations | 74,149 | 74,149 | 74,149 | 74,149 | 74,149 | 74,149 |

Notes. See Table 1 notes for information on the sample and variables. Central city status unknown is the omitted category in specifications which include central city residence variables. Estimates are weighted using the appropriate person-level weights provided by the 2000 U.S. Census. Significance levels are noted by the following: ** significant at 1%; * significant at 5%; + significant at 10%. "---" means that the variable is not included in the specification.

**Table 3**. Gains to Citizenship.

| Employment | | |
|---|---|---|
| | Unauthorized Immigrant Characteristics | Authorized Immigrant Characteristics |
| Exogamy | 0.060** | 0.032** |
| | (0.010) | (0.007) |
| Constant | 0.671** | 0.339 |
| | (0.204) | (0.236) |
| R-squared | 0.019 | 0.065 |
| Number of observations | 19,452 | 13,640 |
| | Mexican | Puerto Rican |
| Exogamy | 0.049** | 0.027+ |
| | (0.007) | (0.014) |
| Constant | 0.696** | 0.877** |
| | (0.104) | (0.234) |
| R-squared | 0.030 | 0.120 |
| Number of observations | 34,115 | 4,959 |
| | Married Couples | Cohabiting Couples |
| Exogamy | 0.040** | 0.036* |
| | (0.004) | (0.015) |
| Constant | 0.655** | 0.754** |
| | (0.088) | (0.135) |
| R-squared | 0.073 | 0.065 |
| Number of observations | 74,206 | 5,395 |

Notes: See the notes for Tables 1 and 2 for information on the sample and control variables. The dependent variable in all specifications is employment and the right hand side variables (as in Column 4 of Table 2) are the same in all specifications. In the first panel, the regressions are run separately on immigrants with observable characteristics that are common among the undocumented immigrant population in the U.S. Immigrants with "illegal characteristics" are coming from Mexico or Central America, residence in California, Texas, Florida or New York, and have less than a high school degree. Immigrants with "legal characteristics" have none of these characteristics. The second panel compares Mexicans and Puerto Ricans in terms of the returns to marrying a native. The last panel considers the returns to sharing a household with an opposite sex native for married and cohabiting immigrants. Estimates are weighted using the appropriate person-level weights provided by the 2000 U.S. Census. Significance levels are noted by the following: ** significant at 1%; * significant at 5%; + significant at 10%.

**Table 4**. Effect of Spouse Characteristics.

| Variable | OLS (1) Employed | OLS (2) Employed | IV (second stage) (3) Employed | IV (second stage) (4) Employed |
|---|---|---|---|---|
| Marriage to a native | 0.040** (0.004) | 0.026** (0.004) | 0.057* (0.024) | 0.057* (0.024) |
| Spouse is employed | --- | 0.210** (0.005) | --- | 0.209** (0.008) |
| Log of spouse's income | --- | -0.007** (0.000) | --- | -0.007** (0.000) |
| Spouse is high school graduate or has GED | --- | 0.015** (0.005) | --- | 0.011* (0.005) |
| Spouse has some college/Associates degree | --- | 0.030** (0.005) | --- | 0.024** (0.006) |
| Spouse has Bachelors degree/Masters/PhD | --- | 0.026** (0.006) | --- | 0.021** (0.007) |
| Constant | 0.783** (0.062) | 0.675** (0.063) | 0.662** (0.069) | 0.662** (0.069) |
| R-squared | 0.073 | 0.109 | 0.108 | 0.108 |
| Number of observations | 74,149 | 74,149 | 74,149 | 74,149 |

Notes. Controls from the full model, as shown in column 4 of Table 2, are included in all of these regressions. See notes for Tables 1 and 2 for information on the sample and variables. Spouse's income includes wages, or income from own business in the previous year. Estimates are weighted using the appropriate person-level weights provided by the 2000 U.S. Census. Significance levels are noted by the following: ** significant at 1%; * significant at 5%; + significant at 10%.
"---" means that the variable is not included in the specification.

Table 5. Tests of Network Hypotheses.

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | OLS | OLS | OLS | OLS |
| | Employment | Employment | Employment | Employment |
| Marriage to a native | 0.009** | 0.035** | 0.017** | 0.007 |
| | (0.003) | (0.007) | (0.005) | (0.008) |
| Difference in mean employment between natives and immigrants | -0.723** | --- | --- | -0.717** |
| | (0.010) | | | (0.018) |
| Interaction between marriage to a native and the difference in mean employment between natives and immigrants | 0.090** | --- | --- | 0.061** |
| | (0.014) | | | (0.017) |
| High school graduate or GED | --- | 0.045** | --- | 0.043** |
| | | (0.006) | | (0.008) |
| Some college/Associates degree | --- | 0.077** | --- | 0.072** |
| | | (0.006) | | (0.006) |
| Bachelors/Masters/PhD degree | --- | 0.127** | --- | 0.112** |
| | | (0.007) | | (0.007) |
| Interaction between marriage to a native and high school | --- | -0.007 | --- | -0.005 |
| | | (0.010) | | (0.011) |
| Difference between own education and some college | --- | -0.006 | --- | -0.004 |
| | | (0.009) | | (0.008) |
| Interaction between marriage to a native and college degree and above | --- | -0.029** | --- | -0.021** |
| | | (0.009) | | (0.007) |
| Percent of MSA with same country of birth<br>    Spline 1 (0-0.10] | --- | --- | -0.547* | 0.744** |
| | | | (0.232) | (0.231) |
| Spline 2 (0.10-.20] | --- | --- | 0.059 | -0.040 |
| | | | (0.241) | (0.228) |
| Spline 3 (0.10-.30] | --- | --- | -0.211** | -0.084 |
| | | | (0.081) | (0.088) |
| Spline4 (0.30+) | --- | --- | 0.230* | 0.017 |
| | | | (0.108) | (0.184) |
| Interaction between marriage to a native and Spline1 | --- | --- | 0.608+ | 0.940** |
| | | | (0.322) | (0.346) |
| Interaction between marriage to a native and Spline2 | --- | --- | 0.079 | -0.168 |
| | | | (0.375) | (0.401) |
| Interaction between marriage to a native and Spline3 | --- | --- | -0.177 | -0.180 |
| | | | (0.149) | (0.139) |
| Interaction between marriage to a native and Spline4 | --- | --- | -0.813** | -0.641** |
| | | | (0.131) | (0.139) |

*Continued*

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|  |  |  |  |  |
|---|---|---|---|---|
|  |  |  | *Continued* |  |
| Constant |  | 0.591** | 0.676** | 0.682** | 0.582** |
|  |  | (0.070) | (0.074) | (0.074) | (0.063) |
| R-squared |  | 0.174 | 0.109 | 0.109 | 0.175 |
| Number of observations |  | 74,149 | 74,149 | 74,149 | 74,149 |

Notes. See the notes for Tables 1 and 2 for information on the sample and variables. The regressions control for: 44 age dummies, three educational qualification dummies, disability, veteran status, four race dummies, two metro area dummies, eleven region dummies, years in the U.S., recent immigrant (less than 5 years) dummy, percent of MSA with same country of birth, country of birth fixed effects, native unemployment rates at MSA-age group cells and spouse characteristics (if spouse is employed, spouse's log income, and three educational qualification dummies). In specifications where variable of interest varies by MSA, age group and country of birth (columns 1, 2 and 3), standard errors are clustered on (MSA$\times$ age group $\times$ country of birth) cells. In (column 4), standard errors are clustered on MSA cells.

** significant at 1%; * significant at 5%; + significant at 10%.

¨---¨ means that the variable is not included in the specification except for the three education dummies.

**Table 6**. More Tests of Network Hypotheses.

| | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| | (OLS) | (OLS) | (OLS) | (Tobit) |
| | Percent native in occupation within MSA | Paid employment | Self employment | Commuting |
| Marriage to a native | -0.036** | 0.024** | 0.001 | -0.972** |
| | (0.004) | (0.005) | (0.003) | (0.256) |
| Constant | 0.309** | 0.637** | 0.038* | 27.403** |
| | (0.062) | (0.065) | (0.018) | (4.655) |
| R-squared | 0.399 | 0.065 | 0.053 | --- |
| Number of observations | 59,079 | 74,149 | 74,149 | 59,079 |

Notes: See the notes for Tables 1 and 2 for information on the sample and variables. The number of observations in columns 1 and 4 is smaller, as we restrict the regression to those who are employed. We use a tobit estimator instead of an OLS estimator as the travel time to variable is left censored (zero hours) as well as right censored (99 hours).
** significant at 1%; * significant at 5%; + significant at 10%.