Male Marriageability and Local Marriage Market Outcomes: Exploiting Economic Globalization as a Natural Experiment

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April 6, 2015

Very Preliminary Draft,

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1. Motivation

In the past several decades, the United States witnessed a dramatic decline in marriage rate, especially among socioeconomically disadvantaged groups. In his influential book *The Truly Disadvantaged* (Wilson, 2012), William Julius Wilson attributes such social changes to the deindustrialization of American economy. More specifically, as the United States has experienced the dramatic transformation from a manufacturing-oriented economy to a service-oriented economy, its occupational structure becomes polarized. Individuals without college education, who used to have decent jobs in manufacturing, now could not find jobs suitable to their skill level and suffer from unemployment. An important implication of such economic impact is that the male marriageably pool might shrink among certain groups (e.g.

black and the uneducated), and consequently, marriage rate would decline at the societal level and other social problems would follow.

However, why has such countrywide deindustrialization occurred in the United States? Above all, the technological change and economic globalization are considered to be the two major factors (Autor and Dorn, 2013; Autor et al., 2013; Wilson, 2011). However, in this paper, let us only focus on the latter. By employing a natural experimental approach, the labor economist Autor et al. (2013) demonstrate a causal effect of expanding international trade (the increasing import competition from China) on local labor market in the United States. Specifically, they discover that rising imports lead to higher unemployment, lower labor force participation, and reduced wages in local labor markets that house import-competing manufacturing industries. According to their main model specification, import competition explains one-quarter of the contemporaneous aggregate decline in U.S. manufacturing employment.

Intuitively, compared to their counterparts in the service sector, American workers in the manufacturing sector are more vulnerable to increasing imports from developing countries, because most of them are low-skill labors without a college degree and they have less comparative advantage in international competition. As the U.S. economy upgrades from a manufacturing-dominant economy to a service-dominant economy, low-skill workers who previously employed in the manufacturing sector are very likely to encounter unemployment and other negative labor market experiences. Moreover, given that traditionally men and women are segregated into different occupations (Levanon et al., 2009), we could reasonably speculate that men are more affected by deindustrialization due to their historical concentration in manufacturing sector.

According to family formation theory, a man's economic condition is crucial for a marriage to happen in both a traditional and a modern setting. In a traditional setting (Becker, 1981), a man is supposed to be the major if not the only breadwinner after marriage, so the importance of his labor force endowment is self-evident. In a modern setting when female labor force participation has increased and men and women play more symmetrical economic roles, a man's economic resources still affect his marriage prospect (Oppenheimer, 1988). When discussing the issue of marriage decline, Oppenheimer (1988) proposes to bring men back in the debate. On the one hand, she reinstates older Malthusian ideas about the economic costs of marriage (Easterlin, 1987; Hajnal, 1965) and points out that it is too naive to believe man's economic conditions become unimportant in the modern era. On the other hand, Oppenheimer further develops an uncertainty hypothesis (1988) to explain why the economic characteristics for a man could still matter. Simply put, a man's work and earning not only reflect his financial situation but also convey a message about what kind of lifestyle he will later bring into a marriage. Low-status jobs, unemployment, and irregular and temporary employment signals career uncertainty, which impedes assortative mating and marriage formation. As the process of deindustrialization proceeds in the United States, we may expect to observe males with low-skills become less and less marriageable and correspondingly, females in the same marriage market undergo more and more difficulties to find marriage partners. As a consequence, the total marriage rate declines.[1]

A large number of empirical studies have been conducted to test the validity of "marriageable men hypothesis". Even though previous studies largely fail to examine causality due to data and method limitations, they do provide some evidence about the positive rela-

[1]It is worth to mention that the shrinking pool of "marriageable" men is definitely not the only cause of marriage decline in recent decades. Other factors such as the empowerment of women's status and culture change may also play important roles in this process.

tionship between male labor market performance and marriage market outcomes (e.g. Blau et al., 2000; Kalmijn, 2011; Mare and Winship, 1991; Wood, 1995). However, for researchers who conduct aggregate level analysis, they conclude that only a small fraction of total marriage decline could be attributed to the increasing unemployment (Mare and Winship, 1991; Wood, 1995). Besides the ambiguity of making causal claims, most previous studies also fail to include measures of deindustrialization into their research design. Even though the important role of economic restructuring is frequently emphasized in the literature of marriage decline, they are mostly likely used as background knowledge rather than a concrete part in the empirical strategy.[2]

To summarize, in this paper, we will try to overcome the methodological limitation in previous studies and reexamine the causal relationship between male marriageability and marriage market outcomes. In addition, we will directly measure the level of deindustrialization and incorporate such information into our research design.

2. Research Design

2.1 Exploiting Economic Globalization as a Natural Experiment

Why are the associations between male marriageability and marriage market outcomes observed in previous studies not necessarily causal? A simple answer is that the causality of interest is under two potential threats.[3] Firstly, if an omitted variable simultaneously correlates with the key independent variable (male marriageability) and the dependent variable

[2]The study by Wood (1995) is one of a few exceptions, but there is still space for his research design to improve.

[3]Measurement error may be another threat to establish causality. However, since it is largely a technical issue, it is not elaborated in this section.

(marriage market outcome), the relationship we observe may be spurious. Secondly, if the variables we study are subject to simultaneous causality (male marriageability affects marriage market outcome, and marriage market outcome also affects male marriageability), the estimate of the key independent variable we obtain is still biased.

In order to identify the causal relationship discussed above, we will adopt a natural experiment approach, and China's increasing import competition (Autor et al., 2013) will be exploited.

Even though during the past several decades, the United States has increased its imports from many different developing countries in the world, we single out the U.S.-China trade for this natural experiment design given the following two reasons. Firstly, because of the bigger import share from China than from other countries, a larger number of Americans are affected by exposure to China's import competition. Secondly and more importantly, the increase of imports from China could be exploited as an exogenous shock to local American people. In fact, China did not start its transition from a central planning economy to a market economy until the late 1970s and did not join the World Trade Organization until the year of 2001. Both of these events, which are largely irrelevant to ordinary American people, account for China's dramatic productivity growth during the past several decades. As a consequence, while U.S.'s imports from other countries are more likely to be driven by the growing demands of domestic markets, its increasing import from China largely results from the changing situation of the supply side. At the same time, due to historical legacy, different regions in the United States have different industrial specializations. Intuitively, regions with more manufacturing industries have been more affected by Chinese workers' productivity growth, and thus workers in these regions are more likely to experience job loss. Based on these historical facts, we could adopt the instrumental variable approach by exploiting the

regional variations of exposure to Chinese import competition as an exogenous source to our key independent variable "male marriageability". We will elaborate such natural experiment design in the following sections.

2.2 Unit of Analysis, Variables and Data

In this study, all variables are measured at the regional level. Instead of defining regions based on administrative boundaries (e.g. state and county), we adopt the concept of commuting zone (CZ) developed by Tolbert and Sizer (1996). Specifically, a commuting zone includes urban and rural areas that share a common (economic and labor) market.[4] It is a very useful measure for local labor market in social science research. In 1990, 741 commuting zones are delineated for all U.S. counties and county equivalents. In order to use the measure of commuting zone in this study, we have to make an assumption that local marriage market is equivalent to local labor market. This assumption is plausible because just like labor market, marriage market is also a local concept. At the same time, as a growing number of women enter the labor force, workplace has become an increasingly important location to meet potential partners.

Then we will discuss variables in this study, all of which are measured as decade change and at the commuting zone level. Moreover, given that marriage markets are largely racially segregated, all dependent and independent variables are separately generated from the black sample and the white sample.[5] Firstly, the outcome "marriage market outcome" is measured by "decade percent change of percent female age 20 - 34 currently married" and "decade per-

[4]Another frequently used unit in previous studies is metropolitan statistical are (MSA). This measure only include urban areas and thus does not cover the geography of the entire country, so it is considered to be inferior to the measure of commenting zone

[5]Other racial or ethnic groups are not studied here due to small population size.

cent change of percent female age 20 - 34 currently divorced". Secondly, the key independent variable "male marriageability" is measured by "decade percent change of percent male age 20 - 34 currently employed in manufacturing". "Employment" is defined as a status that is currently without job but actively seeking job. Besides the key independent variable, we also control a set of explanatory variables that might affect marriage market outcomes. They are "decade percent change of male to female sex ratio among the age group 20 - 34", "decade percent change of female age 20 - 34 currently in school", "decade percent change of female age 20 - 34 with at least some college education" and "decade percent change of percent female age 20 - 34 currently employed". We also construct a period dummy ("period 1990 - 2000" = 0; "period 2000 - 2007" = 1) and a set of state dummies to control for temporal and regional heterogeneity. In addition, the instrumental variable is "the annual change in exposure to import from China", the measure of which will be discussed in details in section 2.3.

In terms of data, we adopt the 1990 and 2000 samples of 5% U.S. census Integrated Public Use Microdata (IPUM) as well as a pooled sample (2005, 2006 and 2007) of American Community Survey (ACS), which is used as a sample of year 2007. By doing so, we are able to construct two waves of change variables — 1990 - 2000 change variables and 2000 - 2007 change variables. Beside microdata, we also rely upon the UN Comrade Database[6] to obtain international trade data for our instrumental variables. The choice of 1990 as the starting point is due to the fact that international trade data needed for this study is only available after 1991, while the choice of 2007 as the endpoint is to avoid including economic recession period, in which the validity of our instrument is weakened.

The data from census and ACS are both microdata, in which most information is collected

[6]http://comtrade.un.org

at the individual or household level. However, these datasets do provide geographic identifiers that could be matched to commuting zone. The geographic identifier variable in the three samples we use is "PUMA (Public Use Microdata Areas)". We adopt crosswalks provided by Dorn[7] to match the corresponding microdata to commuting zones. After variables needed are generated, we collapse microdata files to aggregate (commuting zone) level samples. In order to minimize measurement errors, we only keep commuting zones with more than 20 observations in each sex-racial group. Otherwise, those commuting zones are coded as missing. It is worth mentioning that due to smaller population size of black, our black sample has more missing values than that of our white sample. Moreover, we narrow down our analysis to mainland United States, so commuting zones in several states are dropped from our final sample. Readers should be minded that commenting zone is a smaller geographic unit inside state.

2.3 The Instrumental Variable Approach

Even though IV estimates are ultimately preferred, we begin our statistical analysis with OLS and fixed-effects models. Equation (1) represents the OLS regression model. $\triangle Mar$ is the dependent variable, which is measured by "decade percent change of female currently married" or the "decade percent change of female currently divorced". $\triangle MEmploy$ stands for the key independent variable "decade percent change of male manufacturing employment". $\mathbf{X}$ consists of the set of control variables. e is the error term. Subscripts i and t represent region (commuting zone) and time period, respectively.

$$\triangle Mar_{it} = \alpha + \beta_1 \triangle MEmploy_{it} + \beta_2 \mathbf{X}_{it} + e_{it} \tag{1}$$

[7] http://www.ddorn.net/data.htm

Equation (2) presents the state-level fixed-effects model. Besides common components in equation (1), this equation includes a state-level invariant error term μ_s and an error term ϵ_{it} that is idiosyncratic at the commenting zone level. The subscript s refers to state.

$$\triangle Mar_{its} = \alpha + \beta_1 \triangle MEmploy_{its} + \beta_2 \mathbf{X}_{its} + \mu_s + \epsilon_{it} \tag{2}$$

Compared to OLS models, state-level fixed-effects models could facilitate us to go one step further towards causality, because they take into account all unobeserved characteristics that are invariant at the state level (e.g. marriage law). However, as for unobeserved characteristics that vary within state, fixed-effects models could not provide proper controls. Therefore, we need to refer to IV estimates.

In terms of the instrumental variable regression model, it will be estimated by two-stage least squares (2SLS or TSLS) method. Since we still want our models to control for state fixed-effects, we will adopt 2SLS regressions with state fixed-effects. Given that its second stage could also be expressed by equation (2), we will only discuss the first stage here.

$$\triangle MEmploy_{its} = \gamma + \eta_1 \triangle ExposeU_{uits} + \eta_2 \mathbf{X}_{its} + \upsilon_s + \nu_{it} \tag{3}$$

As discussed before, the exogenous instrumental variable — the regional exposure to Chinese import competition ($\triangle ExposeU$) — should be negatively correlated with our key independent variable $\triangle MEmploy$, so the relationship could be expressed by equation (3). In other words, if a commuting zone is more exposed to import from China, male marriageability in that region will drop more rapidly. Specifically, $\triangle ExposeU$ is measured as follows (Autor et al., 2013):

$$\triangle ExposeU = \sum_j \frac{L_{ijt}}{L_{ujt}} \frac{\triangle M_{ucjt}}{L_{it}} \tag{4}$$

where $\triangle M_{ucjt}$ is the observed change in U.S. imports from China in industry j between the start and end of a period; L_{ijt} stands for the start of period employment (year t) in industry j and commuting zone i; L_{uit} stands for the start of period employment (year t) in industry j in the United States; L_{it} stands for the start of period employment (year t) for all industries in region i. L_{ijt}, L_{ujt} and L_{it} are used to adjust $\triangle M_{ucjt}$ so as to proxy the different level of regional exposure to Chinese import competition. This measure consists of two exogenous sources — 1) the dramatic increase of Chinese import competition and 2) the historical regional difference in industrial specializations in the United States.

In addition, given that $\triangle ExposeU$ could still be endogenous to male marriageability — it could be driven by some domestic forces that simultaneously affect men's economic opportunities, we also plan to adopt a three-stage lease squares estimation strategy to check the validity of our instrumental variable $\triangle ExposeU$. $\triangle ExposeO$ — (Imports Change from China to Other High Income Countries[8]) / Workers) — will be used as the instrument for $\triangle ExposeU$. $\triangle ExposeO$ is measured as follows (Autor et al., 2013):

$$\triangle ExposeO = \sum_j \frac{L_{ijt-1}}{L_{ujt-1}} \frac{\triangle M_{ocjt}}{L_{it-1}} \tag{5}$$

where $\triangle ExposeO$ is identical to $\triangle ExposeU$ except that 1) here $\triangle M_{ucjt}$ is replaced by $\triangle M_{ocjt}$, which is measured by the observed change in imports from China to other high-income countries between the start and end of a period and 2) in places of start-of-period

[8]These high income countries include Australia, Denmark, Finland, Germany, Japan, New Zealand, Spain and Switzerland.

employment levels by industry and commuting zone, this measure adopts employment levels for the *prior* decade. Given that during the same period, other high-income countries also experience a rapid increase of imports from China and such increase is positively correlated with U.S.'s imports from China, $\triangle ExposeO$ could be used as an instrument for $\triangle ExposeU$. Compared to $\triangle M_{ucjt}$, $\triangle M_{ocjt}$ is less likely to be affected by U.S.'s domestic demand, and the use of lagged employment levels could mitigate a potential bias that contemporaneous employment by region is affected by anticipated imports from China.[9]

Before moving on to empirical results, we would like to remind our readers about how to correctly interpret the causal effect of interest as well as some potential threats to the validity of our instrument. First of all, just as in all IV regressions, the estimate of the key independent variable we obtain here is the average causal effect among compliers. More precisely, the IV estimation allows us to obtain the average causal effect of male manufacturing employment on female marriage market outcomes among commuting zones which would have lower manufacturing employment rates if they were more exposed to import from China and would have higher manufacturing employment rates if they were less exposed to import from China. We are not able to make inferences among always takers (commuting zones that have high manufacturing employment rates regardless of their exposures to import from China) and never takers (commuting zones that have low manufacturing employment rates regardless of their exposures to import from China).

Secondly, we are fully aware of some potential threats to the validity of our instrument

[9]For both $\triangle ExposeU$ and $\triangle ExposeO$, they are measured as the average number of the annual imports change from China adjusted by historical industrial structure, because annual data is available for the constructions of these two variables. For other variables, however, they are calculated from three time points — 1990, 2000 and 2007, because we have to construct them by using census and a pooled sample of ACS, which are not available annually.

"exposure to import from China". For example, the exclusion restriction assumption would be violated if the instrument has a direct effect on our dependent variables or it affects female marriage outcomes via channels other than male marriageability. In addition, SUTVA (Stable Unit Treatment Value Assumption) may also be violated if the exposure to Chinese import in one commuting zone has an impact on male manufacturing employment in another commuting zone. For example, high exposure to imports from China might lead to out-migration from one commuting zone to another, which increases labor supply to the latter. In order to evaluate whether or not these assumptions are plausible in our research setting, we conduct different robustness checks and subgroup analyses.

3. Empirical Results

3.1 Descriptive Statistics

We begin our discussions with descriptive statistics. Some general trends could be told from Table 1. First of all, for both black and white, all variables appear to have the same direction and only differ in terms of magnitudes. Secondly, we find one of our outcome variables "decade percent change of female currently married" is negative, which is in line with previous findings — as time goes by, fewer American young women enter into a marriage. In terms of "decade percent change of female currently divorced", it is a negative number, which is probably due to the selection effect of fewer people getting married over time. Thirdly, our data also supports the trend of American deindustrialization — we observe a decline in male manufacturing employment from 1990 to 2007. As for control variables, we find increasing trends for male to female sex ratio, percent female currently in school, percent female with college education and percent female currently employed, all of which are as expected. Finally, two instrumental variables both turn out to be positive, indicating that during the past three decades, American workers are on average more and more exposed

to Chinese import competition.

[Table 1 about here]

3.2 Results from OLS and Fixed-Effects Regressions

Table 2 presents results estimated by OLS and fixed-effects regressions for the black sample. Let us first focus on the effect of male marriageability on female currently married. Results from OLS models with/without controls and fixed-effects model all demonstrate a robust positive and significant relationship between the two variables, which indicate that male marriageability does promote marriage formation among the black. Results from Model 3, the most preferred model, show that as the decade change of male manufacturing employment increases by one percentage point, the decade change of female currently married will increase 0.217 percentage points, which is not a small effect. As for the outcome variable "decade change of percent female currently divorced", both the OLS model with controls as well as the state fixed-effects model display a negative and significant relationship, which suggest that as marriageable males are more available, a smaller proportion of female will become divorced. Results from Model 6 indicate that as the decade change of male manufacturing employment increases by one percentage point, the decade change of female currently divorced will decrease 0.057 percentage points. In summary, results presented in Table 2 are largely consistent with previous findings, which imply that at least to some extent, the marriage decline in the United States is attributed to the lack of marriageable men.

[Table 2 about here]

After discussing the OLS and fixed-effects results for the black sample, we move to Table 3 and look at results for the white sample. As for determinants of the outcome variable "female currently married", we find a more or less similar patterns with that of in the black sample,

even though the magnitude of the male marriageability effect turns out to be smaller. Results from Model 3 show that as the decade change of male manufacturing employment increases by one percentage point, the decade change of female currently married will increase 0.091 percentage points. However, in terms of the outcome variable "female currently divorced", the effect of male marriageability turns out to be statistically insignificant under all model specifications. This is probably due to the fact that among white women, not only does male employment matter, but also what specific occupation men hold is crucial when evaluating the quality of marriage life.

[Table 3 about here]

Overall, without taking into account the endogeneity problem, our findings are largely consistent with previous studies.

3.3 Results from 2SLS IV Regressions

In Table 4, we report results estimated by 2SLS IV regressions for the black sample. For both outcome variables, Panel A and Panel B present results from the second stage and the first stage, respectively. Under all model specifications, we find very robust negative and significant effects of exposure to import from China on our key independent variable "decade change of percent male manufacturing employment", indicating that higher exposure to import competition indeed lowers the average male marriageability at the commuting zone level. Interestingly, by using the 2SLS estimation strategy, the coefficients of our key independent variable "decade change of percent male manufacturing employment" become statistically insignificant under all model specifications, which imply that the positive effect of male marriageability on female currently married and the negative effect of male marriageability on female currently divorced reported in Table 2 are actually not causal. Some

unmeasured factors might simultaneously affect male marriageability and female marriage outcomes.

[Table 4 about here]

Very similar with Table 4, in Table 5 we also find negative and significant results in first stage but statistically insignificant effects of our key independent variable under all model specifications. Such findings demonstrate that just as that of for the black, the marriage decline among white people in the United States also could not be attributed to the deterioration of male marriageability, which contradicts the prediction by Wilson (2012, 2011) as well as his supporters.

[Table 5 about here]

4. Robustness Checks

4.1 On the Validity of the Instrument

Given that the instrument we currently adopt may still subject to U.S.'s domestic demand (e.g. employers layoff workers because of anticipated increase of Chinese import), we use a three stage least squares estimation method to check the validity of our instrument. Specifically, besides the adoption of $\triangle ExposeU$ as an instrument for male marriageability, we also introduce $\triangle ExposeO$ as an instrument for $\triangle ExposeU$. The three equations will be estimated simultaneously.

Results from 3SLS regressions with state fixed-effects are presented in Table 6. In this Table, let us first look at Panel C, in which the coefficients of $\triangle ExposeO$ on $\triangle ExposeU$ are reported. We find in both samples and for both outcome variables, the first stage

coefficients are all positive and significant, indicating that the measure "annual imports change from China to other high income countries adjusted by historical industrial structure" is a good predictor of our instrument in the second stage. In Panel B, we also find the second stage coefficients are all negative and significant as predicted. Just as the results we obtain from 2SLS IV regressions, the negative coefficients in Panel B demonstrate that exposure to imports from China, which is measured by "annual imports change from China to U.S. adjusted by historical industrial specialization", will accelerate the decline of male manufacturing employment. Finally, the coefficients of our key independent variable in Panel A all turn out to be statistically insignificant, which are consistent with our findings by using 2SLS IV estimation method. Therefore, we have more confidence to conclude that the effect of male marriageability on female marriage outcomes are not causal.

[Table 6 about here]

Besides concerning the exogeneity of our instrument, we also want to examine whether or not the instrument (exposure to Chinese import) we adopt is a weak instrument. For our most preferred models in Table 4 and Table 5, we find the F-statistic against the null hypothesis that the excluded instrument is irrelevant in the first-stage regression are all larger than 10. Given that we only specify one endogenous regressor in these models, the F statistics found indicate that we need not worry about weak instrument in this study.

4.2 Subgroup Analysis

Even though we find no significant effect of male marriageability on marriage outcomes among females in mainland United States, it is possible that the effect does exist among some subgroups. In Table 7, we present results for both black and white in the north, in the south and in highly urbanized areas. Choosing to study these subgroups is because the black population has been more concentrated in the south and metropolitan areas. Many

hypotheses about male marriageability are actually proposed based on qualitative studies in black ghetto (e.g. Wilson, 2012). As a consequence, it is interesting to examine whether or not the "male marriageable men hypothesis" is better supportive in certain subgroups. However, results in Table 7 show that no causal effect could be identified in any subgroup listed above.

[Table 7 about here]

5. Conclusion and Discussion

To summarize, in this study, we reexamine the causal relationship between male marriageability and female marriage market outcomes in the historical context of American deindustrialization. By exploiting regional difference in exposure to Chinese imports as a natural experiment, we find the associations between male marriageability and marriage outcomes reported by OLS and fixed-effects regressions are actually spurious. Some unobserved factors might be simultaneously correlated with male labor market endowments and female marriage prospects. Some previous studies such as England et al. (2013) do provide potential explanations.

We are also aware of some limitations of this study. First of all, marriage formation and dissolve are individual behavior, but we have to conduct aggregate level analysis so as to exploit historical regional difference in industrial structure. Secondly, due to insufficient observations in certain commuting zones, we have a relatively large number of missing values, especially in the black sample. Finally, in the current version, we have not used data to show what factors account for the spurious relationships between male marriageability and female marriage outcomes.

Table 1: Summary Statistics for Dependent Variables, Independent Variables and Instrumental Variables

	Black				White			
Variables	Mean	SD	Min	Max	Mean	SD	Min	Max
Decade Percent Change of Female Currently Married	-4.254	7.054	-35.259	19.303	-5.438	4.160	-23.673	8.786
Decade Percent Change of Female Currently Divorced	-1.580	3.207	-13.333	13.043	-1.063	1.944	-11.556	6.633
Decade Percent Change of Male Manufacturing Employment	-3.662	5.970	-32.363	16.398	-3.482	3.865	-20.764	16.407
Decade Change of Male to Female Sex Ratio	0.0732	0.380	-1.400	4.797	0.003	0.107	-0.698	1.272
Decade Change of Percent Female Currently in School	4.293	6.621	-28.578	32.512	3.336	3.794	-13.790	25.277
Decade Change of Percent Female with College Education	1.079	9.257	-33.590	26.876	4.410	5.557	-14.922	23.063
Decade Change of Percent Female Currently Employed	1.773	7.519	-25.908	31.077	0.863	3.769	-11.118	16.081
Period 2000 - 2007 (Period 1990 - 2000 as Reference)	0.499	0.501	0	1	0.555	0.497	0	1
(Annual Imports Change from China to US) / Worker	2.125	1.990	0.110	13.490	2.142	2.286	-0.074	28.826
(Annual Imports Change from China to Other High Income Countries) / Worker	2.104	1.781	0.116	12.363	2.044	1.859	-0.166	15.259
Number of Commuting Zones	499				825			
Number of States	42				49			

Notes: The number of commuting zones for "Decade Change of Male to Female Sex Ratio" in the white sample is 801.

Table 2: The Effect of Male Marriageability on Female Marriage Outcomes: OLS V.S. State Fixed-Effects Regressions (Black Sample)

Variables	Dependent Variable: Decade Change of Percent Female Currently Married			Dependent Variable: Decade Change of Percent Female Currently Divorced		
	OLS		Fixed-Effects	OLS		Fixed-Effects
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Decade Change of Percent Male Manufacturing Employment	0.140**	0.192***	0.217***	-0.022	-0.051*	-0.057*
	(0.051)	(0.053)	(0.060)	(0.023)	(0.022)	(0.022)
Decade Change of Male to Female Sex Ratio		2.082	2.068		-1.230*	-1.312*
		(1.270)	(1.254)		(0.522)	(0.527)
Decade Change of Percent Female Currently in School		-0.167*	-0.170*		-0.075**	-0.079**
		(0.074)	(0.078)		(0.025)	(0.029)
Decade Change of Percent Female with College Education		0.129*	0.170**		0.008	-0.011
		(0.057)	(0.060)		(0.031)	(0.034)
Decade Change of Percent Female Currently Employed		-0.081	-0.099		0.046	0.065*
		(0.080)	(0.090)		(0.031)	(0.032)
(Period 1990 - 2000 as Reference)						
Period 2000 - 2007	-2.081*	-2.895*	-3.356**	-0.240	-0.300	0.004
	(0.776)	(1.074)	(1.124)	(0.391)	(0.442)	(0.455)
State Fixed-Effects	No	No	Yes	No	No	Yes
Constant	-2.701***	-1.539*	-1.215	-1.540***	-1.292***	-1.456***
	(0.518)	(0.632)	(0.671)	(0.259)	(0.304)	(0.301)
R-Squared	0.036	0.074	0.083	0.003	0.052	0.069
Number of Commuting Zones	499					
Number of States	42					

Notes: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, + $p < 0.1$.
All standard errors are clustered at the state level.

Table 3: The Effect of Male Marriageability on Female Marriage Outcomes: OLS V.S. State Fixed-Effects Regressions (White Sample)

Variables	Dependent Variable: Decade Change of Percent Female Currently Married			Dependent Variable: Decade Change of Percent Female Currently Divorced		
	OLS		Fixed-Effects	OLS		Fixed-Effects
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Decade Change of Percent Male Manufacturing Employment	0.128*	0.077*	0.091*	0.023	0.011	0.037
	(0.050)	(0.035)	(0.041)	(0.017)	(0.021)	(0.019)
Decade Change of Male to Female Sex Ratio		-1.814	-1.525		0.974	1.697
		(1.525)	(1.471)		(1.231)	(0.960)
Decade Change of Percent Female Currently in School		-0.551***	-0.546***		-0.014	0.010
		(0.053)	(0.055)		(0.025)	(0.023)
Decade Change of Percent Female with College Education		0.002	-0.001		-0.038	-0.070**
		(0.027)	(0.033)		(0.023)	(0.023)
Decade Change of Percent Female Currently Employed		-0.253***	-0.240***		0.036	0.047*
		(0.040)	(0.042)		(0.026)	(0.022)
(Period 1990 - 2000 as Reference)						
Period 2000 - 2007	2.132***	2.538***	2.580***	-1.550***	-1.102***	-0.807***
	(0.432)	(0.418)	(0.412)	(0.141)	(0.191)	(0.185)
State Fixed-Effects	No	No	Yes	No	No	Yes
Constant	-6.177***	-4.531***	-4.521***	-0.122	-0.224	-0.248*
	(0.333)	(0.242)	(0.270)	(0.160)	(0.191)	(0.113)
R-Squared	0.077	0.356	0.351	0.160	0.173	0.207
Number of Commuting Zones	825	801	801	825	801	801
Number of States	49					

Notes: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, + $p < 0.1$.
All standard errors are clustered at the state level.

Table 4: The Effect of Male Marriageability on Female Marriage Outcomes:
2SLS IV Regressions with State Fixed-Effects (Black Sample)

	Dependent Variable: Decade Change of Percent Female Currently Married		Dependent Variable: Decade Change of Percent Female Currently Divorced	
Variables	Model 7	Model 8	Model 9	Model 10
		Panel A: Two-Stage Least Squares		
Decade Change of Percent Male Manufacturing Employment	-0.014	0.026	0.002	-0.039
	(0.367)	(0.383)	(0.167)	(0.172)
Decade Change of Male to Female Sex Ratio		-0.174**		-0.079**
		(0.058)		(0.026)
Decade Change of Percent Female Currently in School		1.501		-1.258*
		(1.406)		(0.631)
Decade Change of Percent Female with College Education		-0.077		0.063*
		(0.063)		(0.028)
Decade Change of Percent Female Currently Employed		0.134		-0.008
		(0.089)		(0.040)
(Period 1990 - 2000 as Reference)				
Period 2000 - 2007	-2.092**	-3.015**	-0.170	-0.028
	(0.637)	(1.062)	(0.290)	(0.476)
State Fixed-Effects		Yes		
Constant	-3.261*	-2.022	-1.487*	-1.380
	(1.437)	(1.730)	(0.654)	(0.776)
		Panel B: First Stage for Male Marriageability		
(Annual Imports Change from China to US) / Worker	-0.565***	-0.533***	-0.565***	-0.533***
	(0.169)	(0.161)	(0.169)	(0.161)
First Stage R-Squared	0.042	0.149	0.042	0.149
Number of Commuting Zones		499		
Number of States		42		

Notes: Same control variables are included in first stage equations.
*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, + $p < 0.1$.

Table 5: The Effect of Male Marriageability on Female Marriage Outcomes: 2SLS IV Regressions with State Fixed-Effects (White Sample)

	Dependent Variable: Decade Change of Percent Female Currently Married		Dependent Variable: Decade Change of Percent Female Currently Divorced	
Variables	Model 7	Model 8	Model 9	Model 10
Panel A: Two-Stage Least Squares				
Decade Change of Percent Male Manufacturing Employment	0.044	0.098	-0.014	-0.056
	(0.260)	(0.224)	(0.112)	(0.115)
Decade Change of Male to Female Sex Ratio		-1.483		1.114
		(1.862)		(0.953)
Decade Change of Percent Female Currently in School		-0.545***		-0.003
		(0.049)		(0.025)
Decade Change of Percent Female with College Education		-0.000		-0.081***
		(0.043)		(0.022)
Decade Change of Percent Female Currently Employed		-0.241***		0.061*
		(0.049)		(0.025)
(Period 1990 - 2000 as Reference)				
Period 2000 - 2007	2.046***	2.577***	-1.526***	-0.755***
	(0.294)	(0.371)	(0.126)	(0.190)
State Fixed-Effects		Yes		
Constant	-6.423***	-4.501***	-0.265	-0.520
	(0.883)	(0.693)	(0.380)	(0.355)
Panel B: First Stage for Male Marriageability				
(Annual Imports Change from China to US) / Worker	-0.284***	-0.280***	-0.284***	-0.280***
	(0.067)	(0.066)	(0.067)	(0.066)
First Stage R-Squared	0.044	0.128	0.044	0.128
Number of Commuting Zones	825	801	825	801
Number of States		49		

Notes: Same control variables are included in first stage equations.
*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, + $p < 0.1$.

Table 6: The Effect of Male Marriageability on Female Marriage Outcomes: 3SLS Regressions with State Fixed-Effects

	Black		White	
	Married	Divorced	Married	Divorced
Variables	Model 11	Model 12	Model 11	Model 12
	Panel A: Three-Stage Least Squares			
Decade Change of Percent Male Manufacturing Employment	-0.117	0.021	0.416	-0.238
	(0.390)	(0.172)	(0.267)	(0.146)
Decade Change of Male to Female Sex Ratio	2.017	-1.297*	-1.294	1.554
	(1.394)	(0.620)	(2.064)	(1.114)
Decade Change of Percent Female Currently in School	-0.173**	-0.079**	-0.541***	0.005
	(0.055)	(0.025)	(0.052)	(0.027)
Decade Change of Percent Female with College Education	0.172	-0.012	-0.001	-0.070**
	(0.088)	(0.039)	(0.045)	(0.024)
Decade Change of Percent Female Currently Employed	-0.099	0.066*	-0.244***	0.052
	(0.061)	(0.027)	(0.052)	(0.027)
(Period 1990 - 2000 as Reference)				
Period 2000 - 2007	-3.337**	0.000	2.691***	-0.893***
	(1.049)	(0.465)	(0.377)	(0.200)
State Fixed-Effects	Yes			
Constant	-4.116	-0.777	-3.025	-0.479
	(2.265)	(0.998)	(1.676)	(0.919)
	Panel B: Second Stage for Male Marriageability			
(Annual Imports Change from China to US) / Worker	-0.859***	-0.859***	-0.432***	-0.432***
	(0.246)	(0.246)	(0.117)	(0.117)
	Panel C: First Stage for Exposure to Imports from China to US			
(Annual Imports Change from China to Other	0.756***	0.756***	0.734***	0.734***
High Income Countries) / Worker	(0.039)	(0.039)	(0.038)	(0.038)
First Stage R-Squared	0.662	0.662	0.536	0.536
Number of Commuting Zones	449		801	
Number of States	42		49	

Notes: "Married" and "Divorced" refer to the dependent variables "Decade Change of Percent Female Currently Married" and "Decade Change of Percent Female Currently Divorced", respectively.
Same control variables are included in first stage equations.
*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, + $p < 0.1$.

Table 7: The Effect of Male Marriageability on Female Marriage Outcomes:
2SLS IV Regressions with State Fixed-Effects (North V.S. South V.S. Highly Urbanized Areas)

Variables	North				South				Highly Urbanized Area			
	Black		White		Black		White		Black		White	
	Married Model 8	Divorced Model 10	Married Model 8	Divorced Model 10	Married Model 8	Divorced Model 10	Married Model 8	Divorced Model 10	Married Model 8	Divorced Model 10	Married Model 8	Divorced Model 10
Panel A: Two-Stage Least Squares												
Decade Change of Percent Male Manufacturing Employment	0.317 (0.749)	-0.134 (0.306)	0.328 (0.246)	-0.016 (0.115)	-0.058 (0.397)	-0.071 (0.195)	-0.452 (0.547)	-0.185 (0.269)	0.369 (0.551)	0.079 (0.255)	-0.317 (0.172)	-0.112 (0.083)
Decade Change of Male to Female Sex Ratio	2.623 (1.545)	-0.649 (0.630)	-2.049 (6.130)	4.004 (2.861)	-0.043 (2.460)	-2.671* (1.206)	-4.867 (3.243)	0.002 (1.595)	2.228 (2.781)	-1.508 (1.286)	-1.348 (2.509)	-0.020 (1.212)
Decade Change of Percent Female Currently in School	-0.085 (0.093)	-0.098** (0.038)	-0.481*** (0.073)	0.001 (0.034)	-0.266*** (0.074)	-0.044 (0.037)	-0.577*** (0.074)	-0.005 (0.036)	-0.089 (0.073)	-0.149*** (0.034)	-0.742*** (0.064)	0.000 (0.031)
Decade Change of Percent Female with College Education	0.142 (0.104)	-0.020 (0.042)	0.033 (0.052)	-0.081*** (0.024)	0.149 (0.123)	-0.024 (0.060)	-0.101 (0.118)	-0.095 (0.058)	0.122 (0.101)	0.030 (0.047)	0.029 (0.044)	-0.105*** (0.021)
Decade Change of Percent Female Currently Employed	-0.094 (0.079)	0.087** (0.032)	-0.234*** (0.060)	0.046 (0.028)	-0.082 (0.084)	0.058 (0.041)	-0.162 (0.114)	0.095 (0.056)	0.103 (0.079)	-0.005 (0.036)	-0.220*** (0.057)	0.033 (0.027)
(Period 1990 - 2000 as Reference) Period 2000 - 2007	-4.133* (1.622)	1.077 (0.661)	2.813*** (0.482)	-0.479* (0.225)	-2.184 (1.458)	-0.617 (0.715)	2.742** (0.931)	-1.000* (0.458)	-2.624 (1.518)	-0.679 (0.702)	3.391*** (0.467)	-0.435 (0.226)
State Fixed-Effects	Yes											
Constant	0.016 (2.259)	-2.632** (0.921)	-4.065*** (0.664)	-0.851** (0.310)	-2.959 (1.984)	-1.004 (0.973)	-6.415** (2.004)	-0.463 (0.986)	-1.163 (2.414)	-0.310 (1.116)	-5.533*** (0.700)	-1.149*** (0.338)
Panel B: First Stage for Male Marriageability												
(Annual Imports Change from China to US) / Worker	-0.722*** (0.367)	-0.722*** (0.367)	-0.342*** (0.089)	-0.342*** (0.089)	-0.504*** (0.175)	-0.504*** (0.175)	-0.213*** (0.100)	-0.213*** (0.100)	-0.464* (0.202)	-0.464* (0.202)	-0.486*** (0.089)	-0.486*** (0.089)
First Stage R-Squared	0.070	0.070	0.128	0.128	0.249	0.249	0.145	0.145	0.141	0.141	0.177	0.177
Number of Commuting Zones	204		447		295		354		315		370	
Number of States	27		34		15		15		39		43	

Notes: "Married" and "Divorced" refer to the dependent variables "Decade Change of Percent Female Currently Married" and "Decade Change of Percent Female Currently Divorced", respectively.
Same control variables are included in first stage equations.
*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, + $p < 0.1$.

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