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Three Essays on Institutional Economics of Gender

Maria Tackett

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Three Essays on Institutional Economics of Gender

Maria Tackett

Dissertation submitted to the
College of Business and Economics at
West Virginia University

In partial fulfillment of the requirements for the degree of

Doctor of Philosophy
in
Economics

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Economic History.

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ABSTRACT

Three Essays on Institutional Economics of Gender

Maria Tackett

This dissertation is a collection of essays that incorporate institutional analysis into Economics of Gender research. I specifically consider the role of institutional arrangements in the economic status of women, opportunities the institutional arrangements create for women, and outcomes of changes in institutional arrangements that affect women. In chapter 2 I investigate the relationship between income distribution inequality and labor mobility, as globalization is viewed in the existing literature as aiding income inequality by allowing greater capital mobility but not mobility of labor. The literature argues that globalization creates changes in bargaining power for labor and capital owners thus decreasing income share received by labor. I find that while male mobility is indeed negatively related to labor share, female mobility has a positive association with labor share. In chapter 3 I estimate the relationship between the institutions of economic freedom and women's share of managers. The motivation is policymakers' concerns with low female representation in leadership positions, which among others include women in corporate management. I find a positive relationship between the two, implying that less regulated markets provide incentives that favor less gender discrimination for this type of employment. In chapter 4, jointly with Andrew Young, we seek to explain the relationship between female suffrage rights and government growth while taking spatial dependence effects into account. Women and men have different preferences when it comes to publicly provided goods. Specifically women prefer higher government spending on health and education. Literature has linked this distinction in preferences and women suffrage rights to government growth in the U.S. At the same time, local governments have been shown to engage in yardstick competition creating spatial spillovers. We find no relationship between government overall spending and taxation levels with suffrage rights implementation, after we control for spatial correlation. We additionally find that spending on social services by a state has a positive association with suffrage rights being implemented in that state and neighboring states. For example, that granting female suffrage rights in one state is associated with higher government spending on social services in neighboring states.

Dedication

Andrew Tackett

Inna Sidorenko

Ludmila Slivko

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Chapter 1

Introduction

Economics of gender literature finds a strong relationship between economic status of women and economic development. This association works both ways. To give an example, gender discrimination contributes to lower economic growth through underutilization of human capital, while economic development leads to first a decrease in women's labor force participation levels and then an increase (Mammen and Paxson, 2000). At the same time, development literature tells us that institutions are important in economic analysis, while economics of gender fails to recognize this importance most of the time. In this dissertation I aim to address a largely missing part of the economics of gender literature by considering the role of institutional arrangements in the economic status of women, opportunities the institutional arrangements create for women, and outcomes of changes in institutional arrangements that affect women.

In the second chapter I analyze the role of globalization in income distribution, as measured by labor share. Globalization is often viewed as a process that increases income inequality between workers and capital owners, by allowing capital owners to move capital to other countries and thus presenting capital owners with higher bargaining power and higher income share. I argue that globalization also allows for labor mobility, although in a longer run, which could lead to further changes in bargaining power and as such changes in income shares awarded to labor and capital. I employ a share-capital schedule theoretical model (Bentolila and Saint-Paul, 2003). According to the model bargaining power could be one of the explanations why labor and capital owners are not paid value of their marginal product. As women and men have been shown to have lower bargaining power than men (Card et al, 2014) I separately analyze the relationship between labor share and mobility of men and relationship between labor share and mobility of women. I find that while mobility of men is associated with lower labor

share, mobility of women is associated with higher labor share. One of the explanations could be that, holding everything else constant, exit of those with lower bargaining power (women) increases overall bargaining power of those remaining in a country and their labor share and the other way around for exit of men. I argue that globalization should not necessarily be viewed as creating or decreasing inequality and that immigration and emigration will lead to changes in bargaining power and not necessarily in the same direction for both genders. Policy makers aiming to constrain globalization processes, including emigration and immigration, will inevitably run into unintended consequences.

The next chapter of my dissertation considers the problem of underrepresentation of women in the managerial profession. This problem has been addressed by a few countries' policymakers, requiring a certain share of women in upper level management positions. The reason behind policymakers' concern is underutilization of human capital, if this gender disparity is a result of discrimination. Such underutilization of human capital will negatively affect economic development. However, as Becker (1971) predicts, employers indulging their taste for discrimination and not using resources in the most efficient way, thus not minimizing their costs, will only do so in a non-competitive economic environment. Competition between firms will drive discriminating employers out of business. To test Becker's prediction I employ Economic Freedom of The World index that measures government involvement in the economy and competitiveness of firms both domestically and abroad. I find that in countries with higher values of Economic Freedom of the World index the ratio of women to men in management profession is higher. I additionally find that it is area 5 of the index measuring the extent of regulation in the economy and its subcomponent credit market regulation that have a strong association with the number of women in management positions. Thus, I suggest that policy makers concentrate on

creating more favorable institutional environment that would empower women, through, for example, being able to access credit or find employment at a company that has easy access to credit instead of creating mandated gender shares in a profession.

In chapter 4 jointly with Andrew Young we consider the association of women's suffrage in the beginning of the 20th century in the United States with government growth. Lott and Kenny (1999) find that with the introduction of suffrage government tax revenues and government spending has increased in the states with higher share of female population. They explain this phenomenon with women's higher preferences for government spending compared to men. We argue that introduction of the suffrage laws has spatial correlation and so does government spending, omitting this correlation would lead to biased results. Suffrage movement often involved neighboring states: through media and rallies. At the same time, yard-stick competition is well documented in public finance literature. Increase of spending in one state affects spending decisions of neighboring states. We find that while there is correlation between spending and taxation decisions of neighboring states there is no association between female suffrage and overall government spending and between female suffrage and overall government taxation. At the same time, we find that government spending on social services (charities, hospital, and prisons) did increase with female suffrage in the United States, and that relationship includes spillover effects from neighboring states. As such, giving voting rights to a disenfranchised group does not necessarily lead to changes in government size, rather in one of its components. A spatial approach to such issues seems to be an important identification strategy.

The contributions of my dissertation are three-pronged. First, I find that mobility of women and men as a globalization process creates opposite outcomes for income distribution

inequality between labor and capital owners. I argue that globalization and specifically immigration and emigration should not be regarded as negative or positive, but rather complicated issues that need careful analysis. Second, I find that more competitive economic environments with lower levels of regulation and credit regulation specifically have a positive association with the number of women in management profession, something that is a concern to policy makers. I suggest promoting women's professional representation by creating facilitating economic institutions, rather than restrictive ones, such as a mandated share of women in a profession. Finally, with Andrew Young we find that allowing a disenfranchised group to vote does not necessarily lead to government growth. A spatial approach to this analysis is key, as it allows to control for omitted spatial correlation. This is contrary to previous literature that finds that giving women the right to vote in the United States led to government growth.

Chapter 2

Gender, Migration, and Labor Share

2.1. Introduction

Concerns about income inequality draw the attention of government officials, academics, and the general public. The visibility of the Occupy Wall Street movement and the popularity of Thomas Piketty's *Capital* are illustrative. One specific type of income inequality involves the division of income between labor and capital. In this paper I explore the relationship between that division and migration flows, paying particular attention to the role of gender.

While the constancy of labor share is one of the stylized facts of economic growth, many countries have experienced declines in the portion of GDP accounted for by wages, salaries, and benefits.¹ These declines have been observed in OECD countries (Jones 2003) and European countries in particular (Blanchard 1997), as well as in low- and middle-income countries (Harrison 2005). The concern about these declines is expressed in a chapter title from the 2012 *OECD Employment Outlook*: “Labour Losing to Capital: What Explains the Declining Labour Share?”

In answering the question posed above, some have pointed to globalization as a cause. Many perceive globalization as favoring firms and their profits over workers and their wages. Greater mobility of capital provides its owners the ability to seek out cheaper labor, thus giving capital owners greater bargaining power. Piketty goes as far as to state: “It is perfectly clear to me that the decline of labor unions, globalization, and the possibility of international investors to put [sic] different countries in competition with one another [...] have contributed to the rise in

¹ See Young (2010) for a discussion of the interpretation of labor share as “relative stable”.

the capital share.”² There is some empirical evidence to support this view. Harrison (2005) and Guscina (2006) find that increasing trade shares are linked to decreases in labor shares. Decreuse and Maarek (2013) report that foreign direct investment (FDI) flows are associated with declines in manufacturing sector labor shares. Jayadev (2007) and Schneider (2011) find that financial openness is associated with lower labor shares.³

However, while Young and Tackett (2015) report evidence on trade and financial flows that is consistent with the above studies, they also report that measures of *social* globalization are associated with higher labor shares in a large sample of countries. Young and Tackett employ the KOF globalization index (Dreher 2006; Dreher et al. 2008) for which the social globalization component measures individuals’ exposure to different knowledge, cultures, and people outside of their country’s borders. As such, the KOF index acknowledges that globalization implies greater labor mobility as well as mobility of capital. Great labor mobility may counteract the effect of capital mobility on relative bargaining power, leading to higher labor share.

Alternatively, labor’s bargaining power rests in part on groups of workers solving collective action problems (e.g., via unions). Immigrants may weaken bargaining power creating external competition for jobs. Furthermore, since collective action problems are more easily solved in homogenous (e.g., common language; culture) groups, immigrants may weaken the internal cohesion of bargaining groups.

To my knowledge, the only empirical study focusing on the relationship between labor mobility and labor share is Jaumotte and Tytell (2007). They document a negative relationship

² Quoted in Dolcerocca and Terzioglu (2015). The quote is a transcription from a verbal interview, which should be remarked upon given the “[sic]”.

³ The measure of financial openness in Jayadev (2007) is capital openness based on IMF *Exchange Arrangements and Exchange Restrictions* annual reports, based on Quinn and Inclan’s (1997) methodology, and calculated by Lee and Jayadev (2003). The measure of financial openness in Schneider (2011) is economic restrictions and financial flows sub-indices of KOF index of globalization.

between immigration flows and labor share for OECD countries. I improve on their study by analyzing a larger sample of OECD and non-OECD countries and including measures of emigration as well as immigration. Emigration towards better wages and working conditions is analogous to capital seeking cheaper labor abroad. Furthermore, Jaumotte and Tytell's empirical model assumes that immigration flows have a contemporaneous effect on labor shares at an annual frequency. In this paper I employ panel data and an empirical model where six-year labor share averages are related to emigrant and immigrant stocks (taken as percentages of a countries' populations).

For both emigration and immigration, I also consider the effects of male and female stocks separately, which is also a novel contribution to the literature. Immigrants to a country may have less bargaining power in its labor markets than the native born, but relative bargaining power may also independently differ across male and female workers. A cursory look at the medium earnings by gender, nativity and US citizenship status reveals that native males have the highest medium earnings, while immigrant women have the lowest (**figure 2.1**).

Figure 2.1 Median Income by Gender, Nativity, U.S. Citizenship Status

Source: Current Population Survey. Characteristics of the Foreign-Born Population by Nativity and U.S. Citizenship Status. March 2012. Retrieved from <https://www.census.gov/population/foreign/data/cps2012.html>

Thus, a higher number of immigrants and/or immigrant women to the population could be associated with lower bargaining power of labor, holding everything else constant. At the same time, greater labor mobility might allow for higher bargaining power, either through a threat of fleeing the country or by altering the skill composition within a country.

Making both of the above distinctions (emigration versus immigration; female versus male) turns out to be important in my analysis. For example, some of the more robust results are the estimated effects on labor shares in OECD countries associated with emigration. These results are qualitatively different depending on whether the emigration of males or females is considered. A 3.5 percentage point increase in the stock of male emigrants as a percent of an OECD country's population is associated with a decrease in labor share of between about 26 to 60 percent, depending on the point estimate. Starting from a mean labor share (of GDP) of about 0.414, this implies a decrease of between about 10 to 24 percentage points (or around 0.86 to 2 sample standard deviations). The corresponding effect for female emigration is an *increase* in labor share of about 11 percentage points (just under sample standard deviation). These results are consistent with males generally having more bargaining power, holding everything else constant, while labor mobility serves to increase bargaining power. In the case of the negative male emigration effect, all else equal, the loss of relatively high bargaining power of males dominates in its effect on labor share.

This paper joins a wealth of studies of the determinants of labor shares. Among the potential determinants that have been studied are technological change (Bentolila and Saint-Paul 2003; Karabarbounis and Neiman 2015), structural change (De Serres et al. 2002), institutional set up (Rodrick 1999; Young and Zuleta 2013; Young and Lawson 2014). Finally, this study relates to previous research of gendered migration causes and outcomes, by showing separate

relationships between female and male migration and labor share. Studies in this area among other issues include investigations of female brain drain (Naghsh Nejad 2013; Young and Naghsh Nejad 2014; Dumont et al. 2007) gendered remittance patterns (Morrison, et al. 2007), labor market assimilation of immigrant women (Schoeni 1998), and the transfer of fertility norms from destination to source countries (Beine et al. 2013).

The rest of this paper is organized as follows: the next section describes theoretical background and empirical model, I then describe the data in section 3, I discuss the results in section 4, introduce additional robustness checks in section 5, and draw a conclusion in section 6.

2.2. Theoretical background and empirical model

The theoretical background of this paper originates in Bentolila and Saint-Paul (2003)⁴. They derive what they refer to as the share-capital schedule. The Share-capital schedule is a relationship between labor share and the capital-to-output ratio. Under certain assumptions (neoclassical production function; competitive factor markets) labor share of income can be shown to be a function of only the capital-to-output ratio.

Bentolila and Saint-Paul (2003) note that the share-capital schedule will not be altered by changes in factor prices and/or changes in labor-augmenting technology. However, the schedule will shift if there are changes in capital-augmenting technology or if there is an exogenous change in the median worker's skill level. An economy can also depart from the share-capital schedule if, for example, factor markets are imperfectly competitive and labor and/or capital are not paid their marginal products..

⁴ Other recent empirical papers based on the theory are: Young and Lawson (2014), Young and Zuleta (2013)

Perhaps the best way to explain the three different types of changes and their effect on labor share is with a graph (see **figure 2.2**) similar to the one in Bentolila and Saint-Paul (2003).

Figure 2.2 Labor Share Capital Schedule Changes

A change in factor prices leads to a movement along the share-capital schedule, from point C_0 to point C_1 , and each capital to output ratio corresponds to a particular labor share. A change in the elasticity of substitution between capital and labor (e.g., change in median skill type of a worker) shifts the share-capital schedule from A to B and changes labor share for a given capital to output ratio, from point C_1 to point C_2 . Finally, relaxing the assumption of perfect competition leads to a movement away from the share capital schedule, once again, labor share moves without movements in capital to output ratio, from point C_2 to point C_3 on the graph.

The empirical model used to estimate the relationship between labor share and migrant stocks in this paper is a log-linearized form of the share-capital schedule:

$$\ln(\alpha_{it}) = \beta_0 + \beta_1 EMIGRATION_{it} + \beta_2 IMMIGRATION_{it} + \beta_3 \ln(k_{it}) + \sigma X + \gamma_t + \quad (2.1)$$

ε_{it} ,

where α_{it} denotes country i 's labor share in year t , k_{it} capital to output ratio, X_{it} a matrix of additional control variables, γ_t year fixed effects, and ε_{it} error term.

The independent variables of interest are: $EMIGRATION_{it}$ and $IMMIGRATION_{it}$. They denote, respectively, a country's emigrants and immigrants as percentages of the country's population. In the light of the theoretical discussion above, immigration and emigration may have different effects on labor share. First, changes in immigrant and emigrant stocks might be related to changes in the capital to output ratio, which in turn would change labor share for each country. This means movements along the share-capital schedule (point C_0 to point C_1 , **figure 2.2**) and no significant association with labor share for the independent variables of interest (if, of course, the capital to output ratio is the only channel for the association), since the capital to output ratio is included in each specification.

Second, the association between the independent variables of interest and labor share might be represented by the shifts in the share-capital schedule (from A to B, **figure 2.2**), due to changes in the elasticity of substitution between capital and labor. This could happen, for example, if there is variation in median skill level of an economy, or human capital stock caused by changes in the migrant stock. In this case, although the migrant stocks will enter the regressions significantly, controlling for variables that could potentially alter the elasticity of substitution (such as sectorial shares), will lead to disappearance of the significance. The expected sign will be negative if the median skill of the economy decreases as a result of labor mobility and positive if the median skill of the economy increases. For example, if immigrants

crowd out natives of domestic work into receiving education and into labor force this could lead to a higher labor share.

Finally, there is a possibility of movements towards/away from the share-capital schedule (point C₂ to point C₃, **figure 2.2**). In this instance, if there is a wedge between the value of marginal product of labor and the wages workers receive as a result of departure from perfectly competitive markets assumption, due to, for example, bargaining power of one of the sides might have, the wedge will decrease/increase. Again, in this case, emigrant and immigrant stocks will enter the regressions significantly, however, the significance will decrease once I control for variables that could create a difference between wages and value of the marginal product of workers. Higher emigrant and immigrant stock to the population might decrease the ability of labor to bargain as a group, which would in turn lead to a greater difference between wages and value of the marginal product of workers and imply lower labor share. At the same time, higher emigrant stock could pose a threat of labor fleeing the country and increase the bargaining power of labor. In this case the expected sign on the relationship between labor share and emigrant stock will be positive.

Additionally, I employ an alternative specification

$$\ln(\alpha_{it}) = \delta_0 + \delta_1 EMIGRATION_F_{it} + \delta_2 EMIGRATION_M_{it} + \delta_3 IMMIGRATION_F_{it} + \delta_4 IMMIGRATION_M_{it} + \delta_5 \ln(k_{it}) + \mu X + \gamma_t + \epsilon_{it}, \quad (2.2)$$

The independent variables of interest in this specification are: *EMIGRATION_F_{it}*, *EMIGRATION_M_{it}*, *IMMIGRATION_F_{it}*, and *IMMIGRATION_M_{it}*. They denote, respectively, a country's female emigrants, male emigrants, female immigrants, and male immigrants as percentages of the country's population. The gender distinction may be important if bargaining power differs between females and males. The distribution of income between workers and

capital owners can be a function of their relative bargaining power, determining the sort of wedge that will exist between workers' marginal product and their wages. The size of this wedge may be a function of the relative amount of female versus male migrants.

In light of the discussion above, the relationships between female migrant stock and labor share and male migrant stock might be different a priori. Higher number of female emigrants, holding everything else constant, could be associated with an increase in overall bargaining power and higher labor share as a result of lower bargaining power of women relative to that of men. Similarly, higher number of male emigrants would then be associated with higher lower overall labor share, holding everything else constant. Additionally, if immigrant men and women assume different positions in the work force that lead to changes in the median skill level in opposite directions we should also see different signs on the relationships between female immigrant stock and labor share and male immigrant stock and labor share⁵.

2.3. Data

The time periods included in the regressions are: 1980, 1990, and 2000. For each time period, labor share and the capital to output ratio are constructed as averages over six-year periods with the time period years specified above being first. Thus, labor share and capital to output ratio are averages of their respective values from 1980-1985, 1990-1995, and 2000-2005. This is done for three reasons: to preserve a large sample size, ensure that business cycle fluctuations are not being picked up and account for the fact that labor share association with gendered migration stock might not be fully revealed if the problem is investigated in a short-run (in this case, if both

⁵ See for example, Staut (1999) and Tastsoglou and Miedema (2005) for a discussion of the different positions immigrant men and women assume in the host economy. Additionally, see Beneria (2008) who notes that it is immigrant women who crowd out native women of child care and care for the elderly.

variables were to be recorded in the same year). Migrant labor is allowed time to assimilate and complete the job search, while capital owners use the time period to shift the capital to lower-cost labor. For some of the years not all six values of labor share were available, those are replaced with either five or four-year averages⁶. Thus the sample for this study is represented by an unbalanced panel with three time periods (1980, 1990, and 2000) and 93 countries.

Labor share is the wage share in GDP from Extended Penn World Tables (EPWT) version 4 by Marquetti and Foley (2011)⁷. The capital to output ratio is constructed by dividing each country's fixed net capital stock by its real GDP levels, both of the variables are from EPWT v. 4 (Marquetti and Foley 2011) and both are in 2005 purchasing power parity US dollars. The average employee compensation share of GDP for the sample used in this study is 0.414 (see **table 2.1**), which is slightly higher for OECD subsample (0.504) and is lower for non-OECD (0.374) subsample.

⁶ For example, the labor share data for Brazil is available for year 1992, 1993, 1994, and 1995, and is unavailable for 1990 and 1991. The value recorded for Brazil for 1990 time period is the average of the available values. For the whole sample there are 29 cases of only four years of data available and 12 cases of only 5 years of data available.

⁷ Extended Penn World Tables version 4 (EPWT v. 4) is an extension of Penn World Tables version 7, by Heston, Summers, and Aten (2011).

Table 2.1 Summary Statistics

Variable	Description	Mean	Std. Dev.	Obs.
α	Employee compensation share of GDP	0.414	0.116	202
$\ln(\alpha)$	(log of) Employee compensation share of GDP	-0.930	0.327	202
<i>EMIGRATION</i>	Emigrant stock as a percent of total population	6.593	7.052	202
<i>IMMIGRATION</i>	Immigrant stock as a percent of total population	6.661	9.964	202
<i>EMIGRATION_F</i>	Female emigrant stock as a percent of total population	3.296	3.578	202
<i>EMIGRATION_M</i>	Male emigrant stock as a percent of total population	3.296	3.552	202
<i>IMMIGRATION_F</i>	Female immigrant stock as a percent of total population	3.112	4.326	202
<i>IMMIGRATION_M</i>	Male immigrant stock as a percent of total population	3.547	6.012	202
<i>IMMIGRATION_NON_OECD</i>	Immigrant stock as a percent of total population originating in non-OECD countries	4.417	8.554	202
<i>IMMIGRATION_OECD</i>	Immigrant stock as a percent of total population originating in OECD countries	2.243	4.075	202
<i>IMMIGRATION_F_NON_OECD</i>	Female immigrant stock as a percent of total population originating in non-OECD countries	1.978	3.519	202
<i>IMMIGRATION_M_NON_OECD</i>	Male immigrant stock as a percent of total population originating in non-OECD countries	2.438	5.368	202
<i>IMMIGRATION_F_OECD</i>	Female immigrant stock as a percent of total population originating in OECD countries	1.134	2.057	202
<i>IMMIGRATION_M_OECD</i>	Male immigrant stock as a percent of total population originating in OECD countries	1.109	5.368	202
$\ln(k)$	(log of) capital to output ratio	0.459	0.376	202
$\ln(RGDP)$	(log of) real GDP per capita in 2005 U.S. dollars	9.015	1.144	202
<i>INVESTMENT PRICE</i>	(log of) Price of investment goods	0.086	0.322	195
<i>FLOW</i>	KOF Economic Flows Index	56.525	20.596	194
<i>FREEDOM</i>	Economic Freedom of the World Index	6.305	1.208	186
<i>DEMOC</i>	Polity IV Index of Democracy	6.524	4.027	189
<i>PRIMARY</i>	Primary school (gross) enrollment rate	101.036	14.855	188
<i>SECONDARY</i>	Secondary school (gross) enrollment rate	72.334	31.019	171
<i>AG_SHARE</i>	agricultural value added as a percentage of GDP	11.982	10.995	161
<i>MAN_SHARE</i>	manufacturing value added as a percentage of GDP	16.619	6.466	154
<i>EMBASSY</i>	Absolute number of embassies in a country	64.28	36.20	197
<i>LETTER</i>	Outgoing and incoming letters per capita	10.78	24.16	202
<i>FORMOV</i>	Freedom of international movement index	1.58	0.65	198
<i>DOMMOV</i>	Freedom of domestic movement index	1.74	0.59	197
<i>WOSOC</i>	Women's social rights index	1.49	0.90	185

To construct the *EMIGRATION*, *IMMIGRATION*, *EMIGRATION_F*, *EMIGRATION_M*, *IMMIGRATION_F*, and *IMMIGRATION_M* variables I divided the migrant stocks for 1980, 1990, and 2000 provided by World Bank's Global Bilateral Migration Database (Ozden et al 2011) by the population of each country in each respective time period and multiplied the results

by 100. The migration data is collected from countries' censuses and population registers. Ozden et al (2011) define an immigrant in the data set as a foreign-born resident of the country providing the census or population register data⁸. They then extrapolate emigrant population based on source countries of the immigrant population. Total population data is acquired from EPWT v. 4 (Marquetti and Foley 2011). The average female emigrant stock in the sample employed in current investigation is about 3.3% of total population, male emigrant stock is 3.3%, female immigrant stock is about 3.1%, and male immigrant stock is about 3.5% (see **table 2.1**).

The additional control variables contained in matrix X are as follows. According to Gollin (2002) labor share is consistently underestimated for countries with lower levels of income and a relatively high share of GDP value added by agriculture. This happens because a large part of labor force in such countries is self-employed, thus their income is mistakenly considered to be capital income, understating the value of labor income. Furthermore, Weil (2013) adds that capital share variation in developed countries is much lower than in the developing, possibly due to better data quality. To address these concerns I separate the sample for some specifications by OECD and non-OECD countries for each period in addition to controlling for income levels. Each specification includes a natural logarithm of real GDP per worker in 2005 US dollars to account for income differences ($RGDP$).

Karabarboukis and Neiman (2014) find that the decline in the price of investment goods is responsible for the decline in corporate labor share. I include the relative price of investment goods in most of the regressions ($INVESTMENT_PRICE$). This variable is an average and is calculated over 6 years for each time period, in a manner similar to capital to output ratio and

⁸ It is important to note that census and population register data have a few limitations, such as undocumented migrants providing inaccurate information to census workers. For further discussion of migration data limitations see Billsborow et al (1997), Gamlen (2010).

labor share. The data source for the price of investment goods and the price of consumption goods is Penn World Tables 8.0, (Feenstra et al, 2015)

Another variable included in most of the specifications is financial flows index (*FLows*), as calculated by Dreher (2006). It is comprised of trade, foreign direct investment, portfolio investment, and income payments to foreign nationals, all as a percent of GDP. Financial flows index is a part of a larger KOF Index of Globalization (Dreher 2006) *FLows* variable in this study represents the possibilities capital owners potentially undertake in search of low cost labor, thus increasing their own bargaining power and conceivably income share.

Institutional quality is represented by the *FREEDOM* and *DEMOC* variables. *FREEDOM* is economic freedom as measured by Economic Freedom of the World Index (Gwartney, et al 2013). The index is chain-linked and scores countries on a scale from 0 to 10 (with higher values given to countries with greater economic freedom), depending on the level of freedom economic agents have to make and execute their decisions. The index is based on the following five areas: government size, legal structure and security of property rights, access to sound money, freedom to trade internationally, and regulation of credit, labor, and business. The fifth area of the index “Regulation of Credit, Labor, and Business” includes centralized bargaining power in its calculation, which, as mentioned previously, could facilitate movements towards/away the labor-share schedule. As Young and Lawson (2014) show, there is a positive relationship between economic freedom and labor share of income.

DEMOC is a part of polity IV democracy index (Marshall and Jaggers 2010). It ranks countries on a scale from 0 to 10 based on their level of democracy, with higher scores given to countries with higher democracy levels. One of the studies mentioning the relationship between income distribution and democracy levels is Rodrik (1999) paper, where he shows that there is a

positive association between democracy levels and labor share of manufacturing sector. At the same time, economic freedom and democracy level differences could serve as push and pull factors for migration, thus, excluding institutional quality factors could lead to omitted variable bias.

Human capital is measured as primary and secondary school gross enrollment rate, provided by World Bank World Development Indicators, and included in regressions as a robustness check under *PRIMARY* and *SECONDARY*. As mentioned above, including human capital might help us discern between shifts of the share-capital schedule and movements towards/away from it.

As an additional robustness check, I include agricultural and manufacturing value added to GDP, titled as *AG_SHARE* and *MAN_SHARE*, the data is also available through World Bank World Development Indicators. The reason behind including these two variables is an attempt to account for the already mentioned labor share in manufacturing sector relationship with democracy (Rodrik 1999), the idea documented by Gollin (2002) that labor share would be underestimated in societies with relatively higher agricultural value added to GDP, and a remark by Tzannatos (1999) that gender shares vary by sector. A greater influx/exit of one of the genders compared to the other could then potentially lead to changes in sectorial composition of an economy, at least in the employment shares of each sector. The variables' summary statistics, along with their descriptions and short names are presented in **table 2.1**.

2.4. Results

Tables 2.2 and **2.3** contain results of regressions of (log) labor share on emigrant and immigrant and female and male emigrant and immigrant stock and additional control variables for three

time periods: 1980, 1990, and 2000 for up to 93 countries. Column 1 of **table 2.2** contains a base fixed period effects specification, which only controls for the natural logarithm of the capital to output ratio, and the natural logarithm of real GDP per capita, in addition to the two independent variables of interest: the emigrant and immigrant stocks as a percentages of total populations. Neither of these variables of interest enter the specification significantly.

However, separating immigrant and emigrant stocks by gender in further specifications produces more interesting results. Column 2 of **table 2.2** contains the base fixed effects specification, although the independent variables of interest are now male and female emigrant and immigrant stocks as percentages of total populations: *IMMIGRATION_F*, *IMMIGRATION_M*, *EMIGRATION_F*, and *EMIGRATION_M*. The estimated coefficients on *IMMIGRATION_F* and *EMIGRATION_F* are positive while the estimated coefficients on *IMMIGRATION_M* and *EMIGRATION_M* are negative. This pattern manifests in most of the subsequent specifications. This suggests that increased opportunities for female migration are positively associated with labor share, while the association between male migration and labor share is negative.

I then move on to separating the sample by OECD and non-OECD countries. For each of the time periods I consider a country as being part of OECD if it has joined the organization during that year 1980, 1990 or 2000 or before. Separating the sample into OECD and non-OECD countries provides more informative results, see specifications 4 and 5 of **table 2.2**. The magnitude of the statistically significant variables of interest is as follows. For non-OECD countries the estimated coefficient on *IMMIGRATION_F* is 0.017, meaning that a 4.2 percent increase in female immigrant stock (about 1 sample standard deviation) is associated with a 7 percent increase of labor share in non-OECD countries. Starting from the mean labor share of the

sample, 0.414, this translates into just under 3 percentage point increase. This constitutes about 25 percent of the labor share sample standard deviation.

Table 2.2 OLS Estimates from Regressions of (log) Labor Share on Emigration and Immigration Stock and Female and Male Emigration and Immigration Stock

	(1)	(2)	(3)	(4) non-OECD	(5) OECD
<i>EMIGRATION</i>	0.0009 (0.0028)				
<i>IMMIGRATION</i>	-0.0031 (0.0036)				
<i>EMIGRATION_F</i>		0.0145 (0.0207)	0.0070 (0.0159)	0.0243 (0.0237)	0.0764*** (0.0180)
<i>EMIGRATION_M</i>		-0.0147 (0.0218)	0.0010 (0.0152)	-0.0083 (0.0178)	-0.1026*** (0.0218)
<i>IMMIGRATION_F</i>		0.0301*** (0.0058)	0.0143* (0.0074)	0.0170* (0.0089)	0.0965*** (0.0307)
<i>IMMIGRATION_M</i>		-0.0248*** (0.0047)	-0.0056 (0.0088)	-0.0040 (0.0107)	-0.0945*** (0.0322)
<i>Ln(k)</i>	-0.0284 (0.0771)	-0.0194 (0.0786)	0.0024 (0.1058)	-0.0247 (0.1316)	0.1157 (0.0894)
<i>Ln(RGDP)</i>	0.1939*** (0.0277)	0.1767*** (0.0294)	0.0796 (0.0692)	0.0392 (0.0954)	0.1026 (0.0712)
<i>INVESTMENT_PRICE</i>			0.0960 (0.1088)	0.1470 (0.1431)	0.1026 (0.0938)
<i>FREEDOM</i>			0.0634** (0.0241)	0.0729* (0.0372)	0.0527* (0.0276)
<i>DEMOC</i>			0.0160 (0.0112)	0.0157 (0.0115)	0.0433** (0.0187)
<i>FLAWS</i>			0.0002 (0.0012)	0.0023 (0.0022)	0.0007 (0.0006)
<i>PRIMARY</i>			0.0006 (0.0026)	0.0000 (0.0035)	0.0094*** (0.0019)
<i>SECONDARY</i>			0.0032** (0.0015)	0.0040 (0.0027)	-0.0003 (0.0008)
F-stat (redundant fixed effects)	7.514***	6.940***	16.260***	4.487**	26.792***
Countries	93	93	71	47	27
Observations	202	202	145	79	66
R-squared	0.4144	0.4690	0.6359	0.4523	0.7964

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. White heteroscedasticity and autocorrelation consistent standard errors are in parentheses. Dependent variable is $\ln(\alpha)$. Constants are included in regressions though not reported above. “Fixed Effects” refer to fixed time period effects. The null hypothesis for the redundant fixed effects test is that the fixed effects are jointly insignificant.

The reason for the positive association between labor share and female immigrant stock becomes more clear after considering the results of **table 2.4**, column 6. It is female immigrants

from OECD countries who are driving this relationship between labor share and female immigrant stock. Women who arrive from OECD countries could be more highly skilled and thus have more bargaining power than native citizens and especially so women in non-OECD countries. For instance, for the OECD subsample the mean secondary school enrollment rate is 95.62 and for the non-OECD subsample it is 56.2. Moreover, the OECD subsample mean secondary school enrollment ratio of girls to boys is 100.06, while for the non-OECD subsample the ratio is 92.89. Higher skilled females may have more bargaining power, plausibly accounting for this difference in OECD versus non-OECD effects. Holding everything else constant, more female immigrants from OECD would then be associated with higher labor share.

For OECD countries the coefficient on *EMIGRATION_F* is 0.0764, therefore a 3.5 percent increase in female emigrant stock (about 1 sample standard deviation) is associated with a 11 percentage point increase in labor share, starting from the sample mean of 0.414. The coefficient on *EMIGRATION_M* is -0.1026, meaning a 3.5 percent increase in male emigrant stock (again, about one sample standard deviation) is then associated with about a 14 percentage point decrease in labor share, starting from the sample mean of 0.414.

As women have lower bargaining power than men⁹ the exit of women, would be associated with a gain of bargaining power for the labor force overall, holding everything else constant. Contrary, the exit of men who have higher bargaining power, holding everything else constant, would then be associated with lower labor share. Additionally, if men comprise a higher share of union members, exit of men then would decrease the amount of insiders (and union members) and decrease bargaining power of labor¹⁰.

⁹ Card et.al. (2014)

¹⁰ See, for example, Even and Macpherson (1993) who state that between 1973 and 1988 private sector unionization rate in the U.S. fell for women less than for men by 9.5 percentage points. Antonzyck, Fitzenberger, and

The coefficients on *IMMIGRATION_F* and *IMMIGRATION_M* are close in magnitude, but of opposite signs, 0.0965 and -0.0945 respectively. A 4.3 percent increase in the first one (about one sample standard deviation) is associated with approximately a 17 percentage point increase of labor share, starting from the sample mean of 0.414, a 6 percent increase in the second one (about one sample standard deviation) is associated with approximately a 23 percentage point decrease of labor share¹¹.

One explanation could be that as more women migrate to the developed world and provide child and elderly care services, native women gain more bargaining power by, for example, being able to work full time as opposed to part time¹². Overall then, higher number of female immigrants would be associated with higher labor share. At the same time, it could be the case that male immigrants are agreeing to work for lower compensation, undermining the bargaining power of native workers. As shown in **figure 2.1**, median income of men who are not U.S. citizens is only larger than that of women who are not U.S. citizens.

Sectorial shares of GDP are added to the regressions in **table 2.3**. For the non-OECD subsample, column 2, the only statistically significant variable is *EMIGRATION_F*, its magnitude is 0.0436, meaning that a 3.5 percent increase in female emigrant stock (about one of the sample standard deviation) is associated with about a 6percentage point increase in labor share, starting from the sample mean of 0.414.

Sommerfeld (2010) document a decrease in collective wage bargaining coverage by 16.5 percentage points for male and 19.1 percentage points for female employees in West Germany

¹¹ To compare with the previous research of determinants of labor share, Guscina (2006) finds that a 1 percentage point increase in international trade to GDP ratio leads to a 14 percentage point decrease in labor share.

¹² See, for example, Beneria (2008), who discusses this process.

Table 2.3 Further OLS Estimates from Regressions of (log) Labor Shares on Female and Male Immigration and Emigration Stock with Sectorial Shares Added to the Regressions

	(1)	(2) non-OECD	(3) OECD
<i>EMIGRATION_F</i>	0.0146 (0.0157)	0.0436* (0.0229)	0.0935*** (0.0303)
<i>EMIGRATION_M</i>	-0.0122 (0.0146)	-0.0229 (0.0202)	-0.1362*** (0.0354)
<i>IMMIGRATION_F</i>	0.0270** (0.0124)	0.0566 (0.0401)	0.0680 (0.0446)
<i>IMMIGRATION_M</i>	-0.0119 (0.0080)	-0.0115 (0.0137)	-0.0589 (0.0483)
<i>Ln(k)</i>	-0.0139 (0.0927)	-0.0626 (0.1164)	0.0498 (0.0793)
<i>Ln(RGDP)</i>	-0.0553 (0.0599)	-0.1135 (0.0802)	-0.0988 (0.0982)
<i>INVESTMENT PRICE</i>	0.0664 (0.1221)	0.0578 (0.1589)	0.0283 (0.1421)
<i>FREEDOM</i>	0.1006*** (0.0342)	0.1121** (0.0531)	0.0852** (0.0326)
<i>DEMOC</i>	0.0096 (0.0113)	0.0045 (0.0125)	0.0749* (0.0399)
<i>FLows</i>	-0.0002 (0.0014)	0.0007 (0.0026)	0.0001 (0.0009)
<i>PRIMARY</i>	-0.0018 (0.0035)	0.0005 (0.0043)	0.0071** (0.0032)
<i>SECONDARY</i>	0.0024 (0.0017)	0.0007 (0.0030)	-0.0005 (0.0010)
<i>AG_SHARE</i>	-0.0208** (0.0082)	-0.0190** (0.0085)	-0.0203*** (0.0069)
<i>MAN_SHARE</i>	0.0053 (0.0048)	0.0104 (0.0075)	0.0019 (0.0044)
F-stat (redundant fixed effects)	15.316***	5.029**	7.393***
Countries	64	41	25
Observations	110	67	43
R-squared	0.6661	0.5454	0.8503

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. White heteroscedasticity-consistent standard errors are in parentheses. Dependent variable is $\ln(\alpha)$. Constants are included in regressions though not reported above. “Fixed Effects” refer to fixed time period effects. The null hypothesis for the redundant fixed effects test is that the fixed effects are jointly insignificant.

Female migrant labor in developing countries could be benefiting from potential brain drain as women exit the country, more and more women acquire higher human capital in hopes to emigrate and gain bargaining power.¹³ At the same time, since there are less highly educated women and in developing countries, their exit is more noticeable, thus the threat of highly educated female labor fleeing allows for a gain in overall bargaining power.¹⁴

For OECD subsample, column 3, the only statistically significant estimated coefficients belong to *EMIGRATION_F* and *EMIGRATION_M*. They respectively amount to 0.0935 and - 0.1362, starting from the sample mean of 0.414 this translates into a 13.5 percentage point increase in labor share associated with a 3.5 percent increase in female emigrant stock, and a 19 percentage points decrease of labor share is associated with a 3.5 percent increase in male emigrant stock.

Notably, in most regressions in **tables 2.2** and **2.3** female migrant stock variables are smaller in magnitude than male migrant stock. This could be because more women tend to migrate as a part of a family, rather than on their own. As Docquier et al (2009) notice, in 2004 28.6 percent of women who received U.S. employment based visas were principal visa holders (implying, that 71.4 percent were not), while only 34.7 percent of men receiving the same type of visa were dependent. In most cases dependents of visa holders are not able to hold a job (legally or due to language and skill constraints), to this extent women migrants participate in the labor force at lower rates than do migrant men.

Comparing the results of **tables 2.2** and **2.3**, the association between immigrant stocks separated by gender and labor share becomes not statistically different from zero, holding the sectorial shares constant, see columns 4 and 5 of **table 2.2** and columns 2 and 3 of **table 2.3**.

¹³ See Beine et al (2013)

¹⁴ As noticed by Docquier et al (2009)

This loss of statistical significance could be happening for a few reasons. First, immigrant stock is only associated with labor share via economy sectors, thus a debate on the effects of immigration on labor share should take sectorial shares into account.¹⁵ Second, immigrant stock is defined as those born abroad, in this sense it could be no different from native population and its relationship with labor share. Third, including extra variables into regressions decreases degrees of freedom and increases standard error, thus, there still could be an association between immigrant stock and labor share.

Another difference between **tables 2.2** and **2.3** is that the variables with statistically significant coefficients in **table 2.3**, where the sectorial shares are held constant (columns 2 and 3), *EMIGRATION_F* for non-OECD countries and *EMIGRATION_M* and *EMIGRATION_F* for OECD countries are larger in magnitude than in **table 2.2**, suggesting that leaving out agriculture and manufacturing share of GDP creates a downward bias on the independent variables of interest. The estimated coefficient on *EMIGRATION_F* for non-OECD countries increases in magnitude by about 80 percent, from 0.0243 to 0.043, the coefficient on *EMIGRATION_M* increases by about 33 percent in magnitude, from -0.1026 to -0.1362 and the coefficient on *EMIGRATION_F* increases by about 23 percent from 0.0764 to 0.0935.

These results are especially interesting, since, for example, Valentinyi and Herrendorf (2008) report different labor shares for different sectors of the economy, Young and Zuleta (2013) find that unionization rates have heterogeneous effects on labor share across sectors, furthermore Tzannatos (1999) points out that female employment share varies across the sectors, finally capital intensity differs across economy sectors. At the same time the size of each sector in the economy could be correlated with income, for example, countries with lower incomes

¹⁵ Which is, holding demand for labor constant, similar to a concern that immigration decreases wages for natives

would have a larger agricultural sector, which is in turn a push/pull factor in the migration decision. Additionally, as Card et al (2014) show, women hold relatively less bargaining power in manufacturing sector. Thus, holding sectors constant, presents us with a clearer picture of the relationship between migrant stock and labor share.¹⁶

The coefficients on agricultural share are negative and statistically significant in all three specifications of **table 2.3**, while manufacturing share has a positive, although not statistically significant coefficient estimate. The signs on the two could be picking up the fact that labor share is higher in more developed countries, where agriculture share of GDP is lower.

Concerning other statistically significant variables. Economic freedom of the world index (*FREEDOM*) has a positive relationship with labor share across all of the specifications where it is included in **table 2.2** and **2.3**. The coefficient ranges from 5.27 to 11.21 percent increase in labor share associated with a 1 point increase in the index, or from approximately 1/5 to slightly below 1/2 of the standard deviation of the labor share in the sample with 1 standard deviation increase in *FREEDOM*, which includes 1/3 of the standard deviation increase in labor share reported by Young and Lawson (2014).

Democracy index (*DEMOC*) enters the regression significantly for OECD countries only in both **tables 2.2** and **2.3**. The association between *DEMOC* and labor share is higher than 1 percentage point increase in labor share with a 1 point increase in democracy index, reported by Rodrik (1999). A 1 point increase in democracy index is associated with a 1.7 percentage point increase in labor share before sectorial shares are included and an increase of 3 percentage points after, starting from the sample mean of 0.414, nevertheless qualitatively Rodrik's (1999) conclusion still holds, democratic institutions are associated with higher labor share.

¹⁶ Although Jaumotte and Tytell (2008) discuss sectorial shares in the paper, they are not included in the regressions.

Finally, human capital as measured by primary and secondary education levels, *PRIMARY* and *SECONDARY* respectively are positive whenever they are not statistically significant from zero, in specifications 3 and 5 of **table 2.2** and 3 of **table 2.3**. This could imply that higher human capital levels allow labor to have higher bargaining power over income distribution and thus be positively associated with labor share.

Interestingly enough, economic flows index (*FLOWS*) is not statistically significant in any of the specifications. This could be due to a small number of degrees of freedom, however it also suggests that studies of the relationship between labor share and globalization should include labor mobility as a control variable.

2.5. Robustness Checks

The results presented in **tables 2.2** and **2.3** and discussed in the previous section raise a number of reasonable concerns. In this section, I attempt to address these concerns. To begin, the relationship between labor share and immigrant stock from OECD and non-OECD countries might not be analogous. To account for it I include source of the immigration stock in the regressions contained in **table 2.4**.

Separating immigration stock by the origin country (OECD or non-OECD) does not produce meaningful results, as presented in the regression contained in column 1 of **table 2.4**. However, separating immigrant stock by gender and origin country while controlling for total emigrant stock, column 2, shows that the estimated coefficient on female immigrant stock from OECD countries is larger than the coefficient on female immigrant stock contained in **table 2.2**. At the same time, the estimated coefficient on female emigrant stock from non-OECD countries is smaller (0.1222, 0.0301, and 0.0235 respectively).

Table 2.4 OLS Estimates from Regressions of (log) Labor Share on Emigration Stock and Immigration Stock from OECD and Non-OECD Countries and on Emigration Stock and Female and Male Immigration Stock from OECD and Non-OECD Countries

	(1)	(2)	(3) non-OECD	(4) OECD	(5)	(6) non-OECD	(7) OECD
<i>EMIGRATION</i>	0.0007 (0.0028)	-0.0004 (0.0028)	0.0022 (0.0045)	-0.0003 (0.0032)			
<i>EMIGRATION_F</i>					0.0174 (0.0224)	0.0238 (0.0279)	0.0663* (0.0325)
<i>EMIGRATION_M</i>					-0.0182 (0.0240)	-0.0181 (0.0259)	-0.0754* (0.0418)
<i>IMMIGRATION_OECD</i>	0.0054 (0.0050)						
<i>IMMIGRATION_nonOECD</i>	-0.0046 (0.0040)						
<i>IMMIGRATION_F_OECD</i>		0.1222* (0.0679)	0.2117 (0.1310)	-0.0203 (0.0722)	0.1367* (0.0717)	0.2400* (0.1286)	-0.0111 (0.0689)
<i>IMMIGRATION_F_nonOECD</i>		0.0235*** (0.0064)	0.0175 (0.0106)	0.1677 (0.1120)	0.0219*** (0.0066)	0.0146 (0.0102)	0.1618 (0.0979)
<i>IMMIGRATION_M_OECD</i>		-0.1151* (0.0669)	-0.2178* (0.1150)	0.0115 (0.0742)	-0.1300* (0.0708)	-0.2554** (0.1098)	0.0011 (0.0702)
<i>IMMIGRATION_M_nonOECD</i>		-0.0191*** (0.0063)	-0.0106 (0.0105)	-0.1473 (0.1131)	-0.0170** (0.0068)	-0.0066 (0.0105)	-0.1312 (0.0915)
ln(k)	-0.0171 (0.0767)	-0.0260 (0.0753)	-0.0478 (0.0804)	0.0746 (0.1259)	-0.0146 (0.0780)	-0.0351 (0.0828)	0.1013 (0.1310)
ln(RGDP)	0.1801*** (0.0299)	0.1759*** (0.0306)	0.1469*** (0.0510)	0.3312*** (0.0760)	0.1703*** (0.0327)	0.1388** (0.0541)	0.2747*** (0.0770)
F-stat (redundant fixed effects)	12.4135***	11.6572***	5.0392***	29.1272***	11.5472***	5.0257***	27.5971***
Countries	93	93	69	28	93	69	28
Observations	202	202	128	74	202	128	74
R-squared	0.4238	0.4701	0.2588	0.6090	0.4728	0.2632	0.6533

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. White heteroscedasticity-consistent standard errors are in parentheses. Dependent variable is $\ln(\alpha)$. Constants are included in regressions though not reported above. “Fixed Effects” refer to fixed time period effects. “Fixed Effects” refer to fixed time period effects. The null hypothesis for the redundant fixed effects test is that the fixed effects are jointly insignificant.

At the same, time both estimated coefficients on male immigrant stock from OECD and non-OECD countries, contained in column 2 of **table 2.4** are larger than the estimated coefficient on total male immigrant stock, although not significant, reported in column 3 of **table 2.2**. (-0.1151, -0.0191, and -0.0056 respectively). At the very least, these results suggest that the association between female migrant stock and labor share is not similar to that of male migrant stock and labor share.

The regressions contained in columns 3 and 4 of **table 2.4** are based on the non-OECD and OECD subsamples. For non-OECD countries the only statistically significant estimated coefficient is male immigrant stock from OECD countries, it is negative and larger than the estimated coefficient presented in **table 2.2**, albeit not statistically different from zero. Throughout the tables the coefficient on male immigrant stock for non-OECD countries only enters the regressions significantly in **tables 2.4** and **2.8**. The takeaway here is that if a statistically significant association does exist between labor share and male immigrant stock for non-OECD countries it is driven by male immigrants from OECD countries. As Hugo (2014) notices, many multinational companies prefer to hire managerial staff from the country where the multinationals originate. Thus, the immigrant workers from OECD countries might be capturing the lower bargaining power of native workers created by foreign capital. Hence the negative sign on *IMMIGRATION_M_OECD*.

None of the estimated coefficients for the variables of interest in the OECD subsample enter the regression significantly, as reported in column 4, this could be due to multicollinearity, which increases standard errors. Simply put, there is a probability that the size of immigrant stock originating in non-OECD countries is highly correlated with immigrant stock originating in

OECD countries, pull factors could be very similar for immigrants coming from OECD and non-OECD countries.

However, estimated coefficients on female and male immigrant stock from OECD countries switch signs, although the magnitude of both is very small (-0.0203 for female immigrant stock and 0.0115 for male immigrant stock). At the same time, the magnitude of the estimated coefficient on female and male immigrant stock from non-OECD countries is large (0.1677 and -0.1473 respectively). This could imply that it is mostly female immigrants from non-OECD countries that have a positive association with labor share and male immigrants from non-OECD countries that have a negative one.

Estimations contained in columns 5, 6, and 7 of **table 2.4** control for the gender of emigrant stock and origin and gender of immigrant stock. In addition to the results being qualitatively similar to that of the estimations contained in columns 2, 3, and 4, the estimated coefficient on female immigration stock from OECD countries for non-OECD subsample (column 6) becomes statistically significant and remains positive. This sheds some light on the relationship between female immigrant stocks and labor shares in non-OECD countries and is discussed in the previous section. As mentioned before, the shortage of highly skilled female labor is higher in non-OECD countries, which plausibly gives highly skilled women higher bargaining power.

Finally, although none of the estimated coefficients on immigrant stock variables are statistically different from zero, *EMIGRATION_F* and *EMIGRATION_M* enter the regression contained in column 7 significantly with a positive sign on female emigration stock and a negative sign on male emigration stock, similar to the results presented in **tables 2.2** and **2.3**. The magnitude of both estimated coefficients is smaller than that of estimated coefficients on

EMIGRATION_F and *EMIGRATION_M* reported in column 3 of **table 2.3** and column 5 of **table 2.2**.

Overall, while supporting the results reported in **tables 2.2** and **2.3**, the results of **table 2.4** give some insight on the association between labor share and migrant stock variables.

The next concern is that, although women make up a large share of migrant stock it has not always been the case that women travelled to join workforce, but rather as a part of a family.¹⁷ The results presented in **tables 2.2** and **2.3** might not be capturing the fact that the share of women receiving education and joining workforce has increased overtime and thus reporting biased results.¹⁸ Moreover, working women in 1980 could have had lower bargaining power than working women in 2000, due to their lower education rates. In addition to including period fixed effects to the regressions reported in **tables 2.2** and **2.3**, I conduct a limited sample robustness check (**table 2.5**), by employing observations from year 1990 and 2000 only.

The sign on *EMIGRATION_F* becomes negative, columns 1, 2, 4, and 5, although the estimated coefficient is not significantly different from zero and of a small magnitude. Considering that including period fixed effects in the estimations contained in columns 1 and 4 is redundant, as shown by the F-statistic, the estimated coefficient on *EMIGRATION_F* is only - 0.003. As mentioned above, period fixed effects are redundant in the estimations contained in columns 1 and 4 of **table 2.5**. Thus, I report results of similar regressions without period fixed effects in columns 2 and 5 respectively, however, doing so does not produce meaningfully different quantitative nor qualitative results.

¹⁷ For this sample the mean share of female emigrants is 0.497

¹⁸ For this sample the mean secondary school enrollment ratio of girls to boys is 86.2 in 1980, 98.4 in 1990 and 100.95 in 2000

Table 2.5 Limited Sample Robustness Check, Year 1980 Excluded. OLS Estimates from Regressions of (Log) Labor Shares on Female and Male Immigration and Emigration Stock

	(1)	(2)	(3)	(4)	(5)	(6)
	Fixed Effects	Pooled	Fixed Effects	non-OECD Fixed Effects	non-OECD Pooled	OECD Fixed Effects
<i>EMIGRATION_F</i>	-0.0020 (0.0211)	-0.0031 (0.0206)	0.0005 (0.0148)	-0.0023 (0.0194)	-0.0030 (0.0191)	0.0875*** (0.0211)
<i>EMIGRATION_M</i>	-0.0005 (0.0221)	0.0008 (0.0218)	0.0027 (0.0148)	0.0015 (0.0150)	0.0016 (0.0146)	-0.1220*** (0.0239)
<i>IMMIGRATION_F</i>	0.0296*** (0.0053)	0.0297*** (0.0055)	0.0198** (0.0081)	0.0250** (0.0108)	0.0235** (0.0113)	0.1052*** (0.0372)
<i>IMMIGRATION_M</i>	-0.0263*** (0.0042)	-0.0266*** (0.0045)	-0.0127 (0.0082)	-0.0162 (0.0106)	-0.0151 (0.0107)	-0.1046** (0.0393)
<i>ln(k)</i>	-0.0217 (0.1375)	-0.0251 (0.1341)	0.1252 (0.1148)	0.1354 (0.1645)	0.1548 (0.1570)	0.1519* (0.0859)
<i>ln(RGDP)</i>	0.1988*** (0.0382)	0.1997*** (0.0381)	0.1349** (0.0647)	0.1403 (0.0866)	0.1511* (0.0800)	0.0249 (0.0712)
<i>INVESTMENT PRICE</i>	0.0528 (0.1129)	0.0592 (0.1135)	0.2168* (0.1149)	0.3746** (0.1716)	0.3960** (0.1609)	0.0075 (0.1434)
<i>FREEDOM</i>			0.0537* (0.0278)	0.0380 (0.0441)	0.0207 (0.0410)	0.0836*** (0.0301)
<i>DEMOC</i>			0.0133 (0.0134)	0.0115 (0.0146)	0.0121 (0.0144)	0.0607** (0.0255)
<i>FLows</i>			0.0002 (0.0015)	0.0035 (0.0032)	0.0038 (0.0031)	0.0008 (0.0009)
<i>PRIMARY</i>			-0.0002 (0.0027)	-0.0027 (0.0045)	-0.0024 (0.0044)	0.0083*** (0.0022)
<i>SECONDARY</i>			0.0026* (0.0014)	0.0050* (0.0026)	0.0046* (0.0025)	-0.0006 (0.0008)
F-stat (Redundant fixed effects)	2.692		9.129***	0.413		10.441***
Countries	81	81	63	40	40	27
Observations	135	135	100	53	53	47
R-squared	0.4944	0.4836	0.6691	0.5736	0.5691	0.8426

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. White heteroscedasticity-consistent standard errors are in parentheses. Dependent variable is $\ln(\alpha)$. Constants are included in regressions though not reported above. “Fixed Effects” refer to fixed time period effects. The null hypothesis for the redundant fixed effects test is that the fixed effects are jointly insignificant. Time periods included in the regressions: 1990 and 2000.

Considering statistically significant variables for non-OECD and OECD subsamples, contained in columns 5 and 6, of **table 2.5**, the results are similar to that of the estimations contained in columns 4 and 5, of **table 2.2**. The estimated coefficients on *IMMIGRATION_F* for non-OECD countries, *IMMIGRATION_F* and *EMIGRATION_F* for OECD countries are positive, and negative on *EMIGRATION_M* and *IMMIGRATION_M* for OECD countries. The magnitude of the coefficients, reported in **table 2.5** is larger, however not by much. The largest increase belongs to the estimated coefficient on *IMMIGRATION_F* for non-OECD countries, the smallest in magnitude of the five statistically significant estimated coefficients, reported in **table 2.2** as 0.0170 and 0.0235 in **table 2.5**, while, for example, the estimated coefficient on *IMMIGRATION_F* for OECD countries changes from 0.0965 in **table 2.2** to 0.1052 in **table 2.5**. In general, truncating the sample does not produce meaningfully different results from those reported earlier.

According to the National Bureau of Economics Research an average business cycle length in the U.S. is about 69 months, or a little less than five years.¹⁹ By averaging the dependent variable, labor share, over 4 to 6 years I intend to eliminate short-term fluctuation. However, this strategy might not be optimal, as for example, other countries might have longer business cycles. Thus, I perform a robustness check by including a 7 to 10 year average labor share as an independent variable in the estimations. Capital to output ratio and relative investment price are also changed to 7 to 10 year averages in these estimations. The results are reported in **tables 2.6** and **2.7**.

18. <http://www.nber.org/cycles.html>

Table 2.6 OLS Estimates from Regressions of 10 Year Average (Log) Labor Share on Emigration and Immigration Stock and Female and Male Emigration and Immigration Stock

	(1)	(2)	(3)	(4) non-OECD	(5) OECD
<i>EMIGRATION</i>	-0.0022 (0.0036)				
<i>IMMIGRATION</i>	0.0019 (0.0019)				
<i>EMIGRATION_F</i>		0.0229 (0.0262)	0.0066 (0.0153)	0.0227 (0.0205)	0.0708*** (0.0198)
<i>EMIGRATION_M</i>		-0.0280 (0.0267)	-0.0022 (0.0151)	-0.0111 (0.0176)	-0.0975*** (0.0236)
<i>IMMIGRATION_F</i>		0.0164*** (0.0050)	0.0142** (0.0067)	0.0170* (0.0088)	0.0980*** (0.0282)
<i>IMMIGRATION_M</i>		-0.0104** (0.0048)	-0.0060 (0.0083)	-0.0049 (0.0110)	-0.0978*** (0.0298)
<i>ln(k)</i>	-0.0106 (0.0587)	0.0067 (0.0600)	-0.0179 (0.0847)	-0.0397 (0.1171)	0.1130 (0.1127)
<i>ln(RGDP)</i>	0.1799*** (0.0278)	0.1703*** (0.0300)	0.0846 (0.0663)	0.0335 (0.0986)	0.1042 (0.0733)
<i>INVESTMENT PRICE</i>			0.1085 (0.0923)	0.1663 (0.1187)	0.0784 (0.1388)
<i>FREEDOM</i>			0.0482** (0.0230)	0.0421 (0.0327)	0.0546** (0.0265)
<i>DEMOC</i>			0.0106 (0.0106)	0.0085 (0.0112)	0.0356 (0.0225)
<i>FLows</i>			0.0005 (0.0011)	0.0028 (0.0018)	0.0008 (0.0006)
<i>PRIMARY</i>			0.0003 (0.0019)	-0.0001 (0.0031)	0.0093*** (0.0022)
<i>SECONDARY</i>			0.0033** (0.0014)	0.0039 (0.0026)	-0.0002 (0.0008)
F-stat (redundant fixed effects)	5.5787***	5.5462***	16.9609***	3.2836**	26.8097***
Countries	87	87	68	45	26
Observations	176	176	133	69	64
R-squared	0.4938	0.5065	0.6507	0.4768	0.7866

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. White heteroscedasticity and autocorrelation consistent standard errors are in parentheses. Dependent variable is 10 year average $\ln(\alpha)$. Constants are included in regressions though not reported above. “Fixed Effects” refer to fixed time period effects. The null hypothesis for the redundant fixed effects test is that the fixed effects are jointly insignificant.

In column 1 of **table 2.6** emigrant and immigrant stock are not separated by gender. The estimated coefficients on both *EMIGRATION* and *IMMIGRATION* are not statistically different from zero, which is similar to the results contained in column 1 of **table 2.2**. The results of estimations based on whole sample reported in column 2 and 3 of **table 2.6** are also comparable

to the results reported in columns 2 and 3 of **table 2.2**. In the benchmark specification, column 2, the only statistically significant estimated coefficients belong to female immigration stock and male immigration stock, once additional control variables are introduced into the regressions, the only statistically significant variables is female immigration stock. Interestingly, the statistically significant estimated coefficients reported in column 2 of **table 2.6** are larger in magnitude, than those reported in column 2 of **table 2.2**, however, with inclusion of additional control variables, column 3 of **table 2.2** and column 3 of **table 2.6**, the magnitude of the statistically significant variable converges. (0.0142 in **table 2.6** and 0.0143 in **table 2.2**). Qualitatively, the results in both tables are similar for statistically significant variables as well: estimated coefficients on female immigrant stock are positive and negative on male immigrant stock.

Dividing the sample into OECD and non-OECD countries, columns 4 and 5 of **table 2.6** again delivers results comparable to the results reported in columns 4 and 5 **table 2.2** qualitatively and quantitatively.

Comparing **tables 2.3** and **2.7**, in which sectorial shares added to the regression. The first column of each table contains estimation employing the whole sample. In both tables the only statistically significant estimated coefficient belongs to *IMMIGRATION_F*, the size of the coefficient is similar in the two tables (0.0270 in **table 2.3** and 0.0212 in **table 2.7**). The rest of the estimated coefficients on independent variables of interest, although not statistically significant from zero, keep the same signs: negative for male migrant stock and positive for female migrant stock.

Column 2 of **table 2.7** contains results of an estimation based on the non-OECD subsample. These results are similar to the results reported in column 2 of **table 2.3**: the only statistically significant coefficient belongs to *EMIGRATION_F*. However, period fixed effects

appear to be redundant in the estimation contained in column 2 of **table 2.7**. Thus, I estimate a similar regression without controlling for period fixed effects, which is contained in column 3 of **table 2.7**. The coefficients on both directions female migrant stock become statistically significant, with positive signs and of a comparable magnitude to the coefficients on *EMIGRATION_F* and *IMMIGRATION_F* reported in column 2 of **table 2.3**. Although, the latter is not statistically different from zero in **table 2.3**.

The last column of **table 2.7** reports results of an estimation based on the OECD subsample. The estimated coefficients on all four variables of interest are statistically significant, as opposed to only statistically significant coefficients on female and male emigrant stock as reported in **table 2.3**. Moreover, all four estimated coefficients are larger in magnitude than the estimated coefficients in **table 2.3**. While the increase in magnitude for estimated coefficients on female and male emigrant stock is around 6 percent, the changes are larger for immigrant stock variables: 0.0680 to 0.0956 estimated coefficient change on *IMMIGRATION_F*, a 40 percent increase, and a change from -0.0589 to -0.0877 of the estimated coefficient on *IMMIGRATION_M*, a 49 percent increase in magnitude.

Altogether, while the results from employing 7 to 10 year averages of labor share as an independent variable do not refute the findings presented in **tables 2.2** and **2.3**, the results presented in **tables 2.6** and **2.7** offer additional insights into the relationship between labor share and migration. Such as, the magnitude of the association might be larger than presented earlier, furthermore, although female immigration stock for non-OECD countries is not significantly different from zero when sectorial shares are controlled for in **table 2.3**, it might still be associated with labor share, as it does enter a similar estimation significantly, (column 3 of **table 2.7**).

Table 2.7 OLS Estimates from Regressions of 10 Year Average (Log) Labor Shares on Female and Male Immigration and Emigration Stock

	(1)	(2)	(3)	(4)
	Fixed Effects	non-OECD Fixed Effects	non-OECD Pooled	OECD Fixed Effects
<i>EMIGRATION_F</i>	0.0101 (0.0161)	0.0350* (0.0205)	0.0468* (0.0235)	0.1000*** (0.0331)
<i>EMIGRATION_M</i>	-0.0074 (0.0154)	-0.0099 (0.0191)	-0.0167 (0.0208)	-0.1446*** (0.0383)
<i>IMMIGRATION_F</i>	0.0212* (0.0126)	0.0446 (0.0328)	0.0538** (0.0264)	0.0956** (0.0454)
<i>IMMIGRATION_M</i>	-0.0082 (0.0071)	-0.0059 (0.0135)	-0.0067 (0.0115)	-0.0877* (0.0502)
<i>Ln(k)</i>	-0.0530 (0.1011)	-0.1270 (0.1370)	-0.1329 (0.1300)	0.0520 (0.0980)
<i>Ln(RGDP)</i>	-0.0119 (0.0755)	-0.0684 (0.0951)	-0.0528 (0.1028)	-0.1331 (0.0950)
<i>INVESTMENT_PRICE</i>	0.0498 (0.0966)	0.0292 (0.1166)	-0.0082 (0.1169)	-0.0353 (0.1520)
<i>FREEDOM</i>	0.0785** (0.0341)	0.0757 (0.0480)	0.0452 (0.0490)	0.0984** (0.0354)
<i>DEMOC</i>	0.0065 (0.0102)	0.0011 (0.0115)	-0.0048 (0.0107)	0.0585 (0.0517)
<i>FLAWS</i>	0.0003 (0.0014)	0.0019 (0.0028)	0.0015 (0.0026)	0.0006 (0.0010)
<i>PRIMARY</i>	-0.0001 (0.0026)	0.0036 (0.0035)	0.0055 (0.0033)	0.0068* (0.0034)
<i>SECONDARY</i>	0.0025 (0.0016)	-0.0003 (0.0031)	-0.0020 (0.0029)	-0.0005 (0.0010)
<i>AG_SHARE</i>	-0.0130 (0.0081)	-0.0100 (0.0090)	-0.0083 (0.0093)	-0.0212** (0.0080)
<i>MAN_SHARE</i>	0.0039 (0.0051)	0.0117 (0.0070)	0.0141** (0.0065)	0.0002 (0.0039)
F-stat (redundant fixed effects)	12.2927***	1.9839		17.2044***
Countries	61	38	38	24
Observations	98	57	57	41
R-squared	0.6376	0.5030	0.4573	0.8593

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. White heteroscedasticity-consistent standard errors are in parentheses. Dependent variable is 10 year average of $\ln(\alpha)$. Constants are included in regressions though not reported above. “Fixed Effects” refer to fixed time period effects. The null hypothesis for the redundant fixed effects test is that the fixed effects are jointly insignificant.

The results presented in **tables 2.2** and **2.3** suggest an association between labor share and migrant stock, however labor share could also serve as a push or pull factor in a decision to migrate. For example, a relatively low labor share of a country could be the reason why men decide to move to other countries. Moreover, policymakers, aware of the positive relationship

between mobility of women and labor share and the negative relationship between mobility of men and labor share could come up with policies constraining mobility of men and making mobility of women easier. There is also a possibility that certain variables correlated with migration and labor share have been omitted from the regression. In an attempt to solve the endogeneity problem, I use an instrumental variables technique; the results are presented in **table 2.8**.

For instrument variables method not to produce biased results, the instruments have to be correlated with the endogenous variables, in this case migrant stock separated by gender, *IMMIGRATION_F*, *IMMIGRATION_M*, *EMIGRATION_F*, *EMIGRATION_M*, they should also only have association with the dependent variable, labor share through the endogenous variables. At the same time, instrumental variables cannot be correlated with one another to provide meaningful results.

The decisions to emigrate and choose a country to migrate to might be influenced by opposite factors, furthermore, men and women might have different reasons to migrate²⁰. Thus finding strong, valid instrumental variables for all four endogenous variables might prove to be a difficult task. I supplement not so sophisticated lagged male and female emigrant, and immigrant stocks as instruments with the following variables. There are at least two reasons to employ an array of instrumental variables. First, there needs to be at least as many instrumental variables as endogenous regressors, ideally more to be able to conduct validity tests²¹. Second, as the first stage of two stage least squares produces a linear combination of instruments to maximize their

²⁰ For example, Ferrant and Tuccio (2015) find that while discrimination serves as a push and pull factor for female migrants it does not impact men's decision to migrate

²¹ See Murray (2006) for the discussion

correlation with each endogenous variable, a linear combination of highly collinear instrumental variables will not capture variation on all endogenous variables.

Number of embassies (*EMBASSY*) and number of international letters sent and received per capita (*LETTER*) are components of Dreher (2006, 2008) KOF index of globalization. The index measures how open a country is politically, economically, and socially. A higher number of embassies and international letters in a country could imply a more globalized environment conducive to migration.

Freedom of international movement (*FORMOV*), freedom of domestic movement (*DOMMOV*), and women's social rights (*WOSOC*) are indexes constructed as a part of CIRI Human Rights Data Project (Cingranelli et al 2014). Freedom of international movement and freedom of domestic movement are measured on the scale from 0 to 2. With a score of 0 signifying extreme constraints for country's citizens to travel abroad and return and travel inside of the country respectively, 1 signifying moderate constraints, and 2 signifying the absence of these constraints. *WOSOC* is measured from 0 to 2, with 0 signifying a country does not allow any social rights for women and 2 signifying that all or nearly all social rights are guaranteed by the law and enforced by the government. The CIRI Human Rights variables could serve as push and pull factors in a decision and ability, in the case of foreign movement freedom, to migrate. Interestingly the association between CIRI Human Rights variables could have positive or negative association with female migration, depending on the level of women's rights in the origin country (Naghsh Nejad 2013) and the gap in the rights between origin and destination (Naghsh Nejad and Young 2015).

Finally, air carrier domestic takeoffs and takeoffs abroad of air carriers registered in the country (*AIR*) is a World Bank world development indicator. This variable could both signify openness of a country and correlate with the amount of migrants.

Table 2.8 2SLS Estimates from Regressions Of (Log) Labor Share on Female and Male Emigration and Immigration Stock

	(1)	(2) OECD	(3) non-OECD
<i>EMIGRATION_F</i>	-0.0066 (0.0221)	0.1242*** (0.0246)	0.0488 (0.0302)
<i>EMIGRATION_M</i>	0.0104 (0.0213)	-0.1734*** (0.0292)	-0.0368 (0.0290)
<i>IMMIGRATION_F</i>	0.0358*** (0.0120)	0.1460** (0.0727)	0.1090** (0.0447)
<i>IMMIGRATION_M</i>	-0.0255*** (0.0093)	-0.1399* (0.0748)	-0.0272** (0.0136)
<i>ln(k)</i>	-0.0749 (0.1066)	0.0925 (0.0858)	-0.0894 (0.1095)
<i>ln(RGDP)</i>	-0.0381 (0.0604)	-0.1041 (0.0701)	-0.1684** (0.0709)
<i>INVESTMENT_PRICE</i>	0.2159 (0.1372)	0.0884 (0.1676)	0.3117* (0.1707)
<i>FREEDOM</i>	0.1151*** (0.0342)	0.1064*** (0.0289)	0.1289** (0.0541)
<i>DEMOC</i>	0.0107 (0.0105)	0.0543 (0.0344)	-0.0013 (0.0125)
<i>FLows</i>	-0.0009 (0.0013)	0.0006 (0.0008)	-0.0012 (0.0023)
<i>PRIMARY</i>	-0.0027 (0.0036)	0.0085*** (0.0025)	0.0017 (0.0038)
<i>SECONDARY</i>	0.0026 (0.0016)	-0.0011 (0.0008)	0.0028 (0.0028)
<i>AG_SHARE</i>	-0.0232*** (0.0079)	-0.0185*** (0.0061)	-0.0253*** (0.0076)
<i>MAN_SHARE</i>	0.0011 (0.0050)	-0.0005 (0.0037)	0.0004 (0.0091)
F-stat (first stage <i>EMIGRATION_F</i>)	33.26***	83.58***	41.51***
F-stat (first stage <i>EMIGRATION_M</i>)	112.61***	69.34***	165.62***
F-stat (first stage <i>IMMIGRATION_F</i>)	492.34***	279.33***	37.42***
F-stat (first stage <i>IMMIGRATION_M</i>)	1083.38***	257.38***	535.15***
J-stat	1.071	1.308	3.304
Countries	58	24	36
Observations	98	41	56

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. White heteroscedasticity and autocorrelation consistent standard errors are in parentheses. Dependent variable is $\ln(\alpha)$. Constants are included in regressions though not reported above. Instrumental variables in regression (1) are *LETTER*, *AIR*, lagged emigrant and immigrant stock separated by gender, , in regression (2) *WOSOC*, *EMBASSY*, lagged emigrant and immigrant stock separated by gender, , in regression (3) *FORMOV*, *DOMMOV*, *EMBASSY*, *LETTER*, lagged emigrant and immigrant stock separated by gender

The first column of **table 2.8** contains results of a two stage least squares regression of the whole sample with the following instrumental variables: *LETTER*, *AIR*, lagged male and female emigrant and immigrant stock. The estimated coefficients on *IMMIGRATION_F* and *IMMIGRATION_M* are statistically significant, with a positive sign of female immigrant stock and a negative sign on male immigrant stock. The estimated coefficients are 0.0358 (*IMMIGRATION_F*) and -0.0255 (*IMMIGRATION_M*) are larger in magnitude than the estimated coefficient on *IMMIGRATION_F* 0.0270 and *IMMIGRATION_M* -0.0119 for a comparable OLS regression reported in column 1 of **table 2.3**. Although the latter estimated coefficient in column 1 of **table 2.3** is not statistically different from zero. The difference of the estimated coefficient size for *IMMIGRATION_F* between OLS and 2SLS is about 33 percent changing from 0.0270 to 0.0358.

The estimated coefficients on the other two variables of interest are not statistically different from zero, although it should be noted that the signs are switched, a positive on *EMIGRATION_M* and a negative one on *EMIGRATION_F*. This could be happening if labor share or inequality between workers and capital owners works as a push factor in one's decision to emigrate. The implication is that women choose to emigrate when inequality levels are low (high labor share), judging by the positive signs on female emigrant stock in **tables 2.2** and **2.3**. However, a more plausible explanation is that the small size of the sample might be creating bias.

Column 2 of **table 2.8** reports results of a two stage least squares regression for OECD subsample. The following instrumental variables are employed in the estimation, *WOSOC*, *EMBASSY*, and the lagged emigrant and immigrant male and female stock. All four variables of interest have significant estimated coefficients, the signs are positive on female emigrant and

immigrant stock and negative on male immigrant and emigrant stock. The magnitude for all four is larger than the reported estimated coefficients for the same variables in **tables 2.2** and **2.3**. For example, the estimated coefficient on *EMIGRATION_F* in table for OECD countries in table **2.3** is 0.0935 and 0.1242 in **table 2.8**. This implies an increase of 32 percent going from 0.0935 to 0.1242. One of the important takeaways here is that after all there might be a statistically significant association between immigrant stock variables in OECD subsample, that disappears in **table 2.3** after manufacturing and agricultural shares are controlled for.

Column 3 of **table 2.8** contains results of an instrumental regression based on non-OECD subsample. The following instrumental variables are employed in the estimation: *FORMOV*, *DOMMOV*, *EMBASSY*, *LETTER* and lagged emigrant and immigrant stock separated by gender. Although estimated coefficients on *EMIGRATION_F* and *EMIGRATION_M* are not statistically significant from zero, the signs are equivalent to those on estimated coefficients on *EMIGRATION_F* and *EMIGRATION_M*, positive for female emigrant stock and negative for male emigrant stock. The magnitude of the coefficients estimated by two stage least squares is larger than those estimated by ordinary least squares, however, not by much.

The estimated coefficients that enter the regression significantly belong to male and female immigrant stock variables. Again, female immigrant stock estimated coefficient is positive and male immigrant stock estimated coefficient is negative. The magnitude of *IMMIGRATION_F* coefficient is much larger than the magnitude of the estimated coefficients on *IMMIGRATION_F* in **tables 2.2** and **2.3** for non-OECD countries. It is 0.0170 and statistically significant in **table 2.2**, 0.0680 and statistically not different from zero in **table 2.3**, and 0.1090 in **table 2.8**. Starting from 0.0680 this is about a 60 percent increase. Similarly, the magnitude of the estimated coefficient on *IMMIGRATION_M* is larger than the magnitude of the estimated

coefficients on *IMMIGRATION_M* reported in **tables 2.2** and **2.3**. However, *IMMIGRATION_M* does not enter either of the regressions for non-OECD countries contained in **tables 2.2** and **2.3** significantly. At the same time, it enters the regressions contained in columns 3 and 6 of **table 2.4**. As mentioned above, if a statistically meaningful relationship between male immigrant stock and labor share does exist in non-OECD countries it is driven by immigrants from OECD countries, who are capturing the presence of foreign capital in non-OECD countries.

The F-statistic of the first stages of all three regressions is reported in **table 2.8** as well. It is above the conventional magnitude of 10 and implies that the instrumental variables are strong. Furthermore, there is not enough evidence to reject the validity of the instrumental variables, according to J-stat of Sargan-Hansen J-test of over identifying restrictions, also reported in **table 2.8**. The null of the test is that the instruments are valid and rejecting the null would be a reason for concern. At the same time the sample size is small, which potentially creates biased coefficient estimates. Thus, the results must be interpreted with caution. I use instrumental variable regression results as a robustness check, while relying on the magnitude reported by ordinary least squares estimation in **tables 2.2** and **2.3**.

Finally, there could be potential heterogeneity between countries. For example, the quality of education, might differ from one country to another. Including country fixed effects would solve this problem. However, the panel is unbalanced with only three periods. Including country fixed effects would lead to a loss in degrees of freedom. Thus, I attempt to capture the heterogeneity by including region fixed effects²². The results of the estimations employing fixed regional effects are reported in **table 2.9**. For most of the estimations, columns 2, 4, and 5 the region fixed effects appear to be redundant as reported by F-statistics. At the same time, it is

²² According to United Nations regional division. <http://unstats.un.org/unsd/methods/m49/m49regin.htm>

worth noting that all of the statistically significant estimated coefficients are of a comparable size and of the same sign as the estimated coefficients reported in **table 2.2**.

Table 2.9 Region Fixed Effects Robustness Check. OLS Estimates from Regressions of (log) Labor Shares on Female and Male Immigrant and Emigrant Stock with United Nations Regions Fixed Effects Added to Each Regression

	(1)	(2)	(3)	(4) non-OECD	(5) OECD
<i>EMIGRATION</i>	0.0006 (0.0029)				
<i>IMMIGRATION</i>	-0.0016 (0.0041)				
<i>EMIGRATION_F</i>		0.0173 (0.0207)	0.0068 (0.0189)	0.0210 (0.0216)	0.0726*** (0.0225)
<i>EMIGRATION_M</i>		-0.0180 (0.0213)	0.0041 (0.0173)	-0.0005 (0.0173)	-0.1002*** (0.0277)
<i>IMMIGRATION_F</i>		0.0283*** (0.0057)	0.0145* (0.0074)	0.0212* (0.0106)	0.0933** (0.0383)
<i>IMMIGRATION_M</i>		-0.0217*** (0.0053)	-0.0021 (0.0101)	-0.0015 (0.0119)	-0.0842** (0.0398)
<i>Ln(K)</i>	-0.0073 (0.0822)	-0.0059 (0.0830)	-0.0043 (0.1205)	-0.0295 (0.1351)	0.1149 (0.0744)
<i>ln(RGDP)</i>	0.1279*** (0.0479)	0.1228** (0.0484)	0.0701 (0.0791)	0.0483 (0.0986)	0.0024 (0.0706)
<i>INVESTMENT_PRICE</i>			0.0877 (0.1161)	0.0635 (0.1569)	0.0837 (0.1165)
<i>FREEDOM</i>			0.0716*** (0.0269)	0.1220*** (0.0417)	0.0841*** (0.0255)
<i>DEMOC</i>			0.0184* (0.0109)	0.0175 (0.0114)	0.0488** (0.0229)
<i>FLOWS</i>			-0.0005 (0.0016)	0.0012 (0.0026)	-0.0005 (0.0009)
<i>PRIMARY</i>			0.0013 (0.0026)	0.0014 (0.0037)	0.0088*** (0.0020)
<i>SECONDARY</i>			0.0039***	0.0037	0.0001
F-stat (redundant year fixed effects)	10.2094***	9.4564***	21.1388***	9.0647***	20.6963***
F-stat (redundant region fixed effects)	2.3466**	1.4212	3.5417***	2.2515*	2.1315
Countries	93	93	70	47	27
Observations	202	202	145	79	66
R-squared	0.4476	0.4928	0.6541	0.5020	0.8275

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. White heteroscedasticity-consistent standard errors are in parentheses. Dependent variable is $\ln(\alpha)$. Constants are included in regressions though not reported above. The null hypothesis for the redundant year fixed effects test is that the period fixed effects are jointly insignificant. The null hypothesis for the redundant region fixed effects test is that the region fixed effects are jointly insignificant.

2.6. Conclusion

Globalization is often named as one of the factors contributing to income inequality. This happens through distribution of income away from workers and towards capital owners by increasing capital owners' bargaining power. This increase in bargaining power could be caused by capital mobility. At the same time, globalization allows for increased worker mobility. Thus, owners of both factors should be able to have bargaining power.

In this paper I investigate the relationship of labor mobility, measured by immigrant and emigrant stock, and the labor share of national income. I am specifically interested in the relationship between labor share and migrant stock in OECD and non-OECD countries and the different relationship female and male migrant stocks might have with the labor share, since women have been shown to have lower bargaining power.

I find that female immigrant stock has a positive association with labor share in OECD countries, somewhat driven by immigrants from non-OECD countries who crowd out native women of domestic work, which in turn allows native women to gain higher bargaining power. At the same time, male immigrant stock has a negative association with labor share in OECD countries, plausibly due to lower reservation wages of immigrants, which undermines bargaining power of natives.

Female emigrant stock has a positive association with labor share in OECD countries, while male emigrant stock has a negative one. If women do have lower bargaining power, their exit, holding everything else constant, will be associated with an overall higher bargaining power of labor, and, conversely, exit of men, who hold higher bargaining power would then be associated with lower bargaining power overall.

Interestingly, while the magnitude of the association between female immigrant stock and labor share is roughly equal to the magnitude of the association between male immigrant stock and labor share in OECD countries, this is not the case for female and male emigrant stock. The association between male emigrant stock and labor share is larger in size than the association between female emigrant stock and labor share in OECD countries. The explanation for this could be that women migrate as a part of family, as opposed to become a part of workforce, more often than men do. Additionally, this difference supports the idea that migration research should not omit separating migrant stock by gender.

For non-OECD countries, female emigrant stock and female immigrant stock are positively associated with labor share, which could be explained by relative shortage of highly skilled women. At the same time, male immigrant stock is negatively associated with labor share in non-OECD countries, which is driven by primarily men immigrating from OECD countries and accompanying movement of capital in the same direction.

In this paper, I reveal that increased labor mobility possibilities, as a part of globalization, are not necessarily creating or decreasing inequality. The migration issue is multifaceted; I show the importance of gendered approach to migration studies, and the different associations with labor share created by globalization along with potential processes explaining the associations. The findings suggest that policy focused on income inequality as a result of decreasing labor share should not view globalization as necessarily causing or decreasing income inequality and instead take into account the disparity in bargaining power between men and women.

Chapter 3

Women in Management and Economic Freedom

3.1. Introduction

Female underrepresentation in firm leadership positions is increasingly viewed as a concern for policymakers. In a lecture titled “Breaking the Glass Ceiling” Lise D. Versterlund, Andrew W. Mellon Professor of Economics at the University of Pittsburgh, notes that although one third of MBA graduates in the U.S. are female, only 1.2% of Fortune 500 companies have female CEOs. Furthermore, executive officer positions filled by women in the Fortune 500 are below 15% and that number has not increased significantly over the last 5 years (Catalyst, 2014). The situation is similar in other countries. According to the Australian Census of Women in Leadership (2012) only 6% of managers of revenue generating departments of the ASX 200²³ are women. In response to female underrepresentation, Europe is on the verge of passing mandatory quotas to increase the share of women on corporate boards and German companies such as Daimler, Deutsche Telekom and Lufthansa are voluntarily increasing the number of women carrying out leading roles, such as supervisory board members and middle and upper-management positions²⁴.

This paper focuses on women’s representation in firm management²⁵. Women make up about half of labor force but their representation in management is much lower than that²⁶. In the sample of 81 countries that I examine in this paper the average female labor force share is around

²³ Top 200 companies listed on Australian Securities Exchange

²⁴ According to Spiegel (Germany) issue from November 26th, 2013 and Time issue from March 22nd 2010

²⁵ Occupations in this group include chief executives, commercial production, specialized services, hospitality, retail, and other services managers.

²⁶ See for example, the issue of Argus (U.K.) from May 22nd, 2014.

50% while the average share of women in the managerial profession is around 30 % (**figures 3.1** and **3.2**).

Figure 3.1 Share of Women in the Managerial Profession in a Sample of 81 Countries

Source: International Labour Organization (2013). *Employment Distribution by Sex and Occupation*. Retrieved from <http://unstats.un.org>

Figure 3.2 Share of Women in the Labor Force in a Sample of 81 Countries

Source: World Bank. (2012). Labor force participation rate, female. From International Labour Organization, Key Indicators of the Labour Market database. Retrieved from <http://data.worldbank.org>

Policymakers' concerns regarding female underrepresentation in firm management stem mainly from a belief that the source of the underrepresentation is gender discrimination. If women are passed up for management positions because shareholders and/or existing management simply prefer to hire men, then such discrimination may negatively affect an economy. Employers are essentially prejudiced against utilizing half or more of available human capital. Such prejudice may be especially inefficient when it comes to management positions.

However, the source of female underrepresentation may be rooted not only in the preferences of employers, but also those of employees, customers, or policymakers (Becker, 1971). If employers wish to indulge their own tastes for discrimination they will likely forgo profits to the extent that doing so is inconsistent with cost minimization. Market competition may then drive firms with stronger tastes for discrimination out of business. Alternatively, market forces will not punish discriminating employers if their employees or customers have tastes for discrimination²⁷. In particular, if discrimination is rooted in consumer preferences then it will not occur at the expense of profits. Policymakers may also create incentives for employers to discriminate. Their motives could be rooted in their own preferences or those of voters. The group discriminated against may not have the political power to affect changes in those policies. Finally, a certain group can be underrepresented in a particular type of employment if their average productivity is lower than that of other individuals.

In this paper I explore the relationship between economic freedom and women's representation in management positions in a cross-section of up to 81 countries. The Fraser Institute's Economic freedom of the World (EFW) index is used as a measure of the involvement of a country's government and the extent to which their markets are open and competitive, both

²⁷ In the case where employees have a taste for discrimination we are, all else equal, more likely to see segregation rather than discrimination (i.e. firms that only hire men or only hire women)

domestically and in relation to firms abroad. As DeHaan et al (2006) simply put it “Economic Freedom implies competition”. By employing the index I aim to provide insights into the sources of female underrepresentation in the managerial profession.

If the observed underrepresentation is rooted in employer preferences for discrimination then greater economic freedom is likely to be positively related to the representation of women in management. Market forces will tend to drive discriminating employers out of profitability. Likewise, if discrimination is driven by policy, greater economic freedom is likely to be less associated with discrimination. This will be the case because greater economic freedom implies a smaller role for policy in determining labor market outcomes. Alternatively, if real productivity differences between males and females drive discrimination, then economic freedom may have no relationship to female representation in management, or even a negative one as greater freedom allows employers to better exploit those productivity differentials towards higher profits. In a similar fashion, greater economic freedom would not constrain discrimination stemming from employees and customers. Indeed, there may be in those cases a negative relationship between economic freedom and female representation in the managerial profession, as firms would hire less women to minimize costs and maximize profits.

This paper joins a number of studies that test implications of the Becker (1971) model of discrimination. For example, Kawaguchi (2007) reports that Japanese firms that are more willing to hire females tend to be more profitable. Weber and Zulehner (2014) also report that Austrian firms with lower female employee shares have lower survival rates.

Another stream of literature explores the effect of competition (measured in a variety of ways) on the relative status of minorities in the labor force. For instance, Black and Brainerd (2004) measure competition as an increase in international trade and find that competition

decreased gender wage gaps across industries in the U.S., more so in the concentrated industries than in competitive industries that are more likely to already have lower wage gaps due to more efficient resource allocation, which is in accordance with Becker (1971) model²⁸. Levine, Levkov, and Rubinstein (2008) adopt a similar approach to measure the impact of the economic environment on the racial wage gap. They find that increase in competition (as measured by banking sector deregulation) lowered the wage gap between blacks and whites in the economy overall. Furthermore, Weichselbaumer and Winter-Ebmer (2007) utilize the Fraser's Institute's EFW index and report that in a cross-country sample more open and competitive environments are associated with smaller gender wage gaps.

This paper belongs to the latter set of the studies. However, it concentrates on firm management and analyzes cross-country variation in female management employment shares and the ratios of women to men in management. To the best of my knowledge there are only two other studies that investigate the effect of market forces on the share of women in professional employments, both of which focus on the banking industry within the United States. Ashenfelter and Hannan (1986) show that market concentration negatively affects the share of women in managerial positions. Black and Strahan (2001) report that deregulation of banking industry since 1970s increased the amount of women in managerial positions. While there are benefits to focusing on a single industry (e.g. by limiting the amount of uncontrolled for heterogeneity in the sample) the present study offers a more general look at whether or not increased economic freedom (including less regulation) is associated with more women in management.

²⁸ Although this is not the finding Berik et al (2004) arrive at for Taiwan and South Korea while utilizing international trade as a proxy for competition. They show that the gender wage gap in concentrated industries increases.

Similar to Weichselbaumer and Winter-Ebmer (2007) I utilize the Fraser Institute's Economic Freedom of the World (EFW) index as a proxy for the competitiveness of markets to analyze its relationship with the representation of women in management. I find that economically freer environments are associated with greater gender equality in management. In particular, a 1 point increase a country's EFW score is associated with about a 0.66 percentage point increase in female managers as a share of the employed. That effect constitutes about 1/2 of a sample standard deviation in that share of the employed. Additionally, I find that a 1 point increase in a country's EFW score is associated with a 2.5 percentage point increase in the ratio of women to men in management positions. This is approximately the difference, for example, between Mexico and Montenegro or Luxembourg and Malaysia or France and Ukraine in 2011. These findings support the argument that market competition is associated with lower levels of discrimination based on the preferences of the employers.

Gender inequality and its effects on economic growth have been widely explored in the economic literature. For example, Dollar and Gatti (1999), Hill and King (1995), and Forbes (2000) show that gender inequality in education is detrimental to economic growth. Lamanna and Klasen (2009) find that gender inequality in education and employment hinder economic development. Furthermore, Esteve-Volart (2004) develops a theoretical model to demonstrate the inverse relationship between economic growth and discrimination-based exclusion of women from labor force, in general and from the managerial positions specifically. If economic growth is in part a function of gender inequality, it is natural to ask about the sources of that inequality.

This paper contributes to our understanding of whether or not market mechanisms tend to eliminate costly discrimination against women in the management of firms.²⁹

The rest of the paper proceeds as follows: section 2 describes the empirical specification and the data utilized in the study, section 3 goes on to present and discuss the results of the empirical analysis, section 4 contains robustness checks, and section 5 concludes the paper.

3.2. Empirical Specification and Data Description

I employ the following empirical specifications to investigate the association between economic institutions and the representation of women in the managerial profession:

$$MANAGERSR_i = \beta_0 + \beta_1 EFW_i + \beta_{2,...,k} X_i + \gamma_t + \varepsilon_i, \quad (3.1);$$

$$MANAGERSF_i = \beta_0 + \beta_1 EFW_i + \beta_{2,...,k} X_i + \gamma_t + \epsilon_i, \quad (3.2)$$

Where $MANAGERSR_i$ is a ratio of female to male managers, $MANAGERSF_i$ is the level of female managers among the employed, EFW_i is a measure of economic freedom, X_i is a vector of additional control variables for country i , γ is a year-specific binary variable, and ε and ϵ are error terms.

The first dependent variable $MANAGERSR$ that will be utilized to estimate the association between the changes in economic freedom and the amount of female managers relative to that of male managers in a country. Its mean value for the sample is 44.957%; meaning that for each 100 male managers there are roughly 45 female managers. The second dependent variable $MANAGERSF$ represent the level of female managers among the employed.

²⁹ Regarding other factors that may be associated with female representation in the labor force, Tzannatos (1999) suggests that religion and industry composition are both important; Goldin (1995) finds that education has a large impact on the share of women in labor force.

The mean score of the sample of the second dependent variable is 1.676%, implying that for each 100 employed persons there are about 1.7 female managers.

The data are organized as a cross-section. Most of the dependent variable observations are for the year 2011, but for some countries they are for one of the years 2009, 2010, 2012, or 2013. (Specifically, 57 out of 81 observations for *MANAGERSR* are from 2011, similarly, 57 out of 81 observations for *MANAGERSF* are from 2011.) The heterogeneity in the observation period of the dependent variable creates a dilemma what year to employ for independent variables. All of the control variable observations are the year 2005 except for the religion variables, which are for the year 1980. Anything after 2005 seems to have closer association with 2009 and not 2011. One can think of this as medium-run versus short-run problem.

The variable of interest is the Economic Freedom of the World (*EFW*) chain-linked index produced by Gwartney, Lawson, and Hall (2013). The *EFW* index scores countries on a scale of 0 to 10 for each of the following five areas: (i) size of government, (ii) legal structure and property rights, (iii) access to sound money, (iv) freedom to trade internationally, and (v) the regulation of credit, labor, and business³⁰. A higher *EFW* index score corresponds to lower government involvement in activities of private markets, allowing for competitive resource allocation in product and factor markets, including the allocations of human capital and labor services. The more economically free a country is, the greater the role for private markets and competition in allocating resources, including human capital and labor services. The 2005 *EFW* scores are used for all of the 8, the mean score for the sample is 7.038.

³⁰ See table 3.1 for a more complete description of Economic Freedom of the World Index.

Table 3.1. The Areas and Components of EFW Index

Area 1. Size of Government.
Measures public as opposed to private involvement in resource allocation through <ul style="list-style-type: none"> • Government consumption as a share of total consumption • Transfers and subsidies as a share of GDP • Government investment and government enterprises • Top marginal tax rate <ul style="list-style-type: none"> - Top marginal income tax rate - Top marginal payroll tax rate
Area 2. Legal Institutions and Security of Property Rights
Measures the extent to which the government provides protection to its agents and their property by ensuring <ul style="list-style-type: none"> • Judicial independence • Impartial courts • Protection of property rights • Military noninterference in rule of law and politics • Integrity of the legal system • Legal enforcement of contracts • Non-existent regulatory costs of the sale of real property • Reliability of police • Non-existent business costs of crime
Area 3. Sound Money
Measures consistency of monetary policy and institutions and ease of holding foreign currency through <ul style="list-style-type: none"> • Money growth • Standard deviation of inflation • Inflation in the most recent year • Freedom to own foreign currency bank accounts
Area 4. Freedom to Trade Internationally
Measures the extent to which international trade is restricted through <ul style="list-style-type: none"> • Tariffs <ul style="list-style-type: none"> - Revenue from trade taxes (%) - Mean tariff rate - Standard deviation of tariff rates • Regulatory trade barriers <ul style="list-style-type: none"> - Non-tariff trade barriers - Compliance cost of importing and exporting • Black market exchange rates • Controls of the movement of capital and people <ul style="list-style-type: none"> - Foreign ownership/investment restrictions - Capital controls - Freedom of foreigners to visit
Area 5. Regulations
Measures the extent to which regulation constraints and creates <ul style="list-style-type: none"> • Credit market regulations <ul style="list-style-type: none"> - Ownership of banks - Private sector credit - Interest rate/negative real interest rate • Labor market regulations <ul style="list-style-type: none"> - Hiring and minimum wage - Hiring and firing costs - Centralized collective bargaining - Hours - Cost of worker dismissal

- Conscription
- Business regulations
 - Administrative procedures
 - Bureaucracy costs
 - Starting a business
 - Extra payments, bribes, and favoritism
 - Licensing restrictions
 - Cost of tax compliance

Different areas of the index might have different channels of association with the representation of women in management profession. As managerial profession requires certain human capital, higher government transfers to women with children might disincentivise³¹ women to gain the needed human capital for the profession and give women an incentive to bear children instead. At the same time childcare subsidies might allow women to join workforce. Thus, the relationship between the size of government and share of women in a managerial profession at least ex-ante is ambiguous. Government transfers and subsidies are a component of area 1 of the index. Property rights, including women's property rights, are a part of the area 2 of the index. Women's property rights have been found in the literature (see for example, Agarwal, 1994) to be one of the most important factors determining women's social status and economic well-being, especially so in developing countries. Freedom to trade internationally, area 4 of the index, would create a more competitive environment and punish discriminating employers, Bhagwati (2007) discusses this issue in depth. Finally, regulation, area 5 of the index, plausibly pertains to this paper the most. Credit market regulations could hurt women if they have lower levels of human capital (due to taking a career break to have children), as they will be the first ones to let go and the last ones to hire, similar to young people if there is not enough credit available to employers due to credit market regulations, as found by Feldmann (2006).

³¹ See, for example, Tanner and Hughes (2013) on the role government transfers play in disincentivising population from joining labor force.

Additionally higher credit market regulations could be associated with lower dynamism in terms of firms entering and exiting markets, as these regulations would present an additional constraint faced by firms. Thus decreasing competition and allowing employer taste-based discrimination. Labor market regulations and business regulations could also undermine women's ability to assume management positions. If there are, for example, maternity leave regulations, an employer, all else equal, will prefer to hire a male. Business regulations could decrease degree of competition for firms, through for example, mandated costs to starting a new business. Less competitive environments will then allow employers to indulge their taste for discrimination (Becker, 1971).

This paper joins a wealth of papers utilizing cross-country samples to explore the relationship between the dimensions of institutional quality measured by the EFW and various development variables, such as economic growth (e.g. Ayal and Karras, 1998; Dawson, 1998; Gwartney et al., 1999; Heckelman and Stroup, 2000; Young and Sheehan, 2013)³², health, education and disease prevention outcomes (Stroup, 2007), political freedoms (Lawson and Clark, 2010), and subjective well-being (Gehring, 2013; Ovaska and Takashima, 2006; Nikolaev, 2014) To my knowledge the present paper is the first to examine the cross-country relationship between economic freedom and the relative representation of females in professional employment.

The additional control variable vector X includes the natural logarithm of GDP per capita to control for the income levels in all of the specifications. The rest of the control variables are divided into two sets. The first set describes the well-being of women in each country: female to male life-expectancy ratio (*LIFE*), fertility rates (*FERTILITY*), female to male secondary school

³² See De Haan and Sturm (2006) for an extensive survey of the literature examining the relationship between market-oriented institutions and policies (as measured by EFW) and economic growth

enrollment (*SCHOOL*), and female to male labor force participation (*LABOR*). The set is included to account for country-specific cultural or other determinants of female representation in management. Ultimately, higher well-being of women in a society indicates that women's issues are of significant importance and women are treated as being equal to men. Additionally, any formal or informal institution that would affect the share of women in the managerial profession is likely to affect this well-being set of variables as well.

Countries with relatively more women in the labor force and relatively more women receiving education could be speculated to have relatively more female managers, while holding other factors constant. Relative life expectancy proxies for a few factors, such as relative healthcare accessibility and relative access to various consumption goods (drinking water, nutrition, etc).

The expected sign on fertility rates is ambiguous. Higher fertility rates, first of all, are an opportunity cost of becoming a manager, and, second, account for the role of women in a society (all else equal, societies where women are less likely to be in the workforce, and/or become managers and are more likely to tend after the children and the house will have higher fertility rates). At the same time countries where formal and informal institutions present more opportunities for women to become managers, women are more likely to be able to provide for their children while holding a job (i.e. through government aid for single mothers)

All four of the well-being variables have been shown to be correlated with economic environment as measured by the Economic Freedom of the World Index in Stroup (2008). If including the variables decreases the significance of the relationship between economic freedom and the dependent variable it would mean that the well-being indicators are the channels of association between economic freedom and representation of women in management.

The second set includes the variables that control for the main religion of a country: percent of Muslim (*MUSLIM*) and percent of Catholic (*CATHOLIC*) population as measured by La Porta et al (1999). As Tzanatos (1999) argues, including “noneconomic” determinants (such as religion) of female labor force participation in the analysis should give us better understanding of the participation decision, as he finds that including religion variables increases explanatory power of the regressions. Additionally, Rosson and Fields (2008) find a negative significant relationship between economic freedom of the world and growth of evangelical christianism. Thus, omitting the religion variables could potentially lead to biased results. Descriptions and summary statistics for all variables are contained in **table 3.2**.

Table 3.2 Summary Descriptions and Statistics of Variables Included in Regressions

Variable	Description	Mean	Std. Dev	Obs	Source
<i>MANAGERSF</i>	Share of female managers in the employed population	1.676	1.160	81	International Labour Organization
<i>MANAGERSR</i>	Ratio of female to male managers	44.957	18.705	81	100*(female managers/male managers)
<i>EFW</i>	Economic freedom of the world index	7.038	0.911	70	Gwartney, Lawson, Hall (2013)
<i>GOVT_SIZE</i>	Size of Government component of EFW	6.384	1.298	70	Gwartney, Lawson, Hall (2013)
<i>EFW Area 1</i>					
<i>PROP_RIGHT</i>	Legal Structure and Security of Property Rights component of EFW	6.176	1.648	70	Gwartney, Lawson, Hall (2013)
<i>EFW Area 1</i>					
<i>MONEY</i>	Access to Sound Money component of EFW	8.253	1.755	70	Gwartney, Lawson, Hall (2013)
<i>EFW Area 3</i>					
<i>TRADE</i>	Freedom to Trade Internationally component of EFW	7.349	1.123	70	Gwartney, Lawson, Hall (2013)
<i>EFW Area 4</i>					
<i>REGULATION</i>	Regulation of Credit, Labor, and Business component of EFW	7.037	0.927	70	Gwartney, Lawson, Hall (2013)
<i>EFW Area 5</i>					
<i>CREDIT</i>	Regulation of Credit subcomponent of EFW	8.84	1.184	70	Gwartney, Lawson, Hall (2013)
<i>EFW Area 5A</i>					
<i>LABOR</i>	Regulation of Labor subcomponent of EFW	6.041	1.376	70	Gwartney, Lawson, Hall (2013)
<i>EFW Area 5B</i>					
<i>BUSINESS</i>	Regulation of Business subcomponent of EFW	6.207	1.179	70	Gwartney, Lawson, Hall (2013)
<i>EFW Area 5C</i>					
<i>EFW₂₀₀₅-EFW₂₀₀₀</i>	Change in the economic freedom of the world index from 2000 to 2005	0.222	0.636	60	Economic Freedom of the World Index ₂₀₀₅ – Economic Freedom of the World Index ₂₀₀₀
<i>EFW₂₀₀₅-EFW₁₉₉₅</i>	Change in the economic freedom of the world index from 1995 to 2005	0.646	1.027	60	Economic Freedom of the World Index ₂₀₀₅ – Economic Freedom of the World Index ₁₉₉₅
<i>ln(GDP)</i>	(log of) GDP per capita in current US\$	8.642	1.604	81	World Bank, World Development
<i>LIFE</i>	Ratio of female to male life expectancy at birth in years , %	108.052	3.923	81	Female life expectancy at birth in years 100*(world bank, WDI)/male life expectancy at birth in years (world bank,
<i>FERTILITY</i>	Fertility rate, total (births per woman)	2.284	1.290	81	World Bank, World Development
<i>SCHOOL</i>	Ratio of female to male secondary enrollment, %	98.374	11.470	71	World Bank, Word Development Indicators

<i>LABOR</i>	Ratio of female to male labor force participation, %	71.247	16.945	79	100*(Female labor force participation (World Bank, WDI) /male labor force participation (World Bank, WDI))
<i>CATHOLIC</i>	Catholic population as a percent of total population	35.911	38.905	81	La Porta et al (1999)
<i>MUSLIM</i>	Muslim population as a percent of total population	12.723	27.749	80	La Porta et al (1999)
<i>MAN_SHARE</i>	Manufacturing, value added (% of GDP)	14.922	6.467	79	World Bank, World Development
<i>AG_SHARE</i>	Agriculture, value added (% of GDP)	10.012	11.898	81	World Bank, World Development
<i>DEMOC</i>	Polity IV Index of Democracy	7.254	3.479	71	Marshall and Jaggers (2010)
<i>POL_RIGHTS</i>	Women's political rights index	2.080	0.514	75	Cingranelli, Richards, Clay (2014)
<i>ECON_RIGHTS</i>	Women's economic rights index	1.573	0.661	75	Cingranelli, Richards, Clay (2014)
<i>JOBS_SCARCITY</i>	Percentage of those disagreeing that men deserve a job more than women when jobs are scarce	58.954	20.281	53	World Value Survey, Wave 5. (2004-2008) European Value Survey. (2008)
<i>HOUSEWIFE</i>	Average response to the statement "Being a housewife is just as fulfilling as working for pay", with "Strongly agree" rated at 1 and "Strongly disagree" rated at 4.	2.307	0.311	54	World Value Survey, Wave 5. (2004-2008) European Value Survey. (2008)

Note: Observation period for the dependent variables is from 2009-2013. The independent variables are measured for the year 2005. *CATHOLIC* and *MUSLIM* are measured for the year 1980. Full sample includes 81 countries.

3.3. Results

Table 3.3 contains the results of regressing the share of female managers in the employed population of a country (*MANAGERSF*) on economic freedom (*EFW*) and the set of control variables discussed in the previous section. The second column reports the regression results with the well-being control variables included, the third with the religion variables included and the fourth combines both sets. In all of the specifications, where Economic Freedom is included, it appears to be positively and significantly associated with the representation of female managers in a country's employed population.

Table 3.3 OLS Estimates from Regressions of the Share of Female Managers in the Employed Population on Economic Freedom of the World Index

	(1)	(2)	(3)	(4)
<i>EFW</i>		0.379* (0.206)	0.466*** (0.146)	0.390* (0.215)
$\ln(GDP)$	0.286*** (0.089)	0.126 (0.140)	-0.039 (0.130)	0.127 (0.166)
<i>LIFE</i>		0.108** (0.0414)		0.109** (0.045)
<i>FERTILITY</i>		0.247 (0.193)		0.245 (0.225)
<i>SCHOOL</i>		-0.014 (0.017)		-0.015 (0.018)
<i>LABOR</i>		0.0163** (0.009)		0.018 (0.014)
<i>CATHOLIC</i>			-0.002 (0.004)	0.001 (0.005)
<i>MUSLIM</i>			-0.011*** (0.004)	0.002 (0.010)
F-stat (redundant year binary variables)	40.301***	7.156***	299.234***	4.996***
Observations	81	64	69	63
R-squared	0.223	0.403	0.276	0.405

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. White HAC standard errors are in parentheses. Dependent variable is *MANAGERSF* Year binary variable coefficients are included in the regressions although not reported above

The results of **table 3.3** suggest that a 1 point increase in *EFW* is associated with at least a 39% increase in *MANAGERSF*. Starting from the mean of about 1.7% this increase would translate, all else equal, into a 0.66 percentage point change, which is equivalent to a little over one half of a standard deviation in the female representation of management among the employed population. To give an example, a 1 point increase in the *EFW* corresponds to the difference between the economic environment of Iran and the economic environment of Italy in 2005, and a 0.66 percentage point change corresponds to the difference between *MANAGERSF* in Slovakia and Costa Rica in 2011.

Table 3.4 reports the alternative dependent variable: the ratio of female to male managers in a country (*MANAGERSR*). This dependent variable may relate more closely to the suggested policies that involve quotas in terms of the ratio of women to men in a certain profession. In all of the specifications the coefficient on *EFW* is positive and statistically significant. As in the **table 3.3**, the second and the third columns contain the results of estimations including the two different sets of control variables separately, and the fourth column reports the results of an estimation including both sets of controls. Based on the results reported in **table 3.4**, a 1 point increase in *EFW* is, all else equal, associated with a 5.6% increase in the ratio of female to male managers, This is about 2.5 percentage points starting from the mean of *MANAGERSR* in the sample. This is approximately the difference, for example, between Mexico and Montenegro in 2011.

Notably once the well-being variables are reintroduced into the regression (column 4 of **tables 3.3 and 3.4**) the coefficient on the Economic Freedom of the World Index decreases compared to the column 3 of each table, suggesting that the well-being of women could be the channel of association between economic environment and the amount of female managers.

Indeed, as mentioned above, Stroup (2008) finds that markets as measured by the Economic Freedom of the World index, are associated with the well-being variables perused in this paper.

Due to the heterogeneity of the dependent variable observation periods year-specific binary variables are included in each regression; the F-test of the year-specific effects rejects their redundancy.

Table 3.4 OLS Estimates from Regressions of the Ratio of Female to Male Managers on Economic Freedom of the World Index

	(1)	(2)	(3)	(4)
<i>EFW</i>		4.956* (2.960)	7.155*** (2.544)	5.641* (3.002)
<i>ln(GDP)</i>	1.136 (1.552)	0.153 (2.061)	-5.897** (2.276)	-1.946 (2.137)
<i>LIFE</i>		2.341*** (0.599)		2.012*** (0.645)
<i>FERTILITY</i>		12.700*** (4.026)		9.541** (4.202)
<i>SCHOOL</i>		0.413 (0.329)		0.274 (0.325)
<i>LABOR</i>		0.325** (0.137)		0.314 (0.213)
<i>CATHOLIC</i>			0.0745 (0.0568)	0.081 (0.064)
<i>MUSLIM</i>			-0.321*** (0.0529)	-0.102 (0.115)
F-stat (redundant year binary variables)		8.033***	299.234***	5.861***
Observations	81	64	69	63
R-squared	0.074	0.492	0.347	0.545

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. White HAC standard errors are in parentheses. Dependent variable is *MANAGERSR*. Year binary variable coefficients are included in the regressions although not reported above

One more control variable that is positively and significantly associated with both of the dependent variables is the life expectancy ratio of women to that of men. This could be due to the fact that relatively longer lives also mean relatively longer time available to climb the career ladder for women.

Fertility seems to be also correlated with the relative number of female to male managers positively, as can be seen from **table 3.4**. As Mammen and Paxson (2000) discuss, fertility and income could have a positive correlation with income if the income effect of higher wages outweighs the substitution effect and a negative one if the substitution effect outweighs the income effect. If we assume that women in managerial positions enjoy higher wages it would mean that the income effect allows them to afford more children.

Interestingly, the fertility variable is not correlated with the number of female managers among the employed rather their amount relative to male managers. One could speculate that higher managerial wages for men produce a substitution effect that outweighs the income effect.

As one would expect a high share of population that practice Muslim religion is negatively and significantly associated with both of the dependent variables, however, once the well-being variables are controlled for the significance and the power of the variable *MUSLIM* goes away. This could indicate that the religion variables are associated with the number of women in managerial positions through well-being variables.

Table 3.5 contains the relation between separate areas of EFW index with the two dependent variables. Area five of the index, that measures the amount of government regulation in an economy, does have a positive and significant association with the share of female managers in the labor force. This is not surprising as this particular area includes policies such as minimum wage, maternity leave, and other possible labor regulations, which create additional constraints for employers. However, none of the areas seem to be associated with the variation in the gender ratio in the managerial profession. This could be because the components of the index separately are strongly correlated with the quality of life and religion variables controlled for in

the regression and are correlated with each other, which presents a multicollinearity issues
(Lawson, 2006).

Table 3.5 OLS Estimates from Regressions of the Share of Female Managers in the Employed Population and the Ratio of Female to Male Managers on the Separate Areas of Economic Freedom of the World Index

	(1) <i>MANAGERSF</i>	(2) <i>MANAGERSR</i>
<i>GOVT_SIZE</i> <i>EFW Area 1</i>	0.083 (0.117)	1.549 (1.603)
<i>PROP_RIGHT</i> <i>EFW Area 2</i>	0.134 (0.160)	-0.075 (2.112)
<i>MONEY</i> <i>EFW Area 3</i>	-0.146 (0.109)	-0.068 (1.927)
<i>TRADE</i> <i>EFW Area 4</i>	0.133 (0.258)	2.754 (3.911)
<i>REGULATION</i> <i>EFW Area 5</i>	0.460*** (0.162)	3.189 (2.502)
<i>ln(GDP)</i>	0.047 (0.187)	-1.229 (2.778)
<i>LIFE</i>	0.102** (0.049)	1.884** (0.709)
<i>FERTILITY</i>	0.244 (0.250)	9.581** (4.479)
<i>SCHOOL</i>	-0.016 (0.019)	0.227 (0.312)
<i>LABOR</i>	0.013 (0.018)	0.344 (0.267)
<i>CATHOLIC</i>	0.004 (0.005)	0.086 (0.065)
<i>MUSLIM</i>	0.000 (0.011)	-0.069 (0.137)
F-stat (redundant year binary variables)	5.916***	5.473***
Observations	63	63
R-squared	0.485	0.558

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. White HAC standard errors are in parentheses. Dependent variables is *MANAGERSF* in the first regression and *MANAGERSR* in regression 2. Year binary variable coefficients are included in the regressions although not reported above

Table 3.6 OLS Estimates from Regressions of the Share of Female Managers in the Total Worker Population and the Ratio of Female to Male Managers on Area 5 of Economic Freedom of the World Index

	(1) <i>MANAGERSF</i>	(2) <i>MANAGERSF</i>	(3) <i>MANAGERSF</i>	(4) <i>MANAGERSR</i>	(5) <i>MANAGERSR</i>	(6) <i>MANAGERSR</i>
<i>REGULATION. EFW Area 5</i>	0.5646*** (0.1166)	0.4496*** (0.1595)		6.4389*** (2.3001)	3.6577* (2.0638)	
<i>CREDIT. EFW Area 5A</i>			0.3246*** (0.0978)			6.9201*** (1.7796)
<i>LABOR. EFW Area 5B</i>			0.2129** (0.1036)			0.0996 (1.7955)
<i>BUSINESS. EFW Area 5C</i>			0.0177 (0.1387)			0.4646 (2.3557)
<i>ln(GDP)</i>	-0.0070 (0.0960)	0.1428 (0.1320)	0.0601 (0.1397)	-3.3564* (1.8989)	-0.8058 (1.9128)	-3.5642 (2.6876)
<i>LIFE</i>		0.1095** (0.0458)			2.0574*** (0.6558)	
<i>FERTILITY</i>		0.2432 (0.2292)			9.6715** (4.4964)	
<i>SCHOOL</i>		-0.0164 (0.0163)			0.2413 (0.3317)	
<i>LABOR</i>		0.0102 (0.0159)			0.2427 (0.2308)	
<i>CATHOLIC</i>		0.0015 (0.0047)			0.0773 (0.0623)	
<i>MUSLIM</i>		-0.0006 (0.0097)			-0.1295 (0.1145)	
F-stat (redundant year binary variables)	42.4238***	12.560***	27.543***	557.649***	7.002***	19.141***
Observations	70	63	70	70	63	70
R-squared	0.3011	0.4433	0.3481	0.1412	0.5362	0.2308

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. White HAC standard errors are in parentheses. Dependent variable is *MANAGERSF* in columns (1), (2), and (3) and *MANAGERSR* in columns (4), (5), and (6) Year binary variable coefficients are included in the regressions although not reported above

One way to avoid the multicollinearity issue would be to consider one of the areas of the index separately. In the regressions reported in **Table 3.6** I concentrate on area 5 of the EFW index, namely, *REGULATION*. I additionally consider its three subcomponents: credit market regulations, labor market regulations, and business regulations. Conceptually, it seems that for the purpose of this paper market regulation should be the most relevant of the five areas of the index. Policies imposing a certain gender share in a profession would be captured by labor market regulation subcomponent and area 5 of the EFW index. In all of the specifications contained in **table 3.6** where *REGULATION* is the independent variable of interest, its estimated coefficient is positive and statistically significant, with a magnitude above that of the estimated coefficient for the whole index for *MANAGERSF* (compare 0.4496 and 0.390, **table 3.3**) and below that of the estimated coefficient for the whole index for *MANAGERSR* (compare 3.6577 and 5.641, **table 3.4**).

Interestingly, it is credit market regulations index that has a statistically significant positive association with both *MANAGERSF* and *MANAGERSR*. As mentioned earlier, Feldmann (2006) finds that credit market regulations hurt young people and women in particular, creating higher unemployment rates for both groups. As women might have lower levels of on the job training, for example if they take a career break to have children, they would be the first ones to be fired and last ones to get hired when the credit flow is tight for the companies. It could also be the case that it is more difficult for women to access credit due to their lower levels of education and cultural norms in developing countries (Marvel, 2012), preventing them from receiving education or increasing their income and as such creating a vicious circle. At the same time, labor market regulations index has a statistically significant and positive association with female managers as a share of the employed but not in relation to male managers. It could be the

case that lower labor market regulations (which would imply higher labor market regulation index) allow for both more male and female managers. Overall, there seems to be a positive association between women in the managerial profession and economic freedom of the world index, suggesting that employers in less constrained markets would aim to hire managers in a more efficient way and discriminate less. At the same time, the issue of causation is not addressed in this paper, as such I am not claiming that in order to increase the amount of women in managerial profession an economy needs to change its institutional arrangement.

3.4. Robustness Checks.

In this section I employ alternative specifications, as there could be certain variables affecting both number of women in the management profession in each country and its economic institutions that I have yet to include in the analysis. First, to check for the robustness of results I employ the value added to GDP by manufacturing (*MAN_SHARE*) and agriculture sectors (*AG_SHARE*). As found by Tzanatos (1999), women are less likely to be in the administrative positions than men in the manufacturing sector, which is the motivation behind using *MAN_SHARE* variable. Furthermore, according to Goldin (1995) women will be active participants of labor force in low-income agriculture-dominated economies, given the agriculture is of certain types, taking this relationship into consideration I am including *AG_SHARE* variable as an additional control variable. The results of regressions containing *AG_SHARE* and *MAN_SHARE* as additional control variables are contained in **table 3.7**. While the estimated coefficients on *EFW* are positive and significant for both dependent variables *MANAGERSF* and *MANAGERSR* are positive and significant, Tzanatos' (1999) prediction of lower number of women in the administrative positions in manufacturing sector is also confirmed. The estimated

coefficients on *MAN_SHARE* are negative and significant, suggesting a lower number of women in the managerial profession in countries with prevailing manufacturing sector. Additionally, the estimated coefficients on *AG_SHARE* are negative and significant, suggesting that in countries with higher agricultural share there are less women managers. Assuming that countries with higher agricultural shares are also low income countries where women, although they are a part of labor force, as suggested by Goldin (1995), will have lower education rates, compared to men, which could plausibly prevent women from assuming managerial positions.

Table 3.7 OLS Estimates from Regressions with Additional Control Variables of Female to Male Managers Ratio on Economic Freedom of the World Index

	(1) <i>MANAGERSF</i>	(2) <i>MANAGERSR</i>
<i>EFW</i>	0.4075** (0.1676)	5.8475** (2.8257)
<i>ln(GDP)</i>	-0.4088 (0.3120)	-9.0658** (4.2201)
<i>LIFE</i>	0.0754 (0.0475)	1.5617** (0.6207)
<i>FERTILITY</i>	0.2644 (0.2286)	10.0904** (4.6200)
<i>SCHOOL</i>	-0.0341* (0.0187)	0.0052 (0.3557)
<i>LABOR</i>	0.0311* (0.0159)	0.5132** (0.2168)
<i>CATHOLIC</i>	0.0026 (0.0043)	0.1104* (0.0600)
<i>MUSLIM</i>	0.0065 (0.0086)	-0.0160 (0.1132)
<i>MAN_SHARE</i>	-0.0569*** (0.0182)	-0.7441** (0.2941)
<i>AG_SHARE</i>	-0.0944* (0.0561)	-1.3087* (0.7175)
F-stat (redundant year binary variables)	6.522***	5.199***
Observations	61	61
R-squared	0.5211	0.6111

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. White HAC standard errors are in parentheses. Dependent variables are *MANAGERSF* in column (1) and *MANAGERSR* in column (2). Year binary variable coefficients are included in the regressions although not reported above

I next include *DEMOC* variable in my analysis to control for democratic institutions. *DEMOC* is a part of Polity IV democracy index (Marshall and Jaggers 2010). It ranks countries on a scale from 0 to 10 based on their level of democracy, with higher scores given to countries with higher democracy levels. Stroup (2008) not only investigates the relationship between the institutions of economic freedom and women's well-being, but also compares this relationship to the connection between institutions of democracy and women's well-being, as democratic institutions. Stroup (2008) suggests that investigating these two institutional arrangements' association with women's well-being creates potential biases in the empirical results. While Stroup (2008) finds that it is institutions of economic freedom that matter more for women's well-being, democratic institutions still have an association with women's well-being as well, although a weaker one. The results of regressions with both *DEMOC* and *EFW* are reported in **table 3.8**. After additional control variables are added to the regressions (columns 2 and 5) the association between *EFW* and women in managerial profession variables disappears. This could be explained by multicollinearity between *DEMOC* and *LIFE*, *FERTILITY*, *SCHOOL*, and *LABOR*. As Stroup (2008) finds, democratic institutional arrangements and democratic institutional arrangements interacted with higher levels of economic freedom do have an association with women's fertility, life expectancy, education rates, and the ratio of men to women in the labor force. Omitting *LIFE*, *FERTILITY*, and *SCHOOL* (column 3) and *FERTILITY* (column 6) leads to the increase of statistical significance of the estimated coefficients on *MANAGERSF* and *MANAGERSR* respectively.

Table 3.8 OLS Estimates from Regressions of the Share of Female Managers in the Total Worker Population and the Ratio of Female to Male Managers on Economic Freedom of the World Index with Democracy Control Included in the Regressions

	(1) <i>MANAGERSF</i>	(2) <i>MANAGERSF</i>	(3) <i>MANAGERSF</i>	(4) <i>MANAGERSR</i>	(5) <i>MANAGERSR</i>	(6) <i>MANAGERSR</i>
<i>EFW</i>	0.3326* (0.1675)	0.1787 (0.2162)	0.3968** (0.1799)	4.1463 (3.1020)	4.3953 (3.4924)	7.1399* (3.9000)
<i>ln(GDP)</i>	-0.0922 (0.1293)	0.1787 (0.1554)	-0.0678 (0.1414)	-6.3412** (2.3966)	-2.3881 (2.2762)	-6.8204*** (2.1319)
<i>DEMOC</i>	0.0818* (0.0486)	0.0466 (0.0672)	0.0369 (0.0588)	2.4793** (1.1513)	0.5048 (1.1752)	-0.6331 (1.5260)
<i>LIFE</i>		0.1329*** (0.0447)			2.1172*** (0.6944)	
<i>FERTILITY</i>		0.3362 (0.2375)			9.1403** (4.4550)	1.1652 (4.3323)
<i>SCHOOL</i>		-0.0104 (0.0184)			0.2439 (0.3358)	0.1549 (0.4137)
<i>LABOR</i>		0.0219 (0.0146)	0.0160 (0.0120)		0.2945 (0.2299)	0.4025 (0.2508)
<i>CATHOLIC</i>		0.0015 (0.0046)	0.0011 (0.0043)		0.0954 (0.0616)	0.1491** (0.0611)
<i>MUSLIM</i>		0.0070 (0.0111)	-0.0014 (0.0088)		-0.0731 (0.1539)	-0.1485 (0.1821)
F-stat (redundant year binary variables)	4.721***	4.303***	6.329***	47.360***	6.036***	3.394**
Observations	67	60	66	67	60	60
R-squared	0.2219	0.4198	0.2668	0.2163	0.5585	0.4535

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. White HAC standard errors are in parentheses. Dependent variable is *MANAGERSF* in columns (1), (2), and (3) and *MANAGERSR* in columns (4), (5), and (6) Year binary variable coefficients are included in the regressions although not reported above

As I attempt to approximate qualitative variables, such as education level by using their quantitative counterparts, education rate, I am plausibly omitting the heterogeneity of the quality present in a cross-country study. Simply put, education quality could vary from country to country. There could also be other omitted variables affecting both the share of women in management positions and economic freedom levels. The best way to correct for the omitted bias variable problem is to include country fixed effects, however it is not feasible in a cross-country study as it would lead to a loss of all degrees of freedom. I instead include region binary variables in the regressions³³. The results are contained in **table 3.9**. With the additional control variables introduced into the regression (column 2) the estimated coefficient becomes statistically insignificant for the dependent variable *MANAGERSF*, while it remains significant for *MANAGERSR* (column 4). Additionally, Hausman F-test rejects redundancy of the region binary variables. This suggests that there are omitted variables not captured in the previous analysis, and it is the ratio of women to men in the managerial profession that has a positive association with the institutions of economic freedom, rather than the number of women managers among the workers. Additionally, the magnitude of the estimated coefficient on *EFW* is larger than that in **table 3.3**, compare 10.437 and 5.641 (**table 3.4**).

³³ According to United Nations regional division. <http://unstats.un.org/unsd/methods/m49/m49regin.htm>

Table 3.9 OLS Estimates from Regressions of the Share of Female Managers in the Total Worker Population and the Ratio of Female to Male Managers on Economic Freedom of the World Index with United Nations Regions Binary Variables Added to the Regressions

	(1) <i>MANAGERSF</i>	(2) <i>MANAGERSF</i>	(3) <i>MANAGERSR</i>	(4) <i>MANAGERSR</i>
<i>EFW</i>	0.5147*** (0.1907)	0.4692 (0.2797)	8.6076*** (2.6346)	8.8096** (3.7629)
<i>ln(GDP)</i>	-0.2279 (0.1494)	0.0364 (0.1835)	-8.7021*** (2.1244)	-4.9258** (2.1898)
<i>LIFE</i>		0.1186** (0.0450)		1.6075** (0.6585)
<i>FERTILITY</i>		0.3433 (0.3475)		9.7044* (4.8897)
<i>SCHOOL</i>		0.0028 (0.0222)		0.4289 (0.3347)
<i>LABOR</i>		0.0082 (0.0177)		0.3221 (0.2357)
<i>CATHOLIC</i>		-0.0023 (0.0047)		-0.0015 (0.0556)
<i>MUSLIM</i>		0.0036 (0.0100)		0.0226 (0.1101)
F-stat (redundant year binary effects)	6.411***	3.083***	52.282***	7.836***
F-stat (redundant region binary effects)	26.482***	13.580***	15.797***	6.920***
Observations	70	63	70	63
R-squared	0.3754	0.5135	0.4605	0.6727

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. White HAC standard errors are in parentheses. Dependent variable is *MANAGERSF* in columns (1), (2) and *MANAGERSR* in columns (3) and (4) Year binary variable coefficients and region binary variable coefficients are included in the regressions although not reported above

As the results of **table 3.9** show, there are potentially omitted variables in the analysis. In some cultures women's main task might be viewed as child bearing and rearing, additionally political and economic rights of women might differ from country to country. I employ the following variables: *POL_RIGHTS*, *ECON_RIGHTS*, *JOBS_SCARCITY*, *HOUSEWIFE*. *POL_RIGHTS* and *ECON_RIGHTS* are indexes constructed as a part of CIRI Human Rights Data Project (Cingranelli et al 2014). I then attempt to control for culture variables. As Tzannatos (1999) notices, discrimination might come not only from the work place, but also from home and culture of a country in general.

Both variables are measured on the scale from 0 to 2. With a score of 0 signifying a country that does not allow any political or economic rights for women and 2 signifying that all or nearly all political and economic rights are guaranteed by the law and enforced by the government. *JOBS_SCARCITY* and *HOUSEWIFE* are constructed by using answers to World Value Survey (wave 5, 2004 - 2008) and European Value Survey (2008).

Table 3.10 OLS Estimates from Regressions of the Share of Female Managers in the Total Worker Population and the Ratio of Female to Male Managers on Economic Freedom of the World Index with Women's Political, Economic Rights, and Cultural Controls Included in the Regressions

	(1) <i>MANAGERSF</i>	(2) <i>MANAGERSR</i>
<i>EFW</i>	0.7074* (0.3825)	10.4372* (6.0522)
<i>ln(GDP)</i>	-0.5232*** (0.1900)	-10.3272** (4.3917)
<i>POL_RIGHTS</i>	-0.3820 (0.3577)	-0.4476 (4.8027)
<i>ECON_RIGHTS</i>	0.4778 (0.3907)	2.0464 (5.1933)
<i>JOBS_SCARCITY</i>	0.0258** (0.0109)	0.5099** (0.1957)
<i>HOUSEWIFE</i>	-0.6883 (0.5190) (0.4939)	-8.0977 (10.2140) (8.3974)
F-stat (redundant year binary variables)	15.145***	6.080***
Observations	49	49
R-squared	0.3568	0.3440

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. White HAC standard errors are in parentheses. Dependent variable is *MANAGERSF* in column (1) and *MANAGERSR* in column (2). Year binary variable coefficients are included in the regressions although not reported above

JOBS_SCARCITY represents the percentage for each country of those asked who disagree with the following statement: “When jobs are scarce men should have more right to a job than women”. To construct the variable *HOUSEWIFE* for each possible response to the question “Being a housewife is just as fulfilling as working for pay” I gave a score, 1 if the response is “strongly agree”, 2 – “agree”, 3 – “disagree”, and 4 if the response is “strongly disagree”. I then

averaged the scores for each country. The results of regressions containing *POL_RIGHTS*, *ECON_RIGHTS*, *JOBS_SCARCITY*, and *HOUSEWIFE* are reported in **table 3.10**. The estimated coefficients on *EFW* remain positive and statistically significant. Interestingly, *JOBS_SCARCITY* also has a positive and significant association with both dependent variables *MANAGERSF* and *MANAGERSR*, suggesting that in countries where more people disagree with statement that “men should have more right to a job than women when the jobs are scarce” there are higher number of female managers among the workers and female to male workers.

Gwartney et al (1999) suggest that for the purposes of economic analysis considering only levels and not changes of economic freedom index might not be sufficient, as the levels do not capture the trend in which the index is moving. They also note that changes over longer periods of time are more credible and lead to more meaningful outcomes.

Table 3.11 contains results of regressions of *MANAGERSF* and *MANAGERSR* on the level of *EFW* in 2005 and its changes from 2000 to 2005 (columns 1 and 3) and from 1995 to 2005 (columns 2 and 4). While the estimated coefficients on the changes of *EFW* are not statistically different from zero, the estimated coefficients on the levels of *EFW* are positive and statistically significant. Interestingly, when 10-year changes (contrary to 5-year changes) are controlled for the magnitude of the coefficients on the level of *EFW* increases compared to the regressions that do not control for changes. Compare 0.517 (column 2) and 0.390 (column 4 of **table 3.3**) for the dependent variable *MANAGERSF*. Also, compare 6.637 (column 4) and 5.641 (column 4 of **table 3.4**) for the dependent variable *MANAGERSR*.

Table 3.11 OLS Estimates from Regressions of the Share of Female Managers in the Total Worker Population and the Ratio of Female to Male Managers on Economic Freedom of the World Index and Its 5-Year and 10-Year Changes

	(1) <i>MANAGERSF</i>	(2) <i>MANAGERSF</i>	(3) <i>MANAGERSR</i>	(4) <i>MANAGERSR</i>
<i>EFW₂₀₀₅</i>	0.5709** (0.2636)	0.5166** (0.2496)	5.9362* (3.4186)	6.6368** (3.2411)
<i>EFW₂₀₀₅-EFW₂₀₀₀</i>	-0.2514 (0.2909)		2.3250 (3.6390)	
<i>EFW₂₀₀₅-EFW₁₉₉₅</i>		0.0033 (0.2159)		2.3943 (2.4186)
<i>ln(GDP)</i>	0.0011 (0.2307)	0.1038 (0.2203)	-1.6798 (3.0384)	-1.5072 (2.7362)
<i>LIFE</i>	0.1338** (0.0551)	0.1357** (0.0555)	2.0495*** (0.6820)	1.9613*** (0.6848)
<i>FERTILITY</i>	0.3297 (0.2553)	0.4370 (0.2880)	13.6971*** (3.6145)	14.4692*** (3.7941)
<i>SCHOOL</i>	-0.0339 (0.0292)	-0.0237 (0.0285)	-0.1363 (0.3121)	-0.1264 (0.2932)
<i>LABOR</i>	0.0328** (0.0159)	0.0316** (0.0153)	0.4598** (0.1901)	0.4244** (0.1845)
<i>CATHOLIC</i>	0.0037 (0.0050)	0.0039 (0.0050)	0.1179* (0.0640)	0.1164* (0.0634)
<i>MUSLIM</i>	0.0152 (0.0107)	0.0142 (0.0104)	0.0061 (0.1213)	-0.0003 (0.1173)
F-stat (redundant year binary variables)	7.285***	3.976***	26.407***	18.328***
Observations	56	56	56	56
R-squared	0.4554	0.4469	0.6209	0.6250

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. White HAC standard errors are in parentheses. Dependent variable is *MANAGERSF* in columns (1), (2) and *MANAGERSR* in columns (3) and (4) Year binary variable coefficients and region binary variable coefficients are included in the regressions although not reported above

As an additional robustness check I conduct a beta regression analysis, Ferrari and Crebari-Neto (2004). This analysis is useful when the dependent variable is contained between 0 and 1, excluding the boundaries, since its predictions will also be confined to (0, 1) range. I change *MANAGERSR* to (0, 1) range by dividing it by 100. There are no countries in the sample with 0 female managers, there are also no countries where the number of female managers is equal to the number of male managers. The results of beta regressions are contained in **table**

3.12. It is the post estimation that allows one to interpret the magnitudes of the results presented in **table 3.11**.

Table 3.12 Estimates of Beta Regressions of the Ratio of Female to Male Managers on Economic Freedom of the World Index

	(1) <i>MANAGERSR</i>	(2) <i>MANAGERSR</i>
<i>EFW</i>	0.2887*** (0.1112)	0.2703** (0.1145)
<i>ln(GDP)</i>	-0.1911* (0.1012)	-0.0900 (0.0842)
<i>LIFE</i>		0.0918*** (0.0253)
<i>FERTILITY</i>		0.4868*** (0.1581)
<i>STUDENT</i>		0.0126 (0.0128)
<i>LABOR</i>		0.0146* (0.0081)
<i>CATHOLIC</i>		0.0039 (0.0025)
<i>MUSLIM</i>		-0.0058 (0.0045)
Observations	70	63

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. White HAC standard errors are in parentheses. Dependent variable is *MANAGERSR*. Year binary variable coefficients and region binary variable coefficients are included in the regressions although not reported above

Specifically, a 1 point increase in *EFW* index is associated with a 0.071 increase in the ratio of women to men in management profession, when no well-being or culture variables are included in the regression, and with a 0.063 increase when they are included, which is slightly above the estimated coefficient of 5.6% contained in **table 3.3**.

Finally, **table 3.13** contains results of regressions that employ a subsample, with year 2011 observations for *MANAGERSF* and *MANAGERSR* present only. The results are similar to those in columns 4 of **tables 3.3** and **3.4**, in magnitude, sign, and significance.

Table 3.13 OLS Estimates from Regressions of the Share of Female Managers in the Total Worker Population and the Ratio of Female to Male Managers on Economic Freedom of the World Index. Year 2011 Only

	(1) <i>MANAGERSF</i>	(2) <i>MANAGERSR</i>
<i>EFW</i>	0.4394* (0.2214)	6.0665** (2.7996)
<i>ln(GDP)</i>	0.1027 (0.2242)	-4.8700 (3.0295)
<i>LIFE</i>	0.1373** (0.0665)	1.4231 (0.9421)
<i>FERTILITY</i>	0.4922** (0.2268)	15.3179*** (2.6203)
<i>SCHOOL</i>	-0.0287 (0.0238)	-0.4165 (0.3107)
<i>LABOR</i>	0.0248 (0.0216)	0.6263** (0.2667)
<i>CATHOLIC</i>	0.0031 (0.0049)	0.1119* (0.0626)
<i>MUSLIM</i>	0.0010 (0.0124)	-0.1767 (0.1557)
Observations	50	50
R-squared	0.3706	0.6168

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. White HAC standard errors are in parentheses. Dependent variable is *MANAGERSF* in column (1) and *MANAGERSR* in column (2).

To sum up, the robustness checks presented in this section are based on the existing literature on the economic freedom of the world index and are largely aimed at capturing omitted variable bias unavoidably present in any cross-country comparison. While the relationship between *EFW* and the ratio of female to male managers proves to be robust, the relationship between share of women managers among workers and *EFW* loses in statistical significance when region binary variables are included in the regressions.

3.5. Conclusion

Lower gender inequality has been shown to lead to higher economic growth. While everyone agrees that discrimination is detrimental to the society, the methods to overcoming discrimination are still quite a controversial issue. For instance, European Union has proposed

quotas for female board members as a way to increase gender equality in firm management. The approach has its opponents and advocates.

In this paper I investigate a different solution to increasing gender diversity of firm management, the solution being to consider institutions. I find that less constrained markets are associated with greater amount of women managers among the employed population of a country and in relation to male managers. To be more specific one point increase in economic freedom index is associated with about $\frac{1}{2}$ of the standard deviation increase in the share of female managers in the labor force. At the same time a one point increase in the index is associated with the increase of 2.5 percentage points in the ratio of female to male managers, which is about 0.12 of the standard deviation.

Although the relationship might seem to be very small, it is the direct association of the market forces with the representation of women in the managerial profession compared to that of men. The indirect association works through female to male life expectancy ratio, fertility rates, female to male secondary school enrollment ratio, female to male labor force participation that have also been shown to be affected by the Economic Freedom of the World Index.

While it is attractive to correct gender underrepresentation in a profession by passing a policy that requires a certain share of women in that profession, the unintended consequences of such policy could potentially hurt firms and employees. The solution I offer in this paper is to consider institutional arrangements. Specifically, it is area 5 of the index and credit market regulations that have been shown in the literature and in this paper to have a negative association with women's economic status and their representation in management. Thus, I believe credit market regulations need special attention from policy makers whose aim is decreasing unequal gender representation in managerial profession.

Chapter 4

Revisiting the Relationship between Women's Suffrage and Government

4.1. Introduction

"They depend on government because they are not depending on their husbands"

-Jesse Watters, Fox News Host (2014)

In a widely cited paper, John Lott and Lawrence Kenny (1999) argue that the institution of women's suffrage in the US resulted in an expansion of the size and scope of government. They are motivated by the fact that voting patterns in the US have been, and continue to be, systematically different than those of men. In particular, women are more likely to vote democratic and support generous and wide-ranging government programs.³⁴ Based on state-level data from 1870 to 1940, Lott and Kenny (1998) report evidence in support of their hypothesis. Kau and Rubin (2002) also report evidence that women's suffrage resulted in greater demand for government programs.³⁵ And Miller (2008) finds that women's suffrage was associated with significant growth in US public health expenditures. All of these studies provide support for the idea that the expansion of suffrage to women was associated with the growth of US government.

The Nineteenth Amendment to the US Constitution in 1920 guaranteed women the right to vote nationwide. However, 29 states (out of the then total of 48) granted women's suffrage prior to this amendment (Lott and Kenny 1999, pp. 1166-1167; see their Table 1 for a chronology). Both Lott and Kenny (1999, pp. 1168 & 1172) and Miller (2008, pp. 1291-1293)

³⁴ Lott and Kenny cite Langer (1996) to this effect. Furthermore, Thomas (1990, 1994), Duflo (2003), Chattopadhyay and Duflo (2004), and Anzia and Berry (2011) report evidence that women place more emphasis on the provision of public goods, public health and education spending, and child welfare; Jianakoplos and Bernasek (1998) report that women are more risk averse than men, which would be consistent with them having a stronger preference for social security programs.

³⁵ Kau and Rubin (2002) also find that, due to greater female labor force participation over the course of the twentieth century, that the growth of US government is linked to increased ability to tax female productivity.

point out spatial patterns in the timing of women's suffrage adoption by those states. In particular, western states typically were early adopters of women's suffrage laws; members of the former Confederacy almost all adopted before 1920. Figure 1 provides a map of the 48 contiguous US states; each is labeled by its year of women's suffrage adoption and also shaded according to the time interval of adoption.

Figure 4.1 The Years Women Suffrage Rights Were First Introduced in the U.S.

Casual observation suggests spatial correlation in the timings of adoption. (Notably, the states that did not ratify the Nineteenth Amendment are for the most part neighbors to one another.) To our knowledge, however, no researchers have taken this spatial correlation into account formally while estimating the relationship between women's suffrage and government. In this paper we revisit this relationship, employing spatial econometrics to explicitly take these patterns into account.

Ignoring spatial dependence can lead to biased estimates of the relationship between women's suffrage and government. There is considerable mobility of individuals across US states. As such, neighboring states are in jurisdictional competition with one another with regards to their policies (Tiebout 1956). Individuals in a given state can "vote with their feet", exercising

their exit option if that given state's policies are contrary to their preferences (Hirschman 1978). Given this, state governments compete with their policy offerings to retain and enlarge their tax bases. This competition raises two potential sources of spatial dependence in the state-level relationship between women's suffrage and government. First, a state's adoption of women's suffrage may have been dependent on whether its neighbors had already adopted. Second, if women's suffrage resulted in an expansion of a particular state's government, then its neighbors may have made policy responses to attract new citizens and/or retain their own. These policy responses could have included suffrage adoption, but also other policies that might have been perceived as substitutes for the vote. To the extent that one or both of these mechanisms were operative, the government variables and suffrage policies of a state's neighbors are relevant omitted variables and sources of biases.

Historical evidence regarding the women's suffrage movement is consistent with Tiebout (1956) competition being a source of spatial dependence in the timings of women's suffrage adoptions across US states. The western states – generally early adopters of women's suffrage – competed with one another over women's suffrage policies as part of an effort to attract women and families. For example, in 1865 California had three men for every woman; in Washington (then a territory) the ratio was 4:1 and in Colorado it was actually 20:1 (Flexner 1959, p. 157). (**Figure 4.2** provides a map of the US where states are shaded according to their female population shares.)

Figure 4.2 Share of Women 21 Years of Age and Older in the U.S. in 1922

Mead (2004) reports that Colorado adopted women's suffrage in 1893 based on what they viewed as the success of that policy in Wyoming (adopted 1869). More generally, Lemke (2016) reports that jurisdictional competition around the turn of the century led to not only suffrage but also to various other political and economic rights being extended to women.

There is also some anecdotal evidence that political strategies associated with the women's suffrage movement led to spatial dependence in the timings of adoptions across states. For example, suffragists campaigning in Nevada (adopted 1914) leveraged the fact that all of its neighboring states had already granted women the vote. They distributed maps with Nevada shaded in black and featuring the slogan: "Out, Damned Spot!" (Catt and Shuler 1923). Media in Washington State (adopted 1910) provided extensive coverage of 1858 and 1860 suffrage campaigns in the neighboring state of Oregon (adopted 1912); similarly, New Jersey suffragists, following adoption in that state, moved on to participate in rallies in New York (Catt and Shuler 1923).

Lesage and Dominguez (2012) discuss the importance of employing spatial econometric models in empirical public choice studies. In the present context, a state's government revenue

and expenditures policies may have been determined in part by those of neighboring states.³⁶ Furthermore, while a state's adoption of women's suffrage may have affected its revenue and expenditure policies, the timing of its adoption may itself have been affected by the adoption of women's suffrage by neighboring states. As such, any estimate of the relationship between women's suffrage and government must include appropriate estimates of both the direct and indirect effects (LeSage and Pace 2009). The latter are cumulative changes that include feedback effects. The total effect of women's suffrage on government expenditures or revenues must be correctly calculated as the sum of the direct and indirect effects.

Based on the estimation of spatial Durbin models (SDMs) we report that women's suffrage is not meaningfully related to total state revenues or expenditures in a statistically significant way. However, disaggregating state government expenditures into different categories does yield some significant results. In particular, women's suffrage appears to have had statistically significant and positive indirect effects on social service expenditures; also positive and statistically significant direct effects on transportation expenditures. Following Lott and Kenny (1999) our women's suffrage variable is an interaction between a suffrage dummy (1 if yes; 0 otherwise) and the 21-or-older female population share. To place the above results in a quantitative perspective, conditional on women being granted suffrage in a state a standard deviation increase in the female population share is associated with about a cumulative 1.5% increase in social service expenditures; around a 14% increase in transportation expenditures.

Our results are interesting when compared to those of Lott and Kenny (1999). On the one hand, our results are consistent with the general narrative provided by Lott and Kenny: women

³⁶ The revenue and expenditure policies of neighboring states can also be linked because voters use neighboring state policies as a "yardstick" against which to evaluate their own state's policy offerings (Shleifer 1985; Besley and Case 1995).

have greater demand for government services and women's suffrage was associated with expansions in state governments. On the other hand, Lott and Kenny report statistically significant effects in regards to total revenues and expenditures, but do not find meaningful effects in regards to different expenditures categories. They argue that those "categories do not capture the major trends in taxes and spending" (p. 1178). While their argument is a reasonable one, once spatial dependence is accounted for we find that statistically significant effects of women's suffrage are *only* associated with the social services and transportation categories of state expenditures. While our findings are in this way inconsistent with those of Lott and Kenny, they are consistent with Miller (2008) who reports that women's suffrage was associated with public health spending in particular.

Our paper relates to the broader literature on the determinants of US government growth during the twentieth century.³⁷ While this paper studies US government growth during 20th century in connection to women's suffrage, Holcombe (1997), for example, argues that Civil War veterans were the first special interest group to obtain monetary transfers from the US federal government and that they set a precedent followed by other special interest groups in the twentieth century. Alternatively, Higgs (1987) argues that periods of crises – examples of particular importance include the Great Depression and the World Wars – led to "ratchet effects" in government spending and involvement in the economy.³⁸ And Zywicki (1994) argues that the

³⁷ See Holcombe (2005) for a review of different theories of US government growth. See also Shelton (2007) for a review of the theories in the context of accounting for cross-country experiences; also an empirical analysis the competing hypotheses for a large panel of countries, 1970-2000.

³⁸ Peacock and Wiseman (1961) originally put forth the idea of ratchet effects, where government expands in size and scope during a crisis period and then subsequently contracts, though not all the way to its initial size and scope; they support their hypothesis using British data. Rasler and Thompson (1985) provide evidence in support of ratchet effects based on the British, French, Japanese, and US experiences. However, Holcombe (1993) notes that the estimated trend growth in US federal government expenditures any Great Depression/WWII ratchet effect that is discernable in the data. Also, Bologna and Young (2015) examine a panel of 70 countries from 1966-2010; based on Reinhart and Rogoff (2009, 2011) crises dates, report effects on measures of government size and scope that are for the most part statistically insignificant.

movement towards popular election of the US Senate (culminating in the Seventeenth Amendment) combined with the increasing importance of interstate special interest groups led to an expansion in federal government size and scope.³⁹ Related closely to the issue studied in the present paper, Husted and Kenny (1997) argue that the removal of poll taxes and literacy tests in the mid-Twentieth century resulted in an effective expansion of the franchise to poorer individuals and an increase in government welfare expenditures.

Though we are ultimately interested in accounting for US government growth, the spatial dependence of women's suffrage policies is fundamental to our analysis. Our paper, then, is also related to the growing number of studies that consider spatial dependence and spillovers in policies and institutions (e.g., Baicker 2005; Hall and Ross 2010; Bologna 2014; Bologna et al. 2014).

We proceed as follows. In section 2 we discuss the Lott and Kenny (1999) data that we revisit and the spatial econometric methodology that we employ. We then present our main results in section 3. Having established those main results, we report on a number of alternative specifications and robustness checks in section 4. Finally, we provide some concluding discussion in section 5.

4.2. Data and Methodology

We work with the same data that Lott and Kenny (1999) employ.⁴⁰ These data are for the 48 contiguous US states, annually from 1870 to 1940. Taxation and spending data are drawn from

³⁹ However, Tarabar and Hall (2015) fail to find any structural break senators ideology (NOMINATE scores: Poole and Rosenthal 1997) associated with the Seventeenth Amendment. This is consistent with Romero's (2007) finding that there is no statistically significant difference in the percentage of roll call in favor of "Progressive" reforms pre- and post-Amendment.

⁴⁰ Lawrence Kenny generously made the data available to us.

the *Financial Statistics of States* or provided to Lott and Kenny by John Wallis (Lott and Kenny 1999, pp. 1168-1169) and are converted into real (1967) dollars and made per capita. In our estimations, revenues and expenditures are always logged. Population and labor force data are drawn from the *Historical Statistics of the United States: Colonial Times to 1970* (US Census Bureau 1975).

The dependent variables in our main estimations (reported in section 3) are (log) per capita real revenue and expenditure series, and measures of congressional voting patterns. First, we consider states' total expenditures (*EXP*) and total revenues (*REV*). Then we break down expenditures into different major categories: current and capital expenditures on elementary and secondary schools and libraries (*EDU*); current expenditures on social services, such as charities, prisons, and hospitals (*SOC*); current and capital highway expenditures (*TRANS*). Following Lott and Kenny (1999), we also report results based on Poole and Rosenthal (1991) NOMINATE scores for voting patterns in the Senate (*SNOM*) and the House of Representatives (*HNOM*). The NOMINATE scores map Senate and House ideology outcomes onto a scale from -1 to 1. Positive values indicate conservative (right; less government) values; negative values indicate liberal (left; more government) values. Values farther from 0 in either direction indicate greater ideological strength. While the revenue and expenditure dependent variables speak to the relationship between women's suffrage and state governments, the NOMINATE scores give us some idea of whether women's suffrage influenced the size and scope of the US federal government.

The control variable of primary interest is an interaction between a women's suffrage binary variable and the 21 years and older female population share. The binary variable takes a value of 1 for observations corresponding to a given year and a state that has adopted women's

suffrage; 0 otherwise. The interaction, then, provides a measure of women's portion of the electorate (which is, of course, nil if they are not permitted to vote). It is the share of women who are 21 or older in states that had granted the vote; zero otherwise. **Table 4.1** contains summary statistics for variables used in the estimations⁴¹

Table 4.1 Summary Statistics

Variable	Description	Mean	St. Dev.	Obs
<i>REV</i>	Natural log of state total revenue	3.388	0.736	864
<i>EXP</i>	Natural log of state total expenditure	3.312	0.697	768
<i>EDU</i>	Natural log of education expenditure	2.038	0.660	864
<i>SOC</i>	Natural log of expenditure on social services	1.306	0.799	864
<i>TRANS</i>	Natural log of expenditure on highways	2.178	1.344	720
<i>SNOM</i>	Senate voting patterns index	-0.016	0.401	720
<i>HNOM</i>	House of representatives voting patterns	0.015	0.285	672
Share of female population age 21 or over in the states where suffrage has been implemented		0.478	0.032	698
Binary suffrage variable	Equal to 1 if suffrage rights have been implemented and 0 otherwise	0.828	0.378	864
Poll tax	Binary variable equal to 1 if there is a poll tax in place and 0 otherwise	0.220	0.414	864
Literacy test	Binary variable equal to 1 if there is a literacy test requirement for voting and 0 otherwise	0.382	0.486	864
Secret Ballot	Binary variable equal to 1 if there is a secret ballot in place and 0 otherwise	0.954	0.210	864
Motor vehicle registration	Per capita motor vehicle registrations	0.235	2.384	864
Log density	Natural logarithm of population density	3.571	1.443	864
Rural	Share of rural population	0.561	0.201	864
Fraction of the population that is black	Share of the population that is black	0.097	0.142	864
Fraction of the population age 65 or older	Share of the population age 65 or older	0.052	0.015	864
Female workers	Share of the workforce that is female	0.309	0.082	864
Manufacturing	Share of the work force in manufacturing	0.115	0.083	864
Fraction of the population age 10 that is illiterate	Share of the population age 10 and older that is illiterate	0.053	0.047	864
Fraction of the population that is foreign-born	Share of the population that is foreign born	0.106	0.081	864
Real manufacturing wage	Real manufacturing wage	3077.766	1517.384	864

⁴¹ Analogous to Lott and Kenny's table 4 we report results for only this one additional control, leaving the results of a larger set of socio-economic controls for the appendix (**tables A1-A12**). This set consists of binary variables for a literacy test requirement and a secret ballot; per capita motor vehicle registrations, population density, female labor force share, the manufacturing employment share, and the real manufacturing wage rate; population shares for rural areas, black individuals, 65 years or older individuals, 10 years older and illiterate, and foreign born.

All of our regressions also include a poll tax binary variable (1 if a poll tax was in effect; 0 otherwise). Lott and Kenny (1999) hypothesize and find empirical evidence that a poll tax will be, all else equal, associated with less support for taxes and government expenditures. They reason that a poll tax decreases voter turnout in favor of higher income members of the electorate, and higher income voters are less supportive of redistributive policies (Husted and Kenny 1997).

The novel results reported in this paper are from the estimation of spatial econometric models. The data are organized into panels and spatial econometric techniques require that panels be balanced. As such, we employ somewhat smaller samples than those employed by Lott and Kenny (1999).

Table 4.2 Years Included in Spatial Analysis for Dependent Variables

	<i>REV</i>	<i>EXP</i>	<i>EDU</i>	<i>SOC</i>	<i>TRANS</i>	<i>HNOM</i>	<i>SNOM</i>
1912							
1914							
1915							
1916							
1917							
1918							
1919							
1920							
1922							
1923							
1924							
1925							
1926							
1927							
1928							
1929							
1930							
1931							
1932							
1934							
1936							
1937							
1938							
1939							
1940							
Number of Years	18	16	18	18	15	14	15

For each dependent variable, **table 4.2** reports the years for which observations are available for each of the 48 contiguous states. Therefore we also report OLS results (analogous to Lott and Kenny) to ensure that the novel spatial econometric results do not differ simply because of different samples.⁴²

To choose an appropriate spatial econometric model for each dependent variable we follow the procedure described in Elhorst (2010). The first step in the procedure is to estimate an OLS model and establish the need to include spatial and/or time-period fixed effects. The next step is to find out if there is any kind of spatial correlation in the data by employing Lagrange-Multiplier (LM) tests of auto and error correlation.

There are four LM-tests to be conducted: LM no spatial lag, LM no spatial error, robust LM no spatial lag, and robust LM no spatial error tests. The two robust tests allow for the presence of the other type of spatial correlation in the data: robust LM no spatial error test also allows for spatial lag, and similarly robust LM no spatial lag allows for spatial error correlation. As Elhorst (2010) warns including spatial and/or time period fixed effects in the model might lead to incorrect rejection of no spatial lag hypothesis when using a robust LM no spatial lag test. Furthermore, neither of the two tests allow for spatial lag of the independent variables. Thus, Elhorst (2010) suggests that the failure to reject no auto or no spatial error correlation should prompt to estimate the default spatial Durbin model (SDM):

$$Y_t = \rho WY_t + X_t\beta + WX_t\theta + \Gamma + \delta_t I_N + E_t \quad (4.1)$$

Where $Y_t = (Y_{1t}, \dots, Y_{Nt})'$ and each $Y_{it} (i=1, \dots, N)$ represents a vector of observations of one of the dependent variables over the years T ; $X_t = (X'_{1t}, \dots, X'_{Nt})'$, where each X_{it} is a $K \times N$ matrix representing independent variables, one of interest being the interaction of women's suffrage

⁴² In the next section we additionally report OLS results based on the full sample Lott and Kenny employ

with the female population share; $E_t = (\varepsilon_{1t}, \dots, \varepsilon_{Nt})'$, with each ε_{it} being a vector of errors; $\Gamma = (\gamma_1, \dots, \gamma_N)'$ where each element represents a vector of state fixed effects; and δ_t denotes time-specific effects (I_N is an $N \times 1$ vector of ones); ρ is a spatial autoregressive coefficient; β and Θ are $K \times 1$ vectors containing estimated coefficients on the independent variables; $N = 48$ states; T depends on the particular dependent variable; $W = W_{NT} = I_T \otimes W_N$ is a spatial weight matrix that characterizes the relationship of neighboring states,⁴³ I_T is a $T \times T$ identity matrix.

Once SDM is fitted, Wald and Likelihood Ratio tests are employed to test two hypotheses. The first one is: $H_o: \Theta = 0$, which suggests fitting Spatial lag, or Spatial Auto Regressive (SAR) model:

$$Y_t = \rho W Y_t + X_t \beta + \Gamma + \delta_t I_N + E_t \quad (4.2)$$

The second hypothesis $H_o: \Theta + \rho \beta = 0$ suggests fitting Spatial Error Model (SEM):

$$Y_t = \rho W Y_t + X_t \beta + \Gamma + \delta_t I_N + \Phi_t, \Phi_t = \mu W \Phi_t + E_t \quad (4.3)$$

here the spatial error term matrix Φ_t , depends on the error terms of the neighbors and the random error matrix E_t . Failing to reject the two hypotheses would prompt to employ SAR or SEM in place of SDM only if the LM tests point to that model as well, otherwise SDM is the suggested model. Additionally, Elhorst (2010) suggests conducting a Hausman test to decide if random state effects model would fit the data better than a fixed state effects model.

4.3. Main Results

We report four sets of OLS results for each dependent variable: (i) pooled, (ii) fixed state effects, (iii) fixed year effects, and (iv) two-way fixed effects. **Table 4.3** reports these results for *REV*.

⁴³ See **appendix C** on how matrix W_N is constructed.

The pooled OLS results (column 1) are qualitatively and quantitatively similar to those reported by Lott and Kenny (1999): female suffrage is positively and statistically significantly (1% level) associated with total state government revenue collected. Based on the point estimate, conditional on women's suffrage a standard deviation in the (21 and older) female population share (0.032) is associated with about a 4.7% increase in total real per capita revenues.

Columns 2 and 3 of **table 4.3** contain results based on, respectively, state or year fixed effects being included. The coefficient estimates on the women's suffrage interaction are contradictory (positive for state effects only; negative for year effects only). However, likelihood ratio (LR) tests reject the null hypotheses that either set of effects is jointly insignificant (1% level in both cases).⁴⁴ When both state and year fixed effects are included (column 4) the coefficient estimate on the women's suffrage interaction decreases substantially (relative to that reported in column 1) and is only significant at the 10% level. Based on the two-way fixed effects point estimate, conditional on women's suffrage a standard deviation in the female population share is associated with only about 1/3 of a 1% increase in total real per capita state revenues.

⁴⁴ The state fixed effects LR test is based on a comparison of the model with only year fixed effects (column 2) to the two-way fixed effects model (column 4); the year fixed effects LR tests is based on a comparison of the model with only state fixed effects (column 3) to the two-way fixed effects model (column 4).

Table 4.3 OLS Estimates from Regressions of (Log) Total State Revenue on Female Suffrage Interaction Variable

	(1)	(2)	(3)	(4)
	Pooled OLS	State Fixed Effects	Time-period Fixed Effects	Two way fixed effects
Female suffrage x fraction of the population that is female	1.470*** (13.67)	0.513*** (8.429)	-0.190** (-2.365)	0.106* (1.786)
Poll tax	-0.179** (-2.566)	-0.00506 (-0.071)	-0.215*** (-6.173)	-0.224*** (-4.340)
LM spatial lag	774.614***	162.074***	45.202***	7.873***
LM spatial error	471.243***	198.414***	42.043***	6.493***
robust LM spatial lag	309.315***	348.290***	6.798***	4.695**
robust LM spatial error	5.944**	12.198***	3.638*	3.315*
State fixed effects LR Test		754.286***		
Time period fixed effects LR Test		606.650***		
States	48	48	48	48
Observations	864	864	864	864
R-squared	0.565	0.910	0.893	0.955

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. t-statistics is in parentheses. Dependent variable is *REV*. Constants are included in regressions though not reported above. The null of likelihood ratio state fixed effects test is that the state fixed effects are jointly insignificant. The null of likelihood ratio time period fixed effects test is that the time period fixed effects are jointly insignificant.

The Lagrange multiplier (LM) tests reported in column 4 of **table 4.3** all suggest that there is spatial dependence in the sample. Therefore we follow Elhorst (2010) and estimate a SDM and conduct Wald and LR tests to assess the more restrictive SEM and SAR alternatives. We also employ a Hausman test to determine whether we will include random or fixed state effects in the SDM model. The Hausman test fails to reject the null of a significant difference between the random and fixed effects models. This suggests that each US state has unobservable characteristics that are uncorrelated with the included controls. Since the random state effects model will yield efficient estimates, we report in **table 4.4** the estimated results for an SDM of

REV with random state effects and fixed year effects. Wald tests then lead to the rejection of the SEM and SAR models in favor of the SDM.⁴⁵

Table 4.4 SDM Estimates from Regressions of (Log) Total State Revenue on Female Suffrage Interaction Variable

	(1) Direct	(2) Indirect	(3) Total
Female suffrage x fraction of the population that is female	0.074	-0.015	0.059
	(1.064)	(-0.143)	(0.568)
Poll tax	-0.217***	-0.096	-0.312*
	(-4.250)	(-0.665)	(-1.866)
ρ		0.138***	
		(2.909)	
Wald test spatial lag		35.916***	
Wald test spatial error		37.316***	
Random Effects Hausman Test		5.374	
States		48	
Observations		864	
R-squared		0.656	

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. t-statistics is in parentheses. Dependent variable is *REV*. Constants are included in regressions though not reported above. Random state and time fixed effects are included in the regression. Random effects refer to random spatial effects. The null hypothesis for the Hausman test is that there is significant difference between the random state effects model and the fixed state effects model.

Since an SDM includes the spatial autoregressive parameter (ρ) the estimated coefficients cannot themselves be interpreted as the correct marginal effects of the controls. This is because feedback effects must be taken into account. For example, the adoption of women's suffrage in Colorado may affect spending patterns not only in Colorado but also in its neighbors, including Wyoming. However, spending patterns in Wyoming will then feedback into spending patterns in Colorado. To account for these feedback effects, we follow LeSage and Pace's (2009) procedure for calculating the correct direct, indirect, and total effects of women's suffrage and other

⁴⁵ LR tests are not conducted for random effects model, as they would require estimation of spatial lag random effects and spatial error random effects models.

controls. In particular, the indirect effects are cumulative, including feedback effects. The total effects are the sum of the direct and indirect effects.

As reported in **table 4.4**, once spatial dependence is taken into account women's suffrage does not appear to have statistically significant direct or indirect effects on total state revenues. The spatial autoregressive parameter estimate is positive and statistically significant (1% level), consistent with spatial dependence. However, the correctly calculated marginal effects do not suggest a meaningful relationship between the adoption of women's suffrage and states' total revenue collections.

Turning to total state expenditures (*EXP*), OLS results are reported in **table 4.5**. Regarding the coefficient estimates on the women's suffrage interaction, the results are largely similar to those reported for total revenues in **table 4.3**. (The LR tests again suggest that neither set of fixed effects is redundant.) However, in the case of expenditures the two-way fixed effects estimate is not only very small, but it is also not statistically significant. However, similar testing as described above suggests that there is spatial dependence in the data and that an SDM with random state and fixed year effects is appropriate. The results from estimating that model are reported in **table 4.6** and, as with revenues, neither the direct nor the indirect effects are statistically significant. Unlike Lott and Kenny (1999), our spatial econometric results suggest that women's suffrage did not affect overall state government expenditures and revenues patterns.

Table 4.5 OLS Estimates from Regressions of (Log) Total State Expenses on Female Suffrage Interaction Variable

	(1) Pooled OLS	(2) State Fixed Effects	(3) Time-period Fixed Effects	(4) Two way fixed effects
Female suffrage x fraction of the population that is female	1.389*** (12.971)	0.531*** (7.368)	-0.168* (-1.932)	0.058 (0.811)
Poll tax	-0.249*** (-3.418)	-0.171* (-1.878)	-0.293*** (-7.394)	-0.305*** (-4.555)
LM spatial lag	645.493***	320.040***	39.824***	5.989**
LM spatial error	433.906***	213.086***	33.026***	3.108*
robust LM spatial lag	213.507***	108.937***	7.782***	6.933***
robust LM spatial error	1.920	1.984	0.984	4.0516**
State fixed effects LR Test		509.211***		
Time period fixed effects LR Test		500.821***		
States	48	48	48	48
Observations	768	768	768	768
R-squared	0.541	0.866	0.864	0.930

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. t-statistics is in parentheses. Dependent variable is *EXP*. Constants are included in regressions though not reported above. The null of likelihood ratio state fixed effects test is that the state fixed effects are jointly insignificant. The null of likelihood ratio time period fixed effects test is that the time period fixed effects are jointly insignificant.

Table 4.6 SDM Estimates from Regressions of (Log) Total State Expenses on Female Suffrage Interaction Variable

	(1) Direct	(2) Indirect	(3) Total
Female suffrage x fraction of the population that is female	0.040 (0.468)	-0.087 (-0.675)	-0.046 (-0.390)
Poll tax	-0.292*** (-4.665)	-0.159 (-0.926)	-0.451** (-2.258)
ρ		0.114** (2.235)	
Wald test spatial lag		26.112**	
Wald test spatial error		28.758**	
Random Effects Hausman Test		33.077	
States		48	
Observations		768	
R-squared		0.616	

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. t-statistics is in parentheses. Dependent variable is *EXP*. Constants are included in regressions though not reported above. Random state and time fixed effects are included in the regression. Random effects refer to random state effects. The null hypothesis for the Hausman test is that there is significant difference between the random state effects model and the fixed state effects model.

We now disaggregate state government expenditures into some major categories and consider them separately. In **table 4.7** we report OLS estimates based on educational expenditures (*EDU*) at the dependent variable. The results are again qualitatively quite similar to those reported in **tables 4.3** and **4.5**. In particular, the two-way fixed effects coefficient estimate on the women's suffrage interaction is small and statistically insignificant. Also, in this case the LM tests associated with the two-way fixed effects model (column 4) do not suggest that the data are characterized by spatial dependence. We therefore consider the OLS two-way fixed effects as preferred and conclude that women's suffrage does not have a meaningful association with state education expenditure patterns.

Table 4.7 OLS Estimates from Regressions of (Log) Education Expenses on Female Suffrage Interaction Variable

	(1) Pooled OLS	(2) State Fixed Effects	(3) Time-period Fixed Effects	(4) Two way fixed effects
Female suffrage x fraction of the population that is female	0.866*** (8.130)	0.277*** (4.038)	-0.187 (-1.468)	0.044 (0.537)
Poll tax	-0.282*** (-4.084)	-0.313*** (-3.900)	-0.302*** (-5.502)	-0.438*** (-6.200)
LM spatial lag	321.036***	133.745***	45.312***	0.145
LM spatial error	219.542***	100.476***	21.371***	0.030
robust LM spatial lag	104.264***	33.752***	30.068***	0.437
robust LM spatial error	2.769*	0.484	6.126**	0.321
State fixed effects LR Test		997.907***		
Time period fixed effects LR Test		265.293***		
States	48	48	48	48
Observations	864	864	864	864
R-squared	0.469	0.857	0.666	0.895

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. t-statistics is in parentheses. Dependent variable is *EDU*. Constants are included in regressions though not reported above. The null of likelihood ratio state fixed effects test is that the state fixed effects are jointly insignificant. The null of likelihood ratio time period fixed effects test is that the time period fixed effects are jointly insignificant.

Alternatively, we do report meaningful results in regards to state social services expenditures (*SOC*). **Table 4.8** contains the OLS estimates and, while the LR tests again suggest that we focus

on the two-way fixed effects results (column 4), in this case the women's suffrage interaction enters positively and statistically significantly (1% level).

Table 4.8 OLS Estimates from Regressions of (Log) Social Services Expenses on Female Suffrage Interaction Variable

	(1)	(2)	(3)	(4)
	Pooled OLS	State Fixed Effects	Time-period Fixed Effects	Two way fixed effects
Female suffrage x fraction of the population that is female	0.857*** (7.947)	0.149** (2.219)	-0.0597 (-0.626)	0.292*** (4.023)
Poll tax	-0.207*** (-2.952)	0.0101 (0.128)	-0.212*** (-5.148)	-0.193*** (-3.078)
LM spatial lag	600.246***	258.666***	4.764**	3.600*
LM spatial error	236.869***	119.172***	2.752*	0.625
robust LM spatial lag	415.065***	145.730***	2.440	15.388***
robust LM spatial error	51.687***	6.236**	0.428	12.414***
State fixed effects LR Test		710.389***		
Time period fixed effects LR Test		436.484***		
States	48	48	48	48
Observations	864	864	864	864
R-squared	0.629	0.907	0.872	0.944

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. t-statistics is in parentheses. Dependent variable is *SOC*. Constants are included in regressions though not reported above. The null of likelihood ratio state fixed effects test is that the state fixed effects are jointly insignificant. The null of likelihood ratio time period fixed effects test is that the time period fixed effects are jointly insignificant.

Based on the point estimate, the effect is modest: conditional on women's suffrage a standard deviation increase in the female population share is associated with an increase in social services expenditures of just under 1%. Furthermore, the LM tests indicate spatial dependence, so in **table 4.9** we report the SDM results. Here we see that, while the direct effects estimate is small and statistically insignificant, the indirect effects estimate is positive and statistically significant (1% level). The total effect is also positive and significant (1% level); based on the point estimate, conditional on women's suffrage a standard deviation increase in a particular state's female population share increases real per capita social services expenditures cumulatively across states by about 1.5%.

Table 4.9 SDM Estimates from Regressions of (Log) Social Services Expenses on Female Suffrage Interaction Variable

	(1)	(2)	(3)
	Direct	Indirect	Total
Female suffrage x fraction of the population that is female	0.093	0.390***	0.483***
	(1.167)	(3.268)	(4.516)
Poll tax	-0.243***	-0.009	-0.252
	(-3.868)	(-0.061)	(-1.494)
ρ		-0.018	
		(0.375)	
Wald test spatial lag		189.353***	
LR test spatial lag		186.546***	
Wald test spatial error		172.070***	
LR test spatial error		189.121***	
Random Effects Hausman Test		97.368***	
States		48	
Observations		864	
R-squared		0.350	

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. t-statistics is in parentheses. Dependent variable is *SOC*. Constants are included in regressions though not reported above. State and time fixed effects are included in the regression. Random effects refer to random state effects. The null hypothesis for the Hausman test is that there is significant difference between the random state effects model and the fixed state effects model.

We likewise report positive and significant effects for women's suffrage in relation to state transportation expenditures. The two-way fixed effects OLS estimate on the women's suffrage interaction is positive, large, and statistically significant (**table 4.10**; column 4). The LM tests support the presence of spatial dependence in the data, so we will focus again on the SDM results (**table 4.11**). Unlike the case of social services expenditures, with regards to transportation expenditures the direct effect estimate for women's suffrage is positive and statistically significant; the indirect effect estimate is near zero and statistically insignificant. Perhaps not surprisingly then, the OLS two-way fixed effects estimate on women's suffrage is about the same size as the direct effect estimate from the SDM model. Conditional on women's suffrage in either case, a standard deviation increase in a state's female population share is associated with around a 14% increase in its real per capita transportation expenditures.

Table 4.10 OLS Estimates from Regressions of (Log) Transportation Expenses on Female Suffrage Interaction Variable

	(1) Pooled OLS	(2) State Fixed Effects	(3) Time-period Fixed Effects	(4) Two way fixed effects
Female suffrage x fraction of the population that is female	5.026***	4.858***	4.638***	4.394***
	(14.92)	(14.393)	(13.875)	(13.123)
Poll tax	-0.248	-0.175	-0.459**	-0.379**
	(-1.597)	(-1.156)	(-2.546)	(-2.161)
LM spatial lag	0.058	0.296	2.406	1.724
LM spatial error	0.471	1.716	5.639**	3.902**
robust LM spatial lag	0.343	0.931	0.654	0.389
robust LM spatial error	0.757	2.351	3.886**	2.566
State fixed effects LR Test		63.426***		
Time period fixed effects LR Test		80.821***		
States	48	48	48	48
Observations	720	720	720	720
R-squared	0.453	0.492	0.504	0.546

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. t-statistics is in parentheses. Dependent variable is *TRANS*. Constants are included in regressions though not reported above. The null of likelihood ratio state fixed effects test is that the state fixed effects are jointly insignificant. The null of likelihood ratio time period fixed effects test is that the time period fixed effects are jointly insignificant.

Table 4.11 SDM Estimates from Regressions of (Log) Transportation Expenses on Female Suffrage Interaction Variable

	(1) Direct	(2) Indirect	(3) Total
Female suffrage x fraction of the population that is female	4.558***	-0.080	4.479***
	(13.328)	(-0.131)	(6.431)
Poll tax	-0.436**	-0.684**	-1.120***
	(-2.541)	(-2.056)	(-3.043)
ρ		-0.206***	
		(-3.502)	
Wald test spatial lag		31.900***	
LR test spatial lag		29.636***	
Wald test spatial error		26.035**	
LR test spatial error		25.424**	
States		48	
Observations		720	
R-squared		0.491	

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. t-statistics is in parentheses. Dependent variable is *TRANS*. Constants are included in regressions though not reported above. Time fixed effects are included in the regression.

Now we turn to the congressional voting patterns as captured by the House of Representatives (*HNOM*) and Senate (*SNOM*) NOMINATE scores. While the expenditure and revenue dependent variables reported on above are state-level variables, the NOMINATE scores speak to changes that might have been taking place at the level of the federal government. To save space, while we report OLS results for *HNOM* in **table 4.12** we focus here on the SDM model results (**table 4.13**) as supported by the LM tests. The estimate direct, indirect, and total effects of women's suffrage on House voting patterns are all small and statistically insignificant. We similarly find no evidence that women's suffrage is associated with changes in Senate voting patterns. The OLS results for *SNOM* are reported in **table 4.14** and the LM tests do not suggest that the data are characterized by spatial dependence. The two-way fixed effects estimate on the women's suffrage interaction is small and statistically insignificant⁴⁶.

⁴⁶ Appendix B contains tables that report results of SDM estimations for Senate voting patterns. Once we take spatial correlation into account we find there to be a negative and significant relationship between women's suffrage and Senate voting patterns in the same state, similar to the finding of Lott and Kenny (1999). This difference in results for Senate and House voting patterns could be explained by higher turnover in the House of Representatives than in the Senate (compare 2 and 6 year terms) which then translates into short and long-term responses to constituents' requests.

Table 4.12 OLS Estimates from Regressions of House Voting Patterns on Female Suffrage Interaction Variable

	(1) Pooled OLS	(2) State Fixed Effects	(3) Time-period Fixed Effects	(4) Two way fixed effects
Female suffrage x fraction of the population that is female	0.0772 (1.647)	0.180*** (3.694)	0.163** (2.234)	0.011 (0.155)
Poll tax	-0.011 (-0.364)	0.045 (0.907)	-0.004 (-0.141)	0.043 (0.930)
LM spatial lag	64.589***	98.488***	15.866***	14.444***
LM spatial error	33.277***	76.980***	0.541	4.473**
robust LM spatial lag	37.131***	32.909***	45.174***	49.150***
robust LM spatial error	5.819**	11.401***	29.850***	39.179***
State fixed effects LR Test		269.678***		
Time period fixed effects LR Test		130.728***		
States	48	48	48	48
Observations	672	672	672	672
R-squared	0.620	0.737	0.676	0.783

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. t-statistics is in parentheses
Dependent variable is *HNOM*. Constants are included in regressions though not reported above. The null of likelihood ratio state fixed effects test is that the state fixed effects are jointly insignificant. The null of likelihood ratio time period fixed effects test is that the time period fixed effects are jointly insignificant.

Table 4.13 SDM Estimates from Regressions of House Voting Patterns on Female Suffrage Interaction Variable

	(1) Direct	(2) Indirect	(3) Total
Female suffrage x fraction of the population that is female	-0.005 (-0.073)	0.062 (0.497)	0.057 (0.492)
Poll tax	0.073 (1.487)	0.186 (1.532)	0.259* (1.851)
ρ		0.111** (2.054)	
Wald test spatial lag		65.528***	
LR test spatial lag		70.260***	
Wald test spatial error		71.660***	
LR test spatial error		78.535***	
Random Effects Hausman Test		62.424***	
States		48	
Observations		672	
R-squared		0.266	

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. t-statistics is in parentheses
Dependent variable is *HNOM*. Constants are included in regressions though not reported above. State and time fixed effects are included in the regression. Random effects refer to random state effects. The null hypothesis for the Hausman test is that there is significant difference between the random state effects model and the fixed state effects model.

Table 4.14 OLS Estimates from Regressions of Senate Voting Patterns on Female Suffrage Interaction Variable

	(1) Pooled OLS	(2) State Fixed Effects	(3) Time-period Fixed Effects	(4) Two way fixed effects
Female suffrage x fraction of the population that is female	-0.042 (-0.604)	0.122* (1.752)	0.017 (0.153)	-0.136 (-1.312)
Poll tax	-0.054 (-1.178)	0.115 (1.524)	-0.049 (-1.105)	0.141* (1.880)
LM spatial lag	11.335***	9.130***	2.269	0.481
LM spatial error	2.227	5.920**	0.003	0.474
robust LM spatial lag	22.498***	6.654**	14.959***	0.009
robust LM spatial error	13.389***	3.444*	12.693***	0.002
State fixed effects LR Test		321.784***		
Time period fixed effects LR Test		44.192***		
States	48	48	48	48
Observations	720	720	720	720
R-squared	0.480	0.669	0.513	0.689

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. t-statistics is in parentheses. Dependent variable is *SNOM*. Constants are included in regressions though not reported above. The null of likelihood ratio state fixed effects test is that the state fixed effects are jointly insignificant. The null of likelihood ratio time period fixed effects test is that the time period fixed effects are jointly insignificant.

4.4. Further Results

In this section we employ several alternative specifications. To begin we first report OLS results based on the whole sample (years 1870 to 1940) to ensure that we are able to reproduce the results Lott and Kenny (1999) report. We then employ an alternative control variable of interest. It is a binary variable equal to 1 if there are female suffrage laws in place in a given year and a state; 0 otherwise. The reason to employ the binary variable and omit multiplying it by the shares of women is to avoid possible correlation between the shares of women in neighboring states. In the next alternative specification we employ placebo laws technique, similar to Bertrand et al (2004). If the results reported in the previous section still hold under the placebo laws, the identification strategy should be questioned. For each state we randomly assign the year when the suffrage laws were implemented, while keeping the mean and standard deviation of the non-

placebo year variable. Finally we report results of the three specifications described above based on a limited sample, that omits years 1920 and onwards, when women's suffrage was nationally established by the 19th amendment.

The results reported in column 1 of **table 4.15** are again, as in the previous section, qualitatively and quantitatively similar to those reported by Lott and Kenny (1999): the coefficient on the women's suffrage interaction is 0.213 and is statistically significant at the 10 percent level. Column 2 contains results of a regression employing the full sample with total tax revenue as the dependent variable and women's suffrage binary variable as the independent variable of interest. Although it is smaller in magnitude (compare 0.090 and 0.213 in column 1), it is still of the same sign. With the introduction of placebo laws (column 3 of **table 4.15**) the coefficient on the independent variable of interest changes, specifically it switches the sign.

Table 4.15 OLS Estimates from Regressions of (Log) State Total Revenue on Female Suffrage Interaction Variable, Binary Suffrage Variable, and Placebo Binary Suffrage Variable

	(1) Full sample	(2) Full sample	(3) Full sample	(4) Years 1920 and onwards omitted	(5) Years 1920 and onwards omitted	(6) Years 1920 and onwards omitted
Female suffrage x fraction of the population that is female	0.213*			0.115		
	(1.880)			(0.696)		
Suffrage binary variable		0.090*			0.065	
		(1.779)			(0.894)	
Placebo suffrage binary variable			-0.097*			0.047
			(-1.880)			(0.657)
Poll tax	-0.125***	-0.122***	-0.126***	0.032	0.034	0.028
	(-2.726)	(-2.658)	(-2.754)	(0.487)	(0.521)	(0.424)
States	48	48	48	48	48	48
Observations	1,832	1,832	1,832	1,179	1,179	1,179
R-squared	0.824	0.824	0.824	0.740	0.740	0.740

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. t-statistics is in parentheses. Dependent variable is *REV*. Constants are included in regressions though not reported above. The independent variable of interest in columns (1) and (4) is female suffrage interaction variable. In columns (2) and (5) binary variable equal to 1 if suffrage rights have been implemented in a state and 0 otherwise. In columns (3) and (6) placebo suffrage binary variables.

Next, we employ a subsample, excluding year 1920 and onward, when women's suffrage was nationally established, columns 4, 5, and 6 of **table 4.15**. In none of the specifications the independent variables of interest: women's suffrage interaction variable (column 4), suffrage binary variable (column 5), placebo binary variable (column 6) have statistically significant coefficients on them.

We then conduct a spatial analysis similar to the one described in section 3, however, now the independent variables of interest are either the binary suffrage variable or the placebo binary suffrage variable. For this spatial analysis, as in section 3, we are using subsample of year identified in **table 4.2** to preserve a balanced panel.

Column 4 of **table 4.16** contains results of an ordinary least squares regression with total state revenue as the dependent variable (*REV*) and suffrage binary variable as the independent variable of interest. The coefficient is marginally significant (10 percent level), however it is smaller in magnitude than the comparable coefficient on women's suffrage interaction, contained in column 4 of **table 4.3** (compare 0.055 and 0.106).⁴⁷

⁴⁷ **Tables 4.16, 4.18, 4.21, 4.23, 4.29, 4.31, 4.34, 4.36, 4.39, 4.41** contain results of OLS specifications that based on the testing procedure described in the previous section indicate spatial dependence in the data generating processes and suggest use of fixed state and year effects.

Table 4.16 OLS Estimates from Regressions of (Log) Total State Revenue on Female Suffrage Binary Variable

	(1)	(2)	(3)	(4)
	Pooled OLS	State Fixed Effects	Time-period Fixed Effects	Two way fixed effects
Female suffrage binary variable	0.717*** (13.598)	0.245*** (8.378)	-0.062 (-1.625)	0.055* (1.947)
Poll tax	-0.172** (-2.458)	-0.004 (-0.050)	-0.214*** (-6.153)	-0.223*** (-4.337)
LM spatial lag	785.571***	349.953***	44.549***	7.869***
LM spatial error	305.358***	163.773***	41.778***	4.733**
robust LM spatial lag	485.260***	198.043***	6.477**	6.288**
robust LM spatial error	5.046**	11.862***	3.707*	3.152*
State fixed effects LR Test		758.114***		
Time period fixed effects LR Test		609.754***		
States	48	48	48	48
Observations	864	864	864	864
R-squared	0.564	0.909	0.892	0.955

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. t-statistics is in parentheses. Dependent variable is *REV*. Constants are included in regressions though not reported above. The null of likelihood ratio state fixed effects test is that the state fixed effects are jointly insignificant. The null of likelihood ratio time period fixed effects test is that the time period fixed effects are jointly insignificant.

Table 4.17 contains results of estimating an SDM with total state revenue as the dependent variable and binary suffrage variable as the primary control of interest. Similar to the result reported in section 3 there is no statistically significant direct nor indirect relationship between women's suffrage and total state revenue. At the same time increase in state total revenue in one state is associated with increases in state revenue in neighboring states. This latter result also holds when placebo effects are in place, **table 4.19**. Only the year when suffrage was implemented in each state is changed, while the state's total revenue and its geographical location is still the same. This could serve as additional evidence to no relationship between state total revenue and women's suffrage.

Table 4.17 SDM Estimates from Regressions of (Log) Total State Revenue on Female Suffrage Binary Variable

	(1) Direct	(2) Indirect	(3) Total
Female suffrage binary variable	0.038 (1.161)	0.0003 (0.005)	0.038 (0.771)
Poll tax	-0.213*** (-4.044)	-0.091 (-0.656)	-0.304* (-1.858)
ρ		0.198*** (7.048)	
Wald test spatial lag		35.203***	
Wald test spatial error		36.536***	
Random Effects Hausman Test		22.845	
States		48	
Observations		864	
R-squared		0.655	

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. t-statistics is in parentheses. Dependent variable is *REV*. Constants are included in regression though not reported above. State and time fixed effects are included in the regression. Random effects refer to random state effects. The null hypothesis for the Hausman test is that there is significant difference between the random state effects model and the fixed state effects model.

Table 4.18 OLS Estimates from Placebo Test Regressions of (Log) Total State Revenue on Female Suffrage Binary Variable

	(1) Pooled OLS	(2) State Fixed Effects	(3) Time-period Fixed Effects	(4) Two way fixed effects
Female suffrage binary variable	0.657*** (12.502)	0.078** (2.449)	0.055 (1.616)	-0.026 (-0.994)
Poll tax	-0.215*** (-3.023)	0.012 (0.168)	-0.215*** (-6.165)	-0.227*** (-4.412)
LM spatial lag	773.371***	378.758***	43.566***	7.962***
LM spatial error	419.470***	183.555***	42.562***	5.518**
robust LM spatial lag	361.699***	207.175***	5.478**	4.099**
robust LM spatial error	7.798***	11.972***	4.475**	1.656
State fixed effects LR Test		755.303***		
Time period fixed effects LR Test		669.317***		
States	48	48	48	48
Observations	864	864	864	864
R-squared	0.551	0.903	0.892	0.955

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. t-statistics is in parentheses. Dependent variable is *REV*. Constants are included in regressions though not reported above. The null of likelihood ratio state fixed effects test is that the state fixed effects are jointly insignificant. The null of likelihood ratio time period fixed effects test is that the time period fixed effects are jointly insignificant.

Table 4.19 SDM Estimates from Placebo Test Regressions of (Log) Total State Revenue on Female Suffrage Binary Variable

	(1) Direct	(2) Indirect	(3) Total
Female suffrage binary variable	-0.017 (-0.657)	0.004 (0.051)	-0.014 (-0.175)
Poll tax	-0.221*** (-4.402)	-0.105 (-0.766)	-0.326** (-2.044)
ρ		0.199*** (7.049)	
Wald test spatial lag		35.494***	
Wald test spatial error		37.022***	
Random Effects Hausman Test		33.729	
States		48	
Observations		864	
R-squared		0.659	

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. t-statistics is in parentheses. Dependent variable is *REV*. Constants are included in regressions though not reported above. State and time fixed effects are included in the regression. Random effects refer to random state effects. The null hypothesis for the Hausman test is that there is significant difference between the random state effects model and the fixed state effects model.

The next dependent variable is state total expenses (*EXP*). A regression based on full sample (column 1, table 4.20) delivers similar to Lott and Kenny (1999) effects, specifically positive and statistically significant relationship. A change of the independent variable of interest from the suffrage interaction variable to a suffrage binary variable (column 2, table 4.20) still leads to a positive and significant relationship, however the estimated coefficient is lower than that in column 1 (compare 0.099 and 0.227). Randomly shuffling suffrage years (column 3, table 4.20) produces negative and statistically significant effect. Truncating the sample (columns 4, 5, and 6, table 4.20) does not produce any meaningful results.

Table 4.20 OLS Estimates from Regressions of (Log) State Total Expenses on Female Suffrage Interaction Variable, Binary Suffrage Variable, and Placebo Binary Suffrage Variable

	(1) Full sample	(2) Full sample	(3) Full sample	(4) Years 1920 and onwards omitted	(5) Years 1920 and onwards omitted	(6) Years 1920 and onwards omitted
Female suffrage x fraction of the population that is female	0.227** (1.990)			0.018 (0.122)		
Suffrage binary variable		0.099* (1.941)			0.020 (0.307)	
Placebo suffrage binary variable			-0.097* (-1.884)			0.041 (0.648)
Poll tax	-0.110** (-2.446)	-0.107** (-2.372)	-0.112** (-2.485)	0.029 (0.503)	0.030 (0.518)	0.027 (0.461)
States	48	48	48	48	48	48
Observations	1,881	1,881	1,881	1,230	1,230	1,230
R-squared	0.828	0.828	0.828	0.780	0.780	0.780

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. t-statistics is in parentheses. Dependent variable is *EXP*. Constants are included in regressions though not reported above. The independent variable of interest in columns (1) and (4) is female suffrage interaction variable. In columns (2) and (5) binary variable equal to 1 if suffrage rights have been implemented in a state and 0 otherwise. In columns (3) and (6) placebo suffrage binary variables.

Table 4.21 OLS Estimates from Regressions of (Log) Total State Expenses on Female Suffrage Binary Variable

	(1)	(2)	(3)	(4)
	Pooled OLS	State Fixed Effects	Time-period Fixed Effects	Two way fixed effects
Female suffrage binary variable	0.671*** (12.770)	0.253*** (7.329)	-0.051 (-1.252)	0.035 (1.022)
Poll tax	-0.242*** (-3.315)	-0.170* (-1.864)	-0.293*** (-7.369)	-0.304*** (-4.550)
LM spatial lag	653.175***	322.859***	39.031***	5.970**
LM spatial error	441.611***	217.360***	32.727***	3.098*
robust LM spatial lag	213.318***	107.080***	7.346***	6.840***
robust LM spatial error	1.754	1.581	1.043	3.968**
State fixed effects LR Test		513.035***		
Time period fixed effects LR Test		503.760***		
States	48	48	48	48
Observations	768	768	768	768
R-squared	0.538	0.865	0.864	0.930

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. t-statistics is in parentheses. Dependent variable is *EXP*. Constants are included in regressions though not reported above. The null of likelihood ratio state fixed effects test is that the state fixed effects are jointly insignificant. The null of likelihood ratio time period fixed effects test is that the time period fixed effects are jointly insignificant.

Table 4.22 SDM Estimates from Regressions of (Log) Total State Expenses on Female Suffrage Binary Variable

	(1)	(2)	(3)
	Direct	Indirect	Total
Female suffrage binary variable	-0.028 (0.743)	-0.041 (0.696)	-0.013 (-0.229)
Poll tax	-0.299*** (-4.614)	-0.175 (-1.008)	-0.474** (-2.313)
ρ		0.258*** (7.128)	
Wald test spatial lag		24.215**	
Wald test spatial error		26.859**	
Random Effects Hausman Test		35.044	
States		48	
Observations		768	
R-squared		0.796	

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. t-statistics is in parentheses. Dependent variable is *EXP*. Constants are included in regressions though not reported above. State and time fixed effects are included in the regression. Random effects refer to random state effects. The null hypothesis for the Hausman test is that there is significant difference between the random state effects model and the fixed state effects model.

Table 4.23 OLS Estimates from Placebo Test Regressions of (Log) Total State Expenses on Female Suffrage Binary Variable

	(1)	(2)	(3)	(4)
	Pooled OLS	State Fixed Effects	Time-period Fixed Effects	Two way fixed effects
Female suffrage binary variable	0.564*** (10.700)	0.102*** (2.714)	0.006 (0.152)	-0.045 (-1.436)
Poll tax	3.389*** (12.305)	-0.155* (-1.649)	-0.291*** (-7.320)	-0.310*** (-4.632)
LM spatial lag	663.992***	350.397***	38.368***	6.071**
LM spatial error	387.496***	239.352***	33.558***	3.286*
robust LM spatial lag	285.180***	113.071***	6.320**	6.448**
robust LM spatial error	8.684***	113.071***	1.510	3.663*
State fixed effects LR Test		515.636***		
Time period fixed effects LR Test		550.117***		
States	48	48	48	48
Observations	768	768	768	768
R-squared	0.512	0.857	0.864	0.930

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. t-statistics is in parentheses. Dependent variable is *EXP*. Constants are included in regressions though not reported above. The null of likelihood ratio state fixed effects test is that the state fixed effects are jointly insignificant. The null of likelihood ratio time period fixed effects test is that the time period fixed effects are jointly insignificant.

Table 4.24 SDM Estimates from Placebo Test Regressions of (Log) Total State Expenses on Female Suffrage Binary Variable

	(1) Direct	(2) Indirect	(3) Total
Female suffrage binary variable	-0.055* (-1.733)	-0.075 (-0.923)	-0.130 (-1.368)
Poll tax	-0.298*** (-4.891)	-0.146 (-0.879)	-0.445** (-2.283)
ρ		0.265*** (7.138)	
Wald test spatial lag		25.037**	
Wald test spatial error		27.940***	
Random Effects HausmanTest		36.164***	
States		48	
Observations		768	
R-squared		0.621	

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. t-statistics is in parentheses. Dependent variable is *EXP*. Constants are included in regressions though not reported above. State and time fixed effects are included in the regression. Random effects refer to random state effects. The null hypothesis for the Hausman test is that there is significant difference between the random state effects model and the fixed state effects model.

The results contained in **tables 4.22** and **4.24** again suggest that while there is no relationship between women's suffrage and state expenses, expenditure increases in one state are associated with expenditure increases in neighboring states. Implementing placebo effects in place of suffrage years does not alter the parameter ρ from table **4.22** to table **4.24**, again suggesting no relationship between state expenditure and women's suffrage rights.

Considering state spending on education (*EDU*), the results reported in **table 4.25** suggest no statistically significant relationship between women's suffrage and education spending. Likewise, as reported in **tables 4.26** and **4.27**, there is no evidence of spatial correlation in the data generating process, which is similar to the results reported in the previous section (**table 4.7**), nor there seems to be any statistically significant relationship between women's suffrage and state education spending.

Table 4.25 OLS Estimates from Regressions of (Log) State Education Expenses on Female Suffrage Interaction Variable, Binary Suffrage Variable, and Placebo Binary Suffrage Variable

	(1) Full sample	(2) Full sample	(3) Full sample	(4) Years 1920 and onwards omitted	(5) Years 1920 and onwards omitted	(6) Years 1920 and onwards omitted
Female suffrage x fraction of the population that is female	-0.129 (-0.703)			0.020 (0.070)		
Suffrage binary variable		-0.092 (-1.106)			-0.022 (-0.171)	
Placebo suffrage binary variable			0.304*** (3.749)			0.514*** (4.231)
Poll tax	-0.375*** (-5.097)	-0.379*** (-5.141)	-0.368*** (-5.023)	-0.284** (-2.456)	-0.286** (-2.469)	-0.308*** (-2.680)
States	48	48	48	48	48	48
Observations	1,827	1,827	1,827	1,173	1,173	1,173
R-squared	0.731	0.731	0.733	0.635	0.635	0.641

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. t-statistics is in parentheses. Dependent variable is *EDU*. Constants are included in regressions though not reported above. The independent variable of interest in columns (1) and (4) is female suffrage interaction variable. In columns (2) and (5) binary variable equal to 1 if suffrage rights have been implemented in a state and 0 otherwise. In columns (3) and (6) placebo suffrage binary

Table 4.26 OLS Estimates from Regressions of (Log) State Education Expenses on Female Suffrage Binary Variable

	(1)	(2)	(3)	(4)
	Pooled OLS	State Fixed Effects	Time-period Fixed Effects	Two way fixed effects
Female suffrage binary variable	0.421*** (8.055)	0.132*** (4.017)	-0.076 (-1.266)	0.024 (0.658)
Poll tax	-0.278*** (-4.019)	-0.312*** (-3.891)	-0.302*** (-5.505)	-0.438*** (-6.200)
LM spatial lag	323.641***	101.383***	45.143***	0.144
LM spatial error	103.707***	33.507***	21.585***	0.427
robust LM spatial lag	222.479***	113.071***	29.342***	0.030
robust LM spatial error	2.545	0.419	5.784	0.312
State fixed effects LR Test		998.566***		
Time period fixed effects LR Test		266.145***		
States	48	48	48	48
Observations	864	864	864	864
R-squared	0.468	0.857	0.666	0.895

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. t-statistics is in parentheses. Dependent variable is *EDU*. Constants are included in regressions though not reported above. The null of likelihood ratio state fixed effects test is that the state fixed effects are jointly insignificant. The null of likelihood ratio time period fixed effects test is that the time period fixed effects are jointly insignificant.

Table 4.27 OLS Estimates from Placebo Test Regressions of (Log) State Education Expenses on Female Suffrage Binary Variable

	(1)	(2)	(3)	(4)
	Pooled OLS	State Fixed Effects	Time-period Fixed Effects	Two way fixed effects
Female suffrage binary variable	0.388*** (7.538)	0.047 (1.338)	0.010 (0.180)	-0.015 (-0.415)
Poll tax	-0.303*** (-4.360)	-0.300*** (-5.462)	-0.300*** (-5.462)	-0.440 (-6.230)
LM spatial lag	340.461***	148.300***	44.602***	0.131
LM spatial error	129.298***	116.806***	22.470***	0.015
robust LM spatial lag	214.462***	31.532***	26.633***	0.559
robust LM spatial error	3.299*	0.038	4.501**	0.443
State fixed effects LR Test		999.895***		
Time period fixed effects LR Test		280.294***		
States	48	48	48	48
Observations	864	864	864	864
R-squared	0.455	0.855	0.666	0.895

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. t-statistics is in parentheses. Dependent variable is *EDU*. Constants are included in regressions though not reported above. The null of likelihood ratio state fixed effects test is that the state fixed effects are jointly insignificant. The null of likelihood ratio time period fixed effects test is that the time period fixed effects are jointly insignificant.

Table 4.28 OLS Estimates from Regressions of (Log) State Social Services Expenses on Female Suffrage Interaction Variable, Binary Suffrage Variable, and Placebo Binary Suffrage Variable

	(1) Full sample	(2) Full sample	(3) Full sample	(4) Years 1920 and onwards omitted	(5) Years 1920 and onwards omitted	(6) Years 1920 and onwards omitted
Female suffrage x fraction of the population that is female	0.080 (0.488)			0.174 (0.690)		
Suffrage binary variable		0.024 (0.322)			0.070 (0.616)	
Placebo suffrage binary variable			0.113 (1.553)			0.029 (0.272)
Poll tax	0.0927 (1.362)	0.093 (1.367)	0.093 (1.372)	0.235** (2.271)	0.237** (2.282)	0.230** (2.219)
States	48	48	48	48	48	48
Observations	1,795	1,795	1,795	1,141	1,141	1,141
R-squared	0.759	0.759	0.759	0.662	0.662	0.662

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. t-statistics is in parentheses. Dependent variable is *SOC*. Constants are included in regressions though not reported above. The independent variable of interest in columns (1) and (4) is female suffrage interaction variable. In columns (2) and (5) binary variable equal to 1 if suffrage rights have been implemented in a state and 0 otherwise. In columns (3) and (6) placebo suffrage binary variables.

Likewise, there is no statistically significant relationship between social services spending and women's suffrage when the full sample is used, or when years 1920 and onward are excluded (**table 4.28**). However, employing the balanced panel subsample starting in 1915 (**table 4.29**) with binary suffrage variable as the control variable of primary interest reveals a positive statistically significant relationship, similarly to what is discussed in the previous section (**table 4.8**). The magnitude of the coefficient on the suffrage binary variable is larger than that on women's suffrage interaction variable. Compare (column 4 **table 4.8** and column 4 **table 4.29**): a standard deviation increase in women's suffrage interaction variable is associated with about a 1 percent increase in spending on social services, and one standard deviation increase in suffrage binary variable is associated with about a 5 percent increase in spending on social services.

Table 4.29 OLS Estimates from Regressions of (Log) Social Services Expenses on Female Suffrage Binary Variable

	(1)	(2)	(3)	(4)
	Pooled OLS	State Fixed Effects	Time-period Fixed Effects	Two way fixed effects
Female suffrage binary variable	0.431*** (8.177)	0.069** (2.138)	-0.007 (-0.146)	0.132*** (3.846)
Poll tax	-0.203*** (-2.900)	0.011 (0.135)	-0.212*** (-5.136)	-0.191*** (-3.052)
LM spatial lag	605.490***	259.138***	4.558**	3.836*
LM spatial error	242.871***	119.950***	2.358	0.770
robust LM spatial lag	414.196***	145.232***	2.902*	14.992***
robust LM spatial error	51.578***	6.044	0.702	11.927***
State fixed effects LR Test		709.665***		
Time period fixed effects LR Test		435.206***		
States	48	48	48	48
Observations	864	864	864	864
R-squared	0.629	0.907	0.872	0.944

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. t-statistics is in parentheses. Dependent variable is *SOC*. Constants are included in regressions though not reported above. The null of likelihood ratio state fixed effects test is that the state fixed effects are jointly insignificant. The null of likelihood ratio time period fixed effects test is that the time period fixed effects are jointly insignificant.

Moving on to taking into account spatial correlation (**table 4.30**) we find that a standard deviation increase in suffrage binary variable in one state is associated with about a 7 percent increase in spending on social services in other states and a women's suffrage interaction variable in one state (column 2 **table 4.9**), and a standard deviation increase in a 7 percent increase of spending on social services in other states (column 2 **table 4.30**) and over 8 percent overall increase in spending on social services (column 3 **table 4.30**). These magnitudes of changes in cumulative social services spending associated with changes in the suffrage binary variable are larger than the changes associated with one changes in women's suffrage interaction variable reported in the previous section. This difference comes from excluding the share of women from the independent variable of interest, suggesting that results contained in **table 4.9** could be picking up spatial correlation between shares of women in neighboring states.

Table 4.30 SDM Estimates from Regressions of (Log) State Expenses on Social Services on Female Suffrage Binary Variable

	(1) Direct	(2) Indirect	(3) Total
Female suffrage binary variable	0.035 (0.899)	0.185*** (3.302)	0.219*** (4.385)
Poll tax	-0.241*** (-3.896)	-0.012 (-0.083)	-0.253 (-1.561)
ρ		-0.016 (-0.316)	
Wald test spatial lag		188.482***	
LR test spatial lag		185.537***	
Wald test spatial error		171.171***	
LR test spatial error		188.139***	
Random Effects Hausman Test		101.049***	
States		48	
Observations		864	
R-squared		0.348	

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. t-statistics is in parentheses. Dependent variable is *SOC*. Constants are included in regressions though not reported above. State and time fixed effects are included in the regression. Random effects refer to random state effects. The null hypothesis for the Hausman test is that there is significant difference between the random state effects model and the fixed state effects model.

Including placebo tests in the analysis (**table 4.32**) further suggests that the relationship between women' suffrage and state spending on social services is not spurious. Contrary to the results reported in **table 4.30**, the statistically significant relationship is the direct one (not indirect) and is negative (column 1, **table 4.32**).

Table 4.31 OLS Estimates from Placebo Test Regressions of (Log) Social Services Expenses on Female Suffrage Binary Variable

	(1)	(2)	(3)	(4)
	Pooled OLS	State Fixed Effects	Time-period Fixed Effects	Two way fixed effects
Female suffrage binary variable	0.383*** (7.333)	-0.161*** (-4.778)	0.019 (0.478)	-0.086*** (-2.685)
Poll tax	-0.228*** (-3.229)	0.006 (0.076)	-0.212*** (-5.150)	-0.203*** (-3.217)
LM spatial lag	604.508***	230.562***	4.368*	4.462**
LM spatial error	233.808***	87.154***	2.212	2.562
robust LM spatial lag	418.525***	156.354***	2.907*	4.503**
robust LM spatial error	47.825***	12.946***	0.751	2.604
State fixed effects LR Test		701.853***		
Time period fixed effects LR Test		409.360***		
States	48	48	48	48
Observations	864	864	864	864
R-squared	0.624	0.909	0.872	0.943

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. t-statistics is in parentheses. Dependent variable is *SOC*. Constants are included in regressions though not reported above. The null of likelihood ratio state fixed effects test is that the state fixed effects are jointly insignificant. The null of likelihood ratio time period fixed effects test is that the time period fixed effects are jointly insignificant.

Table 4.32 SDM Estimates from Placebo Regressions of (Log) State Expenses on Social Services on Female Suffrage Binary Variable

	(1) Direct	(2) Indirect	(3) Total
Female suffrage binary variable	-0.087*** (-2.754)	-0.060 (-0.769)	-0.147 (-1.651)
Poll tax	-0.265*** (-4.260)	-0.147 (-0.974)	-0.413** (-2.415)
ρ		0.029 (0.591)	
Wald test spatial lag		182.463***	
LR test spatial lag		180.570***	
Wald test spatial error		164.832***	
LR test spatial error		181.600***	
Random Effects Hausman Test		105.871***	
States		48	
Observations		864	
R-squared		0.340	

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. t-statistics is in parentheses. Dependent variable is *SOC*. Constants are included in regressions though not reported above. State and time fixed effects are included in the regression. Random effects refer to random state effects. The null hypothesis for the Hausman test is that there is significant difference between the random state effects model and the fixed state effects model.

Considering the next dependent variable, *TRANS*. Employing full sample, changing the main control to a binary variable, including placebo effects, or truncating the sample (**table 4.33**) does not suggest any evidence of a relationship between women's suffrage and highway spending. Interestingly, while the magnitude of the relationship between women's suffrage, measured by the interaction of women shares and suffrage laws binary variables, and state highway spending is large and statistically significant (column 4 **table 4.10**) it is not statistically different from zero, when the independent variable of interest does not contain the shares of women by state (column 4 **table 4.34**). Moreover, removing shares of women from the independent variable of interest in spatial analysis (**table 4.35**) also leads to the coefficients being statistically not different from zero, while the results that do include women's shares by state (**table 4.11**) suggest an up to a 14 percent cumulative increase on spending on highway

Table 4.33 OLS Estimates from Regressions of (Log) State Transportation Expenses on Female Suffrage Interaction Variable, Binary Suffrage Variable, and Placebo Binary Suffrage Variable

	(1) Full sample	(2) Full sample	(3) Full sample	(4) Years 1920 and onwards omitted	(5) Years 1920 and onwards omitted	(6) Years 1920 and onwards omitted
Female suffrage x fraction of the population that is female	0.205 (0.665)			-0.459 (-0.985)		
Suffrage binary variable		0.163 (1.160)			-0.139 (-0.658)	
Placebo suffrage binary variable			-0.188 (-1.360)			0.007 (0.035)
Poll Tax	-0.279* (-1.840)	-0.274* (-1.805)	-0.294* (-1.940)	0.385* (1.810)	0.384* (1.804)	0.392* (1.843)
States	48	48	48	48	48	48
Observations	1,539	1,539	1,539	885	885	885
R-squared	0.865	0.865	0.865	0.780	0.780	0.780

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. t-statistics is in parentheses. Dependent variable is *TRANS*. Constants are included in regressions though not reported above. The independent variable of interest in columns (1) and (4) is female suffrage interaction variable. In columns (2) and (5) binary variable equal to 1 if suffrage rights have been implemented in a state and 0 otherwise. In columns (3) and (6) placebo suffrage binary variables.

spending with one standard deviation increase in women's suffrage interaction variable.

Plausibly, the correlation, including spatial correlation, is between highway spending and share of women independently of suffrage rights. Women could be choosing to move to states with better highway quality. Additionally, there is positive correlation between highway spending in neighboring states, as signified by parameter ρ . It is positive and significant. Finally, it is interesting to note that placebo test results (**table 4.37**) suggest a statistically significant negative relationship between suffrage and highway spending.

Table 4.34 OLS Estimates from Regressions of (Log) Transportation Expenses on Female Suffrage Binary Variable

	(1)	(2)	(3)	(4)
	Pooled OLS	State Fixed Effects	Time-period Fixed Effects	Two way fixed effects
Female suffrage binary variable	2.470*** (14.727)	1.633*** (12.780)	0.090 (0.587)	0.032 (0.234)
Poll tax	-0.220 (-1.410)	-0.042 (-0.172)	-0.324*** (-3.030)	-0.300 (-1.447)
LM spatial lag	418.300***	227.170***	57.848***	37.880***
LM spatial error	278.784***	141.408***	38.032***	21.317***
robust LM spatial lag	141.726***	91.823***	22.942***	27.839***
robust LM spatial error	2.210	6.061***	3.127*	11.277***
State fixed effects LR Test		316.877***		
Time period fixed effects LR Test		302.660***		
States	48	48	48	48
Observations	720	720	720	720
R-squared	0.450	0.746	0.741	0.833

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. t-statistics is in parentheses. Dependent variable is *TRANS*. Constants are included in regressions though not reported above. The null of likelihood ratio state fixed effects test is that the state fixed effects are jointly insignificant. The null of likelihood ratio time period fixed effects test is that the time period fixed effects are jointly insignificant.

Table 4.35 SDM Estimates from Regressions of (Log) State Transportation Expenses on Female Suffrage Binary Variable

	(1)	(2)	(3)
	Direct	Indirect	Total
Female suffrage binary variable	0.210 (1.412)	-0.479* (-1.915)	-0.269 (-1.074)
Poll tax	-0.201 (-1.270)	-0.605 (-1.115)	-0.806 (-1.265)
ρ		0.528*** (7.719)	
Wald test spatial lag		85.373***	
Wald test spatial error		90.351***	
Random Effects Hausman Test		39.496*	
States		48	
Observations		720	
R-squared		0.466	

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. t-statistics is in parentheses. Dependent variable is *TRANS*. Constants are included in regressions though not reported above. State and time fixed effects are included in the regression. Random effects refer to random state effects. The null hypothesis for the Hausman test is that there is significant difference between the random state effects model and the fixed state effects model.

Table 4.36 OLS Estimates from Placebo Regressions of (Log) Transportation Expenses on Female Suffrage Binary Variable

	(1)	(2)	(3)	(4)
	Pooled OLS	State Fixed Effects	Time-period Fixed Effects	Two way fixed effects
Female suffrage binary variable	1.765*** (9.958)	1.064*** (7.657)	-0.533*** (-3.709)	-0.376*** (-2.920)
Poll tax	-0.269 (-1.615)	0.045 (0.173)	-0.310*** (-2.922)	-0.322 (-1.558)
LM spatial lag	443.106***	267.810***	60.415***	39.194***
LM spatial error	236.319***	151.290***	37.493***	21.746***
robust LM spatial lag	245.307***	149.032***	27.388***	28.399***
robust LM spatial error	38.519***	32.512***	4.467**	10.951***
State fixed effects LR Test		311.929***		
Time period fixed effects LR Test		403.515***		
States	48	48	48	48
Observations	720	720	720	720
R-squared	0.369	0.712	0.746	0.836

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. t-statistics is in parentheses. Dependent variable is *TRANS*. Constants are included in regressions though not reported above. The null of likelihood ratio state fixed effects test is that the state fixed effects are jointly insignificant. The null of likelihood ratio time period fixed effects test is that the time period fixed effects are jointly insignificant.

Table 4.37 SDM Estimates from Placebo Regressions of (Log) State Transportations Expenses on Female Suffrage Binary Variable

	(1) Direct	(2) Indirect	(3) Total
Female suffrage binary variable	-0.444*** (3.195)	-0.226 (-0.535)	-0.671 (-1.332)
Poll tax	-0.281 (-1.279)	-1.004 (-1.512)	-1.285 (-1.660)
ρ		0.271*** (5.737)	
Wald test spatial lag		43.581***	
LR test spatial lag		48.446***	
Wald test spatial error		56.312***	
LR test spatial error		63.513***	
Random Effects Hausman Test		40.146**	
States		48	
Observations		720	
R-squared		0.362	

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. t-statistics is in parentheses. Dependent variable is *TRANS*. Constants are included in regressions though not reported above. State and time fixed effects are included in the regression. Random effects refer to random state effects. The null hypothesis for the Hausman test is that there is significant difference between the random state effects model and the fixed state effects model.

Next dependent variable is *HNOM*, voting patterns in the House of Representatives. Lott and Kenny (1999) find there to be a negative relationship between *HNOM* and women's suffrage interaction variable, which is successfully replicated and holds for binary suffrage variable as the independent variable of interest (**table 4.38** columns 1 and 2). However, allowing for spatial correlation reveals no statistically significant relationship between voting patterns in the House of Delegates and women's suffrage (**table 4.40**). Similarly, conducting placebo tests (**tables 4.41** and **4.42**) does not provide any meaningful results.

Table 4.38 OLS Estimates from Regressions of House Voting Patterns on Female Suffrage Interaction Variable, Binary Suffrage Variable, and Placebo Binary Suffrage Variable

	(1) Full sample	(2) Full sample	(3) Full sample	(4) Years 1920 and onwards omitted	(5) Years 1920 and onwards omitted	(6) Years 1920 and onwards omitted
Female suffrage x fraction of the population that is female	-0.243*** (-3.583)			-0.350*** (-3.453)		
Suffrage binary variable		-0.107*** (-3.601)			-0.156*** (-3.552)	
Placebo suffrage binary variable			-0.085*** (-3.029)			-0.045 (-1.196)
Poll Tax	-0.122*** (-5.278)	-0.124*** (-5.379)	-0.123*** (-5.294)	-0.139*** (-3.952)	-0.141*** (-4.010)	-0.134*** (-3.788)
States	48	48	48	48	48	48
Observations	1,586	1,586	1,586	1,059	1,059	1,059
R-squared	0.696	0.696	0.696	0.706	0.706	0.702

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. t-statistics is in parentheses. Dependent variable is *HNOM*. Constants are included in regressions though not reported above. The independent variable of interest in columns (1) and (4) is female suffrage interaction variable. In columns (2) and (5) binary variable equal to 1 if suffrage rights have been implemented in a state and 0 otherwise. In columns (3) and (6) placebo suffrage binary variables.

Table 4.39 OLS Estimates from Regressions of House Voting Patterns on Female Suffrage Binary Variable

	(1)	(2)	(3)	(4)
	Pooled OLS	State Fixed Effects	Time-period Fixed Effects	Two way fixed effects
Female suffrage binary variable	0.038* (1.682)	0.082*** (3.548)	0.068** (2.000)	0.0001 (0.002)
Poll tax	-0.530*** (-4.772)	0.046 (0.936)	-0.003 (-0.129)	0.043 (0.934)
LM spatial lag	64.566***	99.452***	16.319***	13.651***
LM spatial error	33.357***	79.074***	0.669	4.829***
robust LM spatial lag	36.886***	30.474***	45.012***	47.404***
robust LM spatial error	5.673**	10.095***	29.363***	37.582***
State fixed effects LR Test		270.065***		
Time period fixed effects LR Test		132.077***		
States	48	48	48	48
Observations	672	672	672	672
R-squared	0.620	0.736	0.676	0.783

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. t-statistics is in parentheses. Dependent variable is *HNOM*. Constants are included in regressions though not reported above. The null of likelihood ratio state fixed effects test is that the state fixed effects are jointly insignificant. The null of likelihood ratio time period fixed effects test is that the time period fixed effects are jointly insignificant.

Table 4.40 SDM Estimates from Regressions of House Voting Patterns on Female Suffrage Binary Variable

	(1) Direct	(2) Indirect	(3) Total
Female suffrage binary variable	-0.011 (-0.292)	0.025 (0.421)	0.015 (0.248)
Poll tax	0.074 (1.539)	0.180 (1.467)	0.255* (1.816)
ρ		0.117** (2.172)	
Wald test spatial lag		64.364***	
LR test spatial lag		68.878***	
Wald test spatial error		70.342***	
LR test spatial error		76.980***	
Random Effects Hausman Test		148.206***	
States		48	
Observations		672	
R-squared		0.264	

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. t-statistics is in parentheses. Dependent variable is *HNOM*. Constants are included in regressions though not reported above. State and time fixed effects are included in the regression. Random effects refer to random state effects. The null hypothesis for the Hausman test is that there is significant difference between the random state effects model and the fixed state effects model.

Table 4.41 OLS Estimates from Placebo Regressions of House Voting Patterns on Female Suffrage Binary Variable

	(1)	(2)	(3)	(4)
	Pooled OLS	State Fixed Effects	Time-period Fixed Effects	Two way fixed effects
Female suffrage binary variable	0.037 (1.623)	0.087*** (3.552)	0.037 (1.172)	0.008 (0.289)
Poll tax	-0.011 (-0.399)	0.050 (1.010)	-0.006 (-0.216)	0.043 (0.938)
LM spatial lag	65.538***	101.229***	17.949***	14.528***
LM spatial error	35.513***	79.369***	1.575	4.781**
robust LM spatial lag	34.678***	34.883***	41.247***	46.670***
robust LM spatial error	4.653**	13.023***	24.873***	36.924***
State fixed effects LR Test		272.820***		
Time period fixed effects LR Test		132.131***		
States	48	48	48	48
Observations	672	672	672	672
R-squared	0.620	0.736	0.674	0.783

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. t-statistics is in parentheses. Dependent variable is *HNOM*. Constants are included in regressions though not reported above. The null of likelihood ratio state fixed effects test is that the state fixed effects are jointly insignificant. The null of likelihood ratio time period fixed effects test is that the time period fixed effects are jointly insignificant.

Table 4.42 SDM Estimates from Placebo Regressions of House Voting Patterns on Female Suffrage Binary Variable

	(1) Direct	(2) Indirect	(3) Total
Female suffrage binary variable	0.005 (0.161)	-0.025 (-0.287)	-0.021 (-0.209)
Poll tax	0.074 (1.558)	0.182 1.466	0.256* (1.783)
ρ		0.113** (2.114)	
Wald test spatial lag		64.417***	
LR test spatial lag		68.837***	
Wald test spatial error		70.401***	
LR test spatial error		76.888***	
Random Effects Hausman Test		47.644**	
States		48	
Observations		672	
R-squared		0.264	

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. t-statistics is in parentheses. Dependent variable is *HNOM*. Constants are included in regressions though not reported above. State and time fixed effects are included in the regression. Random effects refer to random state effects. The null hypothesis for the Hausman test is that there is significant difference between the random state effects model and the fixed state effects model.

Finally, although Lott and Kenny (1999) find a negative and statistically significant association (column 1, **table 4.43**) between voting patterns in the Senate (*SNOM*) and women's suffrage interaction variable, this relationship does not hold for the balanced panel subsample. Additionally, there seems to be no spatial correlation in the data generating process (**table 4.44** column 4) and in the data generating process with placebo effects included, **table 4.45**.

Table 4.43 OLS Estimates from Regressions of Senate Voting Patterns on Female Suffrage Interaction Variable, Binary Suffrage Variable, and Placebo Binary Suffrage Variable

	(1) Full sample	(2) Full sample	(3) Full sample	(4) Years 1920 and onwards omitted	(5) Years 1920 and onwards omitted	(6) Years 1920 and onwards omitted
Female suffrage x fraction of the population that is female	-0.468*** (-4.732)			-0.791*** (-5.806)		
Suffrage binary variable		-0.210*** (-4.863)			-0.351*** (-5.985)	
Placebo suffrage binary variable			-0.157*** (-3.820)			-0.148*** (-2.912)
Poll Tax	-0.209*** (-6.171)	-0.214*** (-6.315)	-0.208*** (-6.138)	-0.195*** (-4.114)	-0.201*** (-4.240)	-0.177*** (-3.686)
States	48	48	48	48	48	48
Observations	1,586	1,586	1,586	1,059	1,059	1,059
R-squared	0.674	0.674	0.672	0.733	0.734	0.726

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. t-statistics is in parentheses Dependent variable is *SNOM*. Constants are included in regressions though not reported above. The independent variable of interest in columns (1) and (4) is female suffrage interaction variable. In columns (2) and (5) binary variable equal to 1 if suffrage rights have been implemented in a state and 0 otherwise. In columns (3) and (6) placebo suffrage binary variables.

Table 4.44 OLS Estimates from Regressions of Senate Voting Patterns on Female Suffrage Binary Variable

	(1)	(2)	(3)	(4)
	Pooled OLS	State Fixed Effects	Time-period Fixed Effects	Two way fixed effects
Female suffrage binary variable	-0.024 (-0.724)	0.051 (1.534)	-0.007 (-0.137)	-0.072 (-1.504)
Poll tax	-0.054 (-1.183)	0.117 (1.540)	-0.050 (-1.114)	0.140* (1.869)
LM spatial lag	11.374***	9.307***	2.295	0.474
LM spatial error	2.284	6.204**	0.002	0.481
robust LM spatial lag	22.237***	6.230**	14.948***	0.002
robust LM spatial error	13.147***	3.127	12.654***	0.009
State fixed effects LR Test		322.166***		
Time period fixed effects LR Test		45.384***		
States	48	48	48	48
Observations	720	720	720	720
R-squared	0.481	0.669	0.513	0.689

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. t-statistics is in parentheses. Dependent variable is *SNOM*. Constants are included in regressions though not reported above. The null of likelihood ratio state fixed effects test is that the state fixed effects are jointly insignificant. The null of likelihood ratio time period fixed effects test is that the time period fixed effects are jointly insignificant.

Table 4.45. OLS Estimates from Placebo Regressions of Senate Voting Patterns on Female Suffrage Binary Variable

	(1)	(2)	(3)	(4)
	Pooled OLS	State Fixed Effects	Time-period Fixed Effects	Two way fixed effects
Female suffrage binary variable	0.003 (0.082)	0.071** (2.017)	0.026 (0.554)	-0.049 (-1.102)
Poll tax	-0.054 (-1.187)	0.120 (1.581)	-0.050 (-1.126)	0.143* (1.917)
LM spatial lag	10.985***	7.775***	2.004	0.676
LM spatial error	1.946	4.748**	0.013	0.570
robust LM spatial lag	23.729***	7.124***	15.055***	0.166
robust LM spatial error	14.690***	4.097**	13.064***	0.060
State fixed effects LR Test		320.808***		
Time period fixed effects LR Test		42.582***		
States	48	48	48	48
Observations	720	720	720	720
R-squared	0.480	0.670	0.514	0.689

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. t-statistics is in parentheses. Dependent variable is *SNOM*. Constants are included in regressions though not reported above. The null of likelihood ratio state fixed effects test is that the state fixed effects are jointly insignificant. The null of likelihood ratio time period fixed effects test is that the time period fixed effects are jointly insignificant.

4.5. Conclusion

Literature finds that women and men commonly prefer different public goods, with women favoring health and education spending. This difference in preferences combined with granting women suffrage rights in the early 20th century in the U.S. has been shown to increase government size and scope.

At the same time the literature does not take into account possible spatial dependence between the time the suffrage laws were introduced and spatial dependence of government growth in neighboring states, both of which could be explained by yardstick competition. Ignoring spatial correlation could lead to biased results.

In this paper we investigate the relationship between female suffrage and government spending, while accounting for spatial spillover effects, captured by direct, indirect, and total effects commonly used in spatial econometrics empirical literature. We find that female suffrage is associated with increases in social services spending in neighboring states. We additionally find that there is an auto-regressive positive correlation in the size of total spending and total revenue of neighboring states. There is also positive correlation in voting patterns of house state representatives of neighboring states. At the same time, contrary to the previous literature, there seems to be no relation between women's suffrage and state total spending, total revenue, and voting patterns of congressmen when spatial dependence is accounted for.

To sum up, we find that while women's suffrage did not change the overall size of government it is associated with changes in its spending on certain categories. This paper additionally reveals that analysis of local government institutional arrangements and policies aimed at changing such arrangements need to address and take into account potential spatial correlation.

Chapter 5

Conclusion

The objective of this dissertation is to incorporate institutional analysis into economics of gender. All three essays aim to point out the importance of institutions when considering women's economic status. The main finding of the second chapter is that globalization does not necessarily create or diminish income inequality as measured by labor share. Mobility of women, as a part of globalization, has a positive association with labor share, while mobility of men has a negative association with labor share. This essay leaves some questions unanswered, such as, what are the underlying processes of the opposite outcomes of male and female mobility? I argue it is the difference of bargaining power between man and women. However, I also believe the issue is more complicated and the processes are different for the two genders, the two migration directions, the two types of destinations (developed and developing countries) and the two types of origin countries (also developed and developing).

In the third chapter by conducting a cross-country comparison I consider the relation between women's representation in management positions and economic institutions, measured by Economic Freedom of the World index. I find that countries with economically freer institutions enjoy higher ratio of female to male managers. I argue that based on Becker (1971) theory discriminating employers would not be able to survive competition and will be forced to leave the market leading to lower discrimination levels. I find that it is lower levels of regulation in the economy and regulation of credit market specifically that have a strong and positive association with female representation in management. While I do find correlation between the two, further research would have to be concentrated on the causation part of the argument.

Finally, in the fourth chapter, jointly with Andrew Young, we find that women's suffrage did not lead to higher government spending and higher tax revenue collection in states with

higher share of women in the beginning of the 20th century. This finding is contrary to the previous research. We add to the literature by employing a spatial analysis. Omitting spatial correlation plausibly led previous research to the conclusion that women's suffrage is to blame for government growth. We find that there is spatial correlation (yard-stick competition) between neighboring states when it comes to the spending and taxation decisions. We additionally find that government spending on social services (hospitals, prisons, and charities) is positively associated with female suffrage in the same state and female suffrage in neighboring states, through spatial spillovers. A possible extension of this research would be to conduct a spatial analysis of the relationship between voting rights of other disenfranchised groups, such as immigrants, and government spending.

The overall policy suggestion of this research is to consider institutional framework, a bigger picture. Chapter 2 presents globalization as a highly complicated issue with not one but many outcomes. The findings suggest that policy focused on income inequality as a result of decreasing labor share should not view globalization as necessarily causing or decreasing income inequality and instead take into account the disparity in bargaining power between men and women. This requires a better understanding of underlying causes and determinants of such disparity and creates ideas for future research. For example, would increase in migrant flows of women from developing to developed countries increase bargaining power of women in developed countries?

Chapter 3 suggests concentrating on creating facilitating economic environment for women's success. Such environment would need to have low government regulation and, especially so, low credit market regulation. This suggestion is contrary to the mandated share of women in upper management in some countries. Finally, chapter 4 suggests that giving voting

rights to a previously disenfranchised group does not necessarily lead to government growth.

While the research of chapter 4 concentrates on the beginning of the 20th century, its outcomes pertain to today's world. Women are often viewed as the ones to vote less conservatively, as indicated by the quote in the beginning of chapter 4. We, however, believe that women do not prefer a larger government overall, rather higher spending on certain categories.

References

- Alexander, H. (2012, March 18). Norway's businesswomen and the boardroom bias debate. *The Telegraph*. Retrieved from <http://www.telegraph.co.uk/>
- Antonczyk, D., Fitzenberger, B., Sommerfeld, K. (2010). Rising wage inequality, the decline of collective bargaining, and the gender wage gap. *Labour Economics*, 17(5), 835-847.
- Anzia, S. F., Berry, C. R. (2011). The Jackie (and Jill) Robinson Effect: Why Do Congresswomen Outperform Congressmen? *American Journal of Political Science*, 55(3), 478-493.
- Ashenfelter, O., Hannan, T. (1986). Sex discrimination and product market competition: The case of the banking industry. *The Quarterly Journal of Economics*, 149-173.
- Ayal, E. B., Karras, G. (1998). Components of economic freedom and growth: an empirical study. *The Journal of Developing Areas*, 327-338.
- Baicker, K. (2005). The spillover effects of state spending. *Journal of Public Economics*, 89(2), 529-544.
- Barlow, K. K. "Why Are Women Underrepresented at the Top of Careers." *Why Are Women Underrepresented at the Top of Careers?* University Times, 3 May 2012. Web. 10 Nov. 2014. <<http://www.utimes.pitt.edu/?p=21065>>.
- Becker, G. S. (1957. 2nd ed. 1971). *The Economics of Discrimination*. Chicago: Univ. Chicago Press
- Beine, M., Docquier, F., & Schiff, M. (2013). International migration, transfer of norms and home country fertility. *Canadian Journal of Economics/Revue canadienne d'économique*, 46(4), 1406-1430.

- Beneria, L. (2008). The crisis of care, international migration, and public policy. *Feminist Economics*, 14(3), 1-21.
- Bentolila, S. Saint- Paul, G. (2003). Explaining Movements in the Labor Share. *Contributions to Macroeconomics* 3, 1103-1103.
- Bertrand, M. (2011). New perspectives on gender. *Handbook of labor economics*, 4, 1543-1590.
- Bertrand, M., Duflo, E., & Mullainathan, S. (2004). How Much Should We Trust Differences-In-Differences Estimates?. *The Quarterly Journal of Economics*, 119(1), 249-275.
- Besley, T., Case, A. (1995). Incumbent behavior: vote-seeking, tax-setting, and yardstick competition. *American Economic Review*, 85(1), 25–45.
- Bhagwati, J. (2007). *In defense of globalization: With a new afterword*. Oxford University Press.
- Bilsborrow, R. E. (1997). *International migration statistics: Guidelines for improving data collection systems*. International Labour Organization.
- Black, S. E., Strahan, P. E. (2001). The division of spoils: rent-sharing and discrimination in a regulated industry. *American Economic Review*, 814-831.
- Black, S., Brainerd, E. (2004). Importing equality? The impact of globalization on gender discrimination. *Industrial and Labor Relations Review*, 57(4), 540–559
- Blanchard, O. J., Nordhaus, W. D., Phelps, E. S. (1997). The medium run. *Brookings Papers on Economic Activity*, 89-158.
- Bøhren, Ø., Staubo, S. (2013). Does mandatory gender balance work? Changing organizational form to avoid board upheaval. *Journal of Corporate Finance*.
- Bologna, J. (2014). A Spatial Analysis of Entrepreneurship and Institutional Quality: Evidence from US Metropolitan Areas. *Journal of Regional Analysis and Policy*, 44(2), 109-131

- Bologna, J., Young, A. T., Lacombe, D. J. (2014). A spatial analysis of incomes and institutional quality: evidence from US metropolitan areas. *Journal of Institutional Economics*, 1-26.
- Card, D., Cardoso, A. R., Kline, P. (2014). Bargaining, sorting and the gender wage gap: The role of firms in the relative pay of women.
- Catalyst. *Quick Take: Statistical Overview of Women in the Workplace*. New York: Catalyst, March 3, 2014.
- Catt, C. C., Shuler, N. R. (1923). *Woman suffrage and politics*. Scribner.
- Chattopadhyay, R., Duflo, E. (2004). Women as policy makers: Evidence from a randomized policy experiment in India. *Econometrica*, 72(5), 1409-1443
- Cingranelli, D. L., Richards, D. L., Clay, K. C. (2014). The CIRI human rights dataset. *CIRI Human Rights Data Project*, 6.
- Cingranelli, D. L., Richards, D. L., Clay, K. C. (2014). The CIRI human rights dataset. *CIRI Human Rights Data Project*, 6.
- Clarke, T., Nielsen, B. B., Nielsen, S., Klettner, A., Boersma, M. (2012). *Australian Census of Women in Leadership*. Commonwealth of Australia.
- Dawson, J. W. (1998). Institutions, Investment, and Growth: New Cross-country and Panel Data Evidence. *Economic Inquiry*, 36(4), 603-619.
- De Haan, J., Sturm, J. E. (2000). On the relationship between economic freedom and economic growth. *European Journal of Political Economy*, 16(2), 215-241.
- De Haan, J., Lundström, S., Sturm, J. E. (2006). Market-oriented institutions and policies and economic growth: A critical survey. *Journal of Economic Surveys*, 20(2), 157-191.

- De Serres, A., Scarpetta, S., De La Maisonneuve, C. (2002). Sectoral shifts in Europe and the United States: how they affect aggregate labour shares and the properties of wage equations.
- Decreuse, B., Maarek, P. (2008). FDI and the labor share in developing countries: A theory and some evidence.
- Docquier, F., Lowell, B. L., Marfouk, A. (2009). A gendered assessment of highly skilled emigration. *Population and Development Review*, 297-321
- Dolcerocca, A., Terzioglu, G. 2015. Interview with Thomas Piketty: Piketty responds to criticisms from the left. *Potemkin Review* 1, <http://www.potemkinreview.com/pikettyinterview.html>.
- Dollar, D., Gatti, R. (1999). *Gender inequality, income, and growth: are good times good for women?*. Development Research Group, The World Bank.
- Downs, A. (1957). An economic theory of democracy
- Dreher, A. (2006). Does globalization affect growth? Evidence from a new index of globalization. *Applied Economics*, 38(10), 1091-1110
- Dumont, J. C., Martin, J. P., Spielvogel, G. (2007). Women on the move: the neglected gender dimension of the brain drain.
- Elhorst, J. P. (2010). Applied spatial econometrics: raising the bar. *Spatial Economic Analysis*, 5(1), 9-28.
- Elhorst, J. P. (2012). Matlab software for spatial panels. *International Regional Science Review*, 0160017612452429.
- Esteve-Volart, B. (2004). Gender discrimination and growth: Theory and evidence from India.

- Even, W. E., Macpherson, D. A. (1993). The decline of private-sector unionism and the gender wage gap. *Journal of Human Resources*, 279-296.
- EVS (2011): European Values Study 2008: Integrated Dataset (EVS 2008). GESIS Data Archive, Cologne. ZA4800 Data file version 3.0.0, [doi:10.4232/1.11004](https://doi.org/10.4232/1.11004)
- Feenstra, R. C., Inklaar, R., Timmer, M. (2015). “The Next Generation of the Penn World Table” forthcoming *American Economic Review*, available for download at www.ggdc.net/pwt (<https://sites.google.com/a/newschool.edu/duncan-foley-homepage/home/EPWT>).
- Feldmann, H. (2006). Credit market regulation and labor market performance around the world. *Kyklos*, 59(4), 497-525.
- Ferrant, G., Tuccio, M. (2015). How do female migration and gender discrimination in social institutions mutually influence each other?
- Ferrari, S., Cribari-Neto, F. (2004). Beta regression for modelling rates and proportions. *Journal of Applied Statistics*, 31(7), 799-815.
- Forbes, K. J. (2000). A Reassessment of the Relationship between Inequality and Growth. *American economic review*, 869-887.
- Gamlen, A. (2010). International migration data and the study of super-diversity.
- Gehring, K. (2013). Who Benefits from Economic Freedom? Unraveling the Effect of Economic Freedom on Subjective Well-Being. *World Development*, 50, 74-90.
- German Quotas: How German Firms Help Women Get Ahead. (2013, November 26). Spiegel Online. Retrieved from <http://www.spiegel.de>
- Goldin, C. 1995. “The U-Shaped Female Labor Force Function in Economic Development and Economic History,” in T. Paul Schultz, ed. *Investment in Women’s Human Capital*. Chicago: University of Chicago Press.

Gollin, D. 2002. Getting income shares right. *Journal of Political Economy* 110, 458-474.

Gray, E. 2016. Newsflash: young women vote with their brains. *Huffington Post*

(http://www.huffingtonpost.com/2014/07/01/fox-news-beyonce-voters-jesse-watters_n_5548970.html)

Grimes, A. P. (1967). *The puritan ethic and woman suffrage*. New York: Oxford University Press.

Guscina, A. (2006). *Effects of globalization on labor's share in national income*. International Monetary Fund.

Gwartney, J. D., Hall, J., Lawson, R. 2014. *Economic Freedom of the World: 2014 Annual Report*. Fraser Institute.

Gwartney, J. D., Lawson, R. A., Holcombe, R. G. (1999). Economic freedom and the environment for economic growth. *Journal of Institutional and Theoretical Economics (JITE)/Zeitschrift für die gesamte Staatswissenschaft*, 643-663.

Gwartney, J.D., Lawson, R., Hall, J., 2013. *Economic Freedom of the World: 2013 Annual Report*. Fraser Institute.

Hall, J. C., Ross, J. M. (2010). Tiebout competition, yardstick competition, and tax instrument choice: evidence from Ohio school districts. *Public Finance Review*, 38(6), 710-737.

Harrison, A. 2005. Has Globalization Eroded Labor's Share? Some Cross-Country Evidence (No. 39649). University Library of Munich, Germany.

Heckelman, J. C., Stroup, M. D. (2000). Which Economic Freedoms Contribute to Growth?. *Kyklos*, 53(4), 527-544.

- Heston, A., Summers, R., Aten, B. (2011). Penn World Table Version 7.0 Center for International Comparisons of Production. *Income and Prices at the University of Pennsylvania*.
- Higgs, R. (2012). Crisis and Leviathan: Critical Episodes in the Growth of American Government. Kent, GBR: Independent Institute. Retrieved from <http://www.ebrary.com>
- Hill, M. A., & King, E. (1995). Women's education and economic well-being. *Feminist Economics*, 1(2), 21-46.
- Holcombe, R. G. (1999). Veterans' interests and the transition to government growth: 1870–1915. *Public Choice*, 99(3-4), 311-326.
- International Labour Organization (2013). *Employment Distribution by Sex and Occupation*. Retrieved from <http://unstats.un.org>
- International Labour Organization (2013). Maternity leave benefits. From International Labour Office, Maternity protection database. Retrieved from <http://www.ilo.org>
- Jayadev, A. (2007). Capital account openness and the labor share of income. *Cambridge Journal of Economics*, 31(3), 423-443.
- Jayadev, A., & Lee, K. (2003). *Capital account liberalization, growth and the labor share of income: reviewing and extending the cross country evidence*. Mimeo.
- Jones, C. I. (2003). Growth, capital shares, and a new perspective on production functions. *Berkeley University Manuscript*.
- Kau, J. B., Rubin, P. H. (2002). The growth of government: sources and limits. *Public Choice*, 113(3-4), 389-402.
- Kawaguchi, D. (2007). A market test for sex discrimination: Evidence from Japanese firm-level panel data. *International Journal of Industrial Organization*, 25(3), 441-460

- Klasen, S., Lamanna, F. (2009). The impact of gender inequality in education and employment on economic growth: new evidence for a panel of countries. *Feminist Economics*, 15(3), 91-132
- La Porta, R., Lopez-de-Silanes, F., Shleifer, A., Vishny, R. (1999). The quality of government. *Journal of Law, Economics, and organization*, 15(1), 222-279.
- Lawson, R. A. (2006). On Testing the Connection between Economic Freedom and Growth. *Econ Journal Watch*, 3(3), 398-406.
- Lawson, R. A., Clark, J. R. (2010). Examining the Hayek–Friedman hypothesis on economic and political freedom. *Journal of Economic Behavior & Organization*, 74(3), 230-239.
- Lemke, J. S. (2016). Interjurisdictional Competition and Married Women’s Property Rights. *Public Choice*, 166(3), 291-313.
- LeSage, J. P., Dominguez, M. (2012). The importance of modeling spatial spillovers in public choice analysis. *Public Choice*, 150(3-4), 525-545.
- LeSage, J. P., Pace, R. K. (2014). The biggest myth in spatial econometrics. *Econometrica*, 2(4), 217-249.
- LeSage, J.P., R.K. Pace. 2009. Introduction to spatial econometrics. Boca Raton, US: CRC Press Taylor & Francis Group.
- Levine, R., Levkov, A., Rubinstein, Y. (2008). *Racial discrimination and competition* (No. w14273). National Bureau of Economic Research.
- Lott, J. R., L.W. Kenny (1999). Did women’s suffrage change the size and scope of government? *Journal of Political Economy*, 107(6 Part 1), 1163-1198.
- Mammen, K., Paxson, C. (2000). Women's work and economic development. *The Journal of Economic Perspectives*, 141-164.

- Marquetti, A., Foley, D. 2011. Extended Penn World Tables – EPWT Version 4.0.
- Marshall, G.M., Jaggers, K. 2010. Polity IV project: political regime characteristics and transitions, 1800-2008. Polity IV. (<http://www.systemicpeace.org/polity/polity4.htm>).
- Marshall, G.M., Jaggers, K. 2010. Polity IV project: political regime characteristics and transitions, 1800-2008. Polity IV. (<http://www.systemicpeace.org/polity/polity4.htm>).
- Marvel, M. R. (Ed.). (2012). *Encyclopedia of new venture management*. SAGE Publications.
- Mead, R. (2004). *How the vote was won: Woman suffrage in the Western United States, 1868-1914*. NYU Press.
- Miller, G. (2008). Women's suffrage, political responsiveness, and child survival in American history. *The Quarterly Journal of Economics*, 123(3), 1287-1327.
- Moore, T. (2010, March 22). In Germany, a Quota for Female Managers. Time. Retrieved from time.com
- Morrison, A. R., Schiff, M. W., & Sjöblom, M. (Eds.). (2007). *The international migration of women*. World Bank Publications.
- Murray, M. P. (2006). Avoiding invalid instruments and coping with weak instruments. *The journal of economic perspectives*, 20(4), 111-132.
- Naghsh Nejad, M. (2013). Institutionalized inequality and brain drain: an empirical study of the effects of women's rights on the gender gap in high-skilled migration. *Available at SSRN 2116618*.
- Naghsh Nejad, M., Young, A. T. (2014). Female Brain Drains and Women's Rights Gaps: A Gravity Model Analysis of Bilateral Migration Flows. *Available at SSRN 2191658*.
- Neiman, B., Karabarbounis, L. (2015). *Capital Depreciation and Labor Shares Around the World: Measurement and Implications* (No. 357). Society for Economic Dynamics.

Nikolaev, B. (2014). Economic Freedom and Quality of Life: Evidence from the OECD's Your Better Life Index. *Journal of Private Enterprise*, 29(Fall 2014), 61-96.

OECD (2012), "Labour Losing to Capital: What Explains the Declining Labour Share?", in OECD, *OECD Employment Outlook 2012*, OECD Publishing, Paris.
DOI: http://dx.doi.org/10.1787/empl_outlook-2012-4-en

Ovaska, T., Takashima, R. (2006). Economic policy and the level of self-perceived well-being: An international comparison. *The Journal of Socio-Economics*, 35(2), 308-325.

Özden, Ç., Parsons, C. R., Schiff, M., & Walmsley, T. L. (2011). Where on earth is everybody? The evolution of global bilateral migration 1960–2000. *The World Bank Economic Review*, 25(1), 12-56.

Piketty, T. (2014). Capital in the 21st Century. *Cambridge: Harvard Uni.*

Poole, K. T., Rosenthal, H. (1991). Patterns of congressional voting. *American Journal of Political Science*, 228-278.

Quinn, D. P., Inlan, C. (1997). The origins of financial openness: A study of current and capital account liberalization. *American Journal of Political Science*, 771-813

Rappeport, A. 2016. Gloria Steinem and Madeleine Albright rebuke young women backing Bernie Sanders. New York Times
(http://www.nytimes.com/2016/02/08/us/politics/gloria-steinem-madeleine-albright-hillary-clinton-bernie-sanders.html?_r=0)

Rodrik, D. (1999). Democracies Pay Higher Wages. *The Quarterly Journal of Economics*, 114(3), 707-738.

Rosson, T., Fields, D. (2008). Cultural influences on the growth in evangelical Christianity: A longitudinal study of 49 countries. *Review of Religious Research*, 269-289.

- Schneider, D. (2011). Bargaining, openness and the labor share (No. 2011-068). SFB 649 discussion paper.
- Schoeni, R. F. (1998). Labor market assimilation of immigrant women. *Industrial & Labor Relations Review*, 51(3), 483-504.
- Sheehan, K. M., & Young, A. T. (2013). The Internet, Emotional Contagion, and Foreign Aid. *Emotional Contagion, and Foreign Aid (July 2013)*
- Staudt, K. (1999). Seeds for self-sufficiency? Policy contradictions at the US Mexico boarder. *Gender and migration*, 21-37.
- Stroup, M. D. (2007). Economic freedom, democracy, and the quality of life. *World Development*, 35(1), 52-66.
- Stroup, M. D. (2008). Separating the influence of capitalism and democracy on women's well-being. *Journal of Economic Behavior & Organization*, 67(3), 560-572.
- Tanner, M., Hughes, C. (2013). The Work versus Welfare Trade-Off: 2013-An Analysis of the Total Level of Welfare Benefits by State. *Cato Institute White Paper*.
- Tarabar, D., Hall, J. C. (2015). The Seventeenth Amendment, Senate ideology and the growth of government. *Applied Economics Letters*, 22(8), 637-640.
- Tastsoglou, E., Miedema, B. (2005). Working much harder and always having to prove yourself: Immigrant women's labour force experiences in the Canadian Maritimes. In *In MT Segal & V. Demos (Eds). Special edition on Gender Realities: Local and Global, Advances in Gender Research*.
- Thomas, E. 2014. Fox News host makes a blistering remark about 'Beyonce Voters'. Huffington Post. (http://www.huffingtonpost.com/2014/07/01/fox-news-beyonce-voters-jesse-watters_n_5548970.html)

- Tytell, I., Jaumotte, F. (2008). How Has the Globalization of Labor Affected the Labor Income Share in Advanced Countries?. *IMF Working Papers*, 1-54.
- Tzannatos, Z. (1999). Women and labor market changes in the global economy: Growth helps, inequalities hurt and public policy matters. *World development*, 27(3), 551-569
- Tzannatos, Z. (1999). Women and labor market changes in the global economy: Growth helps, inequalities hurt and public policy matters. *World development*, 27(3), 551-569
- Valentinyi, A., Herrendorf, B. (2008). Measuring factor income shares at the sectoral level. *Review of Economic Dynamics*, 11(4), 820-835.
- Vowles, N. (2014, May 22). Investigation reveals under-representation of women in management roles. Retrieved from <http://www.theargus.co.uk>
- Weber, A., Zulehner, C. (2014). Competition and gender prejudice: are discriminatory employers doomed to fail?. *Journal of the European Economic Association*, 12(2), 492-521.
- Weichselbaumer, D., and Winter-Ebmer R. (2007). "The Effects of Competition and Equal Treatment Laws on Gender Wage Differentials." *Economic Policy* 2007: 235-287
- Weil, D.N. (2013). *Economic Growth*. (3d ed.). Prentice Hall.
- World Values Survey Wave 5 2005-2008 Official Aggregate v.20140429 World Values Survey Association (www.worldvaluessurvey.org). Aggregate File Producer: Asep/JDS, Madrid Spain
- Young, A. T. (2010). One of the things we know that ain't so: Is US labor's share relatively stable?. *Journal of Macroeconomics*, 32(1), 90-102.
- Young, A. T., Lawson, R. A. (2014). Capitalism and labor shares: A cross-country panel study. *European Journal of Political Economy*, 33, 20-36.

Young, A. T., Zuleta, H. (2013). Do Unions Increase Labor Shares? Evidence from US Industry-Level Data. (*November 1, 2013*).

Young, A., Tackett M. (2015). Globalization and the Decline in Labor Shares: Exploring the Relationship beyond Trade and Financial Flows. Working Paper.

Appendix

Appendix A. Full Tables

Table A1. OLS Estimates from Regressions of (Log) Total State Revenue on Female Suffrage Interaction Variable

	(1)	(2)	(3)	(4)
	Pooled OLS	State Fixed Effects	Time-period Fixed Effects	Two way fixed effects
Female suffrage x fraction of the population that is female	1.470*** (13.67)	0.513*** (8.429)	-0.190** (-2.365)	0.106* (1.786)
Poll tax	-0.179** (-2.566)	-0.00506 (-0.071)	-0.215*** (-6.173)	-0.224*** (-4.340)
Literacy test	0.189*** (4.522)	0.143* (1.658)	0.106*** (4.992)	0.0244 (0.392)
Secret Ballot	0.235** (2.370)	0.343*** (4.530)	0.149*** (2.981)	0.122** (2.232)
Motor vehicle registration	0.0108 (1.528)	-0.00372 (-1.096)	0.00228 (0.636)	-0.00118 (-0.483)
Log density	-0.172*** (-7.491)	0.628*** (4.038)	-0.172*** (-14.55)	0.206* (1.773)
Rural	-1.110*** (-6.060)	-2.231*** (-4.634)	-0.176* (-1.798)	0.802** (2.163)
Fraction of the population that is black	0.530 (1.179)	3.222** (2.466)	1.114*** (4.925)	2.065** (2.107)
Fraction of the population age 65 or older	18.34*** (9.890)	49.47*** (21.81)	3.007*** (3.048)	8.222*** (3.255)
Female workers	0.258 (0.458)	-0.0311 (-0.0598)	-1.880*** (-6.365)	-0.482 (-1.268)
Manufacturing	-1.891*** (-4.469)	-1.469** (-2.485)	1.151*** (5.153)	0.767* (1.723)
Fraction of the population age 10 that is illiterate	-1.039 (-1.524)	-7.877*** (-8.892)	0.0295 (0.0853)	-0.479 (-0.670)
Fraction of the population that is foreign-born	0.332 (0.652)	3.378*** (4.034)	3.290*** (12.22)	5.375*** (8.486)
Real manufacturing wage	-0.00003** (-2.067)	-0.0000006 (-0.0856)	-0.00001 (-0.558)	-0.00009*** (-4.256)
States	48	48	48	48
Observations	864	864	864	864
R-squared	0.565	0.910	0.893	0.955

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. t-statistics is in parentheses. Dependent variable is *REV*. Constants are included in regressions though not reported above.

Table A2. OLS Estimates from Regressions of (Log) Total State Expenses on Female Suffrage Interaction Variable

	(1) Pooled OLS	(2) State Fixed Effects	(3) Time-period Fixed Effects	(4) Two way fixed effects
Female suffrage x fraction of the population that is female	1.389*** (12.971)	0.531*** (7.368)	-0.168* (-1.932)	0.0581 (0.811)
Poll tax	-0.249*** (-3.418)	-0.171* (-1.878)	-0.293*** (-7.394)	-0.305*** (-4.555)
Literacy test	0.136*** (3.137)	-0.00467 (-0.0452)	0.0802*** (3.338)	-0.147* (-1.926)
Secret Ballot	0.169* (1.693)	0.159* (1.702)	0.0653 (1.188)	-0.0780 (-1.127)
Motor vehicle registration	0.00964 (1.399)	-0.00418 (-1.055)	0.00393 (1.025)	-0.000183 (-0.0625)
Log density	-0.167*** (-6.996)	0.187 (0.936)	-0.188*** (-13.94)	-0.0855 (-0.557)
Rural	-0.907*** (-4.760)	-2.592*** (-4.225)	-0.266** (-2.384)	0.0760 (0.157)
Fraction of the population that is black	1.005** (2.125)	1.719 (1.038)	1.586*** (6.095)	2.548** (1.973)
Fraction of the population age 65 or older	17.68*** (9.174)	46.35*** (15.72)	3.176*** (2.828)	10.02*** (2.989)
Female workers	-0.0941 (-0.163)	0.0283 (0.0424)	-2.391*** (-7.256)	-0.641 (-1.272)
Manufacturing	-1.385*** (-3.169)	-0.451 (-0.605)	1.223*** (4.851)	1.520*** (2.633)
Fraction of the population age 10 that is illiterate	-0.219 (-0.317)	-8.302*** (-7.257)	0.287 (0.751)	-1.606* (-1.696)
Fraction of the population that is foreign-born	0.695 (1.316)	2.330** (2.140)	3.541*** (11.69)	5.219*** (6.214)
Real manufacturing wage	0.00002* (1.750)	0.00003 *** (3.325)	-0.00009 *** (-3.557)	-0.0002*** (-6.683)
States	48	48	48	48
Observations	768	768	768	768
R-squared	0.541	0.866	0.864	0.930

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. t-statistics is in parentheses
Dependent variable is *EXP*. Constants are included in regressions though not reported above.

Table A3. OLS Estimates from Regressions of (Log) Education Expenses on Female Suffrage Interaction Variable

	(1) Pooled OLS	(2) State Fixed Effects	(3) Time-period Fixed Effects	(4) Two way fixed effects
Female suffrage x fraction of the population that is female	0.866*** (8.130)	0.277*** (4.038)	-0.187 (-1.468)	0.0440 (0.537)
Poll tax	-0.282*** (-4.084)	-0.313*** (-3.900)	-0.302*** (-5.502)	-0.438*** (-6.200)
Literacy test	0.298*** (7.217)	0.321*** (3.303)	0.241*** (7.217)	0.236*** (2.764)
Secret Ballot	0.0945 (0.962)	0.264*** (3.093)	0.0288 (0.365)	0.119 (1.586)
Motor vehicle registration	0.00591 (0.845)	-0.00229 (-0.598)	0.000223 (0.0393)	-0.000714 (-0.213)
Log density	-0.147*** (-6.487)	1.153*** (6.580)	-0.145*** (-7.790)	0.985*** (6.172)
Rural	-1.014*** (-5.589)	-0.341 (-0.630)	-0.377** (-2.429)	1.339*** (2.633)
Fraction of the population that is black	2.116*** (4.753)	-0.654 (-0.445)	2.557*** (7.160)	-1.006 (-0.748)
Fraction of the population age 65 or older	10.82*** (5.890)	32.28*** (12.64)	0.897 (0.576)	8.818** (2.544)
Female workers	-2.270*** (-4.061)	0.760 (1.297)	-3.738*** (-8.009)	0.0471 (0.0903)
Manufacturing	-2.767*** (-6.603)	-2.072*** (-3.113)	-0.684* (-1.938)	-0.511 (-0.838)
Fraction of the population age 10 that is illiterate	-1.393** (-2.064)	-6.495*** (-6.511)	-0.629 (-1.151)	-2.069** (-2.109)
Fraction of the population that is foreign-born	1.214** (2.401)	6.717*** (7.125)	3.149*** (7.406)	7.719*** (8.881)
Real manufacturing wage	0.000005 (0.416)	0.000009 (1.210)	0.00003 (1.083)	-0.00004 (-1.334)
States	48	48	48	48
Observations	864	864	864	864
R-squared	0.469	0.857	0.666	0.895

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. t-statistics is in parentheses
Dependent variable is *EDU*. Constants are included in regressions though not reported above.

Table A4. OLS Estimates from Regressions of (Log) Social Services Expenses on Female Suffrage Interaction Variable

	(1) Pooled OLS	(2) State Fixed Effects	(3) Time-period Fixed Effects	(4) Two way fixed effects
Female suffrage x fraction of the population that is female	0.857*** (7.947)	0.149** (2.219)	-0.0597 (-0.626)	0.292*** (4.023)
Poll tax	-0.207*** (-2.952)	0.0101 (0.128)	-0.212*** (-5.148)	-0.193*** (-3.078)
Literacy test	0.130*** (3.104)	-0.0405 (-0.426)	0.0333 (1.328)	-0.0154 (-0.204)
Secret Ballot	0.202** (2.030)	0.103 (1.239)	0.177*** (2.986)	-0.0996 (-1.495)
Motor vehicle registration	0.0119* (1.676)	-0.000958 (-0.256)	0.00330 (0.776)	0.00195 (0.656)
Log density	-0.0363 (-1.582)	0.625*** (3.644)	-0.00818 (-0.584)	0.387*** (2.737)
Rural	-1.455*** (-7.919)	-1.184** (-2.230)	-0.282** (-2.424)	1.496*** (3.316)
Fraction of the population that is black	-0.815* (-1.809)	5.366*** (3.726)	-0.420 (-1.565)	4.313*** (3.619)
Fraction of the population age 65 or older	21.57*** (11.60)	54.30*** (21.72)	8.210*** (7.018)	14.93*** (4.861)
Female workers	1.727*** (3.051)	1.619*** (2.824)	0.473 (1.349)	0.830* (1.796)
Manufacturing	-4.150*** (-9.781)	-3.603*** (-5.530)	-1.008*** (-3.804)	-0.211 (-0.390)
Fraction of the population age 10 that is illiterate	-1.089 (-1.593)	-7.876*** (-8.067)	0.440 (1.074)	-0.259 (-0.298)
Fraction of the population that is foreign-born	0.631 (1.233)	3.396*** (3.681)	2.613*** (8.189)	3.456*** (4.487)
Real manufacturing wage	-0.0002*** (-15.99)	-0.0002*** (-25.36)	0.000009 (0.360)	-0.0002*** (-9.536)
States	48	48	48	48
Observations	864	864	864	864
R-squared	0.629	0.907	0.872	0.944

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. t-statistics is in parentheses
Dependent variable is *SOC*. Constants are included in regressions though not reported above.

Table A5. OLS Estimates from Regressions of (Log) Transportation Expenses on Female Suffrage Interaction Variable

	(1) Pooled OLS	(2) State Fixed Effects	(3) Time-period Fixed Effects	(4) Two way fixed effects
Female suffrage x fraction of the population that is female	5.026*** (14.92)	4.858*** (14.393)	4.638*** (13.875)	4.394*** (13.123)
Poll tax	-0.248 (-1.597)	-0.175 (-1.156)	-0.459** (-2.546)	-0.379** (-2.161)
Literacy test	0.288*** (3.082)	0.014 (0.950)	0.009 (0.623)	0.006 (0.437)
Secret Ballot	0.140 (0.577)	0.297*** (3.058)	0.364*** (3.482)	0.376*** (3.410)
Motor vehicle registration	0.016 (1.119)	0.084 (0.349)	0.318 (1.280)	0.324 (1.318)
Log density	-0.379*** (-7.374)	-0.361*** (-7.217)	-0.340*** (-6.793)	-0.317*** (-6.545)
Rural	-2.049*** (-4.981)	-2.176*** (-5.426)	-2.543*** (-5.780)	-2.778*** (-6.481)
Fraction of the population that is black	0.116 (0.113)	0.415 (0.408)	1.526 (1.328)	2.067* (1.827)
Fraction of the population age 65 or older	26.27*** (6.136)	27.826*** (6.623)	29.838*** (6.350)	32.255*** (7.020)
Female workers	-1.558 (-1.106)	-2.577* (-1.842)	-3.357** (-2.180)	-4.975*** (-3.247)
Manufacturing	2.350** (2.424)	2.041** (2.158)	2.861 (2.866)	2.358** (2.436)
Fraction of the population age 10 that is illiterate	2.957* (1.789)	3.328** (2.048)	0.874*** (0.443)	1.384 (0.716)
Fraction of the population that is foreign-born	-4.389*** (-3.647)	-3.846*** (-3.239)	-6.509*** (-5.003)	-5.982*** (-4.686)
Real manufacturing wage	0.0001*** (4.696)	0.0001*** (5.072)	0.0002*** (5.766)	0.0002*** (6.383)
States	48	48	48	48
Observations	720	720	720	720
R-squared	0.453	0.492	0.504	0.546

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. t-statistics is in parentheses
Dependent variable is *TRANS*. Constants are included in regressions though not reported above.

Table A6. OLS Estimates from Regressions of House Voting Patterns on Female Suffrage Interaction Variable

	(1) Pooled OLS	(2) State Fixed Effects	(3) Time-period Fixed Effects	(4) Two way fixed effects
Female suffrage x fraction of the population that is female	0.0772 (1.647)	0.180*** (3.694)	0.163** (2.234)	0.011 (0.155)
Poll tax	-0.011 (-0.364)	0.045 (0.907)	-0.004 (-0.141)	0.043 (0.930)
Literacy test	0.00714 (0.419)	-0.0525 (-0.798)	0.0111 (0.691)	-0.0411 (-0.677)
Secret Ballot	-0.0213 (-0.521)	0.0193 (0.343)	-0.00510 (-0.133)	0.0411 (0.780)
Motor vehicle registration	0.00125 (0.488)	0.00257 (1.123)	0.00135 (0.556)	0.00182 (0.857)
Log density	-0.000920 (-0.0984)	0.00903 (0.0887)	0.00305 (0.341)	-0.102 (-1.028)
Rural	0.461*** (6.171)	0.103 (0.316)	0.417*** (5.601)	-0.181 (-0.553)
Fraction of the population that is black	-0.224 (-1.307)	-0.0149 (-0.0173)	-0.245 (-1.525)	-0.726 (-0.881)
Fraction of the population age 65 or older	2.037*** (2.740)	-1.541 (-0.983)	3.188*** (4.347)	-2.020 (-0.927)
Female workers	-0.538** (-2.581)	-0.263 (-0.858)	-0.230 (-1.143)	0.0249 (0.0855)
Manufacturing	1.363*** (7.936)	0.230 (0.577)	1.115*** (6.572)	-0.279 (-0.708)
Fraction of the population age 10 that is illiterate	-1.285*** (-4.645)	-1.083* (-1.872)	-1.502*** (-5.754)	-1.626*** (-2.697)
Fraction of the population that is foreign-born	1.489*** (7.484)	2.388*** (4.356)	1.136*** (5.855)	2.034*** (3.835)
Real manufacturing wage	0.00004*** (6.974)	0.00003 *** (6.131)	0.00008*** (4.621)	0.00009*** (4.512)
States	48	48	48	48
Observations	672	672	672	672
R-squared	0.620	0.737	0.676	0.783

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. t-statistics is in parentheses
Dependent variable is *HNOM*. Constants are included in regressions though not reported above.

Table A7. OLS Estimates from Regressions of Senate Voting Patterns on Female Suffrage Interaction Variable

	(1) Pooled OLS	(2) State Fixed Effects	(3) Time-period Fixed Effects	(4) Two way fixed effects
Female suffrage x fraction of the population that is female	-0.042 (-0.604)	0.122* (1.752)	0.017 (0.153)	-0.136 (-1.312)
Poll tax	-0.054 (-1.178)	0.115 (1.524)	-0.049 (-1.105)	0.141* (1.880)
Literacy test	0.0606** (2.234)	0.102 (1.057)	0.0724*** (2.707)	0.0875 (0.914)
Secret Ballot	0.0880 (1.388)	-0.0520 (-0.619)	0.0934 (1.499)	-0.0242 (-0.288)
Motor vehicle registration	-0.000352 (-0.0833)	0.00148 (0.413)	0.000925 (0.221)	0.00139 (0.390)
Log density	0.00566 (0.379)	0.172 (1.125)	0.00467 (0.312)	0.114 (0.714)
Rural	0.327*** (2.747)	-0.00726 (-0.0148)	0.172 (1.379)	-0.612 (-1.160)
Fraction of the population that is black	-0.634** (-2.312)	-2.567** (-1.993)	-0.625** (-2.320)	-2.134 (-1.611)
Fraction of the population age 65 or older	1.153 (0.980)	-1.313 (-0.554)	3.185*** (2.610)	3.554 (1.009)
Female workers	-0.481 (-1.474)	0.956** (2.051)	-0.260 (-0.788)	1.038** (2.192)
Manufacturing	2.504*** (9.215)	2.028*** (3.377)	2.050*** (7.283)	1.067* (1.676)
Fraction of the population age 10 that is illiterate	-0.554 (-1.289)	-0.958 (-1.101)	-0.881** (-2.072)	-2.245** (-2.317)
Fraction of the population that is foreign-born	0.555* (1.766)	3.524*** (4.259)	0.202 (0.629)	3.771*** (4.406)
Real manufacturing wage	0.00005*** (5.521)	0.00004*** (4.585)	0.00005* (1.837)	0.00003 (0.958)
States	48	48	48	48
Observations	720	720	720	720
R-squared	0.480	0.669	0.513	0.689

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. t-statistics is in parentheses
Dependent variable is *SNOM*. Constants are included in regressions though not reported above.

Table A8. SDM Estimates from Regressions of (Log) Total State Revenue on Female Suffrage Interaction Variable

	(1)	(2)	(3)
	Direct	Indirect	Total
Female suffrage x fraction of the population that is female	0.074	-0.015	0.059
	(1.064)	(-0.143)	(0.568)
Poll tax	-0.217***	-0.096	-0.312*
	(-4.250)	(-0.665)	(-1.866)
Literacy test	0.062	-0.144	-0.082
	(1.346)	(-1.151)	(-0.569)
Secret Ballot	0.134**	-0.273**	-0.139
	(2.661)	(-2.141)	(-0.990)
Motor vehicle registration	-0.002	-0.004	-0.006
	(-0.631)	(-0.913)	(-1.028)
Log density	-0.147***	0.030	-0.117**
	(-3.391)	(0.519)	(-2.523)
Rural	0.072	0.180	0.252
	(0.284)	(0.354)	(0.449)
Fraction of the population that is black	0.707	-0.927	-0.220
	(1.142)	(-0.904)	(-0.238)
Fraction of the population age 65 or older	6.001***	-18.881***	-12.880***
	(2.828)	(-4.208)	(-2.970)
Female workers	-0.588	1.235*	0.646
	(-1.610)	(1.726)	(0.860)
Manufacturing	-0.182	1.423*	1.241*
	(-0.361)	(1.924)	(1.814)
Fraction of the population age 10 that is illiterate	0.359	-1.011	-0.652
	(0.577)	(-0.664)	(-0.407)
Fraction of the population that is foreign-born	3.294***	0.341	3.635***
	(5.678)	(0.334)	(4.062)
Real manufacturing wage	-0.00006**	0.00003	-0.00003
	(-2.279)	(0.698)	(-0.996)
States		48	
Observations		864	
R-squared		0.238	

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. t-statistics is in parentheses. Dependent variable is *REV*. Constants are included in regressions though not reported above. Random state and time fixed effects are included in the regression.

Table A9. SDM Estimates from Regressions of (Log) Total State Expenses on Female Suffrage Interaction Variable

	(1) Direct	(2) Indirect	(3) Total
Female suffrage x fraction of the population that is female	0.040	-0.087	-0.046
	(0.468)	(-0.675)	(-0.390)
Poll tax	-0.292***	-0.159	-0.451**
	(-4.665)	(-0.926)	(-2.258)
Literacy test	-0.033	-0.141	-0.174
	(-0.644)	(-1.020)	(-1.065)
Secret Ballot	-0.021	-0.324**	-0.346**
	(-0.325)	(-2.196)	(-2.134)
Motor vehicle registration	0.0003	-0.008	-0.008
	(-0.105)	(-1.425)	(-1.250)
Log density	-0.222***	0.029	-0.193***
	(-4.627)	(0.464)	(-3.788)
Rural	-0.287	-0.227	-0.514
	(-0.987)	(-0.420)	(-0.873)
Fraction of the population that is black	1.449**	-0.575	0.874
	(2.080)	(-0.500)	(0.811)
Fraction of the population age 65 or older	4.895**	-15.550***	-10.655**
	(2.091)	(-2.927)	(-2.070)
Female workers	-1.241**	-0.089	-1.330
	(-2.580)	(-0.099)	(-1.414)
Manufacturing	0.578	1.088	1.666**
	(1.038)	(1.321)	(2.092)
Fraction of the population age 10 that is illiterate	0.256	0.673	0.929
	(0.351)	(0.368)	(0.503)
Fraction of the population that is foreign-born	2.996***	1.106	4.102***
	(4.274)	(0.930)	(4.027)
Real manufacturing wage	-0.0001***	0.0001	-0.0002***
	(-2.709)	(-1.444)	(-4.248)
States		48	
Observations		768	
R-squared		0.616	

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. t-statistics is in parentheses. Dependent variable is *EXP*. Constants are included in regressions though not reported above. Random state and time fixed effects are included in the regression.

Table A10. SDM Estimates from Regressions of (Log) Social Services Expenses on Female Suffrage Interaction Variable

	(1) Direct	(2) Indirect	(3) Total
Female suffrage x fraction of the population that is female	0.093	0.390***	0.483***
	(1.167)	(3.268)	(4.516)
Poll tax	-0.243***	-0.009	-0.252
	(-3.868)	(-0.061)	(-1.494)
Literacy test	-0.069	0.207	0.138
	(-0.905)	(1.119)	(0.654)
Secret Ballot	-0.154**	-0.382**	-0.536***
	(-2.247)	(-2.637)	(-3.442)
Motor vehicle registration	0.002	-0.001	0.001
	(0.667)	(-0.274)	(0.102)
Log density	-0.292*	1.052***	0.760**
	(-1.751)	(3.349)	(2.312)
Rural	2.720***	-4.996***	-2.276**
	(5.694)	(-5.060)	(-2.240)
Fraction of the population that is black	4.952***	-0.253	4.699*
	(3.213)	(-0.085)	(1.795)
Fraction of the population age 65 or older	12.634***	-34.598***	-21.965***
	(3.319)	(-4.713)	(-3.200)
Female workers	1.372***	-2.855***	-1.483
	(2.721)	(-2.835)	(-1.403)
Manufacturing	-1.414	1.857	0.444
	(-1.581)	(1.588)	(0.440)
Fraction of the population age 10 that is illiterate	1.615	3.326	4.940**
	(1.608)	(1.627)	(2.247)
Fraction of the population that is foreign-born	3.517***	-3.036*	0.481
	(3.292)	(-1.798)	(0.375)
Real manufacturing wage	0.00003	-0.0003***	-0.0003***
	(-0.252)	(-6.116)	(-9.699)
States		48	
Observations		864	
R-squared		0.350	

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. t-statistics is in parentheses
Dependent variable is *SOC*. Constants are included in regressions though not reported above. State and time fixed effects are included in the regression.

Table A11. SDM Estimates from Regressions of (Log) Transportation Expenses on Female Suffrage Interaction Variable

	(1) Direct	(2) Indirect	(3) Total
Female suffrage x fraction of the population that is female	4.558*** (13.328)	-0.080 (-0.131)	4.479*** (6.431)
Poll tax	-0.436** (-2.541)	-0.684** (-2.056)	-1.120*** (-3.043)
Literacy test	0.390*** (3.635)	0.158 (0.832)	0.548** (2.556)
Secret Ballot	0.370 (1.476)	0.575 (1.223)	0.945* (1.736)
Motor vehicle registration	0.004 (0.272)	-0.040* (-1.705)	-0.036 (-1.415)
Log density	-0.323*** (-6.281)	0.103 (1.065)	-0.220* (-1.887)
Rural	-2.533*** (-5.900)	0.389 (0.449)	-2.143*** (-2.139)
Fraction of the population that is black	1.449 (1.260)	2.673 (1.197)	4.122 (1.630)
Fraction of the population age 65 or older	28.951*** (6.368)	-0.174 (-0.019)	28.777*** (2.875)
Female workers	-3.042** (-2.030)	-0.030 (-0.011)	-3.071 (-0.980)
Manufacturing	2.948*** (2.994)	0.696 (0.374)	3.644* (1.687)
Fraction of the population age 10 that is illiterate	-0.082 (-0.042)	-6.213 (-1.595)	-6.295 (-1.402)
Fraction of the population that is foreign-born	-6.516*** (-5.200)	2.510 (0.972)	-4.006 (-1.361)
Real manufacturing wage	0.0002*** (6.279)	0.00005 (-0.993)	0.0001 (1.629)
States		48	
Observations		720	
R-squared		0.491	

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. t-statistics is in parentheses. Dependent variable is *TRANS*. Constants are included in regressions though not reported above. Time fixed effects are included in the regression.

Table A12. SDM Estimates from Regressions of House Voting Patterns on Female Suffrage Interaction Variable

	(1) Direct	(2) Indirect	(3) Total
Female suffrage x fraction of the population that is female	-0.005 (-0.073)	0.062 (0.497)	0.057 (0.492)
Poll tax	0.073 (1.487)	0.186 (1.532)	0.259* (1.851)
Literacy test	0.043 (0.729)	0.145 (0.825)	0.189 (0.925)
Secret Ballot	0.035 (0.609)	-0.248* (-1.922)	-0.213 (-1.467)
Motor vehicle registration	0.002 (1.044)	0.004 (0.925)	0.006 (1.198)
Log density	-0.128 (-1.092)	-0.824*** (-3.218)	-0.952*** (-3.448)
Rural	-0.065 (-0.176)	-1.025 (-1.212)	-1.090 (-1.233)
Fraction of the population that is black	-2.369** (-2.264)	0.326 (0.140)	-2.042 (-0.910)
Fraction of the population age 65 or older	-1.981 (-0.661)	-0.739 (-0.123)	-2.720 (-0.462)
Female workers	0.695678** (2.276465)	2.380*** (3.088)	3.075*** (3.692)
Manufacturing	0.060 (0.097857)	-1.141 (-1.259)	-1.081 (-1.263)
Fraction of the population age 10 that is illiterate	-0.708 (-0.960448)	-6.735*** (-3.988)	-7.443*** (-3.890)
Fraction of the population that is foreign-born	-1.110 (-1.421838)	4.511*** (3.611)	3.401*** (3.345)
Real manufacturing wage	0.000 (1.216892)	0.00006 (1.385)	0.0001*** (2.862)
States		48	
Observations		672	
R-squared		0.266	

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. t-statistics is in parentheses. Dependent variable is *HNOM*. Constants are included in regressions though not reported above. State and time fixed effects are included in the regression.

Appendix B. SDM Estimates for Education Expenses and Senate Voting Patterns

Table B1. SDM Estimates from Regressions of (Log) Education Expenses on Female Suffrage Interaction Variable

	(1)	(2)	(3)
	Direct	Indirect	Total
Female suffrage x fraction of the population that is female	-0.013	0.025	0.012
	(-0.135)	(0.169)	(0.085)
Poll tax	-0.303***	0.021	-0.282
	(-4.252)	(0.113)	(-1.341)
ρ		0.050	
		(1.015)	
Wald test spatial lag		102.667***	
LR test spatial lag		106.714***	
Wald test spatial error		99.662***	
LR test spatial error		106.826***	
Random Effects Hausman Test		163.620***	
States		48	
Observations		864	
R-squared		0.378	

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. t-statistics is in parentheses. Dependent variable is *EDU*. Constants are included in regressions though not reported above. Random state and time fixed effects are included in the regression. Random effects refer to random state effects. The null hypothesis for the Hausman test is that there is significant difference between the random state effects model and the fixed state effects model.

Table B2. SDM Estimates from Regressions of Senate Voting Patterns on Female Suffrage Interaction Variable

	(1) Direct	(2) Indirect	(3) Total
Female suffrage x fraction of the population that is female	-0.308** (-2.552)	0.152 (0.884)	-0.157 (-1.056)
Poll tax	0.081* (1.206)	-0.183 (-1.108)	-0.102 (-0.524)
ρ		0.030 (0.549)	
Wald test spatial lag		49.377***	
Wald test spatial error		47.829***	
Random Effects Hausman Test		10.615	
States		48	
Observations		720	
R-squared		0.510	

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. t-statistics is in parentheses. Dependent variable is *SNOM*. Constants are included in regressions though not reported above. State and time fixed effects are included in the regression. Random effects refer to random state effects. The null hypothesis for the Hausman test is that there is significant difference between the random state effects model and the fixed state effects model.

Table B3. SDM Estimates from Regressions of (Log) State Education Expenses on Female Suffrage Binary Variable

	(1)	(2)	(3)
	Direct	Indirect	Total
Female suffrage binary variable	-0.003 (-0.068)	0.008 (0.123)	0.005 (0.085)
Poll tax	-0.301*** (-4.248)	0.012 (0.064)	-0.289 (0.168)
ρ		0.050 (1.015)	
Wald test spatial lag		102.512***	
LR test spatial lag		106.560***	
Wald test spatial error		99.526***	
LR test spatial error		106.673***	
Random Effects Hausman Test		125.059***	
States		48	
Observations		864	
R-squared		0.378	

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. t-statistics is in parentheses. Dependent variable is *EDU*. Constants are included in regressions though not reported above. State and time fixed effects are included in the regression. Random effects refer to random state effects. The null hypothesis for the Hausman test is that there is significant difference between the random state effects model and the fixed state effects model.

Table B4. SDM Estimates from Placebo Regressions of (Log) State Education Expenses on Female Suffrage Binary Variable

	(1)	(2)	(3)
	Direct	Indirect	Total
Female suffrage binary variable	-0.039 (-1.090)	-0.420*** (-5.024)	-0.459*** (-4.734)
Poll tax	-0.374*** (-5.373)	-0.012 (-0.074)	-0.386** (-2.044)
ρ		0.005 (0.102)	
Wald test spatial lag		181.223***	
Wald test spatial error		173.055***	
Random Effects Hausman Test		34.737	
States		48	
Observations		864	
R-squared		0.390	

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. t-statistics is in parentheses. Dependent variable is *EDU*. Constants are included in regressions though not reported above. State and time fixed effects are included in the regression. Random effects refer to random state effects. The null hypothesis for the Hausman test is that there is significant difference between the random state effects model and the fixed state effects model.

Table B5. SDM Estimates from Regressions of Senate Voting Patterns on Female Suffrage Binary Variable

	(1) Direct	(2) Indirect	(3) Total
Female suffrage binary variable	-0.146*** (-2.694)	0.077 (0.972)	-0.069 (-1.016)
Poll tax	0.076 (1.183)	-0.183 (-1.149)	-0.107 (-0.569)
ρ		0.028 (0.512)	
Wald test spatial lag		49.771***	
Wald test spatial error		48.120***	
Random Effects Hausman Test		21.574	
States		48	
Observations		720	
R-squared		0.511	

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. t-statistics is in parentheses. Dependent variable is *SNOM*. Constants are included in regressions though not reported above. State and time fixed effects are included in the regression. Random effects refer to random state effects. The null hypothesis for the Hausman test is that there is significant difference between the random state effects model and the fixed state effects model.

Table B6. SDM Estimates from Placebo Regressions of Senate Voting Patterns on Female Suffrage Binary Variable

	(1)	(2)	(3)
	Direct	Indirect	Total
Female suffrage binary variable	-0.047 (-1.064)	0.095 (0.827)	0.048 (0.385)
Poll tax	0.077 (1.177)	-0.173 (-1.067)	-0.095 (-0.495)
ρ		0.028 (0.512)	
Wald test spatial lag		44.494***	
Wald test spatial error		43.788***	
Random Effects Hausman Test		20.976	
States		48	
Observations		720	
R-squared		0.515	

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. t-statistics is in parentheses. Dependent variable is *SNOM*. Constants are included in regressions though not reported above. State and time fixed effects are included in the regression. Random effects refer to random state effects. The null hypothesis for the Hausman test is that there is significant difference between the random state effects model and the fixed state effects model.

Table B7. SDM Estimates from Regressions of State Education Expenses on Female Suffrage Interaction Variable

	(1)	(2)	(3)
	Direct	Indirect	Total
Female suffrage x fraction of the population that is female	-0.010	0.028	0.019
	(-0.105)	(0.195)	(0.139)
Poll tax	-0.298***	0.027	-0.272
	(-3.979)	(0.142)	(-1.231)
Literacy test	0.302***	-0.233	0.070
	(3.504)	(-0.999)	(0.258)
Secret Ballot	0.058	-0.378*	-0.320
	(0.001)	(-1.998)	(-1.520)
Log density	0.739***	-0.888**	-0.149
	(3.690)	(-2.326)	(-0.364)
Rural	0.952*	3.105**	4.058***
	(1.730)	(2.471)	(3.088)
Fraction of the population that is black	2.457	-7.887**	-5.430
	(1.382)	(-2.120)	(-1.601)
Fraction of the population age 65 or older	14.804***	-59.215***	-44.411***
	(3.156)	(-6.306)	(-4.737)
Female workers	-0.627	2.424*	1.797
	(-1.064)	(1.882)	(1.378)
Manufacturing	-2.515**	6.772***	4.257***
	(-2.469)	(4.702)	(3.292)
Fraction of the population age 10 that is illiterate	-3.593***	3.894	0.300
	(-2.928)	(1.461)	(0.106)**
Fraction of the population that is foreign-born	8.759***	-5.346**	3.414**
	(6.208)	(-2.585)	(2.065)
Real manufacturing wage	-0.0001***	0.0002***	0.0001
	(-2.747)	(2.699)	(1.310)
States		48	
Observations		864	
R-squared		0.378	

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. t-statistics is in parentheses. Dependent variable is *EDU*. Constants are included in regressions though not reported above. State and time fixed effects are included in the regression.

Table B8. SDM Estimates from Regressions of Senate Voting Patterns on Female Suffrage Interaction Variable

	(1) Direct	(2) Indirect	(3) Total
Female suffrage x fraction of the population that is female	-0.308** (-2.552)	0.152 (0.884)	-0.157 (-1.056)
Poll tax	0.081 (1.206)	-0.183 (-1.108)	-0.102 (-0.524)
Literacy test	0.079 (1.515)	0.068 (0.568)	0.147 (1.041)
Secret Ballot	0.030 (0.417)	-0.100 (-0.622)	-0.070 (-0.409)
Log density	-0.026 (-0.602)	0.096* (1.678)	0.070 (1.662)
Rural	0.010 (0.039)	0.233 (0.471)	0.243 (0.471)
Fraction of the population that is black	-1.918*** (-3.093)	1.736 (1.644)	-0.182 (-0.186)
Fraction of the population age 65 or older	2.628 (1.133)	-11.295** (-2.239)	-8.667* (-1.835)
Female workers	0.893** (2.066)	-2.276*** (-3.025)	-1.383* (-1.800)
Manufacturing	2.056*** (3.583)	-0.416 (-0.490)	1.640** (2.185)
Fraction of the population age 10 that is illiterate	-0.305 (-0.422)	0.432 (0.258)	0.127 (0.078)
Fraction of the population that is foreign-born	-0.957 (-1.414)	4.045*** (3.539)	3.088*** (3.256)
Real manufacturing wage	0.0001* (1.838)	-0.00004 (-0.6447)	0.00003 (0.7784)
States		48	
Observations		720	
R-squared		0.510	

Notes: *, **, and *** denote, respectively, significance at the 10%, 5%, and 1% levels. t-statistics is in parentheses
Dependent variable is *SNOM*. Constants are included in regressions though not reported above. State and time fixed effects are included in the regression.

Appendix C. Matrix W_N

To construct W_N we first construct matrix D_N , where each element d_{ij} is equal to 1 if it satisfies the minimum distance requirement of being one of the four nearest neighbors and zero otherwise, i and $j = (1, \dots, N)$. The minimum distance is calculated as the distance between the centers of geographic mass of each state. Another common technique in spatial econometrics is to specify the spatially weighted matrix, based on the contiguity of the states. This technique is usually employed when Alaska and Hawaii are included in the sample. However, the two states are not in the sample in this paper.

As LeSage and Pace (2014) point out, the choice of the number of nearest neighbors in construction of a weight matrix does not alter the results, as long as the estimates are interpreted correctly and the spatial model is properly specified. Matrix W_N then is a row-standardized version of matrix D_N : $w_{ij} = d_{ij} / \sum_{j=1}^N d_{ij}$. The row-standardization is done to ease interpretation of operations with the weight matrix as an average of neighboring values.