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THEORY AND EVIDENCE FROM
MATERNITY LEAVE LAWS

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Law, Economics and Culture: Theory and Evidence from Maternity Leave Laws*

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Abstract

Why do some countries mandate a long maternity leave, while others mandate only a short one? In a standard mandated benefits model mandated maternity leave makes hiring women more costly, and therefore reduces women's employment and real wages. We incorporate into the standard model society's tolerance of gender based discrimination, showing that the optimal length of maternity leave depends on it. The less tolerant society is of gender based discrimination the longer the maternity leave it will mandate. Relying on recent research in psychology and linguistics according to which patterns in languages offer a window into their speakers' dispositions, we collected new data on the number of gender differentiated personal pronouns across languages, to capture societies' attitudes towards gender based discrimination. We first confirm, using within country language variation, that our linguistic measure is indeed correlated with attitudes towards gender based discrimination. Then, using cross-country data on length of maternity leave, while controlling for political, economic and demographic parameters, we find a strong correlation between our language based measure of attitudes and the length of maternity leave.

JEL Classifications: H2, J7, K31, O57, Z1

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1 Introduction

Mandated maternity leave is perhaps the most widespread social program in the world. However, there is a large variation in the length of maternity leave that countries mandate. Why do some countries mandate that employers provide a long maternity leave, while others mandate only a short one?

To address this question, section 2 presents a mandated benefit model, with an employer, and two types of employees, men and women. The employer is required to provide maternity leave to women and not to men. The employer's cost of providing maternity leave is greater than its value to women, since otherwise there would be no need for the mandate as the employer would freely choose to provide the leave (Summers 1989). Therefore, when the employer is free to discriminate between men and women in their wages, women's wage and employment goes down due to the mandate, and they do not benefit from it.

We then incorporate into the model society's attitudes towards gender based discrimination. In a society where there is some negative view of gender based discrimination the employer is not free to treat men and women differently. This could be the result of a social sanction imposed on employers that treat men and women too differently, or because of a legal provision that restricts the extent of permissible discrimination. Formally, the less willing society is to tolerate gender based discrimination the less able the employer is to discriminate between men and women in their wages.

When gender based wage discrimination is restricted, mandated maternity leave can benefit women, as was shown by Jolls (2000, 2006), since men bear some of the cost of the mandated leave. We show that the less society is willing to tolerate gender based discrimination the longer the maternity leave it will provide. Intuitively, when society is relatively intolerant of gender based discrimination employers are less able to pass on to women the cost of maternity leave. This means that an increase in the length of maternity leave has a smaller effect on women's wages, and therefore a longer leave will benefit them.

To see whether the model's predictions are supported by the data, in section 3 we look for a measure of society's attitudes towards gender based discrimination. Because answers to survey's may be endogenous to current policy, we rely on recent research in psychology and linguistics according to which language shapes a person's view of the world. This view, known as the Sapir-Whorf hypothesis of linguistic relativity, originally advanced by

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Edward Sapir (1929) and Benjamin Lee Whorf (1956), is well summarized by the psychologist Lera Broditsky (2010):

Patterns in language offer a window on a culture's dispositions and priorities... new research shows us that the languages we speak not only reflect or express our thoughts, but also shape the very thoughts we wish to express... As we uncover how languages and their speakers differ from one another, we discover that human nature too can differ dramatically, depending on the languages we speak.

The stable grammatical feature we focus on is personal pronouns. Languages differ in how many of their personal pronouns are gender differentiated. We collected data on the number cases of gender differentiated pronouns in 25 languages. To the best of our knowledge, this is the first time that this variable has been systematically coded and used in an empirical quantitative work. Using World Values Survey data, while exploiting only within country variation, we shows that speakers of languages with more cases of gender differentiated personal pronouns are more likely to have gender based discriminatory views. Intuitively, a language that routinely compels you to specify gender when using personal pronouns increases your awareness and acceptance of gender differences. This is consistent with the linguistic relativity principle, and supports our use of this feature of languages as a proxy for attitudes towards gender based discrimination.

In section 4 we use data on length of maternity leave in different countries, together with our language based measure of attitudes towards gender based discrimination, and other economic, political and demographic controls. In a cross sectional analysis we show that the more cases of gender differentiated personal pronouns a language that is spoken in a country has, the shorter the maternity leave that a country will provide, which is consistent with the prediction of our model.

In section 5 we discuss our results and our model. We show that our results hold even when attitudes are measured directly rather than through our language proxy, and that accounting for paternity leave does not affect them. We note that our results are not driven by countries where Arabic is spoken, and address the issue of multilingual countries. We also discuss the possibility of an alternative channel that is consistent with our results.

The question why countries vary in their mandated maternity leave policies has been of central concern to legal scholars. In particular, the focus has

been on explaining why the U.S. mandates only limited maternity benefits, as opposed to the more expansive benefits mandated in certain European countries (Dowd 1989, Issacharoff and Rosenblum 1994, Schuchmann 1995, Grill 1996, Pelletier 2006, Levmore 2007, Suk 2010). The reasons for the different policies mentioned in these papers include: different approaches to the role of the state (European countries being social welfare states, and the U.S. being individualistic and market oriented), different demographic needs (low fertility in Europe relative to the U.S.), differing goals of the feminist movement (striving for equal treatment in the U.S., and for special treatment in Europe), and different legal structures for providing benefits (in the U.S. antidiscrimination law is relied upon, which places maternity and medical leave under the same legal regime, while in Europe maternity leave is covered by special laws). In our empirical analysis we control, where possible, for these alternative explanations. More importantly, we expand the analysis significantly, and instead of comparing the U.S. with a couple of European countries we utilize data on maternity leave policies and their possible determinants in around 75 countries. The advantages of large sample analysis when addressing comparative law questions is well noted in Spamann (2009).

That maternity leave laws are determined endogenously is in the spirit of Aghion, Alesina and Trebbi (2004), who analyze the endogenous choice of political institutions. Along the same lines Aghion et al. (2010) analyze the feedback between regulation and distrust.¹ The paper is also related to the literature on the effects of culture on economic policies and outcomes (Putnam 1993, 2000; Fukuyama 1995; Guiso, Sapienza, and Zingales 2006, 2008, 2009; Tabellini 2008).

2 The Model

2.1 Set Up

An employer uses labor (L) for production, with the following production function:

$$F(L) = ZL - \frac{1}{2}L^2 \tag{1}$$

¹For papers that look at the effect of maternity leave laws, see Ruhm (1998), Ruhm (2000) and Lalive and Zweimüller (2009).

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where Z is some large parameter. The price of the good produced is normalized to equal one.

The population in the economy consists of a unit mass of men and a unit mass of women. Because of government regulation the employer is legally required to provide maternity leave of length μ to women. This imposes a cost $c(\mu)$ on the employer, when employing women, and its value to women is $v(\mu)$. The utility functions of men and women, U_m and U_w respectively, are:

$$\begin{aligned} U_m &= W_m L_m - \frac{1}{2} L_m^2 \\ U_w &= (W_w + v(\mu)) L_w - \frac{1}{2} L_w^2 \end{aligned} \tag{2}$$

where W_m and L_m are the wage and labor of men, and W_w and L_w are the wage and labor of women.

We assume that $c(\mu) > v(\mu)$, that is the employer's cost of providing maternity leave is greater than its value to women. If this was not the case there would be no need for the mandate, as the employer would freely choose to provide the leave to women absent government regulation (Summers 1989). Assume also that $c'(\mu), v'(\mu) > 0$, and that $c''(\mu) \geq 0 > v''(\mu)$, that is women's marginal benefit of maternity leave is positive and decreasing, while the employer's marginal cost of maternity is positive and non-decreasing.

2.2 Gender Based Discrimination

We first analyze the case where the employer is free to offer different wages to men and women. Using expression 2 we can derive men's and women's labor supply:

$$\begin{aligned} L_m &= W_m \\ L_w &= W_w + v(\mu) \end{aligned} \tag{3}$$

Intuitively, men's labor supply is increasing with their wages, and women's labor supply is increasing with their wages and with their valuation of maternity leave.

The employer solves a separate maximization problem for men and women, taking in each case the number of workers from the opposite gender as given:

$$\begin{aligned} \max_{L_m} F(L_m + \bar{L}_w) - W_m L_m \\ \max_{L_w} F(\bar{L}_m + L_w) - (W_w + c(\mu)) L_w \end{aligned}$$

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These yield the employer's demand function for men and for women:

$$\begin{aligned} W_m &= Z - L_m - \bar{L}_w \\ W_w &= Z - \bar{L}_m - L_w - c(\mu) \end{aligned} \tag{4}$$

Naturally, the demand curve for men is decreasing with the number of men employed, and the demand curve for women is decreasing with the number of women employed. Note that an increase in the number of women employed shifts the demand curve for men downward, and an increase in the number of men employed or in the cost of providing maternity leave shifts the demand curve for women downward.

We can now plug in the labor supply functions into the demand functions, and solve for the wage of men and women:

$$\begin{aligned} W_m^* &= \frac{1}{3}[Z - v(\mu) + c(\mu)] \\ W_w^* &= \frac{1}{3}[Z - v(\mu) - 2c(\mu)] \end{aligned} \tag{5}$$

The number of men and women employed, L_m^* and L_w^* respectively, can be immediately derived from the labor supply functions in expression 3.

Note from expression 5 that $W_m^* - W_w^* = c(\mu)$, that is the difference in wages between men and women is equal to the cost of providing maternity leave. Intuitively, since relative to men employing women imposes a cost $c(\mu)$ on the employer, women's wage is lower than men's wage by this cost.

Let us denote the equilibrium wages and employment before maternity leave is mandated as W'_m , W'_w , L'_m , L'_w . It is easy to see that when no maternity leave is mandated, that is when $c(\mu) = v(\mu) = 0$, we get $W'_m = W'_w = L'_m = L'_w = \frac{1}{3}Z$. Note that for men $W_m^* > W'_m$ and $L_m^* > L'_m$, and for women $W_w^* < W'_w$ and $L_w^* < L'_w$. That is, as a result of the mandated leave women's wage and employment goes down, whereas men's wage and employment goes up.

Figure 1 depicts the labor market for men and women. The introduction of mandated maternity leave shifts women's supply curve outward by $v(\mu)$, and the demand curve for women inward by $c(\mu)$. Since $c(\mu) > v(\mu)$ this results in a decrease in employment of women, which in turn shifts the demand curve for men outward, as expression 4 shows. The resulting increase in employment of men causes a further shift inward in the demand curve for women.

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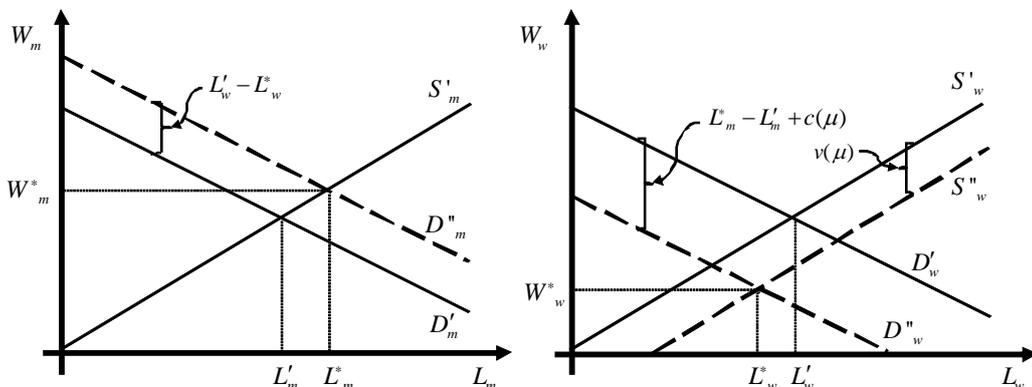


Figure 1: The Labor Market for Men (left) and Women (right)

2.3 Intolerance of Gender Based Discrimination

We now analyze how society's tolerance of gender based discrimination affects the analysis presented above. In a society where there is some negative view of gender based discrimination the employer is not free to treat men and women differently. This could be the result of a social sanction imposed on employers that treat men and women too differently, or because of a legal provision that restricts the extent of permissible discrimination.

To capture society's attitudes towards gender based discrimination formally, we impose the following condition:

$$W_w \geq W_m - \frac{1}{\lambda} c(\mu) \quad (6)$$

where $\lambda \geq 1$. Recall that $W_m^* - W_w^* = c(\mu)$. λ reflects an external constraint on gender based wage discrimination, and therefore captures how much society is willing to tolerate gender based discrimination. The less willing society is to tolerate gender based discrimination the higher λ is, and therefore the smaller the difference between the wage of men and women. To make the constraint in expression 6 meaningful, we assume that the employer must higher the women and men willing to work for the wages offered.

Jolls (2000, 2006) also analyzes the effect of mandated benefit that is targeted at a specific population, when employers cannot discriminate in wages between the different populations. Here, we employ a similar framework, but instead of imposing that the wage of men and women must be equal,

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we consider the extent to which the wage of men and women can be different, and analyze the consequences of a change in the constraint on wage differentiation on the level of mandated benefits.

Plugging in the labor supply functions from expression 3 for L_m and L_w in the demand functions in expression 4 yields the following two conditions:

$$\begin{aligned} W_m &= \frac{1}{2}[Z - \bar{L}_w] \\ W_w &= \frac{1}{2}[Z - \bar{L}_m - v(\mu) - c(\mu)] \end{aligned} \tag{7}$$

Imposing the constraint from expression 6 on the conditions in expression 7, and solving for the wage of men and women, we get:

$$\begin{aligned} \tilde{W}_m &= \frac{1}{3}\left[Z - v(\mu) + \left(\frac{2 - \lambda}{\lambda}\right)c(\mu)\right] \\ \tilde{W}_w &= \frac{1}{3}\left[Z - v(\mu) - \left(\frac{\lambda + 1}{\lambda}\right)c(\mu)\right] \end{aligned} \tag{8}$$

The number of men and women employed, \tilde{L}_m and \tilde{L}_w respectively, can again be immediately derived from the labor supply functions in expression 3.

Note that when $\lambda = 1$, that is when society is indifferent to gender based discrimination, we get $\tilde{W}_m = W_m^*$ and $\tilde{W}_w = W_w^*$. Also, note that $\frac{\partial \tilde{W}_m}{\partial \lambda} < 0$, while $\frac{\partial \tilde{W}_w}{\partial \lambda} > 0$, that is as society becomes less tolerant of gender based discrimination men's wage goes down, while women's wage goes up.

Figure 2 depicts the labor market for men and women in a society that is not indifferent to gender based discrimination, that is when $\lambda > 1$. In equilibrium, the shift inward of the demand for women by $c(\mu)$ as a result of the introduction of mandated maternity leave is offset by a shift outward of the same curve as a result of a decrease in the employment of men. The increase in employment of women shifts the demand curve for men inward. One can see that, relative to the case where there is no mandate, men's wage and employment go down, women's employment goes up while their wage goes down.

2.4 Optimal Length of Leave

We assume that maternity leave is introduced in order to benefit women. We do not address why governments choose to benefit women through a

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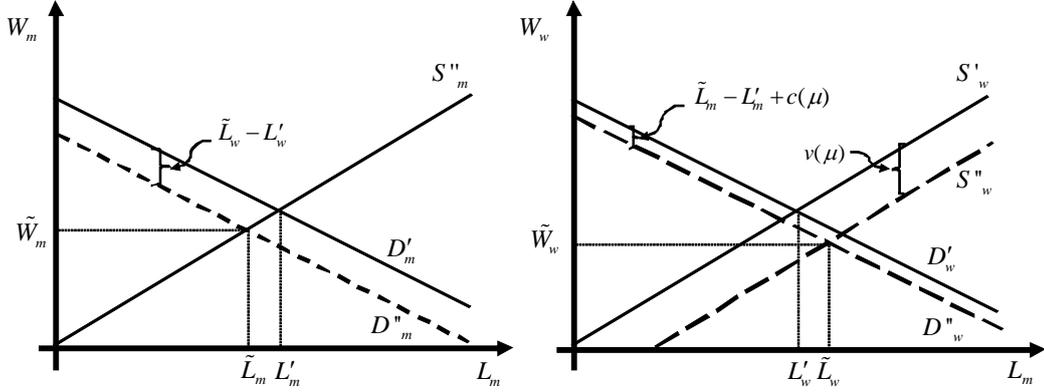


Figure 2: The Labor Market for Men (left) and Women (right) when Society is Intolerant of Discrimination

mandated maternity leave and not through direct transfers, despite its inefficiency (as its cost to the employer is greater than its value to women). This could probably be due to political considerations. Given this objective the social planner chooses the length of maternity leave to maximize women's utility.²

Differentiating women's utility, U_w , with respect to the length of leave, μ , we employ the envelope theorem and ignore $\frac{\partial L_w}{\partial \mu}$, as women choose their labor supply optimally. We thus get:

$$\frac{\partial U_w}{\partial \mu} = \left(\frac{\partial W_w}{\partial \mu} + v'(\mu) \right) L_m$$

Using women's wage from expression 8, we obtain the following first order condition:

$$v'(\mu) = \left(\frac{1 + \lambda}{2\lambda} \right) c'(\mu) \quad (9)$$

The length of maternity leave for which expression 9 hold is denoted by $\tilde{\mu}$.³ Intuitively, increasing the length of maternity leave has a direct beneficial effect on women, but it also results in reduction in women's wage, which harms women. The left-hand side of expression 9 is women's direct gain from

²The analysis does not change if the social planner puts some weight on men's utility, as long as the weight on women's utility is sufficiently large.

³This is a maximum, since the second order condition holds: $v''(\mu) - \left(\frac{1+\lambda}{2\lambda} \right) c''(\mu) < 0$.

increasing the length of maternity leave. The right-hand side of expression 9 is the women's loss from increasing the length of maternity leave, since it is the increase in the cost imposed on the employer when employing women which reduces women's wages, attenuated by society's intolerance of gender based discrimination. At the optimum the marginal gain and marginal loss from a longer maternity leave are equal.

2.5 The Effect of Attitudes on Leave

How do society's attitudes towards gender based discrimination affect the length of maternity leave mandated? To address this question we can look at the effect of λ , which captures society's tolerance of gender based discrimination, on the chosen length of maternity leave, $\tilde{\mu}$.

Employing the implicit function theorem on the first order condition in expression 9, we get:

$$\frac{\partial \tilde{\mu}}{\partial \lambda} = \frac{c'(\mu)}{2\lambda^2[(\frac{1+\lambda}{2\lambda})c''(\mu) - v''(\mu)]} > 0 \quad (10)$$

That is, the less society is willing to tolerate gender based discrimination the longer the maternity leave it will provide. Intuitively, when society is relatively intolerant of gender based discrimination employers are less able to pass on to women the cost of maternity leave. This means that an increase in the length of maternity leave has a smaller effect on women's wages, and therefore a longer leave can be chosen.

3 Language and Attitudes

3.1 Linguistic Relativity

As section 2 explains, we are interested in the relationship between society's attitudes towards gender based discrimination and the length of maternity leave it provides. The main challenge in looking at the effect of attitudes on policies is that current measure of attitudes through surveys may be influenced by current policies. In our case, a maternity leave policy that is favorable to women might produce survey answers that are favorable to women. Ideally, to provide a correlation between long run attitudes and current policies we would like to have a survey done centuries ago and estimate the correlation. We try to deal with this issue using linguistic relativity.

Linguistic relativity is the idea that thought is shaped by language, or more precisely that the particular language we speak influences the way we think about reality. This notion was first advanced by Edward Sapir (1929), but was mostly developed in the writing of his student, Benjamin Lee Whorf (1956). The main thrust of what is known as the Sapir-Whorf hypothesis is well summarized by the linguist Guy Deutscher (2010a):

When your language routinely obliges you to specify certain types of information, it forces you to be attentive to certain details in the world and to certain aspects of experience that speakers of other languages may not be required to think about all the time. And since such habits of speech are cultivated from the earliest age, it is only natural that they can settle into habits of mind that go beyond language itself, affecting your experiences, perceptions, associations, feelings, memories and orientation in the world.

Many studies in psychology and linguistics, each focusing on a specific cross-linguistic difference, have confirmed the effect of language on thought. For example, speakers of languages that use cardinal-direction terms – north, south, east, and west – to define space, instead of defining space relative to an observer, have superior navigational ability and spatial knowledge, and apply the same frame of reference in recall and recognition (Levinson 2003). The way languages divide the color spectrum into colors leads to differences in color discrimination (Winawer et al. 2007). Speakers of languages that do not make significant grammatical distinction between objects and substances (for example, when counting them), pay more attention to the material of objects rather than to their shape (Lucy and Gaskins 2001). More generally, see Lucy (1997), Boroditsky (2003) and Deutscher (2010b).

Applying the linguistic relativity principle to our research, we looked for a grammatical feature of languages that is correlated with attitudes towards gender based discrimination.

3.2 Gender Differentiated Personal Pronouns

One of the stable grammatical features of a language is its use of personal pronouns. Personal pronouns are gender differentiated in some cases, but in other cases they are not. Languages differ in how many of their personal pronouns are gender differentiated. For example, as shown in table 1, Spanish

Table 1: Personal Pronouns in English and Spanish

Person	English				Spanish			
	Singular		Plural		Singular		Plural	
	Masc.	Fem.	Masc.	Fem.	Masc.	Fem.	Masc.	Fem.
1st	I		We		yo		nosotros	nosotras
2nd	You		You		tú		vosotros	vosotras
3rd	He	She	They		él	ella	ellos	ellas

has four cases of gender differentiated pronouns (third person singular, first person plural, second person plural, and third person plural), whereas English has only one case of gender differentiated pronoun (third person singular).

We code, using grammar books, the number of cases of gender differentiated personal pronouns in 25 languages (see data in appendix A). To the best of our knowledge, this is the first time that this variable has been systematically coded and used in an empirical quantitative work.

Applying the linguistic relativity principle to our research, a language that routinely compels you to specify gender when using personal pronouns increases your awareness and acceptance of gender differences. Thus, the number of gender differentiated personal pronouns can be used as a proxy for attitudes towards gender based discrimination, where the fewer gender differentiated personal pronouns a language has the less tolerant its speakers should be towards gender based discrimination.

We are not the first to look at the effects of variation in grammatical gender across languages. Guiora et al. (1982) study the development of gender identity in children who speak Hebrew, English and Finnish, as the sex-determined grammatical features of these languages, and in particular their use of gender differentiated pronouns, vary from almost zero in Finnish, through very low in English, to very high in Hebrew. They find a direct relationship between gender loading in the native language and gender identity attainment. Hill and Mannheim (1992) note the "Whorfian effect" of gender differentiated personal pronouns, and more recently, Boroditsky et al. (2003) find that the way languages assign grammatical gender to inanimate objects affects how their speakers view these objects. In the economics literature, language is used as a proxy for culture also by Licht et al. (2006) and Tabellini (2008).

Table 2: Summary Statistics for World Value Survey Regression

	Mean	S.D.	Min	Max
When jobs are scarce men should have more right to a job than women	0.38	0.48	0	1
Gender Differentiated Personal Pronouns	2.20	1.53	0	4
Male	0.47	0.49	0	1
Married	0.59	0.49	0	1
High School	0.34	0.47	0	1
College or more	0.15	0.36	0	1
Income	4.52	2.47	1	10
Age	41.61	16.16	15	98

3.3 Is Language Correlated with Attitudes?

Before turning to aggregate cross-country data and testing the prediction of our model, it is natural to ask whether our linguistic variable is correlated with attitudes toward gender based discrimination. To do so we used data collected in five sweeps of the World Value Survey, between 1981 and 2008 (see appendix B).

In particular, we looked at the respondents answer to the following question: "When jobs are scarce, men should have more right to a job than women? Agree/ Disagree". One of the advantages of the World Value Survey data is that it allows us distinguish between the country where the respondent lives (from the question "In which country do you live?") and the language the respondent speaks (from the question: "What language do you normally speak at home?"). Every respondent was assigned the number of cases of gender differentiated pronouns the language that he reported to be speaking at home has. If indeed language is correlated with attitudes, as we argue, then we should find that the number of cases of gender differentiated pronouns is associated with a higher likelihood of agreeing with the above statement on men's right to a job.

Summary statistics for the variables we include in our regression, all taken all from the World Value Survey, are presented in table 2

Table 3 presents the results. The dependent variable in Table 3 is a binary variable representing the person's answer to the question whether men have more right to job than women when jobs are scarce. The variable

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Table 3: Language and Attitudes

Dependent Variable:	When jobs are scarce men should have more right to a job than women			
	(1)	(2)	(3)	(4)
Gender Differentiated	0.028	0.025	0.029	0.029
Personal Pronouns	(0.01) ^{***}	(0.01) ^{**}	(0.009) ^{***}	(0.009) ^{***}
Male		0.098 (0.013) ^{***}	0.103 (0.012) ^{***}	0.108 (0.013) ^{***}
Age			0.003 (0.001) ^{***}	0.002 (0.001) ^{***}
Married			0.041 (0.013) ^{***}	0.042 (0.012) ^{***}
Income			-0.021 (0.004) ^{***}	-0.015 (0.003) ^{***}
High School				-0.071 (0.009) ^{***}
College or more				-0.149 (0.013) ^{***}
Country FE	✓	✓	✓	✓
Survey Year FE	✓	✓	✓	✓
Number of Obs.	87,113	87,113	87,113	87,113

* $p \leq 0.1$, ** $p \leq 0.05$, *** $p \leq 0.01$

Standard errors are robust and clustered at the language level

takes the value 1 if the respondent agreed with the statement, and zero if the respondent disagreed with it. The table presents marginal effects of a probit regression. Standard errors are robust and clustered at the language level, to allow for arbitrary patterns of correlation by language. We include controls for country and year of survey fixed effects. Thus, we only exploit the within country and within year variation in responses, which means we hold constant policies, institutions and laws that might also have an impact on individual attitudes.

In specification (1) we see that the more gender differentiated pronouns a language has the more likely the respondent is to think that when jobs are scarce men have more right to a job than women, and this effect is statistically significant.

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In specification (2) we control for the gender of the respondent. Unsurprisingly, men are more likely to think that when jobs are scarce men have more right to a job than women. However, even after controlling for the gender of the respondent, the effect of language on the respondents answer remains significant.

In specification (3) we see that older people and people who are married are more likely to agree with the statement, while people with higher income are less likely to do so. Still, the effect of language on the respondents answer remains significant.

In specification (4) we see that the more educated a person is the less likely the person is to agree with the statement. Still, even after controlling for education, the more gender differentiated pronouns a language has the more likely the respondent is to think that when jobs are scarce men have more right to a job than women.

That speakers of languages with more cases of gender differentiated personal pronouns are more likely to have gender based discriminatory views is consistent with the linguistic relativity principle, and supports our use of this feature of languages as a proxy for attitudes towards gender based discrimination.

4 Maternity Leave and Language

In the cross sectional analysis, we estimate the correlation between the length of maternity leave and gender differentiated personal pronouns, interpreted as a proxy for attitudes towards gender based discrimination. The data on the length of maternity leave in different countries, as well as other demographic and political variable we use, are from the United Nations Statistical Division, Statistics and Indicators on Women and Men. GDP data is taken from the Penn World Table. Each country in the sample was associated with the language most commonly spoken in it, based on the CIA World Factbook and Ethnologue. The exact sources of the data is detailed in appendix B. Summary statistics for the variables we include in our regression are presented in table 4

From table 4 it is clear that there is a large variation in the length of maternity leave that countries mandate. In our sample, the length of maternity leave goes from 45 days (Bahrain and UAE) to 480 days (Sweden). Similarly, there is a large variation in the number of gender differentiated

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Table 4: Summary Statistics for Maternity Leave and Language Regression

	Mean	S.D.	Min	Max
Days of Maternity Leave	115.4	78.63	45	480
Gender Differentiated Personal Pronouns	2.55	1.55	0	4
GDP per capita	17,735	13,319	1,309	53,496
Govt. Share of GDP	16.12	6.76	5.8	37.97
Population (in thousands)	64,519	209,600	257	1,354,146
Fertility	2.29	0.95	1.3	5.8
Women Share of Parliament	16.56	11.1	0	45

personal pronouns of languages spoken in the countries in our sample.

Table 5 presents the results of the OLS regression. The dependent variable in Table 5 is the number of days of maternity leave a country mandates. Standard errors are robust and clustered at the language level.

In specification (1) we can see that there is a strong negative correlation between the length of maternity leave and our linguistic measure. The coefficient is negative and statistically and economically significant, which means that an increase in the number of gender differentiated pronouns a language has reduces the length of maternity leave that is mandated. Specifically, for every additional case of gender differentiated pronouns the length of maternity leave decreases by approximately 20 days. This is consistent with the prediction of our model, that the more tolerant a society is towards gender based discrimination the shorter the maternity leave that it will mandate.

In specification (2) we control for GDP per capita, government share of GDP and population. GDP per capita is not correlated with the length of maternity leave. Government share of GDP, which can be thought of as a proxy for the size of the welfare state, is positively correlated with the length of maternity leave, but this correlation is not statistically significant. The population of country is negatively correlated with the length of maternity leave. The effect of language on leave remains statistically and economically significant after adding these controls.

In Specification (3) we control for the share of women in parliament. The coefficient is positive and statistically significant. Specifically, an increase of one percent in women's representation in parliament is associated with an

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Table 5: Maternity Leave and Language

Dependent Variable:	Days of Maternity Leave			
	(1)	(2)	(3)	(4)
Gender Differentiated	-20.32	-19.90	-17.26	-16.24
Personal Pronouns	(6.30) ^{***}	(7.86) ^{**}	(4.77) ^{***}	(4.74) ^{***}
GDP per capita		0.001	0.0007	0.0006
		(0.001)	(0.0007)	(0.0007)
Government		1.61	1.38	1.66
Share of GDP		(1.34)	(0.99)	(1.05)
Population		-0.00007	-0.00006	-0.00006
		(0.00002) ^{***}	(0.00002) ^{***}	(0.00002) ^{***}
Women Share			1.96	1.88
of Parliament			(1.04) [*]	(1.08) [*]
Fertility				-6.11
				(5.56)
R^2	0.16	0.23	0.29	0.30
Number of obs.	75	75	75	75

* $p \leq 0.1$, ** $p \leq 0.05$, *** $p \leq 0.01$

Standard errors are robust and clustered at the language level

increase in the length of mandated maternity leave of 2 days. This results seems intuitive, and captures the political channel that affects the length of maternity leave. However, even after controlling for this political channel the effect of language on leave remains statistically and economically significant.

In specification (4) we control for fertility rate. A lower fertility rate is associated with a longer leave, which could reflect a policy intended to increase fertility by providing maternity leave, but this effect is not statistically significant. The effect of language on leave remains statistically and economically significant even after controlling for fertility.

The results shown in Table 5 are consistent with our model, that is with the prediction that lower tolerance of gender based discrimination, which we capture here through our language proxy, is associated with a longer mandated maternity leave.

5 Discussion

In this section we discuss some concerns that might arise with respect to our model and our results.

Direct Measure of Attitudes Despite the many studies in psychology and linguistics confirming the effect of language on thought, and our results in table 3, which show a correlation between the number of cases of gender differentiated personal pronouns and gender based discriminatory views, some may object to the idea of using language as a proxy for attitudes. In particular, one may be concerned that our results are driven by our choice of proxy.

To address such a concern we replicate in table 6 our main results from table 5, but instead of using the number of cases of gender differentiated personal pronouns as a proxy for attitudes we simply use the percentage of respondents in each country who thought that when jobs are scarce men should have more right to a job than women, averaged over the waves of the World Value Survey. Note that there is only partial overlap between the countries used in the regression in table 6, and the ones used in the regression in table 5, as explained in appendix C, which also includes the summary statistics for the regression in table 6.

In all specifications in table 6 we see that there is a strong negative correlation between the length of maternity leave and gender based discriminatory views, and this effect is statistically and economically significant. That is, the more people in a country think that when jobs are scarce men should have more right to a job than women, the shorter the maternity leave that a country mandates. This is consistent with the prediction of our model, that the more tolerant a society is towards gender based discrimination the shorter the maternity leave that it will mandate.

Paternal Leave In our model we assumed that mandated leave is provided only to women and not to men. Since some countries mandate paternity leave as well as maternity leave, one can question the validity of our assumption.

It is important to note that our results do not hinge on the assumption that paternity leave is not mandated. What matters is that mandate paternity leave is shorter than mandated maternity leave, which makes hiring women rather than men relatively more costly. Thus, our assumption

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Table 6: Maternity Leave and Attitudes

Dependent Variable:	Days of Maternity Leave			
	(1)	(2)	(3)	(4)
Men Have More	-1.39	-1.21	-0.922	-0.80
Right to a Job	(0.46) ^{***}	(0.50) ^{**}	(0.428) ^{**}	(0.37) ^{**}
GDP per capita		0.0006	0.0005	0.0001
Government		(0.0009)	(0.0009)	(0.0008)
Share of GDP		2.36	2.27	3.69
Population		(1.55)	(1.49)	(1.51) ^{**}
Women Share		-0.00005	-0.00005	-0.00005
of Parliament		(0.00002) ^{***}	(0.00002) ^{***}	(0.00001) ^{***}
Fertility			1.22	1.59
			(1.17)	(1.17)
				-30.51
				(9.48) ^{***}
R^2	0.14	0.17	0.18	0.25
Number of obs.	73	73	73	73

* $p \leq 0.1$, ** $p \leq 0.05$, *** $p \leq 0.01$

Standard errors are robust

that mandated leave is provided only to women and not to men is simply a normalization.

Turning to the data, if what matters is the difference between the lengths of maternity leave and paternity leave, one can argue that our use of maternity leave as the dependent variable in tables 5 and 6 is incorrect. However, it turns out that accounting for paternity leave does not change our results. The reason is that most countries do not mandate a paternity leave, and those which do mandate only a very short one.

In table 7 we replicate tables 5 and 6, but instead of using the length of maternity leave as the dependent variable, we use the difference between the lengths of maternity leave and paternity leave, where data on paternity leave is taken from the Maternity Protection Database of the International Labor Organization (see appendix B).

One can see from table 7 that accounting for paternity leave does not affect our empirical results.

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Table 7: Difference between Maternity and Paternity Leave

Dependent Variable:	Difference between Days of Maternity Leave and Days of Paternity Leave			
	(1)	(2)	(3)	(4)
Gender Differentiated	-19.69	-15.72		
Personal Pronouns	(5.71) ^{***}	(4.99) ^{***}		
Men Have More Right to a Job			-1.34 (0.45) ^{***}	-0.80 (0.36) ^{**}
GDP per capita		0.0006 (0.0006)		0.0001 (0.0008)
Government Share of GDP		1.65 (0.84) [*]		3.55 (1.47) ^{**}
Population		-0.00006 (0.00002) ^{***}		-0.00005 (0.00001) ^{***}
Women Share of Parliament		1.77 (0.99) [*]		1.43 (1.147)
Fertility		-6.37 (5.89)		-29.57 (9.30) ^{***}
R^2	0.16	0.29	0.13	0.24
Number of obs.	75	75	73	73

* $p \leq 0.1$, ** $p \leq 0.05$, *** $p \leq 0.01$

Standard errors are robust and clustered at the language level

Multilingual Countries Our coding associates each country with the language most commonly spoken in it. This may pose a problem for some of the truly multilingual countries.

To address this issue we redefined, where possible, the number gender differentiated personal pronouns in these countries as a weighted average of the number of gender differentiated pronouns in the languages spoken in these countries, with weights given by the percentage of the population actually speaking each language. Using these weighted averages does not change the results we get.⁴ For simplicity we choose to use the language most commonly

⁴The countries in the sample affected by this weighting are Belgium, Canada and Switzerland. If a language in a country is not coded it receives a zero weight. Note that for some multilingual countries where the different spoken languages have the same number of gender differentiated pronouns, such as Ukraine, where both Ukrainian and Russian have one case of gender differentiated pronouns, this procedure has no effect.

spoken in our coding.

Arab Countries A concern that might arise is that our results are driven by countries where Arabic is spoken. As appendix A notes, Arabic has relatively many cases of gender differentiated personal pronouns, and there are relatively many countries where Arabic is spoken. The concern is that if our results are driven by countries where Arabic is spoken they might be capturing another channel that is unique to these countries and that we do not control for, rather than attitudes towards gender based discrimination.

However, dropping the countries where Arabic is spoken from our sample does not change our results. With these countries dropped there is still a strong negative correlation between the length of maternity leave and our linguistic measure, that is economically and statistically significant. Results are available upon request.

Direct Effect of Attitudes on Leave In the standard maternity benefit model, which we present in the beginning of section 2, women do not benefit from the introduction of mandated maternity leave, as the value of the mandated leave is smaller than their resulting decrease in wages. Furthermore, an increase in the length of mandated leave only harms women (since $c''(\mu) - v''(\mu) > 0$). Thus, in the standard model the more you care about women the shorter you want the mandated leave to be.

This result is important, since one could argue that our empirical results are not capturing the dynamics of our model, but rather a more simple effect. That is, one can argue that intolerance of gender based discrimination is simply a reflection of positive attitudes towards women, and that our empirical results simply show that countries with a more favorable attitudes towards women mandate a longer maternity leave. However, as just noted, in the standard maternity benefit model the more you care about women the shorter you want the mandated leave to be, which is inconsistent with this alternative explanation to our results.

6 Conclusion

Why do some countries mandate that employers provide a long maternity leave, while others mandate only a short one? This question seems particularly important as maternity leave is one of the most wide-spread social

program in the world. We incorporate attitudes towards gender based discrimination into a standard mandated benefit model where employers provide maternity leave to women and not to men, showing that the less society is willing to tolerate gender based discrimination the longer the maternity leave it will provide.

Using the linguistic relativity principle we capture attitudes towards gender based discrimination with new data on the number of cases of gender differentiated personal pronouns across languages. Using this measure we find, in a cross sectional analysis, results that are consistent with the prediction of our model.

A Language Coding

One of the stable grammatical features of a language is its use of personal pronouns. Personal pronouns are gender differentiated in some cases, but in other cases they are not. We code, using grammar books, the number of cases of gender differentiated personal pronouns in 26 languages. Table 8 presents our data.

Table 8: Number of Cases of Gender Differentiated Pronouns

Language	Gender Differentiated Personal Pronouns	Language	Gender Differentiated Personal Pronouns
Arabic	4	Icelandic	2
Bulgarian	1	Italian	2
Croatian	1	Mandarin	0
Danish	1	Persian	0
Dutch	1	Portuguese	2
English	1	Romanian	2
Finnish	0	Russian	1
French	2	Serbian	2
German	1	Spanish	4
Greek	2	Swedish	1
Hebrew	4	Turkish	0
Hindi	0	Ukrainian	1
Hungarian	0		

B Data Appendix

- United Nations Statistical Division, Statistics and Indicators on Women and Men
 - Source: <http://unstats.un.org/unsd/demographic/products/indwm/statistics.htm>
 - Variables: Length of Maternity Leave (June 2010), Total Population (June 2010), Total Fertility Rate (June 2010), Percentage of Parliamentary Seats in Single or Lower Chamber Occupied by Women (2005).
- Penn World Table
 - Source: <http://pwt.econ.upenn.edu/>
 - Variables: Real Gross Domestic Product per Capita, current price (2006), Government Share of Real Gross Domestic Product per Capita, current price (2006).
- Ethnologue
 - Source: <http://www.ethnologue.com/web.asp>
 - Variable: Most widely spoken language in each country.
- C.I.A. World Factbook
 - Source: <https://www.cia.gov/library/publications/the-world-factbook/fields/2098.html>
 - Variable: Most widely spoken language in each country.
- World Value Survey
 - Source: <http://www.worldvaluessurvey.org>
 - Variables: Men should have more right to a job than women, Scale of income, Marital status, Age, Highest educational level attained.
- International Labor Organization, Maternity Protection Database

- Source: <http://www.ilo.org/travaildatabase/servlet/maternityprotection>
- Variable: Length of Paternity Leave

C Direct Measure of Attitudes

The percentage of respondents in each country who thought that when jobs are scarce men should have more right to a job than women, was calculated for every country and year of survey using the World Value Survey online analysis, to avoid any risk of manipulation of the raw data. Then an average was taken for every country over the four first sweeps of the World Value Survey. The fifth sweep was not included since it is not available for online analysis

Table 9 presents the summary statistics for the regression in table 6. Note that there is an overlap of only 48 countries between the countries used in the regression in table 6, and the ones used in the regression in table 5. Thus the sample of countries in these two regressions is different.

Table 9: Summary Statistics for Maternity Leave and Attitudes Regression

	Mean	S.D.	Min	Max
Days of Maternity Leave	137.1	87.09	60	480
Men Have More Right to a Job	46.62	23.27	5	100
GDP per capita	18,582	14,752	886	79,813
Govt. Share of GDP	16.25	5.9	6.32	36.54
Population (in thousands)	77,254	212,942	329	1,354,146
Fertility	2.03	0.86	1.2	5.9
Women Share of Parliament	18.26	10.54	0	45

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