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ABSTRACT

Gender and Culture*

This paper reviews the literature on gender and culture. Gender gaps in various outcomes (competitiveness, labor force participation, and performance in mathematics, amongst many others) show remarkable differences across countries and tend to persist over time. The economics literature initially explained these differences by looking at standard economic variables such as the level of development, women's education, the expansion of the service sector, and discrimination. More recent literature has argued that gender differences in a variety of outcomes could reflect underlying cultural values and beliefs. This article reviews the literature on the relevance of culture in the determination of different forms of gender gap. I examine how differences in historical situations could have been relevant in generating gender differences and the conditions under which gender norms tend to be stable or to change over time, emphasizing the role of social learning. Finally, I review the role of different forms of cultural transmission in shaping gender differences, distinguishing between channels of vertical transmission (the role of the family), horizontal transmission (the role of peers), and oblique transmission (the role of teachers or role models).

JEL Classification: A13, J16, Z1
Keywords: gender, culture, social norms

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1. Introduction

Gender differences in economic outcomes have been widely studied in the economics literature. Most of the literature looked at differences in female labor force participation and initially attributed the observed gender gaps to economic variables such as the level of development, women's education, and family choices such as marriage, fertility, and divorce (see Goldin (1990) for an excellent review of the literature). The invention of baby formula and a decline in childcare costs were also found relevant to explaining gender differences in female labor force participation (Attanasio et al., 2008; Albanesi and Olivetti, 2016).

Even after accounting for all these characteristics, a good part of the differences in female labor force participation remains unexplained. In recent years, a new empirical literature has examined whether cultural differences in the role of women in society could help explain gender differences in labor markets. In this literature, culture is defined as "those customary beliefs and values that ethnic, religious, and social groups transmit fairly unchanged from generation to generation" (Guiso, Sapienza, and Zingales, 2006).

The idea that women make decisions about education, family formation, fertility, and work based on beliefs about the role of women in society or on differences in family models has been present in other fields for a long-time (Thorton et al., 1983; Kiecolt and Acock, 1988; Burt and Scott, 2002). In economics, the evidence is more recent, mostly due to the difficulty in establishing a direction of causality. Fortin (2005) finds a strong correlation between gender role attitudes and women's labor market outcomes across 25 OECD countries. Antecol (2000), Blau et al. (2011) and Fernandez and Fogli (2010) show that female labor force participation amongst immigrants in the US (either first or second-generation) is strongly correlated with female labor force participation in the country of origin. The fact that immigrant women—all living in the US and thus facing the same economic and institutional constraints—strongly replicate the behavior of women in the country of origin suggests that culture matters in explaining differences in female labor force participation across countries.

The literature has documented the relevance of culture for other gender gaps such as differences in competitiveness (Gneezy et al., 2009) and in test performance in mathematics (Guiso et al., 2008; Fryer and Levitt, 2010; Pope and Sydnor 2010; Nollenberger et al., 2016).

Following the initial studies aimed at showing that culture matters for gender outcomes, many papers have examined the origin and the evolution of cultural norms. An interesting finding from the study of second-generation immigrants is how persistent cultural norms can be. Understanding their

origins is therefore of primary importance. Part of the literature has focused on that question,[1] whereas more recent contributions investigate channels of cultural transmission[2] and various aspects of social learning. This article provides a summary of that new literature. Surveying the progress made to date, one cannot help but be impressed by what the recent wave of evidence has taught us about gender and cultural norms and about possible policy prescriptions.

The paper is organized as follows: Section 2 describes papers on the historical origin of gender gaps. Section 3 outlines the conditions under which cultural norms tend to be stable or to change rapidly over time. Section 4 describes channels of cultural transmission. Section 5 concludes.

2. The deep-rooted origins and historical persistence of differences in gender roles

This section provides a summary of the literature outlining the historical determinants of gender roles, including agricultural technologies, geography, language, and pre-industrial societal characteristics more generally. The typical study involves the collection and compilation of new and impressive data. Although this is an important contribution in itself, the best papers use these data to convincingly test hypotheses related to the historical origin of gender norms. Of these, the most enlightening trace the full impact of this historical origin through time while examining specific channels and mechanisms. Several methodologies have been used to show that culture matters for gender roles. The first is a cross-country approach, which has the advantage of showing the results for a large set of countries. The disadvantage is that problems of reverse causality and omitted bias can be severe. Most papers propose an instrumental variable strategy, but have a hard time making a case that the exclusion restriction is valid, since it is almost impossible to find a variable that affects a particular economic variable only through culture. The second approach is to focus on within-country analysis, the drawback of which is that it is hard to find external validity. The third approach is to look at second-generation immigrants as a "natural experiment," as described in the introduction. This has the advantage of isolating the role of culture on individual behavior but has the drawback of not being able to look at aggregate effects. The fourth way is to run field or lab experiments, in which the behavior of the participants is a function of their cultural origin; this, too, has the drawback of limited

[1] See Giuliano (2018) for a review.

[2] The underlying model behind all the contributions about cultural transmission is the seminal work by Bisin and Verdier (2001). According to their model, there are three channels of cultural transmission: vertical transmission—when values and beliefs are transmitted from parents to children; horizontal transmission—emphasizing the importance of peer effects; and oblique transmission—emphasizing the relevance of role models such as teachers and of any other form of non-family, non-peer socialization.

external validity, but it is better able to isolate the mechanisms through which culture affects behavior. The best papers are the ones combining at least two of these approaches, guaranteeing solidity in the empirical strategy but also a general message coming from cross-cultural comparisons.

2.1. Historical agricultural technologies, geography, and language

A comprehensive analysis of the origin of various aspects of gender differences (labor force participation, fertility, and sex ratio at birth) has been written by Alesina et al. (2011, 2013, 2018). The hypothesis for their empirical analysis comes from the seminal work of Ester Boserup (1970). In her fascinating book, she argues that differences in the role of women in society originate in different types of agricultural technology, particularly the differences between shifting and plough agriculture. Shifting agriculture, which uses hand-held tools such as the hoe and the digging stick, is labor-intensive, with women actively participating in farm work, while plough agriculture—using the plough to prepare the soil—is more capital-intensive. Unlike the hoe or digging stick, the plough requires significant upper-body strength, grip strength, and the burst of power to either pull the plough or control the animal that pulls it. Farming with the plough is also less compatible with childcare, which is almost always the responsibility of women. As a result, men tended to specialize in agriculture work outside the home, while women specialized in activities within the home. In turn, this division of labor generated different norms about the appropriate role of women. Societies characterized by plough agriculture developed the belief that the natural place for women is in the home. This belief tends to persist even if the economy moves out of agriculture, affecting the participation of women in activities performed outside the home, including market employment, entrepreneurship, and politics.

Alesina et al. (2013) first document a very strong negative correlation between the traditional use of the plough and female labor force participation in agriculture in pre-industrial societies, using the *Ethnographic Atlas*, a dataset assembled by George Peter Murdock in 1967 and containing ethnographic information about 1,265 ethnic groups worldwide.

After looking at the correlation between agricultural technology and female participation in agriculture in pre-industrial societies, Alesina et al. (2013) study whether differences in agricultural technologies still have an impact on economic outcomes and also study differences in gender norms, as measured by subjective attitudes recorded in the *World Value Survey*. In countries or among immigrants with a tradition of plough use, women are less likely to participate in the labor market, own firms, and participate in national politics and also have more traditional gender norms. Giuliano (2015) finds that historical plough use also matters for other types of gender norm: in societies that use (or used) the plough, higher parental authority is granted to the father, inheritance rules favor male

heirs, and women have less freedom to move outside the house. In these societies, women are more likely to wear a veil in public and polygamy is illegal or less accepted.

The authors base their analysis on the hypothesis of Ester Boserup, thus granting a lot of importance to the introduction of the plough, but in fact, geography could be the ultimate determinant of gender differences. As part of their identification strategy, Alesina et al. (2013) construct an instrumental variable based on the suitability of the soil to different types of crops (that is, crops more or less conducive to plough use). One could therefore simply look at the reduced form in which a certain type of soil strongly correlates to societal differences in the role of women.[3] A similar idea is explored in Carranza (2014) for the case of India. She shows how soil texture affects the technology used in land preparation and further determines the gender division of labor. In India, the deep tillage of land reduces the need for transplanting, fertilizing, and weeding—activities performed by women. When women can make little contribution to the agricultural value of the land, the perceived relative value of girls to a household also changes (Boserup 1970). Carranza (2014) shows how these geographical soil characteristics help explain not only female participation in agriculture, but also the infant sex ratio. This is the only paper looking at geography directly; the most common approach is to use the exogeneity of geographical characteristics either as an instrumental variable (Alesina et al., 2013; Galor et al., 2020) or through a mediating channel.

Geography can also influence gender norms through language. Language is fundamental for the transmission of gender norms because, by facilitating efficient communication across individuals, it enhances and reinforces the transmission of cultural values. This point is best made by Galor et al. (2020), who show empirically first how agricultural characteristics that were complementary to distinct gender roles (measured by the variation in caloric suitability to plough-positive/-negative crops) fostered the emergence and prevalence of grammatical gender in a language. In a second step, they show that the linguistic structure fostered the transmission of gender roles. A similar point is made by Gay et al. (2013), who find that women speaking languages that more pervasively mark gender distinctions are less likely to participate in economic and political activities and more likely to encounter barriers in their access to land and credit.

An important insight from all this literature is that geography can have important effects on gender roles either through its direct impact on them or through language and technology. While

[3] The authors include in their specification a measure of overall agricultural suitability, therefore making the exclusion restriction less of a concern.

geography has the advantage of being an exogenous trait, unveiling the channels through which it operates makes the papers more convincing.

2.2. Pre-industrial societal characteristics

Pre-industrial characteristics have been studied as an important factor in gender differences today. Among them, the practice of matrilineality, the mode of residence after marriage, the presence of the dowry versus the bride price, and differences in family structure are fundamental institutions for the organization of societies. These societal characteristics gave a higher status to women in the past, which was then transmitted from generation to generation and persisted until today in the form of differences in norms and beliefs.

Matrilineality (the tracing of inheritance and lineage through female family members) is associated with more favorable women's outcomes for several reasons. Women control the continuity of the matrilineage and resources and thus have higher status. Also, by determining descent, women have greater support from their kin network and better outside options than women in patrilineal societies (Lowes, 2016). These differences in roles and obligations may have important implications. Gneezy et al. (2009) study differences in competitiveness by looking at the Maasai, a patriarchal society in Tanzania, and the Khasi, a matrilineal and matrilocal society in India. The authors conducted an experiment in which two groups were given a choice either to play a ball-throwing game without competition or to compete in the same game with an anonymous person from the same village, with the winner receiving all the benefits. The two societies showed large differences in competitive behavior between men and women. Among the Maasai, 50 percent of men chose to compete versus only 26 percent of women, a result similar to that in Western cultures, where patrilineal systems were historically more common. The result was reversed in the matrilineal Khasi society, where 54 percent of women chose to compete versus only 39 percent of men.[4]

Patrilocality (a social system in which a married couple resides with or near the husband's parents) alone can explain differences in gender roles. Since the woman will leave her parents' house—both physically and financially—at marriage, they gain more returns on investment in a son's health and education because he will remain a part of their family.[5] Jayachandran (2015) documents that gender inequality is more pronounced in northern India, where the social structure is more patrilocal.

[4] Matrilineality is also correlated with differences in spatial reasoning (Hoffman et al., 2011), risk aversion (Gong and Yang, 2012), contribution in a dictator game (Gong et al., 2015), gender differences in civic and political behavior (Gottlieb and Robinson, 2016) and intra-household behavior (Lowes, 2016).

[5] Levine and Kevane (2003) did not find a correlation between patrilocality and differential investment in daughters in Indonesia. They attribute the lack of results to the fact that residential norms are not very tight in

In a fascinating contribution, Bau (2016) studies the interaction of residential practices with policies and how this affects gender differences. She shows that the complementarity between the transmission of culture and the education of one's child means that the introduction and expansion of pension plans will crowd out both educating children targeted by the norm and the transmission of the norm to the next generation. She finds that the establishment of pension plans in Ghana and the expansion of a plan in Indonesia confirm this hypothesis. In Indonesia, matrilocal daughters who are exposed to the pension plan for longer receive less education and are less likely to live with their parents after marriage. In Ghana, patrilocal sons show the same pattern.

Another factor that can vary substantially across cultures is the presence of the dowry versus the bride price. Dowry is a payment by a bride's parents to the couple at the time of marriage, whereas bride price is a transfer from the groom and/or his family to the bride's family. Boserup (1970) describes how the emergence of the two practices is related to the type of agriculture prevalent in a society: where women played a lesser role in agriculture, the dowry prevailed.[6] In India, the prospect of paying a dowry is often related to the desire to have sons rather than daughters (Das Gupta et al., 2003). The presence of dowry also reduces investment in human capital and results in newly married women sometimes being the victims of violence or, worse, dowry death as punishment for the dowry being deemed inadequate by the groom and/or his family (Bloch and Rao, 2002). Ashraf et al. (forthcoming) study how the cultural practice of bride price influences the efficacy of policies to increase education. The authors study the impact on girls' schooling of the Sekolah Dasar Inpres school building program in Indonesia, implemented between 1974 and 1980. After confirming that the program had no overall effect on education,[7] they uncover an important heterogeneity: a positive impact of the program on female education among girls from ethnic groups that traditionally engaged in bride price payments. The authors find similar effects for a school expansion program in Zambia.

Historical family structures are another pre-industrial characteristic that could explain gender roles. Alesina and Giuliano (2014) show that the historical persistence of family structures from medieval times until today correlates with gender roles. In societies with strong family ties, family solidarity is based on an unequal division of family work—the so-called "male-breadwinner hypothesis"—with men working full-time and women dedicated to housework. Weak family ties, in

Indonesia. The other interpretation is that it is a combination of norms—of which patrilocality is only one—that reduces investment in daughters.

[6] Giuliano (2015) confirms this correlation, using data from the *Ethnographic Atlas*.

[7] This result was also in Breierova and Duflo (2004).

contrast, will foster egalitarian gender roles, with men and women participating equally in employment and housework.[8] To mitigate problems of reverse causation and the endogeneity of cultural traits to economic outcomes, the authors use evidence on behavior and gender attitudes for second-generation immigrants in the US and measures of family ties from the countries of origin.

Historical societal characteristics are relevant to another important variable of female well-being: the extent of domestic violence. Alesina, Brioschi, and La Ferrara (2016) link individual-level data from contemporary Africa to historical pre-industrial characteristics obtained from Murdock's *Ethnographic Atlas*. The authors find that many historical societal characteristics affect violence against women today. These are not only economic characteristics (in societies in which women were actively involved in subsistence activities such as gathering, women's role is more highly regarded and violence against women is lower today, whereas plough-based societies and societies whose form of subsistence was fishing or hunting have more violence against women today) but also broadly societal characteristics (women in societies formerly characterized by bride price have a lower probability and lower intensity of violence today, most likely because when men had to pay to marry their wives, they attributed a greater value to and cared more about them). The paper is explorative and looks at all the historical pre-industrial characteristics, finding overall broad confirmation for the general hypothesis that societies that historically did not value women have higher rates of domestic violence today.

A more precise hypothesis is investigated by Tur-Prat (2019), who examines the relationship between family patterns (stem[9] versus nuclear) and intimate-partner violence in Spain. She explores the idea that co-residence with a mother-in-law increases a wife's contribution to farm work and that this, in turn, reduces the level of violence against women. The paper by Alesina et al. (2016) covers the whole world but is mostly based on correlations; Tur-Prat has a more limited geographical coverage but she tries to address causality by using differences in the Christian reconquest of the Iberian Peninsula (722–1492) as an instrument for different family types.

[8] Alesina and Ichino (2009) provide an in-depth analysis of the relevance of family ties to economic outcomes in Italy. Also in Italy, Bertocchi and Bozzano (2015) investigate the determinants of educational gender gap, with a primary focus on the potential influence of family structures. Algan and Cahuc (2007) found a strong correlation between differences in family structure (nuclear versus extended families) and female labor market outcomes in OECD countries. While that study is mostly correlational, Giavazzi et al. (2013) look more broadly at the relationship of culture and female employment, finding a strong effect. They improve on previous studies by using a Generalized Method of Moments (GMM) dynamic panel estimation framework to address the problem of endogeneity.

[9] Stem families are those in which one child stays in the parental household with spouse and children.

The analysis of the historical origins of gender roles has showcased how insights can be gained by examining gender differences from a historical perspective. Specifically, these studies show that history matters and that it can explain part of the persistence of differences in gender norms despite economic growth, development, or the increase in education for women. Econometrically, some of the historical traits studied are also useful sources of exogenous variation.

3. Change and persistence in gender roles

The fact that gender norms show remarkable persistence does not mean that they never change. To date, most of the literature has been devoted to empirically documenting their persistence, with much less attention given to their evolution.

Scholars who looked at factors in the evolution of gender norms using standard economic interpretations emphasize the introduction of the pill (Goldin and Katz, 2002) and of household technology that substantially reduced the time spent on chores (Greenwood et al., 2005). Scholars looking at the relevance of culture have taken three approaches: looking at historical shocks and policies as triggers for the evolution of gender norms; developing models of learning to help understand the dynamics of cultural change; and systematically analyzing different types of cultural values to understand which are more persistent and why.

3.1. Historical shocks and policy changes

Historical shocks and policy changes can alter gender norms. The literature has analyzed cases from a variety of historical periods and geographical areas, but this body of research is only an initial step toward a deeper understanding of the perpetuation of historical shocks; much more remains to be done. For example, which cultural traits are more likely to be changed by shocks? If laws and formal institutions try to alter gender roles, is that likely to change norms permanently? I now turn to a discussion of these different aspects, attempting to organize them according to the consistency of their results across time and space.

3.1.1. Sex ratio

Shocks to the sex ratio appear to have consistently altered the economic behavior of women: a lower/higher male-biased sex ratio is associated with higher/lower levels of female labor participation and less/more traditional gender roles. When shocks reduce the number of men, women are forced to participate in the labor market, which alters their behavior and beliefs permanently. Teso (2019), using the variation in the degree to which different ethnic groups in Africa were affected by the slave trade, shows that women whose ancestors were more exposed to the slave trade are today

significantly more likely to be in the labor force, to be employed in high-ranking occupations, to participate in household decisions, and to have lower fertility.

Grosjean and Khattar (2019) study the case of Australia, where the male sex ratio was very high due to a British policy of sending mostly male convicts (who outnumbered female convicts six to one) and a specific migration pattern (for a long time, immigrants to Australia were mostly men working in mining and pastoralism). Using variation in states' sex-ratios, the authors find that a higher male sex ratio was associated with women being more likely to get married, participating less in the labor force, and being less likely to work in high-ranking occupations. The effect persists today.

Sex ratio can be altered by warfare and conflict. For example, the high mobilization of men in World War II was associated with higher female labor participation (Goldin and Olivetti, 2013; Acemoglu et al., 2004; Fernandez, Fogli, and Olivetti, 2004).

Xue (2016) studies the impact of China's cotton revolution—the adoption of spinning and weaving technologies from 1300 until 1840—on gender roles. This revolution allowed women to produce cotton textiles at home and then sell them, giving them an earning power similar to or greater than that of their husbands. Xue finds a strong and negative relationship between premodern cotton textile production and both sex ratio at birth and gender-biased beliefs.

3.1.2. Policy changes

Much less is known about how policies could change gender roles. Interesting natural experiments that served this purpose are the imposition of state socialist regimes, which promoted women's participation in the labor force, and the reunification of Germany. Research has documented a direct effect of state socialist regimes on female labor force participation but also an effect of social learning. Campa and Serafinelli (2019) study the effect of the imposition of state-socialist regimes across Central and Eastern Europe on gender role norms. They provide two sets of evidence: using data on women who lived close to the East-West border in Germany before the re-unification, they show that career success is much more important to women who lived in East Germany before the reunification compared to women from West-Germany. They did not find the same effect on men. The mediating channels for their results are higher education and full-time employment. They also look more broadly at the effect of state-socialist regimes through the whole Central and Eastern Europe, by studying the behavior of immigrants to the US and comparing gender role attitudes of immigrants coming from Central and Eastern Europe versus Western Europe, before and after the imposition of state socialist regimes. The gender role attitudes of immigrants coming from Central and Eastern Europe have become much less traditional since 1945.

The presence of social learning is documented by Schmitz and Weinhardt (2019), who find that being exposed to East German immigrant women altered the employment decisions and gender role attitudes of West German women who live around them. Part of the effect was driven by an institutional change, as measured by the local-level increase in the public provision of childcare.

Policies can alter gender norms just by providing information. In a fascinating contribution, Bursztyn et al. (2018) study Saudi Arabia, where female labor force participation is very low (15%) and gender differences are very pronounced. The authors provide survey and experimental evidence that while men approve of their wives working in the market—when those men are asked privately—they substantially underestimate the level of support by other men, even in the same neighborhood. The authors also show that providing information—in this case, the truth about what other men think—increases men's willingness to let their wives work. This is also reflected in actual outcomes: five months after the main intervention, the wives of men who had been given the correct information about others were more likely to have applied and interviewed for a job outside the home.

3.2. Social learning

In addition to documenting the long-term effects of historical shocks on gender roles, the literature has started to study cultural change at the intergenerational scale, using models of social learning (Fogli and Veldkamp, 2011; Fernandez, 2013; Giuliano and Nunn, 2017).

Fogli and Veldkamp (2011) develop a model in which women learn about the effects of maternal employment on children by observing nearby employed women. When few women participate in the labor force, information is scarce and participation increases slowly. As information accumulates in some regions, the effects of maternal employment become less uncertain and more women in those regions participate. Learning accelerates, labor force participation rises more quickly, and regional participation diverges. Eventually, information diffuses throughout the economy, beliefs converge to the truth, participation flattens out, and regions become more similar again.

In Fernandez's (2013) model, labor force participation by married women and cultural beliefs about the role of women in society evolve jointly. Married women compare the benefits of increased consumption from labor earnings with the expected utility cost of working. When new information endogenously becomes available, married women update the probability assigned to different views of the long-term consequences of working. When the proportion of women in the labor market increases and the beliefs about women working become more positive, the information content of the signal improves. Both models can generate changes in labor force participation by married women that correspond to its historical evolution in the US over the last century.

Giuliano and Nunn (2017) test a class of evolutionary models (Boyd and Richerson, 1985, 2005; Rogers, 1988) that predict that the stability of the external environment is an important determinant of cultural persistence. The intuition is that if the environment is very stable, all cultural values and beliefs (including beliefs about the role of women) tend to persist because they contain information useful to the current generation. By contrast, if the environment changes a lot from one generation to the next, the previous generation's cultural beliefs are less likely to be useful to the current generation. Using weather data going back to 500AD to construct a measure of cross-generational climatic instability, the authors show that, across a broad cross-section of countries and over two distant periods, societies with greater ancestral climatic instability exhibit less persistence in cultural norms, including gender norms, measured by female labor-force participation (FLFP). The magnitude of the correlation is large. For example, when they examine the correlation between FLFP in 2012 and 1970, the coefficient on FLFL in 1970 is 0.33, indicating considerable persistence over time in FLFP. The persistence is much larger for countries with very low climatic instability (0.63) and not statistically different than zero for very climatically unstable countries.

3.3. What persists and what does not?

Although the research on learning presents initial steps toward a deeper understanding of how gender norms change, much remains to be done. For example, we have little understanding of which cultural traits are more likely to change and where gender norms fall on the scale of stability. The only evidence is work by Giavazzi et al. (2019), who look at how quickly values and beliefs of different generations of immigrants in the US converge to US norms. They find substantial heterogeneity; some norms, such as attitudes towards cooperation, converge very quickly while others, such as attitudes towards sexual morality, abortion, and politics, converge very slowly. Attitudes towards gender roles occupy an intermediate ground, with attitudes towards the role of women in the labor market converging more quickly than those toward the role of women in politics.

4. The channels of cultural transmission

As discussed above, except for few recent investigations of the evolution of gender norms over time, the literature has mainly emphasized their persistence, with most studies arguing that cultural values and beliefs are deeply rooted in the country or ethnic group to which a person belongs and therefore evolve very slowly.

To understand such persistence, one must analyze how beliefs are formed and transmitted in societies. Bisin and Verdier (2001) emphasize three forms of cultural transmission: vertical, horizontal,

and oblique. Vertical transmission is the transmission of values from parents to children: parents socialize their children and, in doing so, balance the trade-off between wanting their children to share their values and beliefs and wanting them to succeed in their environment. Horizontal transmission refers to the importance of peers and oblique transmission refers to the importance of various non-family, non-peer channels, such as role models or teachers, which can shape beliefs.

4.1. Vertical transmission

Most of the literature looking at the behavior of second-generation immigrants to understand gender roles implicitly assumes that the most important channel of transmission is through the family. The importance of culture is measured by female labor force participation in the country of origin and the strong correlation between immigrants' behavior and the country-of-origin measure is interpreted as a transmission of that country's cultural norms from parents to children. Di Miceli (2019) makes the only attempt to disentangle vertical from horizontal transmission, for the case of fertility. Using data on second-generation immigrants in the US from 1910 to 1970, he proxies for vertical transmission using female labor force participation in the country of origin at the time of departure, while horizontal transmission is measured by the fertility of the same-age cohort living in the source country and is transmitted by same-age recent immigrants. He finds evidence that vertical transmission acts as a substitute for horizontal transmission. Parents exert less effort in socialization in places with a large fraction of immigrant couples from their home country.

To measure the transmission channel more precisely, several studies use individual-level data linking parents and children rather than indirect measures of cultural values proxied by country-of-origin cultural variables. Farre and Vella (2013), for example, find that maternal views about women's roles in the labor market and the family correlate strongly with the values of their children (both daughters and sons) using data from the National Longitudinal Survey of Youth 1979. They also show that gender role attitudes can explain labor market decisions.

Vertical transmission has also been shown to explain differences in the gender gap in mathematics. Dossi et al. (2019) study the effect of gender norms on the gender gap in mathematics using evidence from two data sources. First, they use a dataset linking public school records from the Florida Department of Education with birth certificates to reconstruct the family structure and identify families that are gender-biased using fertility stopping rules. They find that girls growing up in a "boy-biased" family score on average three percentage points lower on math exams than girls raised in other types of family. The authors also look more broadly at the entire United States, using evidence from the National Longitudinal Study of Youth. After finding a strong correlation in the

transmission of gender roles within the family, they find that there is a strong correlation between performance in mathematics and maternal gender role attitudes for girls but not for boys.

Fernandez et al. (2004) analyze another way in which vertical transmission from mothers to sons can increase female labor force participation. Using data from the *General Social Survey*, they show that a woman's labor force participation is strongly correlated with that of her mother-in-law. They also show, using Census data, that in regions where more mothers were working during World War II, due to variation in mobilization, the next generation of women is more likely to work. Two channels could explain this correlation: either men prefer women who are similar to their mothers (a preference channel) or a man who grew up with a working mother is more likely to participate in household activities, thereby facilitating his wife's participation in the labor market.

Morrill and Morrill (2013) show that the labor force participation choices of one generation of women are correlated not only with the behavior of their mothers (the standard vertical transmission channel) but also with the behavior of their mothers-in-law. The authors suggest that assortative mating could generate these findings.

4.2. Horizontal transmission

The study of horizontal transmission is much more demanding, due to identification problems related to the reflection problem (Manski, 1993). Well-identified studies of horizontal interactions use quasi-natural experiments to ensure exogeneity in exposure or field experiments. Anelli and Peri (2019), for example, look at whether women who attended high school classes with a large share of male (female) peers are more likely to choose prevalently male or female majors and if, in turn, this choice affects the labor market. To solve the endogeneity problem, the authors use random assignment of men and women across high school classes in Milan. They find no effect of the share of own-gender high school peers on the choice of college major or on college performance. They only find that for male students attending a high school class with 80% or more male classmates, the probability of choosing a predominantly male college major is 6–15 percentage points higher than the average. This effect is even stronger for men in the bottom part of the academic quality distribution. They did not find any evidence that the choice of a predominantly male major could influence income, employment, or occupation. They do not find any effect of classmates' gender on women's choice of major or on their academic performance, even when their high school class had a particularly high share of women.

Jarotschkin et al. (2019) use Stalin's deportation of over two million ethnic Germans and Chechens from the Western parts of the USSR to Central Asia and Siberia in order to study how the

arrival of groups of deportees with very different gender norms influences local cultural values. The assignment of the deportees was a function of local demand for manual labor and was orthogonal to their cultural characteristics. The authors document the presence of horizontal transmission of norms.

Peer effects could be relevant in explaining heterogeneity of performance in the labor market even in selected sections of the population, such as MBA students. Bursztyn et al. (2017) conduct a field experiment in a large public business school in the United States and they find that single women systematically shy away from career-enhancing actions because they believe they will face a penalty in the marriage market.[10] The experiment has a clever design: all the students had to fill out a questionnaire, distributed by a career counselor along with one of two randomized sets of instructions. In the public version, students were told that their answers would be discussed in the career class, while in the private version, students were told that only anonymized answers would be discussed. The authors find that single female students (but not married ones) reported lower desired salaries and lower willingness to travel or work for long hours only when they knew these preferences would be made known to their classmates. All the other groups (men or married women) were unaffected by peer observability. A second experiment confirms that the results are driven by observability by single male peers.[11]

4.3. Oblique transmission

A third channel of cultural transmission, outside family socialization and peer pressure, is the so-called oblique channel. It can take different forms, but probably the most important is prestige bias or the influence of highly respected individuals, such as teachers or particularly respected peers.

Carlana (2019) shows that having a teacher who holds strong gender stereotypes reduces the performance of girls in mathematics. Teacher stereotypes are measured using the Gender-Science Implication Association test.[12] The identification comes from the random assignment of students to teachers holding different gender stereotypes. The author collects data for middle schools in Italy and

[10] This is consistent with the evidence that men prefer female partners who are less professionally ambitious than they are (Fisman et al., 2006).

[11] Single female MBA students also have lower class participation grades than married ones, but not lower grades overall, as the two groups have similar grades in exams and problem sets.

[12] The implicit association test has been developed by Greenwald et al. (1998, 2003, 2009) to measure gender biases. It consists of calculating the reaction time for associations between the names of fields of study, both scientific and nonscientific, and personal names, both male and female. The idea behind it is that the more quickly people respond, the stronger is the association between gender and the specific field of study.

studies three outcomes:[13] performance in standardized test scores in mathematics and reading, choice of high school track, and degree of self-confidence.

For math performance, a one-standard-deviation increase in the teachers' gender stereotype increases the gender gap by 0.03 standard deviations. The teacher gender stereotype is particularly detrimental for girls with lower initial performance. Literature teachers' stereotypes, however, do not affect standardized test scores in reading. The second outcome is the high school track. At the end of middle school, students in Italy can choose between a vocational and a more academic track for high school. Carlana (2019) finds girls exposed to gender-biased teachers less likely to enroll in the most demanding high school track. The last outcome is self-confidence. After collecting information for a sample of roughly 800 students, Carlana (2019) shows that a decline in self-confidence could be an important mechanism for the effect of teacher stereotypes on the math gender gap.

Lavy and Sand (2018) use the random assignment of teachers in primary schools in Israel.[14] The teachers' bias is calculated by comparing how they grade boys' and girls' exams in a classroom, where a student's gender is known, to how they grade a national exam, where students' identities (including gender) are not known. The authors find that gender-biased teachers affect the math gender gap by improving boys' performance and reducing girls' performance and that enrollment in advanced math courses in high school is significantly affected by a gender-biased teacher.

Porter and Serra (forthcoming) study the importance of role models in the choice of economics, a traditionally male-dominated field, as a major in college. Their experiment exposes students taking a Principles class to a female role model. They then look at whether students exposed to a role model are more likely to take Intermediate Economics the next year, or any other economics class, and whether they chose economics as a major. They find that the role model intervention increased interest in economics for female students, but had no impact on male students.

Olivetti et al. (forthcoming) explore the relevance of mothers in shaping gender roles by looking at adolescent behavior in the United States. They provide fascinating evidence on both the standard vertical transmission channel (how mothers influence the gender roles of their children) and an oblique transmission channel (the influence of peers' mothers). To study this question, they look at how the share of high school peers with working mothers affects the likelihood, many years later, that a woman decides to work, controlling for the labor supply of her mother. Using data from the National Longitudinal Survey of Adolescent Health, the authors find that the effect of high school

[13] The sample is 1,400 math and literature teachers working in more than 100 schools in Northern Italy.
[14] The sample is three cohorts of sixth-grade students in Tel Aviv between 2002 and 2004.

peers' mothers' labor supply matters after controlling for the vertical transmission channel: a one-standard-deviation increase in peers' mothers' labor supply is associated with an eight-percent increase relative to the mean participation rate for women in their sample.[15] In terms of mechanisms, the authors conclude that for girls, seeing a large share of women working during one's adolescence reinforces the belief that work and family are compatible.

5. Conclusions

Economists have become increasingly interested in determining whether gender differences in economic outcomes are the result of differences in cultural values and beliefs. Most of the research illustrates that differences in cultural norms regarding gender roles tend to persist and that they evolve very slowly, even after the historical conditions have changed. This persistence is stronger when the environment is very stable, making experimenting with social learning less necessary. The persistence in gender outcomes is reinforced by cultural transmission within the family, but also by peer pressures and by gender biases among authority figures in general, such as teachers and role models.

Many questions remain. An important line of future research is how findings from the literature can inform economic policy. One pessimistic reaction to this literature is that since culture is very sticky, there is very little room for policy intervention. Such a view seems extreme for a variety of reasons. First, there is evidence that gender roles can be changed. Second, recognizing the importance of cultural factors can facilitate finding the optimal policy. An interesting example is provided by Alesina et al. (2011). They start with the observation that, in many societies, differences in the labor supply behavior of men and women originate within the family, because women are the ones who are supposed to take care of the children and do household chores. The authors argue that if differences in male and female labor market participation originate inside the family, then gender-based taxation might induce a more equitable allocation of home duties; by giving women a better outside option, it would increase their implicit bargaining power. Subsidized services to families, however, would not induce any cultural change in that direction but would simply help women performing household tasks, which would largely remain their duty.

Recognizing the importance of cultural norms is useful in other dimensions, such as the debate on whether the underlying sources of observed gender differences are attributable to nature or nurture. For example, gender differences in competitiveness may be primarily attributable to the genetic

[15] The effect of maternal female labor force participation is slightly larger (11 percent).

differences between the sexes. But an alternative hypothesis is that gender differences are culture-specific and determined by the different social and economic functions of men and women in a given society. The fact that women in different environments show different propensities to compete rules out the possibility that women are naturally less competitive. Gneezy et al. (2009) consider their results to be broadly in line with the importance of nurture.

To the extent that preferences are socially determined, then policies can have a strong impact; Bursztyn et al.'s (2018) results for Saudi Arabia are very powerful. Similarly, recognizing that peers, parents, and teachers can all influence the formation of gender biases can help in designing interventions to make such actors aware of their biases (Carlana, 2019). Less-obvious interventions can be also successful. Gay et al. (2013) and Galor et al. (2020) have shown that languages that emphasize gender differences correlate with gender biases; the current emphasis on introducing neutral forms could help fight such biases.

But should policymakers try to change preferences at all? One could argue that since economists strongly advocate a division of labor throughout the economy, shouldn't we accept it inside the family as well? The difficulty in answering this question is that we still don't know whether gender differences are the results of individual preferences or are socially determined. The fact that, for immigrants, the effects of cultural values tend to fade over time suggests that individual preferences may adapt, although slowly, to a new environment. And when social preferences and the environment change, women increase their level of labor force participation beyond the example set by their parents. Similarly, the fact that very simple and low-cost interventions can increase the percentage of women majoring in a male-dominated field seems to indicate that women's preferences might not be very different from those of men (Porter and Serra, 2020). We now realize, however, that we cannot implement successful policies without a deeper understanding of where differences in gender norms come from and of the complex processes that brought us where we are today. Much more work needs to be done.

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