

The Role of Women in Society: from Preindustrial to Modern Times

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Abstract

The participation of women in agriculture and the role of women in society in the preindustrial period were remarkably different across ethnicities and strongly related to the type of agricultural technology adopted historically. The sexual division of labor was broadly associated to two technological regimes: shifting cultivation, where the majority of agricultural work was done by women, and plough cultivation, a system mostly dominated by men. In this article, we review the literature on the persistent effect of the impact of historical plough use on female labor force participation and fertility today. We also provide additional evidence showing that differences regarding the role of women across the two agricultural regimes were more general and persisted over time in other societal aspects, including the form of marital arrangements, the presence of polygamy and the freedom of movement enjoyed by women. (JEL codes: D03, J16, N30)

Keywords: employment, gender roles, economic values, beliefs

1 Introduction

The gender division of labor varies significantly across societies. In particular, there are large differences in the extent to which women participate in activities outside the home. For instance, in 2000, the share of women aged 15–64 years in the labor force ranged from a low of 16% in Pakistan to 90.5% in Burundi. Similar remarkable differences are observed in fertility rates.¹

A recent literature has argued that these differences reflect differences in underlying cultural values and beliefs. Cultural values and beliefs tend to be transmitted from parents to children and stay fairly stable over time. Although the persistence in female labor force participation and fertility has been documented in literature, little is known on where these differences are coming from.

In this article, we review work by Alesina et al. (2011, 2013) on the historical persistence of differences in female labor force participation and fertility and add new evidence on various societal differences regarding the historical role of women in society by looking at marriage

¹ See Fernandez and Fogli (2010)

arrangements (such as monogamy versus polygamy), the presence of the dowry versus the bride price, or differences in inheritance rules favoring women. For the most recent period, we look at similar outcomes together with a more general index summarizing the gap between men and women in four fundamental categories: economic participation and opportunity, educational attainment, health and survival, and political empowerment.

The hypothesis for the empirical analysis comes from Ester [Boserup \(1970\)](#). In her seminal work, the author argued that the origin of differences in the role of women in societies lay in the different types of agriculture traditionally practised across societies. In particular, she highlights important differences between shifting agriculture and plough agriculture. Shifting agriculture, which uses hand-held tools like the hoe and the digging stick, is labor-intensive with women actively participating in farm-work. In contrast, plough agriculture is more capital-intensive, using the plough to prepare the soil. Unlike the hoe or digging stick, the plough requires significant upper-body strength, grip strength, and burst of power, which are needed to either pull the plough or control the animal that pulls it. Also, farming with the plough is less compatible with simultaneous childcare, which is almost always the responsibility of women. As a result, men tended to specialize in agricultural work outside the home.

Given this specialization of labor across gender lines, men tended to work outside of the home in the field, while women specialized in activities within the home. This division of labor then generated different patterns of fertility and different norms about the appropriate role of women in society. Societies characterized by plough agriculture developed the belief that the natural place for women is within the home. These cultural beliefs tend to persist even if the economy moves out of agriculture, affecting the participation of women in activities performed outside the home, such as market employment, entrepreneurship, or participation in politics.

Regarding the impact of different agricultural technologies on fertility, at first, one may expect that societies with historic plough use will have higher levels of fertility. If women are less likely to participate in market activities outside of the home, this lowers the cost of having children and increases fertility. On the other hand, with plough agriculture, children, like women, are relatively less useful in the field. The plough requires strength and eliminates the need for weeding, a task particularly suitable for women and children. This in turn generates a preference for fewer children, lowering fertility.

Societies characterized by plough use, also tended to develop other social norms which emphasize a different role of women in societies. Differences in agricultural technologies, for example, could be at the origin of polygamy: in female farming communities, a man with more than one wife can cultivate more land than a man with only one wife.

Therefore, polygamy is more common in societies with shifting cultivation. Similarly, in societies where women do most of the agricultural work, it is the bridegroom who must pay bride wealth, whereas if women are less actively engaged in agriculture, marriage payments come usually from the girl's family. In South and East Asia, for example, there is a strong connection between the work of women and the direction of marriage payments; in Burma, Malaysia, and Laos, women do most of the agricultural work and bride prices are customary. Not only has the payment of a dowry but also the use of the veil and the seclusion of women at home often characterized plough societies. In the ancient Arab society, or in Sudan, even today, it appears to be a mark of distinction and sophistication for an educated girl to retire into seclusion when she has finished her education.

These differences across societies, prevalent in the preindustrial period, persisted until today and determined differences in labor force participation and the beliefs about the role of women in society (Alesina et al. 2013), fertility (Alesina et al. 2011), and also differences in inheritance rules, freedom of movement, restrictions in the dress-code, and marital arrangements.

We start by documenting the salient facts on women's role in preindustrial societies using data from the Ethnographic Atlas. We do find that societies with traditional plough use have lower participation of women in agriculture and, in addition, the payment of a dowry is a common social norm, whereas polygamy is rare; plough societies also tend to have inheritance rules less favorable to women. We also look at whether contemporary measures on similar aspects reflect similar differences across societies. We find that differences regarding the role and the value of women in societies are related to the historical use of the plough and tend to persist till today.

This article is related to the literature that suggests that differences regarding the proper role of women in society can be explained by cultural beliefs, which are strongly rooted in history (Alesina and Giuliano 2010; Fernandez and Fogli 2010; Alesina et al. 2013). More generally, this article is linked to a recent literature that documented the continuity of cultural norms over remarkably long periods. Voigtlaender and Voth (2012) show the relevance of the presence of plague-era pogroms for the determination of anti-Semitism today. Guiso et al. (2013) provide evidence that the formation of medieval communes had a long-term impact on the level of social capital within northern Italy. Similarly, Becker et al. (2011) and Grosjean (2011) provide evidence of historical state boundaries having lasting cultural impacts. Nunn and Wantchekon (2011) show that Africa's slave trade generated a culture of distrust that continues to persist today. Nisbett and Cohen (1996) and Grosjean (forthcoming) show that

the ‘culture of honor’ in the US South has its origins in a tradition of herding among the Scots-Irish.

This article proceeds as follows: Section 2 documents that in societies that traditionally used plough agriculture, women participated less in farmwork and other activities outside the domestic sphere. In the same section, we also look at other outcomes related to a different role of women in society: the existence of the dowry versus the bride price, whether monogamy versus polygamy is the prevalent marriage institution, and the presence of inheritance rules less favorable to women. In Section 3, we discuss whether these differences persist till today. Section 4 concludes.

2 The Role of Women in Preindustrial Societies

We begin by first reviewing the existing evidence showing that societies that traditionally used plough agriculture had lower female participation in agricultural activities; we also show how plough use was associated with differences in other activities within and outside the domestic sphere.

Before starting reviewing the evidence on preindustrial societies, it is useful to describe briefly the origins of the plough. The literature is reviewed in Pryor (1985). Little is known about the origin of this fundamental technological invention. Historians believe that it existed 4000 years ago in both ancient Sumar and Egypt, but there is no evidence on when it was first introduced and by whom. Three different approaches have been proposed to explain its appearance. A ‘universalistic’ approach, which focuses on the preconditions underlying the adoption of the plough. This approach assumes that if specific prerequisites exist and if the society has knowledge of the plough, this agricultural technology will always be used. Prerequisites include the availability of large animals that can be domesticated to pull the plough and certain conditions of the soil (not too steep, too rocky, too swampy, too frozen, or too obstructed by vegetation). A ‘population approach’, according to which population density and the relative degree of fallowing are the key variables to explain the existence of the plough: as population density increases, there is a shortening of the fallow period, a decline in labor productivity, an intensification in the type of agriculture practiced, and a replacement of previous agricultural technology with the plough. Finally, an ‘ecological approach’, which emphasizes the importance of the characteristics of crops that could be grown in a particular location. The primary benefit of the plough is that it facilitates the cultivation of larger amounts of land over a shorter period of time. This capability is more advantageous for crops that require specific planting conditions that are only met during narrow windows of time or for crops that require larger tracts of land to cultivate a given amount of calories. The benefit of the

plough is also reduced for crops grown in swampy, sloped, rocky, or shallow soils, all of which make the plough less efficient or impossible to use. Taking these factors into consideration, Pryor (1985) classified crops into those whose cultivation benefits greatly from the adoption of the plough—he calls these plough-positive crops—and those whose cultivation benefit less—called plough-negative crops. Plough-positive crops, which include wheat, teff, barley, and rye, tend to have shorter growing seasons and tend to be cultivated on relatively large expanses of land (per calorie of output) that tends to be flat and with deep soil that is not too rocky or swampy. Plough-negative crops, which include sorghum, maize, millet, roots, tubers, and tree crops, tend to yield more calories per acre, have longer growing seasons, and can be cultivated on more marginal land. Alesina et al. (2011, 2013) indeed use the exogenous conditions of the soil as an instrument for the presence of the plough after controlling for overall agricultural suitability, population density, and the presence of large animals.

The measure of historic plough use and all the other variables on societal characteristics, including the role of women in society, come from the *Ethnographic Atlas*, a worldwide ethnicity-level database constructed by George Peter Murdock and containing ethnographic information for 1265 ethnic groups.²

For the historical plough use, ethnicities are classified into one of three mutually exclusive categories: the plough was absent, the plough existed at the time the group was observed but it was not aboriginal, and the plough was aboriginal and found in the society prior to contact. Using this categorization, we construct an indicator variable for traditional plough agriculture that equals 1 if the plough was present and 0 otherwise.

Traditional female participation in agriculture is measured using a variable describing the relative participation of women in agriculture using five different categories: males only, males appreciably more, equal participation, female appreciably more, and female only. The variable is increasing with female specialization in agriculture. We also report results on specific activities that women do in the fields to investigate whether the decline is in all agricultural tasks or it is focused in only a few (such as soil preparation). The data for these activities come from Murdock and White's (1969) *Standard Cross-Cultural Sample*.³ We look at the following

² For more details about the data set see Alesina, Giuliano and Nunn (2011, 2013).

³ The *Standard Cross Cultural Sample* contains information on 186 societies. The database was constructed by first grouping the 1265 societies from the *Ethnographic Atlas* into 186 clusters of closely related groups. A particularly well-documented and representative ethnic group was then chosen for each cluster, and these constitute the observations in the SCCS.

agricultural and nonagricultural activities: land clearance, soil preparation, planting, crop tending, harvesting, caring for small and large animals, milking, cooking, fuel gathering, water fetching, burden carrying, handicraft production, and trading. When examining the relationship between the gender-based division of labor in agriculture and other societal differences regarding the role of women in societies, we include various controls to take into account different characteristics of ethnic groups that may be correlated with plough use and gender roles. In particular, we control for the presence of large domesticated animals, a measure of economic development, and a measure of political complexity, all taken from the *Ethnographic Atlas*.⁴ Controls also include the fraction of land within a 200-km radius from the centroid of the ethnic group historically that is defined as being tropical or subtropical, and the fraction of land that is defined as suitable for the cultivation of crops.

Overall, we found that the use of the plough is associated with a reduction in the female participation in agriculture variable of 0.88 (the mean and standard deviation of this variables are 3 and 1, respectively). Regarding the other agricultural activities, we do find that plough use is associated with less female participation in all agricultural tasks, with the largest declines in soil preparation, planting, and crop tending (Table 1). On the contrary, we find that the plough tends not to be significantly correlated with female participation in other activities. We find some evidence of more female participation in caring for large animals, caring for small animals, and milking, although none of these coefficients is statistically significant. We also find that plough use is associated with significantly less female participation in burden carrying (Table 2).

These results are consistent with women working less in societies that traditionally used the plough. This interpretation of the correlations is fully consistent with Boserup's hypothesis. What is important for her argument is that when plough agriculture is used, women participate less in work outside the home than when hoe agriculture is practiced.

⁴ The presence of domesticated animals is measured with an indicator variable that equals 1 if large domestic animals were present in the society. Economic development is measured using the density of ethnic groups' settlements. Ethnicities are grouped into the following categories: (i) nomadic or fully migratory, (ii) seminomadic, (iii) semisedentary, (iv) compact but not permanent settlements, (v) neighborhoods of dispersed family homesteads, (vi) separate hamlets forming a single community, (vii) compact and relatively permanent settlements, and (viii) complex settlements. Political complexity is measured by the levels of jurisdictional hierarchies in the society. The variable takes on the values of 1–5, with 1 indicating no levels of hierarchy beyond the local community and 5 indicating four levels. Since the local community represents one level of authority, we interpret the variable as measuring the number of jurisdictional hierarchies in the society.

Table 1 Traditional plough use and female participation in preindustrial agriculture

| | (1) | (2) | (3) | (4) | (5) | (6) |
|--|----------------------|---------------------|----------------------|----------------------|----------------------|----------------------|
| Dependent variable: Traditional participation of females relative to males in the following tasks: | | | | | | |
| Overall agriculture | | Land clearance | Soil preparation | Planting | Crop tending | Harvesting |
| Mean of dependent variable | 3.04 | 1.45 | 2.15 | 2.86 | 3.16 | 3.23 |
| Traditional plough agriculture | -0.883*** (0.225) | -0.434** (0.197) | -1.182*** (0.320) | -1.290*** (0.306) | -1.188*** (0.351) | -0.954*** (0.271) |
| Ethnographic controls | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 660 | 129 | 124 | 131 | 122 | 131 |
| Adjusted R-squared | 0.13 | 0.14 | 0.10 | 0.09 | 0.13 | 0.16 |
| R-squared | 0.14 | 0.18 | 0.14 | 0.13 | 0.18 | 0.20 |

Notes: Table is taken from Alesina et al. (2013). The unit of observation is an ethnic group. In column 1, ethnic groups are from the *Ethnographic Atlas* and in columns 2-6 they are from the *Standard Cross Cultural Sample*. The dependent variable measures traditional female participation in a particular agricultural activity in the preindustrial period. The variables take on integer values between 1 and 5 and are increasing in female participation. Traditional plough use' is an indicator variable that equals 1 if the plough was traditionally used in preindustrial agriculture. 'Ethnographic controls' include the suitability of the local environment for agriculture, the presence of large domesticated animals, the proportion of the local environment that is tropical or subtropical, an index of settlement density, and an index of political development. Finer details about variable construction are provided in Alesina et al. (2013). Coefficients are reported with robust standard errors in brackets. Column 1 reports Conley standard errors adjusted for spatial correlation. ***, **, and * indicate significance at the 1, 5, and 10% levels.

Table 2 Traditional plough use and traditional female participation outside of agriculture in the preindustrial period

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
|--|-----------------|------------------|-----------------|-------------------|-------------------|-------------------|---------------------|-------------------|-------------------|
| Dependent variable: Traditional participation of females relative to males in the following tasks: | | | | | | | | | |
| Caring for small animals | 3.53 | 1.73 | 3.25 | 4.65 | 3.90 | 4.64 | 3.47 | 2.78 | 2.47 |
| Caring for large animals | | 0.064 (0.254) | 0.63 (0.697) | -0.019 (0.108) | -0.638 (0.403) | -0.052 (0.205) | -0.962** (0.378) | -0.157 (0.274) | -0.155 (0.542) |
| Traditional plough use | 0.14 (0.517) | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Ethnographic controls | 88 | 95 | 48 | 173 | 159 | 154 | 135 | 74 | 59 |
| Observations | -0.02 | -0.02 | 0.03 | 0.01 | -0.001 | 0.01 | 0.12 | 0.07 | -0.01 |
| Adjusted R-squared | 0.05 | 0.04 | 0.14 | 0.04 | 0.04 | 0.04 | 0.16 | 0.15 | 0.10 |

Notes: Table is taken from [Alesina et al. \(2013\)](#). The unit of observation is an ethnic group from the *Standard Cross Cultural Sample*. The dependent variable measures traditional female participation in a particular activity in the preindustrial period. The variables take on integer values between 1 and 5 and are increasing in female participation. 'Traditional plough use' is an indicator variable that equals 1 if the plough was traditionally used in preindustrial agriculture. 'Ethnographic controls' include the suitability of the local environment for agriculture, the presence of large domesticated animals, the proportion of the local environment that is tropical or subtropical, an index of settlement density, and an index of political development. Finer details about variable construction are in [Alesina et al. \(2013\)](#). Coefficients are reported with robust standard errors in brackets. ***, **, and * indicate significance at the 1, 5, and 10% levels.

There are no data on fertility for preindustrial societies. However, the *Standard Cross-Cultural Sample* contains a measure of preferences for children. Societies can fall into one of three categories: those with a preference to have very few children, those with no clear preference for the number of children, and those with a preference for a large number of children. The correlation between this variable and historical plough use is -0.31 and significant at the 5% level. This finding is consistent with the explanation that plough agriculture reduced the benefit of having children (since they were less useful in the fields) and this resulted in a preference for fewer children.

In her book, Ester Boserup (1970) also hints at the possibility that plough societies developed different social norms and marital arrangements compatible with a different value of women in society. Her idea was not new, as anthropologists have long posited that the origins of household formation rules relate to both technology and productivity. Aberle (1961), for example, concludes that ‘the origins of matrilineal systems are probably to be sought in technology, division of labor, types of subsistence activities and the ecological niches in which these activities occur’. Goody (1976) has linked the demand for wives to the productivity of women in agriculture: in female farming communities, a man with more than one wife can cultivate more land than a man with only one wife. Therefore, polygamy is expected to be more common in societies with shifting cultivation. Finally, in societies where women do most of the agricultural work, it is the bridegroom who must pay bride-wealth; on the contrary, where women are less actively engaged in agriculture, marriage payments come usually from the girl’s family.

We explore these correlations in Table 3. In column 1, we look at the correlation between historical plough use and whether the dowry is the most prevalent mode of marriage. We define a variable equal to 1 if the dowry is the prevalent mode of marriage and 0 otherwise.⁵ In column 2, the relevant outcome of interest is polygamy, defined as a dummy equal to 1 for various forms of polygamy and 0 otherwise.⁶ Finally, we look at the inheritance rule for land and define a variable equal to 1, if the inheritance rule is matrilineal.⁷

⁵ In the classification of dowry reported in the table absence of consideration, reciprocal gift exchange, and the three different forms of bride price (bride price or wealth to bride’s family, bride service to bride’s family, and token bride price) are considered as 0. Our results are robust to two alternative specifications, one where we exclude observations defined as absence of consideration; and another definition where mode of marriage is defined on a 1–3 scale where 1 indicates bride price, 2 reciprocal gift exchanges, and 3 dowries.

⁶ The independent nuclear family is defined as zero; polygamy includes sororal and nonsororal forms of marriages, with cowives who would live in the same or separate dwellings.

⁷ We define as zero patrilineal systems but also absence of individual property rights or rules and when children are equally treated. Our results are robust to the exclusions of

Table 3 Traditional plough use and social norms in the preindustrial period

| | (1) Dowry | (2) Polygamy | (3) Matrilineal society |
|--------------------------------|---------------------|----------------------|-------------------------------|
| Traditional plough agriculture | 0.135*** (0.028) | -0.610*** (0.044) | -0.068** (0.033) |
| Ethnographic controls | Yes | Yes | Yes |
| Observations | 1,080 | 1,070 | 1,074 |
| R-squared | 0.171 | 0.211 | 0.022 |

Notes: The unit of observation is an ethnic group from the *Ethnographic Atlas*. ‘Ethnographic controls’ include the suitability of the local environment for agriculture, the presence of large domesticated animals, the proportion of the local environment that is tropical or subtropical, an index of settlement density, and an index of political development. Coefficients are reported with robust standard errors in brackets. ***, **, and * indicate significance at the 1, 5, and 10 % level.

According to the three different measures of social norms in the preindustrial period, the value of women appears to be lower in societies that were using the plough. Inheritance rules appear to be less favorable to women, as indicated by the fact the matrilineality is less common in plough societies. In line with Boserup’s idea, shifting cultivation societies are characterized by a higher incidence of polygamy and by bride wealth being paid by the future husband. On the contrary, in plough societies polygamy is very rare and a dowry is usually paid by the girl’s family.

3 The Role of Women in Modern Times

In this session, we examine the long-term impact of traditional plough use on female labor force participation, fertility, and a variety of social norms summarizing the role of women in society. To analyze contemporary outcomes, the historical plough use, measured at the ethnicity level, needs to be linked with current outcomes of interest, measured at the country level. Alesina et al. (2011, 2013) match the ethnographic data to current populations using the global distribution of 7612 language groups from the 15th edition of the *Ethnologue*, and the global distribution of population densities from the 2000 *Landscan* database. In the end, the construction

those ethnicities for which individual property rights or rules are not present; or when we define a variable on a scale from 1 to 3, where 1 is patrilineal, 2 is an egalitarian system, and 3 is matrilineal.

procedure generates a measure of the fraction of a country's ancestors who traditionally engaged in plough agriculture.

We first review country-level estimates regarding the role of women in society and fertility, as by Alesina et al. (2011, 2013). We then turn to additional measures regarding social norms, inheritance rules, and a general measure of gender gap across countries today.

In Figure 1, we report the partial correlation plots, taken from Alesina et al. (2013), among traditional plough use and three different outcomes of interest, all of which are intended to reflect cultural attitudes and beliefs about the role of women in society: the level of female labor force participation in 2000, a measure of entrepreneurship (given by the share of firms with a woman among its principal owners), and the presence of women in national politics (given by the proportion of seats held by women in national parliament)⁸.

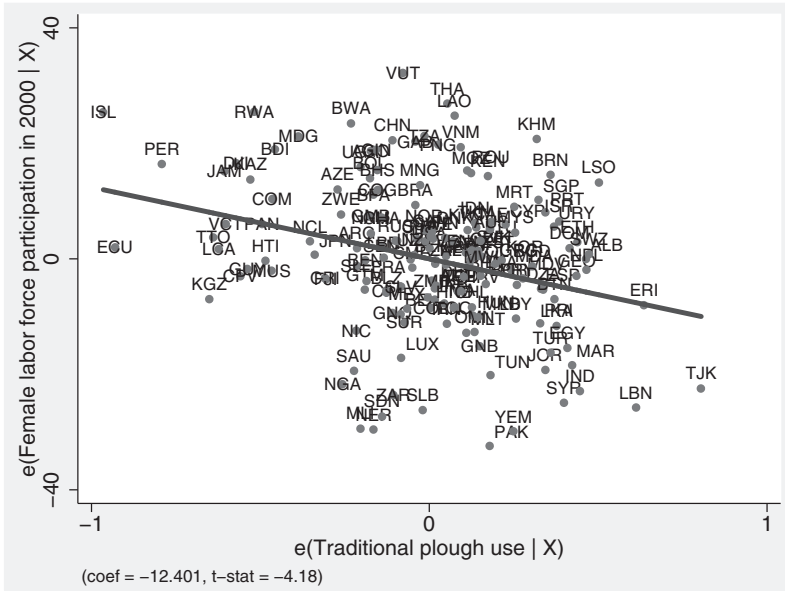
The partial correlation plots show that in countries with a tradition of plough use, women are less likely to participate in the labor market, are less likely to own firms, and are less likely to participate in national politics. The partial correlation plots for traditional plough use also clearly show that the coefficients are not being influenced by a small number of countries or that they are identified only from broad differences across regions. The coefficients are not only statistically significant but they are also economically meaningful. A one standard deviation increase in traditional plough use (0.472) is associated with a reduction of female labor force participation of 5.85 percentage points, which is equal to 11.4% of the sample mean for FLFP and 38% of its standard deviation. The impact of the same increase in traditional plough use on the share of firms with some female ownership is a reduction of 7.19 percentage points, which is 20% of the outcome's mean and 48% of its standard deviation. The reduction on the participation of women in politics is 2.28 percentage points, which is 19% of the outcome's mean and 25% of its standard deviation.

Panel d of Figure 1 shows a strong negative relationship between the historic use of the plough and fertility today. A one standard deviation increase in historic plough use is associated with a decline in fertility of 0.52 children, which is equal to 17% of the sample's mean fertility.

In Figure 2, we look at the relationship among historical plough use and several other measures of social norms related to the value of women in

⁸ The specifications for which partial correlation plots are reported include historical ethnographic controls intended to capture historical differences between societies that had adopted plough agriculture and those that had not. They are the same controls included in the specification for the preindustrial period. The regressions also include as contemporary controls the natural log of a country's real per capita GDP measured in 2000, as well as the variable squared, to take into account the U-shaped bivariate relationship between economic development and female labor force participation.

(a) Female labor force participation



(b) Female ownership

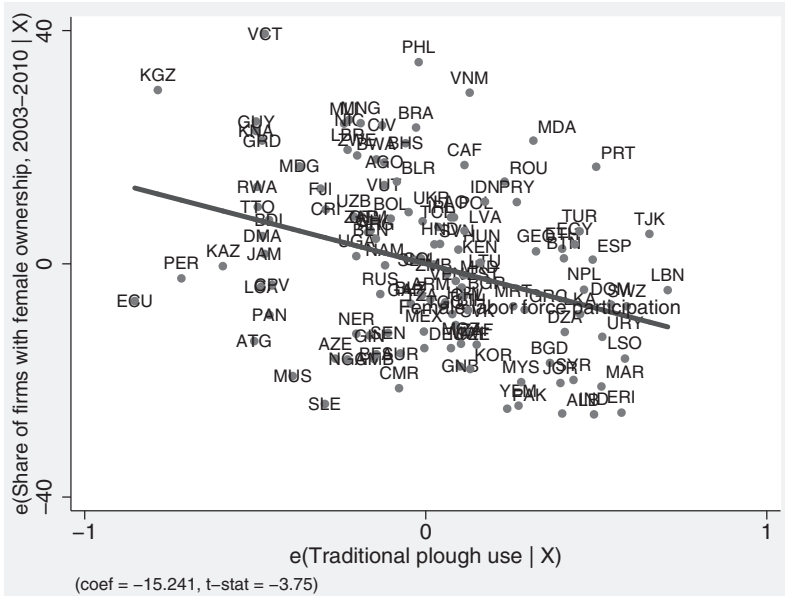
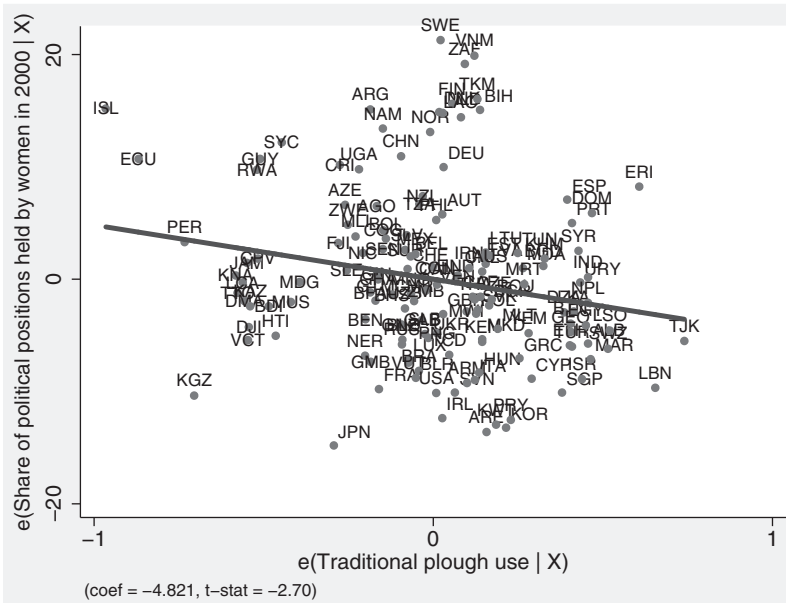


Figure 1 Traditional plough use and the role of women in society (taken from Alesina et al. (2011) and (2013)): (a) Female labor force participation. (b) Female ownership. (c) Participation of women in politics. (d) Fertility.

(continued)

(c) Participation of women in politics



(d) Fertility

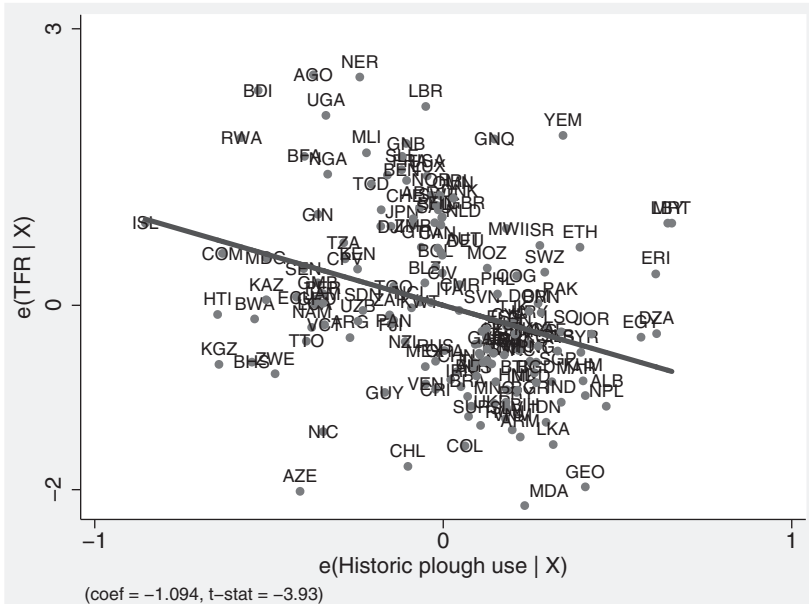
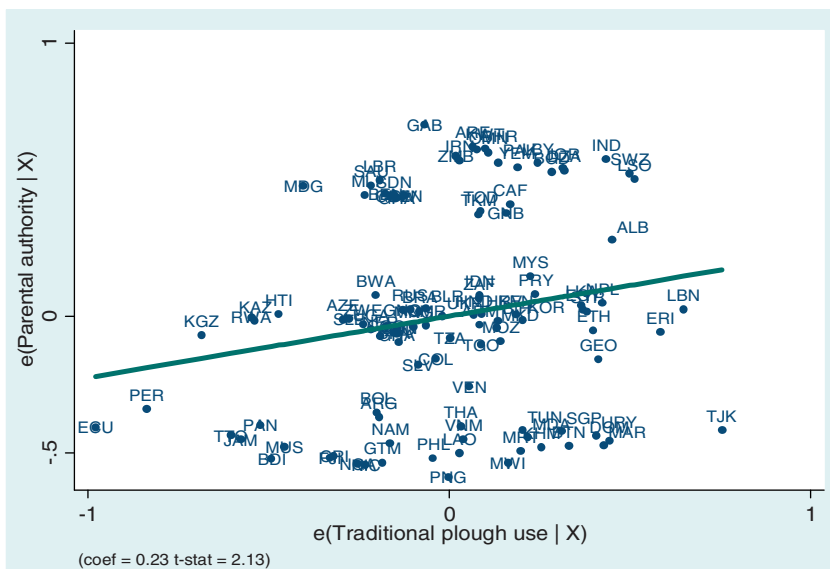


Figure 1 Continued.

(a) Parental authority



(b) Inheritance rules

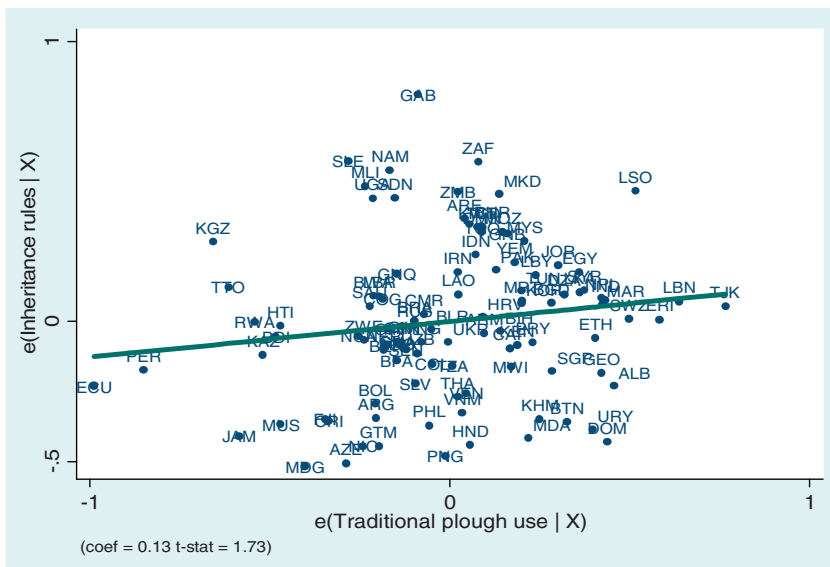
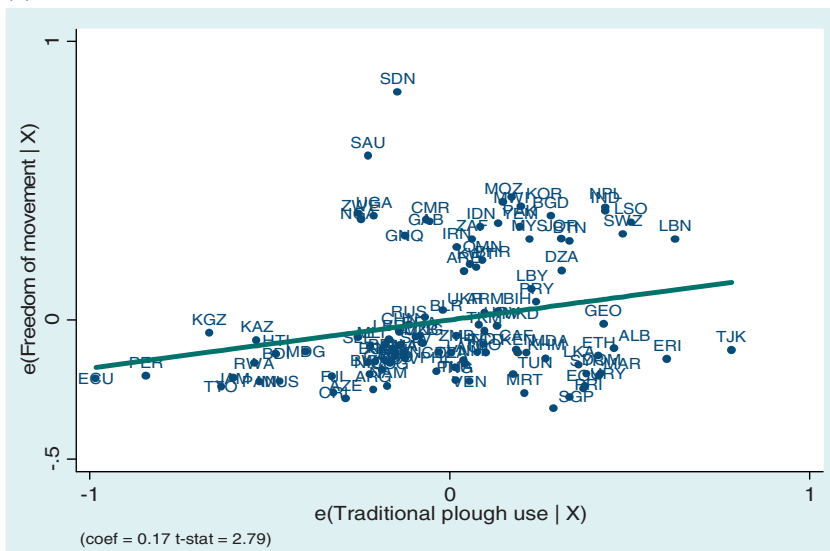


Figure 2 Traditional plough use and the role of women in society. (a) Parental authority. (b) Inheritance rules. (c) Freedom of movement. (d) Dress code. (e) Poligamy.

(continued)

(c) Freedom of movement



(d) Dress code

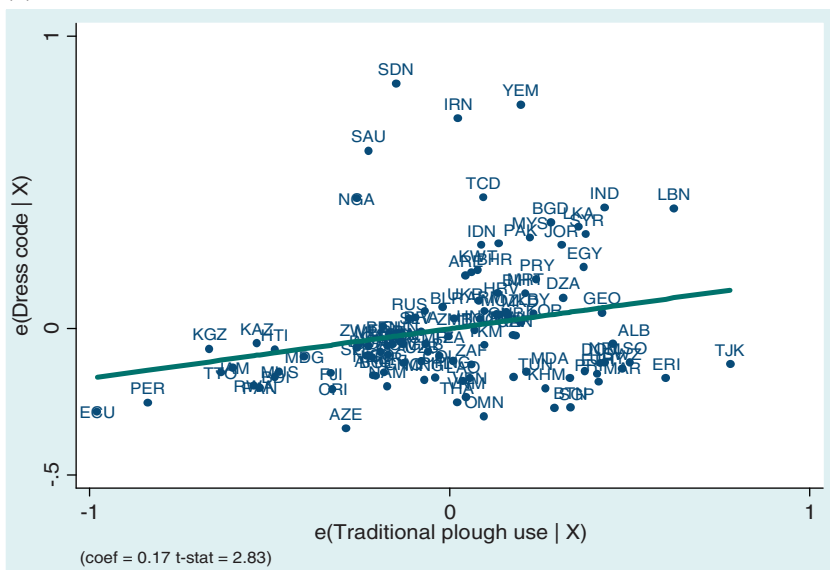


Figure 2 Continued.

(continued)

(e) Poligamy

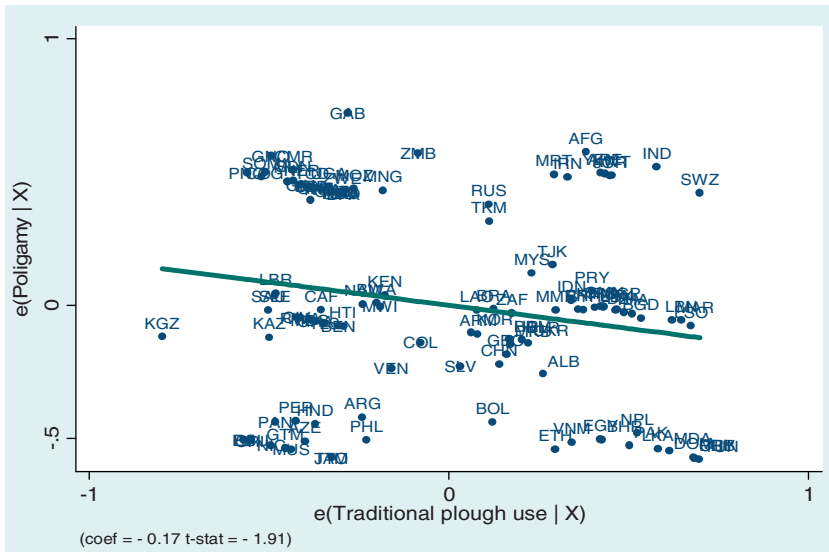


Figure 2 Continued.

society. All the measures come from the OECD Gender, Institutions and Development Database, a dataset which has been constructed to analyze obstacles to women’s economic development. It covers a total of 160 countries and comprises various indicators on gender discrimination. We look at the following measures:

- ‘Parental authority’ indicates whether parental authority is granted to the father and the mother equally. The variable goes from 0 to 1, where 1 indicates more inequality.
- ‘Inheritance rules’ is a variable indicating whether inheritance practices are in favor of male heirs. The variable goes from 0 to 1, where 1 indicates that practices are more favorable to men.
- ‘Freedom of movement’ is a variable indicating whether women have freedom to move outside of the house. The variable goes from 0 to 1, with 1 indicating more restrictions.
- ‘Dress code’ is a variable indicating the obligation to wear a veil in public. The level goes from 0 to 1, where 1 indicates that all women are obliged to wear a veil, whereas 0 indicates that there is not any form of obligation.
- ‘Poligamy’ is a variable indicating whether poligamy is accepted or legal. The variable goes from 0 to 1, with 1 indicating that having more than one spouse is an accepted practice.

As it is apparent from the Figure, there is substantial variation in the role of women in society across different countries, as reflected in laws and different social norms such as polygamy, the extent to which the woman is secluded at home, and the obligation to wear a veil. In terms of laws, many countries have laws related to women's role in the family. There is a strong and positive correlation between child custody rules which do not provide the same parental authority to fathers and mothers and whether the ancestors of a specific country were using the plough. In those countries, parental authority is still in the hands of men. Similarly, there is a strong gender bias in inheritance practices: historical plough use is associated with inheritance laws favoring men.

According to Boserup (1970), it was common in plough societies for women to be secluded at home and being obliged to wear a veil when in public. The same types of norms appear to have persisted until today: women in countries which historically used the plough are still obliged to wear a veil and face substantial restrictions in the possibility of moving freely outside the house.

Another variable related to marriage laws and showing a strong persistence from the past is the acceptance or legality of polygamy. In preindustrial societies with shifting agriculture, it was a man with more than one wife who could cultivate more land than a man with only one wife. Therefore, polygamy was more common in societies with shifting cultivation than in plough societies. These differences in marital arrangements tend to persist till today.

In terms of the magnitude of the results, a one standard deviation increase in traditional plough use (0.464) is associated with an increase in parental authority favoring men of 0.104, which is equal to 26% of the sample mean for parental authority and 25% of its standard deviation. The impact of the same increase in traditional plough use on inheritance rules favoring men is of 0.059, which is 16% of the outcome's mean and 18% of its standard deviation. The impact of historical plough use is particularly large for those variables indicating the extent to which women should be secluded at home: a one standard deviation increase in traditional plough use is associated with more restrictions in moving outside the home of the magnitude of 0.079, which is equal to 53% of the mean and 32% of the standard deviation of the 'freedom of movement' variable. The magnitude for restrictions in dress code is 0.077, equivalent to 66% of the outcome's mean and 30% of its standard deviation. Finally, historical plough use is associated with a reduction in polygamy of 0.174, which corresponds to 18% of the mean and 20% of the standard deviation of the polygamy variable.

As a final and summary outcome, we look at the relationship between the Global Gender Gap Index and the historical plough use. The Global Gender Gap Index, introduced by the World Economic Forum in 2006, is a

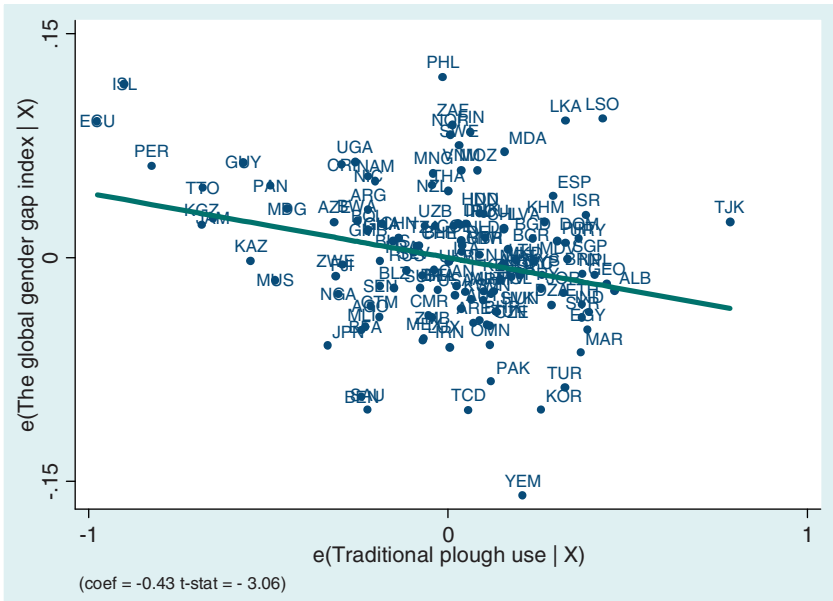


Figure 3 Traditional plough use and the global gender gap index.

framework for capturing the magnitude of gender-based disparities. The index benchmarks national gender gaps on economic, political, education, and health criteria, and it is designed to measure gender-based gaps in access to resources and opportunities in individual countries, rather than the actual level of the available resources and opportunities in the same countries⁹.

Figure 3 shows the partial correlation plot between the Global Gender Gap Index and the historical plough use. There is a strong correlation between gender equality and historical plough use. Countries which historically used the plough show more pronounced differences among men and women in economic outcomes, political participation, education, and health. There is indeed dramatic variation across countries: among the most unequal countries are Yemen, Pakistan, Saudi Arabia, Turkey, and Iran; on the opposite side of the spectrum are the Scandinavian countries but also the Philippines, South Africa, Ecuador, and Peru.

⁹ The Global Gender Gap Index examines the gap between men and women in four fundamental categories: economic participation and opportunity, educational attainment, health and survival, and political empowerment. For more details see [World Economic Forum \(2013\)](#).

4 Conclusions

In this article, we look at the importance of different forms of agriculture practiced traditionally in preindustrial societies in the determination of differences in gender roles in preindustrial and modern times. Societies that traditionally practiced plough agriculture tended to develop a specialization of production along gender lines. Men tended to work outside the home in the fields, while women specialized in activities within the home. This division of labor then generated norms about the appropriate role of women in society. Societies based on plough agriculture, and the resulting gender-based division of labor, developed a cultural belief that the natural place for women is within the home.

Various reasons could explain persistence: underlying cultural traits may be reinforced by policies, laws, and institutions, which affect the benefits of beliefs about gender inequality. A society with traditional beliefs about gender inequality may perpetuate these beliefs by institutionalizing unequal property rights, voting rights, and so on. Beliefs of gender inequality may also cause a society to specialize in the production of capital intensive industries, which in turn decrease the relative cost of norms about gender inequality, thereby perpetuating this trait.

A third explanation is that cultural beliefs are inherently sticky. Alesina et al. (2011, 2013) present evidence consistent with this interpretation. They look at children of immigrants in the USA and Europe and test for a relationship between traditional plough agriculture and cultural beliefs while holding constant the external environment. They do find a high degree of persistence in cultural traits. The evidence reported in this article is consistent with this view, but further research is needed to better understand the evolution and persistence of cultural norms over time.

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