Marriage Patterns and Economic Development

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Abstract

This paper looks at the *Goldin* and the *Kuznets* curves which relate female labour and income inequality with economic development respectively. To some extent, the *Goldin* and the *Kuznets* curves have followed opposite paths, which in turn, might explain how economic development through female labour and income inequality have had an impact on household formation. In this line of thinking, *African* polygyny may occur at early stages of economic development where income inequality is low and gender equality in labour participation predominates. As income rose, income inequality increased and gender inequality in labour participation grew. Then, *Harem* polygyny may arise but on the whole monogamy prevailed and became the preferred marital system. Furthermore the age at first marriage may also be affected by these changing economic conditions. Previous diverging marriage patterns tend to converge when traditional societies turn into modern ones. Then, falling income inequality and increasing gender equality in labour participation may drive the spousal age gap down.

JEL Classification: O1; J16; J12.

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1 Introduction

This paper looks at the relationship between economic development and marriage patterns, thus household formation, in the long run. North (1991) defined institutions as *"…humanly devised constraints that structure political, economic and social interaction. They consist of both informal constraints (sanctions, taboos, customs, traditions and codes of conduct) and formal rules (constitutions, laws, property rights)"[1]*. As the economic environment evolves, we expect institutions to reflect on these changes. Households are no exceptions, and throughout history the economic role of women and the distribution of resources within households have been changing. This paper explores some of these changes and provides a simple discussion. The process of household formation entails both, men and women. Therefore, the changing economic role of women across societies and over time might have played a decisive role. Nevertheless, along the process of economic development the distribution of wealth within a society may have also affected the incentives structure of households.

In particular, we concentrate on two specific patterns related to the formation of a household: (a) marital systems (monogamous as opposed to polygynous households), and (b) the 'European' Pattern which implies a high age at marriage and high proportion of people who never marry (Hajnal, 1965)[2]. We will discuss that changes in the economic role of women within a society and the distribution of wealth may have an impact on the evolution of these marriage patterns. For example, it has been argued that male wage inequality may induce women to postpone marriage, and hence the spousal age gap decreases[3]. On the whole, we argue that female labour and wealth inequality have an impact of marriage patterns[4]. Nonetheless, whether marriage patterns have been shaped

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[1] North (1991: 97)

[2] Hajnal (1965: 101): "The marriage pattern of most Europe as it existed for at least two centuries up to 1940 was, so far as we can tell, unique or almost unique in the world. There is no known example of a population of non-European civilisation which has had a similar pattern. The distinctive marks of the 'European pattern' are (1) a high age at marriage and (2) a high proportion of people who never marry at all. The 'European' pattern pervaded the whole of Europe except for the eastern and south-eastern portion."

[3] Loughran (2002) and Gould and Paserman (2003)

[4] We define female labour in terms of the total contribution of women to their household. This includes household work and market work. Household work leads to the production of household goods, while market work implies the production of food in subsistence economies or earning an income. Wealth inequality, on the other hand, can be composed of labour income (wage) or non-labour income. We have

throughout history by cross-sectional variations in female labour and wealth inequality deserves further discussion.

Our main objective lies with the long-term relationship between gender differences in labour participation, wealth inequality within a society and the process of household formation. Overall, our reasoning follows a sequence of events. First, we observe hunter-gatherers at the earliest stage of economic development. Lovejoy (1981) argued that under Miocene critical ecological conditions, *"Conditions were prime for the establishment of male parental investment and a monogamous mating structure"*[5]. Ethnographic evidence supports the view that among hunter-gatherers monogamy or sororal-polygyny prevails (Diez, 2010a) [6]. However, it is widely observed, even today, that polygynous unions have been highly prevalent in sub-Saharan Africa for centuries. Lesser parental investment may lead us to suppose that the *African* polygyny equilibrium is due to the substantial contribution of co-wives to the household wealth[7]. As economies grew, the economic role of women changed and inequality increased, the *African* polygyny equilibrium would break down[8]. Then, *Harem* polygyny would emerge, but eventually would give way to the *Monogamy* equilibrium observed in modern economies.

Secondly, we also observe among monogamous societies contrasting marriage patterns. In particular, the 'European' pattern remains at the core of research. The high age at marriage recorded in some Northwest European countries provides further evidence that marriage patterns may reflect on the economic conditions. In this regard, postponing marriage is costly. If women earn no income, their parents' household will bear the costs. Parents may

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assumed throughout the study that in traditional societies wealth inequality is mainly caused by non-labour income. Milanovic et al. (2007) found that inequality in pre-industrial times was largely driven by the differences between the rural poor and the landed elite. Piketty (2003) concludes that in France and possibly among other countries in the twentieth century, wage inequality has actually been extremely stable in the long run, and the decline in income inequality is for the most part a capital income phenomenon.

[5] Lovejoy (1981:346)

[6] The Ethnographic Atlas shows that 61.3 percent of nomadic or semi-nomadic societies were monogamous and independent nuclear, while 38.2 percent were polygynous –mostly with co-wives sharing habitation- and 0.5 percent were polyandrous.

[7] The *African* polygyny equilibrium stands for a high incidence of polygynous unions within a community or society where co-wives live in separate habitation.

[8] At early stages of economic development, the relationship between the level of income per capita and income inequality tends to be positive (Kuznets, 1955).

be keen on waiting, and spending time and resources to reduce uncertainty about the traits of a potential spouse. Nevertheless, the costs of living, and other costs associated with pre-marital sex or social norms regarding gender specific roles, would encourage women to marry young. Additionally, men might be required to postpone marriage in order to acquire enough wealth to provide for the newly formed household[9]. Late marriage can be due to the level of economic development and the distribution of resources within a society. Then, section 2 will discuss the *Goldin* curve, which associates female labour participation and economic development (Goldin, 1994). While section 3 will explore the relationship between the income distribution within an economy and economic development or *Kuznets* curve (Kuznets, 1955). Section 4 will provide some concluding remarks. Moreover, we expect to encourage further discussion and research.

2 The *Goldin* curve

Goldin (1994) explored the relationship between economic development and the female labour force, and found out that the labour participation rates of married women first declines and then rises as countries develop, hence the U-shaped relationship or *Goldin* curve[10]. Goldin (1994) argued that the ensuing U-shaped relationship might be the result of a strong income effect and a weak substitution effect accompanied by a change in the location of production, from home to the factory[11]. Along the process of economic development, female labour participation decreased because families often implicitly bought women's work, and consequently women retreated into the home[12]. Moreover, a decrease in the demand for women's labour in agriculture, and social stigmas associated

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[9] This would not be the case for wealthy men, whose decision of marriage would be independent of economic constraints. Nonetheless, wealthy men have been far from being the average man throughout history. If this was the case, we would have more equal societies which, given the Kuznets curve, would occur among hunter-gatherers or advanced economies.

[10] Goldin (1994) made a clear distinction between married and unmarried women. For the purpose of this study, we define *WEA* as the ratio of women economically active per 100 men. We use *WEA* as a proxy of the female labour force.

[11] The substitution effect thus depends on the price of market and household labour.

[12] As Goldin (1994) explains income may rise following an expansion of the market (Internal) or the introduction of a new technology (External).

with manual labour-intensive work, could aggravate the initial decline. As traditional societies transform into modern ones and more skilled labour is demanded, the opportunity cost of staying at home increases and women move back into the labour force, which is captured by the move along the rising portion of the U-shaped relationship[13].

The *Goldin* curve turns out to be a significant instrument to better understand the relationship between economic development and marriage patterns. Diez (2010a) finds that female contribution to subsistence was a strong predictor of *African* polygyny[14]. Moreover, *African* polygyny was also strongly associated with sedentary patterns of settlement. Likewise, gender equality in labour participation has been currently related with countries with a high incidence of polygyny (Diez, 2010a). This relationship strengthens after controlling for the level of economic development of each country. Overall, these findings support the hypothesis that the *African* polygyny equilibrium arises if and only if co-wives contribute largely to the wealth of their own household. Along these lines, Boserup (1970) also observed that women did most of the agricultural work in sparsely populated regions, where extensive agriculture predominated. In this way, the Ethnographic Atlas may throw more light on the subject.

Figure 1 illustrates female contribution to subsistence and intensity of agriculture[15]. We have computed the average *Female Contribution* by the type of agriculture, which is described in the Ethnographic Atlas, variable 28: Intensity of Agriculture. Table A.1 in Appendix shows the codification. Figure 1 shows that -on average-, female contribution to subsistence is higher when horticulture and extensive (shifting) agriculture predominates. Agriculture intensification would imply lower female contribution to subsistence. The

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[13] The process suggests an initially strong income effect combined with a small own-substitution effect. At some point the substitution effect increases while the income effect may decline. During the falling portion of the U the income effect dominates, but during the rising portion of the U the substitution effect dominates (Goldin, 1994).

[14] In this paper, we distinguish between *African* and *Harem* polygyny according to the prevalence or incidence of polygynous unions within a community or society. *African* polygyny refers to many polygyoun unions (many men/many women), whereas *Harem* polygyny implies few (few men/few-many women). Moreover, *African* polygyny involves co-wives in separate habitation as opposed to *Harem* polygyny where co-wives share residence.

[15] Female contribution to subsistence (*Female Contribution)* reflects the percentage total contribution of women to subsistence.

Ethnographic Atlas also illustrates that horticulture and extensive agriculture were (are) predominant in Melanesia, Micronesia, Polynesia and sub-Saharan Africa societies[16].

Figure 1. Female Contribution to Subsistence and Intensity of Agriculture
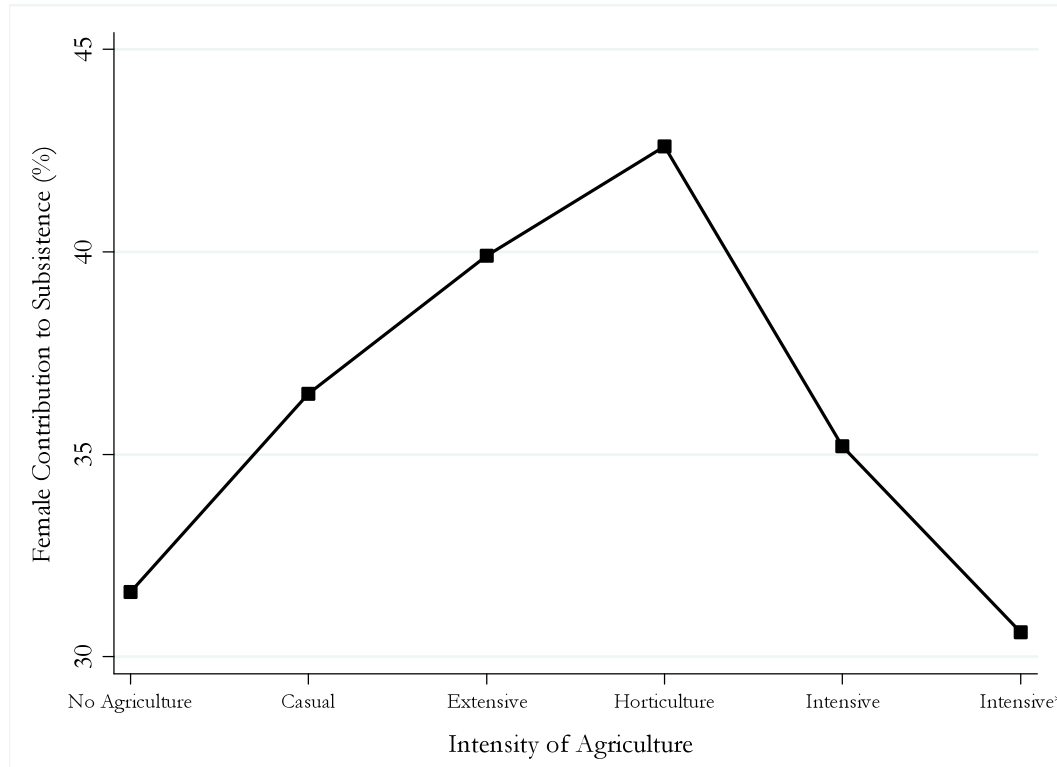
Notes: (i) No Agriculture; (ii) Casual: Casual agriculture, incidental to other subsistence modes; (iii) Extensive: Extensive or shifting agriculture, long fallow, and new fields cleared annually; (iv) Horticulture: Horticulture, vegetal gardens or groves of fruit trees; (v) Intensive: Intensive agriculture, using fertilization, crop rotation, or other techniques to shorten or eliminate fallow period; (vi) Intensive*: Intensive irrigated agriculture (World Cultures, 1999)

On the contrary, intensive agriculture has been widely observed in most Eurasian societies since antiquity. Generally speaking, figure 1 relates agriculture intensification (economic

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[16] More than seventy percent of sedentary societies in sub-Saharan Africa were classified as having extensive or shifting agriculture. In Melanesia, Polynesia and Micronesia more than ninety percent were described as horticulture. While in Eurasia two thirds of societies were described as having intensive agriculture. Most societies in the *New World* were nomadic or semi-nomadic. The Ethnographic Atlas refers to indigenous ethnic groups observed during the nineteenth and twentieth centuries.

development) to female labour (economic role), which in turn may be associated to marriage patterns and household formation[17].

Figure 1 provides further insight regarding the *Goldin* curve. When agriculture is casual or incidental, female contribution seems to be moderately low[18]. The economic conditions associated to hunter-gatherers and pastoralists -who are mostly nomadic or semi-nomadic-, will be crucial. Among hunter-gatherers, there is complete specialisation within the household -men hunt, while women gather-, and female contribution to subsistence is driven by the relative importance of hunting/fishing with respect to gathering. This, in turn, depends on the availability of wild food. Among pastoralists, on the other hand, women seem to contribute on average less than men. In this case, the size of domestic animals may also have an impact on the division of labour (Murdock and Provost, 1973). In both scenarios, monogamy and polygyny have been frequently observed, although *African* polygyny has been rare and polygynous unions conventionally involve co-wives sharing habitation, mostly sororal polygyny. White (1988) observed that in nomadic societies, sisters assist one another in household activities, i.e. packing, unpacking, cooking or gathering food.

In this line of thinking, it can be assumed that the economic activity rate of women at the first stage of economic development (hunting-gathering) is lower than that for sedentary women engaged in shifting agriculture. Although this result would require further analysis and research, figure 2 introduces a hypothetical and 'augmented' *Goldin* curve. By assuming that women were conventionally in charge of most household tasks such as food preparation and children/elderly care, figure 2 provides a long-term overview of the economic role of women over time.

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[17] Although there is also evidence of a high incidence of polygynous unions in Melanesia, *African* polygyny is mainly present in sub-Saharan Africa. Nevertheless, *African* polygyny was observed in New Caledonia, Papua New Guinea and the Solomon Islands during the nineteenth and twentieth centuries in the Ethnographic Atlas.

[18] Murdock and Provost (1973) provide a good review of the division of labour by sex across societies. Out of 844 societies in the Ethnographic Atlas with available data, only in 14 cases women contribute something to hunting activities. Regarding fishing, in 79.2 percent of the societies males fish alone or appreciably more than females. On the other hand gathering activities are predominantly dominated by females; in 80.2 percent of societies females gather alone or appreciably more than males.

Figure 2. The 'augmented' Goldin curve
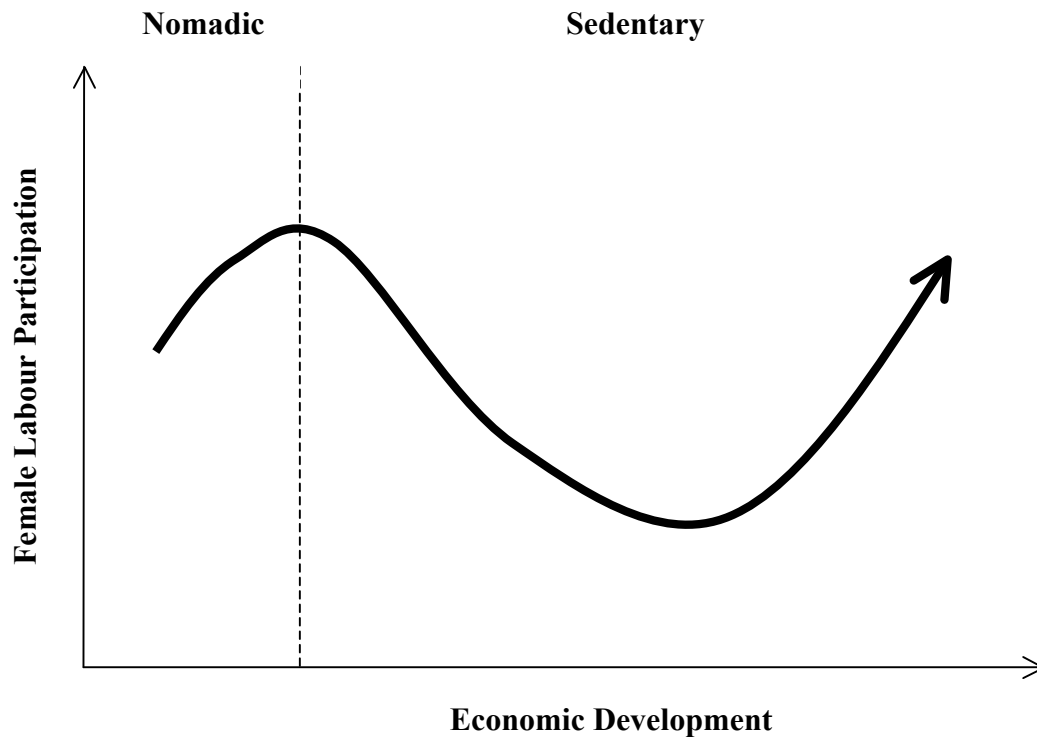
The 'augmented' *Goldin* curve may throw more light on the relationship between economic development and marriage patterns. In particular, we are interested in two fundamental research questions: (1) Why Monogamy? (2) Why the European Marriage Pattern? The transition from a nomadic lifestyle to a sedentary one could have an impact on the organisation of the household. As we state above, *African* polygyny was broadly unknown among hunter-gatherers. Polygyny was frequent among some hunter-gatherers but mainly with co-wives (mostly sisters) sharing habitation. Then, why *African* polygyny prevailed? Whether Eurasian hunter-gatherers preferred monogamy over polygyny whereas sub-Saharan Africans became polygynous deserves further study[19]. In our view, *African* polygyny -where many sedentary men and women are married polygynously-, could have existed in Eurasia too[20]. Herodotus pointed that among the Thracians, who inhabited

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[19] As we showed earlier, high levels of polygyny where co-wives share habitation -mainly sororal polygyny-, were closely associated with nomads or semi-nomads. This would leave us with two possible equilibriums, monogamy with a low incidence of polygynous unions or the *African* polygyny equilibrium where many men and women were married polygynously and co-wives live in separate dwellings.

[20] The transition from hunting-gathering to permanent settlement and agriculture is commonly referred as the *Neolithic* revolution.

Eastern and Southern Europe, it was customary for a man to have more than one wife[21]. Tacitus described the peoples of Germania in the first century AD as "…*almost unique among barbarians in being content with one wife…*"[22] This description followed and hinted that Germanic *barbarians* were monogamous, whereas non-Germanic *barbarians* were essentially polygynous as the Thracians described by Herodotus.

Theoretically, we expect that small changes in consumption at low levels of economic development will be accompanied by sizeable gains/losses in utility. For any woman who has to decide whether to enter an established household (polygyny) or form a new one (monogamy), the potential level of consumption within the household will play a decisive role. Then, if her contribution is restricted to the production of household goods (food preparation, child care) then it could be economically unsustainable for a married man to take a second wife. If, on the other hand, her contribution to the household wealth increases (food production) then a married man would be less discouraged from taking a second wife. Therefore, a woman may prefer a polygynous union when she expects higher levels of consumption. In this way, when the average level of consumption increases within a community or society, women would have less incentive to form a polygynous household, and monogamy will prevail. As a result, we suppose that *African* polygyny should emerge in less economically developed regions, when female contribute to the production of household gods and increase household income. Generally speaking, there is little reason to believe why *African* polygyny could not become known in other regions apart from sub-Saharan Africa. Unfortunately, the evidence to support this view is scant, and further research is needed.

Boserup (1965) also argued that when population density increases in agricultural economies, and hence the amount of natural resources per head is reduced, extensive agriculture could no longer survive if new open fields were not available. This could have partly explained why the demand for women's labour in agriculture sharply decreased since

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[21] Herodotus (Book V: 5)

[22] Tacitus (Germania: 18)

antiquity in some parts of Eurasia[23]. During the Sung period in China, the economic role of women was not closely associated to agricultural activities (Ebrey,1993; pp. 132)[24].

"Yet whatever women contributed to general agriculture, in the imagination of the Chinese scholars women's work largely lay elsewhere. Their work was the slow and tedious production of textiles, one largely within the confines of the home. Symbolically women were associated with cloth, and since ancient times the sexual division of labor had been epitomized by the saying that men plow and women weave."

To what extent the changing economic role of women within a society and throughout history have shaped marriage patterns and household formation remains unanswered. Goody (1983) questioned: how was it that after around AD 300 certain general features of European patterns of marriage came to take a different shape from those of ancient Rome, Greece, Israel and Egypt, and from those of the societies of the Mediterranean shores of the Middle East and North Africa that succeeded them? For the remainder of this section, we will concentrate on the European Marriage Pattern.

Hajnal (1982) drew a broad historical distinction between the "Northwest European" pattern or simple household family system and; the "Non-European", "Eastern" pattern or joint household family system associated mainly with India and China. Hajnal (1982) observed that men and women married relatively late in some Northwest European countries during the seventeenth and eighteenth centuries, whereas in India and China men married relatively earlier and women rather earlier than in Northwest Europe, among other things[25].

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[23] Moreover, large populations could better afford investments in basic infrastructure. This in turn would have improved the standards of living (Boserup, 1981).

[24] Nevertheless the production of textiles involved costs that not all families would have been able to afford, *"Not all women in peasant families would have worked at making cloth. Differences in climate and soil made some areas unsuited for the production of cloth, or so suited to something else like tea that the family specialized in that activity, purchasing whatever cloth they needed. The very poorest families might not be able to secure the land and equipment needed to produce cloth…"* Ebrey (1993: 133)

[25] Hajnal (1982: 452): *"Single household system associated…A) Late marriage for both sexes (mean ages at first marriage are, say over 26 for men and over 23 for women), B) After marriage a couple are in charge of their household (the husband is head of household), C) Before marriage young people often circulate between households as servants."* …*"Joint household systems…a) Earlier marriage for men and rather early marriage for women (mean ages at first marriage are under about 26 for men and under 21 for women), b) A young married couple often start life together either in a household of which an older couple is and remains in charge or in a household of which an unmarried older person (such as a widower or a widow) continues to be the*

The classical theory of marriage would say that marriage takes place if, and only if, the gains from it outbalance the costs (Becker, 1973; 1974). The benefits from marriage will be greater when differences between men and women are more acute. Moreover, uncertainty about the traits of the potential spouse and how the gains from marriage are distributed will induce men and women to spend time and other resources searching for the most appropriate partner. As a result, the age at marriage may depend both on the expected gains from the union and on the costs that involve finding a suitable spouse. The *Goldin* curve captures the changing economic role of women within a society. Therefore, it would assist us to derive the *Goldin* curve for each country in the past. Unfortunately, this is an extremely difficult task, which may ultimately be unfeasible.

Anyhow, let us have a look at the rising portion of the *Goldin* curve. As traditional societies grew into modern ones and skilled labour is highly demanded, the opportunity cost of staying at home increases and women may move back into the labour force (Goldin, 1994)[26]. In addition, social stigmas could be reduced once manual labour-intensive work gives way to more skilled work. Empirically, female labour appears to reach a historical low with the Industrial Revolution. Pinchbeck (1930) argued that during the Industrial Revolution female dependence on male wages increased. Horrell and Humphries (1995) support this view and explain that the decline in participation was caused not only by supply shifts. Supply factors such as the introduction of contraceptive methods, Goldin and Katz (2002); household technologies, Greenwood et al. (2005); cultural beliefs about the long run payoff to working, Fernandez (2007); have accompanied demand factors such as the rise of the clerical sector, the rate of unemployment or social stigmas associated to employers. Regarding marriage patterns, we observe a declining spousal age gap across countries for the period 1950-2000, with both men and women further delaying marriage (Diez, 2010b). Before 1950, marital data are scant but on the whole marriage patterns have remained rather stable[27].

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head. Usually the young wife joins her husband in the household of which he is a member. c) Households with several married couples may split to form two or more households, each containing one or more couples".

[26] Goldin (2006) divides the rising portion of the U-shaped relationship into four stages: (i) Late Nineteenth century to 1920s; (ii) Transition, 1930-1950; (iii) 'Roots of the Revolution' 1950-1970s; (iv) The Quiet Revolution, 1970-today. This is also a useful timeline when looking at marriage patterns.

[27] See Wrigley et al (1997) for a long term review of marriage patterns in England, 1580-1837.

Figure A.1 in Appendix provides further insight into the *Goldin curve*. We present, for a balanced selection of countries, the U-shaped relationship between gender differences in labour participation and economic development for 1950 and 2000. This figure illustrates how the *Goldin* curve has pivoted upwards around the less developed countries -mostly polygynous-, where gender equality in labour participation has remained fairly constant. Generally, gender differences in labour participation have been gradually reduced. This has been particularly acute in developed economies, which have also experienced a rapid decline in the spousal age gap. However, what happened before 1950? Figure A.2 in Appendix shows the long-term patterns (1850-2000) of gender differences in labour participation for a selection of countries. All of these countries are today advanced economies where men and women postpone marriage until their early thirties. To control these patterns, we also include the sex ratios, given the total male and female populations.

First, we observe that among these countries, the Northern and Western European countries -on average-, had a *WEA* value around fifty women economically active for every hundred men in the late nineteenth century and early twentieth century, Southern European and *New World* countries exhibited lower levels. Only exception was Italy, which presents a comparable pattern to Northwest European countries[28]. These levels are rather similar to those observed for developed countries in figure A.1 in 1950. Whether available work (domestic service, family work) were more available for women in Northwest Europe allowing them to postpone marriage remains to be explored. The levels seem slightly different, and most of these countries appear to be on the bottom portion of the *Goldin* curve. Structural differences such as, who employs women and how the economies are structured need to be looked at. In the following section, we introduce the *Kuznets* curve in an attempt to provide further light regarding income and its distribution throughout history.

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[28] The unification of Italy occurred in 1861 and data were first available in 1871 (Bairoch et al., 1968).

3 The *Kuznets* curve

Kuznets (1955) observed that along the process of economic development, the income distribution first became more unequal, and then more equal, generating an inverted U-shaped relationship or *Kuznets* curve[29]. The hypothesis of an inverted U-shaped relationship between income inequality and economic development has been well documented. Barro (2000) argued that, although the Kuznets curve does not explain the size of differences of inequality across countries and over time, it emerges as a clear empirical regularity. Banerjee and Duflo (2003) using non-parametric methods show that the growth rate is an inverted U-shaped function of net changes in inequality. In the first stage of economic development (hunting-gathering) wealth inequality may not be substantial. This is because hunter-gatherers are not able to accumulate and transmit wealth across generations. Similarly, if ownership and property rights are not well established, we would expect that wealth inequality remains relatively low.

In this line of thinking, agriculture intensification may also have a significant impact on land tenure systems. Property rights, or at least the need of a more restrictive system of land tenure, may emerge when land becomes scarce. The establishment of a system of property rights affect ownership and the distribution of land within a society, among other movable or immovable assets. It also makes possible the accumulation and transmission of wealth across generations. In these conditions, some households may be able to implicitly buy women's work. This, in turn, could change the existing customs or marriage patterns. Married women may voluntarily retreat into the home and devote their whole effort to the production of household goods. Nevertheless, it also occurs that in traditional societies - where the demand for skilled labour is relatively low-, manual labour-intensive work may also be regarded as inappropriate for women, and hence social stigmas could arise[30]. As a result, women as daughter or wife involuntarily retreat into the home. Therefore economic

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[29] Robinson (1976) further developed the original hypothesis some years later.

[30] These social stigmas could arise if parents, husband or more significantly the potential employer regard women as inappropriate for the specific work. In this regard, social stigmas may be strongly and positively associated with income levels. In figure A.2 in the Appendix, we illustrate that gender differences in labour participation during the nineteenth and twentieth centuries were low, yet still above forty women for every 100 men economically active in Northwest Europe. In general, cross-country differences in female participation in labour market activities are easily noted. Whether these differences are due to structural differences remains to be analysed.

development via increased population density will have two main effects on the economy: (i) an effect on the demand for agricultural work as we previously explored in section 2, and (ii) an effect on the institutions regarding ownership and the distribution of land, which in turn, will allow households to accumulate and transmit wealth across generations.

When wealth inequality remains low within an economy, polygynous unions may arise if a woman rather prefers to enter an established household than to form a new one. As we discussed above, polygyny may occur if an established household with a married couple and their respective children offer a higher level of consumption than a newly formed household. When, on the other hand, inequality increases, the *African* polygyny equilibrium described in section 2 could break down. This, in fact, is a relevant feature for the understanding of marriage patterns over time. Once wealth can be accumulated and transmitted across generations, wealth inequality grows within a community or society. The distribution of wealth will depend upon class rather than age, and those men and women belonging to wealthy households will be regarded and targeted as marriage prospects. Under these circumstances *Harem* polygyny could arise[31].

Harem polygyny involves few men marrying or mating with many women. When wealth inequality is high, some women would have incentives to become the wife, concubine or mistress of a wealthy man. This may increase the pressure on poorer men to provide their wives with enough wealth to reduce those incentives. To do so, some men would delay or postpone marriage to accumulate the optimal level of desired wealth. Then, would a woman wait or marry early thus creating a large spousal age gap? As Hajnal (1965; pp. 134) pointed out, *"The uniqueness of the European pattern lies primarily in the high age at marriage of women (often with a relatively small difference between the age of husband and wife), rather than in a high age at marriage for men".* Ultimately, women would also have a say, but waiting is costly, and for some households it will not be sustainable. In this regard, the number of households capable of *waiting* will be partly determined by the distribution of income within a society.

In this line of thinking, we suppose that *Harem* polygyny could have occurred at the early stages of economic development, once wealth inequality grew. As the standards of living

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[31] Previously, we discuss two possible equilibriums, *African* polygyny and monogamy. In this section we introduce a third equilibrium *Harem* polygyny that involves few wealthy men mating or marrying with many women.

increased the incentives any woman have to become the second wife or mistress within a household are reduced. Then, *Harem* polygyny may only be sustained when wealth inequality within a community or society grows vastly[32]. Along the *Kuznets* curve, *Harem* polygyny would progressively turn into monogamy with occasional polygyny, and then monogamy will prevail within modern societies. Nevertheless, there is a research question still unanswered, why women waited in Northwest Europe? In extremely unequal economies where few wealthy households enjoy most of the wealth, poorer households may find difficulties in *waiting*. When resources can be accumulated and transmitted across generations family work may be determined by the amount of resources within your own household. Those households endowed with resources will be able to bear the costs associated with *waiting*. Consequently, the distribution of resources within a society could determine marital decisions. Moreover they will be able to implicitly buy women's work by employing them[33].

In this regard, Milanovic et al. (2007) provides sound evidence of the unequal but richer England (1688; 1801) and Holland (1571; 1732) as opposed to the unequal but poorer Old Castile (1752), Kingdom of Naples (1811), India (1750; 1947), China (1880), Byzantine and Roman empires[34]. These findings also illustrate that the distance to the subsistence frontier is a crucial element for the understanding of the relationship between inequality and economic development. In this regard, *waiting* seems less likely in unequal societies in which household are close to the subsistence frontier. The Northwest European countries also exhibit an even distribution of land. In the last World Agricultural Census, the last Gini's index of land concentration in Denmark, Belgium and France were 0.44, 0.56 and 0.53. In contrast, the Gini´s index of land concentration in Portugal, Spain and Italy were 0.78, 0.86

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[32] Wealthy men -who might also be powerful political figures- would have incentives to compromise to monogamous marriage in order to avoid social conflict.

[33] Our views attempt to supplement Galor and Weil (1996, 2000) who argued that the Gender Gap or relative wages have an effect on fertility decisions, population growth, capital intensity and economic growth. Nevertheless, there is little evidence to support the hypothesis that high age at marriage implied lower fertility rates in the eighteenth and nineteenth centuries.

[34] Milanovic et al. (2007) introduce the concept of the Inequality Possibility Frontier (IPF) in which the maximum attainable inequality is an increasing function of mean income. Bearing this in mind, Milanovic et al. (2007) observe that while Gini coefficients are large for such stratified societies as England and Holland, both countries remained far away from the IPF than others.

and 0.78[35]. Figure 3 illustrates the *Kuznets* curve in 1980[36]. Overall, we find that polygynous countries exhibit low levels of income inequality. It is also likely that natural resources have pushed the levels of income inequality up for some less developed economies. This can be partly mitigated with data on the distribution of land, which presents a more conclusive scenario. While polygynous countries in sub-Saharan Africa provide an average Gini's index of land concentration of 0.461 in 1990, in monogamous Europe and America the values are 0.578 and 0.776 respectively. Among developed economies twenty years earlier in 1970, the Gini's index of land concentration was 0.615[37].

Figure 3. Gini index and Economic development, 1980
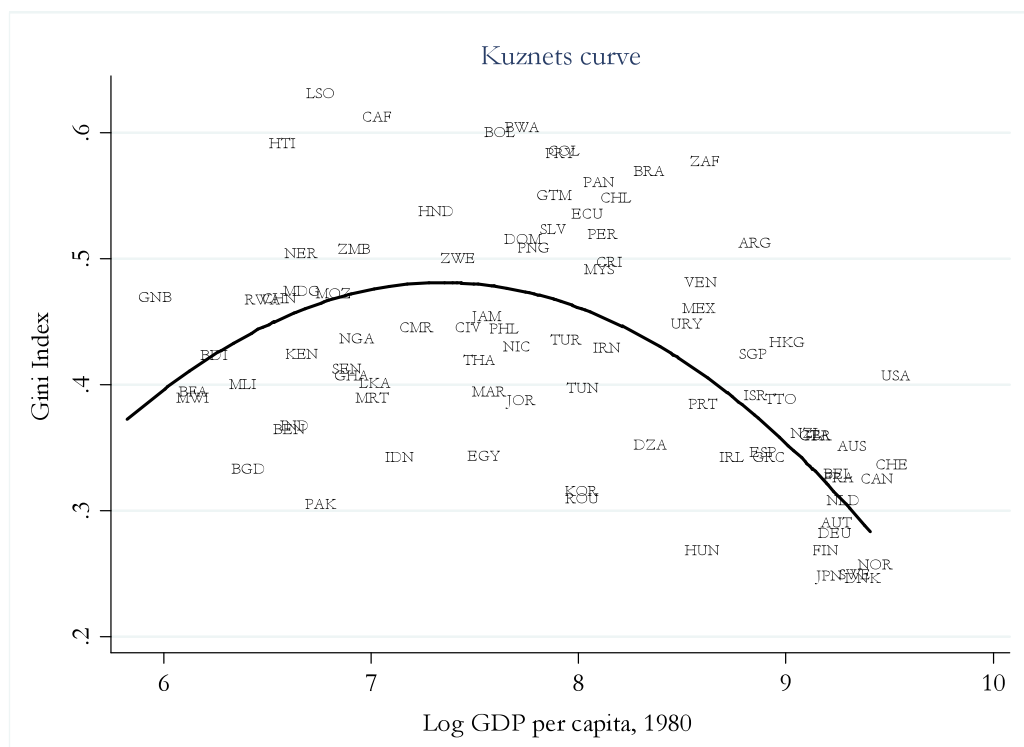
Source: PRED Bank, Version 3.0; Heston et al. (2002); Deininger and Squire (1996)
Notes: GDP per capita stands for real gross domestic product ($ current prices). Gini index: a value of 0 represents absolute equality, and a value of 100 absolute income inequality; Countries are balanced for both figures. Figure 3: Gini Index= -2.04520 + 0.6874*Log(GDP per capita) − 0.0467*Log (GDP per capita)^2, N=88, R^2 = 0.3508.

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[35] FAO (1995) Programme for the World Census of Agriculture 2000
[36] We estimate the *Goldin* and *Kuznets* curves for the same sample of countries. Our objective will be to compare both results.

[37] FAO (1995) Programme for the World Census of Agriculture 2000

Figure 4. WEA and Economic development, 1980

Figure 4 illustrates the *Goldin* curve in 1980. We use gender differences in labour participation, as opposed to labour force participation rates for women 45-59 years old[38]. Gender differences in labour participation have been captured with the ratio of women economically active for every 100 men (*WEA*). From figure 3.b we observe that polygynous countries occupy the left upper tail of the U-shaped relationship. The most notable exceptions are Haiti, Madagascar and China, which are not conventionally regarded as polygynous. In the case of China, as most centrally planned economies, the rates of female participation were well above the average.

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[38] Goldin (1994) used the labour force participation rates for women 45 to 59 years old and the log of GDP/capita, both for 1985. Moreover, the centrally planned economies and countries of the Middle East (except Israel) were excluded. Also, Goldin (1994) omitted twenty countries for which the labour force data differed widely from those given for employment status. The regression line is a quadratic in the log of GDP per capita.

The *Kuznets* and the *Goldin* curves illustrate that increasing wealth inequality has been accompanied by decreasing gender equality in labour participation. Gender equality in labour participation has been recently associated with a declining trend in the spousal age gap (Diez, 2010b). Nowadays, this is partly explained by raising living standards, education or contraceptive methods. In the eighteenth and nineteenth centuries, the economic role of women within a society and the distribution of wealth could have shaped marriage patterns.

4 Concluding remarks

In this paper we have introduced and discussed two important relationships. First the *Goldin* curve relating female labour participation and economic development. Then, we briefly explored the relationship between income inequality and economic development, or *Kuznets* curve. Figure 5 illustrates both relationships.

Figure 5 The 'augmented' Goldin curve and the Kuznets curve
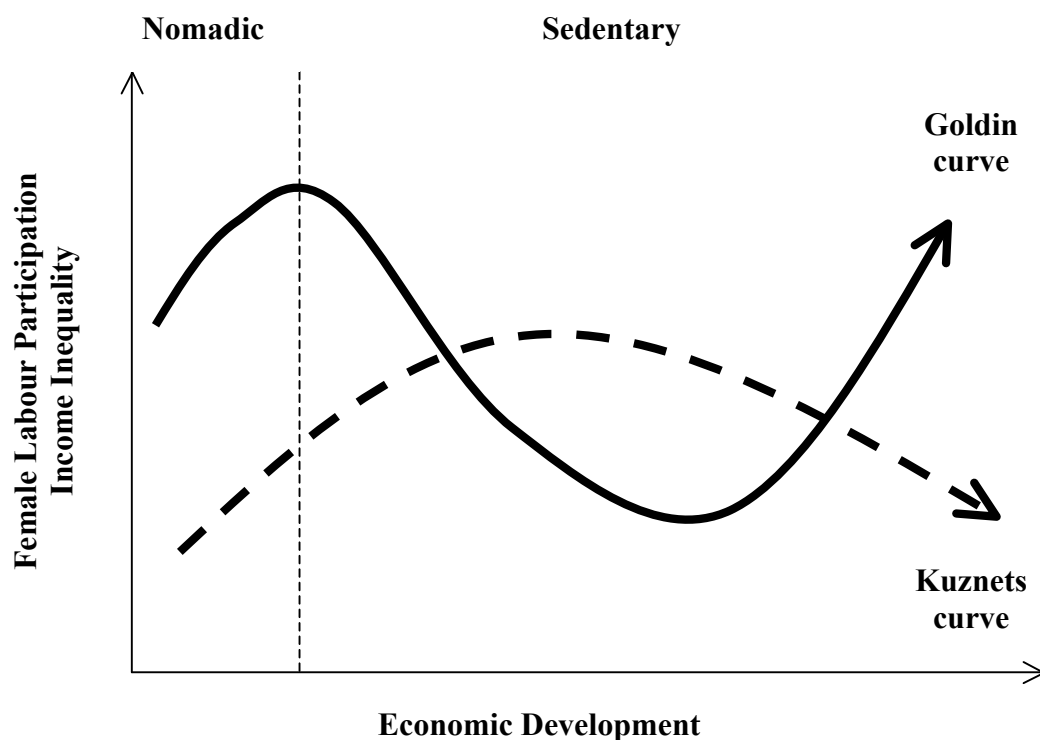
It seems that both, gender equality in female labour participation and income inequality, have followed opposite paths. When gender equality in labour participation was high, income equality was low. These changing economic conditions may reflect on marriage patterns, and hence the household. The transition from the nomadic settlement pattern to a sedentary one brought changes in the formation and organisation of the household. As income rose, gender equality in labour participation decreased, which would have been accompanied by an increase in income inequality. Under these circumstances, *African* polygyny would have vanished giving way to *Harem* polygyny and ultimately monogamy. Figure 6 presents the hypothetical dynamics of marital systems.

Figure 6. Marital Systems and Economic Development
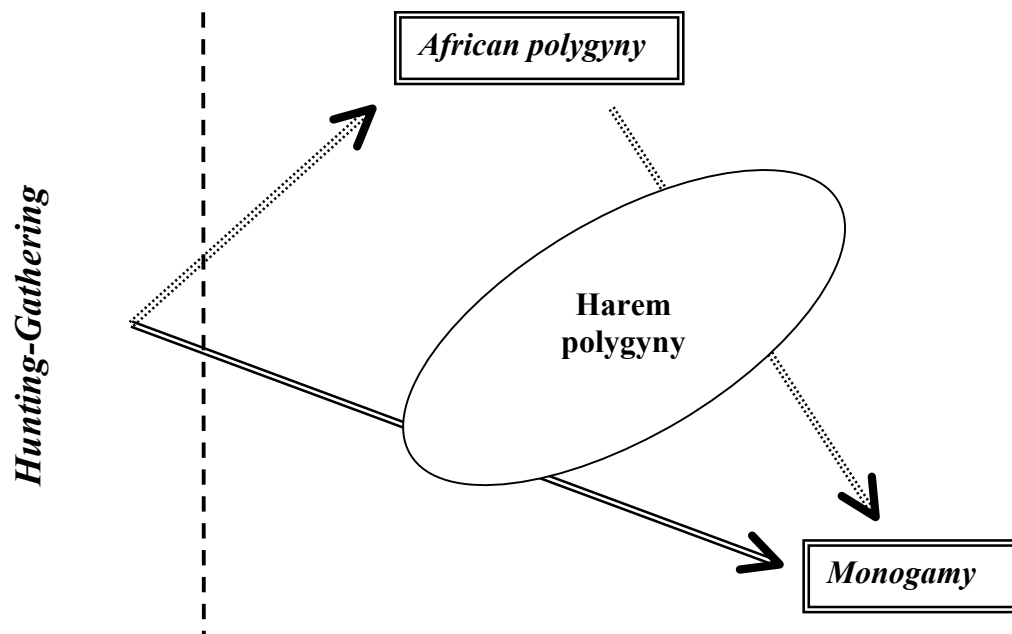
The second major change regarding household formation is the 'European' pattern. The high age at marriage, especially for women, was unknown. Moreover, it is not clear-cut whether the Northwest European women high age at marriage led to lower fertility rates in the eighteenth or nineteenth centuries. In this regard, the changing economic structure and the degree of wealth inequality could have influenced marital decisions. Conventionally, women were expected to marry young while men marry early or late depending upon economic conditions. A high age at marriage for women implies households bearing the cost associated to *waiting*. The distance between household income and subsistence income

within an economy may determine the extent to which women *wait*. Further increases in the standard of living would be accompanied by falling income inequality and more gender equality in labour participation, which in turn would increase the age at marriage of men and women while reducing the spousal age gap.

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Table A.1 Intensity of Agriculture

| Code	Description
0	Missing data
1	No agriculture
2	Casual agriculture, incidental to other subsistence modes
3	Extensive or shifting agriculture, long fallow, and new fields cleared annually
4	Horticulture, vegetal gardens or groves of fruit trees
5	Intensive agriculture, using fertilization, crop rotation, or other techniques to shorten or eliminate fallow period
6	Intensive irrigated agriculture

Source: Ethnographic Atlas

Figure A.1 WEA and Economic Development, 1950 and 2000
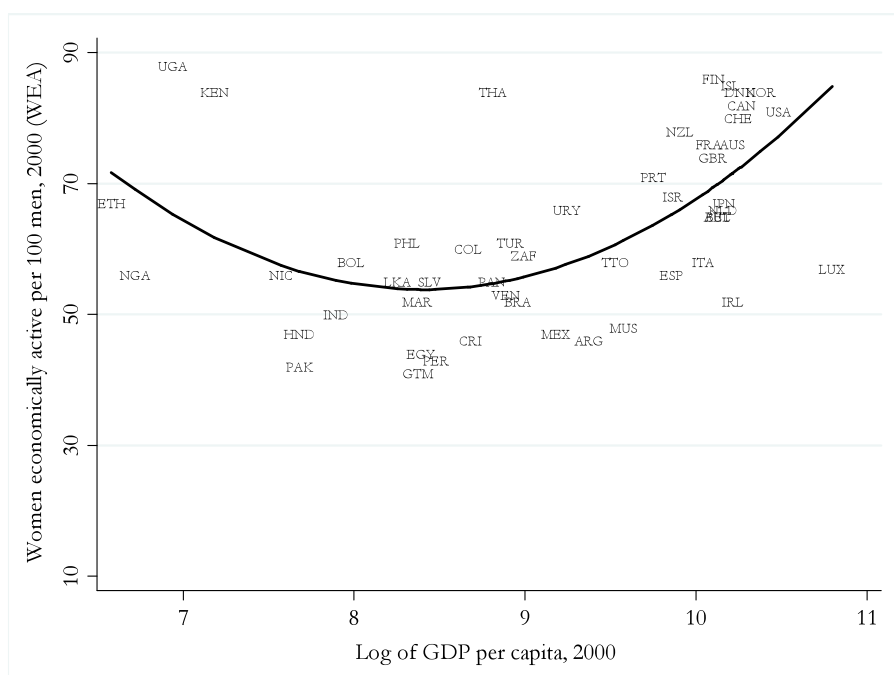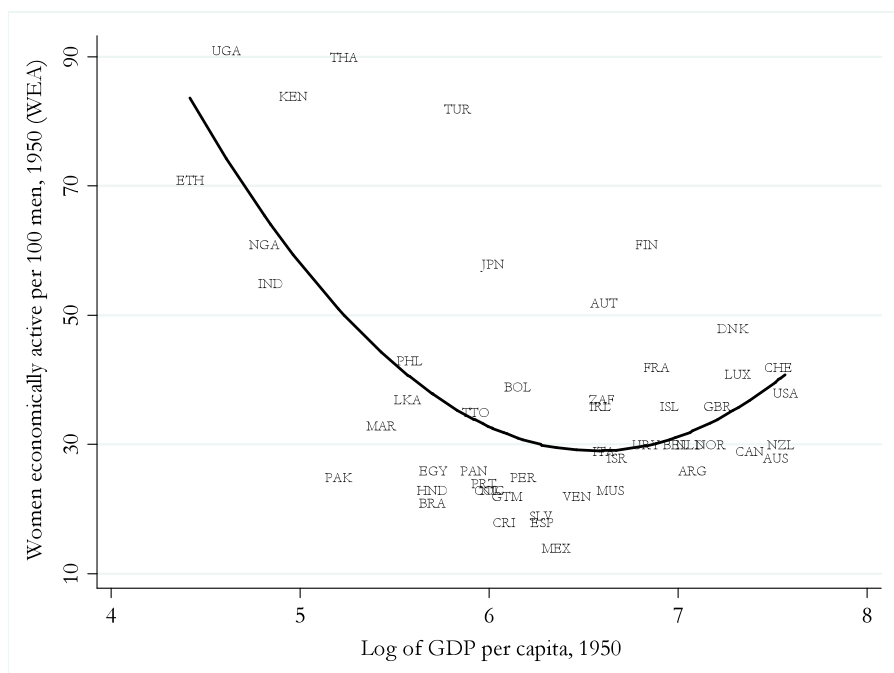
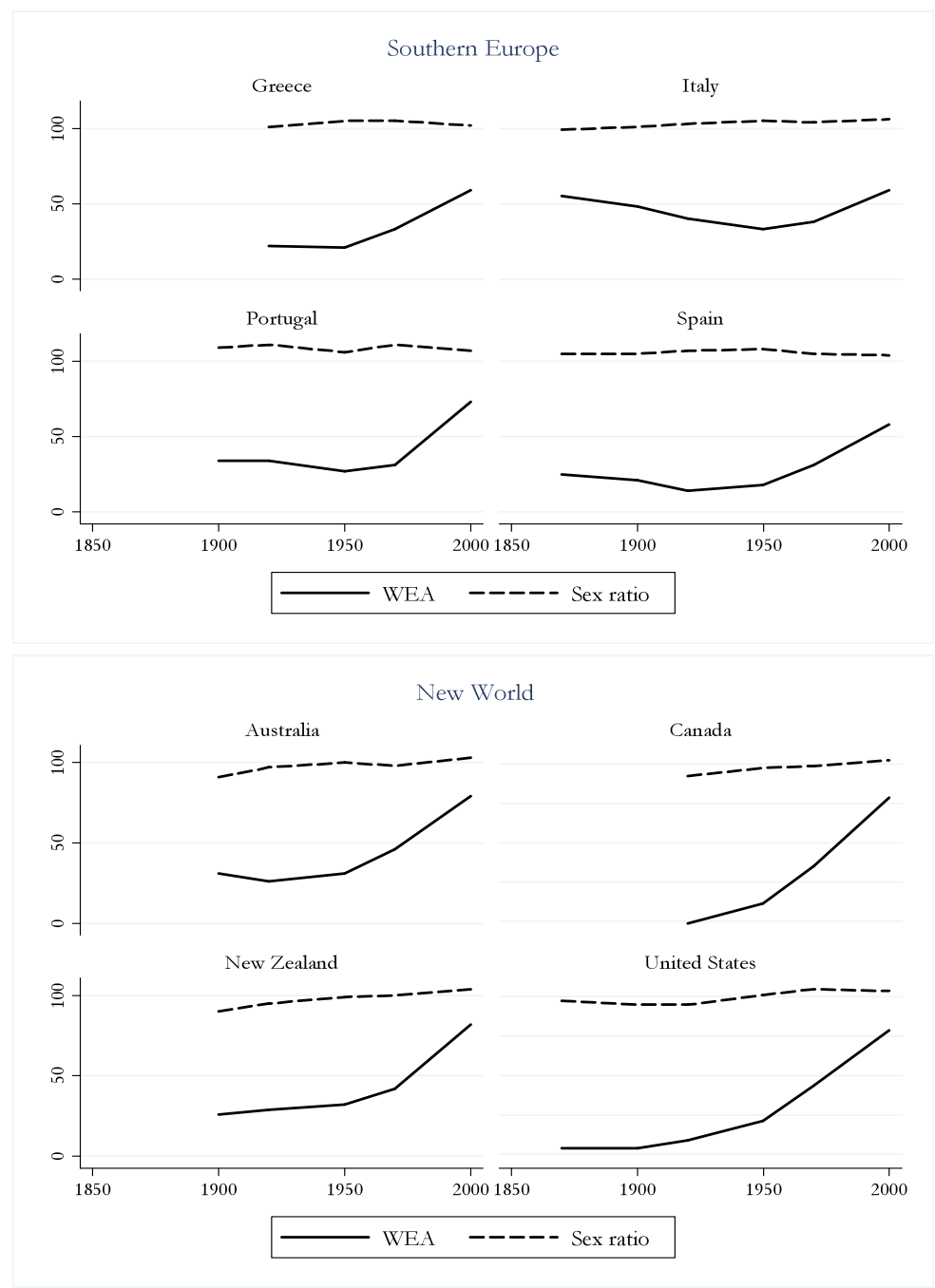**Sources:** PRED Bank, Version 3.0. and Penn World Tables 6.1

Notes: WEA stands for the ratio of women economically active for every 100 men. GDP per capita stands for real gross domestic product ($ current prices) Figure A.1 illustrates a balanced selection of countries. Year, 1950: $WEA = 539.31 - 155.46*Log(GDP per capita) + 11.84*Log (GDP per capita)^2$, N=50, $R^2 = 0.4018$. Year, 2000: $WEA = 434.70 - 90.69*Log(GDP per capita) + 5.39*Log (GDP per capita)^2$, N=50, $R^2 = 0.3469$.

Figure A.2 WEA and Sex ratios, 1850-2000
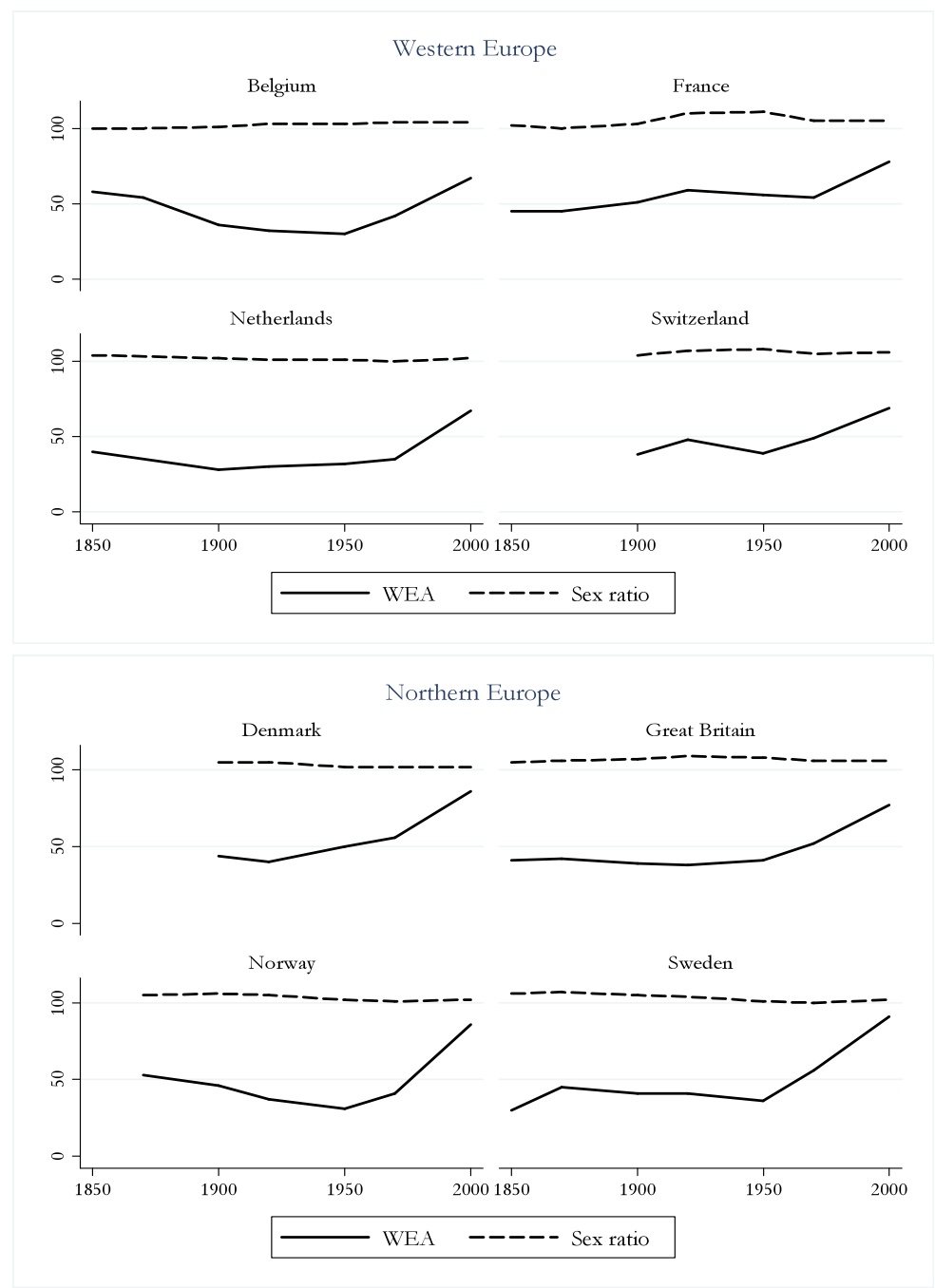
Sources: Bairoch et al. (1968), PRED Bank, Version 3.0

Figure A.2 WEA and Sex ratios, 1850-2000 (continued)

Southern Europe

Greece · Italy · Portugal · Spain

WEA ——— Sex ratio - - - - -

New World

Australia · Canada · New Zealand · United States

WEA ——— Sex ratio - - - - -

Sources: Bairoch et al. (1968), PRED Bank, Version 3.0