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ESSAYS ON MARRIAGE AND FEMALE LABOUR

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A thesis submitted in fulfilment of the requirements for the degree of Doctor in Philosophy

University of Warwick
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March 2010

To my parents, Alfonso and Laura

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ACKNOWLEDGEMENTS

First and foremost I would like to thank my supervisor, Ian Walker, for his support and guidance. Without his comments and patience this thesis would not have been possible. I also wish to thank Myrna Wooders for her support and fruitful collaboration in the early years of this research. Furthermore, I appreciate the constructive and motivating environment which I have the pleasure to enjoy at the University of Warwick. In this regard, I would also like to express my deepest gratitude to Norman Ireland, for his encouragement and support over the years.

I would also like to thank María Dolores Añón Higón for her support and endless patience. She also provided much appreciated help without which I could not have finished the typesetting of this thesis. Finally, I wish to thank Erlinda Go and the Department of Economics and Social Affairs, Statistics Division at the United Nations for the time I shared with them.

I want to express my deepest and most sincere gratefulness to my family and friends for their patience, understanding and moral support over the years this research has taken. In particular, my aunt Marilena whose moral support is invaluable and my uncle Alfonso for all I have learnt with him. A special word of thanks is reserved for my parents Alfonso and Laura for always having faith in whatever I do. This thesis is dedicated to them.

Declaration

This thesis is submitted to the University of Warwick in accordance with the requirements of the degree of Doctor of Philosophy. I hereby declare that this thesis contains no material which has been submitted for the award of any other degree at any other university or equivalent institution. I also certify that the work described here is entirely my own, except where due acknowledgment has been made in the text.

THESIS SUMMARY

Along the process of economic development, marriage patterns have gradually changed. Nonetheless, we still observe contrasting differences across regions. This thesis first examines those differences, and questions what determines those marriage patterns. The answer to this will be the economic role played by women within a society. In this regard, we explore the relationship between gender differences in labour participation and marital outcomes across regions and over time. To do so, we use ethnographic evidence and country-decade data. Moreover, we reconcile distinctive literatures in an attempt to answer our main research question.

The focus of the thesis lies within two specific issues regarding marriage patterns: (i) marital systems, namely polygyny and monogamy, and (ii) the spousal age gap. First, we examine the relationship between female labour participation and polygynous unions. Then, we concentrate on monogamy to explore the spousal age gap. In addition, we discuss our main findings and its implications for the long run. Whether societies have followed a similar path but at different speeds throughout history is our last topic of discussion.

1. Introduction

Goode (1963) argued that family and household systems across societies were moving towards similar patterns, though their origins differed. The main objective of this thesis lies with providing further economic analysis and discussion to better understand some of these contrasting patterns. For this purpose, we concentrate on the formation of households. A household can be defined as *"a cooperative economic unit aimed at the fulfilment of the physical and emotional needs of its members, and characterised by certain inequalities between generations and sexes. It is based on implicit and explicit contracts between household members, such as the marriage contract and the implicit contracts that exist between different generations"* [1]. The formation of a household implies a commitment for the purpose of production and/or reproduction between its members which traditionally has been achieved through marriage.

Theoretically, marriage takes place if, and only if, the gains from marriage outbalance the costs (Becker, 1973; 1974). The benefits from marriage will be greater when differences between men and women are more severe. For example, the optimal age at marriage for men and women may vary depending upon the desired number of children, or the economic ability of men and women to set up an independent household. Fertility decisions (reproduction) and the gender division of labour within a household (production) become crucial elements for understanding marital choices and marital outcomes.

This thesis looks at the gender division of labour within the household. Notwithstanding the enormous relevance of family planning and fertility decisions, we concentrate on the relationship between female labour and marriage. The way men and women may contribute

[1] De Moor and Van Zanden (2010; pp. 3)

to the wealth of the household will be reflected in the process leading to the formation of a household[2]. For example, women who supply market work and earn an income would also be able to spend resources to search for a suitable spouse and perhaps postpone marriage. Then, a major contribution of the thesis is the economic analysis and empirical evaluation of the impact that the economic role played by women have had on marriage patterns throughout history. Boserup (1970) observed how the economic role of women may be closely associated with marital systems. If women's economic role has also changed along the process of economic development, we would expect marital outcomes to adjust to the distinct economic environments.

Explaining marriage patterns has been at the core of the literature for an extended period of time. Goode (1963), Goody (1983, 1990) and Hajnal (1982) among several others have described and examined marriage patterns. Nonetheless, these studies are mostly descriptive. This thesis sheds new light by using economic rationale to explore the relationship between female labour and two specific marriage patterns: marital systems and the spousal age gap. Furthermore, we use sources from several disciplines in an attempt to reconcile ideas, while also contribute to extend the existing research agenda.

The thesis is structured as follows. In chapter 2 we define marital systems following ethnographic evidence, among other sources[3]. Polyandry and polygynandry will be excluded from our analysis because both have been rarely observed among humans. Then, we concentrate on monogamy and polygyny and explore the prevalence of both marital

[2] Household members can contribute to augment the household wealth through 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.

[3] The marital systems observed among human beings can be classified into five main types: (i) monogamy, (ii) polygyny where co-wives share habitation, (iii) polygyny where co-wives live in separate dwellings or *African* polygyny, (iv) polyandry and (v) polygynandry or 'group' marriage.

systems by geographical region and country. Unfortunately, ethnographic evidence may not fully capture past and current trends. Thus, chapter 2 introduces a new methodology to classify countries by the incidence of polygyny. For that purpose, we use marital status data for three census rounds, 1970, 1980 and 1990, and direct measures of polygyny from national surveys. Overall, we classify 184 countries and territories. From these, there are 167 United Nations member states, which represent 87 percent of the total[4]. To our knowledge, this is the first study that classifies countries and regions according to the incidence of polygyny. Additionally, we compare and test the robustness of our results with historical records and the available ethnographic evidence. In doing so, we expect to obtain a better understanding of the distribution and prevalence of marital systems across regions and over time.

After exploring marital systems we continue in chapter 3 by focusing on *African* polygyny as opposed to monogamy. First, we develop a simple theoretical model that explores the incentives' structure of men and women to form or join a polygynous household. We assume that marital outcomes cannot be considered exogenous with respect to the labour participation decision (Van der Klaauwe, 1996). In this way, we will argue that *African* polygyny may be sustained at low levels of economic development when income inequality remains low, if and only if, wives contribute largely to augment the wealth of the household. Secondly, we test our main predictions using a cross-section of societies and countries. For that, we collect qualitative data for 379 societies from the Ethnographic Atlas, and quantitative data for 112 polygynous and non polygynous countries following chapter 2 classification. Our findings support the view that female contribution to subsistence, and thereby gender equality in labour participation, is a strong predictor of

[4] Only 25 United Nations member states were not classified. Moreover, 17 dependent territories were included in our sample.

African polygyny. In line with the model, these results are stable and sizeable once controlling for the level of economic development. On the whole, our findings and discussion may raise further questions regarding the evolution of marital systems across regions in the long run.

The next chapter turns our attention to the spousal age gap. We leave aside polygyny and focus on the spousal age gap within monogamous unions in chapter 4. To do so, we collect data for monogamous countries following chapter 2 classification, and construct a novel cross-country panel for the period 1950-2000. Then, we explore the correlation or potential causality between gender differences in labour participation and the spousal age gap. In general, we find that the spousal age gap decreases with gender equality in labour participation. Like some other studies, we observe that gender equality in the labour market translates into marital outcomes. In contrast to previous studies, we find this relationship at a macro level and over a long period of time, which for some countries imply two or three generations. The empirical results are tested to the inclusion of some control variables such as the sex ratio and the rate of urbanisation, and to different estimation methods and sample sets.

Chapter 5 bonds the previous results with economic development. This chapter introduces the *Goldin* and the *Kuznets* curves which relate female labour and income inequality with economic development respectively. We also discuss the implications of our results in the long run. Moreover, the *Goldin* curve is augmented with the inclusion of hunting-gathering societies. To some extent, the *Goldin* and the *Kuznets* curves have followed opposite paths, which in turn may explain how female labour and income inequality have had an impact on marriage patterns throughout history. In this line of thinking, *African* polygyny would have prevailed at early stages of economic development where income inequality is low and

gender equality in labour participation prevails. Nonetheless, we claim that *African* polygyny would not have been sustainable among hunter-gatherers and pastoralists, who would have opted for other marital systems. As income rose, income inequality increased and gender inequality in labour participation grew. Under these circumstances, monogamy would have become the preferred marital system. Additionally, we expect a considerable spousal age gap within monogamous unions. This situation would be partly reversed when traditional societies turn into modern ones. As a result, falling income inequality and increasing gender equality in labour participation would drive the spousal age gap down[5].

The final chapter of this work briefly summarizes our findings.

[5] In our study, we do not reflect on 'sequential' polygyny which is a marriage pattern associated with modern societies where men and women mate or marry with several partners at different points in time.

2. Marital Systems

"Marriage is a legally and socially sanctioned union that is regulated by laws, rules, customs or beliefs"

Encyclopaedia Britannica (2008)

2.1 Introduction

Thomas Robert Malthus argued that monogamous unions were the dictate of nature and virtue[6]. As if we were journalists in search of an answer, we question Malthus and ask, why monogamy? People marry for a variety of reasons, mainly love and the desire to form a household and have children. There is a vast literature related to marriage choices or whether assortive mating is positive or negative regarding height, race, intelligence or wealth. However, marital systems have received less attention. By assuming that monogamous unions are the *"dictate of nature and virtue"* we omit a relevant episode in the history of marriage and the family. For that reason, we evaluate in this chapter the incidence of polygyny, as opposed to monogamy, across countries, territories and geographical regions.

For the purpose of this study, we first and foremost define marriage as a union between two or more spouses involving common residence and being regulated by laws, rules, customs, or religious and non-religious beliefs[7]. In this way, marital systems can be broadly organised into four different types: (i) Monogamy, which can be defined as the marital system that allows a person to be married to only one spouse; (ii) Polygyny, which is a

[6] "Whether the law of marriage be instituted or not, the dictate of nature and virtue seems to be an early attachment to one woman" Malthus (1798: 15)

[7] Sexual partnerships will be excluded. Concubinage, unregistered marriage, consensual, visiting or *de facto* unions in general will also be analysed in this study as long as data are available.

union between one man and two or more women[8]; (iii) Polyandry involves one woman and two or more men; and (iv) Polygynandry or 'group' marriage. From these marital systems only the first two are of concern in this study as they are the most frequently observed, with polyandrous and polygynandrous unions being rare among humans throughout history[9].

Therefore, our research objectives are threefold. First, we define marital systems using qualitative data from the Ethnographic Atlas. Furthermore, we discuss basic ethnographic concepts. Secondly, we develop a novel methodology to measure the incidence of polygynous unions across countries. Thirdly, we classify countries according to our new measure of polygyny for the period 1950-2000. Finally, we test our country estimates with available ethnographic evidence and historical records. This chapter contributes to the literature in a relevant way. This is the first study, to our knowledge, that compiles data drawn from the Ethnographic Atlas and classifies societies by modern countries and geographical regions. This is the first study, to our knowledge, that classifies countries according to the incidence of polygyny observed for the period 1950-2000.

The remainder of the chapter is structured as follows. In section 2.2 we present the main data sources. Section 2.3 defines and discusses some basic concepts, and introduces an ethnographic classification of countries by marital system. This is followed by section 2.4 where we present a new methodology to measure the incidence of polygyny across

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[8] We will be referring to simultaneous polygyny, not sequential polygyny or second, third, fourth marriages.

[9] The Ethnographic Atlas illustrates just four polyandrous societies out of total of 1,231 with available data: (i) Tibetans who inhabit the Tibetan central plateau in China; Toda people which are a pastoral tribe of southern India; Sherpa (*also called Sharwa)*, mountain-dwelling people of Nepal, Sikkim state in India, and Tibet in China; and finally Marquesan people who inhabit the Marquesas Islands, French Polynesia, (World Cultures, 1999). Polygynandry has not been recorded in the Ethnographic Atlas, but is also associated with polyandrous unions.

countries. A review of the geographical distribution of polygyny and monogamy is introduced in section 2.5. Section 2.6 offers a discussion and some concluding remarks.

2.2 Data Sources

This chapter makes use of qualitative and quantitative data. The qualitative data are ethnographic evidence collected mainly from the Ethnographic Atlas, whereas the quantitative data are collected from censuses and national surveys.

2.2.1 Ethnographic Atlas

Data on marital systems are for the most part taken from the Ethnographic Atlas. The complete 1,267 society Ethnographic Atlas was published by Ethnology in twenty one instalments between 1962 and 1971. In 1967 Ethnology published codes for 862 societies, Murdock (1967a; 1967b). Murdock continued to add more societies to the Ethnographic Atlas after 1967. Furthermore, various corrections were made to the previously published codes. The Ethnographic Atlas presents 115 variables for each society. The data presented in this chapter corresponds to an updated and corrected revision of the original Ethnographic Atlas (World Cultures, 1999). Coded data are derived mostly from ethnographic publications.

Societies are understood as ethnically homogeneous populations. Each society is identified with a particular period of time and geographic coordinates. The period of time is often the earliest reliable ethnographic description found in the literature. There were ten societies in the Ethnographic Atlas where the time period was not specified, and hence they were removed from the sample. Thus, we classified societies according to three different periods

of time: pre-1500, 1500-1800 and 1800-1965. We denote societies described before 1500 as *Ancient Civilisations*, among them Babylonian, Ancient Egyptian, Hebrew, Aryan, Roman, Icelander and Khmer people. The second group corresponds to 29 native-American societies i.e. Aztec, Inca, Cherokee, Taino, Chibcha or Tupinamba; and the Kerala and Guanche people located in present India and Spain. Finally, we have those societies first found and described in the period 1800-1965[10].

Geographic coordinates (latitude; longitude) are also offered in the Ethnographic Atlas. We use them to organize societies by geographical region and country[11]. We do not necessarily entail that sorting data in this way will culturally describe present regions and countries truthfully. Today, many countries are far from being ethnically homogenous (Alesina et al., 2003). Culture may have evolved since ethnographic evidence was first reported. Nonetheless, the Ethnographic Atlas is sufficiently rich and descriptive to be ignored. For that reason, we will use ethnographic evidence to classify geographical regions and countries by the prevalence of marital systems, and also to test the robustness of existing data on the incidence of polygynous and monogamous unions.

Furthermore, there were also nine societies in the Ethnographic Atlas described as speaking a language non-indigenous to the continent where they were located. These were Boer, French Canadian, New England, Haitians, Djuka, Saramacca, Brazilian, Camba and

[10] Figure A.2.1 in appendix 2 illustrates a timeline with the earliest reliable ethnographic evidence recorded in the Ethnographic Atlas by continental areas. For that, we assume four main continental areas: (i) Eurasia: Northern Africa, Europe and Asia; (ii) America; (iii) Sub-Saharan Africa and (iv) Oceania. All *Ancient Civilisations* were found in Eurasia. In figure A.2.1 we observe that ethnographic evidence for sub-Saharan Africa and Oceania just comprises societies in the nineteenth and twentieth centuries.

[11] The term "country" refers to territories or areas, irrespective of their legal status or delimitation of their frontiers or boundaries. There are 192 independent countries recognised by the United Nations and 48 dependent territories. Throughout the study, we follow the geographical classification of the United Nations. Table A.2.1 in appendix 2 presents the number of countries or territories by geographical region.

Groote Eylandt people. To preserve cultural continuity, we removed these societies from our sample. Additionally, seven societies were dropped from the sample either because they were repeated or unclassified by geographical region. Finally, the Seminole people were also taken away since it was the only group where data on economic activity were not available.

As a result, out of 1,267 societies in the Ethnographic Atlas, we have removed twenty-seven for the aforementioned reasons[12]. Table 2.1 distributes societies by geographical region for the whole period, and for the period 1800-1965. From the table, we observe that fewer societies have been described for the Caribbean and Europe than for Northern America, South America and Africa. It is important to understand the cultural nature and purpose of the Ethnographic Atlas. Some of the societies may already be extinct, while many others may currently represent small minorities within countries and geographical regions. Thus, we have created a dummy variable called *Old World* (as opposed to *New World*), which takes the value of 1 for those countries or geographical regions where more than fifty percent of the population have an indigenous language as mother tongue, and 0 otherwise[13].

Data in Table 2.1 corroborate Northern America, South America, Central America, Australia, New Zealand and the Caribbean as the *New World* geographical regions. We understand that in the *New World*, the relevance of indigenous societies described in the Ethnographic Atlas play nowadays a lesser cultural role than in the *Old World*. This is particularly acute after the European colonisation of America and the Pacific that gave way

[12] Table A.2.2 in appendix 2 shows the societies that were removed from the sample.

[13] To construct the dummy variable *Old World*, we used data from Alesina et al. (2003) and Lewis (2009). First, we classified languages by family. Then, we verified which languages and families were indigenous. We define a language as indigenous if it was widely spoken in the continent where the country belongs before 1500. Finally, the percentage of the population speaking an indigenous or non-indigenous language was computed.

to ensuing cultural changes. In subsequent chapters we will refer to this variable to control for cultural continuity.

Table 2.1 The Ethnographic Atlas: Societies by geographical region

Geographical region	**Sample**	
Old World	**Total**	**1800-1965**
Western Africa	170	170
Eastern Africa	147	147
Middle Africa	125	125
Northern Africa	70	69
Melanesia	69	69
South-Eastern Asia	68	67
Southern Asia	58	56
Eastern Asia	27	27
Eastern Europe	25	25
Micronesia	18	18
Polynesia	18	18
Southern Africa	15	15
Western Asia	16	14
Southern Europe	9	7
Northern Europe	4	3
Central Asia	2	2
Western Europe	2	2
New World	**Total**	**1800-1965**
Northern America	262	243
South America	86	82
Central America	34	30
Australia and New Zealand	13	13
Caribbean	2	0
Total	**1240**	**1202**

Source: Ethnographic Atlas; Alesina et al. (2003); Lewis (2009); Encyclopaedia Britannica (2008)

2.2.2 Censuses and National Surveys

We also use quantitative data to measure the incidence of polygyny, and henceforth monogamy. For that purpose, data have been collected from three main sources: (i) United Nations (1990): Patterns of First Marriage[14], (ii) the Demographic and Health Surveys (1985-2005)[15], and (iii) marital status data collected from national censuses, survey reports, and national statistical yearbooks and presented in United Nations (2000a) Women's Indicators and Statistics Database Version 4, Wistat 4, for the decades 1970, 1980 and 1990[16].

United Nations (1990) present data and evidence on the incidence of polygyny from different sources, essentially national surveys and other published work[17]. These data sources offer values of the percentage of married men in polygynous unions, and the percentage of married women in polygynous unions. Furthermore, information on the number of wives per polygynist is also given for some countries. Data range from 1946 for Tunisia to 1986 for Liberia. Percentages are computed for married women aged 15 years old or over, although this is sometimes restricted to 15-49 years old.

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[14] Patterns of First Marriage: Timing and Prevalence was prepared by the Population Division, Department of Economic and Social Affairs (United Nations, 1990). Main data are presented in table 8: Levels of polygamy, selected countries of Africa, various years 1947-1982. Additionally, tables 13 and 14 compiled data on polygynous behaviour.

[15] Data collected from the Demographic and Health Surveys were extracted from the STATcompiler (http://www.statcompiler.com/). For those countries where there was more than one survey, we computed the average. Therefore, data collected from the Demographic and Health Surveys illustrate averages for the period 1985-2005.

[16] United Nations (2000a) extracted data mainly from the United Nations, Demographic Yearbook, 1978 Historical Supplement, 1982, 1987 and 1990; Union of Soviet Socialist Republics, Demographic Yearbook 1990.

[17] Many studies on the incidence of polygyny are based on Dorjahn (1959) and Chamie (1986). Dorjahn (1959) surveys polygyny in Africa while Chamie (1986) provides a good review of polygyny in Arab countries Clignet (1970) and Lesthaeghe et al. (1989) also provide a good review of polygyny in Africa.

Second, the Demographic and Health Surveys -which are a collection of national surveys-, also present data on the percent distribution of currently married men by number of wives and the percent distribution of currently married women by number of co-wives. These surveys covered mostly African, and some Asian and South American countries between 1985 and 2005. Percentages are computed for married women aged 15-49 years old; and married men aged 15 years old and over.

Finally, country data on marital status have also been collected. These data will be used to derive the ratio of the number of currently married women (CMF) to the number of currently married men (CMM) aged 15-64 years old. This, in fact, could be a good proxy or indirect measure of the incidence of polygyny for countries where direct measures on the incidence of polygyny are not available. Data on marital status were collected from United Nations (2000a), and correspond to the available country data provided by the United Nations for three census rounds, 1970, 1980 and 1990.

These three separate datasets, jointly with the Ethnographic Atlas, will assist us to construct an estimate of the incidence of polygyny, and henceforth monogamy, across countries for the period 1950-2000. In this regard, United Nations (1990) provides data for the period 1948-1986, whereas United Nations (2000a) offers marital status data for three census rounds 1970-1990, while the Demographic and Health Surveys cover the latest period 1985-2005. Additionally, the earliest reliable ethnographic evidence was reported for the Babylonian people, and dates back to BC 2000. Figure A.2.1 in appendix 2 and table 2.1 illustrate the first ethnographic evidence reported by geographical region. In sub-Saharan Africa and Oceania ethnographic evidence dates back to the nineteenth century, whereas *Ancient Civilisations* were only reported in Eurasia.

2.3 Concepts and Definitions

In the Ethnographic Atlas marital systems are described under variable 9: Marital Composition: Monogamy and Polygamy. Table 2.2 presents the codified classification. Based on this codification, we distinguish three different types of marital unions: monogamous (codes 1 and 2), polygynous (codes 3 to 6) and polyandrous (code 7). As stated above, we concentrate on the first two and leave polyandrous unions aside.

Table 2.2 Marital Composition: Monogamy and Polygamy

CODE	DESCRIPTION
0	Missing data
1	Independent nuclear, monogamous
2	Independent nuclear, occasional polygyny
3	Preferentially sororal, co-wives in same dwelling
4	Preferentially sororal, co-wives in separate dwellings
5	Non-sororal, co-wives in separate dwellings
6	Non-sororal, co-wives in same dwelling
7	Independent polyandrous families

Source: Ethnographic Atlas

In table 2.2 residential arrangements and sororate are fully described for polygynous unions[18]. We use this piece of information to distinguish between the scenario where co-wives live under the same dwelling, and the case where co-wives live in separate dwellings. This, in fact, is relevant because co-wives living in separate dwellings potentially imply higher costs, but also lesser strife and strain within the family. Moreover, White (1988) states that there is a strong positive correlation between co-wives sharing habitation and

[18] Sororate is the practice of marrying a sister or sisters of a wife. Sororate comes from the Latin *soror* "sister", (Encyclopaedia Britannica, 2008)

sororal polygyny. We observe in our sample that out of 84 societies described as having sororal-polygyny, in just 16 cases co-wives live in separate-dwellings.

In general, sororal-polygyny does seem to be the exception rather than the rule, out of 578 societies described as polygynous in the Ethnographic Atlas only 84 were described as preferentially-sororal, less than 15 percent. In this line of thinking, White (1988) advocated for two specific types of polygyny. First, wealth-increasing polygyny where co-wives largely contribute to the household; then sororal-polygyny, mainly observed in nomadic societies where sisters assist one another in household activities. In this chapter we will classify polygyny on the grounds of residential arrangement between co-wives, leaving aside sororate. This is largely due to the fact that sororal-polygyny is strongly associated with co-wives sharing habitation as we have previously stated.

Table 2.3 Marital Composition: Monogamy and Polygyny

Marital composition	**Residential arrangement**	**Code**
Monogamy 1 (Perfect monogamy)	Independent nuclear	Mo1
Monogamy 2 (Occasional polygyny)	Independent nuclear	Mo2
Polygyny 1	Co-wives in same dwelling	Po1
Polygyny 2	Co-wives in separate dwelling	Po2

Source: Adapted from the Ethnographic Atlas

Based on the above discussion we introduce a new classification of marital systems in table 2.3. In this case, we distinguish between three different marital systems: Perfect monogamy -*Monogamy 1* (Mo1), henceforth-; Polygyny where co-wives live in the same dwelling -*Polygyny 1* (Po1), henceforth-; and Polygyny where co-wives live in separate dwellings -*Polygyny 2* (Po2), henceforth. Moreover, we also present in table 2.3 Monogamy with

occasional polygyny (Mo2) –*Monogamy 2*, henceforth-. Although it can not be understood as a proper marital system, because it just implies monogamy with a low incidence of polygynous unions, we will show the available ethnographic evidence to enrich the following description and analysis.

One drawback with this classification and with the Ethnographic Atlas in general is the qualitative nature of the data. We are not provided with enough quantitative information to determine the exact incidence of polygynous unions within a society. Societies are just classified as mainly polygynous or monogamous. Statistically, census and national surveys illustrate the incidence of polygyny with the percentage of married men and married women in polygynous unions. In this regard, the Standard Cross-Cultural Sample (SCCS) provides qualitative and quantitative data for a sub-sample of societies recorded in the Ethnographic Atlas[19].

Table 2.4 reports the percentage of married men with more than one wife and the percentage of married women in polygynous unions (share husband with one or more co-wives) by marital system. In table 2.4 we observe that the incidence of polygyny for both types, *Polygyny 1* (Po1) and *Polygyny 2* (Po2) is above 40 percent for women and 25 percent for men. On the other hand, the incidence of polygyny for those societies described as

[19] Ethnographic evidence can also be found in the Standard Cross-Cultural Sample (SCCS), which is currently one of the most valuable tools used in cross-cultural research. The SCCS is a sub-sample of the Ethnographic Atlas, with just 186 societies, though presents a much wider range of variables, 2,000 for each of them. It was first published in 1969 (Murdock and White, 1969). Some data presented in this chapter corresponds to an updated and corrected revision of the original Standard Cross-Cultural Sample (World Cultures, 2004). Although the SCCS provides a richer description of societies, we will concentrate on data from the Ethnographic Atlas for the remainder of the study. The reason being is the widespread coverage of the Ethnographic Atlas.

Monogamy 2 (Mo2), or monogamy with occasional polygyny, is relatively low, 7.7 percent of married men and 15.4 percent of married women respectively.

Table 2.4 The incidence of polygynous unions by marital systems

Statistics	***Monogamy 2*** **(Mo2)**	***Polygyny 1*** **(Po1)**	***Polygyny 2*** **(Po2)**
Percentage of married men with more than one wife			
Mean	7.7	36.7	28.2
St. Dev.	9.4	19.9	19.0
Percentage of married women polygynously			
Mean	15.4	56.8	43.7
St. Dev.	16.4	29.7	25.9
Obs.	**30**	**6**	**13**

Source: Standard Cross Cultural Sample[20]

Notes: *Monogamy 2* stands for those societies where monogamous (independent nuclear) unions are the principal marital norm, but some occasional polygyny is observed. *Monogamy 1* is not included because the incidence of polygynous unions is zero.

As a result, ethnographic evidence may be better understood in terms of the prevalence of polygyny. While monogamy with occasional polygyny (Mo2) involves an incidence, on average, of 15 percent of married women in polygynous unions, *Polygyny 1* and *Polygyny 2* present averages well above 40 percent[21]. Recent estimates on the incidence of polygyny barely reach 40 percent. Using the Demographic and Health Surveys we found only 5 countries where the incidence of married women in polygynous unions aged 15-49 years old was above 40 percent; these were Benin, Guinea, Mali, Senegal and Togo. In this regard, we will use 15 percent of married women in polygynous unions as the threshold to

[20] The Standard Cross Cultural Sample (SCCS) provides ethnographic data for 186 societies. Only two societies were removed from the sample, Haitians and Saramacca, since they were described as speaking a language non-indigenous to the continent where they were located. There were 13 societies described as perfectly monogamous, 2 as polyandrous and the rest of the societies were unclassified or presented missing data.

[21] We acknowledge that the incidence of polygyny is determined by the percentage of married men in polygynous unions. Nonetheless, and for strict statistical purposes we have selected the percentage of married women in polygynous unions to determine the incidence of polygyny within a country or geographical region.

determine whether countries or geographical regions may be classified as polygynous or monogamous.

Table 2.5. Societies by marital system and geographical region

Geographical Region	**Ethnographic Atlas**				**Marital System**
	Mo1	**Mo2**	**Po1**	**Po2**	
Northern Africa 1/	15.2	37.9	7.6	39.4	Po2
Western Africa	4.8	6.7	33.9	54.5	Po2
Eastern Africa	4.2	19.6	3.5	72.7	Po2
Middle Africa	0.0	9.7	4.8	85.5	Po2
Southern Africa	0.0	26.7	0.0	73.3	Po2
Western Asia	31.3	50.0	6.3	12.5	Mo2
Central Asia 2/	0.0	50.0	50.0	0.0	Po1
Eastern Asia	59.3	37.0	0.0	0.0	Mo1
Southern Asia	17.9	58.9	17.9	1.8	Mo2
South-Eastern Asia	28.4	64.2	6.0	1.5	Mo2
Northern America (*)	12.7	55.2	30.1	1.9	Mo2
Central America (*)	48.3	41.4	10.3	0.0	Mo1
Caribbean (*)	0.0	100.0	0.0	0.0	Mo2
South America (*)	15.5	53.6	26.2	4.8	Mo2
Eastern Europe	44.0	40.0	8.0	8.0	Mo1
Northern Europe	100.0	0.0	0.0	0.0	Mo1
Southern Europe	88.9	0.0	11.1	0.0	Mo1
Western Europe	100.0	0.0	0.0	0.0	Mo1
Australia and New Zealand (*)	0.0	23.1	76.9	0.0	Po1
Melanesia	9.8	55.7	24.6	9.8	Mo2
Micronesia	55.6	44.4	0.0	0.0	Mo1
Polynesia	5.6	83.3	5.6	0.0	Mo2
Total	**14.6**	**37.1**	**18.3**	**29.7**	**Mo2**

Source: Ethnographic Atlas

Notes: We follow a simple majority rule to determine the predominant marital system. Mo1 stands for *Monogamy 1* or perfect monogamy, Mo2 stands for *Monogamy 2* or monogamy with occasional polygyny, Po1 stands for *Polygyny 1* where co-wives live in the same dwelling, and Po2 stands for *Polygyny 2* where co-wives live in separate dwellings. The asterisk denotes those regions described as *New World*.

1/ Societies described as *Polygyny 2* were all in Sudan. *Monogamy 1* and *Monogamy 2* were prevalent in the rest of Northern Africa.

2/ In Central Asia, there are only two observations. The Kazak people are described as *Polygyny 1*, while Turkmen are described as *Monogamy 2*. We classify Central Asia as *Polygyny 1* because both societies have exhibited some degree of polygyny.

Our next objective will be to illustrate, see table 2.5 below, the proportion of societies by predominant marital system and geographical region. In table 2.5, we found no record of a high incidence of polygyny (Po1 or Po2) for Eastern Asia, Micronesia, Caribbean, Northern Europe, and Western Europe, where monogamy (Mo1) and monogamy with occasional polygyny (Mo2) dominate. In sub-Saharan Africa, *Polygyny 2* prevails. Nearly 86 percent of societies in Middle Africa, exhibit this type of marital system, whereas in Southern, Eastern and Western Africa we observe 73.3, 72.7 and 54.5 percent respectively[22]. Based on this ethnographic evidence presented in table 2.5, it seems reasonable to assume that *Polygyny 2* is almost exclusively *African*.

Polygyny 1 is mainly observed among indigenous people in Australia, Northern America, and Western Africa. Noticeably, this type of marital system is mainly relevant in *New World* regions. White and Burton (1988) observed that in the New World co-wives have a tendency to be related to each other, sororal polygyny, and live in the same house. This, in fact, will be very relevant for our study, because if we assume that indigenous groups are today minorities, this scenario where polygyny is not limited and wives share the same dwellings might be extinct. As a consequence, widespread polygyny will be greatly associated with *African* polygyny or *Polygyny 2*.

Finally, table 2.5 also illustrates that monogamy reigns mainly in Western Europe, Northern Europe, Southern Europe, and Eastern Asia[23]. Neither Western Europe nor Northern Europe presents any evidence of monogamy with occasional polygyny, though it is relatively common in the rest of the regions. On the whole, monogamy with or without occasional polygyny seems to be the principal marital system for most regions of the *Old*

[22] Outside of Africa, we find isolated cases of *Polygyny 2*, e.g. the Ma'dan people in Iraq, the Nuri people of Afghanistan, the Lifu in New Caledonia or the Tikopia people of the Solomon Islands.

[23] Gheg Albanians are the only exception in Southern Europe, they are described as *Polygyny 1*

World, except for sub-Saharan Africa. *African* polygyny or *Polygyny 2*, as previously shown, appears to be nearly exclusive to the African continent. *Polygyny 1* is very infrequent and only dominates among the Australian aboriginals, and some other indigenous societies in the *New World*. These results confirm that widespread polygyny where wives share habitation, namely *Polygyny 1*, is a rare phenomenon associated principally with hunter-gatherers of the New World. This could be a relevant fact, even if we do not have reliable measures of the incidence of polygyny, because it would allow us to associate prevalent polygyny to sub-Saharan Africa and limited polygyny, henceforth monogamy to the rest of the world. Moreover, the Ethnographic Atlas provides consistent cultural evidence for a long period of time which could lead us to think that prevalent polygyny was relatively unknown in Eurasia for along period of time.

On the other hand, the main limitations of the Ethnographic Atlas are threefold. First, countries are not fully represented by societies. Second, societies are not weighted; hence we do not know whether societies are minorities or a main ethnic group within a country. Finally, societies observed in one country may play an important role in a neighbouring country too. Moreover, the Ethnographic Atlas does not provide much evidence on the incidence of polygyny. In this way, our objective for the remainder of the chapter will be to construct a more reliable country measure of the incidence of polygyny for the period 1950-2000. Then, we will contrast our main results with the available ethnographic evidence. For that reason, in the subsequent section we introduce a novel statistical way of measuring the incidence of polygyny across countries.

2.4 Measuring Polygyny and Monogamy

The practical way to assess the incidence of polygyny across countries would be to obtain direct measures on the percentage of married men and married women in polygynous unions for various periods of time. Unfortunately, these data are scattered, time inconsistent, in some cases non-comparable, and in most cases do not even exist[24]. There are some exceptions, especially some sub-Saharan countries where the incidence of polygyny has been somehow described[25]. To overcome this problem, we propose in this section an alternative way of measuring the incidence of polygyny across countries for the period 1950-2000. Our proposed measure will be based on marital status data for the decades 1970, 1980 and 1990. Moreover, we will make use of existing direct measures of polygyny and ethnographic evidence to supplement the dataset and test the robustness of these novel estimates.

In subsequent chapters, we will concentrate on exploring polygyny and monogamy in further detail. Marital systems may evolve in the long run. Unfortunately, marital status data usually captures short run changes. For that reason, our measure will chiefly exploit cross-sectional rather than time series variation. The ultimate objective will be to embody countries according to the incidence of polygyny for the period of study. In this regard,

[24] Chamie (1986) provides a good review of polygyny in Arab countries. However the data provided is the percentage of married men in a polygynous union which is not comparable with other direct measures of polygyny such as the percentage of married women in polygynous unions if, for example, the number of co-wives per husband remains unknown.

[25] Table A.2.3 in appendix 2 illustrates existing direct measures of the incidence of polygyny by geographical region and source of data.

countries will be eventually classified into three main categories: (i) Monogamy (Mo), (ii) Occasional Polygyny (OP) and (iii) Polygyny (Po) [26].

The methodology applied to compute the incidence of polygyny is based on marital status data, available from United Nations (2000a). First, we use these data to derive the ratio of the number of currently married women (CMF) to the number of currently married men (CMM) aged 15-64 years old[27]. This ratio is denoted as CMFM or Currently Married Female for every Male.

$$CMF = \frac{Currently\ married\ women\ (15-64)}{Total\ women\ (15-64)} \tag{2.1}$$

$$CMM = \frac{Currently\ married\ men\ (15-64)}{Total\ men\ (15-64)} \tag{2.2}$$

$$CMFM = \frac{CMF}{CMM} \tag{2.3}$$

This, in fact, can be a good proxy or indirect measure of the incidence of polygyny in a country when data on the percentage of married men and married women in polygynous unions are not available. By multiplying CMFM by one hundred, we will have a measure of the number of currently married women for every hundred currently married men. Perfect

[26] In the previous section, we distinguish between *Polygyny 1* and *Polygyny 2*. We also showed that *Polygyny 1* was infrequent in *Old World* regions. As a result and for the remainder of the chapter we will associate Po with a high incidence of polygynous unions, which in turn is closely related to *African* polygyny or *Polygyny 2*.

[27] The number of currently married men and currently married women aged 15-64 years old include those men and women classified as married and also those men and women in consensual unions where country data were available.

monogamy may then be associated with a hundred, while a high incidence of polygyny would be associated with higher values.

Table 2.6 presents summary statistics for each decade. Overall, we computed a CMFM value for more than one hundred countries for each decade respectively. Values below 100 can be understood as "polyandrous" behavior. Nonetheless ethnographic evidence presented above suggested that polyandrous unions were a rare and unique phenomenon across societies. As a result, we assume a potential measurement error of 10 percent and discard those values below 90. In our sample, only Georgia and the Republic of Moldova in 1990 had a CMFM below 90, and were consequently removed from the sample[28]. The highest CMFM in each decade correspond to Liberia, Niger and Senegal respectively, which are generally known polygynous countries.

Table 2.6 Descriptive Statistics. *CMFM* by decade

Decade	Obs.	Mean	St. Dev.	Max	Min
1970	105	107	7	134	90
1980	139	107	7	199	91
1990	142	107	7	140	92

Source: United Nations (2000a)

Notes: CMFM values are weighted. Population in 1980 was used as analytical weight. Population data come from PRED Bank, Version 3.0.

Table 2.7 illustrates CMFM values by geographical region. CMFM imbalances that might potentially emerge because of a high incidence of polygynous unions are mainly observed in Western Africa. CMFM values for Eastern Africa, Middle Africa, Northern Africa,

[28] Data for Estonia in 1990 was also removed. The computed CMFM was 157, which is inconsistent with ethnographic evidence and CMFM values from neighbouring countries.

Southern Asia, Melanesia and Polynesia would also imply some degree of polygynous behaviour.

Table 2.7. *CMFM* by geographical region

Geographical	**1970**		**1980**		**1990**	
Region	**CMFM**	**N**	**CMFM**	**N**	**CMFM**	**N**
Northern Africa	111	6	107	6	109	4
Western Africa	133	2	141	10	129	7
Eastern Africa	116	10	111	13	114	12
Middle Africa		0	118	6	110	3
Southern Africa	108	2	100	2	99	5
Western Asia	107	8	112	9	108	11
Central Asia		0		0	97	5
Eastern Asia	102	4	106	5	105	5
Southern Asia	113	6	113	8	115	5
South-Eastern Asia	101	7	102	7	102	6
Northern America (*)	100	2	101	3	101	3
Central America (*)	105	7	103	5	102	6
Caribbean (*)	112	9	107	17	106	10
South America (*)	102	10	103	11	100	10
Eastern Europe	101	4	103	4	97	9
Northern Europe	104	7	106	7	107	9
Southern Europe	103	5	104	5	105	8
Western Europe	100	7	105	9	105	8
Australia and New Zealand (*)	108	2	106	2	107	2
Melanesia	115	4	119	5	114	5
Micronesia	98	1	104	2	102	5
Polynesia	114	2	112	3	110	4

Source: United Nations (2000a), PRED Bank, Version 3.0

Notes: CMFM values are weighted averages. Population in 1970, 1980 and 1990 were used as weights. Population data come from PRED Bank, Version 3.0. The asterisk denotes those regions described as *New World*.

In Southern Africa the value of CMFM would indicate perfect monogamy in 1980 and 1990. This finding contrasts with the ethnographic evidence presented above. Recent data

on the incidence of polygyny presented in Table A.2.3 in appendix 2 supports the view that Southern Africa has shown the lowest incidence of polygynous unions within all sub-Saharan regions. The rest of the *Old World* regions present a relatively well balanced CMFM value.

The *New World* regions are predominantly monogamous, mainly because indigenous societies which are the ones recorded in the Ethnographic Atlas gave way to European traditions. Only exception is the Caribbean, where the presence of consensual and visiting unions and data collection problems related to misreporting or under-reporting may have driven up the CMFM value in 1970, United Nations (1990)[29].

Our next objective will be to obtain a more consistent CMFM value for the period of study. To do so, we compute the average of the available CMFM country values over 1970-1990. An average will better describe the country for the period of study. Moreover, it will also provide us with a larger cross-section. Countries where the coefficient of variation was greater than 10 percent were also removed from our sample, leaving us with CMFM average values for 178 countries[30].

Finally, we test the robustness of our estimates with direct measures of the incidence of polygynous unions. For that purpose, we have to convert our CMFM country values into

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[29] *"In the Latin America and Caribbean countries, a major feature of the institution of marriage is the very high prevalence of consensual unions. There is also a high degree of prevalence of visiting unions in the Anglophone and francophone Caribbean countries. Although these two types of marital unions are socially recognized as marriage forms, their prevalence makes it considerably more difficult to estimate reliably both, the age at entry into first union and the overall prevalence of marriages, because current or non-legalized unions are not always reported as marital union"* (United Nations, 1990:156)

[30] The coefficient of variation is a normalised measure of dispersion. It can be defined as the ratio of the standard deviation to the mean. Niger, Kuwait and the Dominican Republic presented a coefficient of variation of 34.7, 10.6 and 10.5 percent respectively and consequently were removed from the sample.

percentages of married men or married women in polygynous unions. To do so, we assume that, under perfect monogamy, there will be 100 married women for every 100 married men. Therefore, an estimate of the percentage of married women in polygynous unions can be computed. We denote this new estimate as *polyest*.

$$polyest = \left(\frac{CMFM - 100}{CMFM} \right) * 100 \tag{2.4}$$

To compare the new estimate, *polyest*, with direct measures of the incidence of polygyny we first compute the average of all the existing data on the incidence of polygynous unions. Previously, we introduced the two main sources of past and current data on the incidence of polygyny: United Nations (1990) and the Demographic and Health Surveys (1985-2005). Both sources provide data on the percentage of married women in polygynous unions aged 15 years old and over or 15-49 years old[31].

Figure 2.1a illustrates our estimate, *polyest*, against the average computed with the percentage of married women in polygynous unions from both sources. From figure 2.1a we observe a downward bias for our estimate, *polyest*. This is particularly acute for sub-Saharan countries[32]. We did not find much evidence of a downward bias regarding non sub-Saharan countries. Therefore, to correct for this bias, we run a regression of our estimates on the average values of the percentage of married women in polygynous unions

[31] Figure A.2.2 in appendix 2 illustrates the linear prediction with a 95 percent confidence interval for measures taken from both sources. As we stated above, United Nations (1990) provides data for a period that covers 1948-1986, whereas the Demographic and Health Surveys cover 1985-2005.

[32] In our study sub-Saharan countries are all countries classified by the United Nations within Western Africa, Eastern Africa, Middle Africa and Southern Africa. Also Sudan and Western Sahara, usually included as Northern Africa, were included in this category. Finally, countries classified as sub-Saharan but described as *New World* territories were excluded. These were Cape Verde, Mauritius, Reunion, Seychelles and Sao Tome and Principe.

for sub-Saharan countries[33]. Only 5 out of 33 countries with available data were not sub-Saharan.

Figure 2.1a: Linear regression estimate of the incidence of polygyny (uncorrected)

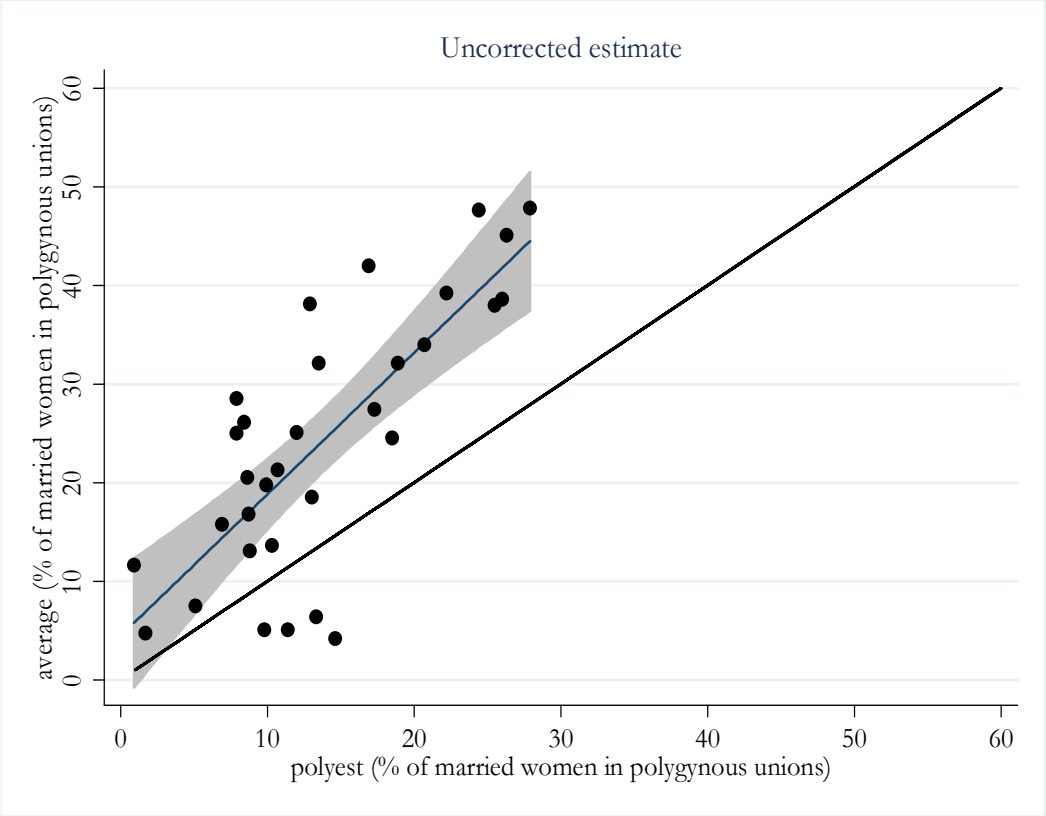
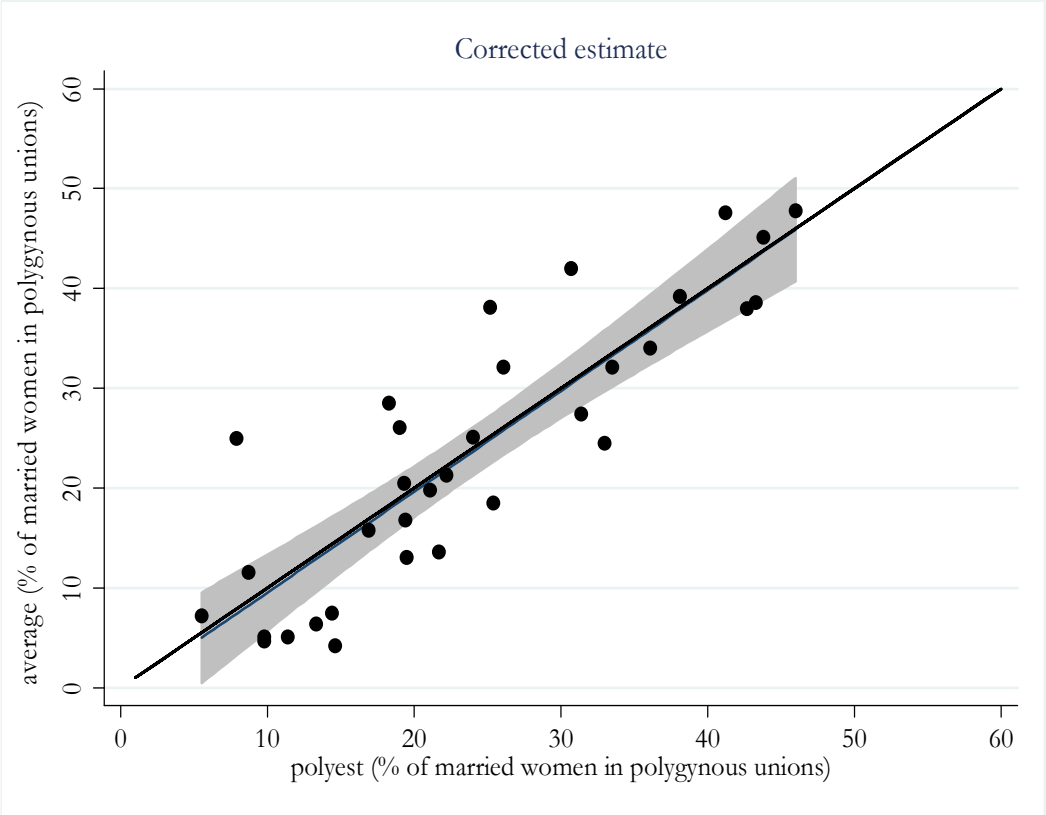


Figure 2.1b illustrates our corrected estimate[34].

[33] To correct for the bias, we run a regression of our estimates (*polyest*) on the average values (*direct measures of polygyny*). There are twenty eight sub-Saharan countries for which we have data. This regression yields a constant of 6.964435 and a coefficient of 1.306923. We use these coefficients to generate corrected estimates of the percentage of married women in polygynous unions for sub-Saharan countries. Results: average = 6.964435 + 1.306923**polyest*, N=28, R^2 = 0.8099. Population in 1980 used as analytical weight. Population data come from PRED Bank, Version 3.0.

[34] Figure A.2.3 in appendix 2 illustrates our corrected estimate against the average values of polygyny only for sub-Saharan countries.

Figure 2.1b: Linear regression estimate of the incidence of polygyny (corrected)



We have also checked the robustness of our estimate, *polyest*, using the Ethnographic Atlas. Overall a high incidence of polygynous unions remains mainly a sub-Saharan Africa scenario. *African* polygyny is rarely found in other continents. Occasional polygyny (OP) is fairly common and found with relative ease across countries, while Monogamy (Mo) seems to be the main marital norm in Europe and the *New World* countries. The sample was also expanded with the addition of six countries for which there was no available data on marital status, but provided data on the incidence of polygyny. Eritrea, Ghana, Niger, Chad and Guinea presented data on the percentage of married women in polygynous union[35]. Moreover, data on the percentage of married men in polygynous unions were also available

[35] Data for Eritrea (8.1%), Ghana (31%), Niger (36.9%), Chad (39.1%) and Guinea (53.5%) were the computed average over all available data from POFM (1990) and the Demographic and Health Surveys (1985-2005).

for Somalia in 1981[36]. This will leave our sample with 184 countries with an estimated value, *polyest*, of the incidence of polygyny.

Once our estimates have been introduced, discussed and tested, we proceed to classify countries according to the incidence of polygyny. In this regard, we adopt the aforementioned classification, based on the Ethnographic Atlas, and distinguish between three possible categories: (i) Monogamy (Mo), (ii) Occasional Polygyny (OP) and (iii) Polygyny (Po). Given the quantitative nature of the data, we will not be able to provide information regarding the residential arrangements of co-wives. Consequently, we will only have one type of polygyny (Po). Nonetheless, and as we stated above, *Polygyny 1* was very infrequent and rare, and hence it is sensible to assume that a high incidence of polygyny would be mainly associated with *Polygyny 2* or *African* polygyny.

To classify countries as polygynous (Po) we selected, as stated above, a threshold of 15 percent of married women in polygynous unions. In anthropology, the threshold between limited and general polygyny has arbitrarily been 20 percent of married men with more than one wife (Murdock, 1949; White, 1988). In our study, we take a more conservative approach selecting the cutting point. The reasons being are twofold. First, in the next chapters we will concentrate on the effect that female labour have on polygyny and the spousal gap in monogamous unions. For this purpose, we need to identify the extremes, that is to say, which countries have been somehow highly polygynous and perfectly monogamous during the period 1950-2000. Second, we acknowledge potential measurement error, and hence we allow for some error margin. In this regard, monogamy

[36] The percentage of married men in polygynous unions in Somalia in 1981 was 20.8 percent. Therefore, it can be assumed that the percentage of married women in polygynous unions in Somalia in 1981 had to be greater than 15 percent.

(Mo) is assumed within a country when the percentage of married women in polygynous unions is less than 10 percent[37].

Finally, countries not classified as monogamous or polygynous are denoted as occasional polygynous (OP), this is the scenario where the incidence of polygyny has not been very high, but enough to separate them from the monogamous ones (Mo). Finally, we understand that monogamous unions are usually the main marital system; even if a country shows a relatively high incidence of men or women married polygynously, monogamy will be present. Our ultimate goal would be to use this classification to study marital patterns in the long run. Therefore, the extremes may provide further information, whether is extreme polygyny or perfect monogamy. Moreover, we understand our limitations and acknowledge potential measurement errors. For that purpose, and once we introduce the classification of countries by marital system in the next section, we will check the robustness of our country values with ethnographic evidence and historical records.

[37] On the whole, the dataset seems reliable and consistent. We have only found two main discrepancies. First, marital status data for Haiti indicates a value of *polyest* of 7.9%, consequently Haiti was assumed to be monogamous. However, recent data from the Demographic and Health Surveys suggested that 25 percent of married women were in polygynous unions. Second, data for Burundi, corrected as a sub-Saharan country, showed a value of *polyest* of 8.7 percent, while a 1987 estimate from the Demographic and Health Surveys illustrated that 11.6 percent of women were polygynously married.

2.5 The Geographical Distribution of Marital Systems

The objective of this section is to describe the geographical distribution of marital systems. To do so, we introduce a new classification based on marital status data and direct measures of polygyny. In appendix 2, Table A.2.4 we present our main findings. Column (1) classifies countries in one of the three main groups: (i) Monogamy (Mo), (ii) Occasional Polygyny (OP) and (iii) Polygyny (Po). When data were not available, we indicate appropriately (na). Columns (2) and (3) provide the percentage of societies by country where polygyny was prevalent either with wives sharing habitation (Po1) or living in separate dwelling (Po2). This is ethnographic evidence classified by country. As stated above, we used the geographical coordinates (latitude; longitude) to identify each of the 1,240 societies with a country. Finally, column (4) indicates whether a country is *New World* or *Old World*. To control for cultural continuity, as we defined earlier, we used the proportion of individuals speaking, as mother tongue, an indigenous language.

Overall, we present data for 225 countries or territories[38]. All the United Nations country members are in the dataset, including Montenegro. From these, we found 121 (Mo) monogamous and 39 polygynous (Po). There were 41 countries or territories for which data were not available. The remaining 24 were labelled as occasional polygynous (OP). Out of the 225, we also uncovered 170 *Old World* countries or territories, and hence 55 in the *New World*.

[38] The excluded territories by continent are: (a) Africa: Saint Helena and Mayotte, (b) Asia: British Indian Ocean Territories, (c) America: Saint Pierre and Miquelon, Saint Barthélemy and Saint Martin, the Falkland Islands, (d) Europe: Alan Islands, Svalbard and Jan Mayen Islands, Holy See, (e) Oceania: Norfolk Islands, Pitcairn Islands. Although some of these dependent territories are statistically included within their main countries. See also table A.2.1 in appendix 2 for more information.

Table 2.8 Marital Systems by geographical region

Geographical Region	**Marital System** [1/]	**Proportion of countries**				**Old World** [2/]
		Mo	**OP**	**Po**	**na**	
Northern Africa	Po2	28.6	42.9	28.6	0.0	100.0
Western Africa	Po2	6.3	0.0	81.3	12.5	93.8
Eastern Africa	Po2	38.9	0.0	61.1	0.0	83.3
Middle Africa	Po2	0.0	11.1	77.8	11.1	100.0
Southern Africa	Po2	20.0	40.0	40.0	0.0	100.0
Western Asia	Mo2	38.9	27.8	5.6	27.8	100.0
Central Asia	Po1	100.0	0.0	0.0	0.0	100.0
Eastern Asia	Mo1	62.5	0.0	0.0	37.5	100.0
Southern Asia	Mo2	11.1	55.6	22.2	11.1	100.0
South-Eastern Asia	Mo2	72.7	0.0	0.0	27.3	100.0
Northern America (*)	Mo2	75.0	0.0	0.0	25.0	25.0
Central America (*)	Mo1	100.0	0.0	0.0	0.0	0.0
Caribbean (*)	Mo2	62.5	12.5	0.0	25.0	0.0
South America	Mo2	84.6	7.7	0.0	7.7	0.0
Eastern Europe	Mo1	90.0	0.0	0.0	10.0	100.0
Northern Europe	Mo1	69.2	0.0	0.0	30.8	100.0
Southern Europe	Mo1	60.0	0.0	0.0	40.0	100.0
Western Europe	Mo1	100.0	0.0	0.0	0.0	100.0
Australia and New Zealand (*)	Po1	100.0	0.0	0.0	0.0	0.0
Melanesia	Mo2	20.0	60.0	20.0	0.0	80.0
Micronesia	Mo1	71.4	0.0	0.0	28.6	100.0
Polynesia	Mo2	33.3	11.1	0.0	55.6	100.0
TOTAL	**Mo2**	**53.8**	**10.7**	**17.3**	**18.2**	**75.6**

Source: Dorjhan (1959), Chamie (1986), United Nations (1990), United Nations (2000a), Demographic and Health Surveys (1985-2005)

Notes: Values are proportions. The asterisk denotes those regions described as *New World*.

1/ Marital Systems refer to the Ethnographic Atlas classification illustrated in table 2.5. Mo1 stands for *Monogamy 1* or perfect monogamy, Mo2 stands for *Monogamy 2* or monogamy with occasional polygyny, Po1 stands for *Polygyny 1* where co-wives live in the same dwelling, and Po2 stands for *Polygyny 2* where co-wives live in separate dwellings. We use ethnographic evidence to test the robustness of our results.

2/ Old World refers to the proportion of countries classified as *Old World*

Table 2.8 summarises our main findings. Geographical regions are presented with the proportions of countries in each category. Moreover, we also included the dominant marital system, under the same title, derived with ethnographic evidence from Table 2.5. To test for robustness we provide in the following sub-sections a discussion of our main results by continent. William Goode pointed out that "*Polygyny will, without question, eventually almost completely disappear as a pattern of behaviour. The new legal codes are gradually moving towards its abolition, women will avoid it where they can, and men will no generally be able to afford it*"[39]. Whether polygyny was legally approved or culturally accepted and observed may be a rich source of evidence to understand to what degree polygyny was prevalent within a society. In this way and with the aim to supplement the ethnographic evidence and data, we review some ancient legal codes and historical records in the next sub-sections and discuss our findings.

2.5.1 Africa

There are reasonably good ethnographic evidence for Africa. In Northern Africa we did not find significant evidence of polygyny, either *Polygyny 1* or *Polygyny 2*, except for Sudan and Libya. Overall monogamy with occasional polygyny was relatively common in Algeria, Egypt, Morocco and Tunisia. This would imply a low incidence of polygynous unions. Our estimates support this view. Only Sudan and Western Sahara are polygynous, while Libya, Morocco and Tunisia show some degree of polygynous behaviour, yet not enough to be considered highly prevalent. Algeria and Egypt are mainly monogamous.

The expansion of Islam in Northern Africa, mainly during the 9-13th centuries brought not only a new religious belief, but Islamic laws which also sanctioned marital unions. *Sharia* or Islamic Law is a legal system based on interpretations of the teachings of the Qur'an. The

[39] Goode (1970: 188)

Qur'an allowed men to marry up to four women: *"If you fear that you shall not be able to deal justly with the orphans; marry women of your choice, two, or three, or four, but if you fear that you shall not be able to deal justly (with them), then only one, or (a captive) that your right hands possess that will be more suitable, to prevent you from doing injustice"* [40]. Islamic law has been gradually given way to modern family laws, particularly in the last decades. Nevertheless polygyny was only banned in Tunisia in 1956. In the rest of Northern Africa, polygyny is lawful although the incidence appears to be very low.

In sub-Saharan Africa, ethnographic evidence is rather conclusive, and supports the scenario with a high incidence of polygynous unions for nearly all countries with available data. We find that our estimates fully confirm the ethnographic evidence for Middle Africa, where polygyny is culturally and legally accepted[41]. In Western Africa and Eastern Africa we also find that most countries culturally described as polygynous are also statistically polygynous with very few exceptions. Notably, Mali and Mauritania are classified as polygynous, although ethnographic evidence is not as conclusive. In this regard, polygyny is lawful in Mali and Mauritania since family laws follow Islamic laws. On the other hand, Burundi and Madagascar classified as monogamous, present ethnographic evidence of a high incidence of polygyny. In Burundi, reforms were made in 1993 to officially abolished polygamy. Polygyny is prohibited in Madagascar too, and is somewhat infrequent (OECD, 2006).

Finally, Southern Africa presents substantial differences between ethnographic evidence and our country values. Only Swaziland and Namibia remain polygynous for us, while Botswana and Lesotho are classified as occasional polygynous, and South Africa is included

[40] The Qur'an: Surah 4:3

[41] For Sao Tome and Principe ethnographic evidence was not available and was classified as Occasional Polyyny (OP).

with the monogamous countries. Legally, polygyny is lawful for all countries in Southern Africa. More importantly, direct measures on the percentage of married women in polygynous unions support our estimates[42] and the view that polygynous unions have decreased sharply in Southern Africa.

2.5.2 Asia

In Asia, we found ample evidence of polygynous behaviour, dating back to the code of Hammurabi, circa third millennium BC. Then, marriage was already a binding agreement involving transfers of money or assets between the families of the spouses. Marital systems were not fully described, although the taking of a second wife was allowed in case of barrenness, *"If a man has espoused a votary, and she has not granted him children and he has set his face to take a concubine, that man shall take a concubine, he shall cause her to enter into his house. That concubine shall not put on an equality with the wife"* [43] or sickness, "*If a man has married a wife and a sickness has seized her, he has set his face to marry a second wife, he may marry her, his wife whom the sickness has seized he shall not put her away, in the home she shall dwell, and as long as she lives he shall sustain her."* [44]

Herodotus described Babylonian marriage as the object of transaction, where rich men who wanted wives could have them[45]. On the other hand, the Massagetae, who also inhabited parts of modern Iran, had one wife[46], as the Egyptians or Greeks[47], although

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[42] The Demographic and Health Surveys estimate that only 7.2 percent of married women are in polygynous unions. Data for Lesotho illustrates that only 5 percent of married men are in polygynous unions.

[43] Code of Hammurabi: Section 145

[44] Code of Hammurabi: Section 148

[45] Herodotus (Book I: 196). Translated by Aubrey de Sélincourt (1954). Penguin Books.

[46] Herodotus (Book I: 216). Translated by Aubrey de Sélincourt (1954). Penguin Books.

[47] Herodotus (Book II: 92). Translated by Aubrey de Sélincourt (1954). Penguin Books.

promiscuity among Massagetae women was rather frequent. In the Old Testament, Abraham and Esau, two of the founding patriarchs of Israel are also described as having more than one concubine or wife, "*And Abraham gave all that he had unto Isaac. But unto the sons of the concubines Abraham had, Abraham gave gifts, and sent them away from Isaac his son, while he yet lived, eastward, unto the east country"* [48] Also, *"And Esau took his wives, and his sons, and his daughters, and all the persons of his house, and his cattle, and all his beasts, and all his substance, which he had got in the land of Canaan; and went into the country from the face of his brother Jacob"* [49]

In the Indian sub-Continent, polygyny prevailed during the Vedic period (Mitter, 1984) [50]. The Law Code of Manu, which is a legal text of ancient India, did not explicitly prohibit polygyny but regulated certain aspects of marriage and polygynous unions such as whom to marry or the seniority between wives[51]. During the Middle Ages Marco Polo in The Travels also described: "…*this king (India) has fully 300 wives or more; for here a man is more highly esteemed in proportion as he supports more wives".* [52] References to harems are also found in the literature, particularly among the Ottomans (Pierce, 1993; Wheatcroft, 1996). Nevertheless, harems appeared to be the exception, not the norm.

Finally, in the Far East, the Sung Code, c. AD 900-1200, stated: *'Anyone who has a wife and then takes another wife is subject to one year penal servitude. The woman's side is subject to a penalty one degree lower. In cases of deception, those taking the wife are subject to a year and a half of penal servitude, but the woman's family is not implicated'* [53] Bigamy was punishable in ancient China, and men

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[48] The Bible; Genesis 25: 5-6

[49] The Bible; Genesis 36: 6

[50] The Vedic period normally span between the second and first millennium BC

[51] The Law Code of Manu: Chapter IX (85): *"If twice-born men marry women of their own class as well as others, the order of their class determines their seniority, as also how they are honoured and where they reside".*

[52] Marco Polo: The Travels pp. 285.

[53] Ebrey (1993): (SHT 13:14b)

and women could only remarry if the first marriage ended by death or divorce, but not before. Also, concubinage was frequent in China, although the legal status of a concubine was not as clearly defined as that of a wife (Ebrey, 1993). Moreover, Buddhism texts do not mention or refer to the subject of monogamy, polygyny or polyandry. In general, Buddhism regards marriage as entirely a personal, individual concern and not as a religious duty. In China, Buddhist ideas, such as celibacy, were confronted by Daoists and Confucians who regarded celibacy as a failure to provide their ancestors with an heir (Ebrey, 1996).

On the whole, ethnographic evidence for Central Asia, South-Eastern Asia and Eastern Asia showed some degree of polygyny, although the incidence of polygyny seems to be rather low. Only the Kazak people and scattered societies in Indonesia, Timor-Leste and Viet Nam were described as polygynous. Our estimates go in line with the ethnographic evidence. All countries in Central Asia, South-Eastern Asia and Eastern Asia were classified as monogamous[54]. Polygyny is legally prohibited in most of these countries or territories except in Myanmar, Thailand and those ones with Muslim populations who are allowed to follow Islamic laws, e.g. Indonesia, Malaysia, the Philippines, Singapore (OECD, 2006).

In contrast, polygynous unions in Western Asia and Southern Asia, which covers the Indian sub-Continent, are more common. Ethnographic evidence showed that a high incidence of polygynous unions is restricted to scattered societies such as the Nuri (Afghanistan), Rwala (Syria) and Ma'dan (Iraq), and some indigenous groups within the Indian sub-Continent which mainly comprises India, Pakistan and Bangladesh. Polygyny is

[54] As we stated above, bigamy was already punishable in ancient China, although concubinage have been widely observed. Nevertheless, if concubines do not have legal status they will not be statistically reported neither in censuses nor in national surveys. In our study, we acknowledge the possible presence of concubinage and other unreported unions.

legally accepted in nearly all countries, except the Transcaucasia (Armenia, Georgia, Azerbaijan) and Nepal. Most of these countries follow Islamic laws, and others allow Muslims to exercise polygyny, e.g. India. In any case, our estimates do not classify any Asian country as polygynous, although some of them were characterised as occasional polygynous.

2.5.3 America

There is little doubt that polygynous unions in America among indigenous people were known before the arrival of Europeans. Vaillant (1944) argued that polygyny was prevalent among the Aztecs, mainly between the common people, although an Aztec king had only one queen, and neither could remarry upon the death of the other. In other parts of Central America polygyny was less known, this is indicated in the Ethnographic Atlas. Only the Lenca people inhabiting parts of Honduras and El Salvador, the Populuca and the Lacandon were described as polygynous.

To the north of Mexico, there was more evidence of polygyny among indigenous groups, mostly *Polygyny 1*, where wives share habitation. The *African* type was relatively unknown in Northern America. Similarly, in South America *Polygyny 2* has been known only among four societies, Piapoco, Goajiro, Tupinamba and Mapuche. Among the Inca people, having many wives was not a crime (Cobo, 1997)[55]. However, there was usually a principal wife, who was the only one who was legitimate. As in Northern America, *Polygyny 1* and monogamy prevails. Ethnographic evidence for the Caribbean rejects the presence of highly prevalent polygyny among indigenous people. Nevertheless, our estimates indicate

[55] The Mayan and Aztec Codices, among them the Codex Mendoza, do not provide much detail on marriage

that there are three countries classified as occasional polygynous. Lately, colonisation brought to the New World the customs, habits and civil codes of the colonisers, generally of European origin. This fact is illustrated in our estimates, since only four American countries or territories, Cuba, Dominica, Saint Kitts and Nevis and French Guiana were classified as non-monogamous.

2.5.4 Europe

In Europe, monogamy has been the preferred marital system since ancient times. Nevertheless, Herodotus also pointed that among the Thracians, who inhabited Eastern and Southern Europe, it was customary for a man to have more than one wife[56]. Tacitus described the peoples of Germania in the first century AD as "…*almost unique among barbarians in being content with one wife…"* [57] This description followed and hinted that Germanic peoples were monogamous, except few who take more than one wife because their prestige or reputation brought them many marital offers. In contrast, non-Germanic *barbarians* were essentially polygynous as the Thracians described by Herodotus.

The incidence of that Germanic polygyny[58] is fairly unknown. Fonay Wemple (1985) studied women in Frankish societies from AD 500-900 and argued that, *"Polygyny was less frequent in the upper classes than in the royal family….Concubinage, on the other hand, was a common occurrence on the upper levels of Merovingian society"* [59] In both cases, polygynous unions seemed

[56] Herodotus (Book V: 5). Translated by Aubrey de Sélincourt (1954). Penguin Books

[57] Tacitus (Germania: 18). The Agricola and the Germania translated by H. Mattingly (1970). Penguin Classics

[58] Polygynous unions are not described or even mentioned in two of the most important Germanic Codes: the Lex Salica and Lex Visigothorum

[59] Fonay Wemple (1985: 40)

to be frequent among the ruling elite or upper classes. Unfortunately, there is little evidence regarding the incidence of polygyny among the lower classes.

In ancient Greece, a man could not legally be married to more than one wife at a time although there was no legal objection to having a concubine (MacDowell, 1978). Similarly, polygynous unions were not accepted under Roman law; "*Marriage, or matrimony, is a binding together of a man and woman to live in an indivisible union"*[60] and *"…you cannot have two wives at the same time"* [61] Although concubinage was widely observed among the ruling elites, concubines had lower status than wives.

In any case, for long periods of time, most marital unions in Europe were undertaken without either a civil or religious ceremony. In ancient Rome, marriage was a matter of intention, in particular among the lower classes; if you lived as man and wife, man and wife you were (Crook, 1984). Then, marital unions were mostly common-law marriages. Common-law unions changed with the advent of Canon Law, a body of laws based on ecclesiastical rules and made within some Christian churches e.g. Roman Catholic, Eastern Orthodox and Protestant branches[62]. In this regard, one of the founding fathers of Christianity, Saint Augustine of Hippo already advocated for monogamous unions in the AD 4-5th centuries:*"…just as the sacrament of polygamous marriage of that age was a symbol of the plurality of people who would be subject to God in all nations of the earth, so too is the sacrament of monogamous marriage of our time is a symbol that in the future we shall all be united and subject to God*

[60] The Institutes, Book I: Of Persons, Chapter X: Marriage (1)

[61] The Institutes, Book I: Of Persons, Chapter X: Marriage (7)

[62] The canon law of the Eastern and Western churches was similar until the Schism of 1054. In Western churches canon law was developed without interruption until the Reformation of the 16th century. Canon law was essential in the transmission of Roman law in Europe during the Middle Ages (Encyclopaedia Britannica, 2008).

in the one heavenly city. Accordingly, leaving a living husband to marry someone else is like serving two or more masters. It was not allowed then, it is not allowed now, and it never will be allowed" [63]

Common-law marriages were finally abolished in Roman Catholic countries by the Council of Trent (1545–1563). Since then, marriages were required to be celebrated in the presence of a priest and two witnesses. Polygynous unions were not permitted, and second marriages were only allowed after the dissolution of the first marriage was granted by the appropriate ecclesiastical authority. In England, common-law marriages were valid until the Marriage Act of 1753, which regulated marital unions and demanded a formal ceremony of marriage. Some centuries later, the combination of Roman and Canon Law produced in 1804 one of the most relevant legal codes, the French or Napoleonic Civil Code, which explicitly prohibited bigamy: *"A second marriage cannot be contracted previously to the dissolution of the first"* [64] From that moment, many countries adopted marriage laws based on the Napoleonic Civil Code.

On the whole, our estimates are fully consistent with the ethnographic evidence, ancient texts, legal codes and historical records, and classify all European countries as monogamous. We acknowledge that illegitimate unions, concubinage and isolated polygynous behaviour were also part of the European history of marriage. For example, the Ethnographic Atlas described Gheg Albanians as polygynous. We could not find available data for Albania to compare this evidence. Additionally, while polygyny is prohibited in Russia, it remains common within Muslim communities (OECD, 2006)[65].

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[63] Saint Augustine, Chapter I: The Excellence of Marriage (18,21). Marriage and Virginity (1999); New City Press.

[64] French Civil Code (1804), Book I, Title V, Chapter I: 147

[65] In this regard, the Ethnographic Atlas illustrates four societies classified as polygynous: the Yakut, Chukchee, Cherkess and Chechen peoples.

2.5.5 Oceania

For Australia and New Zealand ethnographic evidence was conclusive and associated these countries to *Polygyny 1*. With the arrival of Europeans monogamy overcame polygynous unions. On the other hand, Melanesia, Micronesia and Polynesia present contrasting differences. While in Melanesia polygyny appears to be rather frequent, for Micronesia and Polynesia we only found ethnographic evidence in the Cook Islands. Our estimates support this view. Only Samoa is classified as non-monogamous. On the other hand, out of five territories in Melanesia, only Fiji is classified as monogamous. In fact, polygamy is illegal in Fiji, while in Papua New Guinea polygyny is legally accepted and widespread, OECD (2006). Our estimates confirm Papua New Guinea as a polygynous country and New Caledonia, Solomon Islands and Vanuatu as occasional polygynous territories.

2.6 Concluding remarks

Our main objective in this chapter was to classify countries by their incidence of polygyny for the period 1950-2000. To do so, we first defined marital systems using qualitative data from the Ethnographic Atlas. Then, we developed a new methodology, using marital status data from censuses and national surveys, to capture the prevalence of polygyny quantitatively. Finally, we presented and discussed a new classification of countries by marital system, based on the above mentioned methodology. The main findings confirm that highly prevalent polygyny can be mainly associated with sub-Saharan countries, although our results will also include in this category other countries, e.g. Papua New Guinea or Afghanistan, among others. Ethnographic evidence also suggests that highly prevalent polygyny where co-wives share habitation is rarely found in the *Old World*. Only

exceptions we could think of were the harems observed and described in some parts of India and the Ottoman Empire.

We have also provided a brief review of peoples and legal codes based on historical sources for the *New World* and the *Old World*. Under common-law or customary marriages polygynous unions have existed in most geographical areas, although the incidence of polygyny has been relatively low outside sub-Saharan Africa. In most cases, polygynous unions were associated with the ruling elites. As legal codes -among them Roman law, Sung Code, Canon law and Civil codes- were introduced, bigamy or polygynous unions became a punishable offence. Similarly, monogamy with occasional polygyny sooner became "perfect" monogamy. A second marriage could only happen as long as the dissolution of the first one was approved by the appropriate ecclesiastical or civil authority. In contrast, in other geographical areas, principally the Indian sub-continent, Northern Africa, Southern Asia, South-Eastern Asia and Western Asia, legal codes based on tradition or religious beliefs did not explicitly prohibit polygyny, as we have stated above. Islamic laws, in fact, approved polygynous unions, although the incidence of polygyny found for Muslim countries outside sub-Saharan Africa was also very low.

Overall, the introduction of legal codes brought significant changes to the traditional customary marriage. Nonetheless, monogamy was already well established as the predominant marital system, and polygyny was rarely observed. On the contrary, concubinage and prostitution were under these circumstances relatively common, e.g. ancient Rome and China. Whether concubinage or prostitution arises whenever polygynous unions vanished deserves further attention and research, as well as to what degree concubinage or prostitution could coexist with polygyny. Edlund (2002) argued that an important opportunity cost of prostitution is forgone marriage opportunities. This, in fact,

will be reinforced if women's labour market opportunities are scarce. In this line of thinking, the following chapters will focus on how the distinct economic roles played by women across regions and over time have influenced marital systems and other marital outcomes such as the spousal age gap.

3. Polygyny and Female Labour

"Culture is adaptive or functional sub-serving the basic needs of its carriers and altering through time by a sort of mass trial-and-error in a process which is truly evolutionary[66]*"*

3.1 Introduction

Marriage presents stark and contrasting differences across regions and throughout history. While polygyny has been a common feature of sub-Saharan marriage, in Eurasia monogamy has reigned for centuries. In chapter 2 we introduced, described and discussed marital systems. First, ethnographic evidence provided us with three main types of marital unions: (i) *Monogamy*, (ii) *Polygyny 1* where co-wives share habitation, and (iii) *Polygyny 2* where co-wives live in separate dwellings[67]. Furthermore, we observed that *Polygyny 2* was mainly found in sub-Saharan Africa, thereby *African* polygyny, whereas *Polygyny 1* was widespread among some indigenous groups in the *New World*. Statistically, we showed that the incidence of polygyny in Eurasia, Northern Africa and the *New World* regions has been relatively low in recent times. Only, sub-Saharan countries and isolated cases in Western Asia, Southern Asia and Melanesia have shown a high incidence of polygynous unions for the period 1950-2000.

These differences in marital systems can be regarded as innate, autonomous, independent or as the consequence of the social, political and economic environment. The Ethnographic Atlas, censuses, national surveys and historical records compiled in chapter 2

[66] Murdock (1949)

[67] Polyandrous and polygynandrous unions have been infrequent among humans throughout history, and as a consequence we do not include polyandrous unions in our study.

-some dating back to the second millennium BC- do not provide much evidence of a transition amid marital systems. It seems that polygynous unions have been common in sub-Saharan Africa for centuries, while they have been relatively unknown in Eurasia, Northern Africa and also among indigenous societies of the *New World*. Overall, only in Southern Africa, Burundi and Madagascar have experienced a rapid decline in the incidence of polygyny during the last decades[68]. Other countries, such as Gabon, Kenya and Ghana provide symptoms of a slow decline in the incidence of polygyny. These facts raise two major questions. First, if marital systems were culturally autonomous, why then polygynous unions have been mainly restricted to sub-Saharan Africa? Second, if marital systems were shaped by socio-economic conditions, what makes sub-Saharan Africa different from Eurasia, Northern Africa or the *New World*?

This chapter reflects upon the potential impact that socio-economic conditions have on marital systems, leaving aside the randomness of the process. Goody (1976) argued that differences in marital systems between Africa and Eurasia could be related to their methods of production, that is to say, the level of technology. Consequently, observed polygyny and monogamy would imply that those disparities have not been overcome. This, in fact, associates marital systems to technological change, and hence economic growth and development. If economic development affects the economic role of women (Goldin, 1994), then marriage -which involves men and women-, will probably be influenced by the contribution of women, as wives, to the household. This is our main objective for chapter 2, to study the relationship between the economic role played by women which is captured

[68] Our estimates of the incidence of polygynous unions in Southern Africa confirm this fact. Only Namibia and Swaziland were classified as polygynous (Po) countries. South Africa was classified given the available data as monogamous, whereas Botswana and Lesotho did not reach the 15 percent cutting point required to be grouped as polygynous. Moreover, Burundi and Madagascar which traditionally embraced polygyny do not exhibit higher rates of polygynous unions.

by female labour and marital systems[69]. For that purpose, we question whether polygyny, and henceforth monogamy, can be partly explained by the role played by women in the economy.

Conversely, the consequences of marital systems on certain aspects of economic development have brought controversial debates, in particular, whether polygyny should be banned to foster growth and development. Tertilt (2005) using a quantitative model, found that a ban on polygyny may lower fertility and increase savings and output per capita in sub-Saharan Africa. Bride prices, which are often associated with polygynous unions, will encourage men to invest in wives and "sell" daughters as an investment strategy that crowd out investment in physical assets[70]. Nevertheless, to suppose that polygyny hinders economic development would imply that the assumption of *Homo Economicus* for those polygynous men and women would not hold[71]. On the contrary, this chapter assumes that polygyny is endogenous, and emerges as a consequence of optimal decisions taken by men and women given their political, social and economic circumstances. In this way, we hope this research may throw light on the subject.

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[69] 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. In general, household work is less observable than market work, leading in some cases to underestimate the total contribution of women to their households. In this regard, the 'Male breadwinner' theory assumes that men earn a family wage or a wage above their marginal product of labour, which partly mitigates the absence of women from market work. We acknowledge this theory, among others, when discussing the effect that female labour could have on marital systems.

[70] Out of 358 societies in the Ethnographic Atlas with *African* polygyny, for 339 of them the main mode of marriage was Bride price, Bride service or Bride Token, 94.7 percent.

[71] *Homo Economicus* captures the economic assumption that individuals are rational and optimise their utility given specific constraints, i.e. income or time

Thus, the objectives of the present chapter are threefold. First, we will review the literature that examines marital systems, essentially polygyny as opposed to monogamy. To do so, we will survey different disciplines and discuss the main findings. Secondly, we will introduce a simple theoretical approach based on wealth inequality and female labour to analyse the economic incentive structure beneath both marital systems. Thirdly, we will empirically assess our main theoretical findings. For this purpose, we will use ethnographic evidence, censuses and national surveys. Our aim will be to investigate to what degree *African* polygyny, as defined in chapter 2, depends upon women's contribution to the household, wealth inequality and economic development.

This chapter is organised as follows. Section 3.2 provides a review of the literature and discusses some of the main factors explaining polygyny. Section 3.3 introduces the theory. Section 3.4 gives a brief summary of basic concepts, definitions and data sources. The empirical strategy is introduced in section 3.5. Section 3.6 present and analyses our main findings. Section 3.7 concludes and discusses the main implications.

3.2 Related Literature

The cross-cultural literature finds that marital systems are more highly associated with socio-economic factors than with cultural ones (Osmond, 1965)[72]. In this way, polygynous unions are motivated by a wide variety of reasons. This chapter acknowledges that, and provides a review of some of the main factors associated with polygyny. Our main objective lies with understanding why in some regions or countries individuals prefer

[72] In this study we just consider two marital systems, monogamy and polygyny. By explaining the main factors that determine polygyny, we will be exploring the main determinants of monogamous unions too.

polygynous households instead of monogamous ones. For that reason, we will emphasise what has made polygynous regions different throughout history.

Polygyny may be induced by a wide variety of factors. One of these has been post-partum sex taboos that forbid sexual intercourse for a period of time after the birth of the infant. Whiting (1964) claimed that polygyny will develop in societies where these taboos exist for a year or more to provide husbands with socially approved sexual partners. Ember (1974; 1984) found no significant association once controlling for demographic aspects such as male mortality and sex ratios. Post-partum sex taboos would indeed create incentives for men to seek out for a legitimate wife or sexual partner. Nonetheless, if taboos last for one or two years, it seems unlikely that many polygynous unions would be sustained over longer periods of time. The taking of a second wife would also involve marriage transfers, among other costs, which in the end would discourage men from doing so.

Barrenness and sickness have also been accounted for. The Code of Hammurabi regulated the act of taking a second wife or concubine when the wife was barren or sick[73] [74]. The Bible also described the historical episode when Abram took Sarai's maid Hagar to be his second wife, because Sarai was barren[75]. Once again, barrenness seems to be an exceptional reason to induce polygyny. Unfortunately, there is no much empirical evidence on the subject. Though, very high proportions of barren and sick women would be required to explain the high incidence of polygyny in some regions over time. To our knowledge, there are no studies associating barrenness to specific geographical regions throughout history.

[73] The Code of Hammurabi: Section 145

[74] The Code of Hammurabi: Section 148

[75] The Bible: Genesis (16:3)

Levirate, or the practice of a husband marrying the wife of a deceased brother, has also been traditionally found in the literature as a popular justification to polygyny[76]. According to Satlow (2001) levirate would have composed a significant percentage of second wives in ancient Palestine and Jewish Babylonia. For instance, the Bible recorded historical episodes where levirate appeared to be a common practice, "*If brethren dwell together, and one of them die, and have no child, the wife of the dead shall not be married abroad unto one not of his kin; her husband's brother shall go in unto her, and take her to him to wife, and perform the duty of a husband's brother unto he"* [77]. Valliant (1944) also found, among the Aztecs, that divorced women could freely remarry, but widows had to marry a brother of her deceased husband or one of his clansmen. Regardless, for polygynous unions to be prevalent within a society, high male mortality rates would be required. These will heavily imbalance sex ratios, which seems just plausible with wars or large scale migrations. On the whole, levirate does not seem to be a sufficiently strong reason to explain the high incidence of polygynous unions observed in some regions.

Some studies have also focused on the role played by religion. Lesthaeghe et al. (1989) found that Christian populations are less polygynous than Muslim ones, while ethnic groups with African traditional systems are even more polygynous. Islamic countries have conventionally been associated with polygyny. *Sharia* or Islamic Law allows men to marry up to four women[78]. Although polygyny is lawful in most Islamic countries, our results in

[76] Levirate comes from the Latin *levir* "husband's brother" (Encyclopaedia Britannica, 2008)

[77] The Bible: Deuteronomy (25:5)

[78] The Qur'an: Surah (4:3) *"If you fear that you shall not be able to deal justly with the orphans; marry women of your choice, two, or three, or four, but if you fear that you shall not be able to deal justly (with them), then only one, or (a captive) that your right hands possess that will be more suitable, to prevent you from doing injustice"*

chapter 2 illustrate that only 6 countries where Islam has been the state religion between 1970 and 2000 were classified as polygynous (Po)[79].

All the same, Hinduism and Buddhism do not explicitly prohibit polygynous unions. In this regard, we found no evidence of a high incidence of polygyny in countries where Hinduism or Buddhism predominate[80]. In Europe, though polygyny was known for centuries, the incidence of polygynous unions was relatively low before the appearance of Christianity and Civil Codes[81]. Conversely, Betzig (1992a, 1992b, 1995) pointed that Greeks, Romans, and Europeans in the Middle Age exhibited strong polygynous tendencies, with wealthy men having multiple women as wives, concubines or mistresses[82]. As a consequence, although marriage was monogamous, mating was polygynous. Whether concubines enjoyed the same privileges and rights than wives remains debatable. In Ancient Greece, a man could not legally be married to more than one wife at a time (MacDowell, 1978). Roman law recognized the position of concubines, although men could not have a concubine while they have a wife living (Rawson, 1974). Furthermore, concubinage was also frequent in

[79] We follow Barro and McLeary (2005) and sort countries according to their state religion in 1970 and 2000. For this purpose, we define a dummy variable, *Muslim,* as 1 for those countries where Islam is the State religion in 1970 and 2000, and 0 otherwise. Out of 24 countries with Islam as state religion for the period 1970-2000, only Afghanistan, United Arab Emirates, the Maldives, Mauritania, Sudan and Somalia presented evidence of a high incidence of polygynous unions. In addition, only Tunisia banned polygyny in 1956, while Morocco reformed their family laws in 2004 including clauses in the marriage contract that allow married women to prohibit polygyny (OECD, 2006).

[80] Thailand and Myanmar allow polygynous unions. Similarly, India permits polygyny among the Muslim and Hindu population (OECD, 2006).

[81] In chapter 2 we offered a review of ethnographic evidence and historical records where we did not find much evidence to sustain that the incidence of polygyny in Eurasia were comparable to the sub-Saharan case. We are inclined to think that polygynous unions were closely substituted by concubinage and prostitution.

[82] Posner (1992) discussed the widespread practice of concubinage in Greece and Rome.

Ancient China but the legal status of a concubine was not as clearly defined as that of a wife (Ebrey, 1993)[83].

Family laws against polygyny have been emphasised as a major factor too. Whether exogenous doctrines enforcing monogamy or banning polygynous unions would have the desired effect remains to be seen. Becker (1991) argued that doctrines encouraging monogamy are attractive only when the demand for polygyny is weak. In this way, the decline in the incidence of polygyny would be related to changes in the gains from being polygynously married, rather than to the exogenous spread of monogamous doctrines. For example, the Council of Trent (1545–1563) introduced the requirement of a priest and two witnesses to legitimate a union. Nonetheless, the incidence of polygynous households in Europe during the Middle Age appears to be lower than in sub-Saharan Africa during the twentieth century. Some polygynous countries have recently reformed their family laws, in an attempt to counteract polygynous unions. Côte d'Ivoire officially banned polygynous unions[84]. Guinea and Benin, among others, have reformed family laws. Nonetheless the incidence of polygyny remains relatively high in these countries (Tertilt, 2006)[85].

Sex ratios have also been widely studied and related to polygyny. Firstly, we distinguish between sex ratios at birth and sex ratios at marriageable age. The former appears to be

[83] Residential arrangements could in some cases distinguish the position of wives with respect to concubines or mistresses. The legitimacy of wives in highly polygynous regions was achieved through marriage transfers, essentially Bridewealth.

[84] Polygamy was abolished in Côte d'Ivoire in 1964. Polygynous unions prior to 1964 were recognised. Newly formed polygynous unions are punishable by a fine of CFA 50 000 to CFA 500 000 (USD 80 to USD 800) or by six months to three years imprisonment (OECD, 2006). Tertilt (2006) provides a list of countries where polygyny is illegal, restricted or legal. Overall, the incidence of polygynous unions does not seem to be greatly affected by laws enforcing monogamy.

[85] A ban on polygyny does not guarantee monogamy, because of the difficulty of enforcement. Becker (1991) and Elster (1989) argued that although laws and social norms may affect behaviour, they rarely evolve and are maintained if incentives are very weak to uphold them.

reasonably stable and not far from unity. Recent data show that on average sex ratios at birth remain fairly constant and stable at 1.07 male per female births for the period 1995-2000. Only China with 1.18 and the Transcaucasia (Armenia, Azerbaijan and Georgia with 1.15, 1.10 and 1.11 respectively), show serious imbalances[86].

On the other hand, sex ratios at marriageable age or adult sex ratios are subject to a variety of factors such as warfare, gender specific migrations, female infanticide and slavery[87]. Ember (1974) showed that in general societies with a high male mortality in warfare are likely to have an imbalanced sex ratio in favour of females and, presumably for that reason, are likely to practice polygyny. More marriageable women relative to men could induce polygynous behaviour[88]. Nevertheless, wars and large scales migrations have been a common phenomenon around the world that has not been exclusive to polygynous regions.

Slavery has also been closely associated with imbalanced sex ratios and polygyny. Manning (1990) argued that slavery led to imbalance sex ratios at marriageable age in sub-Saharan Africa. This, in fact, could have encouraged polygynous unions. Manning (1990) associated these imbalances mainly to Central Africa and to a lesser degree the Bight of Biafra and the Gold Coast, which in turn are the most polygynous regions today. Whether the incidence of polygyny increased during the slave trade remains to be found. Unfortunately, the

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[86]Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat, *World Population Prospects: The 2008 Revision.*

[87] For our study, marriageable age is defined as 15-44 years. Dickerman (1975) argued that infanticide was mostly practised by hunter-gatherers and stratified societies both to raise living standards and to maintain the social structure. Male infanticide has rarely been observed among sedentary societies. Female infanticide will reduce the number of available women, making polygynous unions more problematical.

[88] Becker (1991) also argued that an increase in the ratio of women to men redistributes married output away from women and towards men.

Ethnographic Atlas only presents evidence for the post slave trade period, while slavery was first abolished in British colonies in 1807[89]. Further evidence about pre-slave trade in sub-Saharan Africa would be required to asses the impact that slavery had on sex ratios, and hence marital systems.

Male migrations -mainly to seek work in the cities or abroad-, are also associated with sex ratios and polygynous unions[90]. Lesthaege et al. (1989) confirms that male migrations and the subsequent surplus of young women have been a common feature in some African regions. Those imbalances could encourage polygynous unions in the sending area, i.e. rural areas, while increase "polyandrous" behaviour in the receiving area, i.e. urban areas. Edlund (2002) points to male sex ratios to sustain high levels of prostitution or "polyandry"[91]. Rural polygyny would be compensated by urban "polyandry". Male migrations can encourage polygynous unions. Nonetheless, polygyny appears to have been prevalent in sub-Saharan regions well before, while male migrations in Eurasia have also been frequent.

When sex ratios at marriageable age are balanced, high levels of polygyny can only be sustained when women married young and men postpone marriage, thus creating a large

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[89] In sub-Saharan Africa, the first ethnographic evidence dates back to 1830 for the Zulu people in modern South Africa, and 1850 for the Bogo and Kru people in modern Sudan and Liberia. Additionally, *"The slave trade was declared illegal in Venezuela and Mexico in 1810, in Chile in 1811, and in Argentina in 1812. In 1817 Spain signed a treaty with Britain agreeing to abolish the slave trade in 1820, but the trade continued to the remaining Spanish colonies until 1880. Chile freed its black slaves in 1823; Mexico abolished slavery in 1829, and Peru in 1854"* (Encyclopaedia Britannica, 2008). Figure A.2.1 in appendix 2 illustrates a timeline of the existing ethnographic evidence.

[90] In Western Asia, expatriates have caused seriously imbalance sex ratios. The lowest sex ratios, 15-44 years old, found in 1980 (women per 100 men) correspond to United Arab Emirates (30), Qatar (46), Bahrain (59), Kuwait (63), Saudi Arabia (72) and Oman (73). On the other hand, Yemen, Saint Lucia and Cambodia present the highest sex ratios with 132, 125 and 122 women for every 100 men.

[91] If there are more men than women, then some men would struggle to get married. Some of these men could prefer to share a woman than to remain single. Polyandry among the lower classes breaks down if women prefer to be prostitutes to the whole population rather than wives to a subset of poor men (Edlund, 2002).

spousal age gap (Tertilt, 2005). Consequently, why women would prefer to marry young? A common explanation follows; women would marry young to maximise fertility[92]. Social stigma associated with pre-marital sex in some traditional societies can also encourage women to marry young. Whether reproduction potential or social stigmas persuade women to marry at an early age does not explain why they would prefer a polygynous union. This is because women in predominantly monogamous regions also marry young. In this way, age at first marriage may be closely associated with the level of economic development. Whether a 25 years old person is young or adult is relative. For that reason, we concentrate and emphasise the age differences between spouses at marriage[93].

Becker (1973) analysed the incidence of polygyny in terms of the relative gains to men and women and claimed that polygynous unions could be explained when men or women differ greatly in wealth or ability, among other attributes[94]. If all men were equal, women would have no incentives to become the second wife of a man, when they can just be the first wife of someone just as good. Kanazawa and Still (2001) developed a theory in which

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[92] Tertilt (2005) found differential fertility rates between polygynous and monogamous countries in 1980 of two-child on average after taking into account infant mortality. Table A.3.1 in appendix 3 presents data for polygynous and non polygynous countries for three periods, 1960, 1980 and 2000. The sample have been restricted to countries with the lowest human development indices in 1980, hence high developed countries (with an index of 0.800 or above) were removed. Our results confirm a differential fertility rate of two-child in 1980. Moreover, table A.3.1 illustrates an increase in 2000, but also that differential fertility rates in 1960 were minor. Josephson (2002) showed that out of 86 studies reviewing polygyny and fertility, 64 concluded that monogamous women had higher fertility rates, 7 that polygynous had higher fertility rates and 15 that polygyny had no effect on fertility.

[93] Recent data on the singulate mean age at marriage (SMAM) for Honduras, Nepal and Madagascar indicate that female age at first marriage is 20.4, 19.6 and 19.8 years respectively, (United Nations, 2000). Moreover, historical records have shown that female mean age at marriage were relatively higher in some European countries in the seventeenth or eighteenth centuries, (Hajnal, 1965; Wrigley et al., 1997). In this regard, it could be the case that a 21 years old woman was considered very young in Europe during the seventeenth century, though old in Nepal in 2000.

[94] Becker (1973) also attributed polygynous unions to sex ratio imbalances.

polygyny emerges spontaneously based exclusively on male resource inequality. If male resource inequality were sizeable, women would choose to marry or mate polygynously. They also found empirical support for this theory with cross-cultural data from a large number of countries[95]. Grossbard (1976) provided the first econometric analysis of African polygyny using household-level data, and confirmed that wealthier men took more wives.

Wealth can be composed of labour and non-labour income. Wealth inequalities originated by non-labour income would entail a well established system of property rights and inheritance rules that allows transfers of wealth across generations. If not, men and women would be born equal, and wealth inequalities will be the result of age and innate attributes, i.e. ability. Along these lines, White (1988) argued that polygynous unions where co-wives share habitation are dependent on the personal ability or productivity of men, i.e. hunters. Among hunter-gatherers, the strongest, boldest and most skilful of hunters would be the most desired husband.

Alternatively, traditional land tenure systems which have prevailed in many regions, especially in sub-Saharan Africa, could have an impact on marital systems[96]. A common feature of these systems, popularly known as "communal land", is that access to land is assured to most households (Place and Hazell, 1993). Therefore, if land as main resource is

[95] Kanazawa and Still (1999) constructed a polygyny score based on cultural data from the Encyclopaedia of World Cultures (Levinson 1991-1995), which contains description of marital systems, among other cultural practices. They weighted their cultural scores with the ethnic and cultural group populations for each country. We raise doubts about the polygyny scores for two reasons. First, some countries are not fully represented. Second, cultural scores do not totally capture the exact incidence of polygyny.

[96] Boserup (1970) stressed that land tenure systems are one of the main factors explaining the contrasting marital systems of Eurasia and Africa.

accessible, differences in agricultural productivity would also generate inequalities[97]. Moreover, if differences in agricultural productivities are negligible, inequalities would only arise between older and younger men, provided that wealth can be accumulated over time[98]. Under these circumstances, a young man would postpone marriage and accumulate enough wealth to compete with older men, -who would be already married and better established- for a suitable spouse. Women could prefer to be the second wife of a married man and hence a member of a wealthier household, than the first one of a newly formed household. Women would have incentives to enter a polygynous union[99].

In Eurasia and the *New World* property rights have been well established and known for centuries. Wealth inequality in many of these societies has been closely associated with male wealth inequality, because land ownership and inheritance rules have conventionally followed a patrilineal pattern[100]. In some cases, disparities in wealth have been commonly observed in Eurasia and the *New World* throughout history (Milanovic et al., 2007)[101]. Thus, if these inequalities have been accounted for, why polygynous unions have not been

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[97] Male heterogeneity in agricultural productivity is difficult to measure. Nevertheless, a substantial heterogeneity would imply that the most efficient men accumulate wealth much faster. Consequently, they would be able to marry earlier and form a polygynous union at a younger age.

[98] Wealth accumulation partly differentiates polygyny among hunter-gatherers from the rest, because the former can scarcely accumulate wealth. In our study, *Polygyny 1* is commonly associated with hunter-gatherers in *New World* regions, whereas *Polygyny 2* usually refers to sedentary groups. We will test these implications in the empirical analysis.

[99] Polygynous unions can also bring some other benefits. Borgerhoff-Mulder and Milton (1985) observed that among the Kipsigis provision of infant care was provided by co-wives.

[100] The Salic Law or *Lex Salica*, written around the time of Clovis (AD 476-96) for the Salian Franks prohibits women to inherit land. Title LIX. Concerning Private Property: 6. *But of Salic land no portion of the inheritance shall come to a woman: but the whole inheritance of the land shall come to the male sex*. In the Ethnographic Atlas, out of 619 societies with available data, nearly in 70% of the cases inheritance rules were patrilineal.

[101] Table A.3.2 in appendix 3 illustrates recent data on the distribution of land. Although in most polygynous countries property rights are not well established and traditional land tenure systems persist, recent data shows that the distribution of land for polygynous countries is more even than in non polygynous ones.

prevalent? That question would leave us with three possible explanations. First, monogamy was socially imposed and even if women were better off in a polygynous union, men would not be allowed to take a second wife[102]. Second, the degree of wealth inequality made just few wealthy men attractive marriage prospects in the eyes of women. Third, wives were expensive and only few men were able to afford more than one. Whether monogamy was socially imposed will also be discussed later on. For the moment we will concentrate on wealth inequality and the implicit cost of taking a second wife.

In this regard, we raise another important question, why men would demand more than one wife? The desire for a second wife could be determined by the potential gains that another wife could bring to the household. Those gains might be reputational, reproductive or economic. In this way, Boserup (1970:50) analysed the position of women in rural communities across regions and found two main patterns:

"…the first type is found in regions where shifting cultivation predominates and the major part of agricultural work is done by women. In such communities, we can expect to find a high incidence of polygamy, and bride wealth being paid by the future husband or his family. The women are hard working and have only a limited right of support from their husbands, but they often enjoy considerable freedom of movement and some economic independence from the sale of their own crops.

The second group is found where plough cultivation predominates and where women do less agricultural work than men. In such communities we may expect to find that only a tiny minority of marriages, if any, are polygamous; that a dowry is usually paid by the girl's family; that a wife is entirely dependent upon her

[102] Alexander et al. (1979) introduced the term socially imposed monogamy. As societies grew, they were forced to impose rules regarding reproductive opportunities in order to elicit cooperation and solidarity within the society. In Eurasia and the *New World* high polygyny is mostly associated with the elite, i.e. Concubinage and *Harems*.

husband for economic support; and that the husband has an obligation to support his wife and children, at least as long as the marriage is in force."

The first type was mainly associated with sub-Saharan Africa and some parts of South East Asia, whereas the second one was predominantly observed in India, China and the Middle East (Boserup, 1970). Following this line of thinking, the more a wife contributes to the household, the higher should be the incidence of polygyny. Boserup (1970) argued that women in rural sub-Saharan Africa have a double role as agricultural workers and housewives. As a result, if we assume that men have similar reproduction or reputational incentives to form a polygynous union across regions[103]. The costs associated with the taking of a second wife would largely influence the desire to form a polygynous household. Therefore, the more wives contribute to the wealth of the household, the smaller are the costs associated with a polygynous union, and the higher would be the demand for wives[104].

Osmond (1965) found a significant positive association between female economic contributions and polygyny, but only for rudimentary societies. Grossbard (1976) also

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[103] Conventionally, *African* polygyny has been partly explained by the desire of men to maximise fertility. Another common explanation lies with prestige and reputation. Nonetheless, these motivations would also explain *Harems,* concubinage and sequential polygyny. In this way, it seems plausible to assume that all men have reproduction or reputational incentives to take a second wife.

[104] The costs associated with a second wife mainly refer to daily consumption, not marriage transfers, which are in some cases a lump sum. In this way, marriage transfers have been commonly misunderstood in the economics literature. Becker (1991) predicted that polygyny is positively associated with bride prices and increasing transfers to the bride, while Bergstrom (1994) also claims that the greater the amount of material resources available per women in the society, the higher will be the bride prices and the greater the amount of resources allocated to each woman. Goody and Tambiah (1973:17) provided a brief description of the role played by marriage transfers: *"Bridewealth passes from the kin of the groom to those of the bride; it forms a societal fund, a circulating pool of resources, the movement of which corresponds to the movement of rights over spouses, usually women. But dowry is part of a familial or conjugal fund, which passes by from holder to heir, and usually from the parents to the daughter".* Bridewealth usually remains within the wife's natal family, and in case of divorce or separation, Bridewealth is returned.

observes a relationship between female contribution to subsistence and more polygyny. Pryor (1977) supports the hypothesis that polygyny increases the accumulation of wealth of a household, when access to land is not restricted. Lee (1979) notices a positive correlation between polygyny and female subsistence contributions for agricultural and gathering societies, and a negative correlation between these two variables for fishing hunting, or herding societies. White and Burton (1988) provided various tests for polygyny using data from the Standard Cross-Cultural Sample (SCCS) and found that the absence of constraints on expansion into new lands favours polygyny. White (1988) claims that polygyny is more prevalent in societies in which women have more to offer to the household economy. Finally, Jacoby (1995), with a large household survey from Côte d'Ivoire, found that conditional on wealth, men do have more wives when female labour contributes a larger share to household income. Whether wealthy inequality and female labour are good predictors of polygynous unions will be subject of analysis in the remaining sections.

3.3 Theoretical Model

In the previous section, we discussed some of the main reasons associated with polygyny. Overall, wealth inequality and female labour appear to be the two most important factors. For the remainder of the chapter, we will concentrate on these two and present a simple theoretical approach to explain polygyny. In this fashion, we introduce in table 3.1 three possible cases regarding marital unions. These three scenarios can be characterised as follows: (i) *Monogamy*, when the incidence of polygynous unions is very low and monogamous unions prevail, (ii) *Harem* polygyny, when the incidence of polygynous unions is low, most men are monogamous, although many women are polygynously married or

mated[105], and (iii) *African* polygyny where the incidence of polygynous unions is high, many men and women are in polygynous unions. Table 3.1 describes scenarios that could emerge in traditional societies. We define traditional societies as those where, (i) the levels of human capital remain low and (ii) all men and women want to get married (universal marriage), hence celibacy is possible, but unwanted.

Table 3.1 Marital Systems, Female Labour and Wealth Inequality

Female labour [a] / **Wealth Inequality** [b] **(non-labour income)**	**High**	**Low**
High	*Harem* polygyny and *Monogamy* [c]	*Harem* polygyny and *Monogamy* [c]
Low	*African* polygyny and/or *Monogamy* [c]	*Monogamy* [c]

Source: Author's

Notes: a/ Female labour captures female participation in household and market activities.

b/ Wealth inequality in traditional societies or less developed economies mainly arises from non-labour income inequalities. Non-labour income refers principally to wealth transmitted across generations, i.e. land.

c/ *Monogamy* also includes some occasional polygyny that may occur exceptionally

When the contribution of wives is not limited to the production of household goods and they participate in other activities, i.e. gathering, producing food or earning income; married men would have more incentives to take a second wife. This would be not just for reproduction or reputational reasons, but also for economic ones. In scenarios where wealth inequality is low, given that non-labour income remains irrelevant, married men would still demand a second wife because they would increase their reputation, reproductive success and because wives would be inexpensive. In traditional societies,

[105] *Harem* polygyny includes wives, concubines and mistresses who share residence with their husband or sexual partner. In sub-Saharan Africa, Bridewealth legitimates the marital union, even if co-wives do no share residence. In Eurasia, we are not aware the concubines or mistress living in separate habitation were legitimated in any particular way.

married men -who are usually older, more experienced and wealthy-, would have an advantage. Single men –who are usually younger, less experienced and poor- would probably have to postpone marriage to accumulate enough wealth to compete with married men for wives. As a result of this competition, women would be highly demanded and marry young, creating a spousal age gap required to sustain a high incidence of polygynous unions. The equilibrium when many men and women are polygynously married could arise; this equilibrium will be denoted as *African* polygyny[106].

Nonetheless, we ought to prove whether or not this is a stable equilibrium. Thus, we question, why would women prefer to enter a polygynous household?[107] The answer lies with the level of economic development. As we stated above, when human capital and non-labour income are irrelevant, male wealth inequality is low and greatly determined by disparities in labour income[108]. Households with a married couple and their respective children could have amassed more wealth, and thus provides higher levels of consumption

[106] Direct measures on the incidence of polygynous unions indicate the existence of this equilibrium in sub-Saharan Africa. Table A.3.3 in appendix 3 illustrates the percentages of men and women married in polygynous unions for a selection of countries. On the whole, the percentages are very high for both, men and women, ruling out imbalances associated with the *Harem* polygyny equilibrium, characterised with few polygynous men and many polygynous women.

[107] We acknowledge the vast literature on arranged marriages. Nonetheless, we assume that parents want their best for their daughters and sons. Therefore, we will use throughout the paper the terminology men and women.

[108] If a well established system of property rights does not exist, land could not be perfectly transmitted across generations. Therefore, male wealth inequality would be greatly affected by labour productivity. If labour productivities are similar among men and women, household wealth inequality would arise between generations. Along these lines, Boserup (1970) observed that wealth inequality in less developed economies is normally driven by land ownership. If land is distributed equally among individuals, or access to land is not restricted by a well-established system of property rights, then wealth inequality might have a weaker impact on marital decisions.

for their members[109]. Women could choose to enter a polygynous or a monogamous household based on the levels of consumption or standard of living that they would enjoy[110].

Let us assume that the levels of consumption that women would enjoy in a polygynous or monogamous household are $\left[c^P, c^M\right]$ where the superscripts denote the type of household, *P* for polygynous and *M* for monogamous, and $c^P > c^M$. We assume that a polygynous household could offer a slightly higher level of consumption than a newly formed one. This is a plausible assumption for societies where wealth inequality is low and largely driven by labour income. Moreover, if access to the factors of production, i.e. land, is not restricted, wealth and hence consumption could be determined by labour productivities and the size of the household. As a result, women would enter a polygynous union when,

$$U(c^P) > U(c^M) \tag{3.1}$$

Let also assume that the utility function is the same across regions, and $U' > 0$, $U'' < 0$, $U(0) = -\infty$ [111]. This simple theory would imply that consumption levels would exclusively determine the marital decision. Brown (1981) also points that a monogamous wife could encourage her husband to take a second wife to share housework or child care. To simplify matters, we will not take into account other potential benefits of entering a polygynous

[109] Borgerhoff-Mulder (1988a) described that Kipsigis men made substantial payment, *Bridewealth*, of livestock, and more recently cash, to get married. Therefore it would take some time to accumulate *Bridewealth* and wealth to sustain a newly formed household.

[110] The choice of husband, among Kipsigis women, is influenced by the *Bridewealth* and the size of his land plot (Borgerhoff-Mulder, 1988b).

[111] The theory could also include forward looking behaviour. Nonetheless, at low levels of economic development forward looking is not the most appropriate way of modelling.

union and assume that households would generally demand a second wife for reproductive or reputational reasons.

So far we have assumed that polygynous unions do not entail any specific costs. What would happen if they do? Women may get disutility from entering a polygynous household. Let us assume that women dislike sharing the husband and habitation with other women[112]. This, in fact, would be a cost associated exclusively with polygynous households. We denote this cost as δ. Let us assume that δ is constant across regions too. All women get the same disutility from entering a polygynous household, no matter culture, religious beliefs or economic development. Then, women would enter a polygynous union when,

$$U(c^P) - U(c^M) > \delta \tag{3.2}$$

Once we have included δ, monogamy could also arise when the cost of entering the polygynous household is greater than the utility gained due to different consumption levels. Under these circumstances, even if the demand for wives is high because wives are inexpensive, we could end up with the *Monogamy* equilibrium[113]. Then, why would women prefer polygyny? To answer this question, we need to refer to economic development.

Economic development can be broadly defined as the process whereby regions or countries improve their standards of living. These are closely associated with consumption levels. Therefore, let us assume there are two traditional societies with c_L and c_H standing

[112] This has already been noticed in the literature. The Ethnographic Atlas provides evidence that polygynous unions in sub-Saharan societies mainly involve co-wives living in separate habitation. Nonetheless, the disutility from sharing a husband would persist.

[113] Polygynous behaviour would be associated with a high demand for spouses. However, women would be required to accept this polygynous behaviour to form a polygynous union.

for their average consumption levels, where L stands for low and H for high, $c_L < c_H$. Then, if wives are inexpensive, married men would demand a second wife and single men would demand a first wife. Women would value both marriage proposal and enter a polygynous household when,

$$U(c_L^P) - U(c_L^M) > \delta \tag{3.3}$$

$$U(c_H^P) - U(c_H^M) > \delta \tag{3.4}$$

The average levels of consumption $[c_L, c_H]$ are just the weighted average of the consumption levels enjoyed by married and single men seeking for a spouse. More decisively, the level of consumption will greatly determined the utility gains that accompanied different consumption levels offered by a polygynous or a monogamous union.

$$\frac{\partial U(c_L)}{\partial c} > \frac{\partial U(c_H)}{\partial c} \tag{3.5}$$

This, in fact, seems rather trivial but turns out to be relevant for our study. At low levels of economic development, small differences in consumption will be accompanied by higher gains/losses in utility[114]. If women have to decide whether to enter a polygynous or a monogamous household, and household wealth inequality remains low, women's incentives would be affected by the level of economic development. Moreover, at low levels of economic development, female labour would be crucial. If wives are limited to household work, wives would be very expensive for the household, discouraging married

[114] Figure A.3.1 in appendix 3 illustrates graphically the case when average consumption increases and wealth inequality remains constant and low.

men from taking a second wife. All men want to get married then single men would seek for a suitable spouse. If, on the other hand, wives contribute more to the household, married men would not be discouraged from taking a second wife, and women's incentives to enter a polygynous union would be higher if the level of consumption within the society is very low.

Consequently, if the average level of consumption increases, women would have less incentive to enter a polygynous household, and *Monogamy* will prevail. *African* polygyny would emerge in less economically developed regions, when female labour is high even if wealth inequality is low. If, on the other hand, female labour is low, *Monogamy* will prevail because married men would not have many incentives to take a second wife. These would be further reduced at low levels of economic development[115].

What would happen when household wealth inequality increases? In this case, women would have incentives to be the second wife, concubine or mistress of a wealthy man. The level of economic development would determine how sizeable must be these differences in wealth that would be closely associated to the level of consumption. At low levels of economic development, we could reach the *Harem* polygyny equilibrium. Wealthy men could be encouraged to form a polygynous union. Having more than one wife could increase their reputation and reproductive success[116]. Wealthy men would be less concerned

[115] Previously, we discussed that wealth accumulation partly distinguish polygynous behaviour between hunter-gatherers and sedentary people. The former will find extremely difficult to accumulate wealth in any form. Moreover, the contribution of women is restricted to gathering. Out of 844 societies in the Ethnographic Atlas with available data, only in 14 women contribute something to hunting activities. Regarding fishing activities, 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.

[116] Polygyny has been closely associated with the elite, Shamans, Chiefs, Sultans, Emperors, and Kings among other powerful figures.

about the economic contribution of their wives to the household. Women, on the other hand, would have incentives to be the second wife, concubine or mistress of a wealthy man. Extremely unequal societies could reach the *Harem* polygyny equilibrium, where few wealthy men have many wives, while poor men are monogamous or unmarried[117]. This equilibrium would be sustainable if and only if wealth inequality persists over time, and economic development remains steadily low.

Along these lines, Betzig (1986) points that polygynous mating was observed in Ancient civilisations, i.e. Roma, Aztec Empire or Ancient China. Betzig (1986) offers an original theory to explain this behaviour. Wealthy parents, who are able to transfer resources, will invest in sons, whereas poor ones will bias their investment toward daughters. As wealthy men grow powerful, more women would be retained in seclusion to maximise their own reproduction success, resulting in *Harem* polygyny[118]. Nevertheless, even if mating was polygynous, as Betzig (1986) described, marriage in those regions was essentially monogamous. It seems that polygynous marriage turned into polygynous mating when male wealth inequalities became substantially large. By then, property rights were established. In the absence of property rights, wealth could not have been amassed across generations and male wealth inequality would have stayed low.

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[117] Even if monogamy prevails among poor men, we do not rule out that some occasional polygyny could emerge because of exceptional circumstances, i.e. levirate and sororate.

[118] *Harems* and *Purdah* are two extreme ways of secluding women to the household. *"Harem is the part of a house set apart for the women of the family. The harem served as the secure, private quarters of women who nonetheless played various roles in public life. Large Harems were common in the wealthy households in Arab countries through the early decades of the 20th century"; "Purdah is the practice that involves the seclusion of women from public observation by means of concealing clothing (veiling) and by the use of high-walled enclosures, screens, and curtains within the home"*, (Encyclopaedia Britannica, 2008)

Lagerlöf (2005) proposed a theory that explains the decline of *Harem* polygyny. If wealthy men also tend to have more children, non-labour income would dilute over time, increasing male wealth equality and consequently eliminating polygyny. This is a plausible theory to explain how the *Harem* polygyny equilibrium turn into *Monogamy* with occasional polygyny, and finally into *Monogamy*. However, Lagerlöf (2005) neglects the role played by economic development and female labour. In this regard, even if male wealth inequality remains high, women could be discouraged to enter a polygynous union if the cost associated, δ, is greater than the utility gain. At higher levels of economic development, male wealth inequalities need to be considerably high to induce women to join a polygynous union. This could be more acute when women work and earn an income. Under these circumstances, women could think that: *It is better to be the head of a mouse than the tail of a lion*.

Finally, Gould et al. (2004) provide an original theory that explains the decline of polygyny in modern societies. When inequality is determined by disparities in human capital -as opposed to traditional societies where difference in non-labour income are more relevant-, wealthy men would value more high quality women who can raise high quality children. As a result, high quality women would be more valued and less affordable, and monogamy would emerge. Nonetheless, this theory fails to explain why monogamy was prevalent in most parts of Eurasia and the *New World* throughout history, well before the twentieth century when human capital became substantially more relevant.

Out of the three possible scenarios: (i) *African* polygyny, (ii) *Harem* polygyny and (iii) *Monogamy*, we would concentrate on the *African* polygyny and *Monogamy* equilibriums. The reason being is that *Harem* polygyny requires exceptional economic conditions to be stable over time. We acknowledge that high wealth inequality within societies has been observed across regions. We are not that confident that these differences between wealthy and poor

men have increased with economic development. Our theory suggests that an increase in the standard of living needs to be accompanied by an increase in male wealth inequality for the *Harem* polygyny equilibrium to remain stable.

Kuznets (1955) hypothesised an inverted U-shaped relationship between income inequality and economic development. That is, low levels of economic development are associated with low income inequality, then income inequality increases and at some critical point starts to decrease over time. This would imply that *Harem* polygyny equilibrium would have occurred at the early stages of economic development, when the standards of living were relatively low, but wealth inequality started to increase. Better economic conditions would require higher wealth inequality; if not, women's incentives to enter a polygynous household would decrease, and hence *Harem* polygyny would progressively turn into *Monogamy* with occasional polygyny, and later into the *Monogamy* equilibrium observed in many countries today[119].

Kuznets (1955) inverted U-shaped relationship also stresses that at very low levels of economic development, income inequality would be low. Under these circumstances, if the demand for wives is high -which in turn would be affected by female labour-, the *African* polygyny equilibrium may emerge. Table 3.1 illustrated that high female labour and low wealth inequality were the two main prerequisites for the *African* polygyny and *Monogamy* equilibriums. We will argue that at high levels of economic development, *Monogamy* would

[119] We distinguish between *Harem* polygyny and *Monogamy* with occasional polygyny. The former involves many women marrying or mating with a man (high intensity), whereas the latter implies that few women are in polygynous unions (low intensity).

prevail, but at low levels of economic development *African* polygyny would be favoured. In the following sections, we empirically test these implications[120]

3.4 Data Sources and Definitions

Our empirical strategy involves three different approaches. First, we will use ethnographic evidence to empirically test the impact of female contribution to subsistence on marital systems across societies. Then, we will use our country estimates of polygyny derived in chapter 2 to measure how female labour affects polygyny at different levels of economic development. This type of polygyny refers to the *African* polygyny equilibrium aforementioned. For that purpose, we present a cross-section Probit-model, with base year 1980[121]. Finally, direct measures on the incidence of polygyny and female employment from national surveys would be brought into play to illustrate the robustness of our main results.

3.4.1 Data Sources

This chapter combines ethnographic evidence, censuses and national surveys. All countries with available data were included[122]. Ethnographic evidence on marital systems, female

[120] In chapter 5 we will have a closer look at the long term relationship between economic development and female labour. For the moment, we will analyse them independently, though we acknowledge that at low levels of economic development it is likely that female labour is high, but this is not always the case (Boserup, 1970).

[121] Our country values in chapter 2 were derived for the period 1950-2000. For this chapter, we take 1980 as a base year for the cross-section.

[122] The term "country" refers also to territories or areas, irrespective of their legal status or delimitation of their frontiers or boundaries. There are 192 independent countries recognised by the United Nations and 46 dependent territories, see table 2.1 and A.2.1 for a detailed classification of societies and countries by geographical regions.

contribution to subsistence activities, settlement patterns and size of the community come from the Ethnographic Atlas introduced and described in chapter 2.

Country data on marital systems are taken from our estimates of polygynous and monogamous countries derived in chapter 2. Table A.2.4 in appendix 2 presents data for 184 countries and territories. There are 39 polygynous (Po), 121 monogamous (Mo) and 39 occasional polygynous (OP). Direct measures on the incidence of polygyny were collected from three main sources. First, Chamie (1986) provides data on Arab countries. Data on sub-Saharan Africa, Northern Africa and parts of Asia ranging from 1947-1982 were published by Patterns of First Marriage (United Nations, 1990)[123]. Finally, recent estimates on the percentage of married men and women in polygynous unions were obtained from the Demographic and Health Surveys (1985-2005)[124].

Data on female participation are collected from the "Population, Policies, Resources, Environment and Development Databank" or PRED Bank, Version 3.0[125]. Population data come from, estimates and projections of populations by sex and five-year age groups, 1950-2050, The 1998 Revision, Demographic Yearbook and World Population Prospects, The 1998 Revision, Volume I: Comprehensive Tables[126]. The Human Development Indices

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[123] Patterns of First Marriage: Timing and Prevalence (United Nations, 1990) was prepared by the Population Division, Department of Economic and Social Affairs, United Nations.

[124] Data collected Demographic and Health Surveys were extracted from the STATcompiler (http://www.statcompiler.com/) Data presented in this chapter are usually the average of all the available surveys for each country for the period 1985-2005. Otherwise, it will be indicated appropriately.

[125] The PRED Bank, Version 3.0 was published by the Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat.

[126] These data were extracted from the Women's Indicators and Statistics Database Version 4 (CD-ROM)

come from the Human Development Reports 2007/2008, United Nations (2007)[127]. Urbanisation rates are taken from PRED Bank, Version 3.0. Moreover, data on religion are extracted from two main sources, Barro and McLeary (2005) and Laporta et al. (1999).

3.4.2 Variable Definitions

3.4.2.1 Ethnographic Atlas

Marital systems can be illustrated in several forms. First, the Ethnographic Atlas defines marital systems under variable 9: Marital Composition: Monogamy and Polygamy. Based on this codification, we distinguished three different types of marital unions: monogamous (codes 1 and 2), polygynous (codes 3 to 6) and polyandrous (code 7). As stated in chapter 2, we concentrate on polygynous and monogamous unions, leaving aside polyandry.

Additionally, residential arrangements and sororate were fully described for polygynous unions. In this way, we classified marital systems into three main groups: (i) *Monogamy*, (ii) *Polygyny 1*, where co-wives live under the same dwelling, and (iii) *Polygyny 2*, where co-wives live in separate dwellings. Table 2.3 introduced this classification in chapter 2. For the main purpose of this chapter, we assume that *Monogamy 1*, henceforth perfect monogamy, and *Monogamy 2*, henceforth monogamy with occasional polygyny, are just one marital system, *Monogamy*, and deal with occasional polygyny as the exception, not the rule.

To compute female contribution to subsistence activities from the Ethnographic Atlas, we use the following methodology. First, values on economic dependence by activity were

[127] These values were revised and updated with the latest revision from the Human Development Report. We managed to add three countries to the original data set of 116 countries or territories. These were Brunei Darussalam, Liberia and Libya.

taken from variables 1-5. There are five main subsistence activities described for each society: gathering, hunting, fishing, animal husbandry and agriculture. These values range from 0 to 9. Table A.3.4 in appendix 3 shows the codification. Variables 50-54 describe gender specific differences or sex differences in participation for each activity. To obtain a measure of female contribution, we first assign arbitrarily percentages to the codified values of variables 50-54. Table A.3.5 in appendix 3 illustrates the procedure[128]. For example, code 1 implies that "Males only, or almost alone" participate in a particular activity, i.e. hunting. Therefore, female participation in hunting activities will be 0 percent. Once we have converted codes into percentages, we computed a weighted average with the values of economic dependence by activity. We computed female participation rates for 379 societies. The variable will be denoted as *Female Contribution,* and is a percentage.

Furthermore, settlement patterns, *Settlement*, are described under variable 30: Settlement Patterns. Table A.3.6 in appendix 3 illustrates the codification. We have grouped categories using a new code. In this way, there are three categories, (i) nomadic (code 1), (ii) semi-sedentary (codes 2-4) and (iii) sedentary (codes 5-8). Finally, we have also taken values regarding the size of the community for each society, *Size of community*, given under variable 33: Mean size of local communities. These values range from 1 to 8. Table A.3.7 in appendix 3 provides the Ethnographic Atlas codification.

[128] All societies present values for economic dependence by activity, variables 1-5. Societies who did not present values for gender differences in participation for all activities were removed. Moreover, code 7: "Irrelevance of gender, especially industrialized production" and code 8: "Activity present: Sex participation unspecified" were also removed. We found zero societies under code 7 and only 7 under code 8. Finally code 9: Absent or unimportant activity, are associated with zero dependence.

3.4.2.2 Censuses and National Surveys

To measure the incidence of polygyny, we use a binary variable, *polygyny,* based on the country estimates derived in table A.2.4 in appendix 2. This variable takes the value of 1 if the country was described as polygynous (Po) and 0 otherwise. Therefore non-polygynous countries include monogamous (Mo) and occasional polygynous (OP). To control for cultural continuity, we also include the dummy variable *Old World* (as opposed to *New World*) which takes the value of 1 for those countries or geographical regions where more than 50 percent of the population have an indigenous language as mother tongue, and 0 otherwise[129].

Female participation in the labour market is measured with the ratio of women economically active per 100 men (*WEA*)[130]. The projected economic activity rate for male and female for the year 1980 covered ages of 15 years and over. Activity rate is the proportion of the population who are economically active, expressed as a percentage. The estimates take into account information on the economically active population obtained mainly from national censuses and labour force sample surveys[131]. These data have been

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[129] To construct the dummy variable *Old World*, we used data from Alesina et al (2003) and Lewis (2009). First, we classified languages by family. Then, we verified which languages and families were indigenous. We define a language or a family as indigenous if it was widely spoken in the continent where the country belongs. Finally, the percentage of the population speaking an indigenous or non-indigenous language was computed. See table A.2.4 in appendix 2.

[130] *WEA* captures gender differences in participation. Conventionally, male participation rates have been relatively high and constant across countries. On the other hand, female participation rates have shown striking differences. In this study, we use gender differences to better capture the role played by women in the labour market. Figure A.3.2 in appendix 3 illustrates a scattered graph and a linear prediction of our main variable of interest *WEA* against the percentage of women economically active (economic activity rate) both for 1980. [$R^2 = 0.9511$].

[131] The International Labour Office defines persons as economically active, if they are working for pay or profit at any time during a specified reference period or are seeking such work. This definition was

adjusted by the International Labour Office so as to arrive at a consistent set of data. *WEA* can be understood as the number of economically active women for every 100 economically active men.

Economic development is captured with the Human Development Indices (*HDI*). The Human Development Indices are based on three dimensions of human and economic development: (i) Longevity (Life expectancy), (ii) Knowledge (Literacy and Enrolment ratios) and (iii) Standards of Living (GDP per capita)[132]. The *HDI* were first derived in 1975. Subsequent revisions for some or all of the components of the *HDI*, changes in methodology, or variations in the country coverage suggest that *HDI* are not directly comparable over time. Nonetheless, *HDI* remain to be widely used as cross-country indicator of the level of human development. We prefer *HDI* over *GDP per capita,* because the latter only reflects average national income. *GDP per capita* does not capture how income is distributed, and our theory requires a reliable measure of human and economic development. Moreover, other control variables included in the cross section are *URBAN* or the rate of urban population (percentage), *Sex ratio 15--44* (number of women per 100 men aged 15-44 years old) and *Muslim80* or the percentage of Muslim population within a country.

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broadened in 1982 to include, if appropriate, persons available for work but not necessarily actively seeking work

[132] Data on life expectancy come from World Population Prospects 1950-2050: The 2006 Revision, Department of Economic and Social Affairs, Population Division, New York, United Nations; Data on adult literacy rates from UNESCO (United Nations Educational, Scientific and Cultural Organization) Institute for Statistics. 2003. Data on combined gross enrolment ratios from UNESCO (United Nations Educational, Scientific and Cultural Organization) Institute for Statistics. 1999. Statistical yearbook. Data on GDP per capita (2000 PPP US$) and GDP per capita (PPP US$) come from World Bank, World Development Indicators 2007.

3.4.3 Summary Statistics

Table 3.2 reports summary statistics for our main variables by marital systems using ethnographic evidence for 379 societies. We observe that societies under *Polygyny 2*, that is to say co-wives live in separate dwellings, are characterized by higher levels of female contribution to subsistence (nearly 45 per cent). This marital system typically refers to the *African* polygyny, as we noticed in chapter 2, table 2.5.

Table 3.2 Descriptive Statistics. *Female Contribution* by Marital System

Variables	***Monogamy***			***Polygyny 1***			***Polygyny 2***		
	Obs.	**Mean**	**St. Dev**	**Obs.**	**Mean**	**St. Dev**	**Obs.**	**Mean**	**St. Dev**
Female Contribution (%)	242	34.58	17.4	66	37.20	15.1	71	44.75	11.9
Size of community (1-8)	242	3.51	2.3	66	2.38	1.3	71	3.93	1.7
Settlement [*dummy*]	242	0.59	0.4	66	0.33	0.48	71	0.87	0.3

Source: Ethnographic Atlas.

Notes: Observations refer to societies as described in the Ethnographic Atlas. Out of 1,240 societies there were 379 with available data. Settlement patterns are captured with the dummy variable *sedentary*, which takes the value of 1 if societies are sedentary, and 0 if societies are nomadic or semi-sedentary.

Additionally, *Polygyny 1* which involves co-wives sharing habitation, was usually found in *New World* regions, mainly among hunter-gatherers. This is reflected in table 3.2. Small communities are mostly associated with these societies. This pattern is also supported by the fact that only 33 percent of *Polygyny 1* societies were sedentary. Conversely, the sedentary pattern of settlement among *Polygyny 2* societies appears in 87 percent of the cases. This is a very important fact. *Polygyny 2* is rarely found among nomads or semi-sedentary societies, who are more inclined towards the other two marital systems. Certainly,

separate habitation for co-wives can be very costly for nomads, especially if female contribution to subsistence plays a lesser role.

In this way, societies described as *Monogamy* present the lowest percentage of female contribution to subsistence (below 35 percent). These societies also present a wider variation regarding *Size of community*. Table A.3.8 in appendix 3 illustrates the number of societies by marital system and *Size of community*. While *Monogamy* appears to be within small and large communities, *Polygyny 2* and mainly *Polygyny 1* societies are relatively small communities[133]. This implies that either type of polygyny has mostly occurred within small communities. Furthermore, we could not say that as communities grew in size *Monogamy* arose, since monogamous unions are widely observed in small or large communities alike. The ethnographic evidence supports our view that as communities grew, wealth inequality probably increased, and polygynous unions became less prevalent. In this regard, either type of polygyny requires unique socio-economic conditions[134].

Table 3.3 shows descriptive statistics for the main variables by countries (*polygyny*=1 or *polygyny*=0). These data come mainly from censuses and national surveys. The table offers data for a total of 112 countries and territories. Additionally, we provide summary statistics for three sub-samples that will be used later on. First, countries classified as *New World* were removed from the sample, leaving *Old World* countries alone. Second, countries classified as *high developed* (with a *HDI* of 0.800 or above in 1980) were also removed.

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[133] Only one *Polygyny 1* society out of 66, the Egba in Nigeria, was described to be larger than 1,000. Moreover, 11 *Polygyny 2* societies out of 77 were described larger than 1,000, among them some well known ones in sub-Saharan Africa, i.e. Bambara (Mali), Fon (Benin), Mossi (Burkina Faso).

[134] Figure A.3.3 in appendix 3 provides further evidence. After removing nomadic and semi-sedentary societies we compare the levels of female contribution to Agriculture and total subsistence by marital system. Overall, female contribution to Agriculture is substantially higher in *Polygyny 2* societies. This is partly due to the fact that pastoralist societies are usually monogamous.

Finally, we present summary statistics only for *Old World* countries classified as *medium and low developed*[135]. The reason being is that all of our polygynous countries are *Old World* and *medium or low developed* countries.

Out of 112 countries included in the main sample, we have 27 classified as polygynous (Po), while the remaining 85 will fit in the category of non polygynous. Noticeably, substantial differences are observed between them. First, as observed previously with ethnographic evidence in table 3.2, polygynous countries possess higher rates of female participation in market activities for the whole sample and sub-samples (71 women are economically active for every 100 men in polygynous countries vis-à-vis 50 in monogamous ones). In this way, gender differences in labour participation are much smaller in polygynous countries. This gap is larger when we compare polygynous countries with other *medium* or *low developed* ones.

Other striking differences lie with the rate of urbanization (while only 25.4 percent of people live in urban areas in polygynous countries, this percentage more than doubles in the case of monogamous countries, up to a 55.6 percent). These differences are maintained in *Old World* countries, and became smaller though relevant in the other sub-samples. Regarding human development, the average *HDI* for polygynous countries is 0.422, whereas for monogamous countries is 0.708. These vast differences are reduced once we remove countries in the subsequent sub-samples. There are no significant differences in terms of the sex ratio; on average there is a perfectly balanced sex ratio aged 15-44 years old in polygynous countries, while it ranges from 96 to 98 women for every 100 men in the

[135] All countries with available Human Development Indices are classified into three clusters by achievement in human development: high human development (with an HDI of 0.800 or above), medium human development (HDI of 0.500–0.799) and low human development (HDI of less than 0.500), Human Development Report (United Nations, 2007).

monogamous ones. Finally, data on the percentage of Muslims provides an interesting fact. Polygynous countries have on average larger Muslim populations, except when we remove *New World* and *high developed* countries.

Table 3.3 Descriptive Statistics. *WEA* by Marital System, 1980

	Total sample					
	polygyny=1			***polygyny=0***		
	Mean	**St. Dev**	**N**	**Mean**	**St. Dev**	**N**
WEA	71	19	27	50	20	85
Sex ratio 15-44	100	15	27	98	7	85
URBAN	25.4	13.6	27	55.6	23.4	85
Muslim80	34.2	36.0	27	18.1	34.4	85
HDI	0.422	0.112	27	0.708	0.148	85
	Excluding *New World* countries					
	polygyny=1			***polygyny=0***		
	Mean	**St. Dev**	**N**	**Mean**	**St. Dev**	**N**
WEA	71	19	27	54	21	57
Sex ratio 15-44	100	15	27	96	8	57
URBAN	25.4	13.6	27	54.4	25.4	57
Muslim80	34.2	36.0	27	26.3	39.6	57
HDI	0.422	0.112	27	0.707	0.165	57
	Excluding *high developed* countries (HDI > 0.800)					
	polygyny=1			***polygyny=0***		
	Mean	**St. Dev**	**N**	**Mean**	**St. Dev**	**N**
WEA	71	19	27	46	21	55
Sex ratio 15-44	100	15	27	98	8	55
URBAN	25.4	13.6	27	46.1	21.5	55
Muslim80	34.2	36.0	27	26.1	39.8	55
HDI	0.422	0.112	27	0.628	0.122	55
	Excluding *New World* and *high developed* countries (HDI > 0.800)					
	polygyny=1			***polygyny=0***		
	Mean	**St. Dev**	**N**	**Mean**	**St. Dev**	**N**
WEA	71	19	27	51	24	33
Sex ratio 15-44	100	15	27	97	10	33
URBAN	25.4	13.6	27	41.9	23.6	33
Muslim80	34.2	36.0	27	42.4	44.4	33
HDI	0.422	0.112	27	0.598	0.134	33

Sources: Authors'; Laporta et al. (1999); PRED Bank, Version 3.0; United Nations (2000a); Human Development Reports 2007/2008 (United Nations, 2007)

Notes: Data on women economically active for Micronesia and Polynesia regions are not available, and hence these regions were removed from the sample. Human Development Indices for SFR Yugoslavia and the USSR republics were not reported, hence they were excluded from the sample. Base year is 1980.

Finally, we present the percentage of ever married men and women aged 45-49 in table 3.4. We stated previously that in traditional societies marriage was almost universal, and celibacy was rare and mostly unwanted. Table 3.4 shows that more than 96 and 98 percent of men and women, aged 45-49 years old, married at least once in 1980. Similarly, more than 90 percent of men and women, aged 45-49 years old, married in monogamous countries. Even if polygyny leaves poor or younger men with dim marriage prospects, because they have to compete with wealthy and older men for wives, recent statistics show that most men tended to get married at least once.

Table 3.4 Percentage Ever Married aged 45-49 years old by Marital System, 1980

	polygyny=1		***polygyny=0***	
Statistics	**Men**	**Women**	**Men**	**Women**
Mean	96.25	98.07	90.29	90.68
Std. Dev.	2.00	1.63	9.10	9.51
N	23	23	76	76

Sources: United Nations (1990) Demographic Yearbook (United Nations, 1984)

3.5 Empirical Model

3.5.1 *Female Contribution* and Polygyny

To analyse the factors that determine whether polygyny or monogamy are predominant within a society, we estimate both a Probit and a Multinomial Probit (MNP) model. We begin with the standard bivariate Probit model. In this case, we estimate the probability that in society *i*, *Polygyny 2* or *African* polygyny is the prevalent marital system. Under these circumstances, the dependent variable takes the value of 1 if a society is described as

Polygyny 2 and 0 if *Monogamy* prevailed. This model leaves *Polygyny 1* aside and tests our two main reference groups[136].

Having explored *Monogamy* and *Polygyny 2*, we enrich our analysis by including the third marital system, *Polygyny 1*. Therefore, we attempt to determine whether society *i* follows a specific marital system from all the potential alternatives. Because these choices belong to unordered categories, we use a Multinomial Probit (MNP) model as an alternative to the frequently used Multinomial Logit (MNL). The main advantage of the MNP model is that allows for correlations between the errors and does not impose the independence of irrelevance alternatives as the MNL does. The idea is that when comparing two alternatives, the ordinal ranking of these alternatives should not be affected by the addition or subtraction of other alternatives from the choice set.

The dependent variable *Marital System* in the MNP has three categories, one for each marital arrangement option (i.e. *Monogamy*, *Polygyny 1* and *Polygyny 2*). For this purpose, we define the probability that the *ith* society will choose the *j*th marital system as,

$$P_{ij} = \Pr(U_{ij} > U_{ik}), \quad for\ k \neq j, \quad j = 1, 2, 3. \tag{3.6}$$

with U_{ij} being the maximum utility attainable for society *i* if they choose the *j*th marital system, and

$$U_{ij} = \beta_j^{'} X_{ij} + \varepsilon_{ij} \tag{3.7}$$

[136] Chapter 2 offers an explanation regarding *Polygyny 1*. On the whole, *Polygyny 1* has been rarely found in the *Old World*. Co-wives sharing habitation have been strongly associated with this specific type of marital system and with nomadic societies of the New World (White and Burton, 1988).

where β_j is a vector of coefficients of each of the explanatory variables. In particular, vector X_{ij} stands for variables which according to previous literature affect the choice by a society of following predominantly a specific marital system. In this case, our variable of interest is female contribution to subsistence, *Female Contribution*, which we assume is required to sustain *African* polygyny. We also control for the size of the community, *Size of community*, and the settlement pattern. For that purpose, we create a dummy variable, *Sedentary*, that takes the value of 1 if the society is described as sedentary, 0 otherwise. We expect *African* polygyny to be positively associated with female contribution to subsistence and with a sedentary settlement pattern, and negatively associated with the size of the community.

Furthermore, the MNP assumes that the stochastic terms ε's have a multivariate normal distribution. As a result, the probabilities can be expressed as,

$$P_{ij} = \int_{-\infty}^{\beta^* X_1} \cdots \int_{-\infty}^{\beta^* X_{j-1}} f(\varepsilon_{i1}^*, \cdots, \varepsilon_{ij-1}^*) \partial\varepsilon_{i1}^*, \cdots, \partial\varepsilon_{ij-1}^* \tag{3.8}$$

Where f(.) is the probability density function of the multivariate normal distribution.

3.5.2 *WEA* and Polygyny

This section introduces a Probit model to examine the relationship between female labour, captured with the ratio of women economically active per 100 men (*WEA*), and the prevalence of polygynous unions. In this case, we replace societies for countries, base year 1980. The Probit model, which estimates the probability that a country *i* is polygynous, is given by:

$$y_i^* = \beta_0 + \beta_1 WEA_i + Z_i^{'}\gamma + \varepsilon_i \tag{3.9}$$

Where

$$y_i^* = \begin{cases} 1 & \textit{if country i is polygynous (Po)} \\ 0 & \textit{if country i is not (Mo;OP)} \end{cases} \tag{3.10}$$

WEA_i captures gender differences in labour participation. The vector Z_i represents a vector of controls, among them, the *Sex ratio 15-44* (number of women for every 100 men aged 15-44 years), the percentage of urban population, *URBAN;* and the percentage of Muslims in the population, *Muslim80*; and ε_{it} is the heteroskedasticity-consistent error term.

As a robustness analysis in the Probit regression results, we further analyze the role of *WEA* on marital choices, by focusing on three subsamples. First, we estimate the model for the subsample of countries classified as *Old World*. The arrival of Europeans produced a substantial social, cultural, institutional and economic change in the *New World*. For that reason, we aim at preserving cultural continuity with the variable *oldworld,* which takes the value of 1 if a country is *Old World*, 0 otherwise[137]. Second, we place special emphasis on the level of economic development. Our theoretical approach hypothesises that *African* polygyny would be sustainable at low levels of economic development. Thus, we created three interaction variables: *WEA* (low), *WEA* (medium-high) and *WEA* (medium). Countries were classified by the level of economic development following their Human Development Indices in 1980. Then, we created dummy variables for countries classified as *low*, *medium* and *high* developed and these dummies were interacted with *WEA*. The interaction variables attempt to capture the moderator effect that development has on the

[137] Table A.2.4 in appendix 2 presents a list of countries and territories classified as *Old World*.

relationship between *WEA* and polygyny. Finally, we estimate the model for the subsample created by the interaction of countries classified as *Old World* and *low*, *medium-high* developed.

3.6 Results

3.6.1 Ethnographic Evidence

This section discusses our empirical results. In Table 3.5 we present the Probit and Multinomial Probit results with data from the Ethnographical Atlas. The aim is to analyse whether female contribution is a good predictor of polygyny. In column (1) the marginal effects of the bivariate Probit model are displayed. The results indicate that female contribution to subsistence activities is positively and significantly associated to *African* polygyny, and that a sedentary pattern of settlement has a substantial effect too. On average, sedentary societies are 21 percent more likely to practice *African* polygyny. Moreover, we do not observe that *Size of community* has a significant effect.

In columns (2)-(4) of table 3.5 we report the marginal effects of changes in explanatory variables on probabilities of choosing *Monogamy*, *Polygyny 1* or *African* polygyny, obtained from the MNP model. The marginal effects are calculated using average values of all independent variables. As the table reveals, a higher contribution of women to subsistence activities increases the probability of *African* polygyny while decreases the probability of *Monogamy* and has no significant impact on the probability of *Polygyny 1*. Additionally, *Sedentary* is, as otherwise expected, a very strong predictor of *African* polygyny.

Table 3.5. Female Contribution and Marital Systems

	Probit	Multinomial Probit		
	***Polygyny 2*=1 *Monogamy*=0**	***Monogamy***	***Polygyny 1***	***Polygyny 2 or African***
	(1) a/	**(2)**	**(3)**	**(4)**
Female Contribution	0.007***	-0.005***	-0.000	0.005***
	(0.001)	(0.002)	(0.001)	(0.001)
Size of community	-0.003	0.024*	-0.028**	0.005
	(0.012)	(0.014)	(0.012)	(0.009)
Sedentary (d)	0.218***	-0.076	-0.116**	0.194***
	(0.046)	(0.058)	(0.049)	(0.039)
Observations	313		379	
Chi-square	44.8		60.8	
Log-Likelihood	-145.1		-305.6	

Notes: Marginal effects are shown in table. Robust standard errors in parentheses (* p<.10, ** p<.05, *** p<.01); (d) for discrete change of dummy variable from 0 to 1

a/ *Polygyny 1* societies were removed from the sample, a total of 66 societies.

Regarding the size effects, an increase in *Size of community* by one unit increases the probability of *Monogamy* by 2.4 percentage points, and correspondingly reduces the probability of *Polygyny 1* by 2.8 percentage points. As societies grow up in size, *Polygyny 1*, which involves many men and women married polygynously and co-wives sharing habitation, would vanish. Larger communities are strongly associated with sedentary patterns of settlement. *Polygyny 1* is closely related to nomads and semi-sedentary peoples. Therefore, once hunter-gatherers abandon their nomadic lifestyle with a nearly perfect specialisation within the household -men hunt and fish, whereas women gather food-, for a sedentary life would leave us with only two major marital systems to discuss, *Monogamy* and *African* polygyny[138].

[138] Removing nomadic and semi-sedentary societies would leave us with two main marital systems. Figure A.3.3 in appendix 3 illustrated the differences in female contribution. Moreover, we also run a Probit model similar to the one in column (1) of table 3.2 only for sedentary societies. The results remain consistent and

The transition from a nomadic lifestyle to a sedentary one raises a fundamental question to understand marital systems and economic development[139]. If hunting-gathering is the first stage of economic development and human beings have all gone through that stage across regions at a point in time, why polygynous unions have been predominantly observed in sub-Saharan Africa? That question would leave us with two possible answers. First, *African* polygyny occurred in Eurasia, but was not observed and reported[140]. This could also imply that the levels of economic development required to maintain the *African* polygyny equilibrium have not been observed in Eurasia for millennia. Second, the transition from hunting-gathering to a sedentary lifestyle took different routes in sub-Saharan Africa and Eurasia. Again, we do not know much about marital systems and economic conditions in sub-Saharan Africa for the pre-slave trade period[141]. Consequently, we also do not know when the transition to a sedentary lifestyle occurred. Regardless, and under the assumption of rational economic agents, this would imply different economic conditions and constraints.

Diamond (1997) proposed three possible factors that could have encouraged hunter-gatherers to become sedentary: (i) The decline in the availability of wild foods, (ii) Climate change that made certain crops (wheat, barley) available in more areas, (iii) Absence of

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robust, and the marginal effect of Female Contribution is higher 0.008, and the coefficient statistically significant at 1 percent.

[139] Malthus (1798) described three main stages of economic development: (i) Hunting and Gathering, (ii) Pastoralism or Animal husbandry and (iii) Agriculture, farmers, tradesmen and craftsmen.

[140] The Ethnographic Atlas offers evidence for Ancient Civilisations in Eurasia dating back to BC 2000, see table A.3.9 in appendix 3. Unfortunately, ethnographic and archaeological evidence mainly refer to large civilisations, *"……..histories of mankind that we possess are histories only of the higher classes…"* (Malthus, 1798)

[141] In the *New World*, mainly America, Australia and New Zealand, more than 65 percent of societies found were described as nomadic or semi-sedentary, whereas 85 percent of societies found in the *Old World* were described as sedentary including sub-Saharan Africa, Eurasia, Melanesia and Polynesia. This implies that few societies in the *New World* had made the transition to a sedentary life before the arrival of the Europeans. The main exceptions were, among others, the Inca and Aztec peoples.

geographic boundaries that restricted the transmission of knowledge and technologies, e.g. the Sahara desert, or the Atlantic and Pacific Oceans. Certainly, climatic and geographic conditions are like chalk and cheese in sub-Saharan Africa and Eurasia. Perhaps, hunter-gatherers were already more polygynous in sub-Saharan Africa than in Eurasia. If gathering prevails as economic activity over hunting or fishing, the contribution of women, as wives, to the household may be higher. This is because gathering, in contrast to hunting or fishing, does not require as much physical strength where men usually have a competitive advantage. Under these circumstances if women contribute more to increase the wealth of the household, we will expect a higher incidence of polygynous unions. Nonetheless, whether hunter-gatherers became straightaway monogamous or remained highly polygynous in Eurasia, remains a mystery that deserves further analysis and research.

3.6.2 Censuses and National Surveys

In Table 3.6 we present the result from estimating the Probit model (3.13) using different specifications. The objective is to assess the relationship between *WEA* and polygyny at a country level. All columns display the marginal effects calculated using mean values of all independent variables. In column (1) we present the basic model in which only *WEA* enters in the specification explaining the probability of a society having a high incidence of polygynous unions. An increase in the number of women economically active for every 100 men (*WEA)* increases the probability of being polygynous in 0.9 percent. Columns (2) to (4) add further controls to test for the robustness of this relationship. In any case the sign and the significance of *WEA* remain stable.

Table 3.6 *WEA* and Polygyny

Base year=1980	***Probit***	***Probit***	***Probit***	***Probit***
	(1)	(2)	(3)	(4)
WEA	0.009***	0.009***	0.005***	0.006***
	(0.002)	(0.002)	(0.002)	(0.002)
Sex ratio 15-44		-0.005	-0.009**	-0.006*
		(0.006)	(0.004)	(0.004)
URBAN			-0.008***	-0.007***
			(0.002)	(0.002)
Muslim80				0.002**
				(0.001)
Observations	112	112	112	112
pseudo-R^2	0.168	0.179	0.388	0.415
Chi-square	13.6	21.8	37.5	37.3
Log-Likelihood	-51.5	-50.8	-37.9	-36.2

Notes: Dependent variable is polygyny, taking the value of 1 if Polygyny (Po), 0 otherwise. Table A.2.4 in appendix 2 provides a list of countries by predominant marital system.
Marginal effects are shown in table.
Robust standard errors in parentheses (* p<.10, ** p<.05, *** p<.01)

Regarding the results in columns (3) and (4), while *WEA* has a positive effect on the probability of a country being polygynous, the sex ratio and the rate of urbanisation have a negative and significant impact. Urbanisation rates have been conventionally associated with a decline in the incidence of polygyny, Lesthaeghe et al. (1989)[142]. Urban areas could raise the standard of living of households, because dense populations could better afford investments in water access, electricity and other public goods. Moreover, urban areas may offer distinct economic and employment opportunities for men and women. Boserup (1970) argued that economic opportunities for women were restricted or illicit in urban areas. Whether urban life secluded wives to the household could be a main factor in the decline of polygyny across regions.

[142] In table A.3.3 in appendix 3 we present a selection of countries where the incidence of polygyny has been measured. On the whole, rural polygyny is more prevalent than urban polygyny, except in Eritrea, Mauritania, Nepal and Pakistan, where the incidence of polygynous unions is very small.

A major observation from table 3.6 is that by adding control variables the *WEA* coefficient is affected. This suggests that we may have an endogeneity problem with our main independent variable. Causality between *WEA* and polygyny might be an issue of concern. An instrumental variable approach may be used to tackle endogeneity. However, when endogeneity is a problem to find appropriate instruments is a challenge. First, we use the potential endogenous variable *WEA* in 1950 (lagged 30 years) as an instrument for *WEA*. The results go in line with table 3.6 and *WEA* remains statistically significant and positive[143].

Furthermore, polygyny would be expected when number of women exceeds the number of men (Becker, 1973). Results in columns (3) and (4) do not support this view for a cross section of countries in 1980. In this regard, we recall that polygyny may arise even if sex ratios are perfectly balanced. Men postpone their first marriage and women marry young, hence the spousal age gap conventionally associated with polygynous countries that guarantees the availability of wives. Statistically this result would not be robust once we control for *New World* countries. Finally, the percentage of Muslims within a society have a higher probability of being polygynous vis-à-vis other religious beliefs. Nonetheless, we will show that once controlling for the level of economic development the presence or absence of Muslims become statistically insignificant.

Column (4) in table 3.6 provides with our most preferred specification. Nonetheless, we have just empirically estimated the effect of *WEA* on polygyny for all available countries.

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[143] We use an ivprobit Two-Stage (Instrumental Variable Probit) where WEA_{1980} is instrumented with WEA_{1950}. The Wald test of exogeneity: [0.0793]. We also instrument WEA_{1980} with GDP per capita. Although signs remain unchanged, WEA_{1980} became statistically insignificant. The Wald test of exogeneity: [0.0546]. This latter result can be partly explained by some unobserved effects caused by economic development.

To capture the role that economic development may play on the relationship between *WEA* and polygyny, we have created three interacted variables: *WEA* (low), *WEA* (medium-high) and *WEA* (medium). Countries were classified by the level of economic development following their Human Development Indices in 1980. Then, we created dummy variables for countries classified as low, medium and high human development. Finally, these dummy variables are interacted with *WEA*.

Table 3.7 illustrates the main results. Column (1) presents the baseline results obtained previously, which we will use as benchmark. In columns (2) and (5), we provide the results obtained by analyzing the role that human and economic development plays as a moderator of the relationship between *WEA* and *polygyny*. The estimated coefficient on the interaction of the *low* developed countries with *WEA* is positive and larger than the estimated coefficient for *medium-high* and *medium* developed countries. As we theorise before, female contributions to the household would greatly determined the demand for wives, especially at low levels of economic development. This is particularly acute when we remove *high developed* and *New World* countries or territories from our sample. Additionally, the difference between the two coefficients is statistically significant at 1%, as shown by the t-test reported in table 3.7[144].

[144] To what degree economic development have an impact on marital systems can be addressed by examining the relationship between GDP per capita and polygyny. Table A.3.10 in appendix 3 illustrates a model where GDP per capita is the independent variable. Results in columns (2) and (4) indicate a negative and statistically significant relationship between GDP per capita and the probability of being polygynous (Po). Additionally, figure A.3.4 in appendix 3 illustrates the relationship between the predicted values obtained from our baseline model and economic development which is captured by GDP per capita, 1980. From figure A.3.4 we observe the negative relationship between polygyny and economic development. We have discussed and observed that *African* polygyny emerges at low levels of economic development. Nonetheless, this is a necessary yet not a sufficient condition for *African* polygyny. Income distribution, institutions will also have an impact on marital systems.

Table 3.7 Economic Development, *WEA* and Polygyny

Base year=1980	***Probit***	***Probit***	***Probit***	***Probit***	***Probit***
	All	*All*	*Old World 1/*	*All 2/*	*Old World 1/2/*
	(1)	(2)	(3)	(4)	(5)
WEA	0.006***				
	(0.002)				
WEA (low)		0.007***	0.009***	0.012***	0.013***
		(0.002)	(0.003)	(0.003)	(0.004)
WEA (medium-high)		0.003	0.003		
		(0.002)	(0.004)		
WEA (medium)				0.006*	0.004
				(0.003)	(0.005)
Sex ratio 15-44	-0.006*	-0.007*	-0.009	-0.010*	-0.010
	(0.004)	(0.004)	(0.006)	(0.006)	(0.007)
URBAN	-0.007***	-0.005**	-0.006**	-0.004	-0.003
	(0.002)	(0.002)	(0.003)	(0.004)	(0.005)
Muslim80	0.002**	0.001	-0.000	0.001	-0.001
	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)
Observations	112	112	84	82	60
pseudo-R^2	0.415	0.489	0.441	0.416	0.330
Chi-square	37.3	40.9	32.4	33.4	21.4
Log-Likelihood	-36.2	-31.6	-29.5	-30.3	-27.6
H_0: WEA (low) = WEA (medium-high)		7.62 [0.00]	8.82 [0.00]	-	-
H_0: WEA (low) = WEA (medium)		-	-	7.31 [0.00]	8.80 [0.00]

Notes: Dependent variable is polygyny, taking the value of 1 if Polygyny (Po), 0 otherwise. See table A.2.4 in appendix 2.

Marginal effects are shown in table.

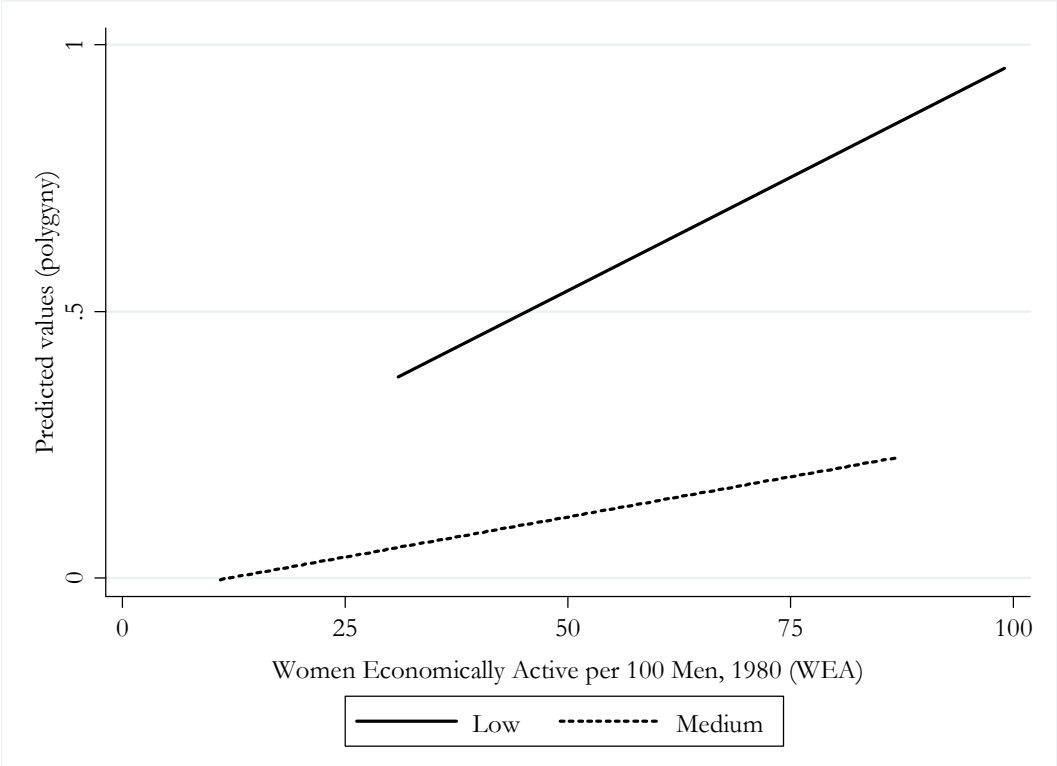
Robust standard errors in parentheses (* p<.10, ** p<.05, *** p<.01)

1/ Sample restricted for those countries classified as *Old World*

2/ Sample is restricted to medium and low development countries

Once we include the interaction variables, our results appear to be more consistent with our theoretical approach. The percentage of Muslims within a population is statistically insignificant in all specifications, columns (2)-(5). Sex ratios are only significant when *New World* countries are not excluded from the sample. This can be explained due to the fact that all *New World* countries are monogamous. When the number of polygynous and monogamous countries are more balanced, small sex ratio imbalances have no impact predicting polygyny. Urbanisation rates remain negative and statistically significant in columns (2) and (3). When *high developed* countries are removed from the sample in columns (4) and (5), urbanisation rates become statistically insignificant.

Figure 3.1 Predicted values (*polygyny*) and *WEA* by level of economic development.



On the whole, at low levels of economic development, an increase in the ratio of women economically active for every 100 men increases the probability of having a high incidence of polygyny by 1.2 percent for *low* and *medium* developed countries. The marginal effect for *low* and *medium* developed countries in the *Old World* is 1.3 percent. Figure 3.1 illustrates how the level of economic development moderates the effect that female labour would have predicting polygyny.

3.6.3 Main Discussion

Sustainable and prevalent levels of polygyny have been observed and reported in sub-Saharan Africa for, at least, the last two centuries. Boserup (1970) claimed that *African* polygyny was due to the fact that women contribute greatly to family income. In these regions, women have a double role as agricultural workers and housewives. Under

traditional land tenure systems, most, if not all households have access to land, and hence wealth and consumption would be greatly determined by the size of the household, wives and children.

At low levels of economic development, small changes in consumption will generate larger changes in the utility derived from consumption. Therefore, a well-established household with a husband, wife or wives with their respective children, could be the best marriage prospect for young women. On the other hand, households would have a strong incentive to take a second wife if and only if they are inexpensive. Bridewealth, as Goody and Tambiah (1973:17) pointed out, would be *a circulating pool of resources* associated with the movement of women. Bridewealth would not be the real cost of taking a wife. The contribution of wives to the household wealth would above all determine how expensive or inexpensive wives are. Thus, the demand for wives would be greatly determined by female labour. If women do not have any restrictions and contribute greatly to the wealth of the household, men could take a second wife for reproductive, reputational or simply economic reasons. The *African* polygyny equilibrium would be stable under these economic circumstances.

Our empirical results support this view. Female labour is, indeed, a very good predictor of *African* polygyny. Murdock (1949), Heath (1958), and Boserup (1970) already viewed high female contribution as a predictor of polygyny. Schlegel and Barry III (1986), among others, confirm these views with cross-cultural analysis. In this chapter, we supplemented the existing literature with a cross-country empirical analysis that, once again, provides evidence of the strong relationship between African polygyny and female labour. In this regard, if economic development brings into play lower female participation rates -as Goldin (1995) hypothesised-, then *African* polygyny would gradually vanished. The *African*

polygyny equilibrium may not be stable, and the incidence of polygynous unions would depend on the degree of wealth inequality. If societies are extremely unequal, we may observe *Harem* polygyny, or monogamy with occasional polygynous unions would prevail.

Finally, figures 3.2a and 3.2b show the linear prediction between female labour and the incidence of polygynous unions. For that, we use direct measures for all the available geographical regions and countries[145]. In both cases, we observe a positive relationship between female labour participation and the incidence of polygynous unions, confirming our empirical results.

In figure 3.2.a only Eastern Africa deviates from the main trend. As we stated above, if the incidence of polygynous unions have decreased, but female labour remains high, the level of economic development would have increased to explain the lower rates of polygyny. In this regard, while all Western Africa and Middle Africa countries are classified as *low developed* in 1980*,* Kenya and Zimbabwe were classified as *medium* and Zambia and Comoros were on the verge of becoming *medium* developed. Regarding figure 3.2.b, mostly Muslim countries (Chad, Niger and Mali), and Benin and Togo, seem to be deviating to the right of the trend. The countries of the Sahel show three of the lowest Human Development Indices in 1980. To the left of the trend, we find mainly Eastern African countries as before.

[145] Figures A.3.5a and A.3.5b in appendix 3 illustrates the predicted values of our main dependent variable, polygyny for *Old World* countries. On the whole, our model predicts relatively well those countries where incidence of polygyny is has been considerably high in the last decades.

Figure 3.2a *WEA* and Polygyny by geographical region

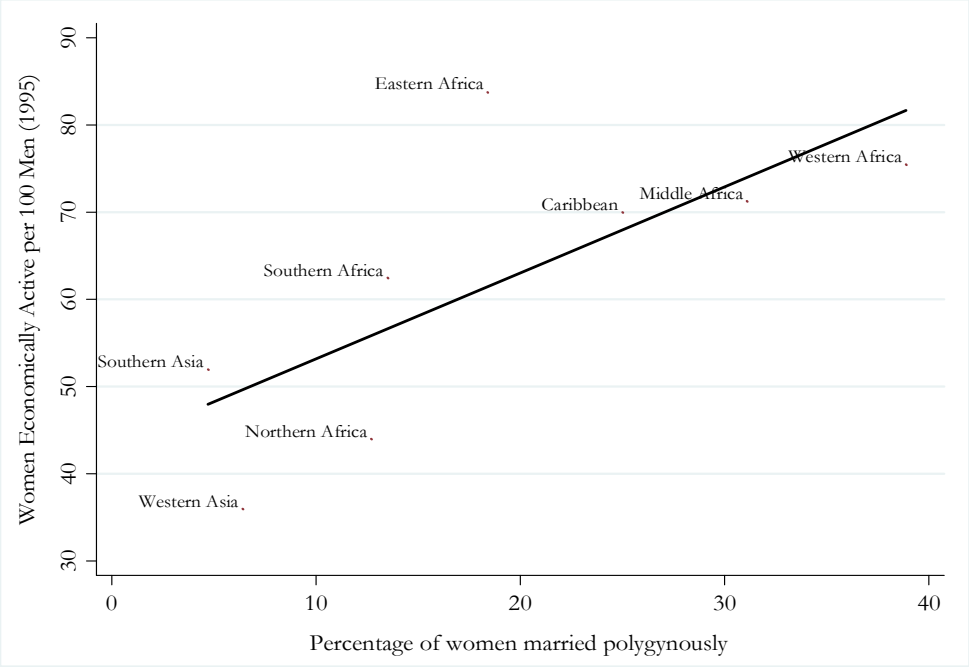
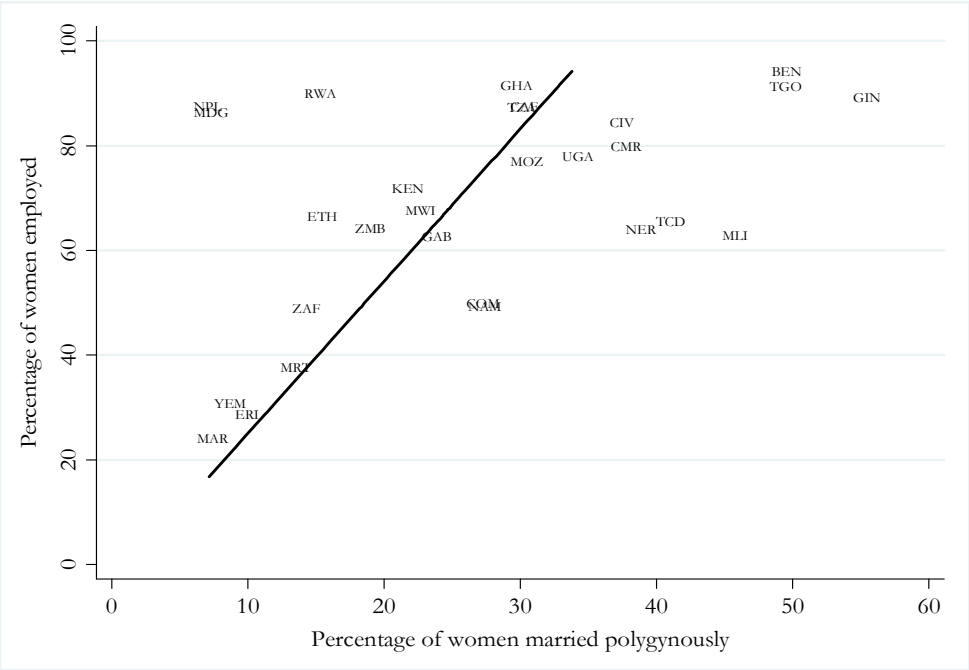


Figure 3.2b Percentage of Women Employed and Polygyny



Sources: PRED Bank, Version 3.0, United Nations (1990), Demographic and Health Surveys (1985-2005)

Notes: The incidence of polygyny by geographical region was computed using a weighted average (weight=population in 1995; Source: PRED Bank, Version 3.0). Data combined measures published in Patterns of First Marriage (United Nations, 1990) with recent estimates provided by Demographic and Health Surveys (1985-2005). The percentage of married women in polygynous unions refers to married women aged 15-49 years old. The percentage of women employed was computed by subtracting from one hundred the percentage of women aged 25-44 years old who answered "No work in the last twelve months" in the Demographic and Health Surveys.

Along these lines, female labour and also wealth inequality have been closely associated with economic development. Goldin (1995) and Kuznets (1955) respectively pioneered these relationships. As we stated previously, the *African* polygyny equilibrium, where many men and women are married polygynously, would not be sustainable as wealth inequality grows. Ethnographic evidence for Southern Africa in chapter 2 illustrated that polygyny was the predominant marital system in more than 70 percent of societies. However, recent data collected on the incidence of polygynous unions made us to classify Botswana and Lesotho as occasional polygynous, while South Africa as monogamous. These countries have rapidly moved from their traditional *African* polygyny equilibrium observed in the Ethnographic Atlas to a *Monogamy* one. This change, induced by an increase in economic development, has also been accompanied by a swift increase in wealth inequality and a decrease in female participation rates[146]. Few polygynous unions have recently been reported, and it is likely that given the new economic circumstances, just a small number of wealthy men would be able to take a second wife, as it was described in Eurasia.

Additionally, female participation rates in polygynous countries have not been observed anywhere else. Among the most developed countries, female participation rates have steadily increased over the last 40 years. Nonetheless, historical data for these countries in the nineteenth century showed substantially lower rates[147]. Whether female labour is related

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[146] Not one of these countries was classified as *low developed* in 1980. Additionally, latest available Gini indices for Botswana, Lesotho and South Africa were 60.5, 63.2 and 57.8. A value of 0 represents absolute equality, and a value of 100 for absolute inequality. Source: World Bank (2007), World Development Indicators 2007 CD-ROM. Washington, D.C. In Botswana and Lesotho *WEA* decreased from 92 women economically active for every 100 men in 1950 to 77 in 2000, and from 61 to 56 respectively, while in South Africa has slightly increased.

[147] Bairoch (1968) presents data of the percentage of women economically active in the nineteenth century for a selection of countries, e.g. Belgium in 1856 provides a rate of female participation of 42 percent, while France and Great Britain had 30.8 and 30.2 percent in 1866 and 1851 respectively. These rates are distant from the ones observed in most polygynous countries for the period 1950-2000.

to economic development, as Goldin (1995) proposed, would deserve further analysis[148]. Our theoretical approach stressed that the *African* polygyny equilibrium would require women to contribute largely to the household wealth, if not, the demand for wives would decrease because wives would be expensive. Few households would compete with single men for wives and the equilibrium would break down. Monogamous unions would become more prevalent, and the spousal age gap would be gradually reduced.

Finally, we briefly discussed the *Harem* polygyny equilibrium. As wealth inequality grows, few wealthy men could be encouraged to take more than one wife, concubines or mistresses. Under these circumstances, the victims of *Harem* polygyny would be poor men who may struggle to find a spouse if they have to compete with wealthy men in the marriage market. Becker (1991) already pointed out that women would not be the ones primarily harmed by polygyny. Nonetheless, wealthy men in traditional and non-democratic societies usually exercise the political and social power. Whether laws forbidding polygyny or enforcing monogamy are motivated by concessions of wealthy men to avoid social conflict is the basis of the *socially imposed monogamy* theory (Alexander, 1987; Alexander et al., 1979; and Betzig, 1986). Nevertheless, by the time wealth inequality grows and some men become wealthy and powerful individuals the incidence of polygynous unions could have been swiftly reduced. As Becker (1991) argued, doctrines encouraging monogamy would be attractive only when the demand for polygyny is weak.

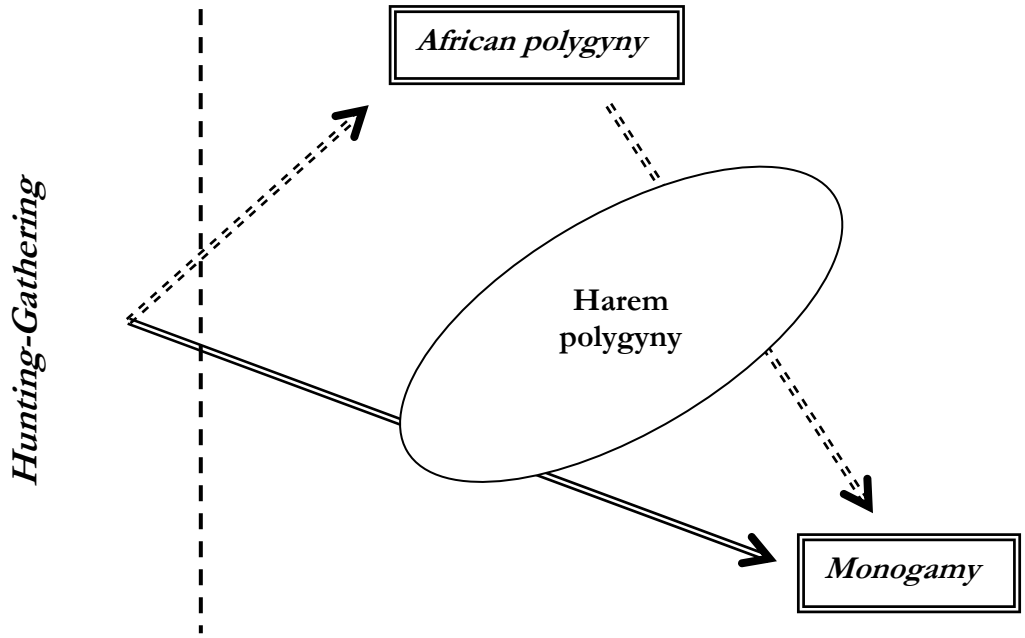
[148] In this regard, Boserup (1970) claimed that population pressure would eventually lead to agricultural intensification, and hence a declining role for women in agriculture.

3.7 Concluding Remarks

The main objective of this chapter was to theoretically understand why *African* polygyny has been prevalent in sub-Saharan Africa. To do so, we developed a simple theoretical model where wealth inequality and female labour determine the preferred marital system. In this way, the *African* polygyny equilibrium required high rates of female labour, low wealth inequality and very low levels of economic development. Under these conditions, the equilibrium would be stable. Then, we empirically assess the relationship between female contribution to subsistence or female labour and polygyny with ethnographic evidence and country data. Our main findings reveal, in both cases, that female labour is a strong predictor of *African* polygyny. This is more acute once we moderate for economic development.

Evidence from this chapter supports the view that the high incidence of polygynous unions observed in some regions throughout history need unique economic conditions. Only if these conditions are met, we would observe those levels of polygyny. Van der Klaauwe (1996) showed that marital status cannot be considered exogenous with respect to the participation decision. In this chapter, we illustrated that *African* polygyny cannot be considered exogenous with respect to the participation decision and the level of economic development. Cultural practices and social norms can be understandably assumed to be exogenous in the short term. Nonetheless, there is little reason to assume that marital systems have not been shaped by distinct economic environment in the long run.

Figure 3.3 Marital Systems and Economic Development



Furthermore, we also question whether the *African* polygyny equilibrium, sometime and somewhere, was predominant in other parts of the World, i.e. Eurasia. Figure 3.3 illustrates the possible routes regarding marital systems over time. As societies grew, and hunter-gatherers replaced their nomadic lifestyles for a more sedentary existence, marital systems evolved. Whether hunter-gatherers took one route towards *African* polygyny or another one towards *Monogamy* would throw light on the subject of marriage and economic development. At a first glance, we would say that a shortcut would be unlikely. In this regard, Tacitus described the peoples of Germania in the first century AD as "…*almost unique among barbarians in being content with one wife*…"[149]. If the rest of the "barbarians" in Eurasia were also highly polygynous, we would have more evidence to assert that women and men are alike across regions, or at least under similar economic circumstances. For

[149] Tacitus (Germania: 18). The Agricola and the Germania translated by H. Mattingly (1970). Penguin Classics

that, it would be encouraging to find more data and evidence, and we are hopeful that this chapter would encourage further research on the subject

Our theory also suggested that *Harem* polygyny would emerge as wealth inequality increased. The degree of inequality would determine the size of the *Harem*. For that, a society would be required to have a system of property rights and inheritance rules that allows the transmission of wealth across generations. The stability of *Harem* polygyny would require persistent and sizeable wealth inequalities. In this way, inequality may increase socio-political instability (Alesina and Perotti, 1996). As a result, we would expect *Harem* polygyny to swiftly turn into monogamy with occasional polygyny, where only few women are married polygynously. Economic development accompanied by lower inequality and higher female labour would eventually bring us the *Monogamy* equilibrium.

4. Spousal Age Gap and Female Labour

4.1 Introduction

The decision to marry, cohabit or remain single has captured the attention of social scientists for its potential implications on the rate of population growth, fertility, labour supply, consumption or investment (Becker, 1981). This chapter carries on with the analysis performed in the previous one, and maintains the focus on the relationship between female labour and marriage[150]. In this case, we explore the association, correlation or potential causality between gender differences in labour participation and age differences between spouses at first marriage, namely the spousal age gap. To empirically test this relationship, we introduce a novel cross-country panel for the period 1950-2000.

While female' age at first marriage has often been the subject of continuous debate and numerous theoretical and empirical analysis, the spousal age gap has not been fully exploited yet. This is partly explained because, (i) data on males' age at first marriage have received less attention; (ii) time-variation of marriage patterns are barely captured in the short term, hence long term studies are required and; (iii) data on marriage have somewhat been poor or insufficient across countries or regions to carry out an appropriate long term empirical analysis. In this regard, this chapter offers various extensions to the existing empirical literature. First, we compile a panel dataset for all countries where data are available and reliable over a long time period, 1950-2000. Second, the dataset will allow us to examine the relationship between female labour participation and the spousal age gap in

[150] Marriage is defined as a partnership or commitment for the purpose of production and reproduction. As a result marriage includes legitimate and *de facto* unions where data were available, e.g. consensual unions. For the purpose of this study the term 'marriages' denotes 'first marriages' unless otherwise stated.

the long run. Third, the panel nature of the dataset will provide us with the opportunity to explore other relevant aspects regarding cross-sectional variation of the spousal age gap[151].

The spousal age gap has a considerable interest in the literature. Widowhood is closely associated with large age differences at marriage (Goldman and Lord, 1983). A widow will face a choice between remarriage, returning to her natal family or remain on her own with her wealth, the help of her children, the State or some charitable institution. Goody (1976) argued that the greater the difference in the marriage age of males and females, the more property will fall under the control of the surviving spouse, i.e. the widow. This would be particularly important in societies where class and kinship are highly valued and where widows may be restricted from remarriage. For example, in traditional China and India widows were less likely to remarry in the upper groups (Goody, 1990).

Additionally, a higher proportion of widows could increase the number of dependants. This, in fact, may increase the costs of living for either family, own or natal. In some cases, widows may depend upon the ability of their children to earn income. If age differences at marriage are considerably large, and as a result widowhood is likely to happen, women could have further incentives to provide and care for their children as an investment. Furthermore, the age difference can also affect the personal relations between the spouses and the resulting impact on issues such as marital stability and marital satisfaction (Presser, 1975). Marital dissatisfaction could increase the likelihood of divorce.

Although the literature on age differences is smaller relative to that on specific male and female age at marriage, we think that the former, on its own, is a very relevant subject.

[151] There are certainly other general studies exploring regional cross-country variations in age at marriage (see Dixon, 1971; Casterline et al., 1986). Goode (1963) provides a general discussion about family patterns and social change.

Certainly, male or female age at marriage can probably help us more in understanding issues related to life cycle decisions, such as fertility. Nonetheless, age differences appear to be a reasonable indicator of the economic conditions of men and women or gender differences. In this regard, the age difference between spouses differs greatly within and between countries, and provides us with the opportunity to exploit cross-sectional variation, analyse past and present marriage patterns and study gender aspects of marriage and the family.

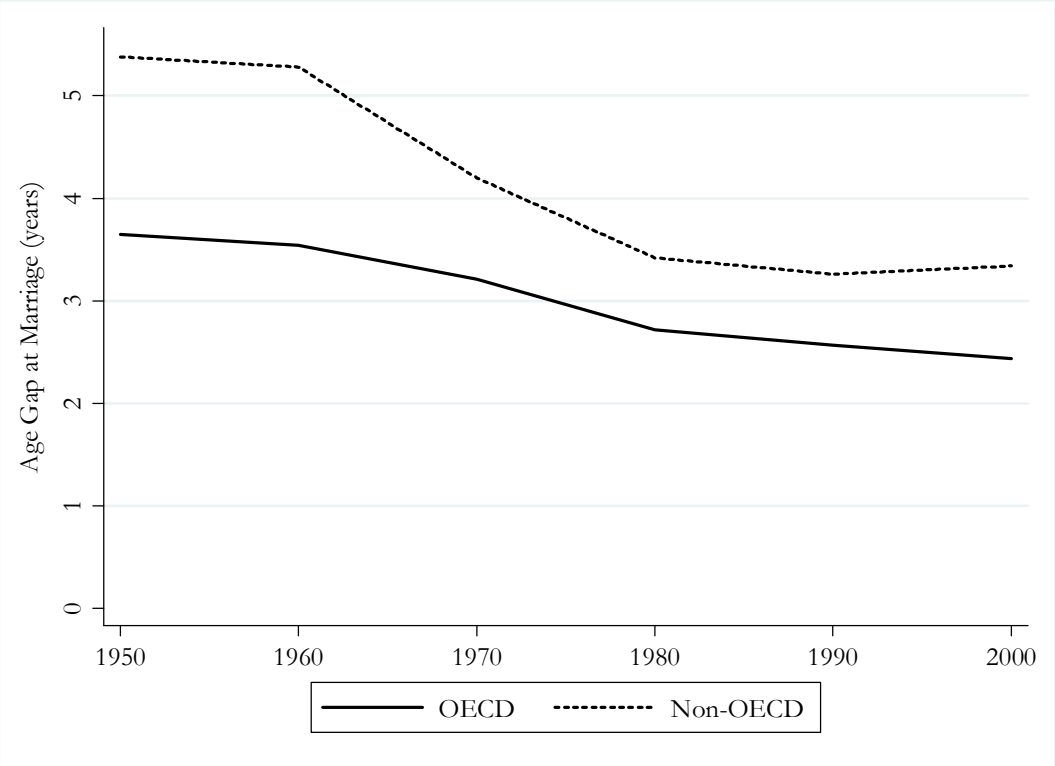
One of the most debated subjects in the history of marriage and the family has been the contrasting marriage patterns observed across countries and throughout history. Whether the spousal age gap is due to individual specific preferences or socio-economic factors deserves further attention. By exploring the relationship between gender differences in labour participation and the spousal age gap we expect to provide additional discussion and analysis. If gender differences in the labour market reflect on gender differences in the marriage market, then we have further evidence that marriage patterns are, above all, a result of the economic environment. Furthermore, by exploring these differences we will be less concern about data collection and comparability within and across countries respectively[152]. Figure 4.1 illustrates the spousal age gap for a selection of countries with available data for the period of study[153]. Over time, we observe a decrease in the age gap at first marriage for both groups: OECD and non-OECD countries. Whether age at first

[152] Country data on marital status are usually collected from national censuses or surveys. The data collection varies widely across countries. Some countries statistically consider *de facto* unions as legitimate ones whereas other countries do not. This fact may have potential implications when we compare age at first marriage for men or women independently. In this regard, gender differences seem an appropriate way of using marital data and make cross-country comparisons.

[153] For robustness, figure 4.1 illustrates data for a balanced panel. For the remainder of the empirical analysis, we would like to remind that the panel is unbalanced. All the countries included in figure 4.1 are monogamous.

marriage has increased more rapidly for women than for men, or age at first marriage for men has decreased or remained fairly stable over a long time periods will deserve further analysis throughout the chapter[154].

Figure 4.1 Spousal Age Gap, 1950-2000 (Selection of countries)



Sources: Patterns of First Marriage (United Nations, 1990), Demographic Yearbooks (United Nations, 1977; 1979; 1984; 1997), World Marriage Patterns (United Nations, 2000b), World Fertility Report (United Nations, 2004), Demographic and Health Surveys (1985-2005), PRED Bank, Version 3.0.

The decreasing trend in the age gap will be at the core of this chapter, and we will attempt to explain the nature of such phenomena. In this regard, the objectives of the present chapter are twofold. First, we introduce a basic empirical model to examine the age gap

[154] In appendix 4, figures A.4.1a and A.4.1b show the age gap decomposition by gender for both groups of countries. Whereas in OECD countries the patterns observed for men and women follow a similar increasing trend, non-OECD countries exhibit an increasing trend for women's age at first marriage, but a fairly stable trend for men.

patterns observed across countries for the period of study. Then, we present estimates and discuss our main hypothesis: i.e. whether gender differences in labour markets are negatively related to gender differences in the age gap. Finally, robustness and sensitivity analyses are carried out to check the validity of our findings. One of the challenges in estimating our model will be the potential endogeneity between our main variables. The age difference between spouses may influence female participation in market activities, while at the same time female participation may be a factor which affects the decision of when to marry. The two causalities are difficult to disentangle, however we attempt to overcome this problem using an instrumental variable approach in our sensitivity analysis.

The remainder of the chapter is structured as follows. In section 4.2 we review and discuss the theoretical literature related to the spousal age gap. This is followed by a description and discussion of the data sources, main variables and summary statistics in section 4.3. Section 4.4 introduces and discusses the main empirical model. Additionally, based on the estimation technique, we discuss the validity of our hypothesis, and main findings in section 4.5. Section 4.6 provides some concluding remarks.

4.2 Related Literature

Variations across countries or regions in the spousal age gap have been widely acknowledged in the literature. Hajnal (1982) drew a broad historical distinction based in part on these variations between the "Northwest European" pattern or simple household family system and the "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[155]. The problem with these two contrasting patterns is that age differences between spouses at marriage are not fully described, although we could infer from the literature that the "Northwest European" pattern might imply a smaller age gap.

Since then, these two patterns have been refined with the introduction of a third one, namely the "Mediterranean" pattern (Parkin, 1992; Bagnall and Frier, 1994). The latter is characterised by a considerable spousal age gap, because men tend to marry for the first time in their late twenties or even thirties, a decade or so later than women. Roth (1987) provides evidence of this pattern for ancient Babylonia and Assyria in the first millennium BC. In ancient Rome, Shaw (1987) also observes that Roman women tended to marry on average in their late teens, while men used to marry in their mid to late twenties, leading to a considerable age gap of ten or more years. A close examination of funerary inscriptions also led Saller (1987) to support the hypothesis of the large spousal age gap within the Roman Empire. Bagnall and Frier (1994) confirmed this pattern with census returns from Roman Egypt. Haines (1996) also observed notable differences between colonial North America and the "Northwest European" pattern of late marriage, since women had a tendency to marry earlier like in the "Mediterranean" type.

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[155] 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 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".*

Goody (1990) provides an excellent review of marital patterns in the major ancient cultures of Asia and the Mediterranean, which confirms substantial variation across regions and over time. Nevertheless, the patterns of marriage were described according to several other parameters such as marital transactions, widow re-marriage, hierarchy and the frequency and societal approval of divorce. In this study, we elaborate a classification of marriage patterns in relation to the age differences between spouses leaving aside other aspects of marriage.

Table 4.1 presents all the possible scenarios. First, we consider the case where men and women marry early in their lives, which has been ambiguously described or captured in the literature. Hajnal's (1982) description of the "Eastern" pattern seems inconclusive with respect to age differences at marriage[156]. Nevertheless, and for the remaining of the chapter we will denote this first pattern of marriage as "Eastern". Second, the "Mediterranean" pattern that leads to considerable age differences between spouses is introduced. Third, we take into account the "Northwest European" pattern of late marriage discussed by Hajnal (1982). Finally, we bring in the case where women married younger men. The latter case is rarely observed at the macro level; hence our focus in the remaining of the chapter will remain on the first three[157].

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[156] Hajnal's (1982) data for traditional China (1929-1931) reveals a singulate mean age at marriage of 21.3 years for men and 17.5 years for women which implies a difference of 3.8 years. This fact will associate *Pattern 1* with the "Eastern" pattern. However, evidence from other neighbouring countries, e.g. Bangladesh in 1972 Census provides a singulate mean age at marriage of 24.0 years for men and 16.4 which implies a difference of 7.6 years. If 24.0 years is considered late marriage in Bangladesh, we will closely associate this case to the "Mediterranean" pattern. Data on age at marriage for India also reveals a considerable age gap.

[157] At the micro level, we are aware that women marry younger men. However, there is no strong statistical evidence at the macro level where women on average marry later than men. We have compared measures of the singulate mean age at marriage across countries for the 1990s and there was only exception, San Marino (-0.1 years) in 1995. Source: World Marriage Patterns (United Nations, 2000b).

Table 4.1 Age at First Marriage and the Spousal Age Gap

	1 or "Eastern"	***2 or "Mediterranean"***	***3 or "Northwest European"***	***4***
Men	Early	Late	Late	Early
Women	Early	Early	Late	Late
Age Gap	*SMALL*	*LARGE*	*SMALL*	*LARGE*

Source: Author's.

Notes: For the purpose of this study, *SMALL* age differences round 0-3 years, while *LARGE* will be those greater than 3 years.

In the literature "Early" generally refers to marriages below 25 years old, and "Late" to those above 25 years old. Nevertheless, we acknowledge that economic and social conditions across countries differ widely. Therefore, it is difficult to agree on a reference age that determines "Early" or "Late" marriages. For example, countries or regions where life expectancy is short would most likely consider 22-23 years as already "Late" marriage. For this reason, our main focus will remain with age differences between spouses instead of the exact timing of marriage. Based on historical evidence for Northwest European countries, we shall define *SMALL* age differences round 0-3 years while *LARGE* will be those greater than 3 years[158].

In table 4.1 we narrow down these patterns to two diverse cases according to the age gap. First, the *SMALL* gap scenario that occurs when, both men and women marry relatively early or late in their lives. On the other hand, we observe a second case in which there are

[158] Between 1500 and 1800, the two basic characteristics of the "Northwest European" pattern of marriage were a high age at marriage (on average 27–29 years old for men, 24–26 years old for women) and a high proportion of never-married (roughly 10–25%). This pattern persisted in Western Europe until approximately the mid-19th century, when men and women started to marry much younger (Matthjis, 2003). Hajnal (1953) reports age differences of less than 4 years for most Northwest European countries. The *LARGE* gap should not be compared to the spousal gap observed in polygynous countries, because we will be referring only to monogamous regions.

substantial age differences or a *LARGE* gap which, as we discussed previously, might potentially be associated with an increase in widowhood, marital instability, and marital dissatisfaction. We will question throughout the chapter whether these two distinct scenarios are encouraged by changes in the economic role played by women within a society or female labour[159].

The transition from *SMALL* to *LARGE* or from *LARGE* to *SMALL* would have required time and significant changes in the modus operandi of men and women within their communities. In this line of thinking, Goody (1983) questioned: how was it that after c. 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? We may also question: how is it that after about 1970, age differences came to take a different shape in some countries? Whether age differences have changed over time, or cultures and countries shifted away from *LARGE* gap scenarios will be instigated by internal or external forces; among them, we will consider that female labour plays a significant role. Nevertheless, we need first to review what are, according to previous studies, the main factors driving age differences at marriage.

For this purpose, we review the classical theory of marriage, which states 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. For example, low wage women will spend more time in household production than high wage men since the opportunity cost of low wage women will be lower. On the other

[159] 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.

hand, 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. Keeley (1977) follows the classical theory of marriage and finds evidence that if wage rates are higher for men than for women, the optimal marriage age for men decreases with his wage rate, while the optimal marriage age for women increases with her wage rate. Zhang (1995) considers men with non-working wives and men with working wives, and also finds a negative relationship between the wage rate of a husband and his age at marriage if his wife does not work, while the opposite is found if his wife works. Using data from Israel, Danziger and Neuman (1999) also find evidence that the age at marriage for both spouses decrease in the husband's wage rate and increases in the wife's wage rate.

The classical theory provides a sound framework to analyse the incentives of men and women to get married. Nevertheless, in the absence of gender wage inequalities and costs of marriage, the decision of whom to marry could be exclusively determined by individual preferences over personal traits, e.g. height or beauty.[160] Whether men or women prefer to marry partners of a similar age -positive assortive mating in age- is certainly a relevant and interesting research subject. However if this hypothesis were on average truthful, age differences between spouses at a macro level might show convergence towards a *SMALL* gap scenario. In this regard, the optimal age at marriage for men and women may vary

[160] Becker (1973) also points that men differing in intelligence, height, race, or other personal traits will tend to marry women with like values of these traits (positive assortive mating), whereas relationship between partners for traits that are close substitutes in household production will tend to be negative. Burdett and Coles (1997) provides a simple proof of why class marriage may arise with heterogeneous men and women.

depending upon the desired size of the family, number of children, or the economic ability of men and women to set up an independent household, among others. On the other hand, if gender differences in wages were considerably large, women may not have many incentives to participate in labour market activities, and hence marry early. The costs of living will accrue on women's parents which under stringent economic conditions may not be prepared to sustain their daughters while they search for a suitable husband[161].

An alternative explanation to the classical theory of marriage follows with Bergstrom and Bagnoli (1993). They focus on the costs of marriage and argue that it takes a considerable time before the earnings ability of men is revealed. Then, men who do not expect they will be economically successful later in life choose to marry young, whereas men who believe they will be economically successful in the future delay their marriage. Bergstrom and Bagnoli (1993) assume that in traditional societies women earn no income and hence marry early because they do not have much additional information about their earnings ability. In this way, the optimal marriage age for men increases with his wage rate. Bergstrom and Schoeni (1996) using data from the 1980 US Census, find that male age at marriage increases with his annual wage earnings if he marries before the age of 30, while there is only a weak relation between the female age at marriage and her annual wage earnings.

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[161] Pre-marital sex is an important social stigma in certain societies, in particular when marriage is registered or sanctioned by law. Men and particularly women will prefer to minimise the risks associated with pre-marital sex. Early marriage for women will consequently be preferred when pre-marital sex is not well accepted. Saint Augustine sanctioned pre-marital sex long time ago (AD 400): *"If a man makes use of a woman for a time, until he finds someone else more suited to his wealth and social standing to take as his partner, that state of mind makes him an adulterer, not with regard to the woman he is on the lookout for but with regard to the one he is sleeping with without being married to her. As a consequence, if the woman is aware of this and still consents to it, then she too is unchaste in her relationship with the man with whom she is not united in marriage. Nevertheless, if she is faithful to him, and when he takes a wife she does not also think about marrying, but sets herself entirely against such a course of action, then I would not dare to call her an adulteress, easy enough though it might be to do so"*. Nevertheless, pre-marital sex attitudes have been changing over time (Singh, 1980).

The main problem with Bergstrom and Bagnoli (1993) is their assumption about traditional societies. It can be argued that in traditional societies, human capital is low, skilled labour is not highly demanded, and wealth inequality is mainly determined by non-labour income. Therefore, whether unskilled men delay marriage because they believe they will be economically successful later in life remains debatable, because the economic success of unskilled men in traditional societies may not vary much over time. In this chapter we follow a different theoretical approach.

When labour is mostly unskilled, the opportunity costs of men and women in the labour market should not be very different. However, while male labour participation rates have been fairly similar across regions and throughout history, female participation rates have fluctuated[162]. Goldin (1994) claims, that the decline in female participation rates has been motivated by the movement of production from the household and family farm to the market[163]. In traditional societies, unskilled labour outside the home and the family is mainly manual labour intensive work, against which a strong social stigma exists (Goldin, 1994).

Therefore, if women earn no income, as Bergstrom and Bagnoli (1993) also assume, they would not be able to spend time and resources to reduce uncertainty about the traits of a

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[162] Boserup (1970: 50) observed that in some regions, *"…a wife is entirely dependant upon her husband for economic support"*.

[163] Goldin (1994) argues that when incomes are extremely low, women are usually in the labour force either as paid labourers, but above all as unpaid family workers. As incomes rose, female participation rates fell. Families implicitly buy women's work, and women then retreat into the home. The decline in female participation rates is partly due to the income effect. Moreover, even if women have incentives to work, they may be barred from manual labour intensive work by social custom or by employer preference. In this way, Goldin and Katz (2002) also showed that the diffusion of the birth control pill decreased the cost to women of remaining unmarried and raised their age at first marriage.

potential spouse[164] [165]. In addition, the costs associated with pre-marital sex, and a great desire for children in traditional societies could further discourage women from delaying marriage. As a result, women would marry relatively young, and would not be able to marry their 'preferred' man. Conversely, men would be the only "breadwinners" in the newly formed household[166]. Because women do not earn any income, men would be required to accumulate wealth to provide the household with, at least, the level of wealth women would have enjoyed as daughters with their parents[167]. This could be achieved if (i) men postpone marriage to acquire wealth (labour income); and/or (ii) parents provide their sons with a pre-mortem inheritance (non-labour income)[168]; and/or (iii) parents provide their daughters with a pre-mortem inheritance or dowry[169]. Under these circumstances, wealthy men and women would be highly regarded as marriage prospects, and they would marry their most 'preferred' woman or man respectively. This is because they would be able to

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164 Uncertainty can be closely associated to the size of the community where men and women live. In small communities, i.e. village, uncertainty about the personal traits of a man or woman would be minimal, while in large areas, cities, uncertainty would increase.

165 If household specialisation occurs because women have lower opportunity costs in the labour market than men, it would be appropriate to think that searching will be more costly for women than men. Under the assumption that women do not work (Bergstrom and Bagnoli, 1993), searching for a suitable partner will be very costly for women and their families.

166 In this chapter, we assume neolocal residence where men and women set up their own household. We acknowledge that in some societies, men move to the bride's kin household (uxorilocal), or women move to the groom's kin household (virilocal). Neolocal residence would imply higher costs for the married couple.

167 The expected gains from marriage would be closely associated with the level of wealth daughters would have enjoyed with their parents. If not, women would not have incentives to accept a marriage proposal. This is consistent with the fact that in some societies unmarried daughters could remain with their natal family to look after her father and mother when they became old (Goody, 1976).

168 Goode (1963) reports that in China (Ting Hsien), the larger the amount of land owned by the family, the lower the age at marriage for males. Emigh (1997) studies the effects that land tenure had on age at marriage in Fifteenth-Century Tuscany, and finds that by restricting access to land marriage was usually delayed.

169 Goody and Tambiah (1973:17) described dowry as *"…part of a familial or conjugal fund, which passes by from holder to heir, and usually from the parents to the daughter"*. Alternatively, Botticini and Siow (2003) proposed a theory where altruistic parents provide dowries for their daughters and bequests for sons in order to mitigate a free riding problem between their married sons and daughters within their natal household. However, if we assume that women do not work, parents would not be as concerned about the free riding problem.

spend resources and time to find a suitable spouse. Conversely, if parents could not provide their sons and daughters with an adequate amount of wealth, men would have to postpone marriage to acquire some, and hence the *LARGE* gap[170].

Furthermore, when women earn no income and parents observe that their daughters could be exposed later in life because of divorce, parents would have more incentives to spend time and resources to find a suitable spouse for them[171]. Moreover, they would also have more incentives to provide their daughters with a pre-mortem inheritance or dowry. By providing a dowry parents could, to some extent, mitigate the threat of divorce internally. In this way, the absence or presence of dowry may be a good indicator of the economic role played by women in traditional societies[172]. Sadly, cross-country data on marriage transfers are relatively scarce. Finally, custom or family laws may also be used to mitigate the threat of divorce. Parents would have incentives to advocate for a marriage contract that guarantees the future of their daughters[173].

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[170] Even in societies where monogamous unions prevail, men would have to provide an adequate level of wealth, if not their marriage proposal would be rejected. Women may have incentives to remain with their family, or become the concubine or mistress of a wealthy man. To reduce uncertainty, men would spend time and resources to find a suitable spouse, and propose once they have acquired a minimal level of wealth.

[171] The institution of 'arranged' marriages attempts to mitigate the problem of uncertainty. North (1991) defines institutions as the humanly devised constraints that structure political and economic and social interaction. The set of institutions can be informal such as sanctions, taboos and customs or formal, laws or property rights. North (1991: 97) describes that "…throughout history institutions have been devised by human beings to create order and reduce uncertainty in exchange".

[172] Anderson (2007) suggests that modernisation, which in turn increases inequality across men, leads dowries to replace their role as pre-mortem inheritance for a direct transfer to the groom, or *Groom price*. Marriage transfers have conventionally been related to the different marital patterns observed in Eurasia and sub-Saharan Africa (Goody, 1976)

[173] The *Lex Visigothorum* already stated in the seventh century the relevance of dowry to enter marriage. Article I. *"Marriage shall not be Entered Into without a Dowry. Marriage is recognized to have greater dignity and honor, where the dowry is given before the nuptial contract has been entered into in writing. For where the dowry has been neither given, nor stated in writing, what expectation can there be of future conjugal dignity, when propriety does not confirm the celebration of*

When, on the contrary, women work and earn an income, they might be able to spend resources and time to find a suitable spouse or 'preferred' man. It could be reasonable to assume positive assortive mating in age. Moreover, women would contribute to the newly formed household with their income. As a result of all these circumstances, the spousal gap would decrease, *SMALL* gap. Similarly, in modern societies, where skilled labour is highly demanded, we would expect an increase in female participation rates. As Goldin (1994) stated, no social stigma exists with skilled labour. In addition, women could be exposed later in life in the labour market if they do not participate as young adults, i.e. accumulation of skills. Thus, women would have further incentives to participate in the labour market. As a result of gender equality in labour participation, the *SMALL* gap would arise.

Overall, we argue that gender differences in labour participation will have a significant and negative impact on the spousal gap. We acknowledge that in certain societies, family and kin or "culture" determine the demand for labour. Also, social stigmas regarding women's work could be subject to specific cultural or religious beliefs. We will control for them as long as data are available. Alternatively, Gould and Paserman (2003) find that women wait longer to get married when they face higher male wage inequality. This, in fact, increases female age at first marriage, and holding constant male age at first marriage will also reduce the spousal age gap[174]. We recognize the theoretical relevance that male wealth inequality may play, though cross-country data on wage inequality remain inadequate for the period of study.

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the marriage, nor the honorable obligation of the written contract accompany it?" The indissolubility of marriage may also be enforced.

[174] Loughran (2002) also provides evidence that female age at first marriage is positively associated with male wage inequality. In particular, rising male wage inequality increases the return to marital search, thereby increasing search duration and decreasing age-specific propensities to marry.

Therefore, the remaining sections of this chapter will focus on the relationship between gender differences in labour participation and age differences at first marriage. For that purpose, we will empirically test whether spousal gaps observed across monogamous countries are partly determined by observed gender differences in labour participation.

4.3 Data Description and Sources

This study combines country data at a decade frequency for the period 1950 to 2000. Data are grouped into decades due to the lack of consistent annual evidence on marital status across countries. The main sources of marital data are national censuses and surveys[175]. All available countries are in the panel, including some dependent territories not classified as independent countries[176]. The panel is unbalanced and the size of the cross-section is limited by the available data on marital status. Observations range from a minimum of 38 countries in 1950 to a maximum of 91 in 1990.

The data used were drawn from several sources. First, data on marital status for the period 1950-1980 were obtained mainly from Patterns of First Marriage (United Nations, 1990)[177] and Demographic Yearbooks (United Nations, 1977; 1984). Data for the period 1990-2000 were collected from the Demographic Yearbook (United Nations, 1997), World Marriage

[175] Data correspond mainly to each census round prepared by the United Nations for the period 1950-2000

[176] The term "country" refers also to territories or regions, irrespective of their legal status or delimitation of their frontiers or boundaries. There are 192 independent countries recognised by the United Nations and 46 dependent territories.

[177] Patterns of First Marriage: Timing and Prevalence (United Nations 1990) was prepared by the Population Division, Department of Economic and Social Affairs, United Nations.

Patterns (United Nations, 2000b)[178], World Fertility Report (United Nations, 2004)[179] and the Demographic and Health Surveys (1985-2005)[180]. Second, female labour data are collected from the "Population, Policies, Resources, Environment and Development Databank" or PRED Bank, Version 3.0[181]. Third, population data for the period 1950-1960 were collected from United Nations (1997): Demographic Yearbook, Historical supplement, Table 3. Population by age, sex, and urban/rural residence, each census: 1948-1997. Population data for the period 1970-2000 come from estimates and projections of populations by sex and five-year age groups, 1950-2050, The 1998 Revision, Demographic Yearbook and World Population Prospects, The 1998 Revision, Volume I: Comprehensive Tables[182].

4.3.1 Variable Definitions

Data on marital status, in particular the timing of marriage, can be presented in several forms. First, though the mean age at marriage would be the ideal measure, we would require information about the number of marriages and the specific ages at marriage of each spouse, which is rarely available. Second, there is the median age at marriage that also requires information about the specific age at marriage. To overcome this problem, Hajnal (1953) derived an indirect measure called the singulate mean age at marriage, SMAM. The

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178 World Marriage Patterns (United Nations, 2000b) was prepared by the Population Division, Department of Economic and Social Affairs, United Nations.

179 The World Fertility Report 2003 (United Nations, 2004) was prepared by the Population Division, Department of Economic and Social Affairs, United Nations

180 Data collected Demographic and Health Surveys were extracted from the STATcompiler (http://www.statcompiler.com/)

181 The PRED Bank, Version 3.0 was published by the Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat.

182 These data were extracted from the Women's Indicators and Statistics Database Version 4 (CD-ROM), Wistat 4 (United Nations, 2000a).

SMAM can be defined as the number of years an individual lives as single among those who ever married at the age of 50. Hajnal (1953) developed a method to estimate the singulate mean age at marriage using the proportions of never-married men and women aged 15-49 years old. Although it might not be the most appropriate measure, we think that using SMAM is a convenient and practical way to evaluate age differences at first marriage. For that reason, we define *GAP* as the difference between male and female singulate mean age at marriage.

There are two important limitations with the SMAM values. As we stated previously, the SMAM values are computed from the proportions of never-married men and women aged 15-49 years old. Therefore, if we allow polygynous unions, the proportions of never-married women will be lower because more women aged 15 years old and over will be required to be married to sustain polygyny. Tertilt (2008) stressed that the age at first marriage is a wrong measure for computing the average age gap in a polygynous society. To overcome this problem, we will use the dummy variable *monogamy* which takes the value of 1 if the country was classified in table A.2.4 in appendix 2 as monogamous (Mo), 0 otherwise. In this way, we exclude from our sample those countries which are potentially polygynous[183]. Secondly, even in the case of perfectly monogamous countries, re-marriage between a divorced, separated or widowed with a never-married could also affect our SMAM values. Widow re-marriage requires exceptional circumstances to occur, while re-marriage after separation or divorce appears to be more common. In particular, if divorce or separation rates are high, then the probability of a divorcee or separated to marry a never-married one would increase. Whether this is common trend across countries present

[183] Table A.2.4 in appendix 2 illustrates three types of countries: polygynous (Po), occasional polygynous (OP) and monogamous countries (Mo). We focus on monogamous countries, although data would also be presented for the polygynous and occasional polygynous countries in appendix 4.

us with a new statistical challenge. Nonetheless, high divorce/separation rates have only been observed in high developed countries in recent times.

The SMAM values for men and women were already estimated for most of the countries in the dataset, except for countries which data were collected from the Demographic and Health Surveys (1985-2005). For those countries, data were available on the proportions never married for the five-year cohorts, and therefore we derive the singulate mean age at marriage following Hajnal's (1953) methodology. Data on the proportions never married for the extreme age cohorts (15-19) and (45-49) are also available for most of the countries. In Figure A.4.2 in appendix 4 we provide Hajnal's (1953) formulae to compute the singulate mean age at marriage. Data on age-specific marital status remain scarce in developing countries, whereas they are usually available for most developed countries since 1950. In the 1970s, data on the percentage ever married, and hence the SMAM, were available for 80 percent of all countries; in the 1990s the coverage had increased to 90 percent (United Nations, 2004).

Coverage and quality of data constitute a limitation that needs to be acknowledged. In some countries, few censuses were available and the existing surveys covered only a part of the country, e.g. the Demographic and Health Surveys. It is not always known how accurately unions are recorded. Formal religious, customary and civil marriages are usually reported as marriages in censuses. Nevertheless, consensual and visiting unions, or concubinage are a major feature in some cultures. Consensual unions are traditionally associated with Latin America and the Caribbean, although most censuses in these countries reported them for the period of study. Visiting unions are also a common feature in the Anglophone and Francophone Caribbean countries. Even though they are

recognized as marriage forms, some of these unions are not always reported as marital unions (United Nations, 1990)[184].

Cohabitation is also an expression used to define the current concept of consensual union for developed countries, and has not been reported in the data until very recently[185]. Finally, concubinage refers more specifically to sexual partnerships and is not usually reported. We also need to take into account countries where boundaries have changed after the Second World War. As stated previously, country data on marital status are not usually reported annually. To overcome this limitation, we have grouped data by decades starting with 1950. We took the closest observation on a plus-minus five years round the decade e.g. if there is a unique observation for 1965, it will show as 1970.

Figure 4.2 shows the percentage of ever married men and women aged 45-49 years old. In this figure we illustrate a selection of countries with available data for all decades. Countries were classified as OECD and non-OECD to provide further information about their level of economic development. Although marriage may not be universal, percentages of ever married men and women are considerably high, above 80 percent in most cases. Unreported marital data, in particular for women, appears to be a more relevant issue for non-OECD countries in 1950 and 1960. We will take this on board and run robustness tests accordingly.

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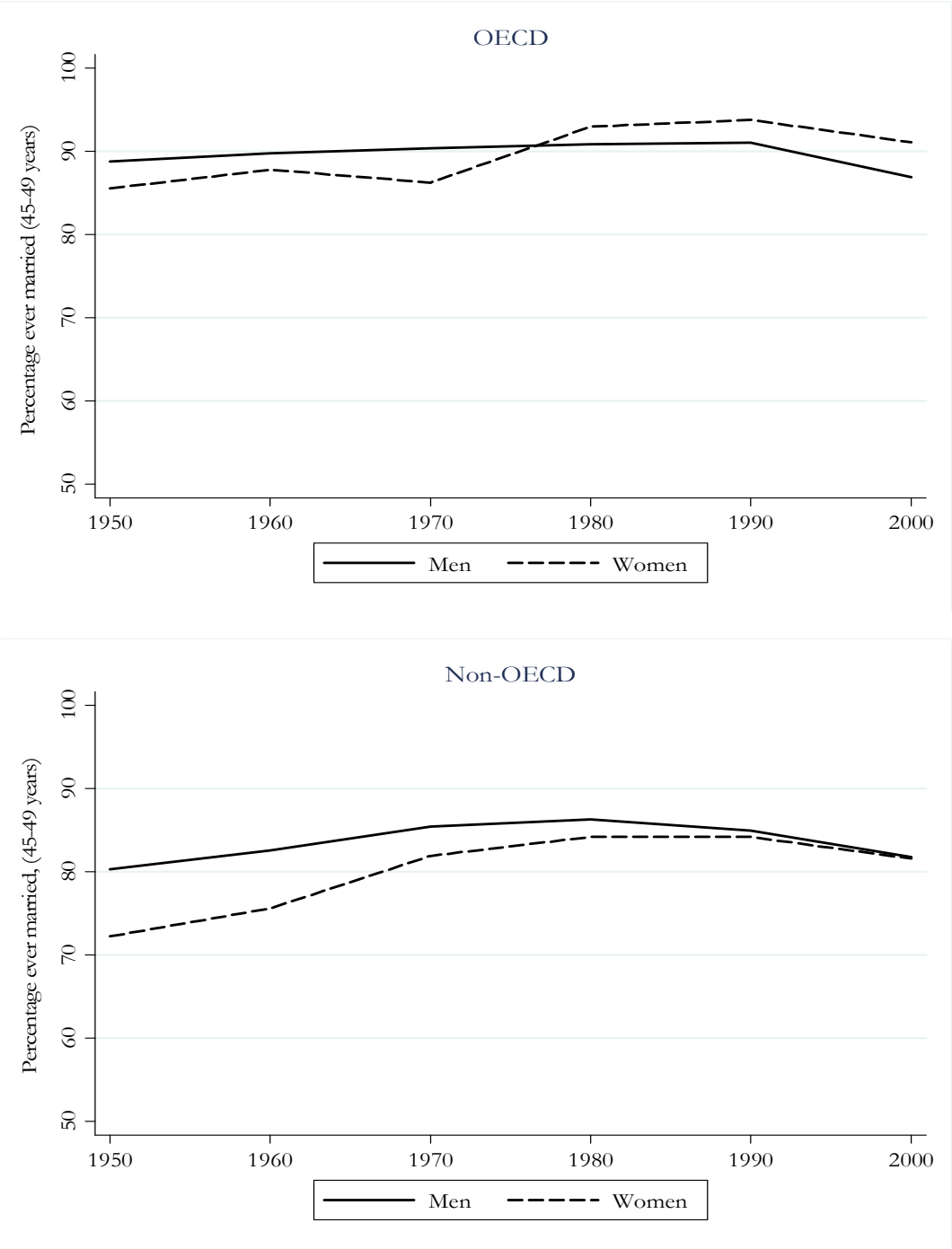
[184] "In the Caribbean, much higher SMAMs are recorded, plausibly as a result of misreporting and un-reporting of consensual and visiting unions." Patterns of First Marriage (United Nations, 1990: 156-157)

[185] Cohabitation has recently been a common practice in some European countries (Kiernan, 2002). Figure A.4.3 in appendix 4 shows that percentage differences between men and women are relatively small. We think that cohabitation, as well as consensual or visiting unions represent a serious problem to make comparisons of gender specific age at marriage. Therefore, by taking the spousal age gap we partly mitigate this problem.

Figure 4.2: Percentage Ever Married by Sex, 1950-2000



Sources: Patterns of First Marriage (United Nations, 1990), Demographic Yearbooks (United Nations, 1977; 1979; 1984; 1997), World Marriage Patterns (United Nations, 2000b), World Fertility Report (United Nations, 2004), Demographic and Health Surveys (1985-2005), PRED Bank, Version 3.0.

With regards to female participation in the labour market, we use two different proxies. First, we construct the ratio of women economically active per 100 men (*WEA*). To do so, we divide the rate of economically active women by the rate of economically active men.

Second, we use the percentage of women in the labour force (*WLF*)[186]. Both variables are annual estimates from the PRED Bank, Version 3.0. The projected economic activity rates cover male and female aged 15 years old and over for the period 1950-2000. Activity rate is the proportion of the population who are economically active, expressed as a percentage. The estimates take into account information on the economically active population obtained mainly from national censuses and labour force sample surveys[187]. These data have been adjusted by the International Labour Office so as to arrive at a consistent set of data.

Banerjee (1998) points that censuses of British India frequently neglected to document the extent of unpaid family labour, or the activities of women and children, who were reduced to the status of dependents because of their invisibility in public spheres. Country specific characteristics such as minimum hours of work or the extent to which family workers are included among economically active population, may affect the measurement of women's participation in economic activity. In this way women's economic activity is often understated[188]. Furthermore, other control variables have been included in the panel data, the sex ratio aged 15-44 years old (women per 100 men), and the rate of urban population, *URBAN* (percentage).

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[186] Both variables are interrelated since *WLF* is simply the number of economically active women divided by the number of economically active men and women. Throughout the study we will use both variables for our empirical tests. Nonetheless, we think that *WEA* better captures gender differences and consequently will be preferred over *WLF*.

[187] The International Labour Office defines persons as economically active, if they are working for pay or profit at any time during a specified reference period or are seeking such work. This definition was broadened in 1982 to include, if appropriate, persons available for work but not necessarily actively seeking work

[188] Volume 5 of Sources and Methods: Labour Statistics is an updated version of the 2nd edition issued in 1996 which presented methodological descriptions of population censuses carried out during the period 1989-94 in 115 countries, areas and territories. The 1st edition issued in 1990 covered the period 1945-89.

4.3.2 Summary Statistics

The panel dataset is a decade country panel covering the period 1950-2000. More than 150 countries have reported at least one observation on age differences at marriage over this period. There are typically more than 70 observations per decade in the dataset, except for 1950 and 1960 for which we only have 38 and 60 respectively. Table 4.2 provides summary statistics for our main variables sorted by geographical regions. We present average values alongside standard deviations and number of observations across geographical regions for the variables of interest: age differences at marriage (*Gap*) in years; the ratio of women economically active per 100 men (*WEA*); the number of women per 100 men aged 15-44 years old (*Sex ratio 15-44*) and the percentage of population living in urban areas (*URBAN*). As we stated previously, data from polygynous (Po) and occasional polygynous (OP) countries have been removed[189].

By restricting the sample to monogamous countries, we expect to have more robust and consistent results. In this way, we may observe from table 4.2 that Middle Africa has been completely removed. Similarly, Western Africa, Southern Africa, Southern Asia and Melanesia only present data for one country. These are Cape Verde, South Africa, Nepal and Fiji. Data for Central Asia correspond to the 1990 census round, which was the only available and reliable observation for the former USSR republics. The remaining regions present well balanced and consistent data for the period of study.

[189] In appendix 4, tables A.4.1 and A.4.2 present descriptive statistics by regions for those countries classified as polygynous (Po) or occasional polygynous (OP). Also, we include in table A.4.3 descriptive statistics for Micronesia and Polynesia, for which data on the ratio of women economically active per 100 men were not available.

Table 4.2 Descriptive Statistics by geographical region [*Monogamous (Mo)]*

Geographical region	Statistics	Gap (years)	WEA (+15) Women/100 Men	Sex ratio (15-44) Women/100 Men	URBAN (%)
Northern Africa	Mean	5.3	29	99	41.1
	St. Dev	0.8	8.6	5.8	10.0
	N	9	12	9	12
Western Africa	Mean	2.4	40	119	29.0
	St. Dev	.	9.1	8.4	20.3
	N	1	6	4	6
Eastern Africa	Mean	3.6	67	102	32.1
	St. Dev	1.3	26.8	3.5	23.2
	N	20	30	27	42
Southern Africa	Mean	3.0	49	98	47.5
	St. Dev	1.1	9.2	2.7	2.5
	N	5	6	6	6
Western Asia	Mean	3.1	48	88	63.3
	St. Dev	0.9	26.2	21.6	19.8
	N	24	42	31	42
Central Asia	Mean	2.3	74	100	40.1
	St. Dev	0.5	8.6	1.5	8.0
	N	7	30	20	30
Eastern Asia	Mean	3.1	61	96	65.8
	St. Dev	1.4	18.1	7.1	30.9
	N	21	30	23	30
Southern Asia	Mean	3.5	64	102	6.1
	St. Dev	0.1	1.7	4.9	3.7
	N	4	6	5	6
South-Eastern Asia	Mean	3.2	59	99	38.8
	St. Dev	1.1	22.3	5.6	28.1
	N	37	48	38	48
Northern America	Mean	2.4	57	98	81.6
	St. Dev	0.6	19.0	4.0	14.1
	N	13	12	15	18
Central America	Mean	4.0	31	101	44.8
	St. Dev	1.5	11.9	3.8	11.4
	N	33	48	43	48
Caribbean	Mean	3.2	60	106	49.9
	St. Dev	1.3	16.3	5.9	21.8
	N	47	54	53	84
South America	Mean	3.6	36	101	59.3
	St. Dev	1.3	11.2	3.2	19.5
	N	52	66	59	66
Eastern Europe	Mean	3.3	72	100	52.9
	St. Dev	0.5	12.2	3.3	14.2
	N	34	54	41	54
Northern Europe	Mean	2.8	63	98	68.1
	St. Dev	1.0	19.4	3.4	16.5
	N	41	54	47	54
Southern Europe	Mean	3.4	47	100	53.1
	St. Dev	1.0	19.1	4.6	20.2
	N	37	48	40	54

Table 4.2 Descriptive Statistics by geographical region (*continued*)

Geographical Region	Statistics	Gap (years)	WEA (+15) Women/100 Men	Sex ratio (15-44) Women/100 Men	URBAN (%)
Western Europe	Mean	3.0	53	99	71.7
	St. Dev	0.6	13.9	5.6	23.5
	N	44	42	41	54
Australia and New Zealand	Mean	2.9	51	97	81.7
	St. Dev	0.9	18.7	2.3	4.7
	N	12	12	12	12
Melanesia	Mean	3.1	20	97	36.3
	St. Dev	0.3	16.0	1.7	8.8
	N	4	6	4	6
Total	Mean	3.3	54	100	53.9
	St. Dev	1.2	21.8	7.9	23.9
	N	445	606	518	672

Sources: Patterns of First Marriage (United Nations, 1990), Demographic Yearbooks (United Nations, 1977; 1979; 1984; 1997), World Marriage Patterns (United Nations, 2000b), World Fertility Report (United Nations, 2004), Demographic and Health Surveys (1985-2005), PRED Bank, Version 3.0.
Notes: The geographical regions refer to the United Nations classification. Data on women economically active for Micronesia and Polynesia regions are not available, and hence they are removed from table 4.2. In the appendix 4, table A.4.3 presents descriptive statistics for these two regions.

Overall, age differences at marriage vary noticeably across countries and geographical regions. In table 4.2 we observe that on average, there is a gap of over 5 years in Northern Africa and 4 years in Central America. This is what we previously refer to as *LARGE* gap. On the other hand, Northern America, Northern Europe, Australia and New Zealand are the regions with the lowest average age differences between spouses or *SMALL* gap, just below 3 years. In Europe, the largest gap observed corresponds to Southern Europe, while the smaller corresponds to Northern Europe, which goes in line with the "Mediterranean" and "Northwest European" patterns discussed above.

Alternatively, we also notice large variations in labour participation across regions. Northern Africa with just 29 women economically active per 100 men, Central America and South America with 31 and 36 present the lowest ratios. On the contrary, in Central Asia and Eastern Europe there are 74 and 72 women economically active per 100 men. This, again, provides remarkable insights about the data, as both geographical regions

include countries that were mostly centrally planned economies for a considerable time during the period of study[190].

Differences in sex ratios aged 15-44 years old are less pronounced. Most geographical regions present a well balanced ratio. The main exceptions are Western Asia, with 88 women per 100 men, and Western Africa (Cape Verde with 119 per 100 men). Western Asia includes countries such as Bahrain, Kuwait, Qatar or United Arab Emirates where sex ratios are seriously imbalanced. The number of male expatriates may considerably skewed sex ratios. Nonetheless, variations in sex ratios tend to be a short term phenomenon. Figures A.4.4a and A.4.4.b in appendix 4 show -for those countries with available data for all census rounds-, the sex ratios aged 15-44 years old for the period 1950-2000. On the whole, sex ratios are stable and well balanced. Colonisation, wars and gender specific migrations may alter temporarily the sex ratios, i.e. European countries exhibit considerable changes in the sex ratios for the post-war years. In any case, we will also measure to what extent sex ratios had an impact on age differences at marriage.

Table 4.2 also provides statistics for the rate of urbanisation. The average values show also considerable disparities across regions. Among the most urbanised regions we have Northern America, Australia and New Zealand with over 80 percent of their population living in urban areas, and Western Europe with 72 percent. At the other end of the spectrum, we find Southern Asia with rates of urbanisation below the 10 percent. It is not striking to find that high rates of urbanisation correspond to *New World* regions such as

[190] After the Second World War, the Union of Soviet Socialist Republics (USSR) was composed of 15 republics. Five of them are in Central Asia (Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan), three in Western Asia (Armenia, Azerbaijan and Georgia), three in Northern Europe (Estonia, Latvia and Lithuania), and the remaining four in Eastern Europe (Belarus, Republic of Moldova, Russian Federation and Ukraine)

United States, Canada, Australia and New Zealand, as opposed to *Old World* ones. In this way, we would attempt to capture these effects too.

Finally, table A.4.4 in appendix 4 shows descriptive statistics by marital system, that is to say, whether countries are classified as monogamous (Mo), occasional polygynous (OP) or polygynous (Po). The results in this table confirm that age differences at marriage are on average substantially higher in polygynous countries, 6.1 years, relative to monogamous ones, 3.3 years. Countries classified as non-monogamous and non-polygynous provide an average gap of 4.6 years. Variations in labour participation of women in market activities are also significant. Polygynous countries show that on average 72 women are economically active per 100 men, whereas the figure is considerable smaller for monogamous countries, 54, and even smaller for the occasional polygynous, 42. Sex ratios do not present considerably differences, and urbanisation rates are higher for monogamous than for polygynous countries, as otherwise expected.

4.4 Empirical Model

In this section, we test the impact that gender differences in labour participation might potentially have on gender differences in age at marriage. For this purpose, our basic model will be the following,

$$Gap_{it} = \beta_0 + \beta_1 WEA_{it} + Z_{it}'\gamma + \varepsilon_{it} \tag{4.1}$$

where the subscripts refer to country i and decade t. Our dependent variable Gap_{it} stands for the age gap at first marriage, and WEA_{it} captures gender differences in labour participation. The vector Z_{it} represents a vector of controls, among them, the sex ratio 15-44 years, the percentage of urban population, *URBAN*, and a time-dummy variable, $CEDAW$; ε_{it} is an error term. To our knowledge there are no empirical studies evaluating the impact of gender differences in the labour market on the spousal gap in the long term. The rest of the control variables will attempt to capture variations in the availability of adult women relative to men, community size effects and the impact that the introduction of the *Committee on the Elimination of Discrimination against Women, CEDAW,* had on country specific family laws, and hence age differences at marriage.

A sudden decrease in the relative number of women at marriageable age implies fewer alternatives for men. If personal traits for men and women are evenly distributed, some men will be unsuccessful in their search for a partner, and will have to wait, leading on average to increase their age at marriage. Also, men will face a more competitive marriage market, and consequently they will need to be more efficient (Becker, 1981). On the other

hand, women who expect to marry could also benefit[191]. Fewer women relative to men could improve their bargaining position in the marriage market and within the household[192]. The likelihood of a future divorce could be less significant, given that there are fewer marriageable alternatives for men. This, in fact, could induce some women to worry less about developing a career. Additionally, if gender differences in wages are noticeable, these women would have lesser incentives to participate in market activities, and hence accept a marriage proposal early in life. A *LARGE* gap could emerge under these circumstances.

Although sex ratios have been a very popular subject at micro level, we observe that changes of aggregate sex ratios in the long run do not vary much across countries. Regardless, we will control for potential heterogeneity in the number of women relative to men; and for this purpose we have collected data for men and women aged 15-44 years old[193]. Additionally, urbanisation rates attempt to capture community size effects and cultural or social stigma attributed to smaller communities. The size of the community may be closely associated with the degree of uncertainty about a potential spouse. In this way, uncertainty would be lower in rural areas, and hence the costs associated with finding a suitable spouse would be smaller. Moreover, social stigmas associated with pre-marital sex,

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[191] In our model we expect that all women and men want to get married. Figure 4.2 confirms for OECD and Non-OECD countries that on average more than 80 percent of men and women have married at least once aged 45-49 years old. Although we do not reach universal marriage, the proportions are sufficiently high to accept this assumption.

[192] Angrist (2001) and Chiapporti et al. (2001) find evidence to support the view that a relative undersupply of women improves the bargaining position of women in the marriage market and within households. Also, Rao (1993) studies the consequences of changing sex ratios in the developing world, and finds that "marriage squeeze" or the imbalance between the number of males and females has played a significant role in the rise in dowries over time, that is to say, in the bargaining power of men and women in the marriage market.

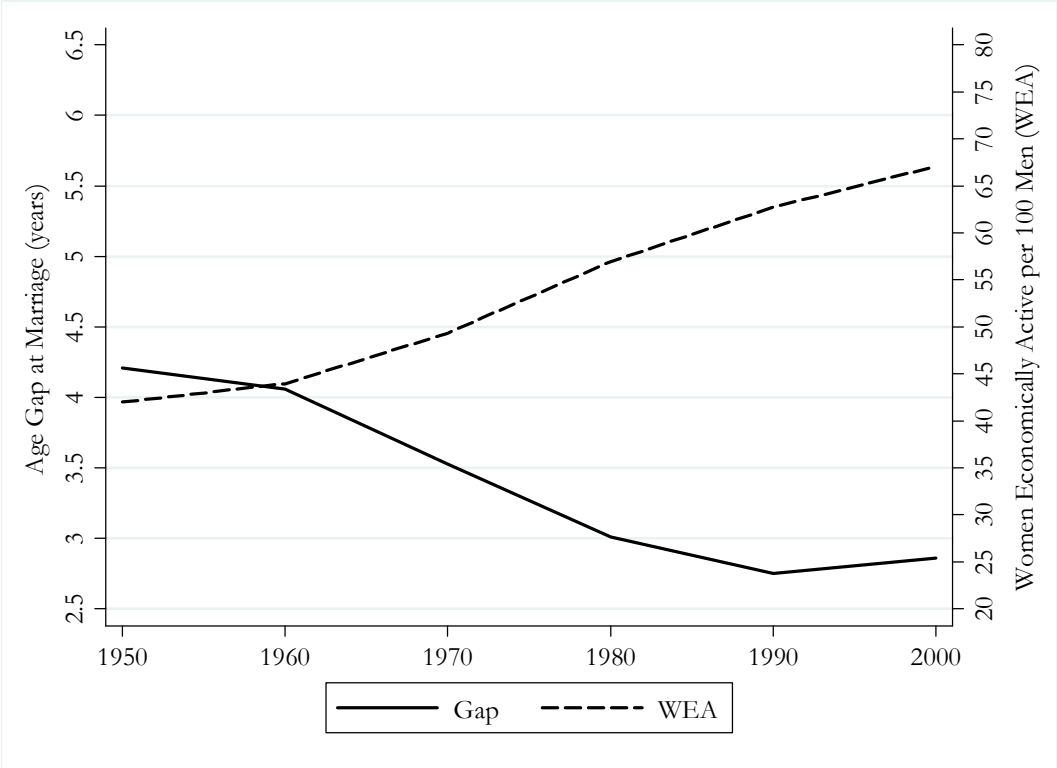
[193] SMAM is derived from marital status data, in particular the proportions of singles or never-married for each 5-years cohort, 15-49. See appendix 4, Figure A.4.2 for Hajnal (1953) formulae. For that reason, we decide to select similar age specific sex ratios.

fertility and gender roles, which in turn may affect the marital decisions of men and women may also be captured by urbanisation rates.

Finally, the time-dummy variable *CEDAW* splits the dataset into two periods, 1950-1980 and 1990-2000, taking the value of 1 for the decades 1990 and 2000, and 0 otherwise. In 1979, the Convention on the Elimination of All Forms of Discrimination against Women (CEDAW) was adopted by the United Nations General Assembly, it entered into force as an international treaty on 3 September 1981[194]. The Convention establishes an international bill of rights for women, periodical meetings with the member states to guarantee the completion of those rights, and an agenda for equality. The agenda is specified in fourteen articles, covering three dimensions: civil rights, human reproduction and cultural factors on gender relations. Article 16 of the agenda, Marriage and Family Life, covers different aspects of marriage, in particular, the right to freely choose a spouse, the rights after dissolution of marriage and property ownership within marriage. Part 2 of Article 16, condemns betrothal and the marriage of a child and recommend countries to take all necessary action to specify a minimum age for marriage and to make the registration of marriages compulsory. In this way, we test whether the introduction of an International Convention as *CEDAW* had an impact on countries family laws and consequently in the spousal gap.

[194] By the thirtieth anniversary in 2009 there are 186 country members. There are only six United Nations member states, Iran, Somalia, Sudan, Nauru, Palau and Tonga who have not signed the convention. Sudan and Somalia are polygynous countries (Po); Iran is occasional polygynous (OP); while Nauru, Palau and Tonga are Micronesian and Polynesian countries which have been excluded from the sample. Niue and the Vatican City have also not signed, and the United States have signed, yet not ratified.

Figure 4.3 Spousal Age Gap and *WEA*, 1950-2000



Sources: Patterns of First Marriage (United Nations, 1990), Demographic Yearbooks (United Nations, 1977; 1979; 1984; 1997), World Marriage Patterns (United Nations, 2000b), World Fertility Report (United Nations, 2004), Demographic and Health Surveys (1985-2005), PRED Bank, Version 3.0.

Figure 4.3 introduces the long term pattern of age differences at marriage and the ratio of women economically active for every 100 men, with data from all available countries and for the period of study, 1950-2000. In Figure 4.3 we observe that while female participation rates on average have increased over time, the spousal gap have decreased from a *LARGE* to a SMALL gap. Figures A.4.5a and A.4.5b in appendix 4, illustrate the scattered plot of *Gap* and *WEA* by decades for the whole sample (unbalanced panel) and a selection of countries (balanced panel). From those figures we also observe a gradual move towards a *SMALL* gap.

There are a variety of techniques that could be used to estimate our empirical model. To evaluate which technique is optimal, it is necessary to consider two factors: the relationship between the unobserved country specific effects, and the potential endogeneity between

our main variables, Gap_{it} and WEA_{it}. Estimates of model (1) are obtained using pooled ordinary least squares (Pooled OLS) and the standard methods of panel data estimation: fixed effects (FE) and random effects (RE) models. Both fixed and random effects models control for unmeasured heterogeneity that pooled OLS ignores. The pooled regression model assumes that any two country/years can be compared, whether across time or across space. The potential advantage of a pooled estimator is that it considers all of the variation in the independent variables. However, the pooled OLS omits unobserved heterogeneity that may impose biases on parameter estimates (Wooldridge, 2002).

The fixed effects model treats differences in the unobserved specific effects as due to deterministic factors. On the other hand, the random effects model treats those differences as being due to stochastic factors. Yet if the country effects are correlated with the independent variables, in our case *WEA* and the control variables *Sex ratio*, *URBAN* and *CEDAW*, the estimates of the random effects model are biased and inconsistent, while the within estimator remains unbiased and consistent. Most applications in economics since the 1980s have made the choice between the random effects and fixed effects estimators based upon the standard Hausman test (Baltagi *et. al.*, 2003). Consequently, in order to check for unbiasedness and consistency, Hausman tests will be conducted when comparing estimates from the fixed and random effects models, Hausman (1978). It is also important to know that there is a limitation with our data due to the complex nature of the independent variable and the limited sources available. Measurement error will cause estimates to be biased and inconsistent. In this way, we acknowledge that the measurement error bias is likely to be more exaggerated in the fixed effects estimates.

4.5 Main Findings

4.5.1 Results

From the above empirical model, we test whether gender differences in labour participation have an effect of gender differences at marriage, which in turn is our main hypothesis. For this purpose, the model specification will be,

$$Gap_{it} = \beta_0 + \beta_1 WEA_{it} + \gamma_1 Sex\ Ratio_{it} + \gamma_2 URBAN_{it} + \gamma_3 CEDAW_t + \varepsilon_{it} \quad (4.2)$$

Table 4.3 displays the results of estimating the model. Our aim throughout the chapter is to explore the long term relationship between gender differences in labour participation and the age gap at marriage. We provide results according to different specifications. Columns (1) and (2) present the pooled ordinary least squares (OLS), columns (3) and (4) present the fixed (FE) and random effects[195] (RE) models respectively. The dependent variable is the age gap at first marriage: *Gap*. The OLS estimation in columns (1) and (2) provide a baseline for exploring the relationship between the number of women economically active per 100 men, *WEA*, and the age gap at marriage, *Gap*. After incorporating the control variables: sex ratio aged 15-44 years old, the rate of urbanisation, *URBAN*, and *CEDAW*, we observe that *WEA* remains statistically significant and with a negative sign. Both results go in line with our main hypothesis which says that on average *WEA* has a negative and significant impact on *Gap*.

[195] The random effects model is estimated by Generalised Least Squares (GLS).

Table 4.3 Panel Data Estimates for the Spousal Age Gap, 1950-2000

Independent variables	*Pooled OLS*	*Pooled OLS*	*Fixed effects*	*Random effects*
	(1)	(2)	(3)	(4)
WEA	-0.023***	-0.018***	-0.025***	-0.021***
	(0.003)	(0.003)	(0.006)	(0.004)
Sex ratio (15-44)		-0.023**	-0.039**	-0.024**
		(0.009)	(0.016)	(0.010)
URBAN		-0.013***	-0.024**	-0.016***
		(0.002)	(0.011)	(0.004)
CEDAW		-0.308**	-0.068	-0.215*
		(0.128)	(0.146)	(0.117)
Constant	4.521***	7.350***	9.922***	7.789***
	(0.173)	(0.986)	(1.902)	(1.086)
Observations	426	421	421	421
R^2	0.167	0.237		0.235
within- R^2			0.309	
Log-Likelihood	-627.2	-598.1	-412.9	
$F(\alpha_i = 0)$			4.46 [0.000]	
Breusch-Pagan LM				140.7 [0.000]
Hausman test				7.83 [0.100]

Notes: 1. Dependent variable is age gap at marriage

2. Robust standard errors are denoted in parentheses.

3. * , **, and *** denote 10%, 5%, and 1% levels of significance, respectively.

An initial consideration is determining which of the models is the most appropriate. Homogeneity of the country effects is rejected for both panel data models (fixed effects: F=4.46; random effects: LM=140.7), suggesting pooled OLS estimates are inefficient at best. In column (3) we include the country specific effects, whereas column (4) extends the previous analysis with a random effects model. In addition, since the Hausman statistic fails to reject the null hypothesis of orthogonality at conventional levels of significance, the more efficient random effects estimates remain consistent and unbiased. Thus, from the statistical test the random effects model appears to be the adequate specification. Therefore, our preferred and baseline model for the remaining of the chapter is the one described in column (4).

The results under column (4) reveal that *WEA*, *Sex ratio (15-44), URBAN* and *CEDAW* are statistically significant. Furthermore, all of them show a negative sign, which confirm our expectations. On average an increase in female labour participation will accompany a decrease in the age gap at marriage. Therefore, *LARGE* gap scenarios will most likely occur when gender differences in labour participation are severely imbalanced. Second, an increase in the number of women relative to men (15-44) will also reduce the age gap. Third, a smaller proportion of the population living in urban areas will increase age differences at marriage. Even if uncertainty about the traits of a potential spouse is higher in urban areas, social stigmas regarding pre-marital sex or gender specific roles, which are closely associated with rural areas, may induce women to marry younger. Fourth, the results also show that the impact of *CEDAW* is negative and statistically significant. The presence of the Committee could be accompanied with country specific amendments to their family and property laws that may potentially change the economic environment.

On the whole, results in column (4) imply that gender equality in labour participation may reduce age differences at marriage between spouses by 2.1 years. Gender equality entails that for every 100 economically active men there are equal number of economically active women. Similarly, sex ratio imbalances have a rather significant effect. A decrease in the number of women relative to men, aged 15-44 years old, may increase the age gap. For example, a sudden reduction from a perfectly balanced sex ratio to 50 women for every 100 men could increase the age gap by 1.2 years. The effect of urbanisation rates and *CEDAW* on the spousal gap appear to be less sizeable.

4.5.2 Sensitivity Analysis

We acknowledged that causality between WEA_{it} and Gap_{it} might be an issue of concern. It can be argued that marital decisions might potentially affect labour choices. When endogeneity is a problem, to find appropriate instruments is a challenge, i.e. instruments that are correlated with the endogenous variable, *WEA*, and uncorrelated with the error term in the main equation, ε_{it}. To choose our instruments, we follow Goldin (1994) who, as we illustrated above, associated economic development and female labour participation. Goldin (1994) argued for a U-shaped relationship between female labour participation and economic development. Goldin (1994) used a sample that included most countries, except centrally planned economies and Muslim ones. In our study, we have removed polygynous (Po) and occasional polygynous (OP) countries from the sample. Polygynous countries are less developed and present higher rates of female labour participation[196]. In this way, these countries will be mostly placed in the upper part of the left hand-side of the U-shaped relationship. As a result of the exclusion of these countries, we are partly converting the U-shaped relationship into a linear and increasing one, especially for the last decades, 1990 and 2000.

For that reason, we will instrument *WEA* with two different approaches that attempt to capture economic development in this way. First, we use as instruments for *WEA*: gross domestic product per capita, *GDP per capita*, and two geographic variables, distance from the equator and the length of a country coastline divided by its area[197]. The geographical

[196] Table A.4.4 in appendix 4 shows the average values for *WEA* by marital system. *WEA* values for polygynous countries are far greater on average than for monogamous ones.

[197] GDP per capita come from the Heston et. al (2002) *Penn World Table Version 6.1*; Distance from the equator is the difference between countries latitude and the equator in absolute value (degrees of latitude), The World Factbook, Central Intelligence Agency (2008). The length of coastline divided by the country area

variables are also included as instruments for two reasons. First, GDP per capita may not fully capture some dimensions of economic development. In this way, geography has also been associated with economic development (Gallup et al., 1999). More importantly, distance from the equator and the length of a country coastline divided by its area, are two of the most exogenous variables. Moreover, there may be concerns regarding the exogeneity of *GDP per capita*, even if statistical tests suggest its appropriateness as instrument. To overcome this, we use a second instrumentation where we replace *GDP per capita* by population relative to potential land, which is a quality adjusted measure of population density[198]. Boserup (1981) argued that population density stimulates technological change, and hence economic development. The validity of the instruments is tested using a Sargan-Hansen test for over-identifying restrictions, as seems from the bottom of table 4.4 the null hypothesis of valid instruments cannot be rejected.

Results of the Instrumental Variable-random effects are illustrated in table 4.4[199]. Column (1) and column (2) present the IV-random effects coefficients with the two sets of instruments respectively. The Sargan-Hansen test of over-identifying restrictions, which evaluates the overall validity of the instruments, does seem to indicate the appropriateness of our sets of instruments in both specifications. In columns (1) and (2), we observe that the relationship between *WEA* and *Gap* remain fairly stable. Additionally, we also include the potential endogenous variable WEA_{t-1} in lagged values, and the results presented in column (3) once again confirm the negative and significant relationship between them.

(metre/square kilometre) comes from The World Factbook, Central Intelligence Agency (2008); and United Nations (2008).

[198] Land is "Equivalent Potential arable land" or potential arable land adjusted for its suitability for rainfed crop production for any of the 21 major world crops (Bot et al., 2000). Population comes from PRED Bank, Version 3.0. Population density measured as population per square kilometre.

[199] The IV random effect estimation was performed using the *xtivreg* procedures in STATA version 10.0

Table 4.4 Sensitivity Analysis for the Spousal Age Gap (1950-2000)

Independent variables	***IV- Random effects***	***IV- Random effects***	***Random effects***	***Random effects***
	(1)	(2)	(3)	(4)
WEA	-0.020**	-0.025***		-0.020***
	(0.009)	(0.006)		(0.004)
WEA_{t-1}			-0.015***	
			(0.004)	
Sex ratio (15-44)	-0.033**	-0.023*	-0.023**	
	(0.014)	(0.013)	(0.011)	
Sex ratio				-0.012
				(0.012)
URBAN	-0.019***	-0.015***	-0.015***	-0.013***
	(0.004)	(0.003)	(0.004)	(0.004)
CEDAW	-0.199	-0.086	-0.258**	-0.207*
	(0.185)	(0.178)	(0.116)	(0.119)
Constant	8.814***	7.765***	7.241***	6.383***
	(1.560)	(1.404)	(1.171)	(1.190)
Observations	334	371	383	421
R^2	0.266	0.233	0.196	0.226
Sargan-Hansen test	0.25[0.88]	2.60 [0.27]		

Notes: 1. Dependent variable is age gap at marriage

2. Robust standard errors are denoted in parentheses.

3. * , **, and *** denote 10%, 5%, and 1% levels of significance, respectively.

4. Sargan test or Sargan-Hanses where the null hypothesis is that the instruments are not correlated with the residuals

As a further robustness check, we are concerned with the potential variability of the *Sex ratio (15-44)*, and run a new specification using the sex ratio for all ages instead. Column (4) presents the results. Once again, we confirm our previous expectations and find that all the independent variables are statistically significant and with a negative sign, with the only exception of the sex ratio that appears not statistically significant[200]. To test for the robustness of the results we have also run our baseline model excluding 1950 and 1960 observations, where data might be less reliable and consistent. In appendix 4, table A.4.5

[200] Further robustness tests have been carried out with other age-specific sex ratios (15-24 years) and (15-64 years) without finding significant differences.

illustrates the main results. Overall, *WEA* is negative and statistically significant, although the size of the coefficient is, as expected, smaller. By 1970, female participation rates in some developed countries have substantially increased. This is partly reflected in the value of the intercept. While for the period 1950-2000 the constant term was 7.789, between 1970 and 2000 was 6.707.

4.5.3 Religion, Institutions and Economic Development

In this section, we test our baseline model for different sub-samples of countries, to evaluate whether our variables of interest are stable. Countries will be grouped according to religion, culture, institutions and economic development. Thus, we seek to account for heterogeneity based on specific country characteristic rather than by estimating country specific parameters.

A) Religion

As regards as religion, we understand that some religious beliefs can influence marital outcomes, specially, when family laws are based on them. For that reason, we will first test in our empirical model the effect that the percentages of Muslims and Roman Catholics in 1980, *Muslim80* and *Catho80* henceforth, have on our main results. We selected these two religions because they are widespread across geographical regions. Percentages come from Laporta et al. (1999).

Table 4.5 Sensitivity Analysis: Spousal Age Gap and Religion

	Random effects	***Random effects***	***Random effects***
Independent variables	**(1)**	**(2)**	**(3)**
WEA	-0.021***	-0.022***	-0.018***
	(0.004)	(0.004)	(0.005)
Sex ratio (15-44)	-0.024**	-0.024**	-0.022**
	(0.010)	(0.010)	(0.011)
URBAN	-0.016***	-0.016***	-0.015***
	(0.004)	(0.004)	(0.003)
CEDAW	-0.215*	-0.199	-0.261**
	(0.117)	(0.122)	(0.123)
Muslim80		-0.001	
		(0.004)	
Catho80		-0.002	
		(0.002)	
Muslim			0.343
			(0.424)
Roman Catholic			0.367
			(0.262)
Constant	7.789***	7.902***	7.294***
	(1.086)	(1.150)	(1.183)
Observations	421	421	421
R^2	0.235	0.235	0.262

Notes: 1. Dependent variable is age gap at marriage

2. Robust standard errors are denoted in parentheses.

3. * , **, and *** denote 10%, 5%, and 1% levels of significance, respectively.

Furthermore, we follow Barro and McLeary (2005) and sort countries according to their state religion in 1970 and 2000. In this way, we attempt to capture whether State religions influence marital decisions through family and marriage laws. For this purpose, we define a dummy variable, *Muslim,* as 1 for those countries where Islam is the State religion in 1970 and 2000, and 0 otherwise. Similarly, we define a second dummy variable, *Roman Catholic*, as 1 for those countries where Roman Catholicism was the State religion in 1970 and 2000, and 0 otherwise.

Table 4.5 shows the results. Column (1) provides the baseline model, which is our preferred specification obtained in table 4.3. In Column (2), we observe that *Muslim80* and *Catho80* are not statistically significant and that *WEA* remains fairly stable, negative and statistically significant. Column (3) presents similar results. Whether Islam or Roman Catholicism, as State religions, impact age differences at marriage remain uncertain. On the whole, neither proportions of Muslim and Catholics, nor Islam and Roman Catholicism appear to be statistically significant. An increase in women labour participation relative to men will accompany a decrease in the age gap at marriage. The results are rather consistent and similar to our baseline model, in which an increase in labour participation reduces on average age differences at marriage between spouses by approximately 2 years.

B) Institutions

In this sub-section we test whether institutional differences impact upon our main results. For this purpose, we divided the sample into two new sub-samples. First, we question whether *New World* countries, as opposed to *Old World* ones, would change our main results. Previously, we observed that *New World* countries have on average higher urbanisation rates. Moreover, Engerman and Sokoloff (2002) argue that in most *New World* economies, inequalities in the distribution of wealth and political power during Colonisation encouraged the development of institutional structures that greatly advantaged small elites. In this way, we construct a new variable, *Oldworld*, for those countries where more than 50 percent of the current population speaks as mother tongue a language indigenous to the continent where the country is located[201]. This variable will allow us to split the sample between *New World* countries and *Old World* countries.

[201] To construct the dummy variable *Old World*, we used data from Alesina et al. (2003) and Lewis (2009). First, we classified languages by family. Then, we verified which languages and families were indigenous. We

Furthermore, we have also observed in the summary statistics that many former USSR republics exhibit high levels of female labour participation. Whether this is a true fact, misreporting of data in these countries, or the rest of the world are under-reporting the participation of women in market activities deserve further analysis. For that reason, we define a new variable, *Socialaw*, for those countries where Socialist/Communist laws have been predominant during the period 1950-2000 (La Porta et al., 1999).

Table 4.6 Sensitivity Analysis: Spousal Age Gap and Institutions

Independent variables	**Total**	**Old World**	**New World**	**Socialist**	**Non-Socialist**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
WEA	-0.021***	-0.018***	-0.020**	-0.016*	-0.022***
	(0.004)	(0.005)	(0.010)	(0.009)	(0.005)
Sex ratio (15-44)	-0.024**	-0.028**	0.001	-0.032	-0.026**
	(0.010)	(0.012)	(0.023)	(0.022)	(0.010)
URBAN	-0.016***	-0.010***	-0.025***	0.016**	-0.019***
	(0.004)	(0.004)	(0.009)	(0.007)	(0.004)
CEDAW	-0.215*	-0.216	-0.267	-0.604***	-0.170
	(0.117)	(0.132)	(0.231)	(0.182)	(0.135)
Constant	7.789***	7.638***	5.755**	6.884***	8.152***
	(1.086)	(1.279)	(2.606)	(2.455)	(1.132)
Observations	421	264	157	67	354
R^2	0.235	0.176	0.304	0.434	0.244

Notes: 1. Dependent variable is age gap at marriage

2. Robust standard errors are denoted in parentheses.

3. * , **, and *** denote 10%, 5%, and 1% levels of significance, respectively.

Table 4.6 illustrates the results. Column (1) reports the results of our baseline model as usual. Columns (2) and (3) provide the coefficients for *Old World* and *New World*. As we can observe from table 4.6, these coefficients appear to be fairly stable, except for the *Sex ratio* which looses statistical significance for *New World* countries. Columns (4) and (5) focus on

define a language or a family as indigenous if it was widely spoken in the continent where the country belongs in 1500. Finally, the percentage of the population speaking an indigenous or non-indigenous language was computed.

Socialist or centrally planned economies. Overall, we accept our main hypothesis for each sub-sample. The sex ratio is also statistically insignificant for Socialist countries, although *WEA* continues to show a negative relationship for all sub-samples.

We understand that inequalities in the distribution of land or the collectivisation of agriculture could have a significant impact on the participation of women in labour market activities. The results illustrated in table 4.6 imply that gender equality in labour participation has a lower impact, particularly in Socialist countries, reducing the gap by approximately 1.6 years on average. In the former USSR, in 1965 family laws were reformed making divorces easier (Moskoff, 1983). This, in fact, could have an impact on marital decisions too. As we stated above, if divorce is a credible threat and easy to obtain, women will have more incentives to participate in market activities, and following our line of reasoning, reduce gender differences at marriage. Mincer (1985) showed that labour force rates of women reached the level of men after 1970 in the USSR. As a result, the spousal gap would be a *SMALL* gap[202].

C) Economic Development

Finally, we consider the level of economic development across countries. In this way, we divide the sample into two new sub-samples: OECD and non-OECD countries. The results are presented in table 4.7.

[202] The highest spousal gap observed within Socialist countries corresponds to Albania in 1955 with 4.7 years. Among non-Socialist countries, Greece in 1981 or Norway in 1960 exhibited higher spousal gaps with 5.1 and 4.8 respectively.

Table 4.7 Sensitivity Analysis: Spousal Age Gap and Economic Development

Independent variables	**Total**	**OECD**	**non-OECD**
	(1)	**(2)**	**(3)**
WEA	-0.021***	-0.017***	-0.024***
	(0.004)	(0.004)	(0.006)
Sex ratio (15-44)	-0.024**	-0.041***	-0.017
	(0.010)	(0.015)	(0.012)
URBAN	-0.016***	-0.015***	-0.015***
	(0.004)	(0.005)	(0.005)
CEDAW	-0.215*	-0.194	-0.267
	(0.117)	(0.135)	(0.175)
Constant	7.789***	9.085***	7.201***
	(1.086)	(1.711)	(1.251)
Observations	421	161	260
R^2	0.235	0.244	0.221

Notes: 1. Dependent variable is age gap at marriage

2. Robust standard errors are denoted in parentheses.

3. * , **, and *** denote 10%, 5%, and 1% levels of significance, respectively.

Independently of the degree of economic development, an increase in women labour participation relative to men will be accompanied by a decrease in the age gap at marriage. However, while in OECD countries gender equality in labour participation may reduce age differences at marriage between spouses by approximately 1.7 years, in non-OECD countries the age gap may be reduced by 2.4 years. These results confirm that an increase in the participation of women in the labour market relative to men will have a greater impact in less economically developed countries. Many of these countries exhibit significant gender inequalities in labour participation, which may induce women to marry early.

Finally, figure A.4.6 in appendix 4 illustrates the long term patterns of *Gap* and *WEA* by major sub-sample. Overall, female participation rates have increased more rapidly in OECD countries than in non-OECD countries. While the spousal gap has gradually decreased in OECD countries, non-OECD countries have moved from a *LARGE* gap to a *SMALL* one in less than forty years. *New World* countries present, on the other hand,

very low female participation rates in 1950 accompanied by a spousal gap way above 4 years. The *New World* countries include some OECD ones, such as United States, Canada, Mexico, Australia and New Zealand, which if excluded, would decrease (increase) female participation rates (spousal gap) even further. Conversely, Socialist countries present very high rates of female participation for the period of study accompanied by a spousal gap around 4 years. Having a closer look at the economic environment of men and women in Socialist and *New World* countries would throw more light on the subject. Nonetheless, we regard this study as the first step to answer the following question: to what extent gender equality in labour participation rates have reflected on marriage patterns across regions and over time?

4.6 Conclusion

The main objective of this chapter was to empirically assess the long term relationship between gender differences in labour participation and age differences at marriage. To do so, we construct a panel dataset from several sources for all the countries with available data that spans from 1950-2000. Our main findings reveal that there is a negative and statistically significant association between our two main variables. This is robust to the inclusion of some control variables such as the sex ratio and the rate of urbanisation; to different estimation methods; and to different sample sets.

Evidence from this chapter supports the view that gender equality in labour participation rates may induce a *SMALL* gap. We argue that if women earn no income, they would not be able to spend time and resources to reduce uncertainty about the traits of a potential spouse. In this way, they would not be able to marry their 'preferred' man. The costs of

living, and other costs associated with pre-marital sex or social norms regarding gender specific roles, would further encourage women to marry young. Men, on the other hand, would postpone marriage to acquire wealth for the newly formed household, which in turn, would lead to a *LARGE* gap. If, on the other hand, women earn an income, they would be able to spend resources and time to find their 'preferred' man. In addition, women would jointly contribute with men to the newly formed household with their income. As a result, the spousal gap may decrease, *SMALL* gap.

Therefore, if gender equality in labour participation rates is strongly associated with a *SMALL* gap, this would imply (on average) positive assortive mating in age. Conversely, if the 'preferred' man of women is of a similar age, then observed *LARGE* gaps would imply substantial gender inequalities in labour participation. Whether convergence in age differences between spouses is achieved across regions, would also imply that, given similar economic environments men and women behave pretty much alike.

Marriage in colonial North America was notable for being early for women, rather different from the Northwest European pattern of late marriage for men and women (Haines, 1996). Both regions had a very similar, if not the same, neolocal residential pattern and cultural traits. Although American men married earlier than most of the Northwest Europeans, the spousal age gap was still higher. The special economic environment of colonial North America with abundant resources and imbalance sex ratios could have led to this spousal age gap in the early years of colonisation. Nonetheless, once sex ratios were more balanced, age differences at marriage remained relatively larger than the Northwest European pattern of the eighteenth and nineteenth centuries for a considerable period of time.

Figure A.4.7 in appendix 4 illustrates the above discussion with data for Great Britain and the United States for the period of time 1850-2000. The long term patterns of gender inequalities in labour participation of Great Britain and the United States followed a rather similar trend, although the levels were substantially higher in Great Britain in the nineteenth century. Goldin (1994) would have claimed that abundant resources could have led families to implicitly buy women's work, which in turn would explain the larger spousal gap. Alexis de Tocqueville, a Northwest European, described the economic environment and role of American women in the nineteenth century[203],

"As for myself, I do not hesitate to avow that although the women of the United States are confined within the narrow circle of domestic life, and their situation is in some respects of one extreme dependence, I have nowhere seen woman occupying a loftier position; and if I were asked, now that I am drawing to the close of this work, in which I have spoken of so many important things done by the Americans, to what the singular prosperity and growing strength of that people ought mainly to be attributed, I should reply: to the superiority of their women."

Regarding "Northwest European" women, Ivy Pinchbeck described the economic environment and role of English women in the eighteenth century[204],

"In the mid-eighteenth century the population of England was mainly rural, and women were largely engaged in productive work in their homes and in some form of domestic industry. In the town, the industrial woman wage earner was not unknown and a large number of women were engaged in some form of trade; but here again, women more often shared the activities of their husbands and acted as partners in the industrial, as in the agricultural sphere…"

[203] Alexis de Tocqueville (1865: 299).

[204] Ivy Pinchbeck (1930: 306).

To conclude, notwithstanding the relevance of other major factors that could determine the spousal gap such as sex ratios, wealth inequality, the desire for children, education and human capital, we find that the participation of women in the labour market plays a decisive role. Nonetheless we advocate for further research on the factors that have driven female labour participation throughout history. If Malthus (1798) argued that scarcity discourages marriage and the rearing of the family; perhaps, we should think if abundance and scarcity have shaped our marriage customs too.

5. Marriage and Economic Development

5.1 Introduction

In the previous chapters, we have introduced two main relationships. Chapter 3 focused on the relationship between female labour participation and marital systems. Overall, we found that at low levels of economic development, female labour participation is a strong predictor of the incidence of polygyny, which has been highly prevalent in sub-Saharan Africa for centuries[205]. The high incidence of polygynous unions observed in some countries may be explained when the contribution of wives to the household wealth is relatively high. Moreover, we also discussed that as economies grow and inequality increases, the *African* polygyny equilibrium would break down[206]. As a result, *Harem* polygyny would emerge, but eventually would give way to the *Monogamy* equilibrium observed in modern economies.

In chapter 4, on the other hand, we argued that gender equality in labour participation may induce a *SMALL* spousal gap within monogamous countries. In this way, if women earn no income, they would not be able to spend time and resources to reduce uncertainty about the traits of a potential spouse. As a consequence, they would not be able to marry their 'preferred' man. The costs of living, and other costs associated with pre-marital sex or social norms regarding gender specific roles, would further encourage women to marry young. In these circumstances, men would postpone marriage to acquire wealth for the

[205] In chapter 2 we also found a high incidence of polygyny unions in other countries or territories such as Afghanistan, the Maldives and Papua New Guinea, among others. In this regard, polygynous unions in Melanesia have been frequently recorded in the Ethnographic Atlas.

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

newly formed household, which in turn, would lead to a *LARGE* gap[207]. If women earn an income, they would be able to spend resources and time to find their 'preferred' man. Moreover, women would jointly contribute with men to the household wealth. Then, the spousal gap may decrease, and hence the *SMALL* gap.

In both chapters, gender differences in female labour participation were closely associated with marital patterns: (i) marital systems, and (ii) the spousal age gap. Chapter 3 also discussed that changes in the distribution of wealth may also have an impact on the evolution of marital systems. Additionally, male wage inequality may induce women to postpone marriage, and hence the spousal age gap decreases[208]. On the whole, we observe that female labour and wealth inequality have an impact of marriage patterns[209]. Nonetheless, whether marriage patterns have been shaped throughout history by cross-sectional variations in female labour participation and income inequality deserves further discussion.

North (1991) defined institutions as *"…humanly devised constraints that structure political, economic and social interaction. They consist of both informal constraints (sanctions, taboos, customs,*

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[207] 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.

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

[209] Previously, we defined 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 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.

traditions and codes of conduct) and formal rules (constitutions, laws, property rights)" [210]. As the economic environment evolves, we would expect institutions to reflect on these changes. Marriage is no exception and throughout history, gender differences in labour participation and wealth inequality have fluctuated. Then, the degree of gender equality in labour participation may be a strong predictor of marital patterns. Additionally, income inequality may affect the incentives structure of bachelors and spinsters.

In this way, our next objective will be to analyse gender differences in labour participation and income inequality over time. For that purpose, if we may see "*a little further it is by standing on the shoulders of giants"*. Thus, section 5.2 will discuss the *Goldin* curve, which associates female labour participation and economic development (Goldin, 1994). Section 5.3 will explore the relationship between the income distribution and economic development or *Kuznets* curve (Kuznets, 1955), while section 5.4 will provide some concluding remarks.

5.2 The *Goldin* curve and Marriage

In chapter 3, we explored the relationship between gender equality in labour participation and marital systems. Goldin (1994) studied the relationship between economic development and gender equality, and argued that the labour participation rates of married women first declines and then rises as countries develop, hence the U-shaped relationship or *Goldin* curve[211]. Goldin (1994) explained that the resulting U-shaped relationship may be

[210] North (1991: 97)

[211] Goldin (1994) distinguished between married and unmarried women. In our study, we do not make such distinction and assume gender differences in labour participation irrespective of the marital status. To do so, we use the ratio of women economically active per 100 men, denoted as *WEA*.

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[212]. As income rose, female labour participation decreased because families often implicitly bought women's work, and as a result women retreated into the home[213]. The decrease in the demand for women's labour in agriculture, and social stigmas associated with manual labour-intensive work, could have led to this situation. As traditional societies transform into modern ones, and skilled labour is highly 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[214].

The *Goldin* curve turns out to be a relevant concept for the understanding of the relationship between gender equality in labour participation and marital systems. In chapter 3, we found that female contribution to subsistence was a strong predictor of *African* polygyny. Moreover, *African* polygyny was also strongly associated with sedentary patterns of settlement. Similarly, gender equality in labour participation was closely related with countries with a high incidence of polygynous unions. This was more significant, once we controlled for the level of economic development. Overall, our results in chapter 3 would support the view that *African* polygyny may exist if and only if wives contribute largely to the wealth of the household.

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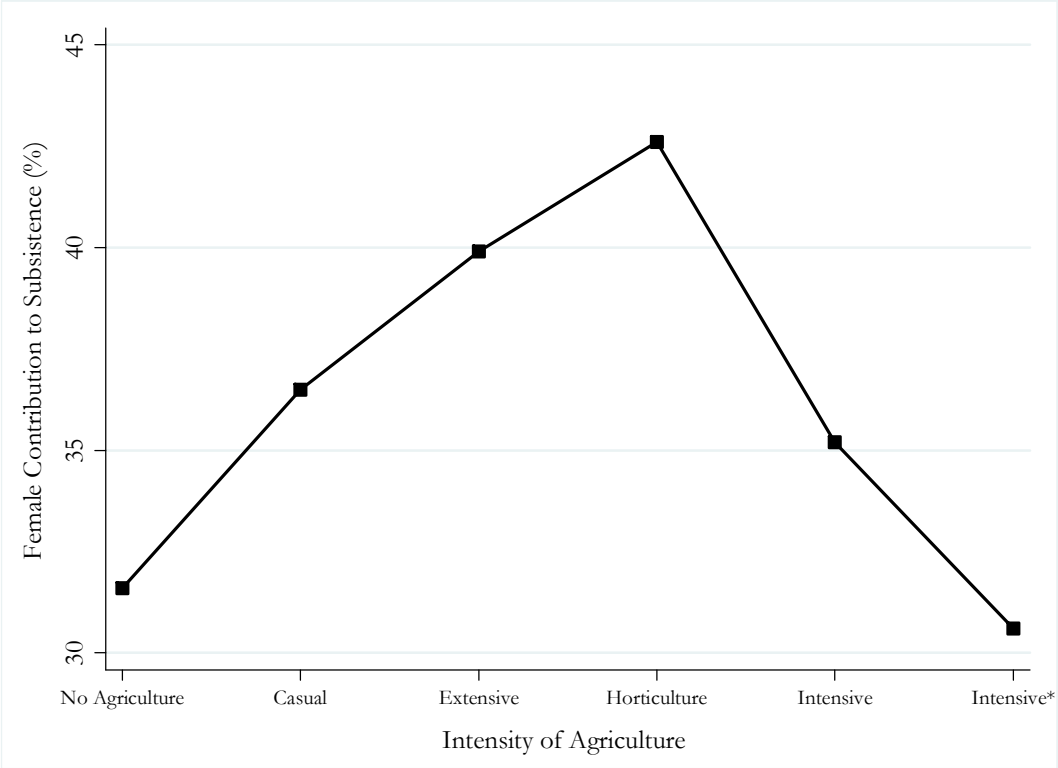
[212] The substitution effect would depend on the price of market and household labour.

[213] As Goldin (1994) explains income may rise as a result of the expansion of the market (Internal) or the introduction of new technology (external)

[214] 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).

Figure 5.1 Female Contribution to Subsistence and Intensity of Agriculture



Source: Ethnographic Atlas (Obs. = 616 societies)
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)

Along these lines, Boserup (1970) observed that women did most of the agricultural work in sparsely populated regions, where extensive agriculture was predominant. In this regard, the Ethnographic Atlas may throw more light on the subject. Figure 5.1 illustrates female contribution to subsistence and intensity of agriculture[215]. We have computed the average of *Female Contribution* by the type of agriculture, which is described in the Ethnographic Atlas, variable 28: Intensity of Agriculture. Table A.5.1 in appendix 5 shows the codification. Figure 5.1 shows that female contribution to subsistence is higher when horticulture and extensive or shifting agriculture predominates. Agriculture intensification implies lower female contribution to subsistence. The Ethnographic Atlas also illustrates

[215] Female contribution to subsistence, *Female Contribution*, was introduced and defined in chapter 3. This reflects as a percentage the total contribution of women to subsistence. Tables A.3.4 and A.3.5 in appendix 3, presents the Ethnographic codification. For a more detailed information see chapter 3, section 3.4.2.1.

that, while horticulture and extensive agriculture were predominant mainly in Melanesia, Micronesia, Polynesia and sub-Sahara Africa; intensive agriculture was widely observed in most Eurasian societies[216]. This would relate agriculture intensification to marital systems. *African* polygyny is mainly present in sub-Saharan Africa. There is also evidence of a high incidence of polygyny in Melanesia[217].

Boserup (1965) argued that when population density increased, and hence the amount of natural resources per head was 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 decreased in Eurasia. Moreover, large populations could better afford investments in basic infrastructure which in turn would have improved the standards of living (Boserup, 1981). Furthermore, 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. In this way, a system of property rights would affect ownership and the distribution of land –among other movable or immovable assets-, making possible the accumulation and transmission of wealth across generations.

In these conditions, wealthy families would be able to implicitly buy women's work, and men and women from landless families would have to seek for work outside the home. In

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[216] 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 horticulturalists. In Eurasia two thirds of societies were described as having intensive agriculture. Most societies in the *New World* were nomadic or semi-nomadic.

[217] *African* polygyny or *Polygyny 2* was observed in New Caledonia, Papua New Guinea and the Solomon Islands in the Ethnographic Atlas. Moreover, Papua New Guinea was classified as polygynous (Po) in table A.2.4 in appendix 2. Only Fiji, out of five Melanesian countries and territories, was classified as monogamous (Mo).

traditional societies, where the demand for skilled labour is relatively low, manual labour-intensive work may be regarded as inappropriate for women, and hence social stigmas could arise[218]. As a result, women retreat into the home as Goldin (1994) would have argued[219]. Therefore, increased population density may have two main effects: (i) a direct effect on the demand for agricultural work, and (ii) an indirect effect on institutions regarding ownership and the distribution of land, which in turn, moves production away from the family, essentially for those who are landless or incapable of investing in other trades.

Figure 5.1 provides further insight regarding the *Goldin* curve. When agriculture is casual or incidental, female contribution to subsistence also appears to be lower[220]. This fact would reflect on hunter-gatherers and pastoralists, who are mostly nomadic or semi-nomadic. Among hunter-gatherers, where there is complete specialisation within the household (men hunt while women gather), lower female contribution to subsistence is due to the relative importance of hunting with respect to gathering. This, in turn, would depend on the

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[218] These social stigmas could arise if parents, husband or 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.5.2 in appendix 5, we observed that gender differences in labour participation in *high* developed economies during the nineteenth and twentieth centuries were lower than in *low* developed countries in the twentieth century, but still above forty women for every 100 men economically active in Northwest Europe. This would imply that not all families would be able to buy women's work. Among poor and landless families, women would be expected to contribute to the wealth of the household.

[219] In some regions, women were closely associated with the home production of textiles. During the Sung period in China: *"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 labour had been epitomized by the saying that men plow and women weave."* Ebrey (1993: 132). 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).

[220] Murdock and Provost (1973) provide a good review of the division of labour by sex across societies.

availability of wild food. Among pastoralists, on the other hand, women appear to contribute on average less than men. In both scenarios, monogamy and polygyny have been frequently observed, although polygynous unions involve in most cases co-wives sharing habitation.

White (1988) observed that in nomadic societies, sisters assist one another in household activities i.e. packing, unpacking, cooking or gathering food. In this way, we are inclined to think that the economic activity rate of women, among hunter-gatherers and pastoralists may be relatively lower than that for sedentary women in shifting agriculture. Although this result would require further analysis and research, we may be able to augment the conventional *Goldin* curve. Figure 5.2 illustrates the 'augmented' *Goldin* curve. We assume that given the ethnographic evidence found, the economic activity rate of nomadic and semi-nomadic women may be lower[221]. Moreover, the falling portion of the U-shaped relationship in the *Goldin* curve is well illustrated in figure 5.1.

The 'augmented' *Goldin* curve may throw more light on the economic role played by women throughout history, and consequently on marital patterns. In chapter 3, we discussed how the transition from a nomadic to a sedentary lifestyle would have affected marital systems, and whether hunter-gatherers once they settle down would have followed the *African* polygyny route or the monogamy one[222]. In this regard, we are inclined to think

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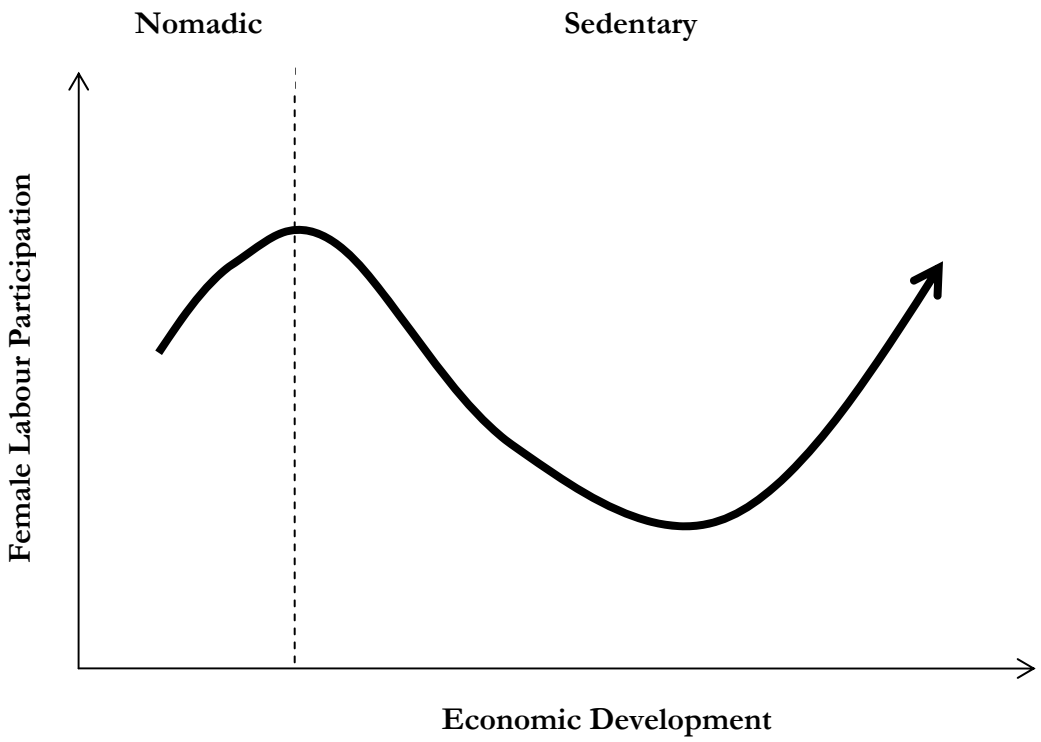
[221] Our study attempts to compare the economic role played by women throughout history. In this regard, we acknowledge gender specific roles within the household regarding the production of household goods. Nonetheless, in order to understand labour and marriage patterns in the long run we need to compare male and female labour participation rates.

[222] 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.

that *African* polygyny would have existed in Eurasia too[223]. If wives contribute largely to increase the wealth of the household, and inequality remains low, there is little reason to neglect the possibility of *African* polygyny in other regions throughout history. Sadly, the evidence to support this view is scant, and further research is needed.

Figure 5.2 The 'augmented' Goldin curve



The rising portion of the *Goldin* curve has been well documented and analysed. 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)[224]. Moreover, once manual labour-intensive work gives way to more

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

[224] Goldin (2006) divides the rising portion of the U-shaped relationship into four well defined stages: (i) Late Nineteenth century to 1920s, (ii) Transition, 1930-1950, (iii) 'Roots of the Revolution' 1950-1970s and (iv) The Quiet Revolution, 1970-today.

skilled work, social stigmas will be reduced. In this way, female labour participation 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 but by changes in demand. Since then, many theories have attempted to explain how women moved back from home to the workplace. 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.

Figure 5.3.a 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[225]. Throughout the study, gender differences in labour participation have been captured with the ratio of women economically active for every 100 men (*WEA*). From figure 5.3.a, we observe that our polygynous countries or territories occupy the left upper tail of the U-shaped relationship. The only exceptions are Burundi, Haiti, Madagascar and China. The first three were classified as monogamous, given the available marital status data, although there is evidence of polygynous behaviour in the past. In the case of China, as most centrally planned economies, the rates of female participation were well above the average.

[225] 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 quadratic in the log of GDP per capita.

Figure A.5.1 in appendix 5 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 which are mostly polygynous and 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 *high* developed economies, which have also experienced a rapid decline in the spousal gap. If we exclude polygynous countries, *LARGE* spousal gaps would be predominantly associated with non-polygynous countries located at the bottom of the *Goldin* curve. As income rose, and families bought women's work, we would expect women to marry relatively young, and men to postpone marriage to acquire wealth.

Figure A.5.2 in appendix 5 shows the long term patterns (1850-2000) of gender differences in labour participation for a selection of countries. All of these countries are nowadays *high* developed economies. To contrast these patterns, we also include the sex ratios, given the total male and female populations. In this way, we observe that among *high* developed countries, the "Northwest European" and the "Mediterranean" marriage patterns can be easily distinguished. The former was closely associated with a *SMALL* spousal gap, while the latter present a *LARGE* gap[226].

[226] As we explained in chapter 4, *LARGE* refers to spousal gaps above our cutting point of 3 years. Haines (1986) provides evidence for some of these countries. The spousal gap in Great Britain and Belgium in 1900 was 1.1 and 1.9 years respectively, while in the United States and Italy were 3.9 and 3.6 years.

Figure 5.3.a *WEA* and Economic development, 1980

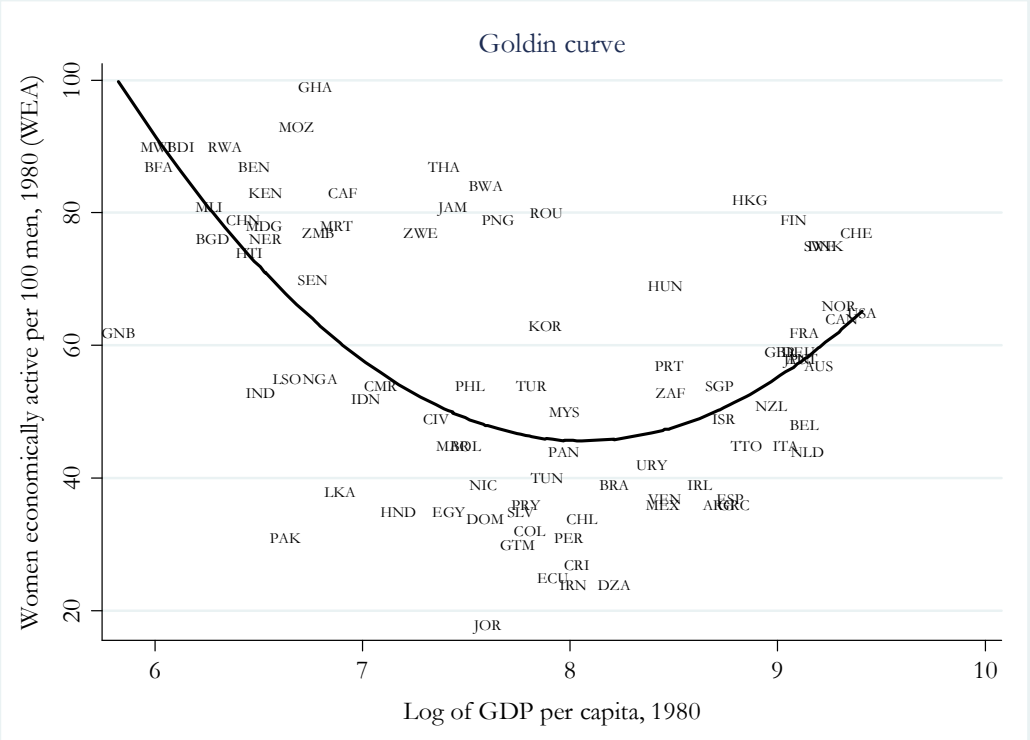
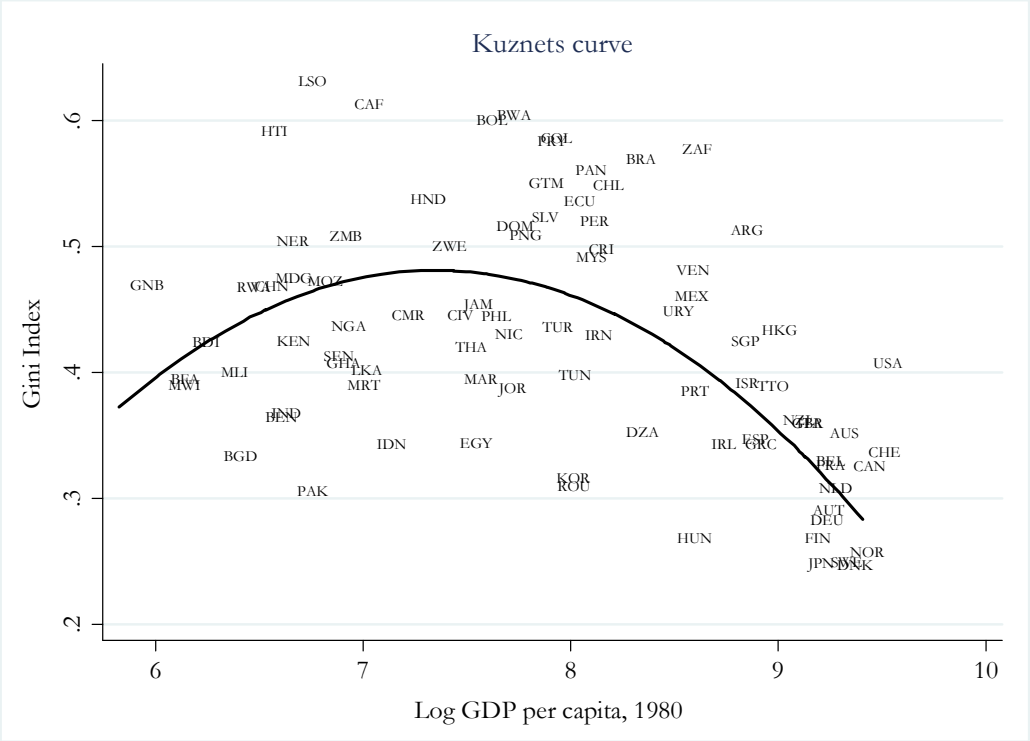


Figure 5.3.b Gini index and Economic development, 1980



Source: PRED Bank, Version 3.0; Heston et al. (2002); Deininger and Squire (1996)
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). Gini index: a value of 0 represents absolute equality, and a value of 100 absolute income inequality; Countries are balanced for both figures. Figure 5.2.a: *WEA* = 749.4679 – 174.6234*Log(GDP per capita) + 10.831*Log (GDP per capita)^2, N=88, R^2 = 0.3533; Figure 5.2.b: Gini Index= -2.04520 + 0.6874*Log(GDP per capita) – 0.0467*Log (GDP per capita)^2, N=88, R^2 = 0.3508.

Figure A.5.2 illustrates that while Northern and Western European countries 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 experienced lower levels. Only exception was Italy, which presents a comparable pattern to Northwest European countries[227]. These levels are rather similar to those observed for *medium* developed countries in figure 5.3.a in 1980. Nonetheless, marital patterns may also be influenced by other factors in the long run. One of them was introduced in chapter 3: the distribution of income within a country. In this way, the next section introduces the Kuznets curve that would relate income inequality and economic development.

5.3 The *Kuznets* curve and Marriage

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[228]. 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 stages of economic development (hunting-gathering) wealth inequality may not be substantial. This is because hunter-gatherers would not be able to accumulate and transmit

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

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

wealth across generations. Similarly, if ownership and property rights are not well established, we would expect that wealth inequality remains relatively low.

Figure 5.3.b illustrates the *Kuznets* curve[229]. Overall, we find that our polygynous countries present lower levels of income inequality than monogamous and *medium* developed ones. It is also likely that natural resources have pushed the levels of income inequality up in *low* developed countries. This can be partly explained with data on the distribution of land, which presents a rather different 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 the *high* developed economies twenty years earlier in 1970, the Gini's index of land concentration was 0.615[230]. Moreover, in some polygynous countries, property rights are not well established, and "communal land" prevails. Under traditional systems of land tenure, property may not be perfectly transmitted across generations.

Therefore, if wealth inequality is low, polygyny would arise when women rather prefer to enter an established household than to form a new one. This would occur if an established household with a married couple and their children may offer a higher level of wealth or consumption to potential spouse. Thus, if women contribute to the household, men would have incentives to take a second wife. Then, a high incidence of polygyny would be possible when young women marry older married men. This would create large age differences between husband and young wives.

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[229] We estimate the *Goldin* and *Kuznets* curves for the same sample of countries. Our objective will be to compare both results later on.

[230] FAO (1995): Programme for the World Census of Agriculture 2000.

If, on the other hand, inequality increases, the *African* polygyny equilibrium would break down. This, in fact, is very significant for the understanding of marriage patterns over time. Once wealth may be accumulated and transmitted across generations, wealth inequality would grow within a country. In this way, the distribution of wealth would depend upon class, not age as before, and wealthy men and women would be highly regarded as marriage prospects. Moreover, if wealth inequality is accompanied by a decrease in the demand for women's labour, then *Harem* polygyny could arise[231].

Harem polygyny would involve few men marrying or mating with many women[232]. If wealth inequality is high, some women would have incentives to become the second wife, concubine or mistress of a wealthy man. This may increase the pressure on less wealthy men to provide their wives with enough wealth to reduce those incentives, which would lead to the *LARGE* gap. Ultimately, women would decide about the best alternative, whether to remain within their family, marry and form a new household or become the second wife, concubine or mistress of a wealthy man.

Following this line of argument, we are inclined to think that *Harem* polygyny would have occurred at the early stages of economic development, once income inequality started to increase. In chapter 3, we discussed that an increase in the standard of living would require higher levels of income inequality to maintain *Harem* polygyny. In addition, wealthy men would have incentives to compromise to monogamous marriage in order to avoid social conflict. As inequality fell following the *Kuznets* curve, *Harem* polygyny would progressively

[231] Previously, we discuss the effect that the establishment of property rights may have on female labour participation. Landless men and women would have to seek work outside their home, which may be affected by social stigmas regarding the appropriateness of women to do manual labour-intensive work.

[232] Most studies do not usually distinguish between *African* and *Harem* polygyny, and treat them equally. The main distinction has to do with the intensity of polygyny. *Harem* polygyny implies many women married polygynously with few men, while *African* polygyny involves many men and women married polygynously.

turn into *Monogamy* with occasional polygyny, and later into the *Monogamy* equilibrium observed nowadays in many modern societies. Furthermore, if falling wealth inequality was accompanied by increasing gender equality in labour participation as figures 5.3.a and 5.3.b illustrate, then the spousal gap may decrease towards a *SMALL* gap. This is partly explained because women would have less incentive to marry young and more resources to find their 'preferred' man, while men would be less concerned about acquiring wealth.

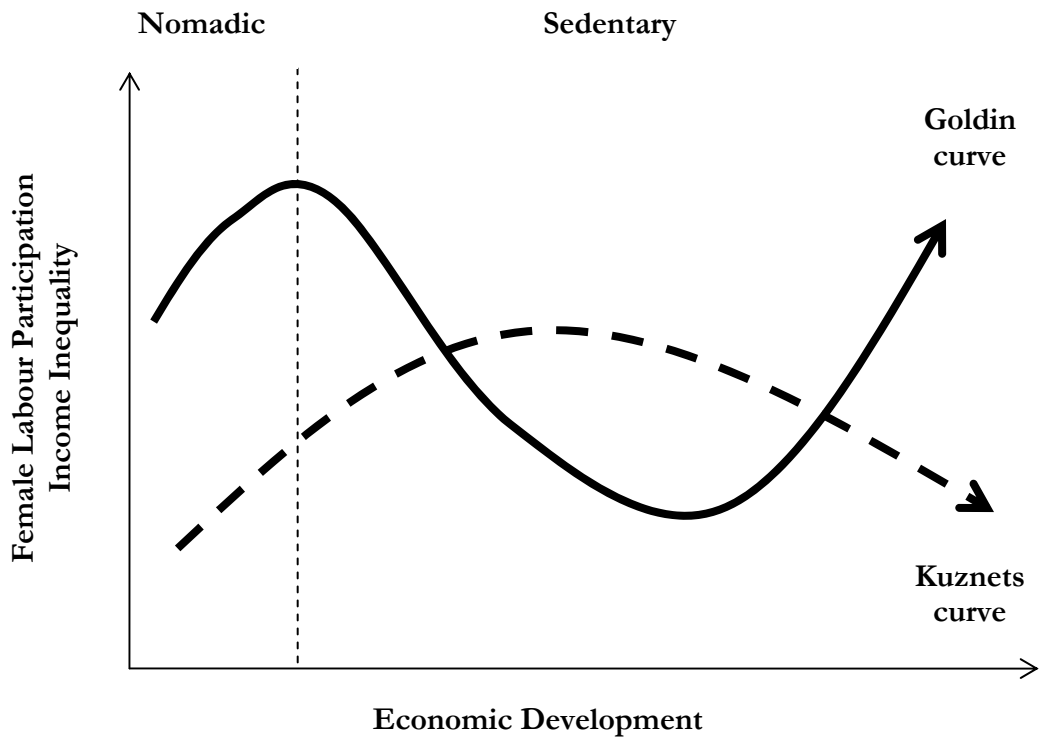
5.4 Conclusion

In this chapter we have discussed two relevant long term relationships regarding economic development. First, the *Goldin* curve which associates female labour participation and economic development. Then, we briefly explored the relationship between income inequality and economic development, or *Kuznets* curve. Figure 5.4 illustrates both relationships. It seems that both, gender equality in female labour participation and income inequality have followed opposed paths. When gender equality in labour participation was high income equality was low. This is also reflected on marital patterns. Among nomadic or semi-nomadic societies, lower rates of female contribution to subsistence and high costs associated with their particular lifestyle led to monogamy and some polygyny[233]. The transition from a nomadic settlement pattern to a sedentary one brought changes in marital systems. In this way, *African* polygyny would have emerged.

[233] 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.

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 given way to *Harem* polygyny and monogamy. This would have been accompanied by a *LARGE* spousal gap, which has been traditionally associated with the "Mediterranean" marriage pattern and some Eastern societies. Further increases in income would be accompanied by falling income inequality and more gender equality in labour participation, which in turn would lead to monogamy and a *SMALL* gap.

Figure 5.4 The 'augmented' Goldin curve and the 'augmented' Kuznets curve



Nonetheless, there is one question which still remains unanswered, why sub-Saharan Africa? Whether climatic conditions or slavery hinder population growth; geographic barriers obstructed the transmission of technology; or simply abundance of resources slowed down the transition from hunting-gathering to a sedentary pattern of settlement

and to higher rates of economic growth remains unknown. Further research and analysis would be required. In this way, archaeological evidence may throw some light on these mysteries. Nevertheless, economic development seems to have reflected on marital patterns, which in many cases do not appear to have evolved much[234].

[234] 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. In this study, we abstract from fertility decisions, and look at marriage and the Gender Gap which is captured by gender differences in labour participation.

6. Conclusion

This final chapter briefly summarizes the findings of this thesis. We looked at the relationship between female labour and marriage by focusing on two widely observed marriage patterns. Chapter 3 analysed marital systems, henceforth polygyny and monogamy, while the spousal age gap was explored in chapter 4. In both cases, we relate the economic role played by women in a society with these marital outcomes. After concluding our analysis we confirm the importance of studying this relationship. In this way, this thesis contributes to the existing literature in several dimensions.

We observe that *African* polygyny is mainly found among sedentary societies. Nomadic and semi-nomadic societies tend to be more monogamous, which goes in line with our model that points to the relative importance of the contribution of women, as wives, to the wealth of the household. Among hunter-gatherers and nomadic pastoralists, female contribution to subsistence appears to be relatively lower than that of women in societies where extensive or shifting agriculture and horticulture predominates. Only sixty-four out of 442 nomadic or semi-nomadic societies were described as having *African* polygyny in the Ethnographic Atlas.

This would imply that nomadic societies were essentially monogamous or sororal-polygynous where sisters assist each other and share habitation. The complete specialisation of hunter-gatherers and the costs associated with impermanent settlements entail that the taking of a second wife will be more costly. Regardless, polygyny was frequent among those who were able to afford these costs or enjoy special privileges, i.e. chiefs, shamans.

The transition from a nomadic lifestyle to a sedentary one may have brought changes to the way men and women mated. Given the available evidence, we contemplate two separate routes. On the one hand, hunter-gatherers and pastoralists became predominantly *African* polygynous, where co-wives live in separate habitation. On the other hand, they became monogamous, and few exceptional polygynous unions were observed. This, in fact, raises a fundamental question in economic development and the history of marriage and the family; why *African* polygyny has been mainly prevalent in sub-Saharan Africa?

We provide two possible explanations. First, *African* polygyny was also predominant in other geographical areas. Nevertheless, the limited and scant existing evidence does not permit us to confirm this view. Only in Melanesia, and other scattered societies we observe similar patterns of behaviour. Our model predicts that, given the economic environment, *African* polygyny may arise because is the best possible choice for men and women. Boserup (1970) corroborates that the contribution of sub-Saharan African women was considerably higher than in other regions. Thus, if the economic role of women is associated with the economic environment, then Eurasian women would have been under similar economic circumstances centuries or millennia before. This raises another research question; when did Eurasian women enjoy similar economic circumstances to those experienced in some sub-Saharan countries?

The economic environment required to sustain *African* polygyny would involve low levels of economic development, low income inequality and gender equality in labour participation. On the contrary, *African* polygyny would vanish -as we discussed in chapter 3- when income rose, income inequality increased and female labour participation decreased. These results are illustrated by the *Kuznets* and *Goldin* curves respectively. In these conditions, only few wealthy men would be able to form a polygynous household,

which goes against the incidence of polygyny observed within some sub-Saharan countries, where more than 20 percent of men are polygynously married. Additionally, lower rates of female labour participation would make polygyny unaffordable for many men. Income inequality may increase once assets can be accumulated and transmitted across generations. Gender inequality in labour participation may increase once access to land is restricted and the production moves away from home. Both scenarios require a system of property rights and inheritance rules, which in turn have been known in Eurasian societies for centuries. Our knowledge is bounded, and just further archaeological and historical research may throw more light on the subject.

The alternative explanation assumes that *African* polygyny was never predominant within Eurasian societies. Therefore, if we assume economic rationality, this can only be explained when economic environments were as different as chalk and cheese. Then, what makes sub-Saharan Africa different from Eurasia? This hypothesis entails Eurasians have never faced the same economic circumstances, and hence the divergent marital patterns observed. This explanation leads to a very pessimistic view of economic development, where only external forces would be able to change the sub-Saharan economic environment. Boserup (1981) argued that a minimal level of population density would kick off economic development. Large populations can better afford investments in public infrastructure which in turn may improve the standard of living. When population density increases, the amount of natural resources per head is reduced, and men and women would have incentives to create rules or norms regarding ownership. However, none of these facts have been observed in sub-Saharan Africa until recently. In this way, we are inclined to think that climate and geography hinder population growth, and consequently economic development, otherwise *African* polygyny would not have prevailed.

In chapter 4, we examine the spousal age gap. For that purpose, we concentrate on monogamous countries. Overall, we find that gender equality in labour participation reduces the spousal age gap. This, in turn, has relevant implications too. Whether convergence in age differences between spouses is achieved across countries, would imply that, given similar economic environments, men and women behave pretty much alike. In addition, we would explicitly show positive assortive mating in age.

Although the spousal age gap has been well documented in the literature, there is little economic analysis about what shapes these age differences at marriage between spouses. This is probably due to the fact that gender specific age at marriage may provide further insight on fertility issues. Nonetheless, the spousal age gap remains a very strong indicator of the level of economic development. Based on a simple economic reasoning, we empirically test the relationship between the spousal gap and gender differences in labour participation. Once we control for sex ratios and the rate of urbanisation, the spousal age gap is negatively associated with gender equality in female participation. This is supported with current and past data. Contrasting marriage patterns such as the "Northwest European" of a *SMALL* gap and the "Mediterranean" one of a *LARGE* gap were accompanied by contrasting differences in gender labour participation. Overall, our results suggest that female labour have reflected on marital patterns. More importantly, we observe that across regions and over time, men and women under similar economic conditions tend to behave alike.

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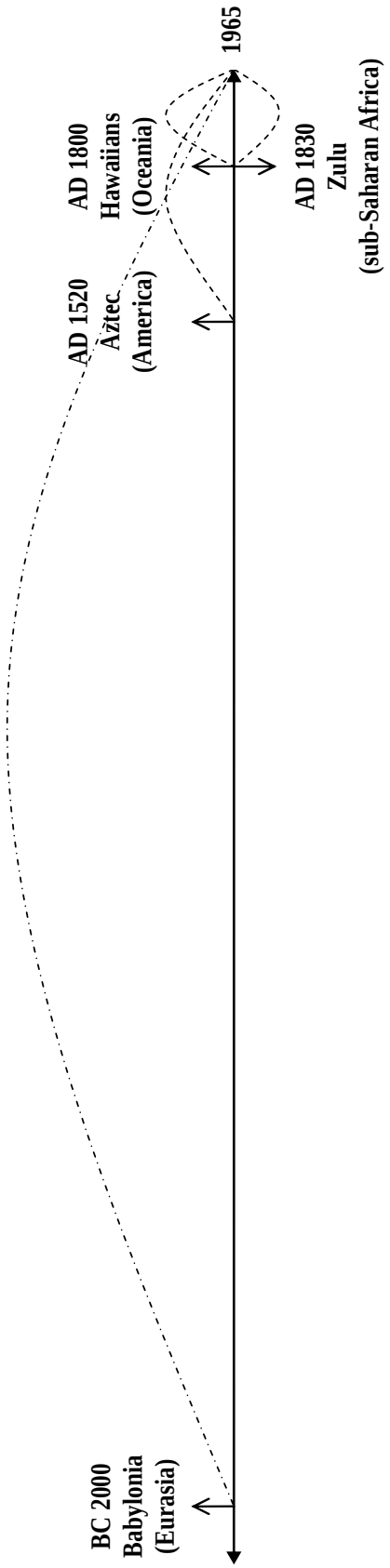
Appendix 2: Marital Systems

Figure A.2.1 Timeline, Ethnographic Atlas 1/



1/ Earliest reliable ethnographic description found in the literature by continental area

Table A.2.1 Distribution of countries and territories by geographical region

Geographical Region	United Nations Member States	Countries or Territories
Northern Africa	6	7
Western Africa *a/*	16	16
Eastern Africa *b/*	17	18
Middle Africa	9	9
Southern Africa	5	5
Western Asia	17	18
Central Asia	5	5
Eastern Asia	5	8
Southern Asia *c/*	9	9
South-Eastern Asia	11	11
Northern America *d/*	2	4
Central America	8	8
Caribbean *e/*	13	24
South America *f/*	12	13
Eastern Europe	10	10
Northern Europe *g/*	10	13
Southern Europe *h/*	14	15
Western Europe	9	9
Australia and New Zealand *i/*	2	2
Melanesia	4	5
Micronesia	5	7
Polynesia *j/*	3	9
Total	**192**	**225**

Territories excluded from sample:
a/ Saint Helena
b/ Mayotte
c/ British Indian Ocean Territories
d/ Saint Pierre et Miquelon
e/ Saint-Barthélemy and Saint-Martin
f/ Falkland Islands
g/ Aland Islands, Svalbard and Jan Mayen Islands
h/ The Holy See
i/ Norfolk Island, Christmas Islands and Cocos Islands
j/ Pitcairn Islands

Source: United Nations

Table A.2.2 List of excluded societies

No date (10)	Non-indigenous (9)	Unclassified (5)	Repeated (2)	No data (1)
Jicaque	Boer	Aullimind	Spanish Basque	Seminole
Betsileo	French Canadian	Buem	Tokelau	
Huastec	New England	Tukulor		
Guaymi	Haitian	Basseri		
Caddo	Djuka	Tristan		
Abnaki	Saramacca			
Chickasaw	Brazilian			
Uzbeg	Camba			
Man	Groote Eylandt			
Bomvana				

Source: Ethnographic Atlas

Table A.2.3. Percentage of married men/women in polygynous unions by region

Geographical Region	**United Nations (1990)**		**DHS (1985-2005)**	
	Men	**Women**	**Men**	**Women**
Northern Africa 1/	4.0	16.8		12.7
Western Africa	29.8	36.7	24.3	38.9
Eastern Africa	20.8	24.9	10.8	18.4
Middle Africa	24.6	37.7	15.1	31.1
Southern Africa		7.5	4.5	13.5
Western Asia	5.3			6.4
Central Asia 2/			0.1	
Southern Asia	6.2		2.6	4.7
Caribbean 3/ (*)			14.6	25.0

Source: United Nations (1990), Demographic and Health Surveys (1985-2005), PRED Bank, Version 3.0

Notes: The values are a weighted average. Population in 1970 and 1995 were used weights. Population data come from PRED Bank, Version 3.0. The asterisk denotes those regions described as *New World.*

1/ Sudan in 1979 was the only available observation for Northern Africa

2/ Kazakhstan in 1997 was the only available observation for Central Asia

3/ Haiti in 2000 was the only available observation for the Caribbean

Figure A.2.2 Linear regression estimate of polygyny by data source

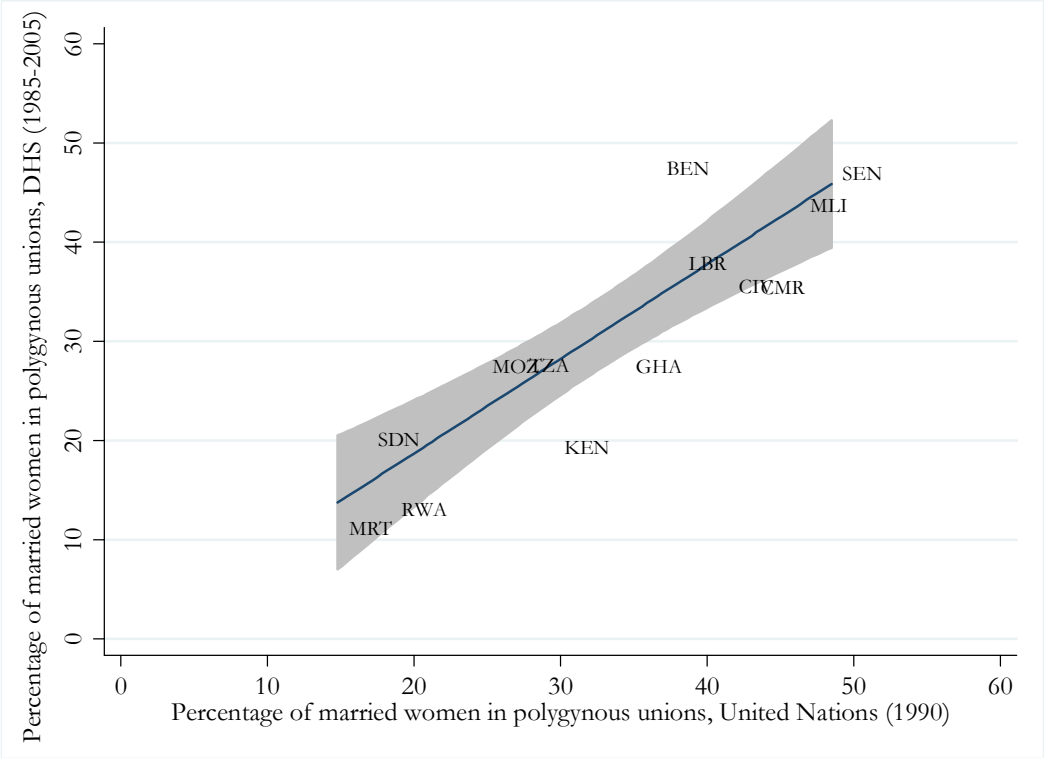


Figure A.2.3 Linear regression estimate of polygyny, sub-Saharan Africa (corrected)

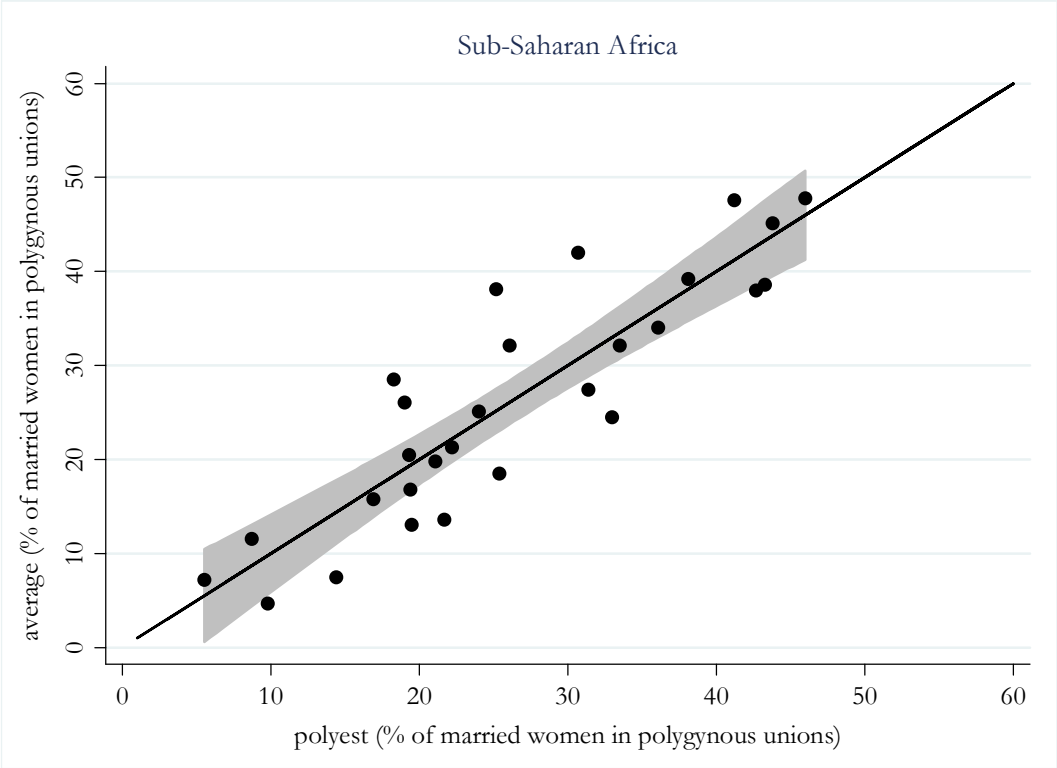


Table A.2.4 Polygyny and Monogamy by country

AFRICA	(1)	(2)	(3)	(4)
Northern Africa (7)	***Marital System***	***Polygyny 1***	***Polygyny 2***	***Old World***
Algeria	Mo	20.0	0.0	Yes
Egypt	Mo	0.0	0.0	Yes
Libya	OP	50.0	0.0	Yes
Morocco	OP	0.0	0.0	Yes
Sudan	Po	5.1	66.7	Yes
Tunisia	OP	0.0	0.0	Yes
Western Sahara	Po	0.0	0.0	Yes
Western Africa (16)	***Marital System***	***Polygyny 1***	***Polygyny 2***	***Old World***
Benin	Po	20.0	80.0	Yes
Burkina Faso	Po	47.4	52.6	Yes
Cape Verde	Mo	na	na	No
Côte d'Ivoire	Po	66.7	33.3	Yes
Gambia	Po	na	na	Yes
Ghana	Po	63.6	36.4	Yes
Guinea	Po	25.0	62.5	Yes
Guinea Bissau	na	60.0	20.0	Yes
Liberia	Po	33.3	66.7	Yes
Mali	Po	27.3	9.1	Yes
Mauritania	Po	0.0	0.0	Yes
Niger	Po	16.7	66.7	Yes
Nigeria	Po	16.9	75.4	Yes
Senegal	Po	25.0	50.0	Yes
Sierra Leone	na	80.0	20.0	Yes
Togo	Po	100.0	0.0	Yes
Eastern Africa (18)	***Marital System***	***Polygyny 1***	***Polygyny 2***	***Old World***
Burundi	Mo	0.0	100.0	Yes
Comoros	Po	na	na	Yes
Djibouti	Mo	na	na	Yes
Eritrea	Mo	0.0	33.3	Yes
Ethiopia	Po	12.9	51.6	Yes
Kenya	Po	0.0	73.9	Yes
Madagascar	Mo	0.0	80.0	Yes
Malawi	Po	0.0	66.7	Yes
Mauritius	Mo	na	na	No
Mozambique	Po	0.0	81.8	Yes
Reunion	Mo	na	na	No
Rwanda	Po	0.0	100.0	Yes
Seychelles	Mo	na	na	No
Somalia	Po	0.0	100.0	Yes
Tanzania	Po	2.9	70.6	Yes
Uganda	Po	0.0	100.0	Yes
Zambia	Po	0.0	80.0	Yes
Zimbabwe	Po	0.0	100.0	Yes

AFRICA (continued)	(1)	(2)	(3)	(4)
Middle Africa (9)	***Marital System***	***Polygyny 1***	***Polygyny 2***	***Old World***
Angola	na	0.0	77.8	Yes
Cameroon	Po	0.0	94.1	Yes
Central African Republic	Po	0.0	100.0	Yes
Chad	Po	50.0	41.7	Yes
Congo	Po	na	na	Yes
Democratic Republic of the Congo	Po	0.0	90.2	Yes
Equatorial Guinea	Po	0.0	100.0	Yes
Gabon	Po	0.0	66.7	Yes
Sao Tome and Principe	OP	na	na	No
Southern Africa (5)	***Marital System***	***Polygyny 1***	***Polygyny 2***	***Old World***
Botswana	OP	0.0	33.3	Yes
Lesotho	OP	0.0	100.0	Yes
Namibia	Po	0.0	66.7	Yes
South Africa	Mo	0.0	85.7	Yes
Swaziland	Po	0.0	100.0	Yes

ASIA	(1)	(2)	(3)	(4)
Western Asia (18)	***Marital System***	***Polygyny 1***	***Polygyny 2***	***Old World***
Armenia	Mo	0.0	0.0	Yes
Azerbaijan	Mo	na	na	Yes
Bahrain	Mo	na	na	Yes
Cyprus	Mo	na	na	Yes
Georgia	na	0.0	0.0	Yes
Iraq	OP	0.0	50.0	Yes
Israel	Mo	0.0	0.0	Yes
Jordan	OP	0.0	0.0	Yes
Kuwait	na	na	na	Yes
Lebanon	na	0.0	0.0	Yes
Oman	na	na	na	Yes
Palestine	na	na	na	Yes
Qatar	Mo	na	na	Yes
Saudi Arabia	OP	0.0	0.0	Yes
Syrian Arab Republic	OP	0.0	50.0	Yes
Turkey	Mo	0.0	0.0	Yes
United Arab Emirates	Po	na	na	Yes
Yemen	OP	100.0	0.0	Yes
Central Asia (5)	***Marital System***	***Polygyny 1***	***Polygyny 2***	***Old World***
Kazakhstan	Mo	100.0	0.0	Yes
Kyrgyzstan	Mo	na	na	Yes
Tajikistan	Mo	na	na	Yes
Turkmenistan	Mo	0.0	0.0	Yes
Uzbekistan	Mo	na	na	Yes
Eastern Asia (8)	***Marital System***	***Polygyny 1***	***Polygyny 2***	***Old World***
China	Mo	0.0	0.0	Yes
Democratic People's Republic of Korea	na	0.0	0.0	Yes
Hong Kong SAR	Mo	na	na	Yes
Japan	Mo	0.0	0.0	Yes
Macau SAR	Mo	na	na	Yes
Mongolia	na	0.0	0.0	Yes
Republic of Korea	Mo	0.0	0.0	Yes
Taiwan	na	0.0	0.0	Yes
Southern Asia (9)	***Marital System***	***Polygyny 1***	***Polygyny 2***	***Old World***
Afghanistan	Po	0.0	25.0	Yes
Bangladesh	OP	50.0	0.0	Yes
Bhutan	na	0.0	0.0	Yes
India	OP	18.2	0.0	Yes
Islamic Republic of Iran	OP	0.0	0.0	Yes
Maldives	Po	na	na	Yes
Nepal	Mo	0.0	0.0	Yes
Pakistan	OP	25.0	0.0	Yes
Sri Lanka	OP	0.0	0.0	Yes

ASIA (continued)	(1)	(2)	(3)	(4)
South-Eastern Asia (11)	***Marital System***	***Polygyny 1***	***Polygyny 2***	***Old World***
Brunei Darussalam	Mo	na	na	Yes
Cambodia	na	0.0	0.0	Yes
Indonesia	Mo	7.4	3.7	Yes
Lao People's Democratic Republic	na	0.0	0.0	Yes
Malaysia	Mo	0.0	0.0	Yes
Myanmar	Mo	0.0	0.0	Yes
Philippines	Mo	0.0	0.0	Yes
Singapore	Mo	na	na	Yes
Thailand	Mo	0.0	0.0	Yes
Timor-Leste	na	100.0	0.0	Yes
Viet Nam	Mo	20.0	0.0	Yes

AMERICA	(1)	(2)	(3)	(4)
Northern America (4)	***Marital System***	***Polygyny 1***	***Polygyny 2***	***Old World***
Bermuda	Mo	na	na	No
Canada	Mo	35.8	0.0	No
Greenland	na	na	na	Yes
United States	Mo	28.0	2.6	No
Central America (8)	***Marital System***	***Polygyny 1***	***Polygyny 2***	***Old World***
Belize	Mo	0.0	0.0	No
Costa Rica	Mo	0.0	0.0	No
El Salvador	Mo	0.0	0.0	No
Guatemala	Mo	0.0	0.0	No
Honduras	Mo	100.0	0.0	No
Mexico	Mo	11.8	0.0	No
Nicaragua	Mo	0.0	0.0	No
Panama	Mo	0.0	0.0	No
Caribbean (24)	***Marital System***	***Polygyny 1***	***Polygyny 2***	***Old World***
Anguilla	na	na	na	No
Antigua and Barbuda	na	na	na	No
Aruba	Mo	na	na	No
Bahamas	Mo	na	na	No
Barbados	Mo	na	na	No
British Virgin Islands	Mo	na	na	No
Cayman Islands	na	na	na	No
Cuba	OP	0.0	0.0	No
Dominica	OP	0.0	0.0	No
Dominican Republic	na	na	na	No
Grenada	Mo	na	na	No
Guadeloupe	Mo	na	na	No
Haiti	Mo	na	na	No
Jamaica	Mo	na	na	No
Martinique	Mo	na	na	No
Montserrat	na	na	na	No
Netherlands Antilles	Mo	na	na	No
Puerto Rico	Mo	na	na	No
Saint Kitts and Nevis	OP	na	na	No
Saint Lucia	Mo	na	na	No
Saint Vincent and the Grenadines	Mo	na	na	No
Trinidad and Tobago	Mo	na	na	No
Turks and Caicos Islands	na	na	na	No
Virgin Islands	Mo	na	na	No

AMERICA (continued)	**(1)**	**(2)**	**(3)**	**(4)**
South America (13)	***Marital System***	***Polygyny 1***	***Polygyny 2***	***Old World***
Argentina	Mo	0.0	20.0	No
Bolivia	Mo	25.0	0.0	No
Brazil	Mo	17.9	3.6	No
Chile	Mo	0.0	0.0	No
Colombia	Mo	40.0	10.0	No
Ecuador	Mo	33.3	0.0	No
French Guiana	OP	na	na	No
Guyana	Mo	33.3	0.0	No
Paraguay	Mo	0.0	0.0	No
Peru	Mo	50.0	0.0	No
Suriname	na	50.0	0.0	No
Uruguay	Mo	na	na	No
Venezuela	Mo	38.9	5.6	No

EUROPE	(1)	(2)	(3)	(4)
Eastern Europe (10)	***Marital System***	***Polygyny 1***	***Polygyny 2***	***Old World***
Belarus	Mo	0.0	0.0	Yes
Bulgaria	Mo	0.0	0.0	Yes
Czech Republic	Mo	0.0	0.0	Yes
Hungary	Mo	0.0	0.0	Yes
Poland	Mo	na	na	Yes
Republic of Moldova	na	na	na	Yes
Romania	Mo	0.0	0.0	Yes
Russian Federation	Mo	11.1	11.1	Yes
Slovakia	Mo	na	na	Yes
Ukraine	Mo	0.0	0.0	Yes
Northern Europe (13)	***Marital System***	***Polygyny 1***	***Polygyny 2***	***Old World***
Channel Islands	na	na	na	Yes
Denmark	Mo	na	na	Yes
Estonia	na	na	na	Yes
Faroe Islands	na	na	na	Yes
Finland	Mo	na	na	Yes
Iceland	Mo	na	na	Yes
Ireland	Mo	0.0	0.0	Yes
Isle of Man	na	na	na	Yes
Latvia	Mo	na	na	Yes
Lithuania	Mo	0.0	0.0	Yes
Norway	Mo	na	na	Yes
Sweden	Mo	0.0	0.0	Yes
United Kingdom	Mo	na	na	Yes
Southern Europe (15)	***Marital System***	***Polygyny 1***	***Polygyny 2***	***Old World***
Albania	na	100.0	0.0	Yes
Andorra	na	na	na	Yes
Bosnia and Herzegovina	na	na	na	Yes
Croatia	Mo	na	na	Yes
Gibraltar	na	na	na	Yes
Greece	Mo	0.0	0.0	Yes
Italy	Mo	0.0	0.0	Yes
Macedonia, The FYR of	na	na	na	Yes
Malta	Mo	na	na	Yes
Montenegro	na	na	na	Yes
Portugal	Mo	0.0	0.0	Yes
San Marino	Mo	na	na	Yes
Serbia	Mo	0.0	0.0	Yes
Slovenia	Mo	na	na	Yes
Spain	Mo	0.0	0.0	Yes

EUROPE (continued)	**(1)**	**(2)**	**(3)**	**(4)**
Western Europe (9)	***Marital System***	***Polygyny 1***	***Polygyny 2***	***Old World***
Austria	Mo	na	na	Yes
Belgium	Mo	0.0	0.0	Yes
France	Mo	na	na	Yes
Germany	Mo	na	na	Yes
Liechtenstein	Mo	na	na	Yes
Luxembourg	Mo	na	na	Yes
Monaco	Mo	na	na	Yes
Netherlands	Mo	0.0	0.0	Yes
Switzerland	Mo	na	na	Yes

OCEANIA	(1)	(2)	(3)	(4)
Australia and New Zealand (2)	***Marital System***	***Polygyny 1***	***Polygyny 2***	***Old World***
Australia	Mo	75.0	0.0	No
New Zealand	Mo	100.0	0.0	No
Melanesia (5)	***Marital System***	***Polygyny 1***	***Polygyny 2***	***Old World***
Fiji	Mo	25.0	0.0	Yes
New Caledonia	OP	0.0	100.0	Yes
Papua New Guinea	Po	28.6	9.5	Yes
Solomon Islands	OP	0.0	12.5	Yes
Vanuatu	OP	33.3	0.0	No
Micronesia (7)	***Marital System***	***Polygyny 1***	***Polygyny 2***	***Old World***
Guam	Mo	0.0	0.0	Yes
Kiribati	Mo	0.0	0.0	Yes
Marshall Islands	Mo	0.0	0.0	Yes
Micronesia, Federated States of	Mo	0.0	0.0	Yes
Nauru	na	0.0	0.0	Yes
Northern Mariana Islands	na	0.0	0.0	Yes
Palau	Mo	0.0	0.0	Yes
Polynesia (9)	***Marital System***	***Polygyny 1***	***Polygyny 2***	***Old World***
American Samoa	Mo	Na	na	Yes
Cook Islands	na	25.0	0.0	Yes
French Polynesia	Mo	0.0	0.0	Yes
Niue	na	0.0	0.0	Yes
Samoa	OP	0.0	0.0	Yes
Tokelau	na	0.0	0.0	Yes
Tonga	Mo	0.0	0.0	Yes
Tuvalu	na	0.0	0.0	Yes
Wallis and Futuna	na	0.0	0.0	Yes

Notes: *Marital System*: (Po: Polygynous; OP: Occasional Polygynous; Mo: Monogamous)

Polygyny 1: Percentage of societies within a country with polygyny where co-wives sharing habitation.

Polygyny 2: Percentage of societies within a country with polygyny where co-wives living in separate dwellings.

Old World: Countries where more than half of the population speak an indigenous language as mother tongue. We define a language as indigenous if it was known in the continent where the country belongs before 1500

Sources: *Marital System*: Dorjhan (1959), Chamie (1986), United Nations (1990), United Nations (2000a), Demographic and Health Surveys (1985-2005).

Polygyny 1: Ethnographic Atlas.

Polygyny 2: Ethnographic Atlas.

Old World: Ethnographic Atlas, Alesina et al (2003) and Lewis (2009).

Data are available on request. To request this dataset please contact: A.Diez@warwick.ac.uk

Appendix 3: Polygyny and Female Labour

Table A.3.1 Fertility rates and Polygyny, 1960-2000

1955-60	Polygynous		Non Polygynous	
	Fertility rate	Surviving one year	Fertility rate	Surviving one year
Mean	6.7	5.5	6.2	5.4
St. Dev.	0.6	0.5	1.3	1.1
N	27	27	55	55
1975-80	**Polygynous**		**Non Polygynous**	
	Fertility rate	**Surviving one year**	**Fertility rate**	**Surviving one year**
Mean	6.9	6.1	4.9	4.5
St. Dev.	0.7	0.6	1.5	1.3
N	27	27	55	55
1995-00	**Polygynous**		**Non Polygynous**	
	Fertility rate	**Surviving one year**	**Fertility rate**	**Surviving one year**
Mean	5.8	5.2	3.2	3.1
St. Dev.	1.0	0.8	1.3	1.2
N	27	27	55	55

Source: Authors', PRED Bank, Version 3.0; United Nations (2007)

Notes: Fertility rate: Average number of children that would be born to a woman in her lifetime. Infant mortality rate: Number of deaths of infants under one year of age per 1,000 live births in a given year.

Polygynous countries refer to those countries classified in A.2.4 as (Po). Non Polygynous refer to those countries classified in A.2.4 as monogamous (Mo) or occasional polygynous (OP).

Table A.3.2 Gini's index of land concentration

	Polygynous		Non Polygynous	
Census rounds	**1970**	**1990**	**1970**	**1990**
Mean	0.397	0.461	0.623	0.656
St. Dev.	0.055	0.079	0.171	0.154
N	3	7	40	57

Source: Author's; FAO (1995) Programme for the World Census of Agriculture 2000

Notes: Gini's (or Lorenz) index of concentration is a measure of concentration of agricultural areas. It varies from 0, when all holdings have the same area, to 1, when all agricultural land in a country is in one holding. Polygynous countries refer to those countries classified in A.2.4 as Po. Non Polygynous refer to those countries classified in A.2.4 as monogamous (Mo) or occasional polygynous (OP).

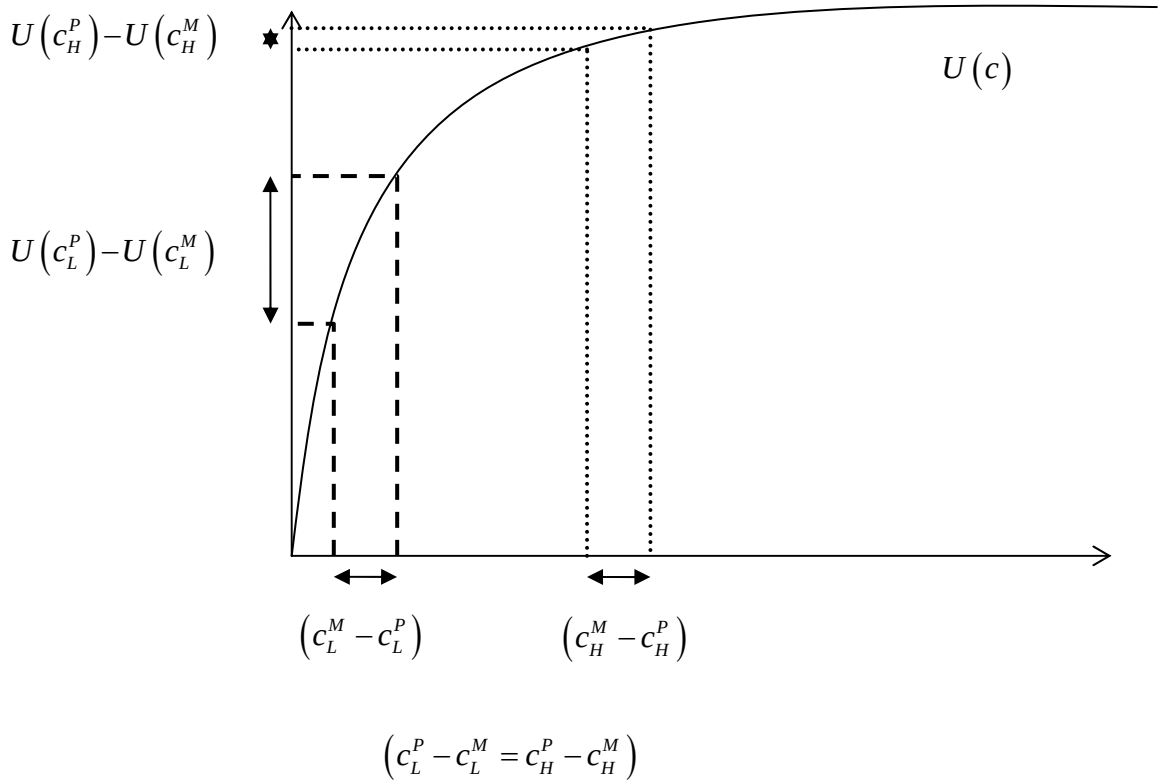
Table A.3.3 Percentage of married men/women in polygynous union by residence

		Men			Women		
Country	**Year**	**Total**	**Urban**	**Rural**	**Total**	**Urban**	**Rural**
Guinea	1999	33.8	27.0	36.2	53.7	46.6	56.3
Senegal	1997	34.5	26.7	38.9	48.6	43.8	51.1
Benin	2001	29.1	21.6	33.5	45.8	37.4	50.2
Togo	1998	24.5	15.7	28.2	42.8	33.9	46.6
Mali	2001	26.8	17.7	29.8	42.7	33.8	45.6
Chad	1997	24.9	20.3	26.5	39.2	36.8	39.9
Niger	1998	23.5	21.3	23.9	37.8	39.4	37.5
Côte d'Ivoire	1999	17.0	9.4	21.2	35.0	25.3	40.1
Cameroon	1998	17.7	12.8	19.8	33.1	26.3	36.0
Uganda	2001	18.0	12.9	18.8	32.7	36.4	32.1
Tanzania	1996	15.0	12.7	15.6	28.8	20.6	31.0
Mozambique	1997	16.3	8.2	18.6	28.5	18.5	30.9
CAR	1995	12.0	7.9	14.7	28.5	26.2	29.9
Comoros	1996	19.1	15.7	20.5	25.3	20.0	27.0
Ghana	1998	12.9	6.7	15.7	22.7	15.7	25.8
Gabon	2000	11.6	11.4	12.3	22.0	20.4	27.0
Malawi	1992	9.1	4.3	10.0	20.8	12.1	21.9
Kenya	1998	9.8	6.7	11.0	16.3	11.0	17.8
Zambia	2002	9.1	3.2	12.4	16.2	6.2	21.6
Rwanda	1992	10.9	6.9	11.0	14.4	9.0	14.7
Ethiopia	2000	8.9	2.5	9.8	13.6	6.9	14.5
Mauritania	2001	6.2	7.7	4.8	11.6	11.1	12.0
Eritrea	1995	5.3	5.3	5.2	7.1	8.2	6.7
Pakistan	1991	3.6	4.2	3.3	4.7	3.2	5.4
Nepal	2001	2.6	2.8	2.6	4.5	4.3	4.5

Source: Demographic and Health Surveys (1985-2005)

Notes: Countries selected were those with available data for men and women. Surveys presented are the latest available.

Figure A.3.1 Gains from consumption given equal consumption differentials



$$\left(c_L^P-c_L^M=c_H^P-c_H^M\right)$$

Table A.3.4 Economic dependence by activity (variables 1-5)

Code	Description
0	0 - 5% Dependence
1	6 – 15% Dependence
2	16 – 25% Dependence
3	26 – 35% Dependence
4	36 – 45% Dependence
5	46 – 55% Dependence
6	56 – 65% Dependence
7	66 – 75% Dependence
8	76 – 85% Dependence
9	86 – 100% Dependence

Source: Ethnographic Atlas.

Notes: There are five activities described in the Ethnographic Atlas: (i) variable 1: Gathering, (ii) variable 2: Hunting, (iii) variable 3: Fishing, (iv) variable 4: Animal Husbandry and (v) variable 5: Agriculture.

Table A.3.5 Sex differences (variables 50-54)

Code	Description	New Code
0	Missing data	-
1	Males only or almost alone	0%
2	Males appreciably more	25%
3	Differentiated but equal participation	50%
4	Equal participation, no marked differentiation	50%
5	Females appreciably more	75%
6	Females only or almost alone	100%
7	Irrelevance of gender, especially industrialized production	-
8	Activity present:: Sex participation unspecified	-
9	Absent or unimportant activity	-

Source: Ethnographic Atlas.

Notes: There are five activities described in the Ethnographic Atlas: (i) variable 1: Gathering, (ii) variable 2: Hunting, (iii) variable 3: Fishing, (iv) variable 4: Animal Husbandry and (v) variable 5: Agriculture.

Table A.3.6 Settlement patterns (variable 30)

Code	Description	New Code
0	Missing data	-
1	Nomadic or fully migratory	Nomadic
2	Semi-nomadic	
3	Semi-sedentary	Semi-sedentary
4	Compact but impermanent settlements	
5	Neighbourhoods of dispersed family homesteads	
6	Separated hamlets, forming a single community	Sedentary
7	Compact and relatively permanent settlements	
8	Complex settlements	

Source: Ethnographic Atlas

Table A.3.7 Mean size of local community (variable 33)

Code	**Description**
0	Missing data
1	Fewer than 50
2	50-99
3	100-199
4	200-399
5	400-1000
6	1,000 without any town of more than 5,000
7	Towns of 5,000-50,000 (one or more)
8	Cities of more than 50,000 (one or more)

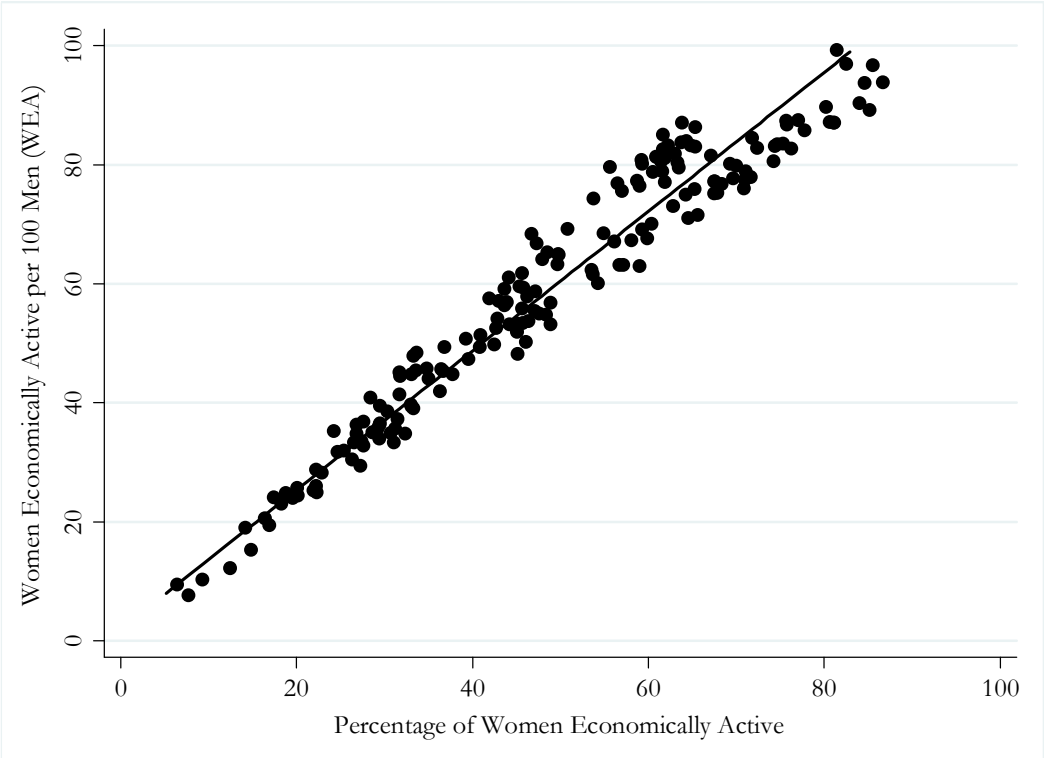
Source: Ethnographic Atlas

Table A.3.8 Societies by Size of Community and Marital System

Code	*Size of community*	*Monogamy*	*Polygyny 1*	*Polygyny 2*
1	Fewer than 50	58	22	3
2	50-99	49	18	11
3	100-199	41	11	19
4	200-399	26	11	16
5	400-1000	18	3	11
6	1,000 without any town of more than 5,000	6	0	0
7	Towns of 5,000-50,000 (one or more)	12	1	10
8	Cities of more than 50,000 (one or more)	32	0	1
	Total	**242**	**66**	**71**

Source: Ethnographic Atlas

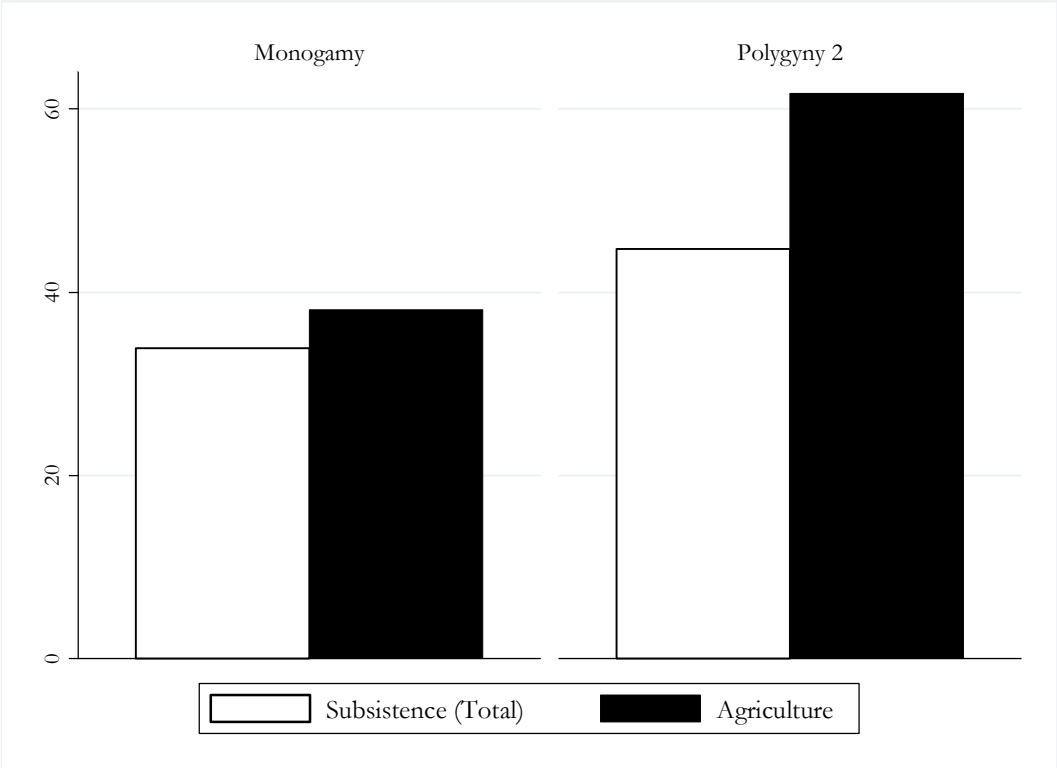
Figure A.3.2 WEA Vs Percentage of Women Economically Active, 1980



Source: PRED Bank, Version 3.0

Notes: Figure A.3.2 includes the linear prediction.

Figure A.3.3 Female Contribution to Subsistence by Marital System



Source: Ethnographic Atlas.

Notes: Only sedentary societies were included (*sedentary* = 1). As a result, *Polygyny 1* societies were removed from sample. Total subsistence includes hunting, fishing, gathering, animal husbandry and agriculture.

Table A.3.9 Ancient Civilisations, Marriage and Economic Activity

Name	Year	Marital System	Settlement Pattern	Dependence Agriculture (%)	Female Contribution
Babylonians	BC 2000	Monogamy	Sedentary	60	Very low
Ancient Egyptians	BC 1400	Monogamy	Sedentary	70	Low
Aryans	BC 800	Monogamy	na	60	na
Hebrews	BC 800	Monogamy	Sedentary	40	Very low
Romans	AD 1000	Monogamy	Sedentary	60	na
Icelander	AD 1100	Monogamy	Sedentary	10	Low
Khmer	AD 1292	Monogamy	Sedentary	50	Equal

Source: Ethnographic Atlas.

Notes: Female Contribution refers only to female contribution to Agriculture

Table A.3.10 WEA, Economic Development and Polygyny

Base year=1980	***Probit*** (1)	***Probit*** (2)	***Probit*** (3)	***Probit*** (4)
WEA	0.009***		0.006***	
	(0.002)		(0.002)	
Log GDP per capita		-0.214***		-0.140**
		(0.048)		(0.067)
Sex ratio 15-44			-0.006*	0.007
			(0.004)	(0.006)
URBAN			-0.007***	-0.002
			(0.002)	(0.003)
Muslim80			0.002**	0.001
			(0.001)	(0.001)
Observations	112	100	112	100
pseudo-R^2	0.168	0.403	0.415	0.429
Chi-square	13.6	32.2	37.3	30.8
Log-Likelihood	-51.5	-32.2	-36.2	-30.7

Notes: Dependent variable is polygyny, taking the value of 1 if Polygyny (Po), 0 otherwise.

Table A.2.4 in appendix 2 provides a list of countries by predominant marital system.

Marginal effects are shown in table.

Robust standard errors in parentheses (* p<.10, ** p<.05, *** p<.01)

Figure A.3.4 Predicted values of polygyny Vs GDP per capita, 1980

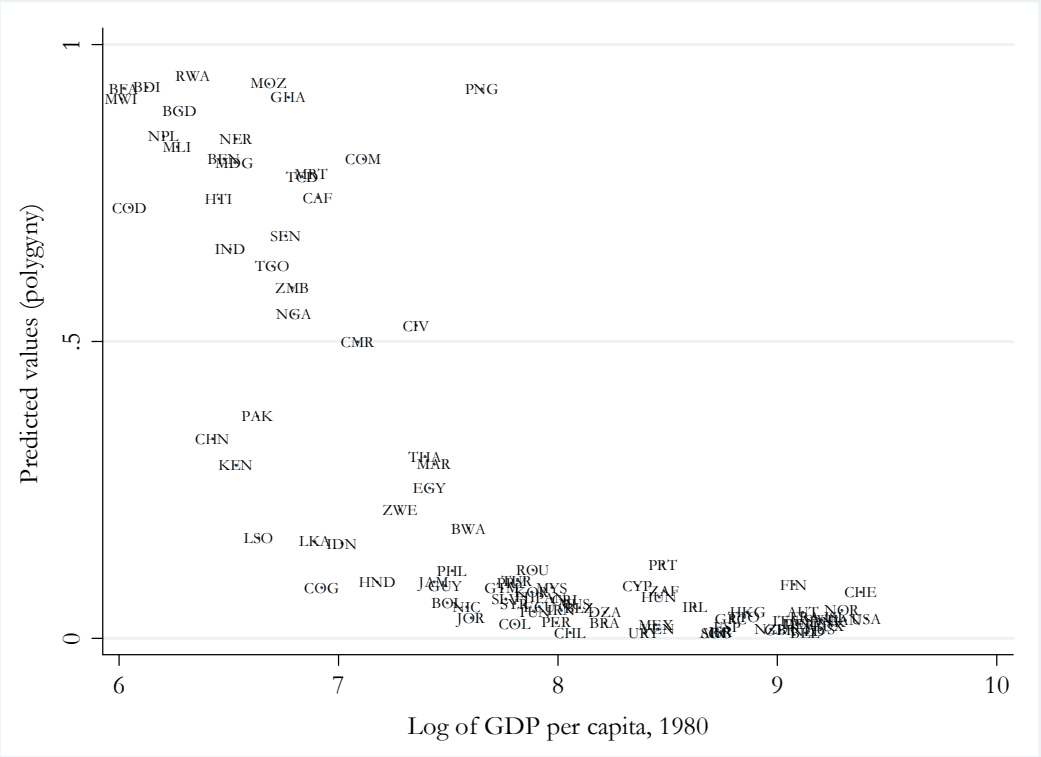


Figure A.3.5a Predicted values of polygyny, sub-Saharan Africa

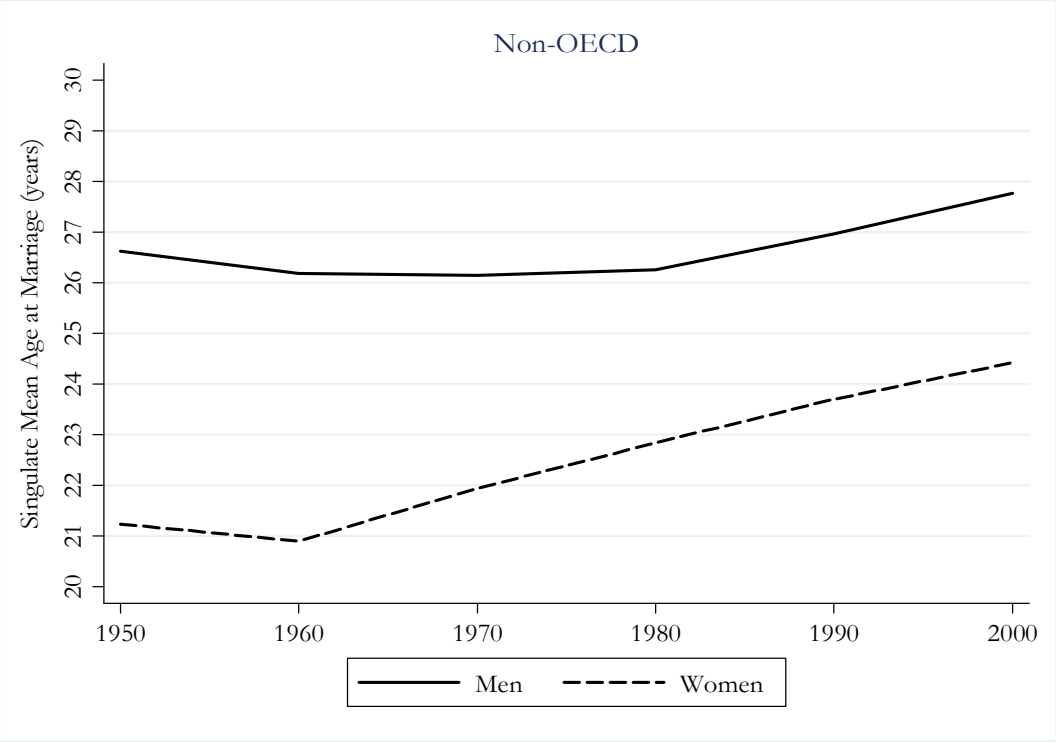
Figure A.3.5b Predicted values of polygyny, Eurasia and Melanesia

Appendix 4: Spousal Age Gap and Female Labour

Figure A.4.1a Spousal Age Gap decomposition, 1950-2000 (Selection of countries)

Sources: Patterns of First Marriage (United Nations, 1990), Demographic Yearbooks (United Nations, 1977; 1979; 1984; 1997) World Marriage Patterns (United Nations, 2000b), World Fertility Report (United Nations, 2004), Demographic and Health Surveys (1985-2005), PRED Bank, Version 3.0.

Figure A.4.1b Spousal Age Gap decomposition, 1950-2000 (Selection of countries)



Sources: Patterns of First Marriage (United Nations, 1990), Demographic Yearbooks (United Nation, 1977; 1979; 1984; 1997) World Marriage Patterns (United Nations, 2000b), World Fertility Report (United Nations, 2004), Demographic and Health Surveys (1985-2005), PRED Bank, Version 3.0.

Figure A.4.2 Computation of the singulate mean age at marriage (SMAM)

(1) Add the proportions single or never married up to and including the age group 45-49 and multiply the sum by 5[1]

(2) Add 1500

(3) Average the proportions for 45-49 and 50-54

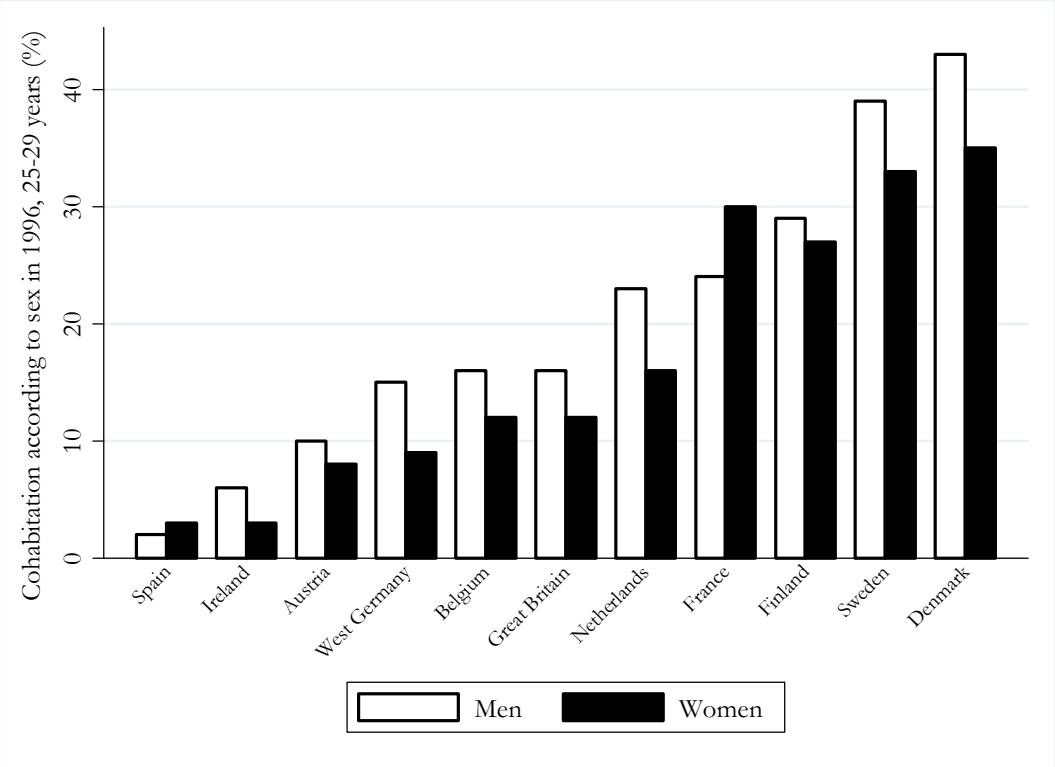
(4) Multiply the result by 50 and subtract it from (2)

(5) Subtract the result of (3) from 100

(6) Divide the result of (4) by the result of (5)

Source: Hajnal (1953)

Figure A.4.3 Cohabitation in Europe, 1996



Source: Kiernan (2002)

Table A.4.1 Descriptive Statistics by geographical region [*Polygynous* (Po)]

Geographical Region	Gap (years)	WEA (+15) Women/100 Men	Sex ratio (15-44) Women/100 Men	URBAN (%)
Northern Africa	6.7	35	101	44.6
	0.6	3.2	2.8	30.4
	2	6	8	12
Western Africa	7.7	75	103	22.5
	1.4	14.2	6.9	13.0
	36	78	58	78
Eastern Africa	5.0	83	103	15.3
	1.1	8.9	4.5	11.1
	32	66	46	66
Middle Africa	5.6	69	105	30.6
	1.2	11.2	4.4	16.4
	15	42	29	42
Southern Africa	2.9	56	106	17.2
	0.6	7.2	6.9	9.5
	2	12	7	12
Western Asia	5.2	15	44	60.1
	3.8	16.0	11.9	24.0
	2	6	4	6
Southern Asia	5.1	63	93	15.8
	1.7	9.9	3.0	6.9
	4	12	8	12
Melanesia	4.8	79	91	9.8
	0.7	1.8	0.5	6.8
	2	6	4	6
Total	6.1	72	101	23.1
	1.8	17.6	11.1	17.2
	95	228	164	234

Sources: Patterns of First Marriage (United Nations, 1990), Demographic Yearbooks (United Nation, 1977, 1979, 1984, 1997) World Marriage Patterns (United Nations, 2000b), World Fertility Report (United Nations, 2004), Demographic and Health Surveys (1985-2005), PRED Bank, Version 3.0.

Notes: The geographical regions refer to the United Nations classification. Data on women economically active for Micronesia and Polynesia regions are not available, and hence they are removed from the table. Table A.4.3 presents descriptive statistics for these two regions.

Table A.4.2 Descriptive Statistics by geographical region [*Occas. polygynous* (OP)]

Geographical Region	Gap (years)	WEA (+15) Women/100 Men	Sex ratio (15-44) Women/100 Men	URBAN (%)
Northern Africa	5.3	34	99	47.1
	1.4	10.1	7.8	19.8
	10	18	14	18
Middle Africa	5.7	.	105	28.1
	0.5	.	0.7	13.2
	2	0	2	6
Southern Africa	4.7	72	109	16.0
	0.7	16.0	8.8	16.3
	7	12	8	12
Western Asia	4.5	23	95	45.3
	0.9	9.5	14.1	22.2
	15	30	23	30
Southern Asia	5.2	45	95	25.3
	1.2	18.6	3.5	13.4
	23	30	25	30
Caribbean	3.4	40	102	50.9
	1.3	18.6	6.6	16.8
	6	6	9	18
South America	3.1	.	.	68.0
	0.7	.	.	8.7
	4	0	0	6
Melanesia	3.6	93	94	27.8
	1.1	3.5	7.3	22.8
	8	6	12	18
Total	4.6	42	97	37.3
	1.3	24.0	9.7	22.3
	75	102	93	138

Sources: Patterns of First Marriage (United Nations, 1990), Demographic Yearbooks (United Nation, 1977, 1979, 1984, 1997) World Marriage Patterns (United Nations, 2000b), World Fertility Report (United Nations, 2004), Demographic and Health Surveys (1985-2005), PRED Bank, Version 3.0.

Notes: The geographical regions refer to the United Nations classification. Data on women economically active for Micronesia and Polynesia regions are not available, and hence they are removed from the table. Table A.4.3 presents descriptive statistics for these two regions.

Table A.4.3 Descriptive Statistics by geographical region (Polynesia and Micronesia)

Geographical Region	Gap (years)	WEA (+15) Women/100 Men	Sex ratio (15-44) Women/100 Men	URBAN (%)
Micronesia	2.8	.	91	41.7
	0.4	.	12.6	20.0
	5	0	7	30
Polynesia	2.6	.	94	39.2
	0.3	.	6.9	13.4
	5	0	6	18
Total	2.7	.	93	40.8
	0.4	.	10.1	17.7
	10	0	13	48

Sources: Patterns of First Marriage (United Nations, 1990), Demographic Yearbooks (United Nation, 1977, 1979, 1984, 1997) World Marriage Patterns (United Nations, 2000b), World Fertility Report (United Nations, 2004), Demographic and Health Surveys (1985-2005), PRED Bank, Version 3.0.

Notes: The geographical regions refer to the United Nations classification.

Figure A.4.4a Sex ratios, 1950-2000 (European countries)

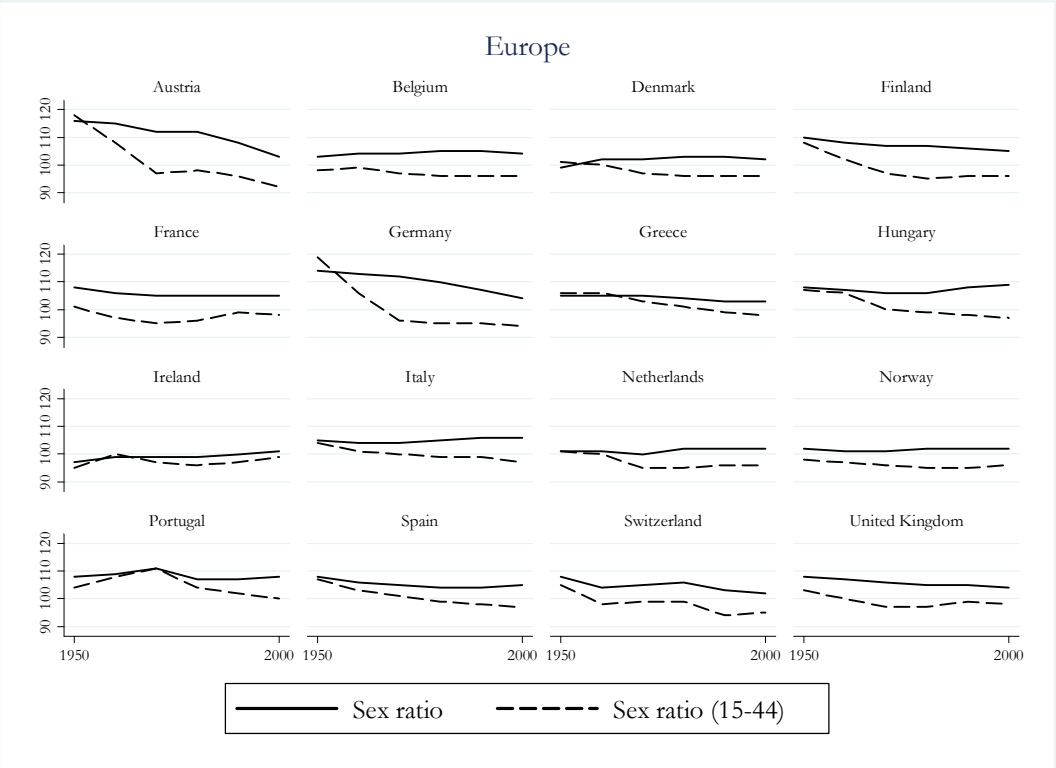
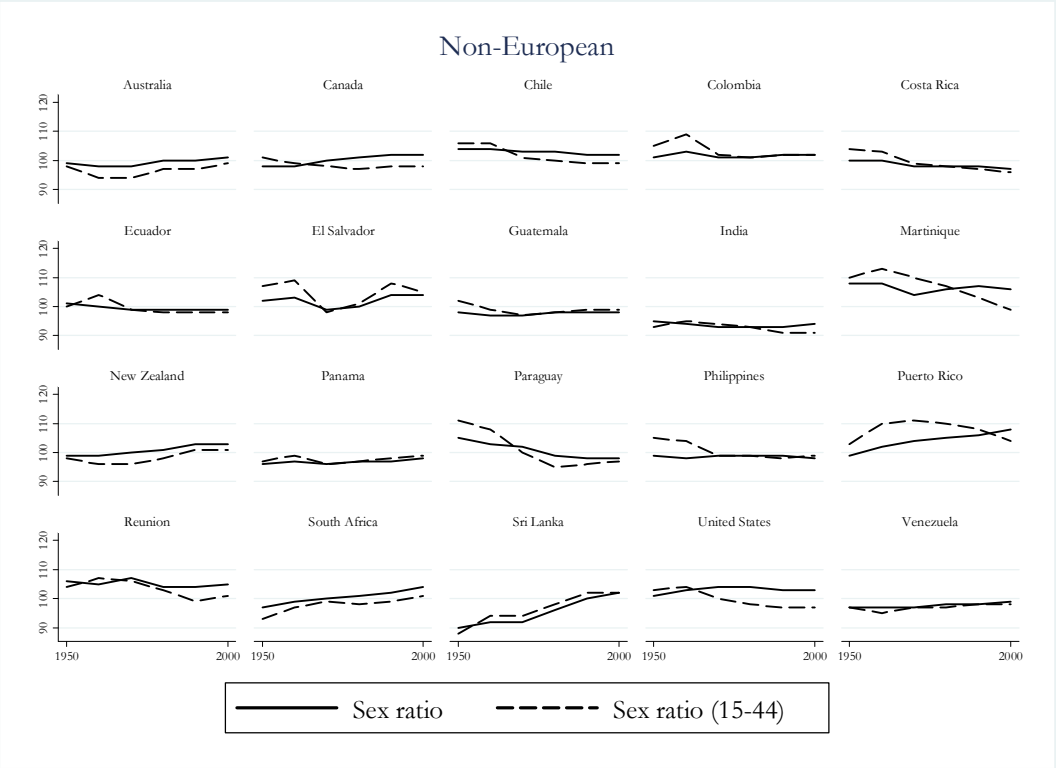


Figure A.4.4b Sex ratios, 1950-2000 (Non-European countries)



Source: United Nations (2000a)

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Table A.4.4 Descriptive Statistics by marital system

Descriptive Statistics	Gap (years)	WEA (+15) Women/100 Men	Sex ratio (15-44) Women/100 Men	URBAN (%)
	Monogamy (Mo)			
Mean	3.3	54	100	53.9
St. Dev	1.2	21.8	7.9	23.9
Obs.	445	606	518	672
	Occasional Polygyny (OP)			
Mean	4.6	42	97	37.3
St. Dev	1.3	24.0	9.8	22.3
Obs.	75	102	93	138
	Polygyny (Po)			
Mean	6.1	72	101	23.1
St. Dev	1.8	17.6	11.1	17.2
Obs.	95	228	164	234
	Total			
Mean	3.9	57	100	44.8
St. Dev	1.7	23.1	8.9	25.8
Obs.	615	936	775	1044

Sources: Authors', Patterns of First Marriage (United Nations, 1990), Demographic Yearbooks (United Nation, 1977, 1979, 1984, 1997) World Marriage Patterns (United Nations, 2000b), World Fertility Report (United Nations, 2004), Demographic and Health Surveys (1985-2005), PRED Bank, Version 3.0.

Notes: The geographical regions refer to the United Nations classification. Data on women economically active for Micronesia and Polynesia regions are not available, and hence they are removed from the table. Table A.4.3 presents descriptive statistics for these two regions.

Figure A.4.5a Spousal Age Gap and *WEA* by decades (Unbalanced Panel)

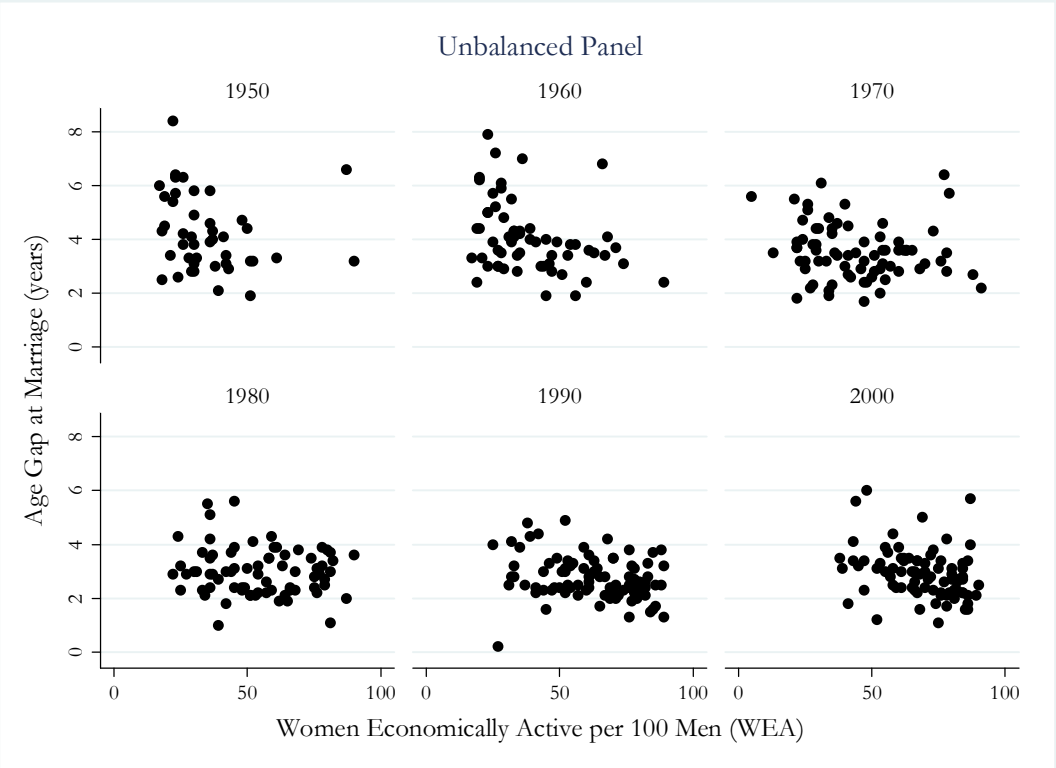
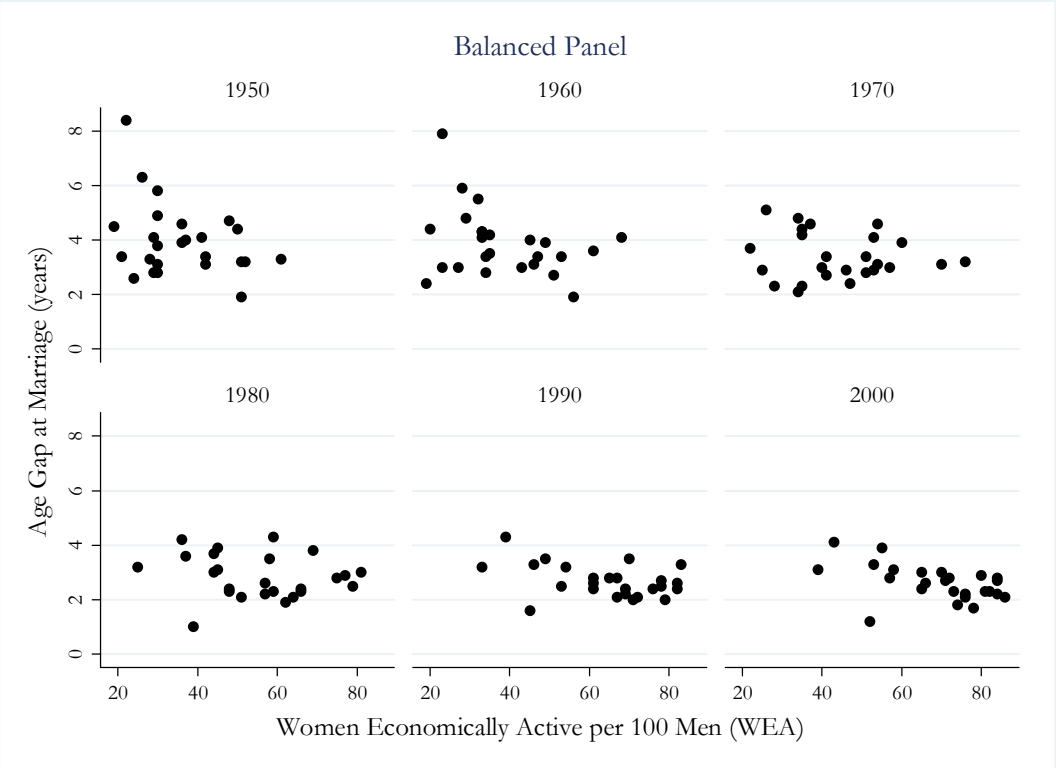


Figure A.4.5b Spousal Age Gap and *WEA* by decades (Balanced Panel)



Source: Patterns of First Marriage (United Nations, 1990), Demographic Yearbooks (United Nation, 1977, 1979, 1984, 1997) World Marriage Patterns (United Nations, 2000b), World Fertility Report (United Nations, 2004), Demographic and Health Surveys (1985-2005), PRED Bank, Version 3.0.

Table A.4.5 Panel Data Estimates for the Spousal Age Gap, 1970-2000

Independent variables	***Random effects***	***Random effects***
	1950-2000	**1970-2000**
	(1)	**(2)**
WEA	-0.021***	-0.010**
	(0.004)	(0.005)
Sex ratio (15-44)	-0.024**	-0.024**
	(0.010)	(0.012)
URBAN	-0.016***	-0.011***
	(0.004)	(0.004)
CEDAW	-0.215*	-0.189*
	(0.117)	(0.110)
Constant	7.789***	6.707***
	(1.086)	(1.226)
Observations	421	323
R^2	0.235	0.162
Breusch-Pagan LM	140.7 [0.000]	102.7 [0.000]
Hausman test	7.83 [0.100]	2.10 [0.717]

Notes: 1. Dependent variable is age gap at marriage

2. Robust standard errors are denoted in parentheses.

3. * , **, and *** denote 10%, 5%, and 1% levels of significance, respectively

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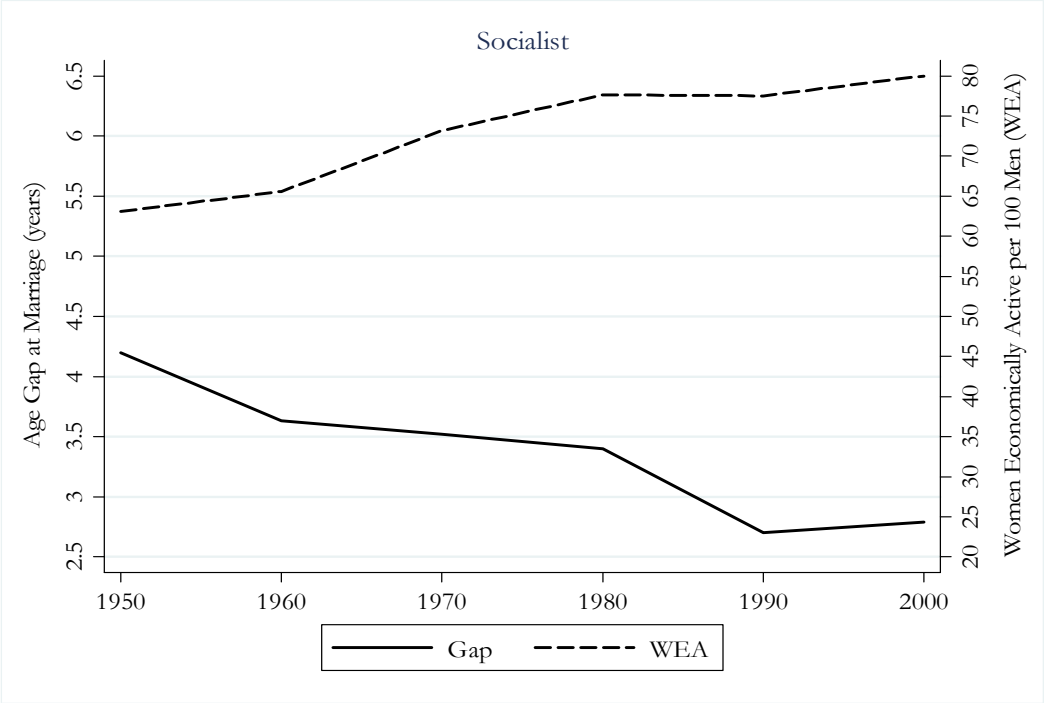
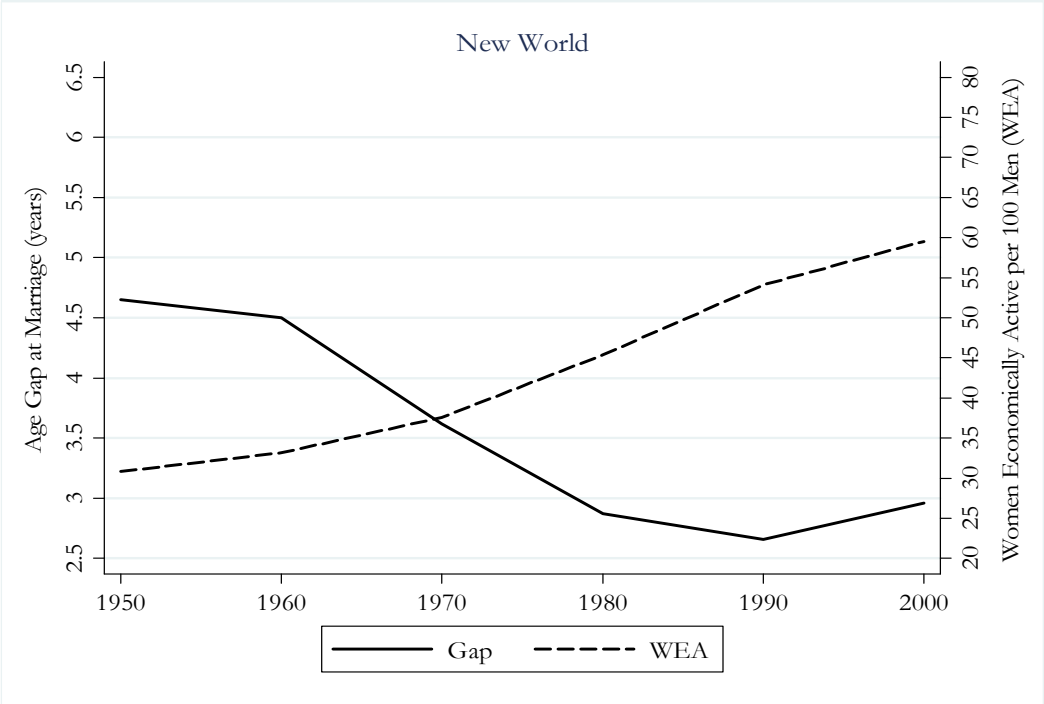
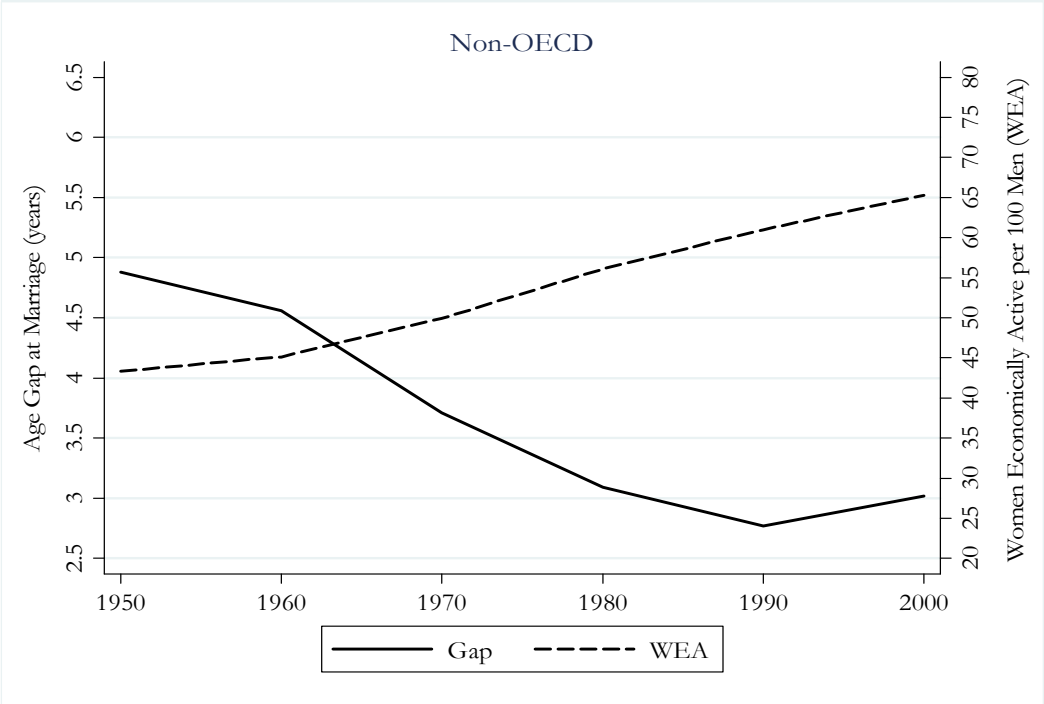
Figure A.4.6 Spousal Age Gap and *WEA* by sub-sample, 1950-2000





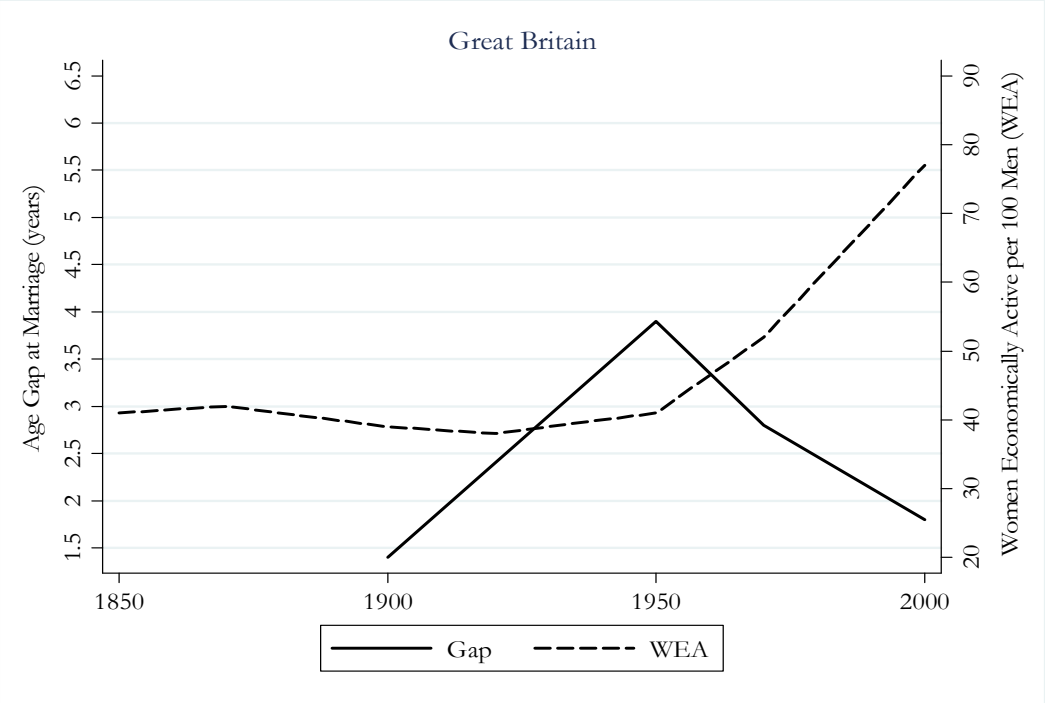
Source: Patterns of First Marriage (United Nations, 1990), Demographic Yearbooks (United Nation, 1977, 1979, 1984, 1997) World Marriage Patterns (United Nations, 2000b), World Fertility Report (United Nations, 2004), Demographic and Health Surveys (1985-2005), PRED Bank, Version 3.0.

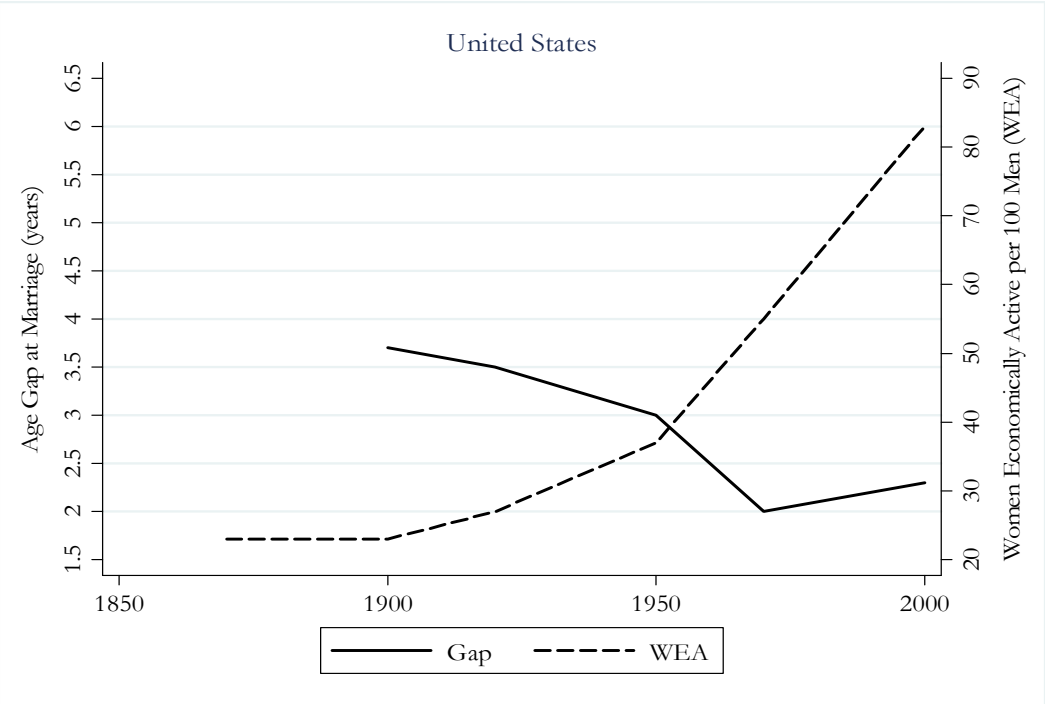
Figure A.4.6 Spousal Age Gap and *WEA* by sub-sample, 1950-2000 (continued)



Source: Patterns of First Marriage (United Nations, 1990), Demographic Yearbooks (United Nation, 1977, 1979, 1984, 1997) World Marriage Patterns (United Nations, 2000b), World Fertility Report (United Nations, 2004), Demographic and Health Surveys (1985-2005), PRED Bank, Version 3.0.

Figure A.4.7 Spousal Age Gap and *WEA*, 1850-2000 (Selection of countries)





Source: Bairoch et al. (1968), Patterns of First Marriage (United Nations, 1990), Demographic Yearbooks (United Nation, 1977, 1979, 1984, 1997) World Marriage Patterns (United Nations, 2000b), World Fertility Report (United Nations, 2004), Demographic and Health Surveys (1985-2005), PRED Bank, Version 3.0

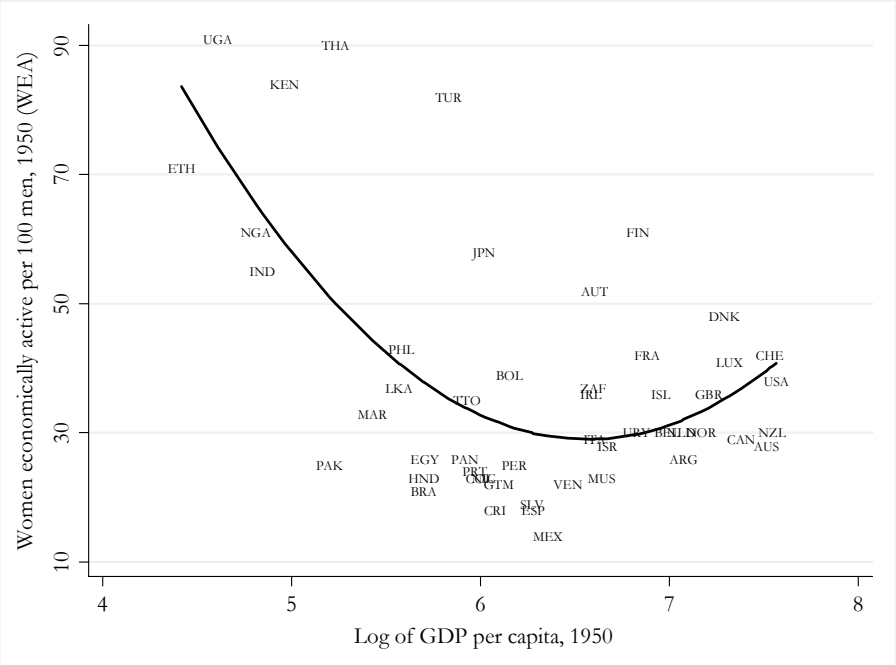
Appendix 5: Marriage and Economic Development

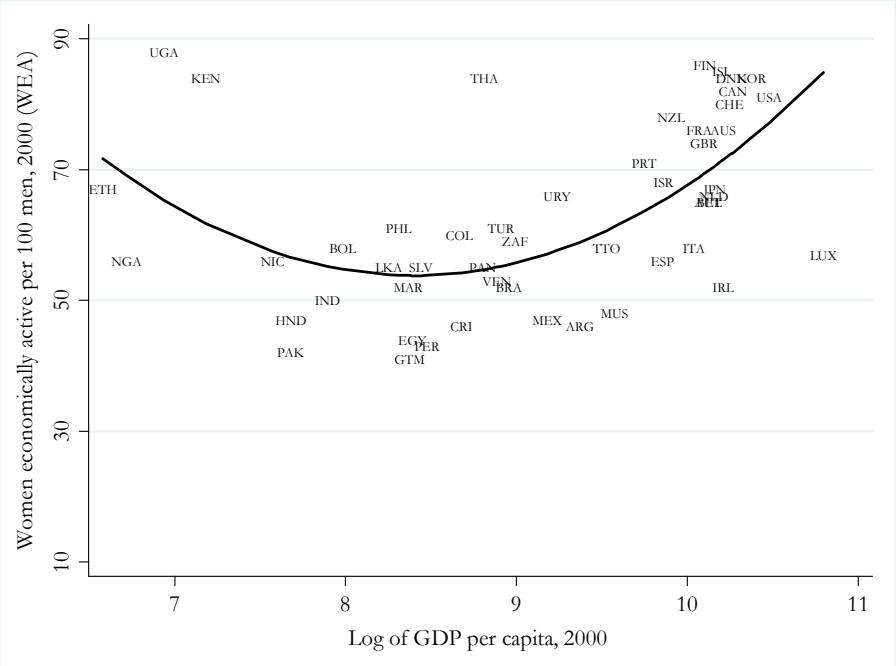
Table A.5.1 Intensity of Agriculture (variable 28)

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.5.1 WEA and Economic Development, 1950 and 2000





Sources: PRED Bank, Version 3.0 and Penn World Tables 6.1

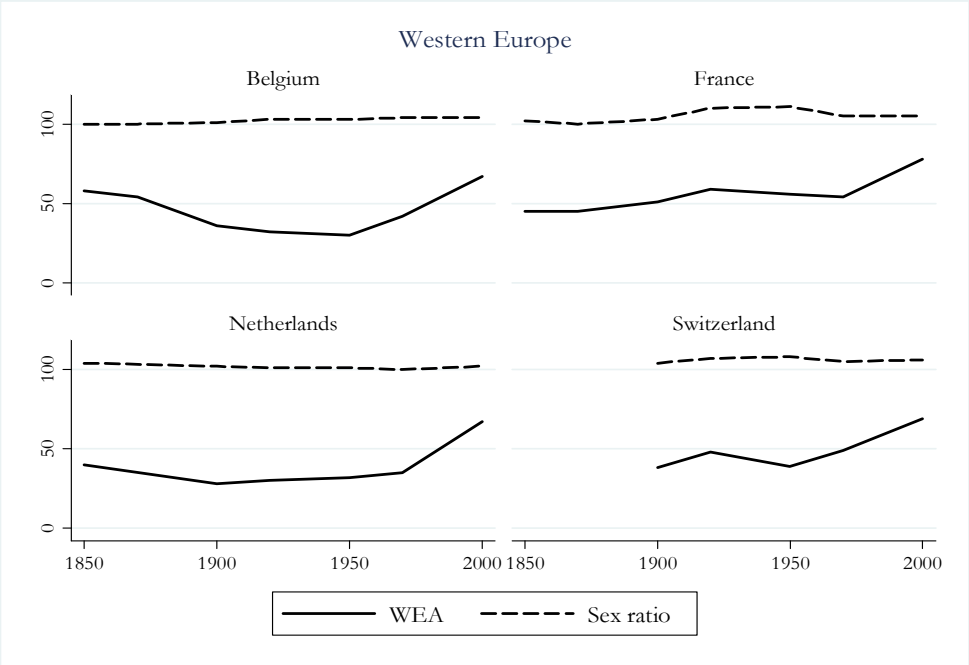
Notes: WEA stands for the ratio of women economically active for every 100 men. GDP per capita stands for real gross domestic product ($ current prices)

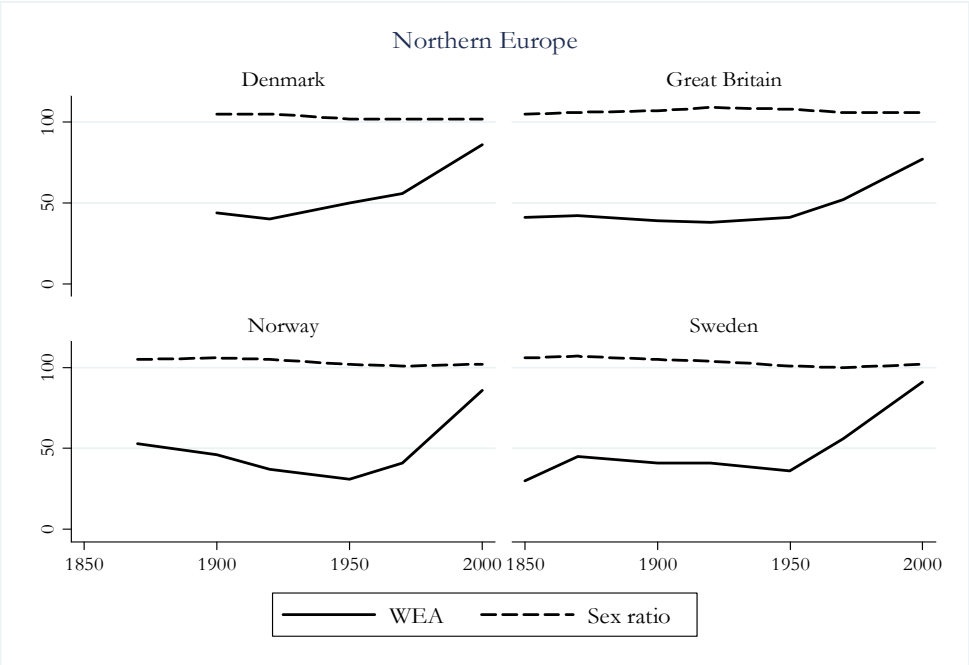
Figure A.5.1 illustrates a balanced selection of countries.

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.

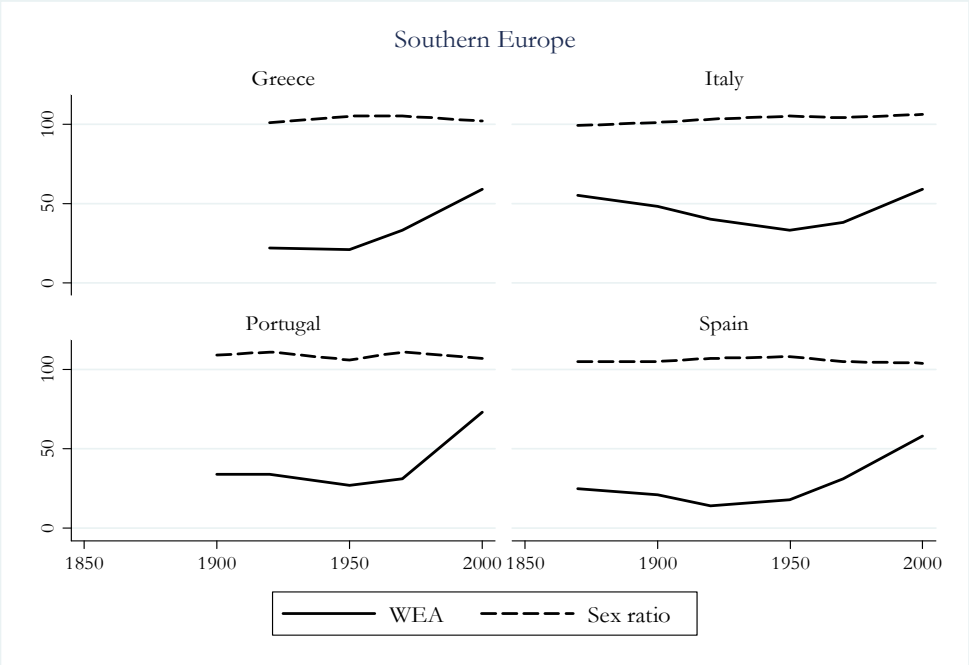
Figure A.5.2 WEA and Sex ratios, 1850-2000

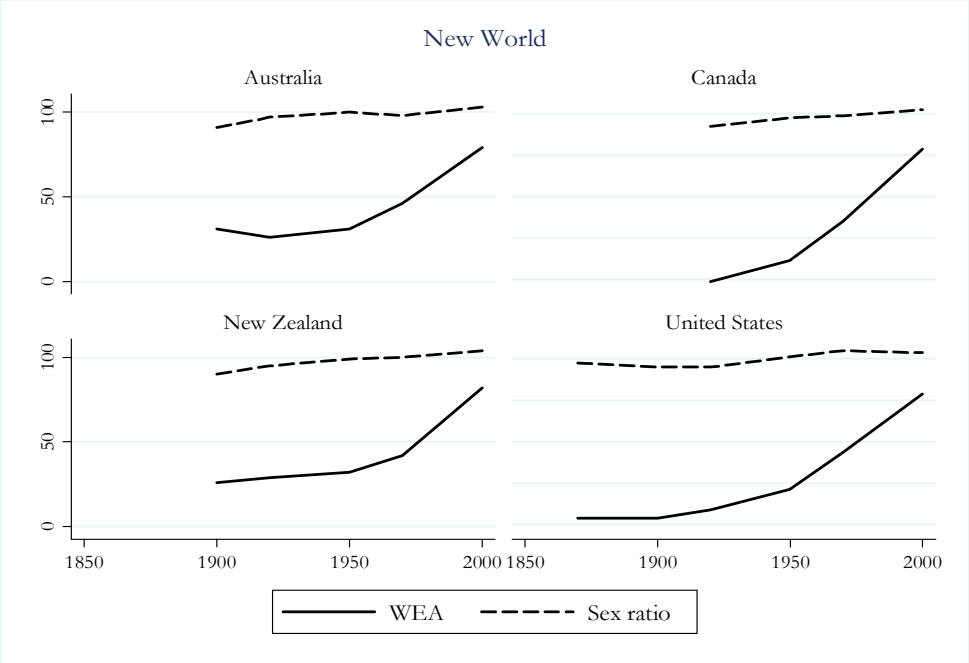




Sources: Bairoch et al. (1968), PRED Bank, Version 3.0.

Figure A.5.2 WEA and Sex ratios, 1850-2000 (continued)





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