The Deep Causes of Economic Development: Family Systems and Female Agency in the World System, 1850-2010

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Introduction

In his seminal work, "Development as Freedom", Sen (2000) perceives women as active agents of change and argues (higher) female agency to be a core contributor of wellbeing and development of the societies. This study tests the Sen hypothesis at the global level: do systematic patterns of female agency, generated by family systems help to explain the diverging paths of economic development in the world economy? (Female) Agency can be defined as individual's capacity to make meaningful life choices and act upon them' (Kabeer, 1999: 438). These life choices can be seen as critical decisions in the realms of education and work, mobility and residence, relationships and fertility (Kok 2014). We present this as an important addition to the current New Institutional Economics (NIE) approach. Much of the research on divergent patterns of economic development focuses on macro-level, formal institutions (i.e., economic and political institutions that ensure the protection of individual economic freedoms such as property rights). A crucial, but underexplored factor is the role of persistent, informal institutions that operate at the micro-level, which have recently been shown to matter for development outcomes (e.g., Alesina, Giuliano, and Nunn 2013). A prime example of such an institution is the family, playing a primary role in transmission of culture and behavior between generations (Bisin and Verdier 2000, 2001). Family has been shown to matter for economic, political and social development of societies. For instance, the shift from parental to individual consent, which characterized north-western Europe in the late medieval period, resulted in redistribution of resources (from old to young and from men to women). This transition has received scholarly attention as one of the key contributors to the economic success of North Sea region (Edlund and Lagerlöf 2006; De Moor and van Zanden 2010). Yet, little is known on the channels through which family organization influences the current development outcomes which makes it harder to determine to what extent the family structure matters for the development process.

The current study aims to contribute to the literature by focusing on three channels, namely fertility, human capital formation, and formal institutions. First, family organizations have been shown to be an important factor in explaining the 'readiness' (i.e., timing) of the fertility transition of the societies (Mason 2001). A closely related literature, the famous "Quality – Quantity tradeoff" argument highlights the link between household structure (in particular the number of children) and human capital formation (Diebolt and Perrin 2013). For both fertility transition and investment in human capital, the agency of women in the household) is of particular importance (Jejeebhoy 1995). Todd (1987) argued that in societies where women have a higher decision-making power in the household, determined by inheritance, polygamy and co-residence practices, the overall level of socio-economic development, captured by human capital formation, is expected to be higher. Duranton et

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al. (2009) provided empirical evidence for the links between family types and regional disparities in household size, educational attainment, social capital, labor participation, sectoral structure, wealth, and inequality in Europe. A last channel runs through the formation of formal institutions. For instance, Greif and Tabellini (2010) argued that while in China, the extended family structure became the center of cooperation, informally ruled by strong moral ties and reputation among clan members, the nuclear household structure in Western Europe made cities the locus of cooperation which was ruled by inclusive and formal arrangements (e.g., legal status of cities, taxation laws) (also Greif 2006).

We provide empirical evidence on this link between family organization, (female) agency and economic development, by employing global data from various sources covering the time period between 1850 and 2010. This data is analyzed by Multilevel Structural Equation modeling, which provides evidence both on direct and indirect channels in a panel data setting. Thus, we aim to provide empirical evidence on the link between family structure and economic development by testing each of the intermediary channels in the same model. This enables us to determine whether female agency in the household promotes economic development independently or by transforming structural conditions that are favorable for economic growth. Moreover, we are able to distinguish the magnitude of the each channel. Some preliminary findings reveal that the decision making power of women in the household to be an important predictor of economic development. A large proportion of the effect of female agency in the household on development runs through its role in fertility patterns and human capital formation, thus providing evidence for the Unified Growth Theory (UGT) and Quality and Quantity Trade-off argument in the literature. [to be Inserted-implications of these findings for different country cases]

Overall, our results support two lines of inquiry in the literature. It highlights the importance of taking into account historical institutions that work at the micro level while studying the disparities in current development outcomes (see, for instance, Greif 1994, 2006; Giuliano and Nunn 2013). The second strand of literature concerns the necessity of studying the gender-differentiated impacts of institutions in the field of comparative economic systems to have a better overview of the interplay between institutions (both at the micro and at macro level) and their capacity to change one another (Hopkins and Duggan 2011).

Literature Review:

A substantial gap exists between average income levels of the world's richest and poorest nations. Excluding those oil rich countries, the world's richest and poorest nations differ by a factor of more than 100 (Rodrik et al. 2004)[2]. A voluminous literature has been dedicated to understand why some countries are poor and the others ones are rich (see for example Acemoglu and Robinson 2012, Barro 1997). Broadly speaking, geographical factors (e.g., factor endowments, natural resources, climate, disease, transport costs), human capital formation, technological innovation, and international trade have been suggested as plausible determinants of economic growth. Since the seminal works of Douglas North

[2] According to the most recent GDP per capita estimates from World Bank (2014), Luxemburg was the richest country in the world with an average income of 90,790 $ whereas Democratic Republic of Congo had the lowest income of 747 $.

(1989,1990) institutions has received substantial scholarly attention as well. A general consensus among the students of economic growth is that the quality of macro institutions is of particular importance in explaining the (persistence of) income differences around the world (see Maseland 2013 for a review). The institutional explanation became popular in the last decades as: (1) it provides insight on traditional explanations of endogenous growth on physical and human capital accumulation, and its variant, technological change and (2) empirical evidence shows institutions to be the most important driver of the development process (Rodrik et al. 2004). Our work is in line with this literature; however we study the role of a lesser explored institution, that of the family and in particular of female agency within the family.

Institutions matter; however, a consensus is yet to emerge on the relevant institutions that drive the (economic) development process. Institutions can be defined as: "the rules of the game in a society or more formally are the humanly devised constraints that shape human interaction" (North 1990:3). Thus, institutions can refer to a wide range of formal rules such as property rights that could be changed rather quickly with amendment and to informal ones such as culture that is harder to change over time (Nunn 2009; Roland 2004; Greif 2006). As part of the literature on institutional economics, scholarly interest in attitudinal factors and cultural beliefs has increased as plausible explanations for persistence of cross-national differences in institutions and economic performance (Maseland 2013:109). It is harder to determine though how these cultural beliefs favorable for economic development came to be in the first place. Family, as the main vehicle of socialization, can provide insight on the underlying norms and values in a society as individuals learn the rules of the game first in this domain (see Dolan 1995 for a review). In the current study, we particularly look at the female agency at the household level for two reasons. First, the household and interfamilial relations are a central locus of women's disempowerment, thus can provide us with insight on cultural patterns in a society (Malhorta 2003). Second, the World Bank (2011) highlighted empowering women as part of the development process, arguing that closing the gender gap is not only beneficial for the wellbeing of women and girls, but also improves the well-being of the society as a whole. In a nutshell, empowering women in the household is expected to promote economic development because when the decision making power of the women in the household is higher, women invest more of the household resources in children compared to men (see for example, Schultz 2001, Duflo 2003, Sahn and Stifel 2002). Thus improving women's access to resources and legal rights have been shown to play a key role in a wide-range of development outcomes, amongst other things, children's educational attainment, and health conditions (World Bank 2011, Duflo 2012, Dollar and Gatti 1999, Drèze and Sen 2002, 2013).

A large share of the evidence in the literature though is limited to the last few decades whereas a number of scholars claimed this link to be historically present. For instance, van Zanden and De Moor (2009) argued female agency in the household to be an important contributor of the economic success of the North Sea region in the post 1600 period. Proponents of this view claimed the European Marriage Pattern (EMP), as devised by Hajnal (1965), to lay behind the 'great divergence' between Europe and the rest of the world and the 'little divergence' between northwest Europe and the rest of the continent (see Dennison and Oglivie 2013 for a review of the literature). The EMP can be described as a unique household formation pattern with late male and female marriage ages, small spousal age gap between the partners, a nuclear household structure and a high female celibacy. According to Hajnal (1965), this unique household formation pattern emerged as early as in the fourteenth century and has been particular to the west of a line from St. Petersburg to Trieste.

Institutional arrangements related to gender, especially regarding the position of women in the household have been linked with economic outcomes as well. Branisa et al. (2013) showed countries with discriminatory law against women also tend to have higher fertility, lower level of human capital formation and a higher level of corruption. According to Tertilt (2005), polygyny causes high fertility and low incentives to save and thereby contributes to underdevelopment in Sub-Saharan Africa. In another study, Tertilt (2006) predicted that enforcing a ban on polygyny would decrease fertility by 40% and increase output per capita by 170%.[3]

The way family is organized is expected to determine the extent to which women can make independent life choices in the household. Through families, people learn the basic rules of interaction, negotiation, dominance and submission and gain – often unequal – access to transmitted resources, to information and to support from kin. The uneven distribution of power within couples, households and family networks means most people had uneven chances of determining their life course. The complex and dynamically shifting connections between the family and state, between the family and religious institutions, and between the family and economic structures has led to regionally different ways in which families are organized, in different relations between family members, and in different expectations regarding their roles and behaviours (Kok 2014:1). Thus family organization should be seen as a regionally path dependent historical institution determining the bargaining position of women in the household and can be defined as "a set of beliefs and norms, common practices, and associated sanctions through which kinship and the rights and obligations of particular kin relationships are defined" (Mason 2001:160). Family structures define what it means to be related by blood; who should live with whom at which stages of the life cycle and economic, social and sexual rights and division of labor among the kin members (Mason 2001).

As many aspects of family structures are organized around gender, these characteristics of the family structures are expected to lead to different level of female agency in the household. In particular we assume inheritance practices, marriage patterns, and polygamy to be the most important determinants of female agency in the household. For instance, Roy (2008) has illustrated that equal inheritance rights for women to be associated with higher women's autonomy. Similarly, Deininger et al. (2010) showed that the introduction of the Hindu Succession Act Amendment of 2005 enforcing equal inheritance rights for girls and women has been related with increased educational attainment, higher household investment in girls, lower dowry payments as well as higher age at marriage. A study by Carmichael et al. (2011) shows female marriage ages and the spousal age gap to be a good indicator of female agency; young girls who marry men many years their senior are likely left with very little say as to the terms of the union and later decisions made within the household. [To be inserted-why polygamy and nuclear household structure is important for female agency]. The way these four characteristics of the family are organized are expected to lead to different levels of female agency.[4] We expect the differences to have consequences for economic development through three interrelated paths: fertility, human capital, and political institutions.

First of all, we expect women's decision-making power to play a crucial role in fertility preferences as women bear the highest opportunity costs of high fertility (Becker 1965; see Carmichael et al. 2014 for a review of the literature). Thus female agency matters for economic development through its role in fertility decline which is an important contributor of the development process. This link has received empirical support in a recent work by Perrin and Diebolt (2013). No developing country (except for oil producers) has

[3] She also predicts an increase in the savings rate by 70%.

[4] See Kabeer 1999 for a review on dimensions related to female agency.

attained medium income levels without going through a fertility transition beforehand (Voigtländer and Voth 2013; see also Chesnais 1992; Chenery, Syrquin, and Elkington 1975). The demographic transition which took place in the 19th and 20th centuries – a period in which fertility, mortality and population growth dropped– has been argued by Unified Growth Theory (UGT) to lead to a shift from the Malthusian model to a modern growth era with sustained technological progress. Thus, UGT highlighted several economic aspects that have contributed to make fertility relatively more costly with respect to investments in child education in the context of rapid technological progress (Murtin 2013). However, independent of the technological progress, clearly other factors came into play as Europeans began to limit their fertility long before the onset of modern growth. Historically, European incomes per capita began to grow once fertility had fallen significantly in the same period when the EMP emerged (Voigtländer and Voth 2013). Girl power – the ability of women to work outside the household and to decide whom to marry – has been suggested as a plausible explanation for this fertility decline before the modern growth (van Zanden and De Moor 2010). Likewise, Voigtländer and Voth (2013) showed fertility restriction to arise without the role for human capital by emphasizing women's opportunity cost, determined by changes in the structure of agricultural production following the Black Death. Mason (2000) discusses the importance of taking into account various dimensions related to family structures in understanding the timing of onset and rapidity of fertility transition. She argues fertility to be much higher in regions such as Sub-Saharan Africa due to the family structure in which the burden of caring for children is distributed among lineages. Moreover, family structure has been shown to be a useful explanation for counter examples, those which show a different pattern than the theory on fertility would predict. For example, Grossbard-Shechtman (1986) showed the negative effect of parents' earnings on fertility to be specific to monogamous countries whereas the income effect of parents on fertility has been found to be positive in Cameroon (Clignet and Sween 1974) where the proportion of married men in polygynous unions is predicted to be 55.6 per cent (Schoellman and Tertilt 2006). In Egypt, a country with few polygamists, male education had a negative effect on fertility, but interestingly, in its rural areas where polygyny is more common, the measured effect of income was less negative than in urban areas (Simon 1974: 117).

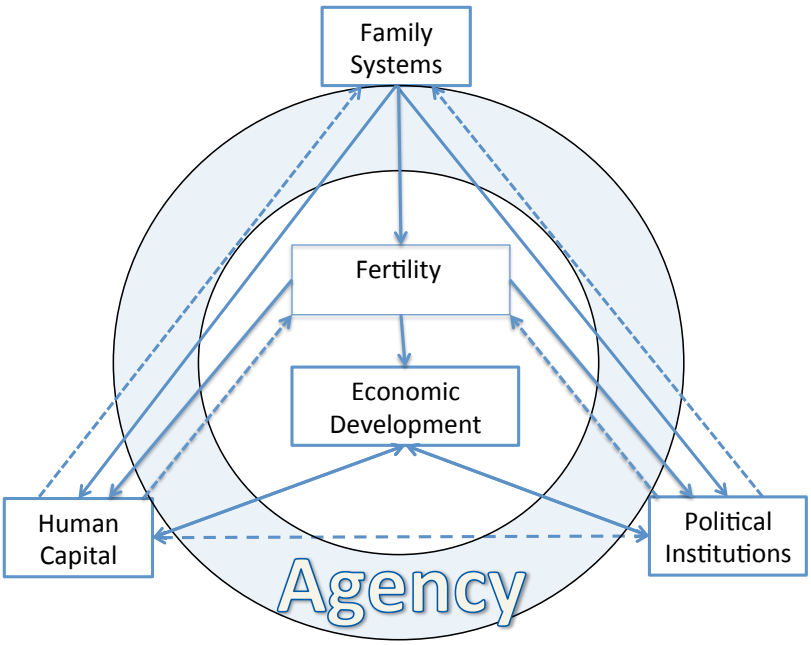
As a second mechanism, human capital formation, one of the robust predictors of economic development, can provide us with further insight on how family and the gender relations can matter for economic development. The traditional division of labor, in which women specialize in reproduction, child care and related domestic activities (Murdock and Provost 1973) may reduce the incentives to invest in the education of female offspring as women would face lower wages and job opportunities in the labor market (Becker 1985). Various factors come at play determining why women are less likely to participate in the labor market. Explanations range from the use of different forms of agricultural practice, different per capita incomes and specialization in female-friendly industries, to differences in cultural beliefs about the appropriate role of women in society (Van der Vleuten 2013)[5]. Among these factors, the role of culture and that of female agency in the household have received substantial empirical support (see for example Alesina et al. 2013; Dilli et al. 2014). Fernandez and Fogali (2009) argues that the mother's decision to participate in the labour market would primarily depend on culture; in particular, how she perceives the role of women in the household, her beliefs as to whether children benefit or are harmed by having a working mother, preferences over market and household work, and expectations on how

[5] Empirical evidence on these explanations has been provided by studies such as Alesina, Giuliano, and Nunn 2013; Fernández and Fogli 2009; Goldin 1994; Iversen and Rosenbluth 2010; Folbre 1994.

she would be treated by her local society (e.g., her neighbors) as a result of working or not. Hence, female labor force participation (LFP) at the aggregate level will depend on the distribution of preferences and beliefs regarding the "appropriate" role of women within a country, which would determine the extent of investment in girls' education. That is the reason the household has received considerable attention in understanding the differences in human capital formation. Few of the scholars attributed particular importance to the bargaining power of women in the household in human capital formation because women usually tend to favor children in their resource allocation behavior compared to men (see Carmichael et al. 2014 for a literature review). Based on nineteenth and early-twentieth century census micro-data, mostly from Western and Eastern Europe and its offshoots, Carmichael et al. (2014) showed that a higher amount of female bargaining power within the household to increase significantly the likelihood of school enrollment of children in United States. In Asia, King et al. (1986) showed that mothers had the least influence on the completion of their children's education in Pakistan where women have very limited agency, whereas the opposite was true for Philippines as women had a strong bargaining position in the household. Todd (1987) also illustrated at the global level, male and female literacy rates to be much higher in countries characterized by family structures in which women have higher decision-making power in the household.

As a final channel, we argue the role of family in countries' economic performances to run through their impact on political institutions. The notion of cultural isomorphism, which has been commonly used in social sciences literature, argues the relations at the micro level to reflect themselves at the macro level. For instance, according to Fish (2002), marriage age imbalances can be used as a direct indicator of power relations in the family and the immediate community, and they are expected to reproduce themselves at higher levels, such as the state. Norms and values have received scholarly attention as drivers of democratic development as they define what is preferable in social relations, and as a result, they decrease the costs for developing, justifying and sustaining formal institutions (Licht, Goldschmidt, and Schwartz 2007; Nee 2005). Todd (1985:6) hypothesized that "family relations – those between parents and children, between husband and wife – provide a model for political ideology and serve to define the relationship between the individual and authority". In a recent study, Dilli (2014) tested the link between family structure and polity empirically with global data. According to her findings, the persistent cross-national gaps in democratic institutions can be partially attributed to the family structures, thus to the extent that they promote liberalism (determined by the coresidence practices) and egalitarianism (determined by the equal inheritance practices between sons and daughter). Similarly, Reher (1998) considers family ties as an explanation for the differences within Europe regarding old-age care and pension systems and Galasso and Profeta (2010) provided empirical evidence for this link. Alesina and Giuliano (2010) have shown family ties to be strong predictors of political participation. Greif and Tabellini (2010) attributed the divergent development pattern between Western Europe and China to the differences in family structures. According to the authors, while the nuclear household structure promoted local institutions such as guilds and universities that are favorable for growth, in China, the extended family structure led to the emergence of local institutions based on kinship, which may hampered the development process.

Figure 1- Theoretical Model



The links between family, female agency and economic development can be summarized in Figure 1 above. One word of caution is necessary before moving to the next section. As clear from Figure 1, most of the intermediary channels are interlinked with each other. For instance, fertility is closely related with the human capital formation (Quality-Quantity Tradeoff) whereas evidence is also present in the opposite direction. For example, Murtin (2012) predicts when average years of primary schooling grow from 0 to 6 years, fertility should decrease by about 40% to 80%. Similarly, both fertility and human capital formation are important drivers of the democratic development of societies (Dyson 2013; Barro 1999; Murtin and Wacziarg 2013) and democratic development may play a crucial role in fertility patterns and human capital formation of societies. However, to avoid having a very complex model, we mainly focus on the steps from female agency to economic development and not explore all the possible links suggested in the literature between our intermediary mechanisms. The solid lines in Figure 1 are tested in our analysis whereas the dotted lines represent the unexplored links in the current study.

Our major concern is the possible reverse causality between female agency in the household and economic development as this link has been shown to be endogenous and mutually reinforcing. Duflo (2012:1053) concludes that "in one direction, development alone can play a major role in driving down inequality between men and women; in the other direction, continuing discrimination against women can, as Sen has forcefully argued, hinder development." Although the reverse causality issue means our results can only be interpreted as partial correlations rather than as a causal effect, we are confident that our results do provide insight on the role family structures in the development process and its mechanisms. Family behavior is argued to experience major transformations due to economic (e.g., industrialization), social (e.g., social capital), and institutional changes (e.g., change in inheritance laws). However, we expect institutional characteristics of the family determining the female agency in the household, such as inheritance practices, marriage partner choice or co-residence patterns to be resistant to economic and social change (Kok

2009,2014). Informal institutions have been shown to be rather persistent over time (Nunn 2012); thus, an underlying assumption in studies employing family structure classification is that these family institutions also change slowly over time. They are expected to be persistent due to the intergenerational transmission of these values from parents to children (see, for example, Alesina and Giuliano, 2010) and the influence of the family institutions on different economic and political institutions, which in return would perpetuate the dominant family traits over time (Galasso & Profeta 2010). Rijpma and Carmichael (2013) provide evidence on the persistent traits of family over the 20th century as well especially regarding inheritance practices by comparing Murdock (1959)'s Ethnographic Atlas, Todd (1985) and Social Institutions related to Gender Inequality (2009), which covers data from 19th and 20th century.

Methodology:

Data & Measurement

To test the relations summarized in Figure 1, global data has been collected for 134 countries between 1850 and 2009.

Our dependent variable is economic development, captured by the Gross Domestic Product (GDP) per capita, which comes from Clio-Infra (2014) largely based on Maddison (1995) estimates. The log of GDP is taken in the analysis. The data on GDP per capita originally covers 166 countries with yearly observations becoming available after 1820s for the large share of the countries.

The main interest independent variable is female agency in the household, for which no direct measure is available, meaning we need to treat it as a "latent variable". Moreover, it is a multifaceted concept, determined by various household characteristics. In the current study, we focus on those dimensions where global data is available historically namely, marriage patters, inheritance, and co-residence, and whether polygamy is practiced. To capture the marriage patterns, the girl power index, developed by van Zanden & De Moor (2009) is used. The girl power index is a continuous variable, calculated by subtracting the spousal age gap from age at first marriage of women. The data comes from Carmichael (2011) and is based on various sources such as United Nations, World Bank, Demographic Healthy Surveys, Hajnal (1965), van Zanden & De Moor (2009) and national censuses. Age at first marriage for both men and women is measured using the Singulate Mean Age at Marriage (SMAM) method that is the average length of single life expressed in years among those who marry before the age of 50 (United Nations, 2008).[6] Our second measure inheritance is available from 1950 onwards on a yearly basis from the World Bank's Fifty years of Women's Legal Rights database. This measure is in dichotomous form where 0 indicates inequality between female and male children and 1 indicates equality. Before 1950s, there is information available on inheritance practices at the start of the 20th century,

[6] This measure can be used as an indicator of women's position in the society in a larger context as well since the girl power index has been tested against contemporary measures of gender equality (i.e., Gender Inequality Index, Global Gender Gap, and Gender Development Index) and it is highly correlated with all these measures of gender inequality (Carmichael et al., 2011).

coming from George Murdock's *Ethnographic Atlas* (1969), updated and turned into country level variables by Jutta Bolt (2012). Murdock's *Atlas* includes information on 1267 societies for the period 1850–1950. It also provides information on the gender distribution of inheritance of land and inheritance of movable property.[7] Co-residence practices are also captured by a dichotomous measure where 1 refers to countries with communitarian family structure, meaning children continue to cohabitate with the parents even after reaching to adulthood, whereas 0 refers to nuclear and stem family types. Lastly, polygamy is a dichotomous variable with 1 indicating countries where polygamy is practiced and 0 otherwise. Both of the two measures come from Rijpma and Carmichael (2013).

Fertility is measured by the number of children per women, available for 195 countries between 1800 and 2008. The data comes from Gapminder (2013), which is largely based on data from the Princeton European Fertility Project and the United Nations World Population Projections.[8] Human capital is measured by average years of schooling among the adult population age over 25 and comes from Clio-Infra project (2013). The data combines total enrolments in primary, secondary and tertiary schooling with age pyramids in order to calculate the average number of years of schooling among the adult population. Lastly, political institutions are captured by the commonly used Polity IV index, constructed by Marshall, Jaggers, and Gurr (2011). This measure covers all the independent states that have a total population of 500,000 or more in a given year. It is based on three criteria; competitiveness of political participation, the competitiveness of executive recruitment, and constraints on chief executive. The scale ranges from -10 (hereditary monarchy) to +10 (consolidated democracy). Table 1 below provides the summary statistics of the main interest variables.

Table 1- Descriptive Statistics (134 countries, 1850-2009)

	min	max	mean
(log) GDP pc	5.31	10.29	8.05 (1.01)
Underlying family variables			
Inheritance	0	1	.63 (.48)
Community[9]	0	1	.41 (.39)
Polygamy	0	.99	.11 (.24)
Girl power	6.80	31.50	18.54 (4.40)
Intermediary Channels			
Fertility	1.14	8.11	4.24 (1.93)
Education	.035	12.80	5.43 (3.06)

[7] For more information on the data, please refer to Carmichael, Dilli and Rijpma (2014)
[8] More information on the data sources can be obtained from http://www.gapminder.org/tag/fertility-rate/
[9] The time invariant variables, community and polygamy have not been included in the model yet due to technical reasons. At the moment results are derived from MPLUS demo version that limits the number of variables and possibilities of analysis. Also still need to find a way to combine both time invariant and time varying variables to capture the latent variable with both time invariant and time varying variables. Therefore the results are very preliminary

Polity2	-10	10	1.93 (7.35)

Estimation Strategy: Multilevel Structural Equation Modeling

The data has been analyzed by using *Multilevel Structural Equation Modeling* or also referred as multilevel path modeling in the literature, by using the MPLUS statistical package (demo version). Our motivation for choosing this method stems from few reasons. First of all, in a multilevel setting we are able to account for the hierarchal structure of our dataset, with years clustered in countries.[10] Ignoring the hierarchal structure may lead to underestimation of the standard errors and thus, unjustified support for our hypotheses. Furthermore, we can account for the issues related to heteroskedasticity and the unbalanced nature of the data (Hox 2002). The second part of the estimation strategy, structural equation model provides two possibilities. On the one hand, in a structural equation modeling it is possible to employ both measurement model and the estimation model at the same time. Our main independent variable of interest is a latent variable, meaning it cannot be directly observed. Thus in a measurement model, we can include the underlying variables to see whether these four measures capture and is indicative of one single concept, in our case family structures. On the other hand, we can actually provide evidence on the mechanisms running from family structures to economic development. We can also differentiate the relevance of the mechanisms for economic development, by evaluating the magnitude of the direct and indirect effects.

The missing values are imputed in MPLUS by using a maximum likelihood (ML) estimation. Thus all the observed values available for each variable are taken into account when dealing with missing values. If an observation is missing the data for all the variables included in the model, this observation is excluded from the estimation.

Preliminary Analysis:

Our preliminary findings reveal some interesting results. [Insert-A short discussion on the measurement model once the variables polygamy and community are included]. As expected from the theory, we find evidence for links between family, demographic transition, socio-economic, and political development. Countries with a higher female bargaining power are also more likely to have higher levels of economic development, quality of political institutions, educational attainment, and lower levels of fertility. [Insert-interpretation of the coefficient of family on economic development once the analysis is repeated with new family measure]. Thus our findings are supportive of van Zanden and De Moor (2010) and Greif and Tabellini (2010) who suggested that family systems and gendered relations within them as plausible explanations of "great" and "little" divergence. Moreover, we find that societies with lower levels of fertility, higher levels of education and better political institutions are positively related with higher levels of economic development, thus providing complementary empirical evidence to the existing literature. The results also provide evidence for the "Quantity-Quality tradeoff" as one unit increase in the fertility measure leads to 0.39 points decrease on average years of educational attainment. However, no direct evidence is found for the role of fertility and educational attainment on

[10] Due to the limitations of the statistical package, only two level hierarchal data could be modeled at the moment. In the next version of the paper a three level data will be modeled, with years clustered in countries and countries clustered in regions.

the quality of political institutions. This finding is rather surprising as education particularly has been shown to matter for democratic development by various studies (e.g., Gleaser et al. 2004; Murtin and Wacziarg 2014). An explanation could be related to our choice of measure on educational attainment, namely average years of education. A study by Castelló-Climent (2008: 180) highlights that the average years of schooling may not provide information on whether a restricted group of highly educated individuals has more influence on democracy than a large mass of moderately educated citizens. Thus, an increase in the average years of schooling could be driven by an increase in the education attained by a minority elite, which might not encourage a democratic regime. Moreover, Murtin and Wacziarg (2014) show primary schooling to be a significant robust determinant of global democratic development between 1870-2000, whereas they find little evidence that secondary and tertiary schooling matter much for democracy.

Table 1. Results for the Multilevel Structural Equation Modeling (N=134, n=10456)[11]

	Estimates
FAMILY	
WOMENINHER	1
GIRLPOWER	19.07***(.901)
FERTILITY	
FAMILY	-7.949*** (0.68)
EDUCATION	
FAMILY	10.063***(2.58)
POLITY2	
FAMILY	16.166** (7.60)
LGDP	
FAMILY	1.119** (.61)
FERTILITY	
YEAR	-0.013***(.00)
EDUCATION	
YEAR	0.038*** (.00)
FERTILITY	-0.392** (0.22)
POLITY2	
YEAR	0.122 (.11)
FERTILITY	-0.244 (.30)
EDUCATION	0.23(.30)
LGDP	
YEAR	0.001 (.00)
POLITY2	0.01***(.00)
EDUCATION	0.14*** (.023)
FERTILITY	-0.073*** (.02)

[11] Please note that these results are very preliminary and incomplete, as it has been modeled in MPLUS demo, which does not aloud the user to account for the panel structure completely, so countries being clustered within regions is not taken into account and limits the number of independent and dependent variables entered in the model. These issues will be dealt with in the next version of the paper.

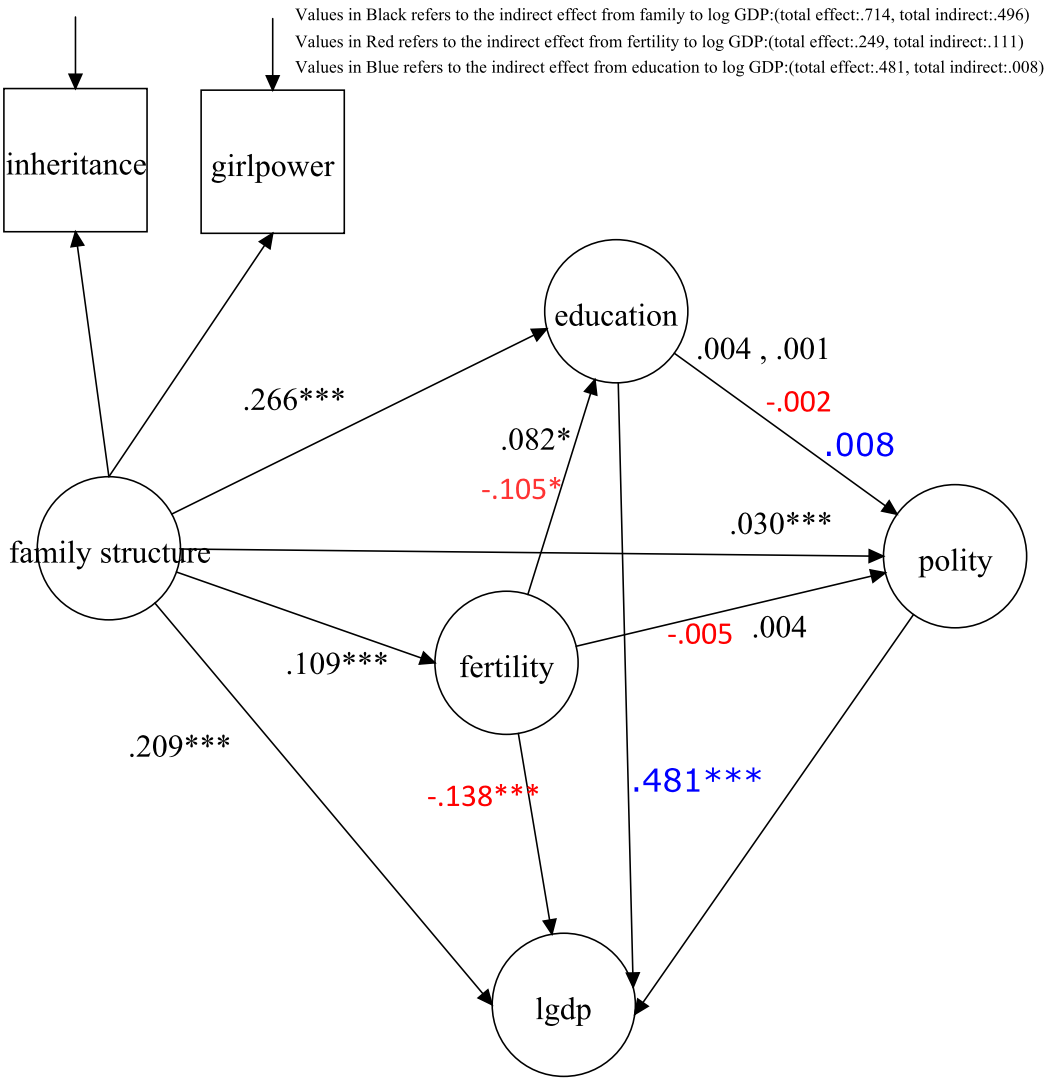
Notes: one-sided p-values- ***<.001,**<.05,*<.10. Model fit statistics: RMSEA=.04, CFI= 0.996, AIC= 190404.950

Figure 2 below show the standardized coefficients of the mechanisms from female agency in the family to economic development. Overall the total effect of family, in particular that of female agency on log per capita GDP is 0.714, of which 0.496 is due to the indirect effect of family running through human capital formation. 15 per cent of the total effect of the family on log GDP (calculated as: 0.109/0.714) can be attributed to its impact on fertility patterns whereas 11 percent of the total effect seems to run thorough the mechanism between family, fertility and education, providing evidence for the quality-quantity tradeoff. Furthermore, 36 percent of the effect of family structures on development runs directly through education, implying that female agency in the household to have an independent effect on educational attainment. This finding can provide insight on cases such as Kerala or Zambia, where half of the male and female population achieved literacy long before the fertility decline took place. Thus, our findings are supportive of Sen (2000) and Dreze and Sen (2013) who attributed a crucial role to the high female agency in the household in explaining the high human development in Kerala. Lastly, 4 per cent of the effect of family on economic development can be attributed to the role of family in development of political structures. Although this mechanism does not seem to be as important as education and fertility in explaining the role of family in economic development process, it does provide some evidence on the suggested link between family and political structure by Todd (1985) and Greif and Tabellini (2010).

Moreover, higher fertility does seem to be detrimental for economic development not only through its role in education but through other mechanisms as well, as 55 per cent of the effect of fertility on economic development seem to be independent of education (calculated as: 0.138/0.249). [To be Inserted-a discussion on the alternative mechanisms from fertility to economic development]. Lastly, the effect of education on development seems to be independent of its role in promoting political institutions.

Figure 2. Standardized Estimates for the Indirect and Direct Effects[12]
(N=134, n=10456)

[12] Year been included in the analysis and standard errors has been clustered at the country level in the analysis presented in Table 1, which are not illustrated in the figure. But our analysis is not complete and currently it is not possible to illustrate all dimensions of the analysis with the diagram. Also in the long run a diagram illustrating a growth modeling will be used, thus enabling to describe specific growth trends for each country and region.


Values in Black refers to the indirect effect from family to log GDP:(total effect:.714, total indirect:.496)
Values in Red refers to the indirect effect from fertility to log GDP:(total effect:.249, total indirect:.111)
Values in Blue refers to the indirect effect from education to log GDP:(total effect:.481, total indirect:.008)
inheritance
girlpower
education
.004 , .001
-.002
.008
.266***
.082*
-.105*
.030***
family structure
polity
-.005
.004
.109***
fertility
.209***
-.138***
.481***
lgdp

Using a fixed effect panel estimation model, the robustness of the findings discussed above has been checked. This estimation method accounts for unobserved omitted time-invariant country characteristics such as geographical conditions. In the first model, only inheritance and girl power index are included, capturing female agency in the family systems in the measurement model above. Our interpretation remains the same; those countries with a higher level of female agency in the household are also characterized by a higher level of economic development. Inclusion of fertility and education leads to a slight decrease in the coefficient of female agency indicators, supporting our arguments above about the intermediary channels, fertility and education. Fertility and education also remain as robust significant predictors of economic development. Political institutions turn out to be insignificant in this model, thus highlighting democracy not to be a necessary condition for economic development, which is slightly different from our findings above. This finding may be in line with cases such as India, being a stable democracy since its independence despite its low level of economic development at the time of independence and China, achieving significant economic growth in the last decades under the communist regime. However, a further investigation is desired to make sure that empirical issues such as sample size or the choice of dealing with missing values do not drive the differences between the two models.[13]

Table 2-Robustness Check with Panel Fixed Effects (134 countries, n= 10456)

	(1)	(2)	(3)	(4)
	lgdp	lgdp	lgdp	lgdp
womeninherit	0.0673**	0.0586**	0.0558**	0.0546**
	(0.0204)	(0.0184)	(0.0176)	(0.0176)
girlpower	0.00282***	0.00202***	0.00172**	0.00170**
	(0.000631)	(0.000552)	(0.000576)	(0.000576)
femfert		-0.0698***	-0.0499**	-0.0480**
		(0.0194)	(0.0169)	(0.0172)
alledu			0.0516*	0.0508*
			(0.0204)	(0.0204)
polityn				0.00353
				(0.00264)
Constant	6.257***	6.667***	6.508***	6.483***
	(0.0636)	(0.138)	(0.135)	(0.139)
Year Dummies	YES	YES	YES	YES
R-squared[14]	0.790	0.797	0.801	0.802

Standard errors in parentheses

="* p<0.05 ** p<0.01 *** p<0.001"

Conclusion

[In progress]

[13] In the next version of the paper, to deal with some of the endogeneity issues, we will also test the same model with GMM estimation method as a robustness check.

[14] It can be an indication of unit root- I did not run diagnostics yet, so the fixed effect results are to be approached with caution. I just did it as a robustness check

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