An Empirical Investigation of Female Labour Force Participation, Fertility, and Cultural Norms in Developing Countries

Submitted by

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Dedication

To the Holy Spirit, my Teacher and Friend, whose sustaining hand has made this possible. And to my loving husband, Ishmael Atorudibo, and wonderful children, TrustGod, Sharon, and Pearl.

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Abstract

In this dissertation I combine individual-level survey data from several developing countries, and one developed country, with country-level average values of institutional and cultural proxies, to empirically study the influence of cultural norms on female labour market and fertility outcomes. The analyses distinguish between culture – the internalized beliefs, attitudes and preferences acquired by individuals within families - and informal institutions which refer to the traditional taboos and unwritten codes of behaviour within indigenous communities. The role of formal institutions i.e., the statutory laws that structure social and political interactions is also highlighted. Following the general introduction, Chapter 2 investigates the relationship between cultural norms embedded in the rules of descent (or kinship systems), as well as the historical modes of settlement, and the labour force participation rate of women in sub-Saharan Africa. Historical information on the rules of descent and patterns of settlement extracted from Murdock's (1967) ethnographic atlas are matched with contemporary ethnicity information in the Demographic and Health Surveys (DHS) for a sample of women in urban areas who are aged 15 to 49 years. The effect of culture is identified by focusing on individuals from different descent systems and ancestral settlement patterns who are resident in the same urban centres and share similar market and institutional settings. The findings show that 62 percent of women in the sample are in the labour market irrespective of their rules of descent. Women of matrilineal descent, however, have a higher probability of being in the labour force than women of patrilineal descent. On the other hand, women from nomadic ancestry, have a much lower average labour force participation rate than women with a sedentary ancestry. Finally, I find the strength of formal institutions to be vital to labour market decisions as its interaction with culture produces better outcomes for women across all cultural backgrounds.

In the third chapter I examine the effect of culture on two distinct fertility outcomes in developing countries, using marital norms as a proxy for culture. With information from the Ethnographic Atlas, I create three marital norms to capture whether a society had a restrictive or permissive attitude towards female premarital sexual activities. The marital norms include an emphasis on female early marriage, an emphasis on female virginity before marriage, and a tolerance towards (or weakly censuring of) female premarital sexual behaviour. The effect of culture is also identified using urban data, as the uniqueness of each marital norm to an individual's ethnic group provides a source of identifying variation in the age at first birth and the number of children per woman. With the same data set as chapter 2 but widening the scope to the whole of Africa and the Middle East (mainly Turkey due to data limitations), the analysis in this chapter shows that marriage norms significantly determine a woman's age at first birth and quantum of births. The cultural emphasis on early female marriage is associated with a significantly lower age at first birth and higher fertility per woman relative to the culture where female premarital sex is weakly censured. Interestingly, an emphasis on female virginity at marriage increases a woman's age at first birth by about 1.13 years and lowers her fertility level by an average of 1 child compared to a woman whose cultural setting weakly censures female premarital sex. Finally, chapter 4 extends the investigation to a developed country case (the United Kingdom) where I explore the relationship between completed fertility and the cultural norms from the countries of ancestry, specifically, the norms regarding female fertility and family size. The differences in the total fertility rates (TFR) for eleven ancestral countries serve as an exogenous source of variation for the outcomes. The influence of such norms is taken as an indicator of the transmission of cultural values from parents to children in immigrant households. Using a sample of second-generation immigrant women aged between 35 and 64 years, I find that the TFR from a country of ancestry has a significantly positive effect on completed fertility. Women from high fertility ancestry countries have a higher completed fertility than women whose parents are from low fertility countries. Overall, the findings in this dissertation provide support for culture as an important determinant of a wide range of economic outcomes.

Keywords: Cultural Norms, Female Labour Force Participation, Descent Systems, Historical Patterns of Settlement, Marriage Norms, Formal Institutions, Fertility, Descendants of Immigrants

Chapter One

1. Introduction

This dissertation is a three-part analysis of the relationship between cultural norms and two sets of outcomes: female labour force participation, and fertility behaviour. The International Labour Organization's 2019 employment statistics show that, globally, the gender gap in labour force participation is still very large even as the gap in educational attainment has narrowed in recent decades. Identifying the factors behind the negative trend in female labour market activities will help developing countries in Africa, especially, to design and implement appropriate policies that create greater economic opportunities for women.

A key determinant of female labour market and fertility outcomes in developing countries is the cultural preferences of individuals regarding women's work outside the home as well as the ideal family size (Fernández, 2011). But in trying to identify the effect of culture we are immediately faced with the challenge of endogeneity and measurement error. One reason why identifying the effect of culture has been so problematic is the difficulty of finding a precise definition for culture as, so far, there is no consensus on how it should be defined. Douglas North's (1990) over-arching definition of institutions as "the humanly devised constraints that structure human interactions" is a good starting point for conceptualizing culture and institutions. Institutions, according to North, are either formal constraints (statutory laws, constitution) or informal rules (customs, traditional taboos, norms of behaviour, moral values), with their respective characteristics of enforcement. Given this definition, some authors conceptualize culture as informal institutions (e.g., Roland, 2004; Alesina & Giuliano, 2014) while others see culture as a component of informal institutions

or, alternatively, that informal institutions are part of a community's cultural heritage (e.g., Pejovich, 1999).

It is still debatable, however, whether culture should be regarded as completely synonymous with informal institutions especially when it is defined appropriately (Guiso, Sapienza and Zingales, 2006; Acemoglu & Robinson, 2021). There is, no doubt, a fine line between the two concepts but, as Guiso et. al suggest, there are aspects of culture that clearly differ from informal rules. While informal rules/codes of conduct can be voluntarily acquired (through intra- and inter-community socialization) cultural values and beliefs are inherited by an individual from previous generations. In addition, informal rules can change with changing circumstances, but cultural traits remain with the individual throughout his/her lifetime. Acemoglu and Robinson's (2021) distinction between a 'cultural set' which is persistent and a 'cultural configuration' which can adapt and change when circumstances change is, technically, a distinction between the characteristics of culture and those of informal rules. Focusing on the inherited aspects of culture rather than the voluntarily acquired codes of conduct makes the distinction between the influence of culture and that of informal institutions possible. This dissertation, therefore, adopts this approach in examining the relationship between cultural norms and economic outcomes.

Typically, cultural values and beliefs develop out of social structures such as families, ethnic groups, etc. and are transmitted from parents to their children. These inherited values and beliefs shape people's expectations and world view, resulting in preferences that have been conditioned by prior beliefs. These culturally conditioned preferences eventually translate into a variety of economic, social, and/or political behaviour some of which may be sub-optimal depending on the degree of conservatism of any given cultural orientation (Guiso,

Sapienza & Zingales, 2008). This is where institutions (formal and informal) become very important because, as Leftwich and Sen (2010) argue, they constitute the 'rules of the game', shaping but not necessarily determining human behaviour. Thus, culture and institutions are endogenous, they can affect or interact with each other and, depending on how strongly connected the cultural attributes are, one or the other can emerge as the primary operating influence (Acemoglu and Robinson, 2021) on human behaviour. This inter-relatedness between culture and institutions informs the difficulty in identifying the effect of cultural beliefs on economic outcomes.

To overcome this hurdle, an approach from epidemiology has been proposed and applied in several research within the social sciences to untangle the effect of culture from other unobserved causes or constraints (Alesina & Giuliano, 2010; Fernandez & Fogli, 2009). The 'epidemiological approach' is an attempt to identify the effect of culture by looking at the heterogenous outcomes of individuals who share the same economic and institutional environments (Fernandez, 2010). It is typically employed in studying the economic outcomes of descendants of immigrants in host (mostly developed) countries. That way the institutional constraints within their countries of ancestry become irrelevant and variations in outcomes can be attributed to the different cultural beliefs across immigrant groups. In this dissertation the epidemiological approach is used in two contexts: internal and international migration. The analyses in the first two chapters are based on the outcomes of female migrants from the rural to the urban areas of their own countries while the fourth chapter examines the case of female descendants of immigrants in a host country.

In chapter 2, individual-level data from the Demographic and Health Surveys for several countries in sub-Saharan Africa are used to examine the impact of cultural norms embedded

in the rules of descent (or kinship) and historical patterns of settlement on women's probability of participating in the labour force, including self-employment and whether an individual gets paid (by cash or in kind) for any way done for others. The chapter merges historical/ethnographic information from George Murdock's (1967a) Ethnographic Atlas with contemporary data to match rules of descent and patterns of settlement to individuals through their respective ethnic groups. This process reveals a woman's ancestral characteristics, i.e., whether she has a patrilineal, matrilineal, or mixed descent; and whether a woman's ancestors were nomads or sedentary agriculturalists. It thus produces cultural proxies that are sufficiently exogenous to allow causality between cultural norms and labour market outcomes to be inferred.

Identification is achieved by restricting the sample to female urban residents, mimicking the 'epidemiological approach' in similar research papers. This enables the comparison of outcomes for individuals with different cultural backgrounds (descent systems and modes of settlement) who, by assumption, are living outside their indigenous communities and away from the informal rules and constraints of their local communities. Secondly, since these women live in a common (formal) institutional setting (i.e., labour market, education, health, and financial sectors, etc.), variations in outcomes can be attributed to influence of their respective cultural values and beliefs.

The estimations return striking differences in the average labour market outcomes of women from the different culture groups. Notably, women of matrilineal descent have a higher probability of labour force participation than women of patrilineal descent. Also, women of nomadic ancestry have a lower probability of being in the labour force than those of sedentary ancestry. Further analysis is made to determine how the interaction of each

cultural proxy with a measure of formal institutions impacts on labour force participation. The findings show that the strength of formal institutions has an important effect on the outcomes, justifying the inclusion of the interaction effect. Outcomes for all culture groups generally improve with higher values of the formal institutional variable.

Following a similar pattern, chapter 3 investigates how marriage norms affect the commencement of motherhood and quantum of births per woman. It begins with a brief review of the theoretical explanations for the inverse relationship between fertility and economic growth. Galor and Weil's (1999; 2000) Unified Growth theory, for example, predicts that as the growth in income per capita increases, the rate of fertility will decline (the so-called fertility transition) due to the higher opportunity cost of childbearing. While this rings true for all developed countries and most emerging economies, the decline in fertility rates in Africa remains very sluggish and, in some countries, has stalled altogether. This is despite the significant economic growth recorded by countries across the continent. Adolescent fertility is also very high in sub-Saharan Africa, standing at 101 births per 1000 women aged 10 to 19 in 2019. This chapter uses the norms of female premarital sexual behaviour obtained from Murdock's Ethnographic Atlas as a proxy for culture and expands the research scope to include all African countries for which data could be obtained and a single country from the Middle East. It tests for the effect of female premarital sexual norms on the age at first birth and number of children.

Premarital sexual norms are classified in the sociological writings as either restrictive or permissive (Broude, 1996; Heise, 1967), each emphasizing a distinct marital value. In this study, two premarital norms are classified as restrictive – the cultural emphasis on early female marriage and the emphasis on female virginity at marriage – because they curtail

female sexual freedom outside marriage. The permissive classification is for the premarital norm that does not restrict female sexual freedom either through its tolerance of the act or weakly censuring female premarital sexual activity. This last category serves as the comparison group in the analysis. The estimates show that, relative to the permissive norm, the marriage norm with emphasis on female early marriage has a strong negative effect on a woman's age at first birth. Not surprisingly, it is also associated a higher number of children per woman. The findings also reveal that women from cultures with an emphasis on female virginity at marriage have their first births at a much later age (with a difference of about 1.13 years) and have less children than women in the permissive category.

The interaction between the marriage norms and the measure of formal institutions also reveals, characteristically, that strong formal institutions are important to fertility outcomes across different culture groups. Their influence is, however, stronger in relation to the cultural value of female virginity than it is to the cultural emphasis on early marriage. It suggests that the strength of formal institutions may not be large enough to mitigate the negative impact of the early marriage culture. It also worth noting that the measure of formal institutions used in analysing fertility outcomes are simply a proxy for formal institutions in general and do not bear specific relevance to the outcomes themselves.

The fourth chapter is an exploratory analysis of the relationship between culture and completed fertility among descendants of immigrants in the United Kingdom. The question addressed in the chapter is whether the fertility norms from a country of ancestry are important to the fertility behaviour of second-generation immigrant women in the UK. Existing research argues that culture is portable and persistent, it is also transmissible across generations (Bisin and Verdier, 2011). But testing for the effect of culture on the fertility of

immigrants could be problematic for several reasons among which are selection into migration, and disruptions to family formation due to migration. The common approach to addressing this problem in the literature has been to study the fertility of descendants of immigrants because their fertility patterns are less likely to be affected by the disruptive forces of migration. This is the strategy adopted in this final chapter. Following Fernandez and Fogli (2006, 2009) the completed fertility of second-generation immigrant women in the UK is examined, using the total fertility rates (TFRs) of their parents' country-of-origin as a proxy for culture. With a sample of women between the of ages 35 to 64, who were born and raised in the UK with at least one parent born outside the UK, I show that the TFR from a country of ancestry has an important positive effect on the completed fertility of second-generation immigrants. Women from high fertility countries have a higher completed fertility than women from low fertility countries. This effect is robust to the inclusion of various individual and parental characteristics including the number of siblings, whether a woman continued her education beyond her sixteenth birthday, and parental economic status when the woman was 14 years old. It is also robust to an extended sample which includes individuals who migrated before their 16^{th} birthday.

This dissertation contributes to the literature in several ways. Firstly, Chapter 2 adds to the broad literature on culture as a determinant of economic and social outcomes in developing and developed countries (Fernandez, 2011). Previous research looks almost exclusively at the outcomes of immigrants in developed countries. This chapter is one of the few studies to investigate culture's influence on female labour market outcomes in developing countries. It is also one of the first to distinguish the influence of culture from that of informal constraints and uses an interaction framework to highlight the importance of high-quality formal institutions in regulating the impact of cultural values and beliefs in

developing societies. Overall, chapter makes a specific contribution to the research on the impact of kinship systems on social and economic behaviour (Brule & Gaikwad, 2017; Lowes, 2016; Robinson & Gottlieb, 2019). It also adds to the research on the influence of historical lineage/ways of life on modern economic, social, and political statuses of people in different parts of the world (Eneyew & Mengistu, 2013; Michalopoulos, Putterman, & Weil, 2016).

Chapter 3 contributes to the literature on culture and fertility by showing that ethnic-based marriage norms exert an important influence on the onset of fertility and the frequency of births. It is one of the first papers to use a combination of historical and contemporary data to estimate the relationship between restrictive versus permissive marriage norms on the onset of motherhood and the quantum of births in African countries. It also makes an important addition to the research on the evolution of current gender norms from pre-industrial social and economic conditions (Alesina, Guiliano and Nunn, 2011, 2013).

Lastly, the fourth chapter is a contribution to the now expanding literature on the fertility outcomes of immigrants and their descendants in developed countries. Following existing studies, such as Fernandez and Fogli (2006, 2009), Stichnoth and Yeter (2013), among others, it applies the 'epidemiological approach' as a means of identifying variation in the fertility outcomes of women from different ethnic and cultural backgrounds within the same institutional settings. While the paper follows the methodology in Fernandez and Fogli (2009) closely, it differs in several ways. It is based on data from the United Kingdom as against the United States' data used in studies by these authors and, therefore, the ethnic groups studied differ systematically from those in the United States. Secondly, the composition of immigrant groups in the UK are very different from those in the U.S. While

the women studied in this research are predominantly from high fertility countries of Southeast Asia, Africa and the Caribbean, the women in U.S. studies are mainly from European countries, most of which are low fertility countries.

The findings in this dissertation have important policy implications. Firstly, there is need for policies aimed at changing the health and economic status of women whether in developing or developed countries, to be culturally sensitive. The strength of cultural ties can impact the degree to which immigrants respond to institutional incentives towards changing their life choices, whether regarding fertility or participating in the labour force. Secondly, the research findings are especially relevant for development programming in Africa. They highlight the need for strong formal institutions (e.g., better property rights, access to physical and financial capital, etc.) that support greater female autonomy and offset the negative effects of cultural preferences and beliefs.

Chapter Two

2.0 Cultural Norms, Descent Rules and Female Labour Force Participation in sub-Saharan Africa

2.1. Introduction

There are considerable differences in the economic wellbeing of societies around the world, part of which can be attributed to the varying perceptions about what is, or is not, an acceptable role for men and women. Essentially, different social attitudes are associated with people of different countries with these attitudinal variations showing up in their economic choices and outcomes (Fernández, 2011). A key area where substantial variations exist, making it an issue of continued concern for development economists, is the participation of women in the labour market. There is a consensus that having access to a source of income is key to improving the living standards of women and children in developing countries because women bear the greater burden of childcare and household management (Klugman & Tyson, 2016). Consequently, creating economic opportunities for women and promoting greater gender equality in employment has been on the global development agenda. The International Labour Organization's (ILO) world employment and social outlook: "Trends for Women 2018", documents improvements in the situation of women in the world of work and in gender equality over the last two decades. This indicates the growing awareness by individuals and corporate organizations that gender equality is pivotal to poverty reduction and rapid economic development. However, that female labour market activities remain disturbingly low particularly in middle- and low-income countries

despite improvements in education, intense urbanization, and falling fertility rates is a rather puzzling situation.

Evaluations of labour market decisions based on the classical economic assumption of self-interested rational behaviour have been unable to completely explain current trends in female labour force participation in developing countries. This limitation, as Daly (2000) argues, stems from the complexity of factors that determine women's labour market decisions which, it is maintained, extend beyond individual choice to include an array of societal relationships. The recognition of social factors as relevant to an individual's economic behaviour has had a sluggish start in economics due, understandably, to problems of quantitative measurement. Nevertheless, the increasing interplay of behavioural economics and social psychology has meant that more and more research in development economics is looking to capture the effect of social interactions on an individual agent's economic decisions. Social structures, such as families, religious groups, schools, ethnicities, etc., are deemed to give rise to a body of shared knowledge, understanding, and practices which are transmitted across generations (Fernandez & Fogli, 2009; Fernández, 2011). The set of norms, beliefs and preferences governing the behaviour of a group of people, regarded here as culture, varies a great deal across societies. Thus, we may find people in societies with very similar environments having different social and economic outcomes because they make choices based on their personal preferences and beliefs.

The place of culture as a determinant of economic behaviour is no longer in doubt in the literature. The key questions for this paper, therefore, are: to what extent does culture affect the labour market outcomes of women in sub-Saharan Africa; and how does the interplay between culture and formal institutions affect the labour market dynamics of

women in this sub-region? I specifically test for culture's effect on labour force participation in general, and specifically on the potential of being paid for one's labour, and whether a woman is self-employed. The analysis is for women between the ages of 15 and 49 years.

Previous studies provide empirical evidence of the effect of culture on female labour force participation. They include the higher likelihood of men whose mothers were in paid employment to have working wives themselves (Fernández, Fogli, & Olivetti, 2004), and the differential rate of labour force participation of second-generation immigrant women in the United States of America and Europe based on the rate of female labour force participation in their parents' country of origin (Farre & Vella, 2013; Fernandez & Fogli, 2009). Other papers examined the effect of culture on the number of female parliamentary seats (Hansen, Jensen, & Skovsgaard, 2015), and the persistence of gendered division of labour (Alesina, Giuliano, & Nunn, 2013). But an important dimension that is overlooked in the literature is the separation of cultural beliefs and preferences from informal institutions – which we define as the constraints on behaviour imposed by social pressure.

It is important, for our purposes, to differentiate between culture and informal institutions. Despite the overlap in their connotations, which explains why they are often treated as the same (for example in Hansen, Jensen and Skovsgaard (2015); or Alesina and Guiliano, (2015)), there are subtle differences between these concepts with underlying implications for human behaviour. People are sometimes assigned to social categories by society (e.g., the caste system in India, see Bidner and Eswaran (2015); Deshpande (2010)) with prescriptions for behaviour which, for fear of sanctions, individuals adhere to and willingly give up their personal preferences. The identity theory of Akelof and Kranton (2000) provides an insight on the ways by which social categorizations can give rise to a type of

externality where an individual's actions can be regulated by the actions and expectations of others. Moreover, the effect of a given culture is usually amplified by communal practice and if very few members of a community are part of a culture that promotes, say the independence of women, its overall influence will be dampened (Robinson & Gottlieb, 2019).

To address the research questions, I examine the cultural norms of descent systems (or kinship types) and historical modes of settlement in a large set of countries in Sub-Saharan Africa, using a framework that enables the separation of culture from informal institutions, known in the literature as the 'epidemiological approach' (Fernandez, 2007; Fernández, 2011). I combine individual-level data for over 200,000 women from the Demographic and Health Surveys (DHS) and Afro-barometer with data from Murdock's (1967a) Ethnographic Atlas (EA). Murdock's EA holds ethnographic and historical information on 1,267 ethnic groups around the world. This enables the matching of women from the DHS with their descent types, i.e., whether they were of the matrilineal, patrilineal or a mixed descent system. Individuals are also matched with the respective settlement patterns of their ancestors: whether they had sedentary or nomadic lifestyles. As a result of the local variations in the rules of descent, the differences in historical modes of settlement, and the coexistence of people from different cultural contexts in a common urban locality, I can isolate the effect of cultural norms from the influence of informal rules/constraints that could potentially confound the results.

Overall, I find that the cultural differences in the descent systems and modes of settlement significantly impact the labour market outcomes of the women studied. Specifically, the matrilineal culture gives women a higher probability of participating in the labour force than

the patrilineal culture. Also, the nomadic system has a highly significant negative effect on women's labour market outcomes compared to the sedentary pattern of settlement. The results support findings by Lowes (2016) and Brule and Gaikwad (2017) of a positive effect of matrilineality on women's performance in household bargaining and political participation. The findings for the nomadic culture also corroborate the evidence provided by Michalopoulos, Putterman and Weil, (2016) and Alesina, Brioschi and La Ferrara (2016) of the relative economic disadvantage of nomadic groups generally and a double disadvantage for women of nomadic ancestry in developing countries.

The relationship between culture and formal institutions is shown to have serious implications for economic development (Guiso, Sapienza, & Zingales, 2006; 2008). So, to test for the resilience of culture in an environment with strong formal institutions, I construct a measure of the quality of formal institutions using Afro-barometer's survey of people's opinions and perceptions regarding formal institutions in their countries. Interacting this variable with the cultural proxies helps in highlighting the changes in women's outcomes at different levels of strength of formal institutions. In general, labour market outcomes improve with a high quality of formal institutions. The interaction of the matrilineal culture with a measure of formal institutions, for example, results in a higher probability of labour force participation for women than the main effect without interactions. Remarkably also, the interaction between the nomadic culture and the measure of formal institutions greatly improves labour market outcomes for nomadic women. specifically, higher levels of formal institutions, representing better regulatory and legal environments, raises the labour market potentials for nomadic women by about 86 percent.

This chapter contributes to the broader literature on culture as a determinant of economic behaviour (Akyeampong & Fofack, 2013; Fernández, 2008; 2011; O'Boyle, 2016; Polavieja, 2015). Several papers have examined culture's effect on gendered outcomes such as female labour force participation and entrepreneurship. A common approach has been to link contemporary outcomes of immigrants in developed countries to economic characteristics in their countries of ancestry. Fernandez and Fogli (2009) and Fernandez (2007), for example, show that the work and fertility outcomes of second-generation immigrant women in the U.S. and Europe are positively correlated with the fertility and employment rates of their countries of ancestry for the years reflecting when their parents were born. This positive relationship is attributed to the persistence of cultural traits showing up in their preferences regarding work and family life.

On their part, Alesina, Giuliano and Nunn (2013) present evidence of culture's influence on female labour force participation and entrepreneurship using traditional agricultural technology as a measure of culture. They argue that the adoption of plough agriculture, as against shifting cultivation, led to a historical division of labour along gender lines, with men working in the fields while women managed the homes. The resultant norms from the gendered division of labour have persisted over time and explain current low levels of female participation in the labour force and political activities. Finseraas and Kotsadam (2017) compare the outcomes of different sex, second-generation immigrant siblings in Norway. They find a robust effect of ancestry culture on female labour force participation, using the female labour force participation rates in the parents' country of ancestry as a proxy for culture. However, using country-level variables as a cultural representation is fraught with measurement issues and can make capturing the effect of culture less precise. I contribute to this literature by assembling an original data set that matches the ethnicities

of women in the DHS with Afro-barometer and Murdock's Ethnographic Atlas to assign to each woman her corresponding formal institutional attribute and her descent system or ancestral pattern of settlement. Thus, I use a more precise measure of culture which is based on individual attributes to examine the influence of each historical characteristic on the current labour market outcomes of women in African societies.

The chapter also contributes to the literature that assesses the effect of cultural norms within kinship/descent systems on economic and social behaviour. With specific reference to the cultural practice of matrilineal descent where kinship is traced through the mother's kin group, and patrilineal descent where children belong to their fathers' kin group. Several papers have presented empirical evidence showing the positive effect of matrilineality on gender equality through its contribution to greater economic and social autonomy for women. Their findings reveal that the matrilineal system is associated with a lower gender gap in household bargaining (Lowes, 2016); competition (Lowes, 2018); risk aversion (Gong and Yang, 2012) and political participation (Robinson and Gottlieb, 2018; Brule and Gaikwad, 2018). The current paper is, to the best of my knowledge, the first to systematically examine the effect of descent systems (i.e., matrilineality versus patrilineality) on female labour market outcomes for countries in sub-Saharan Africa.

Finally, the current research also speaks to the strand of literature on the gendered effects of the nomadic culture. Michaloupolus, Putterman and Weil, (2016) find a negative effect of a historically nomadic lifestyle on the education and wealth statuses of the descendants of nomadic pastoralists in general. But an early anthropological study with specific focus on women's status is Fazel (1977) whose work on Middle Eastern nomads (The Boyr Ahmad of Iran) showcases the level of influence that nomadic pastoralist women historically wielded

in the domestic economy, charged with of the management and control of goods and resources. This contrasts strikingly with recent studies on nomadic societies (Bailey, 2012; Eneyew & Mengistu, 2013; Kipuri & Ridgewell, 2008) that document significantly negative social and economic outcomes for the women. Bailey (2012), for example, discusses the complexity of the daily lives of nomadic women, specifically among the Maasai of Kenya. The author highlights the value of these women as home builders who were saddled with the extensive responsibility of caring for children while also herding, monitoring, and managing livestock diseases. This is corroborated by Eneyew and Mengistu (2013) for groups in Ethiopia, who argue that nomadic women suffer a double marginalization – with little to no decision-making powers despite the huge burden of tasks and responsibilities they inevitably bear. These studies give insight into the economic, social, and political lives of nomadic pastoralists but, for the most part, the inherent economic disadvantage of women within these groups has been under-researched. The current research, therefore, contributes to the literature by investigating the economic impact of the nomadic culture on female labour force participation, paid employment, and entrepreneurship. It is one of the first, so far as I know, to examine the role of nomadic ancestry on the female labour market outcomes of modern populations in sub-Saharan Africa.

The rest of the paper is organized as follows. In Section 2.2, the general background of the paper is discussed, while paying specific attention to the trends in female labour force participation in African societies. It highlights the challenges that African women face in the bid to balance their productive and reproductive responsibilities in the context of different kinship and family structures. It also gives an overview of the factors identified in the literature as explanations for variations in female labour force participation. Section 2.3 gives the conceptual framework and provides clear working definitions for the concepts of

culture, formal and informal institutions. This is followed by a detailed description of the epidemiological approach. Details of the data sources, variables, and descriptive statistics can be found in Section 2.4 while the estimation technique including the identification strategy and econometric models are given in Section 2.5. Section 2.6 presents the main results as well as the interaction estimates while Section 2.7 discusses the research findings. Lastly, Section 2.8 concludes the paper.

2.2 Background/Contextual Framework

2.2.1 Female Labour Force Participation: Trend and History in Africa

The contributions of female labour supply to economic growth, one can argue, ceases to be debatable given research findings in support of its positive impact in developed and emerging economies. There is evidence that the increasing ratio of women in the labour force is beneficial to development especially in terms of poverty reduction, fertility declines and the spread of reproductive rights, and household redistribution of rights and responsibilities (Elder & Smith, 2010). Consequently, a growing number of countries have taken advantage of the productive potential of women to raise their capacity for development, resulting in the rise in female labour force participation (FLFP henceforth) from 50.2 percent in 1980 to 51.7 percent in 2008, according to the ILO cited in Elder & Smith (2010). However, recent ILO statistics also show that the global FLFP rate (for the 15+ age group) has been on a steady decline despite the significant economic growth in developing and emerging regions, falling from 50.9 percent in 2000 to 48.0 percent in 2018 (ILOSTATS, 2019). Within sub-Saharan Africa the FLFP rate has hovered around 63 percent for nearly two decades, dropping slightly from 63.4 percent in 2000 to 63.0 percent in 2018.

There are huge disparities, nonetheless, between low-income and upper-middle income countries in the sub-region where, for example, it was 68.7 percent for low-income countries in 2018 and 49.5 percent for upper-middle income countries in the same year.

Evidently, the rate of growth of FLFP rates both globally and in the sub-Saharan African (SSA) region lags the growth in female educational attainment and declining fertility rates, though the decline in fertility is slower in sub-Saharan Africa (World Bank, WDI 2019). In the league of developing countries, though, SSA's FLFP rate in 2018, for example, was higher than the rates in the Middle East and North African countries, in South Asia, and in Latin America and the Caribbean. It was exceeded only by the rates in East Asia and the Pacific where the FLFP rate was 67.5 percent (WDI, 2019). The higher rate of participation in the labour force by women in Sub-Saharan Africa, relative to other developing regions, has been traced to historical predispositions of African societies towards women's work and the important role women played, and continue to play, in food production or subsistence farming. It also points to the fact that agriculture is still the mainstay of most African economies, employing nearly 60 percent of the labour force of which 55 percent is female (WDI 2019).

The historical dimension of women's participation in market activities is extensively explored in the literature (Akyeampong & Fofack, 2012; 2013; Boserup, 1989; Giuliano, 2017), portraying how current gender role differences are an offshoot of the characteristics of early agricultural production within different regions of the world, and how the structural changes induced by colonial rule helped to entrench gender inequality in Africa's economic life. Hansen, Jensen and Skovsgaard (2015), for example, hypothesize that long histories of agriculture and the consequent development of patriarchal values and beliefs can explain

current gender inequalities in tasks. They argue that the Neolithic Revolution i.e., the prehistoric transition from hunter-gatherer to agricultural societies led to a division of labour in the household where men became sole producers of food and women were carers and home-keepers. The division of tasks, however, depended on the agricultural technology adopted and whether a society cultivated cereal or root crops. While cereal cultivation required the use of the plough that was suitable only to male labour, societies which cultivated root crops relied on hoes and diggers, a labour-intensive production process that depended on women's labour in the farms. With the aid of data from African countries they provide empirical evidence of less gender inequality in societies whose soil composition were more suitable for the cultivation of root crops compared to societies where cereal cultivation was practiced, corroborating findings by Alesina, Giuliano and Nunn (2013) and Demie (2018).

Essentially, African women have always been economically active even though their labour inputs have not always been formally recognized. Akeampong and Fofack (2012) re-echo Boserup's (1970, edited 1989) thoughts on the high premium that pre-colonial African societies placed on women especially for their role in production and procreation. Women had the complete responsibility for subsistence farming to feed the household while also providing labour for the tree crops of the men. But over time, and despite increasing urbanization and economic transformation in sub-Saharan Africa, the participation of women in the labour market became stagnant or declined steadily, which is rather puzzling. The next section highlights some of the factors identified in the literature as influencing female labour supply in various societies.

2.2.2 Determinants of Female Labour Supply

Research on the dynamics of female labour market activities is large and growing still, suggesting a host of factors as explanations for the considerably low levels of FLFP rates. This is despite the increasingly favourable economic conditions and the substantial growth in the educational attainment and human capital development of women around the world. The explanations for current trends in global FLFP rates can be summarized under three themes: structural change, institutional environment, and cultural influences. A brief overview of these themes follows in the sections below without any intention of an in-depth discussion of the theoretical and empirical arguments in the literature.

i. The Structural Change Explanation

The structural change hypothesis is one of the earliest explanations provided for variations in female labour force participation. Attributed in the literature to the works of Sinha (1965), Boserup (1970), and Durand (1975), it proposes a unique structure to the relationship between female labour market choices and economic development. This is the so-called 'Feminization U hypothesis' that speaks of a U-shaped relationship between female labour force participation and the level of economic development.

The Feminization U-theory, expounded in Goldin (1994) and Luci (2009), posits that female employment is fundamentally high when economic development is low. This is typical of a low-income agrarian economy where women can combine their relatively small-scale agricultural activities with some market production from their home workshops. This production set-up also accommodates women's child-rearing responsibilities. As the level of productivity rises and the economy becomes richer, thanks to high industrial and service-based production, female labour force participation rates mostly fall. This results from the

low levels of female education and from women lacking the skills set necessary for engaging with the new structure of the economy. Female employment would later rise with higher levels of economic development when service sector jobs, which are considered fit for women, become readily available and women's education and skills expand to fit such jobs.

The relevance of the U-shaped theory in explaining the dynamics of female labour market participation across countries has been examined with mixed outcomes (see Klasen et al. (2019) for an excellent review of this literature). Evidence of a convex relationship between female labour force participation rates and economic development can typically be found in early studies such as Psacharopoulos and Tzannatos (1989), Goldin (1994), Cagatay and Ozler (1995), and Clark, York, and Anker (2003), using cross-sectional, country-level data for older men and women; and Mammen and Paxson (2000), Luci (2009), and Tam (2011) using multi-country panel data sets. The plausibility of these results has been questioned and regarded as not depicting the true relationship between FLFP and economic development in a variety of contexts. Part of the shortcomings of cross-sectional studies, Klasen et al. (2019) point out, is their implicit assumption that differences in FLFP across countries are a function of the different stages of development rather than different initial conditions. Other findings from panel data estimations are faulted for a lack of sensitivity analysis as well as for their use of outdated versions of ILO's FLFP and GDP data.

To remedy the inherent deficiencies in the data and estimation techniques identified above, Gaddis and Klassen (2014) employed different versions of labour and income data to test the U-shape hypothesis. Applying advanced panel models to help them resolve the endogeneity problem of the GDP data, they showed that empirical support for the U-shape hypothesis depends on the data used, especially the versions of the ILO data on FLFP.

Where the relationship is supported, they argued, this support is shallow and cannot explain a large part of the differences in levels and trends of FLFP across countries. The initial conditions, factor endowments, and historical contingencies of a country were identified as important determinants of female labour force participation. But despite the potentials of the structural change argument, it still does not provide ample explanation for the variations and trends in female labour force participation in Africa even as countries on the continent experience varying degrees of economic growth and rising levels of female education.

ii. State Intervention/Institutional Explanation

The institutional argument is fronted by studies which focus on the positive impact of state interventions on female employment. The research (Gornick, Meyers, & Ross, 1997; 1998; Kremer, 2007; Mandel & Semyonov, 2005), is built on Esping-Anderson's (1990) 'welfare states regimes', depicting the state's role in promoting female labour force participation as two-fold: (i) as an employer providing women-friendly jobs such as service sector jobs, health and social care jobs; and (ii) as an implementer of family-enhancing policies that include the provision of paid maternity and paternity leaves, and publicly funded child benefits, among other things. These resources are aimed at attracting and keeping women in the labour market by enhancing their ability to combine work with family responsibilities (Daly, 2000; Mandel & Semyonov, 2005). Similar institutional arrangements identified as affecting women's probability of being in the labour force include the availability of part-time work (Del Boca, Pasqua, & Pronzato, 2008), favourable tax regimes (Fuchs-Schündeln & Bick, 2014; Schwarz, 2012), child-care services and job protection legislation (Boeckmann, Misra, & Budig, 2015; Pettit & Hook, 2005).

Research on the effect of welfare state policies point to significant cross-national variations in female labour force participation that can be identified with the type of welfare state regime in place. States where women and mothers receive generous benefits have high female employment rates than less generous states (Pettit and Hook, 2005). Cross-country analyses constitute the strategies of most of the studies cited above, making it somewhat difficult to determine whether the variations in female employment rates were due to dis-similar institutions among countries or they were from other country-specific factors. Other research examining the role of the welfare state, however, asks if it could be limiting rather than promoting women's occupational achievements. Mandel and Semyonov (2005) argue that, though the welfare state facilitates women's increased labour market presence, it has unintended side effects of limiting their ability to occupy top-level, managerial positions. Thus, the provision of family-friendly services and jobs that typically employ women - features of welfare states - reinforces already existing gendered division of labour and limits their occupational achievements.

In seeking an explanation for the observed variations in the FLFP and also provide answers to questions on whether welfare states actually help or hinder women's occupational progress, existing research has examined specific types of family policies (Dieckhoff, Gash, & Steiber, 2015; Korpi, Ferrarini, & Englund, 2013; Misra, Budig, & Boeckmann, 2011). Misra, Budig and Boeckmann (2011), for example, explore how work-family policies, especially childcare provision, affect the employment choices of women with varying degrees of responsibility for children. They find cross-country differences in the impact of number of children on women's working hours. While the number of children had no effect on the wages and employment hours of women in a few countries, significant differences appeared between women without children and women with varying numbers of children. Their

results, like findings in Korpi et al. (2013), suggest paying attention to how specific family policies interact with the conditions of women in different contexts, such as socioeconomic class or levels of education. This, the authors argue, will give a better understanding of the impact of work-family policies on women's work and wages.

The analysis of institutional support for female labour supply is done mostly for countries in Europe and North America where there are no data limitations. Research for developing countries is scanty and mainly covers Latin America (Barros, Olinto, Lunde, & Carvalho, 2011) and India (Nandi, Maloney, Agarwal, Chandrashekar, & Harper, 2016), but virtually non-existent for African countries. Nandi et al.'s (2016) work evaluates the impact of affordable child-care provision on women's economic status and empowerment, and on the health and nutritional outcomes of children. Their study highlights the limited availability of day-care services in low- and middle-income countries, pointing out that the availability of such services would relieve women of their dual responsibilities of child rearing and intensive domestic work. Affordable and reliable childcare services, the authors argue, is a policy thrust that could potentially increase the participation of women in the labour market and improve their economic and health statuses.

A close argument for developing countries include Gonzalez et al. (2015) and Heath and Jayachandran (2017), which look at the legal and institutional restrictions on women's economic and social activities. Such restrictions include limits on access to formal institutions, owning and managing property, restrictions on women's work such as working at night or working in certain industries, access to credit, and taking legal action. Though these gender-based restrictions have been relaxed in most countries over the years, they remain quite high in sub-Saharan Africa as well as in the countries of South Asia and the

Middle East and North Africa (MENA). Improving women's economic prospects would require significant policy commitments by governments in these regions to reforming the legal and institutional structures which constrain female labour force participation. This is vital for achieving equality in social and economic opportunities in such societies. Nonetheless, the 'welfare state' explanation for variations in female labour force participation appears weak in explaining conditions in African countries probably due to the failure of many African states to function as employer and provider of family-friendly policies. Overall, there is very little evidence on how institutional support has affected female labour force participation in Africa.

iii. Cultural Influence

A key limitation of the institutional explanation of the variations, and stagnations, in female labour force participation, as identified by Pfau-Effinger (2012), is its failure to account for differences in the gender culture within the countries studied. Indicatively, a vibrant, cross-disciplinary body of research has been studying the role of cultural dispositions on social and economic behaviour, although the underlying theoretical framework required for studying culture in economics is still nascent (Guiso et al., 2006). The fundamental idea behind the consideration of culture as a determinant of female labour supply is that shared beliefs and ways of thinking affect women's attitudes toward labour market activities (Clark, Roger D., Ramsbey, & Adler, 1991). Some of the oft cited writings behind this idea are Becker (1996) and Hakim (2000, 2002).

To underscore the argument that the institutional approach alone does not fully explain cross-national variations in female labour force participation, Pfau-Effinger (2012) examines the labour market behaviour of women with children below the age of three years from six

European countries. Comparing countries from different regions of Europe that practice different types of welfare states, the paper presents descriptive evidence of women's employment behaviour that were contradictory to the objectives of the family policies in place in these societies. By interacting family policies with three different socially accepted family models, viz: the male breadwinner/female part-time care model; the dual breadwinner/external care model (with the state or the market providing care); and the dual breadwinner model with childcare in the extended family, the employment outcomes of women with young children were shown to differ according to the specific context of the societies they belonged to. Thus, despite having similar institutional arrangements women from different societies had different preferences for the labour market despite similarities in family policies. This ties in with Hakim's (2000) premise that women's decisions about work depended on their preferences and that different groups of women prioritise work and family issues differently. A drawback of Pfau-Effinger's (2012) work is, obviously, its qualitative nature and its focus on European societies with well-developed institutional arrangements. Also, the construction of the family models was too ambiguous to lend itself to a quantitative analysis that could improve its external validity and/or replication in a developing country context.

In justifying the consideration of cultural factors as important in economics, O'Boyle (2016) points to the influence of culture on work, consumption, and leisure decisions. The author argues that humans are more than the one-dimensional, self-interested beings living in a self-regulating economy that mainstream economics portrays them to be, but that people are two-dimensional beings with attributes that depict their individual and social inclinations. This dual nature manifests as observable variations in economic outcomes which are traceable to differences in circumstances such as, for example, the differences in

work behaviour that is due to a person's family type, or differences in consumption that is influenced by ethnicity, or differences in attitudes towards leisure dictated by religion or nationality. To buttress this line of thought, Guiso, Sapienza and Zingales (2006) review some contexts in which the impact of culture in economics has been explored. They highlight that majorly, the empirical studies on culture as a factor in economic behaviour is immediately faced with the problem of endogeneity and reverse causality, arguing that this drawback can be minimised if the definition of culture is explicitly restricted to those dimensions of culture that remain largely invariant over time. Culture's influence on economic outcomes is said to pass through prior beliefs, preferences and values which subsequently play out in people's decisions regarding economic exchange, entrepreneurship, and political participation. The next section, therefore, briefly discusses extant work on culture and female labour force participation.

2.2.3 Cultural Norms and Female Labour Market Behaviour

Existing empirical evidence points to the significance of culture's influence on social and economic exchanges at the micro- and macro-levels of the economy. From a macroeconomic perspective, Borck (2014) explores how culture influences childcare provision, fertility levels, female labour supply and the gender gap among the Organisation for Economic Co-operation and Development (OECD) countries. The analysis theoretically interacts cultural attitudes, the provision of childcare, fertility, and female labour supply and, through calibration, produced results to show that childcare usage, fertility rates, female labour force participation, and the gender wage gap vary with specific characteristics of different societies. Societies that were more accommodating of working mothers or the idea of having external childcare tended to provide more childcare which, though raising

fertility rates, also increased women's labour supply and lowered the gender wage gap. This conclusion places a society's cultural values at the centre of any policy proposal that touches women's work and family decisions. Complementarily, a greater part of the literature expounds the micro-level effects of culture by looking at the expressions of individual preferences for different social, political, and economic activities.

The fascination with culture in economics seems to come from its tendency to stay unchanged through diverse economic transformations. There is a possibility, though, that some dimensions of culture, like religious ideologies or language, could subtly change over a long enough period due to the influence of cross-national migrations. Extant literature identifies several factors that potentially explain the persistence of cultural influence much of which are regarded as historical forms of social structures and exogenous shocks. These historical factors have ranged from agricultural technology (Alesina et al., 2013); language (Gay, Santacreu-Vasut, & Shoham, 2013); geography (Carranza, 2014); pre-industrial societal characteristics (Gneezy, Leonard, & List, 2009; Gottlieb & Robinson, 2016; Hoffman, Gneezy, & List, 2011); family structures (Alesina & Giuliano, 2014; Moscona, Nunn, & Robinson, 2018; Tur-Prats, 2015); religion (Guiso, Sapienza, & Zingales, 2003); to historical shocks like the slave trade (Dalton & Leung, 2014; Grosjean & Khattar, 2017; Teso, 2018).

As an example, Alesina, Giuliano and Nunn (2013) implement a test of Ester Boserup's (1970) hypothesis that the differences in gender roles today are rooted in the agricultural technology that existed historically in various societies. Boserup distinguished between shifting cultivation and plough cultivation: shifting cultivation was done with hand-held tools and, therefore, was labour-intensive while plough cultivation was capital-intensive and required physical strength to operate. Boserup argued that the resultant traditional division

of labour shaped the formation of gender roles and norms which have been passed down through generations. Combining ethnographic data on traditional plough use with contemporary information on gender attitudes and female non-domestic activities for second-generation immigrants in the United States, Alesina et al. (2013) conclude that current differences in gender attitudes and female behaviour have been shaped by historical differences in agricultural systems. Specifically, that individuals, ethnicities, and countries whose ancestors used the plough have beliefs that exhibit greater gender inequality today and, therefore, have lower rates of female participation in non-domestic activities including market employment, entrepreneurship, and politics. These studies highlight the value of social structures in moulding cultural beliefs and preferences, an aspect to which we now turn.

i. Descent/Kinship Systems and Cultural Norms

As earlier mentioned, several factors contribute to the persistence of cultural influence on outcomes. One such factor is the social organization of kinship or family systems. The strength of family ties is shown to matter in the determination of economic and political preferences and the outcomes that flow from such preferences. In Alesina and Giuliano's (2010; 2011) opinion, the influence of the family is portrayed in its organization, for example, where the woman works mainly at home while her husband works outside the home. This arrangement, they maintain, comes primarily from beliefs about gender roles internalized from childhood. The parent-child relationship plays a key role in the transmission of values and beliefs across generations and there is empirical evidence to show the inter-generational correlation in gender role attitudes. These attitudes have had significant impact on the level of home production, family size, women's labour supply, and

the willingness of young people to migrate from home for education or work (Alesina & Giuliano, 2010; Farre & Vella, 2013).

The relevance of the family unit in the formation of attitudes and values is universal although its organization and influence differ markedly across nationalities. In the African context, the family exerts substantial influence on the preferences and behaviour of its members mostly because of its broad nature that goes beyond the nuclear to the extended family. The extended family, or kin group, is a very important social network in Africa not only because it provides various forms of social and economic insurance but also because it is a formidable source of protection against external threats to the existence of its members (Cox & Fafchamps, 2007). Therefore, the kinship or descent system plays an important role in the intergenerational transmission of cultural attitudes and practices making it an appropriate measure of the influence of culture on economic outcomes. The ability to measure the effect of culture by studying kinship groups is made possible by the exogenous nature of kin membership and the existence of norms and practices to which members adhere and by which their actions are constrained (La Ferrara, 2007).

ii. Matrilineal versus Patrilineal Descent Systems

Traditionally, kinship systems in Africa, and indeed all parts of the world, have distinct identities. There are two main forms of kinship: the patrilineal kinship system and the matrilineal kinship system, though a few groups with mixed descent also exist. These distinct forms of social organization and rules of descent exist side by side in most African countries and have unique implications for individual preferences regarding social interactions, economic activities, and personal development. The patrilineal kinship system traces a person's lineage through the father's kin group such that inheritance rights can only

be passed from the father to his male children. Daughters do not share inheritance rights and, at marriage, are completely integrated into their husbands' larger families. By contrast, the matrilineal kinship system traces the lineage of children through the mother's kin group and inheritance rights go to the woman's daughters. In this system, children belong to their mothers and a man's inheritance are bequeathed to his sister's children (Lowes 2017; La Ferrara 2007).

The sociology literature provides insight on the potential ways through which descent systems could influence women's preferences. There are very distinct institutional and social structures that govern marriage, succession, inheritance and wealth, and very different roles for men and women in the kin groups. Typically, matrilineal men occupy the positions of authority in the household as well as in public institutions but, unlike in the patrilineal system, men have less control over their wives whose access to inheritance and wealth, as well as their continued allegiance to their kin group, guarantees their exit options in the event of a failed marriage (Richards, 1950; Robinson & Gottlieb, 2019). Matrilineal women also have the important responsibility of socializing children to ensure a proper socialization to the kin group and the development of primary ties of loyalty (Brule & Gaikwad, 2017; Schneider, D. M. & Gough, 1961). In the patrilineal system, which is evidently male-oriented and patriarchal, men are the socially accepted decision makers and women are expected to be seen but not heard. Men have exclusive ownership and control of economic resources while women are expected to depend solely on their husbands for provision and protection from external threats. In many developing societies women, especially married women, have considerably less personal autonomy and men make decisions regarding their wives' market choices and the use of their income (Jayachandran, 2019; Kandiyoti, 1988). These distinct social arrangements imply very different cultural

attitudes and expectations about the role of women in matrilineal and patrilineal societies which feed into women's beliefs and preferences for labour market participation.

iii. Evidence of the Matrilineal Effect

The need to understand the effect of kinship structures and descent rules on gendered outcomes is gaining momentum as can be seen from the increasing level of cross-disciplinary research interests and the different kinds of data in use, which range from experimental data, survey-based data to cross-national data (Gneezy et al., 2009; La Ferrara, 2007; 2016; Lowes, 2017). Lowes (2016), for instance, is an experimental study in the Democratic Republic of Congo (DRC) within the region commonly referred to as the "matrilineal belt" in Southern Africa. It explores the relationship between gender norms of matrilineal kinship systems and household bargaining, testing the hypothesis that the inheritance rights of matrilineal systems provide women with more bargaining power than their counterparts from patrilineal kinship systems. The experiment comprised of 614 matrilineal and patrilineal households from Kanange province in the DRC. The author finds that women from matrilineal households had better bargaining power than women from patrilineal households. They also appeared to face lower threats of domestic violence, have healthier and better educated children, and experienced greater autonomy in household decision making than their patrilineal counterparts.

In a different experiment within the same region Lowes (2017) provides similar empirical evidence of matrilineal kinship advantage for women in spousal co-operation. The availability of outside options for the women made domestic violence unattractive for their husbands and raised the stakes for investment in children. However, the same result could not be obtained in relation to the willingness to compete by matrilineal women relative to

men, signifying a gender gap in competition. In a matching games experiment Lowes (2018) finds a reduction in the gender gap in risk taking within the matrilineal system but no evidence of a smaller gender gap in women's willingness to compete even when compared to women in patrilineal ethnic groups. This contrasts with Gneezy et al. (2009) who find no gender gap in the willingness to compete in the matrilineal society. Their experiment which was conducted among the Maasai in Tanzania – a patrilineal society, and the Khasi in India – a matrilineal society, found patrilineal women to be less competitive than men while matrilineal women were more competitive than matrilineal men. These contradictory results may be due to the small scope and design in each case given the tendency of experimental data to be small, yielding context-specific results that may lack external validity. It no doubt points to the need for more vigorous research using different empirical strategies to explore the sources of variations in outcomes between these distinct descent systems.

Beyond experimental data, the use of survey data should potentially add credence to the existing body of evidence on the importance of descent rules on gender outcomes in Africa. However, there appears to be very few survey-based studies so far, and the available ones look at its impact on access to resources (Gottlieb & Robinson, 2016; Lambrecht, 2016), and human capital accumulation (La Ferrara & Milazzo, 2017). Gottlieb and Robinson (2016), for example, examine how kinship systems affect access to resources along gender lines. They specifically explore the possibility that matrilineal kinship systems could reduce the gender gap in political and civic participation by removing the inequality in access to resources or by altering the norms regarding gender equality, or both. Using a combination of data for 26 sub-Saharan African countries from the Afro-barometer database with ethnicity-level data from Murdock's (1967) Ethnographic Atlas, they compare the political and civic behaviour of

men and women from matrilineal and patrilineal ethnic groups. Estimating a mixed effect model and a difference-in-differences with country fixed-effects technique, they find a positive relationship between matrilineality and a smaller gender gap in political engagement, civic, and political participation. Though causation could not be inferred, the authors think that the smaller gender gap within matrilineal systems could mean that the women participate more in political and civic activities than their counterparts in patrilineal systems. There was, however, little insight on why women from patrilineal systems showed less interest in political or civic activities. Meanwhile, it would be interesting to explore the possible benefits that matrilineal women derive from their increased participation in political and civic activities.

On their part, La Ferrara and Milazzo (2017) exploit a policy experiment in Ghana intended to reform the matrilineal pattern of inheritance to show that descent rules affect the level of investment in children. The policy stipulates a minimum quota of land that parents can bequeath their male children, an action that essentially affects matrilineal households more than patrilineal households. Reason is that patrilineal households already have in existence the inheritance rule that only male children inherit land from their fathers with none for female children. With a simple theoretical framework where parents allocate their resources between investing in a child's education and their own consumption, the matrilineal norm is modelled as an exogenous limit of how much land a child can inherit. This model is used to make predictions about the effect of the law on levels of investment on education within matrilineal households, as well as on how this affects boys relative to girls. A test of the predictions on 5 waves of survey data from the Ghana Living Standards Survey yielded empirical results showing that male children within the Akan, a matrilineal ethnic group, have a lower level of education because of the new law compared to non-

Akan male children. The paper's overall outcome suggests a significant effect of a change in descent norms on the level of parents' investment in children. The paper does well at showing the importance of cultural norms in determining an outcome such as human capital accumulation. It, however, offers little insight regarding the existence of any gender gap in the education of children either within the matrilineal system or between patrilineal versus matrilineal kinship systems.

A useful, though qualitative, study is Lambrecht (2016) on gender attitudes and rules and women's access to land in Ghana which draws attention to the huge gender disparity in this regard. As pointed out in Deere et al. (2013), a female farmer in Ghana is said to own just 9.8 percent of agricultural land compared to 83.1 percent of land that goes to a male farmer. This level of inequality, Lambrecht explains, results from the cultural norms, perceptions and rules about gender roles and responsibilities that are so prevalent in the country and indeed much of Africa. Men are traditionally seen as breadwinners, responsible for providing for the women and children and, therefore, they are prioritized in the allocation of land. Women, however, must receive land for agricultural production from their husbands and have no rights to rent or buy land from outside sources. Ghana is rich in ethnic and religious diversity with households from different kinship backgrounds living side by side. The author exploits this heterogeneous environment to conduct gender-structured interviews and focus-group discussions to elicit information on perceptions about gender roles and cultural rules governing access to land. She finds huge within-group variations in women's access to, and ownership of, land for the matrilineal as well as the patrilineal kinship groups. According to the author, in some regions that are predominantly patrilineal, women have less access to land accompanied with very little decision-making power over land. Yet in other patrilineal regions, women have more rights to land ownership and can

decide on how to use such land. Similar differences appear within the matrilineal system where women from some matrilineal communities have more power relative to men in decision making about land while in other matrilineal regions men have priority in the access and ownership of land.

2.2.4 The Research Gap

To the extent that differences in adherence to descent norms and practices exist in African societies, it is imperative to further investigate, with the aid of a different set of data, the influence of cultural norms on economic behaviour, a task which this chapter sets out to accomplish. A second research gap that this study addresses concerns the influence of the nomadic culture on the contemporary labour market outcomes of women in African countries.

Historically, nomadic pastoralists were a people who relied solely on livestock and were often spatially mobile in search of better grazing land for their livestock (Hudson, 1980). Depending on the season and composition of the household, nomadic families could have multiple homesteads whereby women and young children remain in semi-permanent settlements while the men migrate with their livestock to more fertile grazing areas. Culturally, nomadic societies are largely patriarchal with men having complete control over all economic resources (mainly livestock). Women were regarded as lower in status than men and household labour was divided along strict gender lines. It was the sole responsibility of the female folk to take care of the homestead, care for the children and tend to diseased animals while the male folk take care of the herds. A woman's income would typically come from selling milk collected from some of her husband's animals and her handmade crafts. It is common for a woman to be forced into marriage or given in

marriage at a very young age in order to attract a large bride wealth for her father (Kipuri and Ridgewell, 2008).

Much of the studies on nomadic societies are in the fields of Sociology and Anthropology, while research into the economic consequences of nomadism on women has been scant. One of the few economic papers is Michalopoulus, Putterman and Weil (2016), which explores the effect of a historical lineage on economic status. They studied the economic outcomes of the descendants of sedentary agriculturalists and descendants of nomadic pastoralists in sub-Saharan Africa. They found a significant effect of the historical mode of production (i.e., sedentary versus nomadic) on the measures of education and wealth in contemporary African societies. The descendants of sedentary agriculturalists were found to be more educate and had better economic status than the descendants of nomadic pastoralists.

Michalopoulos and co-authors' suggest a few factors that may contribute to the disparity in the outcomes between nomadic and sedentary cultures, two of which are the differences in attitudes and beliefs, and differential treatment by others. Attitudes and beliefs about women's status in society are shaped by patriarchal norms, resulting in the huge gender disparity in access to resources and a disproportionately heavy burden of household chores on women's shoulders. As a result, there is no incentive for investing in the education and health of female children which may explain their low rate of participation in the labour market. Secondly, people with a nomadic background may be subject to prejudicial treatment by non-nomadic members of the society. Given the traditional structure of nomadic systems, it is possible that women with such backgrounds may lack the work ethics that conventional businesses require and therefore they may be treatment differently by

employers or denied access to financial capital. This would diminish their capacity to engage in income generating activities and further deepen their social and economic disadvantage.

Additionally, Alesina, Briosch and La Ferrara (2016) provide evidence of relative tolerance for domestic violence by women whose ancestors lived in nomadic and isolated settlements. They argue that such tendencies may have persisted because nomadic settlements were often less developed and societal protection for women may have been difficult to maintain. By examining the relationship between a nomadic versus a sedentary ancestry and current female labour market outcomes, this paper makes an important contribution to the existing body of research. It specifically explores the role of formal institutions in relation to the nomadic culture and the impact that their interaction has on the labour market outcomes of women.

2.3 Conceptual Framework

This section aims to provide contextual definitions for culture and related concepts used in this research. This is important because culture, being ubiquitous, is subject to very diverse denotations. Here we distinguish between cultural norms, the informal constraints on women's behaviour brought on by society, and formal institutions, and discuss how each concept is measured. There is also a discussion of the 'epidemiological approach', the key strategy for identifying culture's effect in this study, and how it is used to isolate the effect of culture from that of informal rules.

2.3.1 Definitions: Culture, Formal and Informal Institutions

Conceptually, culture is difficult to define and, so far, there has been no consensus on how it should be defined. This, no doubt, has meant bundling culture together with local institutions (Finseraas & Kotsadam, 2017). Indeed, much of the literature uses both concepts interchangeably (for example Alesina and Guiliano, 2015; Brule and Gaikwad, 2018). Following Fernandez (2011), culture is defined in this paper as the internalized beliefs, attitudes, and preferences acquired by individuals through socialization and transmitted within families. In this sense, culture differs from informal rules of behaviour (or social norms in other contexts). Informal institutions, also known as social norms, extend beyond families to encompass members of the larger community to which people belong. They are unwritten rules (including taboos, customs, and codes of conduct) which govern human behaviour that are adhered to by members of a community in the expectation that others will do the same (Helmke & Levitsky, 2004; Mackie & LeJeune, 2009). Moreover, social pressure is integral to the prevalence of informal rules with their attendant incentives, and individuals expect to be sanctioned or rewarded depending on whether they are compliant to the norms or not. Informal rules are also more amenable to change when people's circumstances change, for example, by migrating out of a local, closely-knit community (Niaz Asadullah & Wahhaj, 2019). Thus, while cultural norms are inherited and long-lasting, informal rules (or social norms) are a product of social interactions and as such they are fast-changing and subject to peer effect (Guiso, Sapienza & Zingales, 2006; Manski 2000).

Formal institutions refer to the statutory laws, constitutions, and regulations that structure economic, social, and political interactions. Economic institutions are especially important

for the protection of property rights, they determine the ease of doing business and shape people's access to assets, employment, and credit (Carter, 2014; Leftwich & Sen, 2010; North, 1991). Cultural beliefs and values invariably influence and shape people's expectations and perceptions of the world. But cultural beliefs can be affected by the formal and informal rules (i.e., the institutions) that have been set up to govern human interactions. In Alesina and Giuliano (2014) the relationship between culture and formal institutions is shown to be one of the mechanisms through which culture determines economic choices. Their interactions produce mutual feedback effects that complement their existence and enhance their co-evolution. Thus, culture can influence and be influenced by institutions and institutions, whether formal or informal, may constrain or enhance the effect of culture depending on the strength of one or the other (Acemoglu & Robinson, 2021).

Previous studies show that culture is portable and persists through time even when initial conditions have changed (Alesina & Giuliano, 2010; Fernandez & Fogli, 2009). Portability makes the distinction between culture and informal rules possible since people tend to carry with them beliefs and attitudes about what is right or wrong when they move away from their indigenous localities. Informal rules, by contrast, are less portable and depend on a certain level of group dominance which is commonplace in villages and community clusters. This study bridges the gap between studies of culture that examine the outcomes of second-generation immigrants in developed countries (Fernandez, 2007; Fernandez & Fogli, 2009; Luttmer & Singhal, 2011), with possibly biased outcomes due to immigrants' exposure to negative shocks in their host countries; and those that study the interactions between culture and formal institutions (Alesina & Giuliano, 2014; Giuliano & Spilimbergo, 2013); in which culture is identified as an informal institution.

The persistence of cultural traits shows the strength of its transmission (mainly through interactions within families), as Bisin and Verdier's (2011) cultural transmission model amply illustrates. Parents are said to purposefully socialize their children (aka 'direct vertical socialization') to their own beliefs and preferences because they think their children will benefit from such preferences. The direct socialization of children by parents, however, takes place within a community which may serve to strengthen or weaken the transmission of culture ('oblique and horizontal socialization'). We focus on socialization in families and, given the two distinct descent systems earlier identified, it is plausible to expect that women from matrilineal and patrilineal systems would have very different preferences and beliefs about being in the labour force based on the distinct, family-based cultural orientations to which they have been socialized. Specifically, I hypothesize that women from matrilineal descent systems will have stronger preferences for labour market activities than women from patrilineal descent systems. This expectation, a priori, stems from the greater autonomy from the men folk that matrilineal women enjoy relative to patrilineal women.

A second hypothesis concerns the labour market outcomes of women with a historically nomadic background. Empirical evidence suggests the existence of a negative relationship between nomadism and the economic and social wellbeing of women (Alesina et al., 2016; Michalopoulos et al., 2016). We should, therefore, expect to see lower labour market outcomes for women of nomadic ancestry relative to women with a history of sedentary settlement.

2.3.2 The Epidemiological Approach

In a selective review of the literature on culture in economics, Fernandez (2011) highlights typical research designs that are employed in the attempt to identify culture's effect on

outcomes. These include survey-based studies which utilise people's opinions captured through surveys (such as the World Values Surveys); historical case studies; experimental studies that employ games like the ultimatum, public goods, or dictator games; and studies which utilise information on immigrants or their descendants, termed the 'epidemiological approach'. Crucially, studies that have relied on responses to survey questions as expressions of culture are thought to be especially plagued by reverse causality in the relationship between culture and outcomes, a problem which must be satisfactorily addressed for any evidence presented to be reliable. The epidemiological approach is presented as an alternative strategy that enables researchers tackle the problem of reverse causality. It examines the economic outcomes of immigrants or that of their descendants in host countries thereby isolating the effect of culture from that of local/indigenous institutions. This also highlights the portability of culture relative to other environmental factors. This approach has been employed to study the female labour force participation rate of second-generation immigrants in the United States of America (Fernandez, 2007; Fernandez & Fogli, 2009; Finseraas & Kotsadam, 2017).

In using the epidemiological approach to study culture's effect on the outcomes of descendants of immigrants there are several issues that may well confound the evidence obtained. As pointed out by Fernandez (2011), immigrants may experience a variety of shocks such as language difficulties or heightened uncertainties that could force a change in their usual behaviour. Culturally induced behaviours are stronger in the presence of incentives, like rewards or punishments, from the wider social network such as neighbourhoods or ethnic clusters. The absence of such networks in a host country potentially diminishes the traditional behaviour. Also, immigrants may not be a representative sample of their country's population and are likely to have preferences and

beliefs that diverge considerably from the average levels in their countries-of ancestry. In addition, the impact of their local culture may be weakened by their exposure to a different culture in the host country, introducing a bias to the results which could make the effect of culture seem insignificant. These limitations are absent in this paper because it studies women in their own countries of origin albeit resident in urban areas. It is also possible that some of our research subjects were born and raised in the urban areas that they lived at the time of the survey.

The advantage of this scenario is that, while the women do not reside in areas where they are constrained by local institutions, they are still within the domain of their countries and are less likely to be influenced by foreign cultures or forced to alter their behaviour due to heightened uncertainty or language difficulties. Secondly, formal institutions are more likely to be weak in villages while local/informal institutions would be very strong and could shroud the effect of an individual's preferred behaviour. People are more likely to comply with social norms in villages because a deviant behaviour may be met with severe sanctions. Outside the village, the local institutions become less important or weakened. In addition, formal institutions play more significant roles in shaping preferences through, for example, the availability of credit facilities, a more organized labour market, better transportation networks, availability of childcare and support, etc. Given similar state/formal institutional environments, the variations in labour market outcomes can be attributed to individual beliefs and preferences (or culture) which are free from local social constraints.

2.4 Data Sources and Description of Variables

2.4.1 Data Sources

The hypothesis of stronger outcomes for women from less repressive culture groups is tested with a combination of historical and contemporary information from three different data sources: The Demographic and Health Surveys (DHS), Afro-barometer, and Murdock's (1967) Ethnographic Atlas. The list of countries, survey waves and data sources can be found in Table 2.7 at the end of the chapter. The primary data source for the participation of women in the labour force is the DHS, a cross-sectional survey of women (and men) aged 15 to 49 years in randomly selected households. This study is based on the most recently available DHS waves (women sample only) with information on the ethnicity of respondents in 19 Sub-Saharan African countries. The waves used span a period of ten years, 2006 – 2016, mainly because questions on ethnicity do not feature in all survey waves for some countries.

The DHS is a nationally representative, large sample household surveys with data on a wide range of indicators regarding the demography, nutrition, and health attributes of the population for purposes of monitoring and impact evaluation. The core questionnaires contain information on reproduction, maternal, and child health. They also provide information on household characteristics, wealth index, and labour market behaviour. Over time, the DHS has been administered in many African countries with the aid of standardized questionnaires (Measure DHS, ICF 2018). This does not only ensure consistency but allows for comparability and the ability to pool together data from different waves and countries with minimal risk of measurement error. Surveys for African countries also include questions on the ethnicity of respondents which enables the matching of different

ethnicities to their historical cultural and economic characteristics obtained from the Ethnographic Atlas.

The second data source, the Afro-barometer, is a dataset constructed from sample surveys carried out in African countries and contains information on a range of socio-political and economic issues. Using standardized questionnaires, the data obtained captures the perception and views of Africans regarding the social, political, and economic structures in their countries. Specific questions on how much people had trust in the political, economic, and legal authorities were asked, and the responses obtained help unveil the quality of formal institutions in these societies. To obtain information on historical characteristics, a third data set - Murdock's (1967a) Ethnographic Atlas (EA), was used. The EA is a world-wide ethnicity-level database put together by George Peter Murdock and contains the ethnographic information of 1,267 ethnic groups around the world. Specifically, the EA provides information on the cultural, economic, and other pre-industrial features of African societies before their contact with Colonial Europe. The EA is, therefore, the main source of information on our key cultural variables – the descent systems and historical settlement patterns of contemporary African societies.

2.4.2 Matching Modern Data to Historical Data

A key step towards understanding the influence of descent rules on economic behaviour is being able to associate people in a modern data set with the historical characteristics of their ancestral lineage. This method is often used in the literature to investigate a range of issues such as the disposition towards violence against women (Alesina et al., 2016); the variations in education and wealth of the people with different economic modes of production (Michalopoulos et al., 2016); and the historical origins of gender roles (Demie,

2018). In this regard, the ethnicity information of each woman in the DHS is matched with the historical characteristics of her ethnic group within the Ethnographic Atlas.

The matching process, which follows the standard procedure in the literature, begins with the construction of a concordance of ethnicity names. A concordance of names was needed because some ethnic groups in the DHS were known by a different name in the Ethnographic Atlas while some ethnicity names in the EA were an umbrella name for several ethnic groups in the DHS. In several cases it was possible to directly match the ethnicity names in the DHS to the ones in the EA. But where it was not possible to match names directly, for instance where a name was spelt differently or belonged to a sub-group, a number of sources were consulted to verify such names and they included the Ethnologue of world languages (Eberhard, David M., Gary F. Simons, and Charles D. Fennig (eds.), 2020.), the Joshua Project, Nunn and Wantchekon's (2011) dataset which provides a concordance between ethnicities in Afrobarometer and the Ethnographic Atlas, and Wikipedia. In the end, a total of 288,198 individuals were matched to the ethnic groups in the EA and assigned corresponding descent and settlement characteristics as given in the Atlas. This produces a unique dataset that enables the investigation of the influence of descent systems and historical patterns of settlement on the labour market choices of women in sub-Saharan Africa.

Previous studies which explored the role of descent systems in economic outcomes utilised experimental data (see for example, Lowes (2017; 2018); (Gneezy et al., 2009), and (La Ferrara, 2007). This paper differs from these studies by matching survey data with ethnographic characteristics to extract information on descent and historical settlement. To the best of my knowledge this is the first of such research that combines ethnographic data

with household survey data for African countries to study the effect of cultural norms on female labour force participation.

2.4.3 Description of Variables

The International Labour Organization's (ILO) definition of the economically active population (EAP) was adapted by the African Development Bank (AfDB 2012) to prepare guidelines for analysing Africa-specific labour force data. The labour force or economically active population includes employed persons i.e., persons who, during a reference period – typically one day or one week – were in paid work or self-employed. Persons in paid employment are those who, during a given reference period, performed some work for wage or salary, in cash or in kind. Self-employment applies to those who, also during a given reference period, performed some work for profit or family gain, in cash or in kind.

The main outcome variable for this research is female labour force participation (FLFP), defined in the DHS as any income-generating activity that was done in the twelve months prior to the survey. This was recoded into a binary variable taking the value of one if a woman reported as currently working or has ever worked in the twelve months prior to the survey, and zero otherwise. It includes respondents who were temporarily away from their jobs for up to a period of one week or one month. With no information in the dataset regarding unemployed women who were looking for work, all women who reported not working were coded as not in the labour force. Two additional outcome variables viz. self-employment and paid work, were studied as well to help fix our understanding of the specific nature of market activity that women engaged in and their likelihood of being paid for any labour services rendered to other people. Self-employment is a binary variable with a value of one if a woman reported owning an enterprise and zero if she is either working

for family or someone else. Likewise, the binary outcome for paid work was recoded from the information on the type of earnings of respondents. Paid work takes the value of one if a woman reported receiving payment for labour either in cash, cash and in-kind, or in-kind, and zero if unpaid is reported. Other control variables from the DHS include individual-specific characteristics such as age, marital status, religion, education; and household characteristics like household size, wealth index, and place/location of household to distinguish urban from rural dwellers.

The information regarding the quality of formal institutions come from Afro-barometer surveys. Reponses to the question: "How much do you trust each of the following, or haven't you heard enough about them to decide?" were coded for the Tax department, the Police department, and the Courts of Law. These three aspects of regulatory and legal institutions are used to construct a measure of formal institutions which is subsequently interacted with the cultural proxies. These are chosen as representative measures for formal institutions in general. Ideally, specific variables with relevance to the labour market in each country would be more appropriate but due to data limitations this is not feasible.

The categories of response given are: 'Not at all'; 'Just a little'; 'Somewhat'; 'A lot'; and 'don't know/haven't heard enough'. To make each into a binary variable, I recoded the options into 'trust' and 'no trust', to capture the strength of each institutional variable. Thus, 'not at all', and 'just a little' responses were coded as 'no trust', while 'somewhat' and 'a lot' were coded as 'trust'. 'Don't know/have not heard enough' responses were coded in the original data as missing values and therefore excluded from the analysis. Each trust variable is averaged by the regions in Afro-barometer and matched with identical regions in the DHS such that observations in the DHS take on average values of 'trust' corresponding

to their region of residence in the surveys. Thus, the measure of formal institutions used in the analysis is a weighted average of the three institutional variables from Afrobarometer. An immediate challenge with Afrobarometer is that not all African countries are covered and so four countries – Ethiopia, Gambia, Chad, and the Democratic Republic of Congo - had no entries and were dropped, reducing the number of countries to 15. Also, Nigeria and Burkina Faso had no information on 'trust in the tax department' included in their survey questionnaires, further reducing the number of countries to 13 and a total of 66,012 observations.

Historical variables from the Ethnographic Atlas include Descent systems and Settlement Patterns. The Descent systems identified are the patrilineal, duolateral, matrilineal, quasi-lineages, ambilineal, bilateral, and mixed systems. Based on this information, a categorical variable for descent systems that is made up of the patrilineal, matrilineal, and mixed descent systems was constructed. All the descent groups that were neither matrilineal nor patrilineal were recoded as mixed descent. Though the dataset does not provide much information regarding the definitions of the mixed descent and the other groups, I utilised the basic definition from the Encyclopaedia Britannica (online access), showing that these groups shared similar characteristics, as a basis for classifying them as mixed. There are eight categories of Settlement patterns: (i) nomadic or fully migratory, (ii) seminomadic, (iii) semi-sedentary, (iv) compact but impermanent settlements, (v) Neighbourhoods of dispersed family homesteads, (vi) Separated hamlets, forming a single community, (vii) Compact and relatively permanent settlements, and (viii) Complex settlements. I combined groups (i) to (iv) to form the nomadic group and groups (v) to (viii) to form the sedentary group. This yields a two-category variable representing settlement patterns. From these I

obtained two measures of culture for my analysis viz., descents systems and settlement patterns.

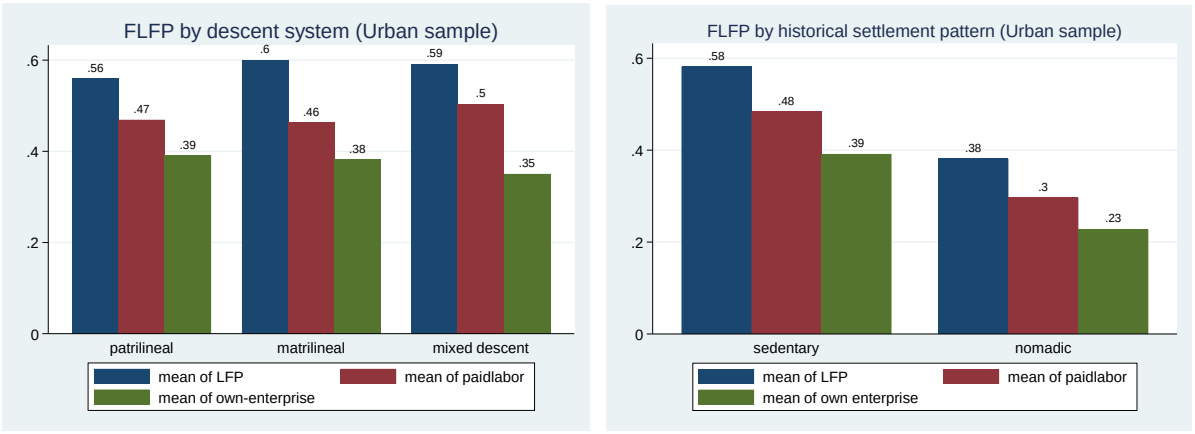
2.4.4 Descriptive Statistics

The summary statistics of relevant variables, (see Table 2.8 at the end of this chapter) are in three parts to show the different characteristics of the variables and their sources. Part (A) shows our outcomes of interest and all the individual (women only), and household variables used. The institutional variables can be found in part (B) while part (C) displays the historical variables. From part (C) we can see that about seventy-four percent of women in the sample belong to the patrilineal descent system, nine percent are of matrilineal descent, and seventeen percent have a mixed descent. Also, most women in the sample, about ninety-five percent, have a historically sedentary background while women with a historically nomadic lifestyle make up just five percent of the sample (see Figure 2.2 for distribution by country).

In terms of labour market activities 57 percent of women in our sample report having a job, 37 percent of women are self-employed while 48 percent receive payment for labour either in cash, in-kind or both. An average woman spends seven and a half years in school and only about 11 percent of the educated have gone beyond secondary education. We also see that 28 percent of the sample have at least a primary education (this includes both complete and incomplete primary schooling), and 44 percent have either a complete or incomplete secondary education. Figure 2.1 below shows the distribution of each outcome variable across the different culture groups. The first panel of Figure 2.1 displays the average values of being in the labour force, being self-employed, and being in a paid employment for the three descents systems. The matrilineal and mixed descent systems have a participation

rate of 60 percent while the patrilineal system has 56 percent participation rate. The figure portrays an almost even distribution of each outcome across the three descent groups. For example, being in paid employment approaches 50 percent for all descent groups while self-employment stays close to 40 percent across groups.

Figure 2.1: Labour force participation by Descent System and Settlement Pattern

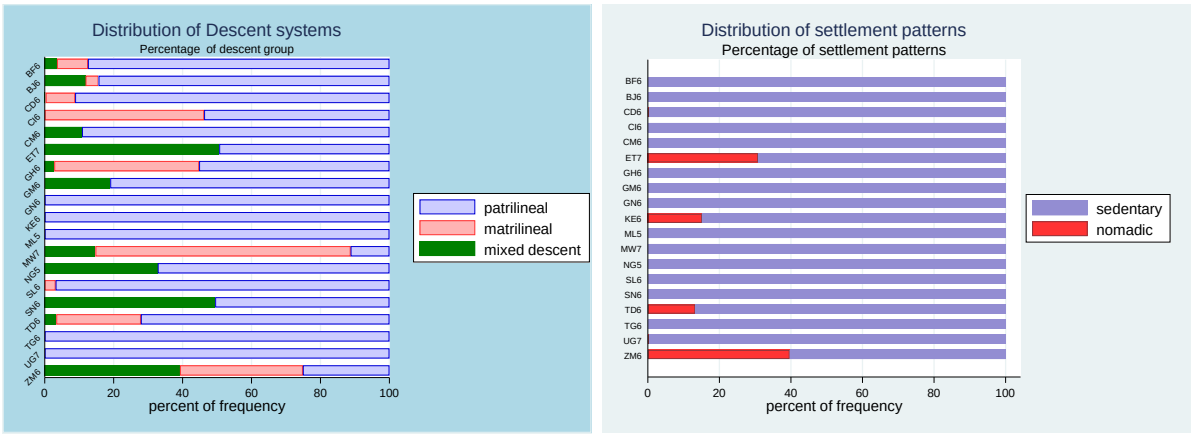


Source: Author's own computations from the DHS data

By contrast we find a large gap between the outcomes of the sedentary group versus those of the nomadic group (see second panel of Figure 2.1). While 58 percent of women with a sedentary settlement history participate in the labour force only 38 percent of women with a nomadic culture are in the labour force. Of the women in the labour, 30 percent of women in the nomadic group are in paid employment while 23 percent are self-employed (own a business venture). Comparatively, 48 percent of women in the sedentary culture group are in paid employment while 39 percent are self-employed. These descriptive statistics point to the possible existence of a systemic disadvantage for women with a nomadic background relative to other culture groups. The magnitude of this disadvantage is however difficult to ascertain mainly due to the limited coverage of nomadic populations in most African surveys. That notwithstanding, it is worth noting that the women in the sample may

currently not be actively engaged in typically nomadic activities given their urban residence, which makes their outcomes in this research significant for policy reasons.

Figure 2.2: Descent Systems and Settlement Patterns by Country



Source: Author's computation from the combined DHS and EA dataset

Part B of Table 2.8 summarizes the measures of formal institutions which, as previous research suggests, can moderate the effect of culture on female economic activities. The variables coded from the individual responses to questions on trust in public institutions range between 0 and 1. A small value (closer to zero) represents low levels of trust, and a large value (closer to one) indicates large trust or confidence in existing formal institutions. The values are regional averages and show that 40 percent of the people surveyed trusted the police department, 41 percent trusted the tax department, and 50 percent trusted the law courts. For brevity, I constructed a single measure of formal institutions by taking an average of the three variables such that changing this measure (taking higher or lower values) would represent changes to all three measures of formal institution.

2.5 Econometric Model/Identification Strategy

2.5.1 Identification

The analysis is restricted to the urban sub-sample to capture the migration of women out of their indigenous villages where the influence of informal institutions would be very strong and likely to confound the results. Urban areas, as defined in the DHS, include capital cities and cities with one million population, small cities with population over 50,000, and other urban towns. All rural areas are assumed to be countryside. This sample restriction is an important prerequisite for the use of the 'epidemiological approach' already explained in section 2.3.2 and enables the isolation of the effect of culture from that of local institutions.

The identifying variation comes from the differences in descent systems and historical settlement patterns which are used here as identifiers of culture. These characteristics are inherited, passed down through ancestral lineages and, therefore, less likely to change over time and space. Using these attributes as measures of culture mitigates the problem of endogeneity that is a common concern in the literature especially where concepts such as social ideologies (Booth, Alison, Fan, Meng, & Zhang, 2018; Zhang, 2018), country of origin (Fernandez & Fogli, 2009; Finseraas & Kotsadam, 2017; Polavieja, 2015), and religion (Guiso et al., 2003; 2006), have been used to measure culture. This strategy helps us determine the direction of causality from culture to economic outcomes. In line with the epidemiological approach, therefore, I exploit the unique setting in the urban sample where women from different cultural backgrounds live together and face similar institutional and labour market conditions. We can attribute variations in labour market outcomes of women to differences in cultural orientations and, at the same time, understand how the interactions between

culture and formal institutions affect the dynamics of female labour force participation in African countries.

2.5.2 Model Specification and Estimation Technique

The goal of this empirical exercise is to examine the relationship between culture and three identified outcomes within the research area. This relationship is shown functionally as follows:

$$Y_{ig} = F\left(Z_{ig}, X_{ig}, H_{ig}\right) \qquad (1)$$

where

Y_{ig}, a binary outcome for individual i in location g, represents either labour force participation, self-employment, or paid work, and takes the value 1 if the response entry for the outcome is yes, and zero if otherwise. Z_{ig} is a categorical measure of culture representing either a woman's descent type or historical settlement pattern. X_{ig} and H_{ig} are, respectively, vectors of individual and household characteristics that are relevant for explaining variations in economic behaviour.

This relationship is represented as a linear probability model as follows:

$$\Pr\left(Y_{ig} = 1 \middle| Z_{ig}, X_{ig}, H_{ig}\right) = G\left(\alpha_0 + \alpha_g + Z'_{ig}\mathbf{B} + X'_{ig}\boldsymbol{\Upsilon} + \epsilon_{ig}\right) \qquad (2)$$

Showing that, for each woman, the probability of success for any outcome is conditioned on the included vectors of explanatory variables. The effect of culture is captured by the parameter $\mathbf{B}$ with α_g included to account for location/community level fixed effects.

The literature on cultural economics argues that one mechanism through which culture affects economic behaviour is its interaction with institutions (Alesina & Giuliano, 2015;

Codazzi, Pero, & Albuquerque Sant'Anna, 2018). I investigate this by interacting each cultural variable (descent or settlement pattern) with the measure of formal institutions defined in section 4. The following interaction model is used:

$$\Pr\left(Y_{ig} = 1 \middle| Z_{ig},\ Z_{ig} * instn,\ X_{ig},\ H_{ig}\right) = G\left(\alpha_0 + \alpha_g + Z'_{ig} + Z'_{ig} * instn\boldsymbol{\Gamma} + X'_{ig}\boldsymbol{\Upsilon} + \epsilon_{ig}\right) \quad (3)$$

Here $\boldsymbol{\Gamma}$ measures the effect of culture on each outcome conditional on the level of formal institutions.

Equations (2) and (3) are estimated by Ordinary Least Squares (OLS) technique with varying specifications. As already mentioned in section 2.4.3, the influence of culture is measured by the descent systems and historical settlement patterns. The descent system comprises of the patrilineal, matrilineal, and mixed descent systems, while for settlement patterns we have the sedentary and nomadic settlements. The largest descent system in the sample is the patrilineal system and, thus, forms the comparison group. For settlement patterns, we have sedentary settlement as our comparison group. Based on our hypothesis, we not only expect to see stronger positive outcomes for women with less repressive cultural backgrounds but also to find improvements in outcomes resulting from interactions with high quality formal institutions.

2.6. Summary and Presentation of Results

A summary of the estimation results is presented next. This is done in two sub-sections: the main results showing the direct effect of culture on outcomes, and the results from interacting culture with the measure of formal institutions.

2.6.1 Main results

The main effect from each measure of culture can be seen in the first four columns of Tables 2.1 – 2.3. The output in columns (1) – (3) represent linear probability (OLS) estimations with survey weights but without location fixed effects. Location effects are included in the estimates in column (4), the preferred specification. Column (1) has as covariates only the culture variables and survey year fixed effects while other controls, that include individual characteristics (column 2) and household characteristics (columns 3 and 4) are added in a stepwise manner to the model. Standard errors are clustered at the primary sampling unit (psu) and appear in parentheses in the tables. For ease of reading, only the coefficients of the culture variables and the constant term are reported.

Evidently, culture plays an important role in current economic outcomes for women, as the results show. Table 2.1 reports parameter estimates from the labour force participation regression, showing positive and statistically significant coefficients at the 1 percent level for the matrilineal and mixed descent systems across all specifications and estimation strategies. With the nomadic group, however, the estimates are negative and statistically significant across all sample groups and specifications, whether location effects are included or not.

Table 2.1 : Labour Force Participation : Main effect (columns 1 - 4) ; Interaction effect (columns 5 and 6)

LFP	(1)	(2)	(3)	(4)	(5)	(6)
Descent systems:						
Matrilineal	0.0684***	0.0694***	0.0662***	0.0466***	0.448***	0.279***
	(0.012)	(0.011)	(0.011)	(0.009)	(0.036)	(0.035)
Mixed descent	0.0744***	0.0617***	0.0658***	0.0614***	-0.105*	0.00659
	(0.015)	(0.013)	(0.013)	(0.010)	(0.050)	(0.042)
Settlement patterns:						
Nomadic	-0.193***	-0.165***	-0.170***	-0.135***	-0.426***	-0.398***
	(0.017)	(0.016)	(0.016)	(0.014)	(0.060)	(0.058)
Matrilineal*formal_instns	-	-	-	-	-0.889***	-0.507***
					(0.079)	(0.080)
Mixed desc.*formal_instns	-	-	-	-	0.339***	0.111
					(0.094)	(0.077)
Nomadic*formal_instns	-	-	-	-	0.609***	0.543***
					(0.118)	(0.109)
Constant	0.675***	-0.463***	-0.475***	-0.486***	-0.309***	-0.324***
	(0.013)	(0.038)	(0.043)	(0.038)	(0.046)	(0.041)
N	65900	65597	65595	65595	65595	65595
Survey year	Yes	Yes	Yes	Yes	Yes	Yes
Individual controls	No	Yes	Yes	Yes	Yes	Yes
Household controls	No	No	Yes	Yes	Yes	Yes
Location Fixed effects	No	No	No	Yes	No	Yes

Standard errors in parentheses; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Individual controls include age, marital status, level of education, and religion. Household controls include household size, household wealth index and area of residence.

In Table 2.2 the estimates for the self-employment regressions are given and as shown, the effect of culture through the matrilineal descent system is positive for all women with and without location fixed effects. There is no statistically significant result from the preferred specification for self-employment both for the matrilineal descent and mixed descent even though the coefficients are positive. Lastly estimates for self-employment for nomadic settlement are negative and statistically significant across all specifications.

Table 2.2: Culture and Self-employment: Main effect (columns 1 - 4); Interaction effect (columns 5 and 6)

Self-employment	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Descent systems:						
Matrilineal	0.0350**	0.0441***	0.0405***	0.0126	0.264***	0.127***
	(0.011)	(0.010)	(0.010)	(0.008)	(0.035)	(0.035)
Mixed descent	0.0568***	0.0237*	0.0234*	0.0188	-0.102*	-0.0383
	(0.013)	(0.011)	(0.011)	(0.010)	(0.042)	(0.041)
Settlement patterns:						
Nomadic	-0.150***	-0.105***	-0.106***	-0.0908***	-0.349***	-0.294***
	(0.014)	(0.014)	(0.014)	(0.013)	(0.047)	(0.048)
Matrilineal*formal_instns	-	-	-	-	-0.548***	-0.247**
					(0.076)	(0.079)
Mixed desc*formal_instns.	-	-	-	-	0.253***	0.115
					(0.076)	(0.077)
Nomadic*formal_instns.	-	-	-	-	0.551***	0.418***
					(0.093)	(0.092)
Constant	0.364***	-0.317***	-0.380***	-0.583***	-0.372***	-0.484***
	(0.012)	(0.035)	(0.042)	(0.039)	(0.044)	(0.041)
N	65900	65597	65595	65595	65595	65595
Survey year	Yes	Yes	Yes	Yes	Yes	Yes
Individual controls	No	Yes	Yes	Yes	Yes	Yes
Household controls	No	No	Yes	Yes	Yes	Yes
Location Fixed effects	No	No	No	Yes	No	Yes

Standard errors in parentheses * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The results for paid work are reported in Table 2.3 where we find a similar trend in the main culture effect. The matrilineal system has a positive and significant effect only for the estimations without location fixed effects while the estimates with location effects is positive but not statistically significant. The mixed descent system has positive and statistically significant estimates for all specifications. As with the other outcomes, the nomadic effect is negative across all specifications and statistically significant at the 1 percent level.

Table 2.3: Culture and Paid Labour: Main effect (columns 1 - 4) ; Interaction effect (columns 5 and 6)

Paid work	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Descent systems:						
Matrilineal	0.0520***	0.0511***	0.0461***	0.00882	0.422***	0.290***
	(0.012)	(0.011)	(0.011)	(0.010)	(0.035)	(0.034)
Mixed descent	0.0835***	0.0815***	0.0853***	0.0662***	-0.0749	-0.00420
	(0.014)	(0.012)	(0.012)	(0.010)	(0.048)	(0.043)
Settlement patterns:						
Nomadic	-0.165***	-0.147***	-0.149***	-0.115***	-0.356***	-0.297***
	(0.017)	(0.015)	(0.015)	(0.013)	(0.062)	(0.060)
Matrilineal*formal instns	-	-	-	-	-0.873***	-0.611***
					(0.077)	(0.077)
Mixed desc.*formal_instns	-	-	-	-	0.333***	0.152
					(0.088)	(0.078)
Nomadic*formal_instns.	-	-	-	-	0.497***	0.384**
					(0.123)	(0.117)
Constant	0.577***	-0.722***	-0.810***	-0.755***	-0.593***	-0.554***
	(0.014)	(0.039)	(0.044)	(0.040)	(0.046)	(0.043)
N	65900	65597	65595	65595	65595	65595
Survey year	Yes	Yes	Yes	Yes	Yes	Yes
Individual controls	No	Yes	Yes	Yes	Yes	Yes
Household controls	No	No	Yes	Yes	Yes	Yes
Location Fixed effects	No	No	No	Yes	No	Yes

Standard errors in parentheses; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

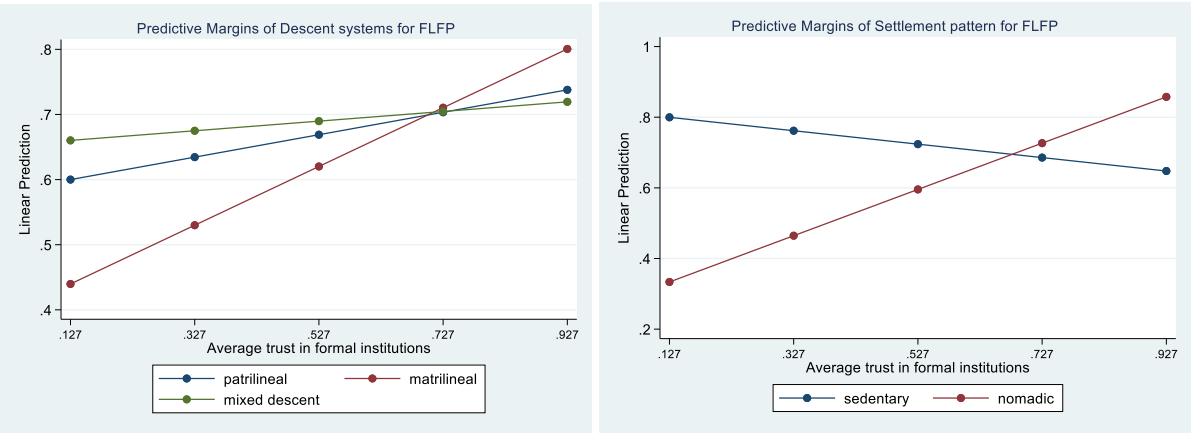
2.6.2 Results from Interacting Culture with Formal Institutions

In addition to the main effects of culture we explore the effect of interacting each cultural proxy with the measure of formal institution on the outcomes. The estimates are also presented in Tables 2.1 – 2.3, columns 5 and 6. Estimates in both columns include all controls but (5) has no location effects, for comparative purposes. Therefore, the analysis will be based on estimates in column (6). From the summary statistics (section B of Table

2.8) the overall, weighted average of the quality of formal institutions is 0.45[1] for formal institutions with a standard deviation of 0.12.

From Table 2.1 column (6), the labour force participation regression yields negative and statistically significant estimates from the interaction between the formal institutional proxy and the matrilineal culture. The estimates for the mixed descent culture are positive but not statistically significant while for the nomadic culture the interaction estimate is positive and statistically significant.

Figure 2.3: Interaction effect of formal institutions with cultural norms: Labour force participation

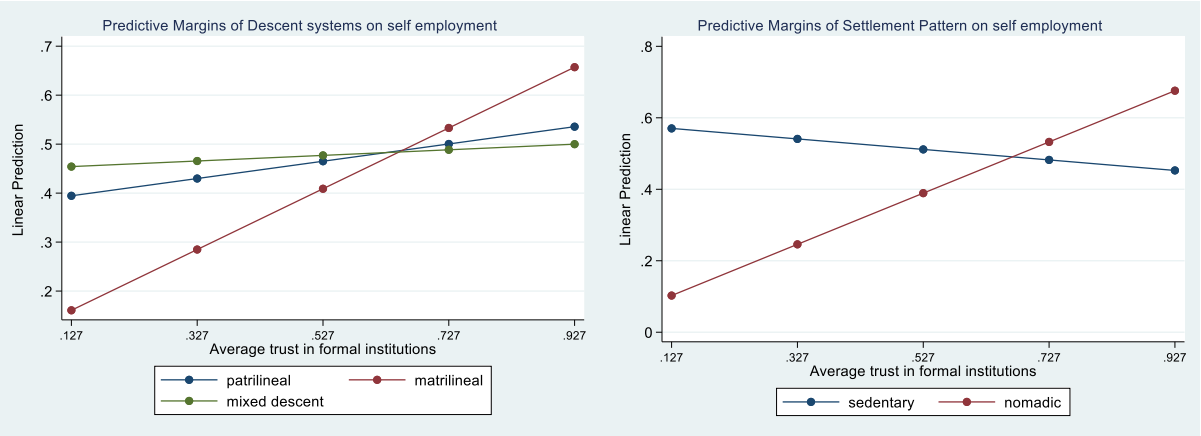


Source: Computed from Author's regression analysis using DHS, the EA and Afrobarometer data sets. Figure shows the changes in outcomes for each culture group as the measure of formal institutions changes from low to high levels.

With respect to self-employment (Table 2.2), the matrilineal culture returns a negative and statistically significant interaction effect, the mixed descent's interaction with formal institutions returns positive estimates with no statistical significance, while the nomadic culture has a positive and statistically significant interaction estimation result.

[1] A high average indicates the presence of strong formal institutions while a low average indicates weak institutions.

Figure 2. 4: Interaction effect of formal institutions on cultural norms: self-employment



Source: Computed from Author's regression analysis using DHS, the EA and Afrobarometer data sets. Figure shows the changes in outcomes for each culture group as the measure of formal institutions changes from low to high levels.

The last outcome variable in this analysis is the probability of being paid for labour services rendered to other people. As in previous cases, the pattern of interaction is repeated as Table 2.3 shows. In the case of the matrilineal culture, the coefficient estimates with interactions effect are negative and statistically significant. We see a positive but statistically insignificant interaction effect for mixed descent when location effects are included, and positive and significant interaction coefficients for the nomadic culture. The significant outcomes of the interaction terms indicate the importance of formal institutions in the model and suggest that the main effects of culture are biased without the interaction with formal institutions.

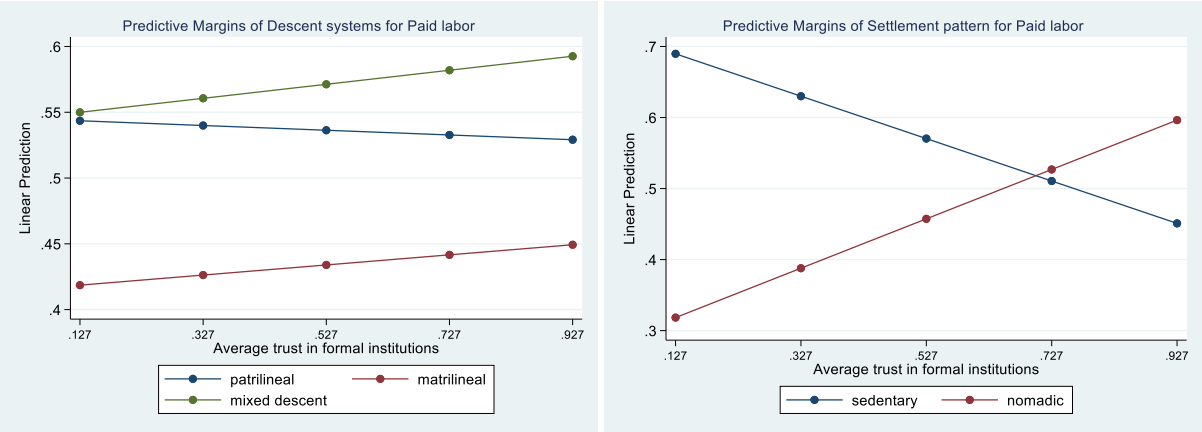
2.7. Discussion of Findings

2.7.1 The Main Effect of Culture:

From the results summarised in the previous section, it is evident that culture plays an important role in the expressed preferences of women for labour market activities. In Table

2.1 for example, we see that, relative to the patrilineal descent system, there is a 6.8 percentage point's difference in the average probability of labour force participation for matrilineal women and women with mixed descent. This outcome does not take account of heterogeneous location effects. When such fixed effects are accounted for, this positive difference reduces to 5.7 percentage points for matrilineal women and 6.1 percentage points for women of mixed descent. This result should, however, not be surprising as it validates the distribution of outcomes depicted earlier in Figure 2.1.

Figure 2.5: Interaction effect of formal institutions with cultural norms: Paid labour



Source: Computed from Author's regression analysis using DHS, the EA and Afrobarometer data sets. Figure shows the changes in outcomes for each culture group as the measure of formal institutions changes from low to high levels.

Overall, the results are in line with findings in Lowes (2016) where the positive impact of the matrilineal culture is thought to be the result of the greater autonomy that the women enjoy which gives them a greater capacity to implement their labour market preferences relative to patrilineal women. This, I argue, can explain why we find a higher probability of labour force participation for the matrilineal culture than for patrilineal culture.

By contrast, a history of nomadic settlement appears to negatively affect the labour market outcomes of women compared to a history of sedentary settlement. Without location fixed effects, the results show about 19.3 percentage points lower probability of labour force

participation for women of nomadic culture relative to those with sedentary culture, dropping to 13.5 percentage points with the inclusion of location fixed effects. Though the literature on the implications of nomadism for women's economic wellbeing is quite scant, the few existing studies highlight the marginalized and lower economic status of nomadic groups (Michalopoulos et al., 2016), and the double disadvantage that this has on the wellbeing of nomadic women (Eneyew & Mengistu, 2013). A major issue when investigating the economic consequences of nomadism for African women, is what Randall (2015) terms 'statistical invisibility'. There are very few surveys from African countries with sufficient information on nomadic characteristics and, as a result, most studies of African nomadic populations are based on experimental data. The results presented in this study do point to the strong impact of the nomadic culture on women's economic opportunities which, I belief, can inform policies which target women empowerment and gender equity.

The interpretation of the outcomes for the mixed descent culture is less straightforward fundamentally due to the ambiguous definition of a mixed descent system as well as the classifications found in the data. Nonetheless, it can be described as a middle ground between the two extreme cultures of patrilineal descent and matrilineal descent – a family organization with a 'laissez faire' disposition towards women. Within the context of this definition, we find outcomes that mimic the less repressive cultural proxy i.e., the matrilineal system, which can then explain the relatively positive economic outcomes it produces compared to the patrilineal descent system.

Next, I explore the relationship between culture and self-employment, a component of the labour market participation that is disproportionately engaged in by women in sub-Saharan Africa. This, it has been found, is the case because of the highly flexible working conditions

that self-employment offers, allowing women to conveniently combine their productive activities (market and domestic) with their reproductive roles (Arbache, Kolev, & Filipiak, 2010). It does seem that women from both the patrilineal and the matrilineal descent systems have similar probabilities of self-employment, the 1.3 percentage point's difference for matrilineal women in Table 2.2 is not statistically significant with the inclusion of location fixed effects.

A similar outcome is reported for women of mixed descent with approximately 2.0 percentage points higher probability of being self-employed than the patrilineal women. The lack of a statistically significant difference between the matrilineal and the patrilineal outcomes in relation to self-employment may not be completely surprising in that, given the prevalence of poverty in African countries, women generally engage a great deal in home-based production intended for the market irrespective of their cultural backgrounds. The outcome for women with a nomadic ancestry is a negative and significantly lower probability of self-employment inclusive of location fixed effects. Nomadic women have a 9.1 percentage points lower probability of being owning an enterprise, suggesting a systematic economic disadvantage compared to women of sedentary ancestry.

Thirdly, we consider the likelihood of being paid for one's labour. This is an important outcome for women in Africa because it sheds light on the value placed on a woman's contribution to household production (whether this is for household consumption or in exchange for a wage). It is also an important indicator of the wellbeing of women and their children. The results in shown in Table 2.2 reveal that all cultural proxies present similar trends to the self-employment and market participation cases. For the matrilineal culture we do not see any significant effect on paid labour even though there is a positive difference

of about 1.0 percentage point relative to the patrilineal culture. On the other hand, the mixed descent system has positive effect, 6.62 percentage points, when we include location effects, and this is statistically significant at the 1 percent level of significance. Lastly in the analysis for paid work, women in nomadic cultures have of about 11.5 percentage points lower probability of being paid for their work than women in sedentary cultures.

The outcomes above suggest that although there may not be any significant difference in the likelihood of being paid for one's labour between the matrilineal and the patrilineal cultures, the mixed descent system gives a woman a higher likelihood of receiving a wage for her labour than the other two cultures. It is not at all obvious from this study why this should be the case, but it is plausible to think that in most societies in sub-Saharan Africa, culture may have less effect on a woman's probability of receiving a wage for her labour. One explanation could be the failure of the market institution. This, however, does not raise any serious concerns for this research because its primary objective has been to determine whether, or not, a woman engages in market production.

2.7.2 The Effect from Interacting Culture with Formal Institutions:

The results in section 2.6.2 give a sense of the dynamic relationship between culture and the economic outcomes of women in African societies. It also points to the value of strong formal institutions and how they interact with cultural norms to transform the social and economic choices of people. The value of this interaction is not trivial for most African countries where the extended family system and strong communal co-existence produce customary practices and socially prescribed codes of conduct for regulating economic and social decisions. These customary practices become (albeit unwritten) constrains on women

and, therefore, influence their choices for market activities. The influence of such constrains are much stronger in settings with closely knit social structures such as villages or rural communities. Therefore, the analysis with the urban data is intended to reduce the influence of informal institutions and clearly project the impact of cultural beliefs on outcomes. The results in the last two columns of Tables 2.1 – 2.3 shed lights on the evolution of labour force participation, paid labour, and self-employment in the face of culture's interaction with formal institutions. The function of the interaction coefficient is to show how the effect of culture changes at different values of the measure of formal institutions.

Using a threshold of 0.45 points, which is the average level of trust for formal institutions in the data, the interaction between the matrilineal culture and the index of formal institutions raises the probability of labour force participation by 8.5 percentage points relative to the patrilineal descent system. This effect is 70 percent larger than the main matrilineal effect without the interaction with location effects. The mixed descent's interaction with formal institution has a net effect of 5.6 percentage points, which is not different from the main culture effect. The changes in outcomes from the interactions can be seen in the first panel of Figure 2.3 where, at higher values of formal institution, labour force participation increases for all culture groups, but the matrilineal descent maintains a strong positive trend in female labour force participation. The moderate rise in the outcome for the mixed descent can also be seen.

The nomadic group's net effect from its interaction with formal institutions is 15.4 percentage points less probability of labour force participation, an improvement of about 7 percent on the main effect. When the value of formal institutions rises by one standard

deviation above the mean, the net effect for the nomadic culture improves to 9.0 percentage points lower probability. This effect improves consistently at higher levels of formal institutions such that at three standard deviations above the mean, the net effect is 4.2 percentage points higher probability of labour force participation for nomadic women relative to women from sedentary cultures. This effect is shown visually on the second panel of Figure 2.3 and suggests that women of nomadic history can engage more in the labour market than their sedentary counterparts in a supportive institutional environment.

Exploring the impact of cultural interaction with formal institutions on the probability of self-employment and paid work reveals a similar pattern of diminishing net effects for matrilineal women. With respect to self-employment, the net interaction effect for the matrilineal culture is 1.6 percentage points higher probability of self-employment. This is 23 percent larger than the main culture effect without interaction. Thus, at an average value of 0.45 points, the presence of formal institutions improves the self-employment prospects for women beyond the advantage that matrilineality accords them. This effect is larger and stronger at higher values of formal institutions, as can be seen in the first panel of Figure 2.4. This is an interesting outcome given the earlier observed lack of significant difference between being self-employed by the matrilineal and patrilineal cultures. In the case of mixed descent, the net effect is positive but smaller than the main culture effect (1.3 compared to 1.9 percentage points). The net effect, however, rises to 4.1 percentage points at two standard deviations above the mean value of formal institutions. The overall effect of the interaction between formal institutions and the mixed descent culture can also be seen in the first panel of Figure 2.4.

Lastly, for self-employment, the nomadic culture returns a negative net effect which approximates the main culture effect (about -11.0 percentage points). As seen with the labour force participation outcome, this effect improves with stronger formal institutions such that at a high enough value, the net effect of the interaction between the nomadic culture and formal institutions for self-employment is positive and rising (see second panel of Figure 2.4).

In terms of paid work, the matrilineal and mixed descent systems do not register any differences in outcomes compared to the estimates obtained without interactions. The nomadic culture also has a net effect that approximates the main cultural effect, but it is the only culture group that registers a substantial increase in the paid work outcome at higher levels of formal institutions. Shown graphically in Figure 2.5, the first panel reveals a rise in the outcome for the mixed descent at higher values of formal institutions. Paid work for the matrilineal culture rises slowly even though its probability is still lower than that of the patrilineal culture. By contrast, there is a significant improvement in the outcome for the nomadic culture when formal institutions become stronger, leading to a steadily rising probability of paid work for the nomadic women relative to women of sedentary backgrounds.

The above analyses suggest that the strength of formal institutions moderates the effect of culture and closes the gap in outcomes between women of patrilineal descent and those of matrilineal descent. When formal institutions are weak, we see a positive difference in the probability of engaging in market activities of matrilineal women compared to women of patrilineal descent. In societies with high quality formal institutions the average probabilities of labour force participation for both culture groups converge to similar levels, but the

matrilineal culture provides a greater advantage than the patrilineal culture in the long run. In addition, formal institutions strong support for nomadic women and are vital to the economic survival of disadvantaged groups.

2.8. Conclusion

This paper contributes to the literature on the effect of culture on economic outcomes by investigating the relationship between culture – measured by descent systems and historical modes of settlement – and the labour force participation, paid work, and self-employment outcomes of women in sub-Saharan Africa. Previous research has used experimental data and a game theoretic framework to analyse the impact of descent systems on economic behaviour, focusing mainly on household bargaining, spousal cooperation, and competition (Gneezy, et. al. 2009; Lowes, 2016, 2017, 2018). Findings from these studies have been inconclusive on several fronts, creating opportunities for further research. Using a combination of historical and contemporary data for African countries, this study tries to isolate the effect of culture by female urban dwellers and finds a strong positive effect of the matrilineal culture on female labour force participation. In addition, the nomadic culture is found to adversely affect female labour market activities as women with nomadic ancestry are consistently less likely to be in the labour force relative to women with non-nomadic ancestry.

The interaction between culture and formal institutions reveals that strong formal institutions can mediate the influence of culture, closing the gap in outcomes between women of different cultural backgrounds. This interaction proves particularly important for the nomadic women who often suffer a double disadvantage in their access to resources

despite bearing the greater weight of household responsibilities. The findings in this paper show that higher levels of formal institutions can obviate the negative effects of the nomadic culture and raise the participation of women in all labour market activities. These findings, therefore, underscore the need to distinguish between cultural beliefs and the informal rules which constrain female social and economic activities so that the right policy direction can be followed to advance the empowerment of women and achieve gender equity in African countries.

Tables

Table 2.4: Data sources and survey waves

Country	**DHS: Survey Year**	**Afrobarometer: Survey Year**
Benin	2011 – 2012	Wave 5: 2011-2013
Burkina Faso	2010	Wave 4: 2008
Cameroon	2011	Wave 5: 2011-2013
Mali	2006	Wave 3: 2005
Guinea	2012	Wave 5: 2011-2013
Sierra -Leone	2013	Wave 5: 2011-2013
Togo	2013	Wave 5: 2011-2013
Zambia	2013 – 2014	Wave 6: 2016
Ghana	2014	Wave 6: 2016
Senegal	2014	Wave 6: 2016
Malawi	2015 – 2016	Wave 6: 2016
Uganda	2016	Wave 6: 2016
Cote D'Ivoire	2011 – 2012	Wave 5: 2011-2013
Nigeria	2008	Wave 4: 2008
Kenya	2014	Wave 6: 2016
Ethiopia	2008	N/A
Congo DRC	2013 – 2014	N/A
Gambia	2013	N/A
Chad	2015	N/A

Table A2.1: Summary Statistics

Variables	Mean	Standard Deviation	Min.	Max.	Count
(A) From the DHS					
In labor force	0.570	0.495	0	1	66012
In paid labor	0.481	0.499	0	1	66012
Self employed	0.374	0.484	0	1	66012
Age	28.06	9.004	15	49	66012
Years of education	7.534	4.627	0	21	65984
No. of children	2.058	2.213	0	16	66012
Kids under 5yrs	1.070	1.170	0	15	66012
Household size	6.317	4.108	1	42	66012
Husband's age	39.19	10.42	15	95	33115
Husband employed	0.948	0.221	0	1	37720
Marital status:					
Never married	0.344	0.475	0	1	66012
Married/with partner	0.554	0.497	0	1	66012
Widowed/Divorced	0.102	0.302	0	1	66012
Educational Attainment:					
No Education	0.169	0.375	0	1	66010
Primary Education	0.283	0.451	0	1	66010
Secondary/High School	0.443	0.497	0	1	66010
Higher Education	0.105	0.306	0	1	66010
Religion					
Traditional religion	0.017	0.128	0	1	65737
No religion	0.877	0.329	0	1	65737
Islam	0.032	0.176	0	1	65737
Christianity	0.072	0.259	0	1	65737
Other religion	0.002	0.045	0	1	65737

Data Sources: DHS various waves, Afrobarometer and Murdock's (1967) Ethnographic Atlas

Table A2.1 cont'd: Summary Statistics

Variables	Mean	Standard deviation	Min.	Max.	Count
(B) From Afro-barometer					
Avg. quality of Formal Instn.	0.450	0.120	0.127	0.847	66012
Trust (for tax dpt.)	0.439	0.141	0.079	0.875	66012
Trust (for police)	0.407	0.147	0.094	1	66012
Trust (for courts)	0.504	0.139	0.155	0.915	66012
(C) From the Ethnographic Atlas					
Descent system:					
Patrilineal descent	0.738	0.440	0	1	66012
Matrilineal descent	0.088	0.284	0	1	66012
Mixed descent	0.173	0.378	0	1	66012
Settlement pattern:					
Sedentary settlement	0.947	0.224	0	1	66900
Nomadic settlement	0.053	0.224	0	1	66900

Data Sources: DHS various waves, Afrobarometer and Murdock's (1967) Ethnographic Atlas

Chapter Three

3.0 Marriage Norms and Fertility Outcomes in Developing Countries

3.1 Introduction

The correlation between fertility rates and economic growth is a well-established economic fact (Galor & Weil, 1996). Empirical evidence suggests that reductions in fertility rates could increase female labour force participation by freeing up time from childcare. A lower fertility rate also has the potential to raise physical and human capital per capita via a lower child dependency ratio (Bloom, Canning, Fink, & Finlay, 2009; Bloom, Kuhn, & Prettner, 2017; Canning, Raja, & Yazbeck, 2015). Indeed, many countries have experienced significant reductions in total fertility rates in the last few decades. But by 2019 while the lifetime fertility in a majority of, mainly developed, countries was below 2.1 live births per woman, most developing countries recorded fertility rates above this level. The region of Sub-Saharan Africa (SSA), for example, had an average of 4.6 live births per woman, Oceania, excluding Australia and New Zealand (3.4), North Africa and Western Asia (2.9), and Central and Southern Asia (2.4) (UN 2019, World Population Prospects).

Adolescent fertility rate has also been significantly high in many countries of sub-Saharan Africa and Latin America. Between 2010 and 2019, adolescent birth rate (i.e., births per 1,000 women aged 15 to 19) was highest in sub-Saharan Africa, at 104 per 1,000 young women, followed by Latin America and the Caribbean at 63 per 1,000 young women. Besides swelling the total fertility rate, adolescent childbearing in this region has very dire health and development consequences for the young mothers and their children, and the larger society. Indeed, the projection by the United Nations that Sub-Saharan Africa could become the most populous region by around 2062, surpassing both Eastern and South-

Eastern Asia and Central and Southern Asia in size, is unsettling. The question then is why, despite the significant progress in development indicators like educational attainment, health care provision and falling child mortality rates, does the fertility decline in much of Sub-Saharan Africa remain sluggish or outrightly stalled in some countries.

Different factors, mostly economic, have been identified as contributing to the sluggish fertility decline in Africa. One of such factors is the late onset of fertility transition in Africa which has been blamed on the slow pace of economic development (Canning et al., 2015; Shapiro, 2015). But consensus is also growing lately that economic factors alone do not adequately explain a wide range of social and economic decisions made by people in African societies, including fertility decisions. Cultural beliefs and attitudes are growing in importance as determinants of the daily choices that are made by individuals and households in developing countries (Fernández, 2008; 2011).

The question addressed in this paper is, therefore, whether cultural norms can explain the unique fertility outcomes of women in Africa and, by extension, the sluggish decline in fertility rates compared to other developing regions. It specifically tests for the impact of cultural norms relating to female premarital sexual behaviour on the age at first birth, representing the commencement of motherhood, and the number of children a woman has (i.e., total fertility at the time of survey). These fertility outcomes have important ramifications for the general wellbeing of women within households and their capacity to contribute to the national economy by, say, participating in the labour force or in political leadership.

Anthropologists suggest that norms about sexuality developed out of the efforts of societies to adapt to the economic and cultural conditions prevalent in preindustrial times. They were

strategies adopted to guarantee the reproductive continuity of a group of people across time by ensuring that their daughters were married at the right time to the right suitors (Goethals, 1971; Murdock, 1964; Whiting, Burbank, & Ratner, 1986). Norms that regulate female premarital sexual behaviour grew out of the unique cultural conditions of each society and were dependent on factors like the nature of subsistence (i.e., whether it was a food producing or a food gathering society), production technology, social stratification (such as the presence of a caste system, etc.), political organization, religion, as well as rules of descent (whether patrilineal, matrilineal, or bilateral) and marital residence.

It is also thought that the various premarital sexual norms may have developed out of the need to curb out-of-wedlock pregnancies in many cultures, as Broude's (1996) review expounds. For example, in patrilineal societies, where descent and inheritance are through a person's father, premarital sexual relations were prohibited for females. Premarital pregnancy was problematic in such systems because an out-of-wedlock child not only reduced the marriage potential of its mother but was essentially without identity if the child's paternity was in doubt. However, in societies where descent was traced through the women – i.e., the matrilineal system – premarital sexual norms tended to be permissive or weakly sanctioned. Premarital pregnancy was tolerated in matrilineal systems because women belonged in their natal homes and were guaranteed the support and acceptance of their kin groups for themselves and their offspring. The nature of marriage rites was also found to correlate with norms of female premarital sexual behaviour. Dowry paying societies, where property was transferred from the bride's family to the groom's, had permissive premarital sexual norms. The practice of bride price payment (wealth transfer from the groom's family to the bride's), on the other hand, led to the evolution of restrictive premarital sexual norms. It is this backdrop that motivates the current empirical

investigation of the relationship between marriage norms, specifically norms that relate to female premarital sexual behaviour (representing culture) and a set of fertility outcomes.

A combination of data from different sources is used to address the research question. Information on the age at first birth and the number of children, as well as other individual characteristics, come from the Demographic and Health Surveys (DHS) for twenty-three (23) African countries and one country from the Middle East. Murdock's (1967a) Ethnographic Atlas (EA) provides information on the cultural practices of the respective ethnic groups identified in the DHS datasets. The focus in this research is on the norms of premarital sexual behaviour of women and girls. The matching of ethnicity names from the DHS to identical names in the Ethnographic Atlas helps in identifying each woman's ancestral practice regarding female premarital sexual behaviour (the details of this process are given in section 3.4.2) [2]. A sample of 196,608 women aged between 15 and 49 years from multiple DHS waves. For a robust result, the restrictive sexual norms obtained from the EA were split into: 'the early marriage of girls' norm and the 'insists on virginity of girls' norm. The justification for the split comes from the findings in previous African studies indicating a difference between cultures with emphasis on female virginity and cultures with emphasis on female early marriage (Swaartbooi-Xabadiya & Nduna, 2014). Additional data on measures of formal institutions[3] were obtained from Afro-barometer and the European Social Surveys (ESS) to create an interaction with culture. This interaction aids the isolation of informal institutions from cultural preferences.

[2] Figure A.1 (see Appendix) maps the distribution of female premarital sexual norms by ethnic groups in Africa using the information from Murdock's (1967) Ethnographic Atlas.

[3] Formal institutions include the state laws, constitutions, and regulations that structure economic, social, and political interactions; informal institutions are the unwritten rules (including taboos and customs) of conduct governing the behaviour of members of a local community (North, 1991).

To identify the effect of each type of female premarital sexual norm on fertility outcomes, this research studies women in urban areas, with the assumption that these women were living outside their indigenous villages. It exploits the fact that women from different cultural backgrounds live in the same urban neighbourhoods and face similar market and institutional settings. This allows the use of the 'epidemiological approach' to estimate the effect of the respective norms on fertility outcomes. Examples of such application can be found in the literature that examines a variety of outcomes for immigrants in developed countries (see Fernandez and Fogli, (2009) and Marcen, Molina et al. (2018) etc.). The differences in premarital sexual norms serve as a means of identifying variation in the effect of culture on the onset of motherhood and fertility at a given age. Comparison is made between the outcomes of the restrictive culture groups - the culture with emphasis on female early marriage and the culture with emphasis on female virginity – and outcomes of the culture that 'weakly censures' female premarital sexual behaviour.

The findings in this paper indicate that, compared to the culture that emphasizes neither female early marriage nor virginity (the control group), the culture with an emphasis on early marriage lowers a woman's age at first birth by 0.72 years while it increases her fertility by 0.32 children (0.45 for the 25 to 49 age cohort). By contrast, the culture with an emphasis on female virginity increases the female age at first birth by 1.13 years and reduces fertility by 0.76 children (0.85 for the older cohort) compared to the permissive or 'weakly censured' group. According to these findings, the cultural norms regarding female premarital sexual behaviour have a strong and significant impact on the fertility outcomes of women in African countries. This suggests a persistence of cultural influence on fertility behaviour and can be regarded as evidence in support of the theory of cultural transmission à la Bisin and Verdier (2011).

This paper contributes specifically to the literature on culture and fertility which, to a considerable extent, is focused on the fertility outcomes of immigrants in developed countries. A key paper in this regard is Fernandez and Fogli (2009), which employs the 'epidemiological approach' to examine the effect of culture on the work and fertility outcomes of second-generation immigrants in the United States of America. Using past female labour force participation rates (FLFP) and total fertility rates (TFR) from countries of ancestry as proxies for culture, they find that the cultural proxies significantly explain the observed outcomes despite controlling for market and institutional conditions. Marcen et al. (2018), also using American data, show that the mean number of children by country-of-origin correlates positively with the number of children born and the decision to have children by second-generation immigrants.

Studies with a focus on migrant populations in Western Europe include Chabe-Ferret (2013), for example, which uses the TeO Survey to examine the persistence of own-country fertility norms among immigrants in France. The author employs a duration model to document a positive effect of home country fertility norms on the hazard rate of second and third births. The paper does not, however, find any significant effect of own-country fertility norms on the age at first birth. On their part, Stichnoth and Yeter (2016) study first- and second-generation immigrants in Germany. They find a positive and significant effect of country-of-origin fertility rates (their measure of culture) on fertility outcomes, noting that the effect was strongest among the first-generation immigrants than it was for the second and later generations.

In a broader context, this study adds to the research on the outgrowth of gender norms from the socio-economic conditions of pre-industrial societies by matching historical norms

of female pre-marital sexual behaviour to current populations and estimating their effect on fertility outcomes. Giuliano's (2017) review highlights several historical precursors of modern-day gendered norms around the world. Some of which include the type of agriculture and agricultural technology a society practiced (Alesina, Giuliano, & Nunn, 2011; 2013; Giuliano, 2015; Hansen et al., 2015), rules of descent and kinship systems (Gneezy et al., 2009; Gottlieb & Robinson, 2016; Lowes, 2016), and ancestral patterns of settlement and social structures (Alesina et al., 2016; Michalopoulos et al., 2016; Moscona et al., 2018). The contribution of this study to existing research lies in its analysis of the effect of marital norms within ethnic groups on fertility outcomes using data from developing countries. Its novelty is in its choice of cultural proxy (female premarital sexual norms) which, to the best of my knowledge, has not been used in any previous study to analyse fertility outcomes in Africa or any other developing region. The distinct rules of female premarital sexual behaviour in different African societies shed light on the level of influence that cultural beliefs exert on fertility decisions in different countries.

The next section explains the context of this research and discusses the relevance of changes in fertility rates to development in Africa. Section 3.3 explores the origins of premarital sexual norms from sociological and anthropological writings. These inform our empirical analysis by highlighting the relevance of premarital norms in contemporary African contexts. A description of the data is given in Section 3.4 together with an explanation of the procedure used in linking historical attributes to the ethnic groups in the DHS dataset. The empirical model and identification strategy are discussed in section 3.5 while section 3.6 presents the estimation results. Lastly, the research findings are discussed in section 3.7 and the conclusions of the paper are reported in section 3.8.

3.2 Background: Culture and Fertility Decisions

In this section I explore a few theoretical explanations found in the literature to underpin the relationship between fertility, or in some cases, changes in the structure of the population, and economic development. It is not the intention of this section to provide a comprehensive review of this extensive literature but to give a selective highlight of key studies that form the supporting framework for this research. It also provides a context for the study.

3.2.1 Fertility Transition and Development: Is Africa different?

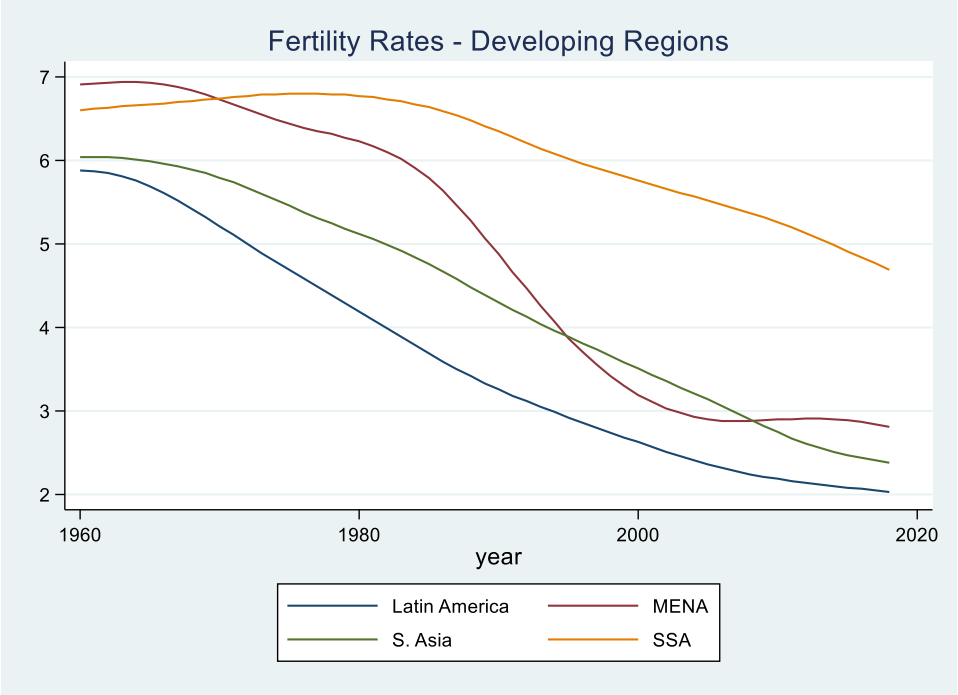
Fertility transition - the decline in fertility from high to low levels - is integral to the development success story of today's economically advanced countries. The steady reduction in total fertility rates in different regions of the world is widely associated with the growth in vital indicators like labour supply, income per capita, and human capital development (Bardhan & Udry, 1999; Bloom et al., 2009; Herzer, Strulik, & Vollmer, 2012). In Galor and Weil (1996; 2000), and Galor (2005a; 2005b) we find the theoretical foundations, through the vehicle of the Unified Growth Theory, for the association between declining fertility and the growth in income per capita. Their theory is used to explain why, and how, the Malthusian trap was averted in developing and developed countries (Chatterjee & Vogl, 2018). The key argument of the theory, as analysed by Galor (2005a), Galor and Weil (2000) and Galor (2011), is that technological progress which resulted from the industrial revolution in Western Europe, and the industrialization process in developing countries led to an increase in the demand for human capital. The higher demand for human capital incentivized parents to invest in their children's education, thus trading off child quantity for quality (Doepke, 2015). This trade off eventually resulted in the reduction

in fertility rates across countries (Becker et al. 1990; 1999). In addition, the higher demand for human capital was reinforced by the reduction in child labour, improvements in life expectancy, and a decreasing gender gap in education and job opportunities (Galor, 2005b). These were the precursors to the successful demographic transition in advanced and emerging economies.

Globally, fertility rates have declined since the 1950s, leading to a much slower growth in world population (United Nations, Department of Economic and Social Affairs, Population Division, 2019a.). However, high fertility rates and, by consequence, rapid population growth is still the norm in Africa, especially Sub-Saharan Africa. This remains a cause of concern among development experts and policy makers and for good reason, given the challenges that rising populations pose to sustainable development. The chief source of worry is Africa's inability to replicate the trend in demographic transition that countries in Europe and North America have experienced through the course of their development. The continent has also been unable to attain a rapid decline in fertility following rising income levels and rapid economic growth as is found among the developing countries of Asia and parts of Latin America (Bongaarts, Frank, & Lesthaeghe, 1984; Bongaarts & Casterline, 2013). Demographers have, however, observed that fertility transition began much later in Africa than it did in other developing regions although this process is not consistent across all African countries despite significant economic progress. They note that this phenomenon is rare in other developing regions, which begs the question why fertility transition in Africa is different (Bongaarts & Casterline, 2013; Bongaarts, Mensch, & Blanc, 2016; Kebede, Goujon, & Lutz, 2019).

A look at recent World Bank data reveals that Africa has seen a very slow decline in total fertility rates between 1965 and 2018 (Figure 3.1). This decline is also mainly driven by North Africa where there has been a steady drop in fertility from 1966 to 2006. The fertility rate in Sub-Saharan Africa, on the other hand, was rising between 1960 and 1972. It stagnated at roughly 6.8 births per woman from 1972 to 1980 before it began a sluggish decline. Therefore, compared to Southern Asia and Latin America, Africa's fertility decline was much slower between 1960 and 2010, and way higher than both regions by 2018 (WDI, 2019). Within Sub-Saharan Africa, there are significant variations across countries such that by 2018 fertility rates ranged widely between 2.4 births per woman in South Africa to 6.9 births per woman in Niger. Overall, the demographic transition in Sub-Saharan Africa is regarded as still in its very early stages (Canning et al., 2015).

Figure 3.1. Fertility Rates for selected Developing Regions (1960-2019)



Source: World Development Indicators (2019), Online access: https://databank.worldbank.org/source/world-development-indicators

Note: The figure shows trends in fertility rates in Latin America, Middle East, and North Africa (MENA), South Asia, and Sub-Saharan Africa (SSA)

The foregoing discussions give credence to the description of Africa as the last major frontier of development (Sinding, 2009). Several reasons account for this including the obvious fact that it lags other developing regions of the world in the race towards improved living standards for its citizens, a situation compounded by its high population growth rate. The need to regulate the rapidly rising African population so that the continent can benefit from the 'dividends' of demographic transition (see Bloom, Canning et al. (2003)) that other developing regions have long been enjoying, is considered a matter that should be prioritized by African leaders (Bloom et al., 2017; Eastwood & Lipton, 2011). An unacceptably high fertility rate is certainly not the only explanation for Africa's low productivity and income. Policy and institutional failures are among the key factors responsible for the pervasive poverty and dismal development outcomes in the continent. But, while it may not be a sufficient condition for economic development, fertility decline is seen as a necessary condition which, combined with the right the policy and institutional environment, can lead to the rapid development of any region or country (Sinding 2009; Canning, Raja et al. 2015).

3.2.2 The Importance of Fertility Transition: A Brief Overview of the Literature

There is a vast theoretical and empirical research on the effect of changes in fertility rate on economic growth which also outlines the potential benefits that poor countries stand to reap by actively seeking to lower their fertility rates (Ashraf, Weil, & Wilde, 2013; Das Gupta, Bongaarts, & Cleland, 2011). The study by Ashraf et. al. (2013) uses a demographic-economic simulation model to analyse the effect of exogenous shocks to fertility on GDP per capita while accounting for general equilibrium effects, the evolution of population age structure, accumulation of human and physical capital, and resource congestion. Matching

the model to data from Nigeria they established that a decline in fertility increases income per capita by an economically significant amount. Their research identifies four channels through which changes in fertility affect the economy. These are: the dependency effect, which is important in the early years of the transition; the congestion of fixed resources (or Malthusian) effect; the capital shallowing (or Solow) effect; and the human capital effect. A more concise description of these effects is given by Bloom, Kuhn et al. (2017) who regard them broadly as 'accounting' and 'behavioural' effects. Accounting effects, they argue, stem from a falling youth dependency ratio resulting from a decline in fertility. As the ratio of the working-age to dependent population rises, it expands the labour force, savings, and each worker's capacity to produce. Behavioural effects arise from the rise in female labour force participation, as well as greater investment in the health and education of children by families due to the fall in fertility.

An extended version of Ashraf et al.'s model is used by Mason, Lee et al. (2016) and Karra, Canning et al. (2017) to confirm the existence of the said effects. Mason et al.'s study incorporates the effects of capital, human capital, and labour to show that changes in the age structure of the population and investments in human capital substantially affect living standards in the long run. Karra et. al.'s extended model includes four new channels/effects: the effect of fertility on savings; the effect of fertility on children's health; feedback from education to fertility; and the inclusion of a three-sector model with market imperfections to capture the conditions in developing countries. They find that the additional channels doubled the effect of fertility reduction on income per capita and predicted a larger positive effect of the reduction in fertility on economic growth. These theoretical papers generally re-affirm the important role of human and physical capital in the productivity and income growth of a country. Investments in human capital is emphasized in the literature as a by-

product of the demographic transition. It is considered a huge necessity for achieving long run economic growth in developing countries (Becker, Gary S., Murphy, & Tamura, 1990; Bloom, Canning, Fink, & Finlay, 2012; Chatterjee & Vogl, 2018; Kalemli-Ozcan, Ryder, & Weil, 2000; Mason et al., 2016).

There are several empirical findings in support of the theoretical conclusions highlighted above. Different studies of the long-run effects of an experimental family planning program in Matlab, Bangladesh, by Joshi and Schultz (2007), Schultz (2009) and Joshi and Schultz (2013), show the positive effect of a program intervention on fertility levels. These studies find that the villages where the program was implemented experienced a decline in fertility of between 10 percent to 15 percent. The decline in fertility, the studies argue, led to higher household incomes (through a lower youth dependency ratio), improved the health and earnings status of women, and led to healthier and better educated children. Miller's (2010) study of the expansion of a family planning organization in Columbia (PROFAMILIA) added new evidence that women's access to contraceptives reduced fertility and their socio-economic outcomes. The study finds that PROFAMILIA lowered the cost of postponing first births and enabled young women to gain more education. This means that girls were able build their capacity to participate in the labour force and had prospects of a better and more independent lives.

Rosenzweig and Zhang (2009) also confirm the negative correlation between fertility and education levels with Chinese data. They use the presence of twins to identify the existence of a trade-off between the quantity of children and their quality, and whether a reduction in fertility raises a family's per child investment in human capital. The study finds that having

an extra child had a negative effect on educational performance, children's health, and expectations about college enrolment.

3.2.3 The Challenge of Adolescent Fertility

Adolescent fertility, defined by the World Health Organization (2004) as pregnancy and childbearing by girls aged between 10 and 19 years, has been a matter of great concern for many countries in recent times. This is because early childbearing has enormous implications for population growth and economic development (WDR, 2007) besides the personal and societal ramifications. The population of adolescents globally is quite significant, standing at 16 percent of total world population. Although there are more adolescents in South Asia (nearly 350 million according to UNICEF statistics) than in any other region, sub-Saharan Africa alone has the greatest proportion of its population as adolescents. They constitute 23 percent of total population in SSA with the numbers growing steadily (UNICEF, 2012; 2019). It is projected that by 2030, Sub-Saharan Africa will be home to almost 25 percent of the world's adolescent population given current trends in population growth (UNFPA, 2013).

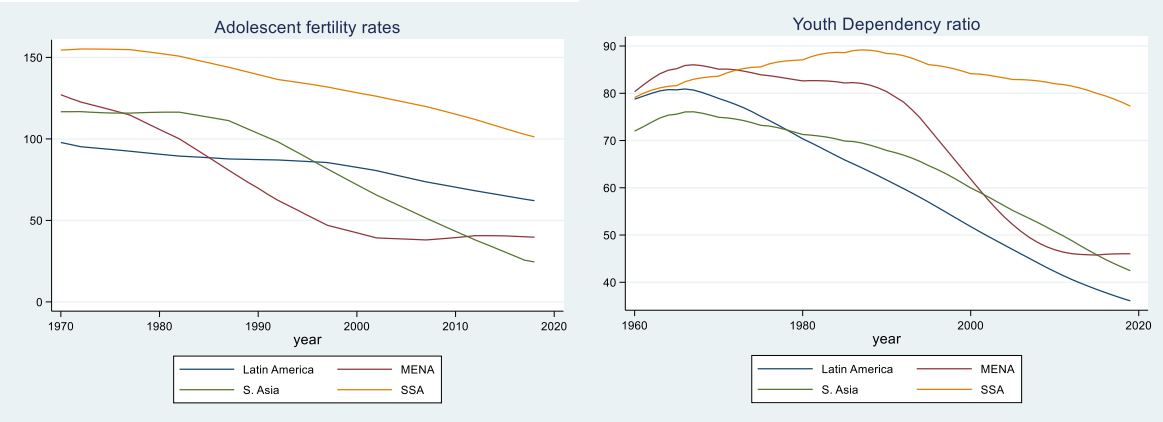
Another notable fact is that the rate of adolescent fertility in some Latin American and Sub-Saharan African countries is very high. Overall, adolescent fertility has remained higher in SSA than other developing regions (see figure 2a), declining from nearly 154 births in 1960 to 101 births per woman aged 10 to 19 years in 2019. It also contributes substantially to the high youth dependency ratio. Figure 2b shows that the youth dependency ratio in SSA is above the ratios in other developing regions. Evidently, the contribution of adolescent fertility to the total fertility rate in sub-Saharan Africa is an important explanatory factor of the stagnating fertility transition in the sub-region and in Africa as a whole. In general, it

poses some major problems for sustainable development in Africa. A rising adolescent fertility rate swells the total fertility rate, given falling child mortality rates, and results in a rapid population growth. The outcome is, therefore, a larger youth dependency ratio which lowers the productive capacity of the working-age population and reduces saving and investment. The consequence of an enlarged youth dependency ratio is a diversion of resources from investments in the production of capital goods to the provision of goods for current consumption by the younger population (Coale & Hoover, 1958), also see Das Gupta et. al. (2011) for review. The overall effect is a fall in long-run economic development and income growth (Das Gupta et al., 2011; Iyigun, 2000; Momota & Horii, 2013) (World Bank WDR 2007). This, no doubt, is the reality that most African countries are faced with.

In addition to the macroeconomic problems that result from a high adolescent fertility rate, there are personal difficulties that an adolescent girl faces from having an early childbirth. Her capacity for personal development is hugely diminished primarily because of her inability to continue schooling. Adolescent pregnancy is identified as a key factor in the school dropout and lower educational attainment of girls (Clark, Shelley, Koski, & Smith-Greenaway, 2017; Lloyd & Mensch, 2006; Lloyd & Mensch, 2008; Panday, Makiwane, Ranchod, & Letsoala, 2009; Sedgh, Finer, Bankole, Eilers, & Singh, 2015). Also, the health and wellbeing of young women and that of their children is jeopardized (Bongaarts et al., 2016; Ganchimeg et al., 2014; Sommer, Likindikoki, & Kaaya, 2015) (WDR 2007; UNICEF, 2012; World Bank, 2011). An out-of-wedlock pregnancy of an adolescent woman can expose her to social ostracism in communities where premarital sex is viewed in a negative light. She may also face financial difficulties if her family regards her pregnancy as shameful and thus reject her and her child (Singh, 1998).

Figure 3.2: Adolescent Fertility and Youth Dependency Ratio

(a) Adolescent Fertility Rate (1970-2019) (b) Youth Dependency Ratio (1960-2019)



Source: World Development Indicators (2019), Online access: https://databank.worldbank.org/source/world-development-indicators

Note: The figure shows trends in (a) Adolescent fertility rates, and (b) Youth Dependency Ratios for Latin America, Middle East, and North Africa (MENA), Southern Asia, and Sub-Saharan Africa (SSA)

3.2.4 Determinants of Fertility in Africa

The foregoing discussions beg the question of why adult and adolescent fertility remains persistently high in African countries. From the standpoint of economic research, the stall in fertility decline can be pinned on a variety of factors including under-development, low level of education, and the failure of political leaders to prioritize the provision of reproductive health services (Bongaarts, 2011; Bongaarts, 2017; Kebede et al., 2019; Shapiro, 2015). The conventional theory of fertility transition does not, however, completely explain the nature and causes of the sluggish decline in fertility in Sub-Saharan Africa. This gap is now being filled by recent studies that are focusing more on the social and cultural dynamics of African societies. Such studies are increasingly helping researchers to identify non-economic reasons for the high fertility rates in Sub-Saharan Africa which have defied the growth in income per capita and levels of educational attainment, low child mortality and improvements in other development indicators.

A succinct summary of some of the social and economic explanations for the high fertility rates observed across Africa is given in Caldwell et al. (1992). The importance of ancestry and descent systems with well-established support networks within the extended family system features prominently. The extended family system has a unique relevance in the African society because it provides social security for the older generation. The practice of polygyny in most parts of Africa and its tendency to absorb men of all economic costs of childrearing, as well as the communal land ownership system, make larger families an attractive choice. Added to that is the pro-natalist nature of African societies which feeds the desire for a large family size and raises the demand for children. Other promoters of high fertility are the land tenure and inheritance system wherein a large family means more land; kinship and family structures; as well as religion and cultural attitudes (Bongaarts & Watkins, 1996; Bongaarts & Casterline, 2013; Bongaarts et al., 2016; Caldwell & Caldwell, 1987; Canning et al., 2015; Casterline & Agyei-Mensah, 2017; Johnson-Hanks, 2015). These factors help to reinforce the strength of cultural preferences on fertility decisions in different countries. The task in this paper is to investigate whether the cultural norms surrounding female premarital sexual behaviour influence the fertility decisions of women in contemporary societies. The next section will, therefore, briefly explore some anthropological writings to understand the development of female pre-marital sexual norms in different societies.

3.3 Conceptual Framework

This section describes the concepts guiding the empirical analysis in this paper. It discusses the nature and historical origins of the rules governing female premarital sexual behaviour that are found in modern societies. The ideas presented here are mainly from the sociology

and anthropology literature. They provide insight on the cultural values and practices surrounding fertility and the prescriptions for female sexual and reproductive behaviour which were common in preindustrial societies. Culture is conceptualized in this study as the shared beliefs, attitudes, and preferences of a group of people. These shared beliefs and perceptions metamorphose into norms of behaviour which shape, and are shaped, by the system in which they are enshrined (Cislaghi & Shakya, 2018; Mackie, Moneti, Shakya, & Denny, 2015; Pulerwitz et al., 2019). Cultural norms tend to persist due to the social pressure and reward (or penalty) systems that drive compliance and/or deter defiance.

There is no gainsaying the fact that women are at the centre of the reproductive process and that every lineage depends on the fecundity of its females for continuity. It is, therefore, understandable for different ideologies and norms concerning female sexuality to be found in different societies. Some common ideologies include those that surround the transition from girlhood to womanhood, the emphasis on upholding family honour, submission to husbands and in-laws, as well as the value placed on serving one's family (Bantebya, Muhanguzi, & Watson, 2014; Marcus, Harper, Brodbeck, & Page, 2015). These, and other rules of their kind, are often intended to ensure the continuity of procreation across generations. They dictate how children should be cared for and what practices should govern adolescent sexuality, courtship and marriage, divorce, inheritance, etc. (Whiting et al., 1986). One of such rules concerns female premarital sexual behaviour and is the cultural proxy of choice for the analysis in this paper.

Studies in anthropology highlight various cultural norms which governed female premarital sexual behaviour in pre-industrial societies that may be found in modern societies today. These range from norms that are very permissive towards, or tolerant of, female pre-marital

sexual activities to norms that expressly prohibit pre-marital sexual relations (Broude, 1975; 1996; Heise, 1967). From ethnographic records, Murdock (1964) groups these pre-marital sexual norms into three distinct variants: the restrictive norms, the permissive norms, and the intermediate (or semi-restrictive) group which is a mix of the two extreme cases and is dependent on prevailing circumstances. Generally, restrictive norms were practiced by societies which valued the chastity of women and girls. Unmarried girls were expected to preserve their virginities until marriage and were severely sanctioned if they engaged in pre-marital sex. Societies where virginity testing at marriage is practiced are among those with restrictive premarital sexual norms (Ember, Carol R., Milagro Escobar, and Noah Rossen 2019). It is also known that some of the societies with restrictive premarital sexual norms "arrange that their daughters are married at or before menarche … explicitly for the purpose of ensuring premarital virginity" (Whiting et at. 1986, 296). However, not all societies where the practice of early/arranged marriage of girls is practiced prohibit female premarital sexual behaviour. Whiting et al. cite the !Kung San of Botswana as an example of a society where female premarital sexual activities are permitted or ignored but childhood betrothal and early marriage is customary.

A second category of premarital sexual norms was found in societies where there were little to no restrictions on premarital sexual relations and female chastity was not relevant. The Trobiand Islanders of Melanesia and the Lepcha of India are some examples of societies known to actively promote premarital sexual relationships (Whiting et al 1986; Ember et al. 2019). The last category is made up of societies with intermediate, or semi-restrictive, norms. This includes a variety of cases such as the cultures where premarital sex is prohibited in principle but weakly sanctioned; societies where trial marriages were practiced; and societies where female premarital sex was sanctioned only when it resulted

in a pregnancy. The strength of each variant was determined by the socio-cultural complexity of a given society. Some examples of societies in this category are the Kikuyu of Kenya and the Kwoma of New Guinea (Whiting et al. 1986).

Based on this insight, it is possible to classify different ethnic groups in contemporary data according to their characteristic norms of female premarital sexual behaviour. This is achieved in this paper by matching ethnographic information on premarital norms (from Murdock's Ethnographic Atlas) to ethnicity names in the Demographic and Health Surveys for the sample of countries with available data. The distribution of premarital norms across Africa is shown in Figure A3.1 in the paper's Appendix. Unfortunately, we find a large proportion of ethnic groups in Africa with missing data on female pre-marital sexual norms. The map however indicates that 25 percent of ethnic groups in Africa have permissive female premarital sex norms while 13 percent have restrictive norms. The restrictive group comprises of the culture with an emphasis on early marriage and the culture with an emphasis on female virginity at marriage.

Evidence from studies with African data suggest that significant associations exist between the norms of premarital sexual behaviour and, for example, premarital fertility and the prevalence of abortion in Cameroon (Johnson-Hanks, 2002; 2003); adolescent pregnancy in Zambia (Svanemyr, 2020); and the relaying of contradictory messages regarding sexuality to young people in rural Tanzania (Wight et al., 2006). Johnson-Hanks (2003) specifically employs ethnographic data to compare the outcomes of two ethnic groups in Cameroon. She finds that premarital sexual relations among adolescents are not just tolerated by the Beti ethnic group but are considered a normal way of life. It is no surprise, therefore, that late female marriage and a high rate of premarital fertility is prevalent among the Betis. By

contrast, the Biu-Mandara abhor premarital sexual relations and insist on female virginity at marriage. They enforce this rule by closely monitoring young women's movements and interactions with the opposite gender. Strict sanctions are characteristically applied on violators while the practice of early marriage is commonly used to curb female premarital sexual relationships.

Similar restrictive norms are found among several ethnic groups in Southern Africa. The Xhosa (i.e., the Zulus of South Africa), for example, emphasis the virginity of girls at marriage and are known for conducting regular virginity tests on girls over the course of their maidenhood. Girls who pass the tests are openly rewarded while the ones who fail face public humiliation (Bennett, Mills, & Munnick, 2010; Durojaye, 2016; Stander, 2016; Swaartbooi-Xabadiya & Nduna, 2014). The emphasis on the chastity of young women and the preservation of their virginity often transcends the desire to simply prevent premarital pregnancy and the birth of illegitimate children. It borders a lot on protecting the family name, which essentially means protecting the honour and pride of the male members of the girl's family. Thus, the integrity of the men in the immediate household and that of the larger lineage are inextricably tied to the chastity of their daughters and wives. Violations of these norms are often met with harsh sanctions and, in cultures where honour killing is acceptable, the loss of virginity often means the loss of life for the girl and her seducer (Addison, 2010; Birech, 2013; Marcus et al., 2015; Schlegel, 1991; Schneider, J., 1971). In the African context, Swaartbooi-Xabadiya and Nduna's study, which was based on adolescents between the ages of 16 to 19 years, shows that female virginity is not only highly valued in Southern African societies, but female chastity is strategically rewarded to make violation unattractive. It also underlines the fact that, though the premarital norms are restrictive in these societies, early marriage is not emphasized and, therefore, early childbearing is less

common. This raises the potential of finding in this study a higher age at first birth and lower fertility among women from the culture with an emphasis on female virginity at marriage.

3.4. Data Description

3.4.1 Data Sources and Sample

The starting point of data collection is the Demographic and Health Surveys (DHS) for Sub-Saharan African (SSA) and the Middle East and North African (MENA) countries. Individual level data from the DHS have been combined with data from Afro-barometer, European Social Survey (ESS), and Murdock's (1967) Ethnographic Atlas (EA) to create a rich dataset containing information on fertility, ethnicity, pre-marital sexual norms, and a measure of formal institutions. The DHS waves are from the period 1986 to 2017 while the seventh round of Afro-barometer (Round 7) and the fourth round of ESS (Round 4) were used. The information in the respective data sources is, clearly, from different time periods but this time difference poses no significant challenge for the study especially because behavioural changes are often sluggish across time. All available DHS waves with information on a woman's ethnicity or her native language, and age at first birth were used. Some countries were dropped for a lack of information on age at first birth. For countries where native language rather than ethnicity was recorded in the data, the ethnic group was traced and matched to the language with the help of an online version of the 23rd Edition of Ethnologue: Languages of the World (edited by Ebarhard, Gary and Charles 2020), and the Joshua Project (n.d), an independent research initiative that highlights ethnic people groups of the world. This enabled the matching of a lot more observations from the DHS to Murdock's Ethnographic Atlas.

An important limitation with the data was the lack of barometer information for eight countries – Angola, Congo DRC, Congo-Brazzaville, Ethiopia, Mozambique, Niger, Rwanda, and Chad. For the Middle East and North African countries in the DHS, only Turkey and Egypt have ethnographic information on pre-marital sexual norms. This considerably reduced the number of MENA countries included in the analysis. Also, within the countries included there were some ethnic groups with missing ethnographic information on pre-marital sexual norms which were then dropped from the analysis. In total, only twenty-four countries had complete information on fertility behaviour, pre-marital sexual norms, and perceptions about formal institutions. Eighteen countries have complete information for at least two waves while six had for only one wave. Lastly, the research is based on the urban population alone which allows the use of the 'epidemiological approach' to analysis the fertility decisions of women outside their local/village communities. The analysis includes all women aged 15 to 49 living in urban areas, a total of 196,608 observations. The list of countries and survey waves, and the names of ethnic groups with their respective norms of pre-marital sexual behaviour are included in the Appendix (Table A3.1).

3.4.2 Data Matching Procedure

Information on the pre-marital sexual norms of different ethnic groups come from Murdock's (1967) Ethnographic Atlas. The Ethnographic Atlas is used in several studies including Fenske (2013); Michalopoulos and Papaioannou (2013); Michalopoulos, Putterman et al. (2016) Alesina, Briosch et al. (2016) to link the historical characteristics of different groups of people to their contemporary outcomes. Michalopoulos et al. (2016), for example, combines data from the Ethnographic Atlas with the DHS to study the influence of ancestral lifeways on modern populations. In the present paper, ethnicity names in the DHS were

directly matched to their counterparts in the EA where possible. In several cases a direct match was not possible due, for example, to differences in spelling, or because some ethnic groups in the DHS were sub-groups of those in the EA, and vice versa. To resolve this, a concordance of ethnicity names was constructed with information from the 23rd Edition of Ethnologue: Languages of the world (online version) and Joshua Project's website. Constructing the language and ethnicity concordance was done by closely following the procedure in Michalopoulos, Putterman et al. (2016), and Giuliano and Nunn (2018). Thus, out of the 379 ethnic groups in the DHS with complete information included in the study, 36 percent (137) were matched directly while 64 percent (241) were matched through the concordance of names.

A second data matching was done between the DHS, the Afro-barometer, and the European Social Survey (for Turkey only) to include information on measures of formal institutions. The data matching was done at the level of the regions in each country using identical regional names from the respective sets of surveys. In large part, the regional names were the same but, in several cases, the regional names in the DHS were different from those in the Afro-barometer – DHS regions were either smaller units of the regions in Afro-barometer or larger, older regional delineations. To ensure uniformity, and with the aid of country maps accessed online, regions in the DHS or the Afro-barometer and the ESS were either grouped or renamed. For example, in Egypt, current regions are known as governorates, as used in Afro-barometer and Arab barometer. But these are sub-divisions of the old regions used in the DHS. Current and older maps of Egypt were used to group the governorates into the old Egyptian regions. The relevance of this exercise is to obtain values for formal institutions for each region from Afro-barometer and ESS and assign them to the

regions in the DHS. This is vital for analysing the interaction effect of formal institutions on culture.

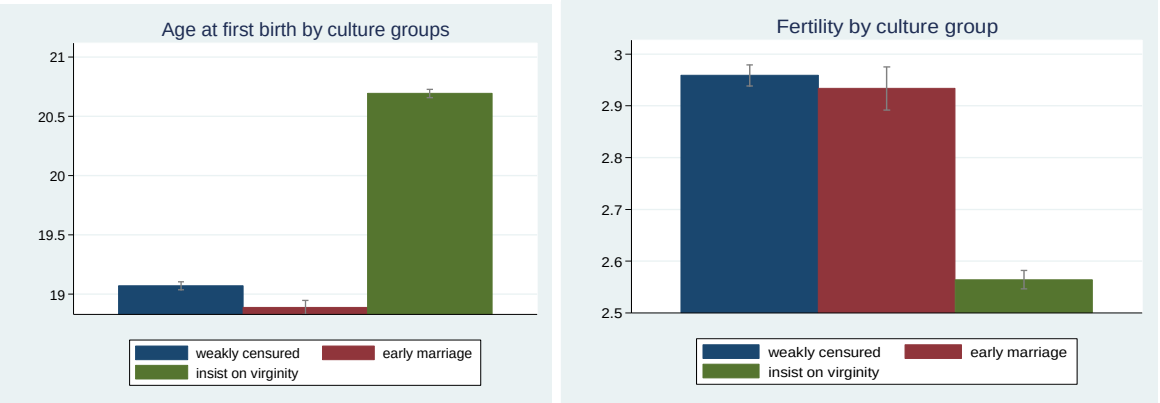
3.4.3 Description of Key Variables

The main cultural variable is the 'Norms of Pre-marital sexual behaviour of girls', which is categorized in the Ethnographic Atlas as: (i) Early marriage of females, (ii) Insistence on virginity of girls, (iii) Prohibited but weakly censured, (iv) Allowed, censured only if girl is pregnant, and (v) Freely permitted. This variable was recoded into three distinct categories: (i) Early marriage (ii) Insistence on virginity of girls, and (iii) Weakly censured. This categorization enables a comparison between societies with strong, or restrictive, pre-marital sexual norms with societies that have less restrictive, or permissive, pre-marital sexual norms for women. The aim is to examine how specific norms of pre-marital sexual behaviour influence the fertility outcomes of the current population of women in the study area. Variation in fertility behaviour is expected within localities (using the primary sampling units of the DHS) where people from different cultural backgrounds reside. The summary statistics for the urban sub-sample, Table A3.8 of the Appendix, shows that 35 percent of women in the study sample have a cultural background that weakly censures or is permissive towards the pre-marital sexual activities of girls. The proportion for the overall sample is 33 percent. Early marriage appears to be the less common form of marital norm in both the overall and urban samples as only 1 percent of women belong in this culture group. Lastly, the practice of guarding the virginity of girls is much more common as the table shows that 64 percent of women in the study sample have this cultural background.

The outcome variables for this research are a woman's age at first birth, and the number of children she has. Age at first birth represents the commencement of motherhood, it is

neutral to marital status but can be expected to correlate with early marriage. This is an important outcome because it helps us assess the prevalence of adolescent or teenage fertility across culture groups. The average age at first birth in the data is roughly 20 years for urban dwellers. In first panel of Figure 3.3 we visualize the distribution of the age at first birth across the three culture groups. Specifically, in cultures where girls must remain virgins until marriage women reach an average age of 20.5 years before having their first child. In cultures where early marriage is the norm, the average woman's age at first birth is roughly 18 years whereas in cultures where the pre-marital sexual behaviour of girls is not strictly censured the average age at first birth is just above 19 years.

Figure 3.3: Average Age at First Birth and Number of Children by Cultural Group



Source: Author's computations from the DHS and the Ethnographic Atlas

The total fertility rate is measured by the number of children ever born by a woman. It will, potentially, be less useful for younger women in this study than for older women since the younger women are less likely to have completed their fertility at the time of the survey. Notwithstanding, the respective culture groups show some interesting dynamics as seen in second panel of Figure 3.3. The weakly censured culture group and the early female marriage group tend to have more children on average, about 3 children per woman. Women from the culture group with emphasis on female virginity before marriage have, on

average, 2.6 children each. The graphs give insight on the relationship between each culture group and our outcomes variables. Specifically, they show that women from the culture with emphasis on female virginity before marriage have, on average, a higher age at first birth and a lower fertility rate compared to women from cultures with emphasis on early female marriage and the culture in which female pre-marital sexual relations are weakly censured. Other explanatory variables in the model included a woman's age, her religion, year of birth, and survey year dummies. An average woman in the urban sample is 33 years old and has about 6 years of education. A transformation to the variable 'religion' was done for Turkey which had no data on religion in the DHS. With over 98 per cent recorded in the ESS as Muslims, attesting to the existing state-wide Islamic religion, all observations in the Turkish data were assigned Islam as their religion.

Finally, the effect of formal institutions is measured by an average of two variables - trust for the police department and trust for the courts of law. Response to the question: "How much do you trust each of the following, or haven't you heard enough about them to decide?" were coded for the Police department and the Courts of Law. The categories of response include: 'Not at all'; 'Just a little'; 'Somewhat'; 'A lot'; and 'don't know/haven't heard enough'. To make each into a binary variable, the options were recoded into 'trust' and 'no trust', to capture the strength of each institutional variable. Thus, 'not at all', and 'just a little' responses were coded as 'no trust', while 'somewhat' and 'a lot' were coded as 'trust'. 'Don't know/have not heard enough' responses were coded in the original data as missing values and, as such, were not included when computing the average. The resultant variable, a proxy for formal institutions, ranges between 0 and 1. An average value closer to 1 represents strong formal institutions while a value closer to 0 indicates weak formal

institutions. In the study sample the average value for formal institution is 0.52, indicating that 52 percent of those surveyed trust existing regulatory and legal institutions.

The choice of variables for institutions is arbitrary and the trust variables selected are simply proxies for formal institutions in general. It is assumed that the level of institutional quality in one area could be indicative of the average quality of institutional arrangements across all other areas of national life. Finally, and based on the previously established understanding of the inter-relatedness between culture and formal institutions, the measure of formal institutions enters the model through its interaction with each cultural variable. The interaction term will, as before, show how the effect of culture changes with changes in the quality of formal institutions.

3.5 Empirical strategy

3.5.1 Identification

Identifying the effect of culture is inherently challenging because of how varied it has been defined. Several different measures are used in the literature to conceptualize culture in a way that permits concise estimations of its effect on outcomes. This study utilizes the norms surrounding female pre-marital sexual behaviour as a measure of culture. Each ethnic group in the chosen data is matched to its unique pre-marital sexual norm as given in the Ethnographic Atlas and the women from these ethnic groups are assigned their respective marriage norms. The norms are in three categories, and each emphasizes a different aspect of female pre-marital sexual behaviour. These differences in pre-marital rules of behaviour enable the identification of the effect of culture on the outcomes of interest. An important element of this empirical strategy is the application of the 'epidemiological approach' which has been used in several studies to estimate the effect of culture on a variety of outcomes

(see for example Fernandez (2007); Fernandez and Fogli, (2009); Stichnoth and Yeter (2016); Marcen, Molina et. al. (2018)).

The 'epidemiological approach' is applied here to identify culture by examining the outcomes of female urban dwellers within their own countries. It is, however, impossible to determine from our data whether a woman was born in an urban area or whether she migrated there from a rural area. But given recent trends in urbanization and the high rate of rural-urban migration across Africa, for example (United Nations, Department of Economic and Social Affairs, Population Division, 2019b), it is plausible to assume that a large proportion of urban dwellers live outside of their indigenous communities. Since we observe women from different ethnic groups in the data living in the same urban localities and sharing the same markets and formal institutions, we can compare their fertility outcomes based on the pre-marital sexual norms of their respective ethnic groups. This approach also helps us to determine whether any observed variations in fertility behaviour are driven solely by cultural preferences or they are also influenced by informal institutions. The argument in this research is that women living outside their local communities and villages are less constrained by the informal rules and regulations in such communities and, therefore, their fertility decisions will more likely be based on their internalized cultural preferences. It is also expected that their fertility choices will be moderated by the strength of formal institutions.

3.5.2 Model Specification and Estimation

The goal of this paper is to examine the effect of marriage norms on female fertility behaviour. Specifically, it investigates how the norms of female pre-marital sexual behaviour affect women's age at first birth, representing their commencement of motherhood, and

fertility at a given age. Women from different ethnic groups and cultural backgrounds are studied within a common institutional setting. We estimate the relationship between cultural norms and fertility behaviour using the following model:

$$y_{ig} = \alpha_0 + \alpha_g + Z'_{ig}\boldsymbol{\beta} + X'_{ig}\Upsilon + \eta_g + \epsilon_{ig} \qquad (1)$$

Where y_{ig} is either the age at first birth or the number of children of woman i in location g. We define Z_{ig} as a vector of binary variables indicating whether woman i in location g belongs to a culture with emphasis on the early marriage of girls, the culture that insists on female virginity before marriage, or a culture group that permits/weakly censures female pre-marital sexual behaviour. The vector, X_{ig}, contains individual characteristics such as age (and its square), religion, and year of birth. Given the apparent endogeneity of education and household characteristics, and the lack of parental information in the DHS data, these variables have been excluded. Location-specific effects are captured in α_g (the sampling clusters in the data); η_g has the survey year fixed effects while ϵ is the random disturbance term.

To explore the influence of formal institutions on each marriage norm, a second model is also estimated with an additional variable for the interaction of culture with a measure of formal institutions:

$$y_{ig} = \alpha_0 + \alpha_g + Z'_{ig}\boldsymbol{\beta} + \left(Z'_{ig} * H\right)\boldsymbol{\Gamma} + X'_{ig}\Upsilon + \eta_g + \epsilon_{ig} \qquad (2)$$

All parameters are as earlier defined. While H represents the measure of formal institutions (already defined in section 4.3), $\boldsymbol{\Gamma}$ is a vector of interaction terms. Equations (1) and (2) are estimated by Ordinary Least Squares without and with location fixed effects. Since women in the study are from different cultural backgrounds but reside in common urban centres,

we expect variations in outcomes at the community level. Therefore, the standard errors reported have been corrected for clustering at this level.

3.6 Results

Estimates are reported for age at first birth and fertility levels for the main model (equation 1) and the extended version that includes the interaction of culture with formal institutions (equation 2). The results are presented in Tables 3.1 to 3.3 with columns having similar characteristics. Table 3.1 shows the main effect of culture on the age at first birth from different specifications in Columns (1) through (4). The effect of the interaction between culture and a representation of formal institutions is shown, also for various specifications, in Columns (5) to (8). In Table 3.2, the estimates are reported for fertility, i.e., the number of children at a given age, from the full sample of women studied. To understand the likely effect of culture on completed fertility, a separate model has been estimated for a restricted sample of women of ages 25 to 49 years and the results are reported in Table 3.3.

We begin first by estimating a very simple version of our models, each including only the outcome variable and the cultural proxy, without and with location fixed effects. Results for all the parsimonious models are shown in columns (1), (3), (5) and (7) for each table while columns (2), (4), (6) and (8) each present coefficient estimates for the cultural proxy (and interaction terms as the case may be) as well as controls for other individual characteristics. For ease of readability each table reports estimates for the cultural variables and their interacted versions only. The discussion and interpretation of the results will focus on the outputs in columns (4) and (8) (our preferred specifications) which contain full controls and location fixed effects. Because the cultural proxy has three distinct categories, the results are reported for two groups i.e., the culture with an emphasis on early marriage and the

culture with an emphasis on female virginity before marriage, while the third group is omitted. Thus, the comparison is between the outcomes for women in the reported groups and the outcomes for women from the culture in which female premarital sexual behaviour is weakly censured.

Considering the main model, the estimates in columns (1) to (4) of Table 3.1 suggest that the culture with emphasis on female early marriage has a negative and statistically significant effect on the age at first birth across all four specifications. The signs support a priori expectations about the relationship between the cultural emphasis on early female marriage and the age at first birth (Jensen & Thornton, 2003). This outcome also suggests that women from cultures with an emphasis on early marriage begin childbearing at a significantly younger age than women whose cultural norms are less restrictive and weakly censure female pre-marital sexual behaviour. On the other hand, we can see that the culture with an emphasis on female virginity before marriage has a positive and statistically significant effect on the age at first birth, as shown by our data (Figure 3.3 (a)). Such an effect indicates that women from this culture are more likely to commence childbearing at an older age than women with a weakly censured cultural background as well as women from cultures that emphasize early female marriage.

There are two separate estimation results for fertility rate, one for the full sample and another for the restricted sample (women of ages 25 to 49). Table 3.2 shows that the coefficient estimates for the culture with an emphasis on female early marriage are positive for all specifications and only statistically insignificant for the simple model with location fixed effects. The positive outcomes are, however, not surprising since early marriage correlates with high fertility. Again, by contrast, insisting on female virginity at marriage has

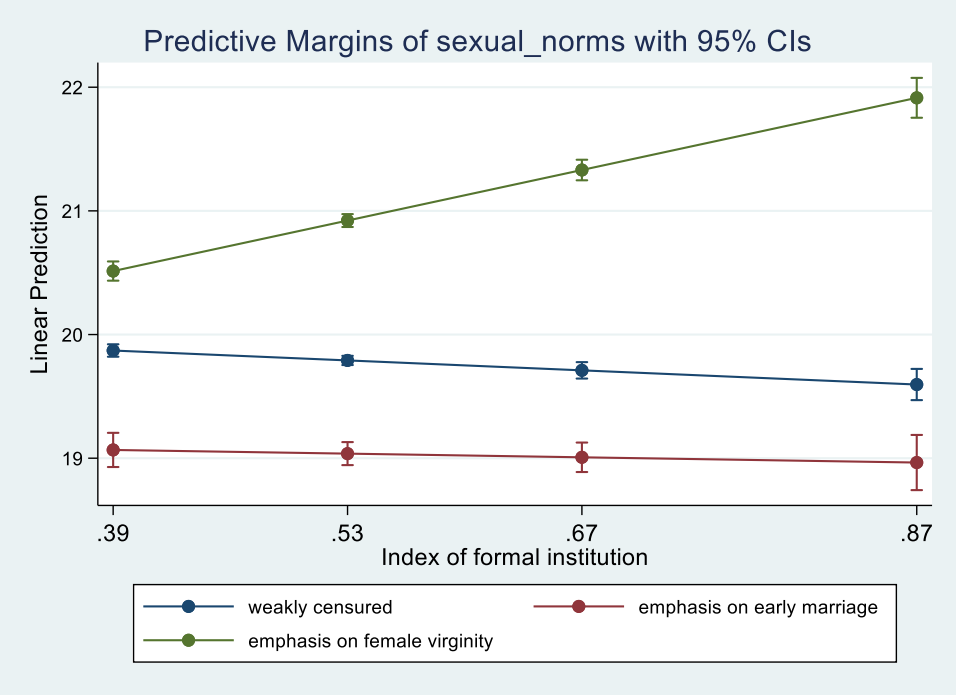
consistently negative and statistically significant coefficients across the different specifications, suggesting that a cultural emphasis on female virginity before marriage lowers fertility. Restricting the sample to women above 25 years yields an even stronger effect on fertility with larger magnitudes and higher levels of statistical significance, as seen in Table 3.3. This simply confirms the opposite effects of the cultural emphases on early marriage as well as female virginity at marriage on fertility relative to the culture which emphasises none of these values.

Next, we set out to ascertain whether the effects observed come mainly from culture or they are confounded by informal constraints on behaviour. To do this, we expand the model to include an interaction between the three cultural variables and an index of formal institutions. The estimates are also reported in columns (5) to (7) of Tables 3.1 to 3.3 for age at first birth and fertility (full sample and sub-sample). Returning to Table 3.1 and, again, focusing on the estimates in column (8), we see that while there is no statistically significant effect for the interaction between formal institutions and the cultural emphasis on early marriage, the interaction effect is statistically significant for the culture with emphasis on female virginity at marriage. These interaction terms suggest that the effect of each cultural proxy varies with the strength of formal institutions in different locations. Moreover, having a statistically significant interaction coefficient indicates that formal institutions matter in determining the effect of culture. Without the interaction variables, such as we have in the first model, the effects of the cultural variables are likely to also capture certain unobserved influences, most likely the influence of informal institutions.

The last set of results (Tables 3.2 and 3.3) provide a clearer picture, showing that, with respect of fertility at any given age, the coefficient estimates for the interaction terms are

statistically significant for both the cultural emphasis on early female marriage and the emphasis on female virginity at marriage. In addition, the results from the interactions are shown graphically in Figures 3.4 and 3.5. Figure 3.4 reveals that the strength of formal institutions does not affect the age at first birth for the culture with emphasis on early marriage, hence the lack of statistical significance of the estimates. But the culture with an emphasis on female virginity returns a remarkably strong interaction effect on the age at first birth, indicated by the upward trend as formal institutions become stronger. With respect to fertility, there is clearly a downward effect (cf. Figure 3.5) for both cultural groups relative to the culture in which female premarital sexual behaviour is weakly censured. Overall, as the quality of formal institutions improves, the fall in fertility rate is sharper for women in the culture with emphasis on female virginity than for the culture with emphasis on early marriage. There is, obviously, no effect on fertility for women in the culture which weakly censures female premarital sexual behaviour.

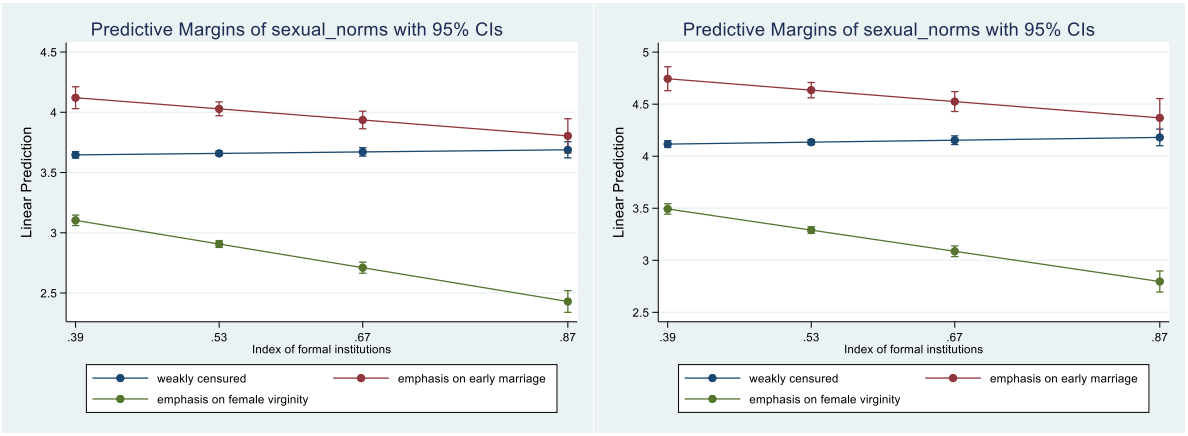
Figure 3.4: Interaction effect of formal institutions on Age at first birth (Full sample)



Source: Computed from Author's regression analysis using DHS, the EA, and Afro-barometer data sets. Figure shows the changes in age at first birth of women within each culture as the measure of formal institutions increases from a low to a high level.

Figure 3.5: Interaction effect of formal institutions on Fertility

(a) Full sample (b) Sub-sample: (25 to 49-year-olds)



Source: Computed from Author's regression analysis using DHS, the EA, and Afro-barometer data sets.
Figure shows the changes in fertility rates within each culture group as the measure of formal institutions increases from a low to a high level.

3.7. Discussion of findings

This paper estimates the effect of culture – captured by the norms governing female premarital sexual behaviour - on the age at first birth and fertility. This section discusses the findings based on the estimates reported in section 6.

3.7.1 Effect of culture on Age at First Birth

According to our estimates, the cultural norm with emphasis on female early marriage significantly decreases the age at first birth by approximately 0.72 years relative to the culture that weakly censures female premarital sexual behaviour. It is reasonable to expect this effect especially in societies where early female marriage is valued. Giving of daughters early in marriage is valued in some societies partly because of the desire to make full use of a woman's reproductive lifespan. This is common in cultures like the Masai tribe in Kenya, where large families are of prime importance (Whiting et al., 1986). In such cultures, women are valued mainly for their reproductive abilities which makes the adoption of birth control

measures at the early stages of marital life highly unlikely. So, women who marry early have a greater likelihood of giving birth to their first babies at a very young age.

We find a huge contrast in the outcome for women from the culture in which female virginity at marriage is highly valued. The estimates show that this marriage norm has a strongly positive effect on the age at first birth. Thus, compared to the culture with a less restrictive disposition toward female pre-marital sexual behaviour, the age at first birth is higher by 1.13 years for women with a virginity cultural background even after controlling for heterogenous location effects. This may be surprising, from a cursory perspective, because it seems logical to expect a correlation between insisting on girls' virginity and early marriage, and by extension, an early commencement of childbearing. Indeed Birech (2013), and Fayisetan and Pebley (1989) explain that the traditional marital requirement of a virgin bride was largely sustained through the early marriage of girls as practiced in India and across several ethnic groups in West Africa. The assumption is that younger brides are more likely to be virgins and highly fecund at the early stages of marriage. Findings in this paper suggest that the conclusions in the above literature do not hold in all cases. A plausible explanation may be Whiting et al.'s (1986) 'Duration of Maidenhood across Cultures' which classifies preindustrial cultures according to the strategy of maidenhood each society adopted. Whiting and co-authors' investigations show that in cultures where late female marriage and prolonged maidenhood (the period between menarche and marriage) was practiced, the virginity of girls before marriage was valued. Such cultures strictly curbed female pre-marital sexual behaviour to prevent out-of-wedlock pregnancies. Thus, in while societies with a duration of maidenhood of five or more years had restrictive rules governing female pre-marital sexual behaviour, societies where maidenhood lasted for about three to four years were more tolerant of female premarital sexual relations. There

are also societies with a short or non-existent maidenhood. These were found to have a mix of restrictive and permissive rules of female premarital sexual relations. While some in this category practiced early/arranged marriages with no real emphasis on female chastity, others placed a high premium on female virginity such that premarital sex was considered a taboo. Therefore, finding that a cultural emphasis on female virginity at marriage has a large positive impact on a woman's age at first birth is somewhat supported by Whiting et al.'s writings on societies with prolonged maidenhood.

3.7.2 Interaction effect of Formal institutions on Age at First Birth

The 'epidemiological' approach to the study of culture in economics is so called because it enables the isolation of culture's effect from that of local/traditional institutions operating in the home countries immigrants. A question that has dogged this approach in developed country studies is how to determine that the effects observed are solely from culture and are not driven by unobserved informal constraints within clusters of immigrant neighbourhoods. Studying the effect of culture within individuals' home countries presents an obvious challenge for distinguishing between the effect of culture and that of informal institutions. This makes accounting for the role of formal institutions like organized labour markets, health care provision, educational institutions, and strong legal and regulatory agencies crucial.

A measure of formal institutions is introduced in our model through its interaction with the cultural proxies. This interaction enables us to compare the fertility outcomes of women in areas with strong formal institutions with those in areas where formal institutions are weak, for example, women in the rural areas. In places where formal institutions are weak, we can expect that informal constraints will hold sway such that a failure to account for this

interaction may result in over- or under-estimating the effect of culture. In this setup, the interaction effect for the culture with emphasis on early marriage from the specification with full controls and location fixed effects is not statistically significant. A summary of the main effects and the effect from the interactions is presented in Table 3.4. At a mean value of 0.52 and a standard deviation of 0.18 for our formal institutional index, the net effect (i.e., the sum of the coefficients of the interaction terms and the cultural variable) shows that, relative to the culture where female pre-marital sex is weakly censured, age at first birth is lower by 0.76 years for women whose cultures emphasize early marriage of women. This effect does not differ so much from the main culture effect obtained without interactions. Indeed Figure 3.4 shows a zero-interaction effect on the culture with emphasis on early marriage across all values of our formal institutional index.

On the other hand, Figure 3.4 shows a significant increase in the age at first birth from the interaction between formal institutions and the culture with emphasis on female virginity. It also reveals, at higher levels of the formal institutional index, the widening gap between the outcome for the cultural emphasis on female virginity and the culture which weakly censures premarital sex. Specifically, at an average level of 0.52 points for the index of formal institutions, the age at first birth is 1.1 years higher for women with a cultural emphasis on female virginity than women whose culture weakly censures premarital sex. At one standard deviation above the mean of formal institutional index the age at first birth increases to 1.73 years for the female virginity culture. This effect is statistically significant at the 1 percent level and indicates that strong formal institutions play an important role in the relationship between cultural norms and fertility outcomes.

3.7.3 Effect of Culture on Fertility

Our second outcome of interest is fertility, which is examined at any given age of women in the sample. After controlling for individual-specific and location effects, the estimates in Table 3.2 show that women whose cultures place emphasis on early female marriage have more children than women whose cultures are tolerant of female premarital sexual activities. Precisely, the cultural emphasis on early female marriage increases fertility by 0.32 children relative the culture where female premarital sex is weakly censured. Like the findings for age at first birth, the culture with emphasis on early marriage produces an effect that is consistent with the theory, providing evidence that a culture of early female marriage contributes significantly to higher fertility rates. This outcome remains consistent for the sample of women of aged 25 to 49 years (see Table 3.3). For this group, fertility increases by 0.45 children relative to the culture that weakly censures female premarital sex.

By contrast, the cultural emphasis on female virginity at marriage exerts a strong negative effect on fertility. It decreases fertility by 0.76 children (0.9 for the older cohort) relative to the culture that weakly censures female premarital sex. Findings in anthropological research have shown that in cultures where prolonged maidenhood and late female marriage are supported, family sizes tend to be smaller. It is reasonable to conclude that the evidence from this analysis support earlier anthropological findings and suggest that pockets of such outcomes can be seen in African societies despite the more common preference for larger families.

3.7.4 Interaction effect of Formal Institutions on Fertility

We next examine how the interaction between culture and formal institutions impacts on fertility. Firstly, the interaction between formal institutions and the culture with emphasis on early female marriage has a statistically significant effect on fertility. It is instructive to note that this was not the case for the age at first birth. At the average value of 0.52 for our chosen index of formal institutions, a cultural emphasis on early marriage increases fertility by 0.38 children relative to the culture in which female premarital sexual behaviour is weakly censured. Figure 3.5(a) highlights this effect on predicted fertility. The gradual decline in predicted fertility for the culture with emphasis on early marriage can be seen. Also, at higher values of formal institutions the gap in fertility between the culture of early marriage and the culture that weakly censures female premarital sexual activities narrows substantially. According to our estimates, raising the index of formal institutions by one standard deviation above its mean results in a much smaller increase in fertility (0.24) for the culture with emphasis on early marriage relative to the comparison culture. A further increase in the index by two standard deviations above the mean causes a decrease in fertility by 0.67 children relative to women from the culture that weakly censures premarital sexual behaviour. The older age cohort (Figure 3.5 (b)) sees a similar interaction effect. A two standard deviation increase in the index of formal institutions increases fertility by 0.18 children relative to the culture that weakly censures premarital sexual relations. This is a much smaller increase in fertility than the 0.51 increase we obtain when the institutional index is at its mean. Thus, the effect of a cultural emphasis on early marriage on fertility is smaller in places where formal institutions are stronger.

Figures 3.5 (a) and (b) also show the interaction effect on fertility for the culture with emphasis on female virginity. These figures show that in places where formal institutions are stronger (indicated by higher values of our institutional index) there is a substantial decline in fertility per woman at all age levels. Such that we find substantial differences between the fertility outcomes of women from the culture that emphasises female virginity and the culture that weakly censures female premarital sexual behaviour. Estimates show that, at the mean institutional index, fertility decreases by 0.73 children (0.83 for the 25 to 49 age range) relative to the comparison group. A one standard deviation increase in the index of formal institutions reduces fertility by 1.01 children for the culture with emphasis on female virginity relative to the culture where female premarital sexual behaviour is weakly censured. The decrease in fertility for the older age cohort is 1.12 children relative to women in the comparison group.

3.8. Conclusion

This chapter contributes to the research on the cultural context of fertility behaviour in different parts of the world. It is common in the literature for home-country fertility rates to be used as a representation of the culture of immigrants or their descendants in developed country studies. The analysis in this chapter is based on developing country cases and employs a unique set of proxies for culture: the rules governing female premarital sexual behaviour within different ethnicities. Based on a combination of ethnographic information and contemporary data from the Demographic and Health Surveys, the study distinguishes between three norms of female premarital sexual behaviour that correspond to different ethnic groups in the DHS. These are: the cultural emphasis on female early marriage, the cultural emphasis on female virginity at marriage, and the culture that is permissive towards

or that weakly censures female premarital sexual behaviour. Armed with these distinct culture groups, and subject to data availability, this chapter has estimated the effect of each marriage norm on the age at first birth and number of births for a sample of women aged between 15 and 49 years using data from African countries and Turkey.

Identifying the effect of culture was achieved by exploiting the differences in the rules governing female premarital sexual behaviour across ethnic groups. The tendency for some ethnic groups to restrict female premarital sexual relations while others tolerated such activities, as well as the differences in what each culture emphasised: either female early marriage, female virginity at marriage, or to weakly censure premarital sexual relations, provided the source of identifying variation in the effect of culture on fertility outcomes. The use of a mainly urban sample enabled the use of the 'epidemiological approach' to estimate the effect of culture and isolate this from the effect of informal institutions. By including the interaction between culture and formal institutions the analysis showed how the effect of culture changed at different levels of strength of formal institutions.

The findings show that in the developing world, the female age at first birth and fertility rate are significantly affected by the rules governing female premarital sexual relations within ethnic groups. Specifically, the age at first birth for a woman whose cultural emphasis is on female early marriage is significantly lower than that of a woman whose culture is permissive towards female premarital sex. The cultural emphasis on the early marriage of young girls is found to significantly raise fertility rates relative to the culture where female premarital sexual behaviour is weakly censured or permitted. Also compared to the culture where female premarital sex is weakly censured, the culture with emphasis on female virginity at marriage increases a woman's age at first birth while also reducing the number

of children she has compared. This paper also unveils an important moderating role for formal institutions. Interactions between each marriage norm and an index of formal institutions yielded mixed results. While the interaction effects on age at first birth and fertility were both very strong for the culture with emphasis on female virginity, there was no effect on the age at first birth for the cultural emphasis on early female marriage. Some effect on fertility was, however, recorded at higher values of the formal institutional index.

These findings show that strong formal institutions do mitigate the negative effect of cultural norms but they also strengthen the positive aspects of certain cultural norms as evidenced by the interaction with the emphasis on female virginity at marriage. They highlight the relevance of separating cultural preferences from traditional constraints while estimating the effect of culture. It is especially relevant when seeking evidence to guide the articulation of programmes targeted at women's reproductive choices in developing countries. Effecting a change in indigenous practices would require measures that are informed by evidence-based research which takes the huge diversity in the norms, preferences, and beliefs across different people groups into account. The findings are also significant for developing inclusive fertility reduction programs for African societies. They underline the importance of understanding the value system in place in such societies and how to incorporate a local content in the development of targeted intervention programs to attain maximum effect. This research opens an important angle for further research which is to examine the relationship between the marriage norms explored in this chapter and the receptiveness of women in Africa and other developing societies to modern methods of contraception.

Tables

Table 3.1: Age at First Birth – Main effect (columns 1 - 4) and Interaction outcomes (columns 5 - 8)

Dep. Variable: Age at first birth	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Cultural norms:								
Early marriage	-1.309***	-0.678***	-0.933***	-0.716***	-0.764	-0.461	-1.055***	-0.945***
	(0.180)	(0.182)	(0.052)	(0.051)	(1.016)	(1.092)	(0.216)	(0.200)
Insists on virginity	2.453***	1.626***	1.470***	1.126***	-0.883**	-1.229***	-1.156***	-0.719***
	(0.080)	(0.090)	(0.043)	(0.038)	(0.297)	(0.283)	(0.152)	(0.146)
Early marriage*instns.	-	-	-	-	-1.351	-0.385	0.303	0.361
					(2.583)	(2.750)	(0.381)	(0.357)
Virginity*institutions	-	-	-	-	5.925***	5.467***	4.823***	3.492***
					(0.530)	(0.484)	(0.279)	(0.273)
Constant	19.25***	-147.0***	19.72***	-111.3***	19.90***	-142.4***	20.09***	-90.88***
	(0.063)	(8.531)	(0.024)	(5.682)	(0.163)	(8.364)	(0.091)	(6.198)
Observations	113849	113842	113849	113842	113849	113842	113849	113842
Full controls**	No	Yes	No	Yes	No	Yes	No	Yes
Location Fixed effects	No	No	Yes	Yes	No	No	Yes	Yes

Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

** Controls include age and age squared, religion, and year of birth. Survey year dummies are excluded because heterogeneity is considered at the cluster/community level. Standard errors are clustered at the primary sampling unit.

Table 3.2: Fertility Rate (Full sample) - Main effect (columns 1 - 4) and Interaction outcomes (columns 5 - 8)

Dep. Variable: Number of children	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Cultural norms:								
Early marriage	0.246*	0.445***	0.0265	0.319***	2.184*	2.650***	0.853***	0.766***
	(0.125)	(0.105)	(0.033)	(0.030)	(0.893)	(0.758)	(0.151)	(0.132)
Insists on virginity	-0.455***	-0.689***	-0.546***	-0.758***	-0.0823	0.0622	0.152*	0.0383
	(0.033)	(0.050)	(0.020)	(0.021)	(0.124)	(0.138)	(0.076)	(0.079)
Early marriage*instns.	-	-	-	-	-4.925*	-5.768**	-1.513***	-0.748**
					(2.297)	(1.949)	(0.265)	(0.232)
Virginity*institutions	-	-	-	-	-0.969***	-1.651***	-1.284***	-1.491***
					(0.209)	(0.227)	(0.136)	(0.146)
Constant	3.186***	40.68***	3.600***	84.25***	2.805***	45.35***	3.477***	74.57***
	(0.028)	(5.117)	(0.012)	(3.199)	(0.058)	(5.078)	(0.045)	(3.377)
Observations	113849	113842	113849	113842	113849	113842	113849	113842
Full controls**	No	Yes	No	Yes	No	Yes	No	Yes
Location Fixed effects	No	No	Yes	Yes	No	No	Yes	Yes

Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

** Controls include age and age squared, religion, and year of birth. Survey year dummies are excluded because heterogeneity is considered at the cluster/community level. Standard errors are clustered at the primary sampling unit.

Table 3.3: Fertility Rate (age 25 to 49) Main effect (columns 1 - 4); Interaction outcomes (columns 5 - 8)

Dep. Variable: Number of children	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Cultural norms:								
Early marriage	0.709***	0.688***	0.295***	0.449***	4.287***	4.188***	1.174***	0.986***
	(0.178)	(0.155)	(0.045)	(0.041)	(1.195)	(1.091)	(0.189)	(0.167)
Insists on virginity	-0.800***	-0.802***	-0.833***	-0.852***	-0.200	0.0359	0.203*	-0.00429
	(0.041)	(0.059)	(0.028)	(0.027)	(0.150)	(0.159)	(0.093)	(0.092)
Early marriage*instns.	-	-	-	-	-9.060**	-9.073**	-1.633***	-0.917**
					(3.012)	(2.772)	(0.334)	(0.296)
Virginity*institutions	-	-	-	-	-1.385***	-1.858***	-1.906***	-1.586***
					(0.256)	(0.262)	(0.167)	(0.168)
Constant	3.684***	45.77***	4.128***	96.59***	3.243***	51.44***	3.931***	85.70***
	(0.036)	(5.963)	(0.012)	(3.927)	(0.072)	(5.939)	(0.055)	(4.022)
Observations	92153	92147	92153	92147	92153	92147	92153	92147
Full controls**	No	Yes	No	Yes	No	Yes	No	Yes
Location Fixed effects	No	No	Yes	Yes	No	No	Yes	Yes

Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

** Controls include age and age squared, religion, and year of birth. Survey year dummies are excluded because heterogeneity is considered at the cluster/community level. Standard errors are clustered at the primary sampling unit.

Table 3.4: Summary of main and Interaction effects

Outcomes	**Age at first birth**		**Fertility rates (full sample)**		**Fertility rates (age 25+)**	
Culture types	Main effect	Net effect	Main effect	Net effect	Main effect	Net effect
Emphasis on early marriage	-0.716	-0.757	0.319	0.377	0.449	0.509
Emphasis on female virginity	1.126	1.097	-0.758	-0.737	-0.852	-0.825

Average value of formal institutions: 0.52; Standard Deviation: 0.18. Net effects are computed from the estimates in column (4) of each table.

Appendix: Additional Tables and Figures

Table A3.1: Age at first birth - Main effects only

Dep. Variable: Age at first birth	(1)	(2)	(3)	(4)
Cultural norms:				
Early marriage	-1.309***	-0.678***	-0.933***	-0.716***
	(0.180)	(0.182)	(0.052)	(0.051)
Insists on virginity	2.453***	1.626***	1.470***	1.126***
	(0.080)	(0.090)	(0.043)	(0.038)
Constant	19.25***	-147.0***	19.72***	-111.3***
	(0.063)	(8.531)	(0.024)	(5.682)
Observations	113849	113842	113849	113842
Full controls**	No	Yes	No	Yes
Location Fixed effects	No	No	Yes	Yes

Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

** Controls include age and age squared, religion, and year of birth. Survey year dummies are excluded because heterogeneity is considered at the cluster/community level. Standard errors are clustered at the primary sampling unit.

Table A3.2: Age at first birth – Interaction effects of formal institutions

Dep. Variable: Age at first birth	(1)	(2)	(3)	(4)
Formal institution	-1.672***	-2.955***	-0.747***	-0.573***
	(0.362)	(0.344)	(0.178)	(0.166)
Cultural norms:				
Early marriage	-0.764	-0.461	-1.055***	-0.945***
	(1.016)	(1.092)	(0.216)	(0.200)
Insists on virginity	-0.883**	-1.229***	-1.156***	-0.719***
	(0.297)	(0.283)	(0.152)	(0.146)
Early marriage*instn.	-1.351	-0.385	0.303	0.361
	(2.583)	(2.750)	(0.381)	(0.357)
Virginity*instn.	5.925***	5.467***	4.823***	3.492***
	(0.530)	(0.484)	(0.279)	(0.273)
Constant	19.90***	-142.4***	20.09***	-90.88***
	(0.163)	(8.364)	(0.091)	(6.198)
Observations	113849	113842	113849	113842
Full controls**	No	Yes	No	Yes
Location Fixed effects	No	No	Yes	Yes

Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

** Controls include age and age squared, religion, and year of birth. Survey year dummies are excluded because heterogeneity is considered at the cluster/community level. Standard errors are clustered at the primary sampling unit.

Table A3.3: Fertility (all women in sample) – Main effect only

Dep. Variable: Number of children	(1)	(2)	(3)	(4)
Cultural norms:				
Early marriage	0.246*	0.445***	0.0265	0.319***
	(0.125)	(0.105)	(0.033)	(0.030)
Insists on virginity	-0.455***	-0.689***	-0.546***	-0.758***
	(0.033)	(0.050)	(0.020)	(0.021)
Constant	3.186***	40.68***	3.600***	84.25***
	(0.028)	(5.117)	(0.012)	(3.199)
N	113849	113842	113849	113842
Full controls**	No	Yes	No	Yes
Location fixed effects	No	No	Yes	Yes

Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

** Controls include age and age squared, religion, and year of birth. Survey year dummies are excluded because heterogeneity is considered at the cluster/community level. Standard errors are clustered at the primary sampling unit.

Table A3.4: Fertility - Interaction effects of formal institutions

Dep. Variable: Number of children	(1)	(2)	(3)	(4)
Formal institution	0.982***	1.779***	0.251**	0.0879
	(0.132)	(0.140)	(0.089)	(0.088)
Cultural norms:				
Early marriage	2.184*	2.650***	0.853***	0.766***
	(0.893)	(0.758)	(0.151)	(0.132)
Insists on virginity	-0.0823	0.0622	0.152*	0.0383
	(0.124)	(0.138)	(0.076)	(0.079)
Early marrg*instn.	-4.925*	-5.768**	-1.513***	-0.748**
	(2.297)	(1.949)	(0.265)	(0.232)
Virginity*instn.	-0.969***	-1.651***	-1.284***	-1.491***
	(0.209)	(0.227)	(0.136)	(0.146)
Constant	2.805***	45.35***	3.477***	74.57***
	(0.058)	(5.078)	(0.045)	(3.377)
Observations	113849	113842	113849	113842
Full controls**	No	Yes	No	Yes
Location Fixed effects	No	No	Yes	Yes

Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

** Controls include age and age squared, religion, and year of birth. Survey year dummies are excluded because heterogeneity is considered at the cluster/community level. Standard errors are clustered at the primary sampling unit.

Table A3.5: Fertility (25 to 49 age cohort) - main effect only

Dep. Variable: Num. of children	(1)	(2)	(3)	(4)
Cultural norms:				
Early marriage	0.709***	0.688***	0.295***	0.449***
	(0.178)	(0.155)	(0.045)	(0.041)
Insists on virginity	-0.800***	-0.802***	-0.833***	-0.852***
	(0.041)	(0.059)	(0.028)	(0.027)
Constant	3.684***	45.77***	4.128***	96.59***
	(0.036)	(5.963)	(0.012)	(3.927)
N	92153	92147	92153	92147
Full controls **	No	Yes	No	Yes
Location fixed effects	No	No	Yes	Yes

Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

** Controls include age and age squared, religion, and year of birth. Survey year dummies are excluded because heterogeneity is considered at the cluster/community level. Standard errors are clustered at the primary sampling unit.

Table A3.6: Fertility (25 to 49 age cohort) - Interaction effects of formal institutions

Dep. Variable: Number of children	(1)	(2)	(3)	(4)
Formal institution	1.134***	2.068***	0.405***	0.134
	(0.166)	(0.169)	(0.108)	(0.105)
Cultural norm:				
Early marriage	4.287***	4.188***	1.174***	0.986***
	(1.195)	(1.091)	(0.189)	(0.167)
Insists on virginity	-0.200	0.0359	0.203*	-0.00429
	(0.150)	(0.159)	(0.093)	(0.092)
Early marrg*avrg_instn	-9.060**	-9.073**	-1.633***	-0.917**
	(3.012)	(2.772)	(0.334)	(0.296)
Virginity*instn	-1.385***	-1.858***	-1.906***	-1.586***
	(0.256)	(0.262)	(0.167)	(0.168)
Constant	3.243***	51.44***	3.931***	85.70***
	(0.072)	(5.939)	(0.055)	(4.022)
Observations	92153	92147	92153	92147
Full controls	No	Yes	No	Yes
Location fixed effects	No	No	Yes	Yes

Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

** Controls include age and age squared, religion, and year of birth. Survey year dummies are excluded because heterogeneity is considered at the cluster/community level. Standard errors are clustered at the primary sampling unit.

Table A3.7: List of countries and survey waves in sample

Country	DHS waves	Country	DHS waves
Benin	Waves 3 to 6	Eswatini	Wave 5
Burkina Faso	Waves 2 to 5	Gabon	Waves 4 and 6
Burundi	Wave 7	Gambia	Wave 6
Cameroon	Waves 3, 4 and 6	Ghana	Waves 1, 3, 4, 5, and 7
Cote D'Ivoire	Wave 6	Guinea	Waves 4, 5, and 6
Egypt	Wave 6	Kenya	Waves 1, 3, 4, 5, and 7
Lesotho	Waves 4,5, and 7	Senegal	Waves 1, 2, 3, 4, 6 and 7
Liberia	Waves 5 and 6	Sierra-Leone	Waves 5 and 6
Malawi	Waves 4, 6 and 7	Togo	Wave 6
Mali	Waves 1, 3, 4, 5 and 6	Turkey	Waves 3, 5 and 6
Namibia	Waves 2, 4, 5, and 6	Uganda	Waves 1, 3, 6 and 7
Nigeria	Waves 2, 4, 5, and 6	Zambia	Waves 2 to 6

Table A3. 8: Summary statistics – urban sample only

Variables	Mean	Standard Dev.	Min.	Max.
Age	32.78	8.275	15	49
Year of birth	1975		1936	2002
Age at 1st birth	20.21	4.157	7	45
Age at 1st marriage	19.65	4.441	5	49
Husband's age	40.33	9.941	14	95
No. of children	3.00	2.019	1	18
Household size	6.43	4.477	1	76
Kids under 5yrs	1.13	1.234	0	21
Years of educ.	6.25	4.745	0	23
Formal institutions*	0.52	0.177	0.142	0.956
Pre-marital norms:				
Weakly censured	0.35	0.477	0	1
Early marriage	0.01	0.109	0	1
Insists on virginity	0.64	0.480	0	1
Religion:				
No religion	0.02	0.132	0	1
Traditional	0.01	0.084	0	1
Christian	0.41	0.492	0	1
Islam	0.56	0.497	0	1
Other**	0.002	0.048	0	1
Year of sample			1986	2017

**Formal institutions variable is represented by a combination of responses for trust in the police force and the law courts. **No details provided in the original DHS data.*

Source: Author's computation from a combination of DHS, the EA, and the Barometer datasets.

Table A3.9: Ethnicities and Premarital norms

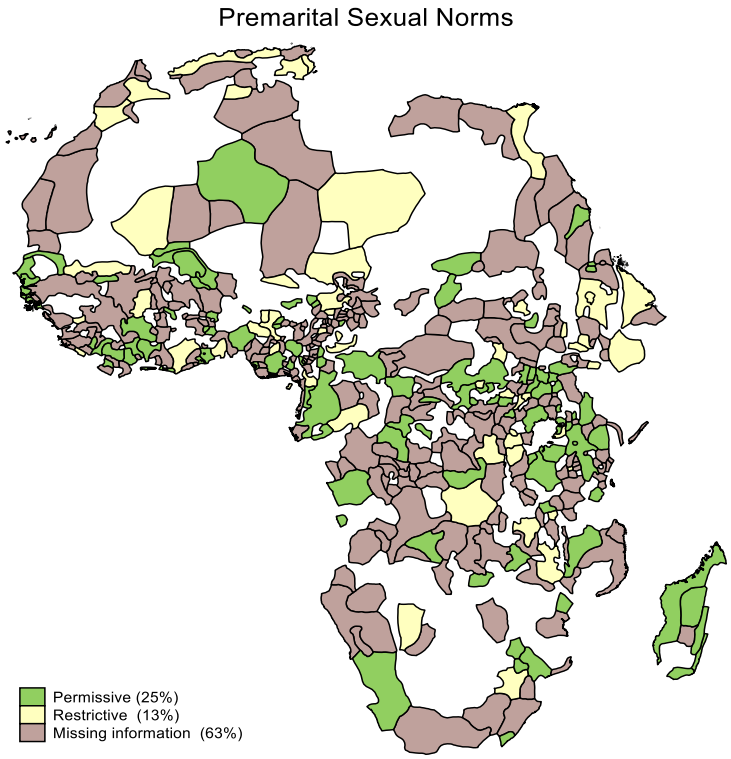
Ethnicities are neatly sorted into each group in data without overlaps.

Permissive: Weakly censures premarital sexual relations	Restrictive: Values Early Marriage of girls	Restrictive: Values Virginity of girls
Acholi	Bamum	Afar
Amba	Bemba	Alur
Babwa	Chewa	Amhara
Bari	Igala	Arusi
Baya	Kanuri	Ashanti
Bete	Kota	Bodi
Dagari	Kung	Burji
Diola	Luba	Chiga
Ekoi	Nyakyusa	Egyptians
Ewe		Fon
Fang		Gusii
Fur		Kafa
Ganda		Konso
Gbande		Kurd
Gisu		Mao
Guro		Mbum
Ibo		Minianka
Ila		Ruanda
Kamba		Rundi
Kipsigis		Sidamo
Kongo		Soninke
Koro		Teda
Kpelle		Turks
Lala		
Luo		
Luvale		
Madi		

Masai Mbuti Nama Ngere Ngumba Samburu Sapo		Vai
Sena Senufo Serer Somali Somba Songhai Tem Thonga Tiv Tukulor Wolof Yao Yoruba Zazzagawa		

Source: Murdock's (1967) Ethnographic Atlas

Figure A3.1: Premarital Sexual Norms by Ethnic Groups in Africa



The restrictive culture group is comprised of the cultural emphasis on early female marriage and the emphasis on female virginity at marriage. The permissive culture group emphasises neither.
Source: Author's computations with data from Murdock's (1967) Ethnographic Atlas. Online access: http://worldmap.harvard.edu/data/geonode:murdock_ea_2010_3

Chapter Four

4.0 The Fertility Outcomes of Descendants of Immigrants in the United Kingdom: Does Culture Matter?

4.1. Introduction

The mid-twentieth century is thought to be the epoch of international migration because of the surge in migrations from less developed countries to their more advanced counterparts in Northern and Western Europe and North America (King, Lazaridis, & Tsardanidis, 2000; Zimmermann, 2005). Recent decades have also witnessed a significant rise in the population of immigrants in the countries of Northern and Western Europe where in a country such as the United Kingdom, for example, an estimated fourteen percent of the total population in 2019 were foreign born (Rienzo & Vargas-Silva, 2020). Immigrants and their descendants have, therefore, progressively become an integral part of the social, demographic, and cultural realities of most first world countries (Hatton & Wheatley Price, 2005). It is not surprising then, that their contributions to the social and economic dynamic of their adopted countries are extensively studied. Numerous papers have discussed the assimilation and integration of immigrants into the mainstream of host countries from a variety of angles, neatly summarised in Kulu and Gonzalez-Ferrer (2014) to include their employment and education, housing and residential patterns, marriage formation and family dynamics, among other things. The quest is not limited to the direct impact of the immigrants themselves but extends to the contributions and outlook of their descendants in the long run.

Research shows that the outcomes of immigrants vary on several fronts from that of the native population as well as across immigrant groups (Kraus and Castro-Martin, 2016; Dubuc

and Haskey, 2010; Wengler, 2011; Rendall et al. 2010), despite their exposure to similar market, institutional, and social conditions. This has slightly tilted the narrative about the sources of such differences away from the typical economic explanations to the more exotic thinking that culture could play an important role. Culture is described as a systematic component of the beliefs and preferences that people hold (Fernandez and Fogli, 2006, 2011) and could matter in explaining why different outcomes are produced by different people from the same set of economic incentives. This paper will attempt to show that cultural beliefs are important to the fertility choices made by descendants of immigrants in the United Kingdom.

A large literature has examined specific aspects of the fertility behaviour of immigrants and their descendants in European countries (De Valk, 2013; Kraus & Castro-Martín, 2018; Kulu & González-Ferrer, 2014; Kulu et al., 2015; Kulu & Hannemann, 2015; 2017; Milewski, 2010; Tønnessen, 2019; Van Landschoot, De Valk, & Van Bavel, 2017)[4], and studies with a focus on the UK include Robson and Berthoud (2006), Booth and Kee (2009), Robards and Berrington (2016), Hampshire, Bell and Simpson (2012), Coleman and Dubuc (2010), Taneja (2015), Wilson (2020) and Kulu and Hannemann (2016), among others. A huge proportion of this literature does not distinguish between the outcomes of different immigrant generations. Only few studies, e.g., Kulu and Hannemann (2016), and Booth and Kee (2009) explicitly examine the fertility outcomes of the descendants of immigrants in the UK. The current paper complements the existing literature by exploring the relationship between indigenous fertility norms and completed fertility of second-generation immigrant women in the UK. Its approach projects the importance of fertility norms from source countries and their

[4] Kulu and Hannemann (2015) is a compendium of country case studies covering Germany, Sweden, France, Spain, Switzerland, and the United Kingdom

influence on ethnic minority women born and raised in the UK, thus contributing to our understanding of their reproductive behaviour. The strength of this influence determines how much the descendants of immigrants add to the total fertility rate of the country. For clarity, ethnic minority is used interchangeably with second-generation immigrants in this paper and follows the standard definition in the context of the UK and related literature[5].

Previous research highlights the tendency of immigrants around the world to uphold the cultural traits of their countries of ancestry despite dwelling under institutional settings that are completely different from what obtains in their ancestral countries (Bisin & Verdier, 2011; Polavieja, 2015). This reveals both the portability of culture and its persistence over time and across generations. Naturally, the question is whether culture matters when evaluating immigrant's economic outcomes and by how much it might influence, for example, a woman's choice to have more (or less) children or pursue further education. This is the question that this paper intends to address with a specific focus on the level of completed fertility of second-generation ethnic minority women in the UK.

Despite the methodological challenge that culture poses to economic research, its relevance is increasingly being validated through empirical evidence. This empirical validation is possible because of innovative strategies of identification, such as the 'epidemiological approach' discussed extensively in Fernandez (2011). This approach has been widely used in studying the association between cultural norms and a variety of economic and social outcomes of the descendants of immigrants in the United States of America (Alesina & Giuliano, 2010; Blau, Kahn, Liu, & Papps, 2013; Di Miceli, 2019; 2009; Fernández & Fogli, 2006), as well as in Norway (Finseraas & Kotsadam, 2017), and Germany (Cygan-Rehm,

[5] For a detailed discussion of the classifications of ethnicity in the UK see Platt et al., (2020) and Hatton and Price (1999).

2011; Stichnoth & Yeter, 2016). The epidemiological approach provides a convenient way of dealing with the endogenous nature of the relationship between cultural norms and a variety of outcomes including fertility and female labour force participation. Its strategy is to study immigrants from different source countries who reside together and face the same institutional conditions in a destination country. Studies for the U.S have generally found a strong influence of cultural norms on the respective outcomes of interest. Di Miceli (2019), for example, examines the association between source-country marital fertility norms and the quantum of birth by second-generation immigrant women in the U.S. The study finds that a unit increase in the lagged value of fertility in the source country is associated with a 1.086 rise in the number of children a woman had. In line with this literature, I apply the epidemiological approach to study the completed fertility of second-generation immigrants in the UK. Because the women studied are residing outside their ancestral countries their cultural beliefs and preferences are divorced from indigenous institutional constraints in a way that the pure effect of culture can be better identified. This is the advantage of the epidemiological approach, and, to the best of the author's knowledge, this paper is one of the first to apply this methodology in studying the fertility behaviour of immigrants in the UK. In addition, studying the descendants of immigrants enables the elimination of the effect of migration on fertility which is a common problem when studying outcomes for first-generation immigrants.

A second contribution to the literature on the fertility of immigrants in the UK is through the chapter's use of country-of-origin fertility rates as a measure of cultural influence. Though a common cultural measure for studies in the U.S., no other paper, as far as the author knows, has employed this measure as an indicator of cultural influence to investigate the fertility outcomes of ethnic minority women in the UK. A close paper is Mussino et al. (2021)

which examines the quantum of childbearing of Polish and Romanian immigrants in Italy and the UK from a country-of-origin perspective. Using data from the Labour Force surveys (LFS), the authors focus on the relationship between the family migration strategies of Eastern European migrants and their fertility outcomes. While related studies such as Kulu and Hannemann (2016), Taneja (2015), and Booth and Kee (2009) confirm the intergenerational transmission of fertility norms across immigrant generations in the UK, they do not explicitly relate a cultural proxy based on a counterpart indicator from the country-of-origin with the fertility behaviour of descendants of immigrants.

In contributing to existing research, therefore, this study merges fertility and ethnicity (represented by parental country of birth) data from the United Kingdom's Household Longitudinal Study (UKHLS) with the 1971 values of total fertility rates (TFRs) (compiled from the World Bank's WDI database) for each country to estimate the effect of cultural norms on completed fertility. Data are pooled from waves 1 to 10 of the UKHLS to produce a sample consisting of UK-born women aged 35 to 64 years whose parents are either of Black, Asian, or Caribbean origin. Thus, the ethnicities of interest originate from countries in Southeast Asia, the Caribbean and Africa. Part of this paper's contribution is the disaggregation of women in the 'Black African' ethnic group in the UKHLS into their respective African countries. Previous studies, including those based on the same dataset, have generally used this group en bloc despite the wide heterogeneity across African societies. Details of the sample selection criteria are given in the section on methodology. Negative Binomial estimations were done for completed fertility using the 1971 TFR values as proxy for cultural norms.

The results reveal a highly significant positive association between the cultural proxy and completed fertility across all groups. In other words, the higher the TFR in the country of origin, the higher the number of children an immigrant descendant had. Specifically, when the TFR in a country of ancestry increases by one unit, the level of completed fertility rises by 16.7 percent after accounting for individual and household-specific characteristics. In addition, the effect is stronger for women with less education and women in older birth cohorts (i.e., women born at least a decade earlier than 1971, the year from which the cultural proxy was taken). The results in this paper closely track a related study by Fernandez and Fogli (2006), whose findings for the U.S. show that second-generation immigrant women from high fertility origin countries had an estimated 14 percent higher completed fertility than women from low fertility countries. Our results hold some important implications. Firstly, they show that immigrants maintain close ties with their origin countries, and this could have a reinforcing effect on the socialization of their children to the cultural norms of such countries. Secondly, the influence of origin countries is important and should be taken into consideration when designing policies for improving the social and economic wellbeing of ethnic minority groups. It is, therefore, important to understand that institutional and economic incentives alone may not induce changes in, say, the fertility patterns of immigrants and their children in developed countries.

In the rest of the paper, I provide a brief review of related literature in section 2 and the details of the data, sample selection as well as a description of the relevant variables in section 3. Section 4 explains the empirical strategy including how the effect of culture is identified in the analysis while the results are presented in section 5 and discussed in section 6. The last section concludes the paper.

4.2. Literature Review

This section provides a brief review of related literature, starting with studies on the relationship between migration and demographic and social change in Europe. Thereafter, it discusses the fertility dynamics of immigrants and their descendants in the United Kingdom.

4.2.1 Immigration and Demographic Change in Europe

International migration is an important global phenomenon that has received huge attention across different regions of the world. But the interest is strongest in the developed countries of Europe and North America, the traditional recipients of large migrant flows from low-income countries. According to the United Nations Department of Economic and Social Affairs (UNDESA), the region of Europe had the largest number of international migrants in 2020: 87 million, while North America hosted nearly 59 million international migrants in the same year (United Nations, Department of Economic and Social Affairs, Population Division, 2021). From a historical perspective, the flow of migrants into Europe has varied over time. While the bulk of immigrants in Northern and Western Europe mostly arrived in the second half of the twentieth century, migration to Southern Europe became pronounced in the early twenty-first century (Arango, 2000; Kulu et al., 2015). Migration to Europe from low- and middle-income countries is rooted in their respective colonial histories as well as the job opportunities created by the post-war reconstruction and economic recovery of European countries at the end of the Second World War (Castles, de Haas, & Miller, 2014; Dubuc, Sylvie & Haskey, 2010; Zimmermann, 2005). Countries like Britain, France, Belgium, and the Netherlands, for example, saw a large inflow of migrant workers and return migration of their nationals from former colonies.

The steady stream of migrants to the developed countries of Europe has, therefore, given rise to an ethnically diverse population in the region, leading to a heightened interest by researchers and policy makers on the impact of rising immigration on the social, cultural, and demographic trends of receiving societies, including whether, and to what extent, immigrants are integrating into their host countries. The debate on the consequences of increased migration spans both ends of the spectrum: from the negative impact of a rising immigrant population on the employment and wages of low-skilled workers, both native-born and migrant, to its contributions to economic growth through a robust labour force and potential of altering the demographic landscape of a receiving country (Azarnert, 2010; Hatton & Wheatley Price, 2005; OECD, 2020; Zaiceva & Zimmermann, 2016).

Demographically speaking, almost all European societies have undergone what is termed a 'postponement transition', where childbearing by men and women is postponed for a variety of reasons including economic and social changes, social interaction processes that affect the timing of fertility, and institutional settings favouring low fertility rates (Balbo, Billari, & Mills, 2013; Kohler, Billari, & Ortega, 2002). Thus, the region has witnessed a persistent decline in total fertility rates from the 1960s to the late 1990s (Bongaarts & Sobotka, 2012; Caldwell & Schindlmayr, 2003; Castles et al., 2014; OECD, 2011) with recent trends in fertility falling below the replacement level[6] of 2.1 children per woman, or the 'lowest-low' levels (Kohler et al., 2002; OECD, 2011). Such low levels of fertility, accompanied by increased life expectancies, have resulted in a rapidly ageing population and, ultimately, a shrinking labour force (Bloom, Börsch-Supan, McGee, & Seike, 2012; Skirbekk, Loichinger, & Barakat, 2012; Tyers & Shi, 2012). This, no doubt, has far-reaching

[6] The fertility 'replacement level' is defined as the cohort fertility rate of 2.1 children per woman, which would ensure the replacement of the previous generation, and therefore population stability, assuming no net migration and no change in mortality rates (OECD, 2011).

implications for the labour market, health and social care provision, and publicly funded pensions.

A large and growing literature has, therefore, been looking at how migration could potentially delay population ageing and boost labour supply in developed countries on the grounds that people who choose to leave their home countries to reside in other more developed societies are largely younger in age relative to the non-migrating population and generally join the labour force of destination countries (Alho, 2008; Castles & Vezzoli, 2009; Galjaard, Van Wissen, & Van Dam, 2012; Goldstein & Kluge, 2016; Rees, Van Der Gaag, De Beer, & Heins, 2012; Wilson, C., Sobotka, Williamson, & Boyle, 2013; Zaiceva & Zimmermann, 2016; Zlotnik, 2012). In addition, immigrants do not only swell the working-age population, but they also contribute to population growth through their higher fertility rates. This makes immigration an important force of population change in receiving countries.

In the context of Great Britain, and the United Kingdom by extension, the influx of migrant workers was historically from the New Commonwealth – i.e., countries in the Caribbean, the Indian sub-continent and Africa. Though the mostly male migrants were originally in Britain on a temporary basis, the vast majority chose not to return to their countries of origin even when the demand for labour slumped and immigration laws became very stringent. Overtime, these workers were joined by their families, leading to a fresh stream of immigrants from India and the Caribbean in the late 1960s. Subsequent decades saw a new flow of migrants and their families from Pakistan, Bangladesh, and African countries south of the Sahara (Coleman, David, Compton, & Salt, 2002; Coleman, David A. & Dubuc, 2010; Dubuc, Sylvie & Haskey, 2010; Dubuc, Sylvie, 2012; Hatton & Wheatley Price, 2005).

Presently, the UK's population includes a sizeable, and growing, proportion of ethnically diverse immigrants from a significant number of developing countries. Together with their descendants they form the core of the 'Ethnic minority' population with the largest groups having origins from India, Pakistan, Bangladesh, Black Caribbean, and Black African countries (Coleman, David, 2010; Stillwell & van Ham, 2010; Taneja, 2015). The diversity of the immigrant population in the UK is evident in their cultural expressions and practices. Such practises are especially pronounced in their levels and patterns of fertility, family formation and marriage (Kulu & González-Ferrer, 2014; Robson & Berthoud, 2006; Sobotka, 2008). It is expected that such a sizeable immigrant population would immensely affect the demographic structure of the society as well as the total fertility rate in the country.

Data by the Office for National Statistics (ONS) show that total fertility rate[7] in the UK had been on a continuous decline from the 1990s till 2001 when it stood at 1.63 children per woman, an all-time low (see Figure 4.1). Picking up again after 2002, the TFR rose to 1.91 in 2008, the highest since 1974. It remained somewhat stable between 2008 and 2012 before taking another plunge in 2013, dropping to 1.68 in 2018 (Office for National Statistics, 2019). With a TFR that is below the replacement level of 2.1 children per woman (Desiderio, 2020; OECD, 2011), the UK's population is rapidly ageing even as the growth in the total and working-age population has slowed (Harper, 2012; Rees et al., 2012; United Nations, Department of Economic and Social Affairs, Population Division, 2019b). Given this scenario, and as noted earlier, immigration is considered as potentially the main driver of population growth and demographic sustainability in the UK. The implications of this consideration

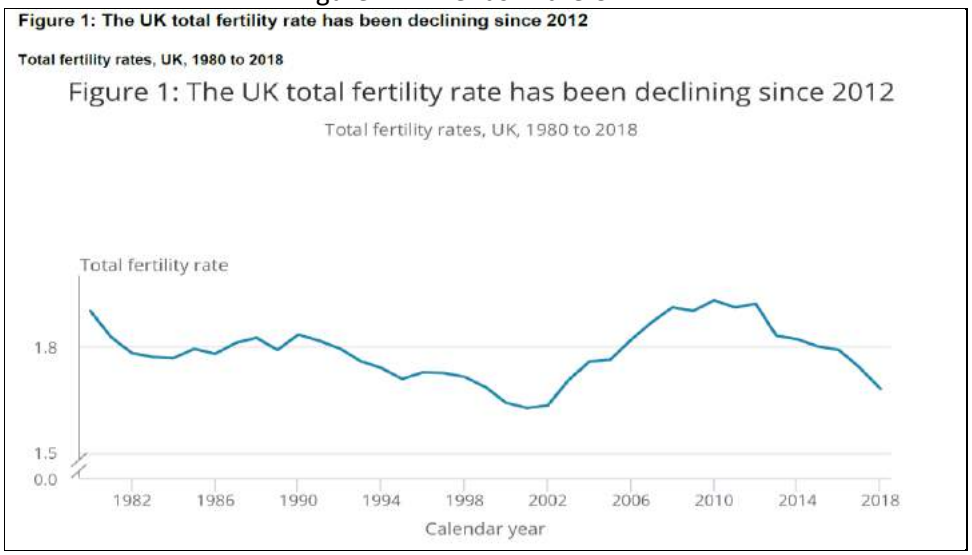
[7] The ONS defines total fertility rate (TFR) as the hypothetical average number of children born per woman if women experienced the age-specific fertility rates (ASFRs) of the year in question throughout their childbearing lives (ONS, 2019).

transcend the demographic to economic, social, and cultural trends in the society (Castles et al., 2014; Kulu et al., 2015; Taneja, 2015).

Available data and prior research show that a large proportion of immigrants to the UK come from high-fertility countries and tend to have fertility patterns like those in their countries of origin (Coleman, David A. & Dubuc, 2010; Dubuc, Sylvie, 2012; Kulu & Hannemann, 2016). This has raised questions about the impact that immigration could have on the total fertility rate of the country, and whether the fertility of immigrants can be relied on to rejuvenate the UK's ageing population and shrinking labour force (Cygan-Rehm, 2011; Dubuc, S., 2016; Harper, 2012; 2016; Murphy, 2016). Studies by Tromans and Jefferies et al. (2009), Robards and Berrington (2016) and Zumpe and Dormon et al. (2012), to mention a few, point to this possibility by documenting evidence of a positive effect of immigrants' fertility rates on the TFR in the UK. Tromans and co-authors, for example, examine the trend in the number of live births in the country between 2001 and 2007, and assess the contributions of UK-born versus foreign-born women to total live births. They show that the UK's TFR increased rapidly from 1.63 children per woman in 2001 to 1.90 in 2007 noting that this surge in the TFR is due to the high proportion of births to foreign-born women.

A key driver of this higher TFR is the size and age-structure of the female population. While the number of foreign-born women of reproductive age had risen by nearly 43 percent in 2007, the number of UK born women of childbearing age was 3 percent lower in 2007.

Figure 4.1: Trends in the UK TFR



Source: The Figure comes from the Office for National Statistics (2019), National Population Projections, fertility assumptions: 2018-based.

Likewise, Zumpe et al. (2012) show that between 2007 and 2011 there was an increase in the proportion of foreign-born women of childbearing age living in the UK. Births by foreign-born women are reported to account for 24 percent of live births in 2011, larger by two percentage points than the 2007 level. But despite the relatively higher fertility rate of foreign-born women, the fertility rate of UK-born women had also risen over the same period. The authors think this might be due to the impact of second-generation immigrants, though this could not be confirmed from birth registrations. In other words, while it was not possible to confirm whether a new-born's mother was a second-generation immigrant from birth records, there was no confusion around the fact that the fertility of second- and later-generations of immigrants has potential to influence the total fertility rate in the United Kingdom. Indeed, the full import of the impact of immigrants on host countries – whether in terms of social, economic, or demographic impact - can only be grasped by looking beyond the first-generation of immigrants to the level of integration and/or adaptation of their descendants to the norms of the mainstream society (Crul & Vermeulen, 2003; 2016; Dubuc, Sylvie, 2012; Heath, A. F., Rothon, & Kilpi, 2008; Vermeulen, 2010; Wilson, B., 2019).

4.2.2 The Fertility Dynamics of Immigrant Descendants in the UK

Fertility rates in the UK seem to slightly diverge from the characteristic levels across the rest of Europe, except for Turkey. While Eastern European countries, for instance, have fertility rates that are deemed 'ultra-low', meaning that the rates are inching dangerously close to 1 child per woman (Kohler et al., 2002), recent trends in UK's TFR indicate a potential rebound closer to the fertility replacement level – joining Sweden in the 'highest-low' fertility group (Andersson, 2008; 2020). Despite the characteristically low levels of fertility observed over the last few decades, there are yet interesting spikes in the number of births which warrant attention. Even though the explanations for the rising TFR in the UK has not been clear cut, studies such as Tromans et al., (2009), Zumpe et al., (2012), Coleman and Dubuc, 2012, and Dubuc and Haskey (2010) highlight the need to take the fertility levels of first-generation immigrants and that of their descendants into account, noting also that these could drive the rise in the UK's fertility rates in the future. Whether this is a plausible explanation is a question that the literature has tried to address albeit through competing hypotheses.

Several hypotheses are propounded in the literature as explanations for the fertility behaviour of migrants, including internal migrants, and the following feature prominently: selection, disruption, adaptation, and socialization (Abbasi-Shavazi & McDonald, 2002; Cygan-Rehm, 2011; Hervitz, 1985; Kraus & Castro-Martín, 2018; Kulu, 2006; Kulu & González-Ferrer, 2014; Lee & Pol, 1993; Mussino & Cantalini, 2021; Singley & Landale, 1998; Sobotka, 2008). They are not mutually exclusive but are often complementary to each other, and even contradictory in certain contexts[8] (Kulu, 2005). The selection hypothesis, for

[8] Family formation is discussed in Sobotka (2008) as a contrast of the disruption hypothesis. Some papers, e.g., Abbasi-Shavazi and McDonald (2002), Mussino (2021) as well as Sobotka (2008) include interrelation of life

example, argues that immigrants select into migration based on their socio-economic characteristics, such as age, education, employment, marital status, etc., and that immigrants can be expected to have similar fertility preferences as the native population in the country of destination. On its part, the disruption hypothesis holds that the process of migrating itself interferes with the childbearing decisions of migrants, resulting in lower fertility levels just before and immediately after the move. This low fertility is however not permanent, and childbearing would increase when time elapses and immigrants become settled. The adaptation hypothesis assumes that immigrants' current social and economic conditions influence their fertility behaviour. It predicts that, as immigrants become exposed to the economic and institutional environment of their host society, their fertility preferences adjust and eventually converge to the levels of the native population.

Lastly, the socialization hypothesis is used to explain the tendency of immigrants to abide by the cultural norms and patterns of behaviour to which they were exposed from childhood in their origin countries. Socialization occurs within the household, also known as direct socialization, as well as through interactions with members of the larger society, regarded as indirect or oblique socialization (Bisin & Verdier, 2011). In this sense, the fertility norms in origin countries play a crucial role in shaping the fertility outcomes of immigrants who, though living outside their countries of origin, maintain ties with their ancestral homes and, therefore, are prone to replicate the fertility patterns observed in their countries of ancestry.

While all the outlined hypotheses can explain the fertility patterns of first-generation immigrants in advanced countries, specifically that of immigrants from high-fertility

course, cultural maintenance – a variant of the socialization hypothesis, and minority status. Others refer to fertility assimilation as a complement to adaptation (Mayer & Riphahn, 2000; Wilson, B., 2019).

countries, a significant number of studies have been based on the socialization hypothesis as an explanation for the fertility outcomes of their descendants. Also known as cultural maintenance (Abbasi-Shavazi & McDonald, 2002), or simply culture (Booth, Alison L. & Kee, 2006; Fernandez & Fogli, 2009; 2006; Kraus & Castro-Martín, 2018; Stichnoth & Yeter, 2016), socialization enables the transmission of fertility norms and preferences across generations of immigrants and, as research shows, it holds the key to the relatively higher fertility rates observed among female descendants of immigrants compared to native-born women with non-migrant parents (Booth, Alison L. & Kee, 2009; Dubuc, S., 2016; Kulu et al., 2015; 2016; Kulu et al., 2017; Milewski, 2010; Van Landschoot et al., 2017). Finding an appropriate, and somewhat universal, measurement for culture is, however, a major challenge for this budding literature. Immigrants' ethnic identity and country of origin variables are the common cultural proxies employed in the literature, but this is often plagued by a lack of complete data. Based on available data, the current study utilizes the values of total fertility rates of countries-of-origin as a measure of indigenous fertility norms and preferences. We expect to see a positive relationship between the measure of cultural norms and the completed fertility of the women studied.

4.3 Data Sources and Description of Variables

4.3.1 Data Sources and Sample Selection

This study aims to explore the relationship between the indigenous fertility norms of ancestry country and the completed fertility of second-generation immigrant women in the United Kingdom. The data for this study are from the End-Users' Licence (publicly available) version of the UK's Household Longitudinal Study (UKHLS), also known as Understanding

Society. The UKHLS is a major annual longitudinal panel survey which began in 2009. It is a nationally representative random sample-survey of households in the United Kingdom which was previously known as the British Household Panel Survey (BHPS)[9] from 1991 to 2009. The survey elicits information on the number of children each adult respondent has, details about his/her ethnicity and immigrant status, as well as other individual and household characteristics. The high point of the UKHLS is its exceptional coverage of ethnic minority and immigrant populations across the country. In addition to the General Population Sample (GPS) which covers England, Wales, Scotland, and Northern Ireland, an Ethnic Minority Boost Sample (EMBS) of close to 4000 households was added in wave 1 (2009), and another Immigrants and Ethnic Minority Boost Sample (IEMBS) of approximately 2,900 households was added in wave 6 (2015). The dataset makes available high-quality information on various aspects of the population's life such as work, income, education, health, etc., which enables the conduct of research on the experiences of people from ethnic minority groups (McFall, Nandi, & Platt, 2020).

The UKHLS is regarded as the most informative dataset yet that is available for studying the fertility behaviour of Black, Asian, and Minority ethnic groups in the United Kingdom. A second data source is the 2019 edition of World Development Indicators' (WDI), from where the total fertility rates (TFRs) of 1971, 1981, and 1991 for the countries included in the study were obtained. Total fertility rate is defined as the number of children that would be born to a woman if she were to live to the end of her childbearing years and bear children in accordance with the age-specific fertility rates of the specified year (UN World Population Prospects, 2019 revised; World Bank's WDI, 2019).

[9] The BHPS households were incorporated into the UKHLS in the second wave (2010-2011).

The analysis pools information from waves 1 to 10 of the UKHLS, spanning the period 2009 to 2019, for female respondents who were born in the UK between 1944 and 1982 with at least one parent not born in the UK. Given the longitudinal structure of the data, and to avoid the duplication of cases, all multiple entries were dropped to ensure that everyone was observed once - at the wave they were first interviewed. In addition, only respondents who had full interviews are included in the sample while those who were interviewed by proxy were dropped. This results in a pure cross-sectional dataset of women from different households who are aged between 35 and 64 years old. The dataset also contains information on the migration status of respondents as well as their ethnic identities. People born outside the UK irrespective of their country of birth are categorised as first-generation immigrants; those born in the UK with at least one parent not born in the UK are defined as second-generation immigrants; while third-generation immigrants are people who were themselves, and their parents, born in the UK but have at least one grandparent not born in the UK. The fourth-generation category includes people who were themselves, their parents, and all grandparents, born in the UK.

For this study, the fourth- and higher generations, including those with incomplete information regarding the place of birth of grandparents, are categorised as natives. The second- and third- generation immigrants are collectively defined as descendants of immigrants. Although this study focuses on the outcomes of the second-generation category, a different sample which includes individuals who migrated to the UK as children before they turned 16 is also analysed to ascertain the robustness of the results. This category of child migrants is regarded in the literature as the 1.5-generation of immigrants and their choices can be presumed to reflect a marriage of the norms and behaviours from

their countries of origin with those in their host countries (Kraus & Castro-Martin, 2018). Their outcomes should add interesting insights to the results.

Ethnicities are identified in the UKHLS by three key variables - race, ethnic group, and country of origin. In addition to the white majority group, the race and ethnic group variables distinctly identify only six ethnic minority groups: Indian, Pakistani, Bangladeshi, Irish, Caribbean, and African. Thus, they do not differentiate between specific ethnic groups in Africa or the Caribbean. Other studies[10] based on the UKHLS have utilised the ethnic classifications of African and Caribbean as given in the data. But it is obvious that such an approach shrouds the huge cultural heterogeneity that exists across the Black African or the Black Caribbean immigrant population (Aspinall & Chinouya, 2008; 2010; Mitton & Aspinall, 2019). To account for this heterogeneity, an individual's country of ancestry (parents' country of origin in this case) is thought to represent a better measure of ethnic identity and is used in this study to identify ethnicity.

In assigning country of origin to second-generation immigrants, priority is given to the father's country of birth. In cases where the father's country of birth is missing the mother's country of birth is used, or the self-reported ethnicity name where this coincides with a country name other than the United Kingdom. In addition, the extent to which fathers and mothers come from the same country is verified (see details in Appendix). In the smaller sample (second-generation only), 41.2 percent of women have parents from different countries (about 39 percent for the sample with the 1.5-generation). Thus, nearly 60

[10] An example is (Longhi, 2020) which examines how ethnic differences account for unemployment differentials among minority ethnic groups with the UKHLS data. It compares the outcomes of black African and black Caribbean people relative to their white counterparts. Kulu and Hannemann (2016) include only the Caribbean category in their analysis of fertility among UK-born ethnic minority women.

percent (61 percent for the larger sample) of women have both their fathers and mothers from the same country of ancestry.

Since this research is focused on the non-white ethnic minority population, the Irish were excluded even though they are part of the ethnic minority classification in the country. For consistency with existing studies in the field, we exclude second generation women with indeterminate country of ancestry, that is, women whose ancestry are traced back to the UK. Also, observations for Europe/other Western countries were dropped. There are, therefore, eleven countries represented in our sample – Bangladesh, China/Hong Kong, Ghana, India, Jamaica, Kenya, Nigeria, Pakistan, South Africa, Uganda, and Sri Lanka - giving a total of 883 observations. The objective is to employ the epidemiological approach[11] in line with the literature to investigate the fertility outcomes of second-generation immigrants in the UK who share the same institutional environment but have different ancestral cultural backgrounds.

4.3.2 Description of Variables

Completed Fertility: This is our outcome of interest and is measured by the number of biological children a woman ever had, including stillbirths but excluding adopted, fostered or stepchildren. Completed fertility is estimated for a sample of women of ages 35 to 64 years, including the childless, using lagged values of total fertility rates (TFRs) in the women's country of ancestry as a proxy for cultural norms. The sample mean of completed fertility is 2.04 children with a standard deviation of 1.49 (see Table 4.1). Figure 4.2 depicts the distribution of completed fertility in the data. Panel (a) shows that about 20 percent of

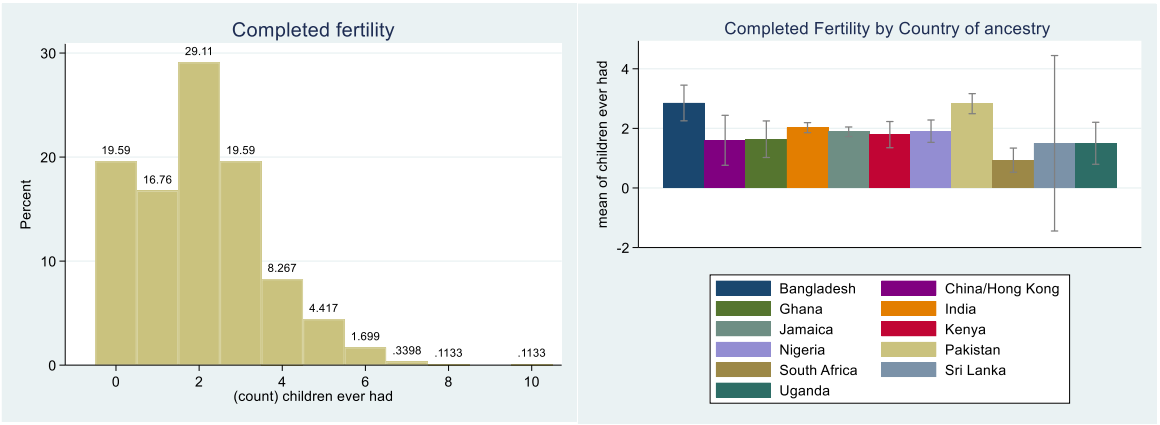
[11] See Fernandez and Fogli 2009; Stichnoth and Yeter, 2016 for application of approach in the U.S and Germany.

women had no children while about 29 percent had two children. In Panel (b) is shown the distribution of completed fertility when the women are grouped according to their country of ancestry. Bangladeshi women have the highest completed fertility (2.85 children), followed closely by women of Pakistani origin with 2.82 children. Women of South African origin have the lowest completed fertility of approximately one child.

The main predictor of our outcome is the TFR for each country of ancestry in 1971. Using lagged values of indicators from origin countries such as total fertility rates or female labour force participation as cultural proxies is a standard approach in the literature. The thinking is that the realised fertility rates from a given country reflect existing cultural preferences with respect to women's role in society as well as cultural beliefs about the ideal family size (Fernandez & Fogli, 2009). Studies have been based on TFRs in ancestry countries, or female labour force participation rates, from one or two decades after the women studied were born (Cygan-Rehm, 2011; 2009; Fernández & Fogli, 2006), or from the decade coinciding with when they were born (see Finseraas and Kotsadam, 2017, for example). As clearly noted in such studies, for example Fernandez and Fogli (2009) or Finseraas and Kotsadam (2017), it is often unclear which decade's TFR or FLFP values would best capture the influence of culture, or how far back one should go to obtain these values. In most cases, data availability often determines the decade chosen, as is applicable in this paper.

Figure 4.2: Sample Distribution of completed fertility

(a) Completed Fertility (b) Average fertility rate by country



Source: Computed by author from UKHLS waves 1 – 10 (2009-2019). Sample restricted to second-generation immigrant women of age 35 to 64 years. Completed fertility is the number of biological children ever born by a woman, including stillbirths.

Culture is represented in this study by the 1971 values of total fertility rate (TFR) for each ancestry country. While the TFR in 1971 is used as a benchmark proxy for culture the expected outcomes are also explored using the TFR values in 1981 to get a sense of how the completed fertility could evolve over time. In Table 4.2 we can see that the TFR values for 1971, 1981, and 1991 are highly correlated, suggesting that the outcomes they each produce may be close to the other. Other explanatory variables in the model include a woman's age (and its square) and birth cohort. Birth cohort is deemed important because it helps to account for peer effects while also allowing us to control for any underlying differences that may result from the distance between a woman's year of birth and the decade from which the cultural proxy is taken. Table 4.1 provides a summary of the birth cohorts in our study and shows that 25 percent of women in our sample were born between 1971 and 1982. The rest were born two to three decades earlier.

To account for the level of a woman's human capital development at adolescence – before the onset of fertility – we also control for her educational attainment at age 16. This addresses the potential endogeneity bias that could be introduced into the model with the

inclusion of current educational attainment, given the existing evidence of correlation between educational attainment and female fertility behaviour (Berrington & Pattaro, 2014). A binary variable was constructed from the question on 'school leaving age' to indicate whether a woman stopped schooling when she was 16 years old or younger, or whether she continued schooling beyond the age of 16. From the summary statistics, 70 percent of women in the sample were either out of school before their 16th birthday or stopped schooling at age 16.

Other confounders of completed fertility are parental characteristics. While the economic status of a woman's parents i.e., whether both parents had a job when she was 14 years old, was included as a predictor, it was not possible to control for parental education. This is because the question on parental education was asked in waves 1, 2, and 6 only and, therefore, including this variable would lead to a substantial loss of sample size. In addition, the number of siblings a woman had is an important indicator of origin-family characteristics and the strength of cultural transmission. Booth and Kee (2006) find origin-family size, captured by the number of siblings, to be significant in explaining a woman's fertility choices. Other studies have also argued that sibship size potentially embodies cultural beliefs regarding the ideal family size (Kraus & Castro-Martín, 2018; Kulu & Hannemann, 2016).

Table 4.1: Summary statistics

Variables	Mean	SD	Min	Max	Obs.
Age	43.18	6.806	35	64	883
Left school at age 16 or younger	0.70	0.477	0	1	867
Number of Children ever had	2.04	1.495	0	10	883
Siblings	2.46	2.532	0	20	883
Mother working when woman was 14	0.61	0.478	0	1	883
Father working when woman was 14	0.79	0.425	0	1	883
In paid employment	0.66	0.463	0	1	880
TFR in 1971*	5.77	0.622	4.21	8.05	883
TFR in 1981*	4.78	1.153	2.55	7.37	883
TFR in 1991*	4.03	1.208	2.14	7.08	883
Was ever married.	1.31	0.431	1	2	881
Birth cohort:					
1944 - 1950	0.04	0.199	0	1	883
1951 - 1960	0.14	0.352	0	1	883
1961 - 1970	0.56	0.497	0	1	883
1971 - 1982	0.25	0.436	0	1	883

*Origin Country Total Fertility Rates (TFR) from World Development Indicators. Excludes observations with missing country of origin information from original data. All other variables are from the UKHLS, data was pooled across waves 1 to 10.

A woman's religion was omitted for reasons of endogeneity mainly because people can change their religious beliefs across their life courses. Ideally, a woman's religion at, say, age 14 or the religion she was brought up in ought to be included. But since this question was asked only to a subset of respondents, i.e., those who responded with 'no religion', an appropriate measure for religion could not be constructed.

Table 4.2: Correlation between Completed Fertility and Cultural proxies

	No. of Children	TFR_1971	TFR_1981	TFR_1991
No. of Children	1			
TFR_1971	0.103**	1		
TFR_1981	0.113***	0.924***	1	
TFR_1991	0.111***	0.866***	0.973***	1

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Source: Computed from Author's working data - UKHLS (2009 – 2020); WDI (2019)

4.4 Empirical strategy

4.4.1 Identification and Model Specification

The effect of culture is identified through the ethnic origin of each woman. Because ethnic classifications in the UKHLS does not include the ethnic groups of people from Africa and the Caribbean, we rely on country of ancestry, rather than race or ethnicity, as an indicator of ethnic background. The women were assigned their fathers' (or mothers' where fathers were missing) country of birth which were then matched with country averages of total fertility rates across three decades (1971, 1981, and 1991) obtained from the World Bank's Development Indicators database (WDI). The TFR, which differs by country, serves as our proxy for culture and each is expected to have a different impact on the outcome. We employ the 'epidemiological approach' to study the outcomes of women who were born and raised in the UK but have different ancestral homes and different indigenous believes about fertility and family size. We expect that since these women live in the same market and institutional settings but are exposed to different cultural beliefs and practices within their households, any variation in completed fertility can be attributed to the influence of the cultural norms and preferences that they were socialized in by their parents and immediate family members.

This paper aims to estimate the effect of indigenous fertility norms, represented by the total fertility rate from a woman's ancestral country, on her fertility decisions. These norms are generally transmitted across generations and tend to persist over long periods of time. Completed fertility for second-generation immigrants in the UK is estimated using a count data estimation method because the outcome variable is a non-negative integer. The starting point for count data estimation is usually the Poisson regression model. But the

assumption of equidispersion of the Poisson Model, namely that the conditional mean and variance are equal, is too restrictive and leads to biased estimates if this assumption is violated (Long & Freese, 2014; Winkelmann & Zimmermann, 1994). The sample mean and variance for completed fertility is 2.04 and 2.35, respectively, meaning that we have a case of overdispersion, albeit slightly. Therefore, the Negative Binomial Model, which allows the conditional mean to differ from the conditional variance, is used to obtain efficient estimates in the face of overdispersion.

The NBM to estimate is specified as:

$$E[y_{ic}|X_{ic}] = \exp(\beta_0 + \beta_1 TFR_c + \beta_2 Z_{ic}) \qquad (1)$$

Where y_{ic} is the completed fertility of woman i from country c, and TFR_c represents the total fertility rate from each country and captures the cultural norms affecting completed fertility. A positive β will indicate a rise in the level of completed fertility. Individual and parental characteristics are included in the vector Z_{ic} as well as a full set of dummies for region of residence and survey year. Different specifications of equation (1) have been estimated by the successive inclusion of regressors to determine how the addition of each control variable affects the strength of the cultural proxy.

4.5 Results

Negative Binomial Estimations, like Poisson estimations, can be reported in several ways, either as coefficients, incidence-rate ratios (IRRs), or marginal effects. The coefficients, however, do not lend themselves to a direct interpretation but need to be transformed into more intuitive formats. The estimates from this analysis are presented in two formats: the

coefficients and their transformations. The coefficients were transformed using a user-written Stata command[12] to facilitate interpretation. Estimates were obtained in a stepwise manner, beginning with just the cultural proxy in specification 1. The regression coefficients and linearized standard errors from the negative binomial estimations are presented in Table 3. For a compact presentation, the table of results excludes age and the dummies for region of residence and survey years. In Table 4 the coefficients have been transformed into percentage changes in respect of the outcome variable.

As expected, the coefficient of culture (the total fertility rate (TFR) in 1971) is positive and significantly different from zero (at the 1 percent level). Since the coefficients approximate semi-elasticities,[13] a one unit increase in the 1971 TFR results in a 14.0 percent (i.e., (exp(0.131) – 1)*100) rise in completed fertility. This effect rises substantially to 19.4 percent[14] in model (2) when the woman's age and her level of human capital development at age 16 were included. The inclusion of the sibship size and birth cohorts in models (3) and (4) respectively, reduces the magnitude of completed fertility only slightly to 18.9 percent and 19.1 percent respectively at the same level of statistical significance.

[12] The 'listcoef' command written by Long and Freese (2014) was used to obtain the percentage change in outcome from each control variable.
[13] Given that the conditional mean for a Negative Binomial Model is exponentiated the regression coefficients can be interpreted as semi-elasticities (Cameron & Trivedi, 2010).
[14] Computed as: (exp(0.177) – 1) * 100.

Table 4.3: NBM Estimates for completed fertility.

Dep. Var.: Completed fertility	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
Fertility rate in 1971	0.131***	0.177***	0.173***	0.175***	0.154***
	(0.034)	(0.030)	(0.028)	(0.028)	(0.027)
Left school at age 16 or younger		0.0953*	0.0847*	0.0834*	0.0498
		(0.040)	(0.039)	(0.038)	(0.040)
Number of Siblings			0.0442***	0.0424***	0.0351***
			(0.006)	(0.006)	(0.006)
1944 - 1950				0.503**	0.372*
				(0.163)	(0.171)
1951 - 1960				0.226*	0.173
				(0.089)	(0.092)
1961 - 1970				0.127*	0.119*
				(0.059)	(0.059)
Father working when woman was 14					-0.138**
					(0.048)
Mother working when woman was 14					-0.174***
					(0.030)
Constant	0.0126	-4.905***	-4.257***	-4.123***	-4.212***
	(0.208)	(0.934)	(0.861)	(1.167)	(1.181)
N	870	855	855	855	855

Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
Columns (2) to (5) also include age and age squared. All specifications include region of residence and survey year dummies, and a constant term.

Lastly, to be sure that these effects are not driven by parental characteristics, we control for the employment status of parents when the woman was 14 years old. The estimated percentage rise in completed fertility, after all explanatory variables were added, is 16.7 percent and is statistically different from zero at the 1 per cent level. The sample size reduces slightly because of disparities in the response to questions on individual characteristics and parental employment status[15]. Overall, all explanatory variables have

[15] For example, some respondents had information on the job status of father but none for the mother.

proven to be important predictors of completed fertility and correlate with the outcome in the expected direction. Although the 1951 – 1960 birth cohort is not a statistically significant predictor of completed fertility, its impact is still in the expected direction.

In Table 4.4, the coefficients from specification (5) above have been transformed into percentage changes. The columns contain the coefficients of each response variable (b), the t-score for the test of the null hypothesis (b=0), the p-values of the t-test, the percentage change in the expected count of completed fertility from a unit increase in a response variable (%), percent change in expected count for a Standard Deviation increase in the response variable (%*Std of X), and the standard deviation of the response variable (Std of X). The discussions that follow focus on the column (**%**) with percentage changes.

Table 4.4: Percentage change in expected completed fertility.

Response Variables (X)	b	t	P>|t|	**%**	%StdX	SDofX
TFR in 1971 (cultural proxy)	0.1541	5.733	0.000	**16.7**	9.7	0.601
Number of Siblings	0.0351	6.308	0.000	**3.6**	9.3	2.525
Left school at age 16 or younger	0.0498	1.239	0.217	**5.1**	7.6	1.495
Birth year cohorts:						
1944 – 1950	0.3717	2.170	0.031	**45.0**	9.0	0.199
1951 – 1960	0.1734	1.890	0.060	**18.9**	6.7	0.352
1961 – 1970	0.1191	2.020	0.044	**12.6**	6.3	0.497
Father had a job when woman was 14	-0.1380	-2.902	0.004	**-12.9**	-5.5	0.425
Mother had a job when woman was 14	-0.1742	-5.876	0.000	**-16.0**	-7.6	0.478

Computation from author's analysis using UKHLS and WDI data. It shows the estimates (**b**) for completed fertility and their transformations (**%**)

4.6 Discussion of findings

The analytical findings in this paper are based on the estimates from our preferred specification (model (5) in Table 4.3). It is, however, important to note that the positive and highly significant estimates for the cultural proxy (TFR in 1971) across all the specifications in Table 4.3 indicate that, holding all other confounding factors constant, indigenous fertility norms from countries of ancestry significantly influence the level of completed fertility of second-generation immigrants in the UK. From Table 4.4, completed fertility is higher by approximately 17 percent for a unit increase in the country-of-origin TFR in 1971. The results indicate that second-generation immigrant women whose parents are from high fertility countries are more likely to have more children than the women whose parents come from low fertility countries. This is the key finding of this study and it confirms previous findings for developed countries such as the United States of America (Blau et al., 2013; Cygan-Rehm, 2011; 2009; Fernández & Fogli, 2006; Stichnoth & Yeter, 2016), France (Chabé-Ferret, 2013) and the United Kingdom (Booth, Alison L. & Kee, 2009; Kulu & Hannemann, 2016; Taneja, 2015), that fertility norms are transmitted within immigrant households from one generation to the other.

There is also a sizeable increase in expected completed fertility (5.1 percent) for women who stopped schooling either before they turned 16 or at the age of 16. It is, however, not clear from this analysis why we should find such an effect, but several reasons could be responsible including the incidence of early marriage for women whose ancestry cultures value early female marriage, and/or teenage childbearing (Berrington & Pattaro, 2014; Coles et al., 2002; Johns, Dickins, & Clegg, 2011). It is argued that when a young woman anticipates having a large family in the future, she may be less interested in human capital investment as a young adult because she anticipates gaining less from being in the labour

force (Booth, Alison L. & Kee, 2006). Thus, by controlling for the level of schooling at adolescence, we can see how completed fertility rises when the level of human capital development is low. Of course, such life-changing decisions can also be determined by family characteristics such as parental education and household wealth so that controlling for parental education and job/economic status addresses this. Recent studies find that immigrant children with less educated parents are more likely to be less educated themselves. Educational disadvantage could lead to a low socio-economic status which is also an important predictor of children's education and eventual fertility choices (Blau, Kahn, & Papps, 2011; De Valk & Milewski, 2011; Miranda, 2008; Nisén, Myrskylä, Silventoinen, & Martikainen, 2014). Without adequate information on parental education, we could only control for the employment status of a woman's parents when she was an adolescent. Our results show that a woman whose father was in paid employment when she was fourteen has about 13 percent (16 percent if mother had a job) lower completed fertility than a woman whose father (or mother) was unemployed. By the magnitude and statistical significance of the parental characteristics, they reinforce the importance of household wealth/income in supporting the human capital development of children. It also highlights the fact that female children in economically disadvantaged immigrant households could be more vulnerable to early childbearing and marriage than obvious.

Looking next at the effect of birth cohorts it is evident that all cohorts contribute significantly to the rise in completed fertility, but older cohorts have a greater impact on completed fertility than the youngest birth cohort, which is also the cohort that matches the period from which the cultural proxy was obtained. Table 4 shows that, relative to women born between 1971 and 1982 (the youngest birth cohort and comparison group), the

completed fertility of women in the 1944 – 1950 birth cohort is estimated to be 45 percent higher. Likewise, women in the 1951 – 1960 cohort are estimated to have a roughly 19 percent higher completed fertility relative to the comparison cohort. Lastly, the 1961 – 1970 birth cohort has an estimated higher completed fertility of about 13 percent than the youngest cohort of women.

Another important family characteristic is the sibship size. Here a unit increase in a woman's number of siblings leads to an increase in completed fertility of roughly 4 percent. This effect is consistent with earlier findings that having many siblings tends to induce a preference for a large family (Booth, Alison L. & Kee, 2009; Fernández & Fogli, 2006; Murphy & Knudsen, 2002). It gives additional credence to the existence of intergenerational transmission of fertility norms among immigrants in the UK.

6.1 Sensitivity Analysis and Robustness Checks

To check that our results are not sensitive to the period from which the cultural proxy was taken, we also explore the relationship between completed fertility and the 1981 values of TFR. The transformed outputs are reported in Table 4.5 and the main results are given in Table A4.1 of the Appendix. Using the specification with all controls included, we find that the cultural effect remains positive and statistically significant. A one unit increase in the 1981 value of TFR is associated with a 10.1 percent rise in completed fertility, which is 60 percent smaller than the estimates produced with the 1971 TFR values. This appears to suggest that culture's influence reduces over time but given the close mean values of TFR in Table 1, 5.8 in 1971 and 4.9 in 1981, we can conclude that the 1971 TFR values are a better representation of cultural norms than later years.

Table 4.5: Percentage change in expected completed fertility – results for TFR in 1981

Response Variables (X)	b	t	P>|t|	**%**	%StdX	SDofX
TFR in 1981 (cultural proxy)	0.0959	6.373	0.000	**10.1**	11.5	1.135
Number of Siblings	0.0360	6.502	0.000	**3.7**	9.5	2.525
Left school at age 16 or younger	0.0564	1.417	0.158	**5.8**	2.8	0.477
Birth year cohorts:						
1944 – 1950	0.3764	2.174	0.031	**45.7**	9.1	0.199
1951 – 1960	0.1820	1.959	0.051	**20.0**	7.0	0.352
1961 – 1970	0.1072	1.796	0.074	**11.3**	5.6	0.497
Father had a job when woman was 14	-0.1461	-3.103	0.002	**-13.6**	-5.8	0.425
Mother had a job when woman was 14	-0.1589	-5.409	0.000	**-14.7**	-7.0	0.478

Computation is based on the estimates from specification (5), Table 2. The table shows the estimates for completed fertility (**b**) and their transformation into percentages (**%**).

In addition, the results are robust to changes in the sample selection. Specifically, a repeat estimation is done with a different sample which includes first-generation immigrants who moved to the UK before they turned 16 – the so-called '1.5 generation' (see Kraft and Wolf, 2015). Using the TFR in 1971 cultural proxy and including all controls, the general pattern of completed fertility is confirmed (see details in Tables A4.3 and A4.4 of the Appendix). Although the magnitudes of the estimates are slightly smaller, all the covariates maintain their level of importance in the estimation of completed fertility. Importantly, the influence of fertility norms from the countries of ancestry remains dominant in the fertility choices of female descendants of immigrants in the UK.

4.7 Conclusion

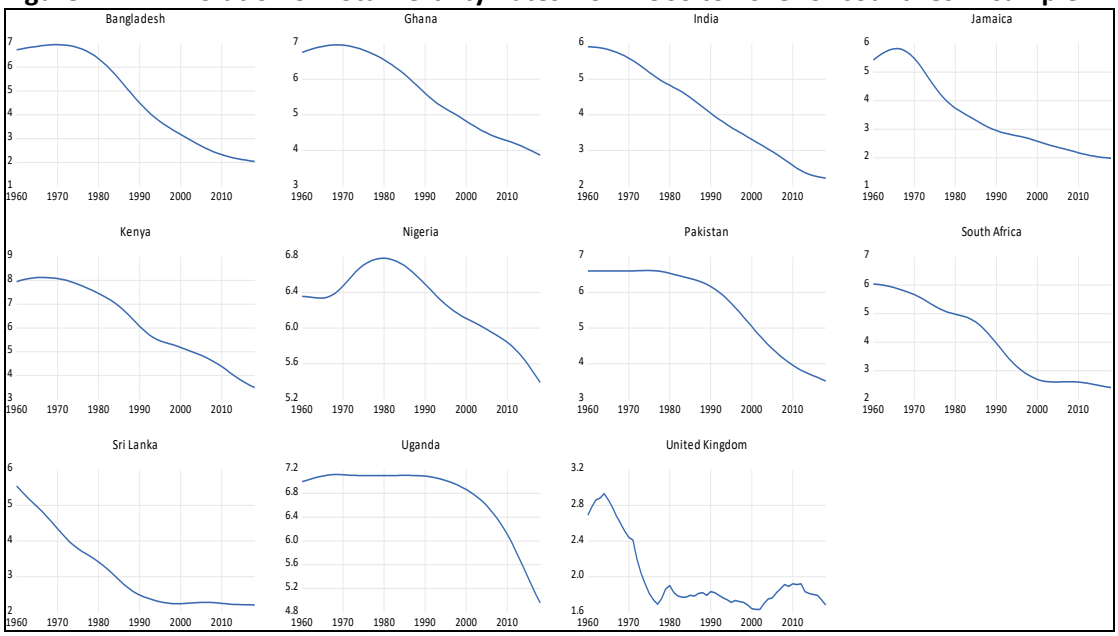
This chapter has explored the relationship between the indigenous fertility norms of ethnic minority groups and the completed fertility of women who were born and raised in the United Kingdom by foreign born parents. It shows that culture is an important factor to the fertility outcomes of immigrants. It extends previous research by disaggregating the African and Caribbean sub-population into their respective countries and imputing country of ancestry values of total fertility rates as indicators of cultural preferences with respect to fertility and family size. Following Fernandez and Fogli (2009), Finseraas and Kotsadam (2017), and Polaveija (2015), the study applied the epidemiological approach to separate the effect of culture from that of formal and informal institutions in ancestry countries, factors which could potentially confound the impact of cultural preferences. Thus, it identifies culture by investigating the fertility outcomes of second-generation immigrants from different ancestry countries living in the UK. Using count data estimation techniques and a combination of data from the UK's Longitudinal Household Study and country of origin values of total fertility rates from the World Bank's WDI, the study finds that lagged values of TFR from a woman's country of ancestry is positively associated with her completed fertility. This finding is robust to the inclusion of a wide range of individual and parental characteristics including the size of a woman's sibship and her educational attainment at the age of 16. It is also robust to the use of cultural proxy from a different decade other than the baseline year and the inclusion of first-generation child immigrants who migrated to the UK before their 16th birthday.

An interesting finding is the changes produced by birth cohorts, showing a systematic response of completed fertility to changes in equivalent rates in origin countries. The lower

completed fertility of younger birth cohorts, which corresponds with falling fertility rates recorded for non-migrating women across the ancestry countries in this study, is evidence of the portability of culture and its transmission across generations. It could also be an indicator of the changing preferences of younger immigrant generations as well as their openness to the social and economic opportunities available to them in the UK. The findings also show that the preferences and values within countries of ancestry do influence the fertility choices of immigrants and their descendants and should, therefore, be considered when evaluating the fertility decisions and other economic outcomes of ethnic minority populations in host countries.

Appendix

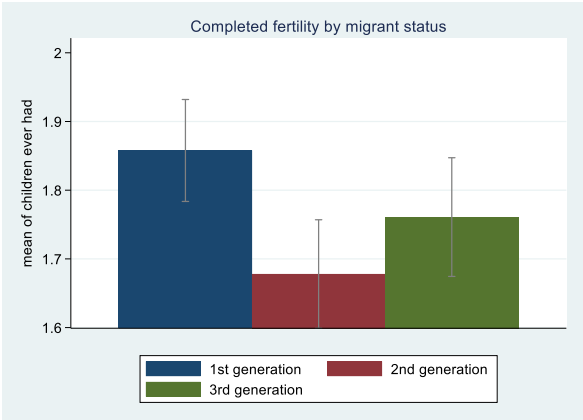
Figure A4.1: Evolution of Total Fertility Rates from 1960 to 2018 for countries in sample



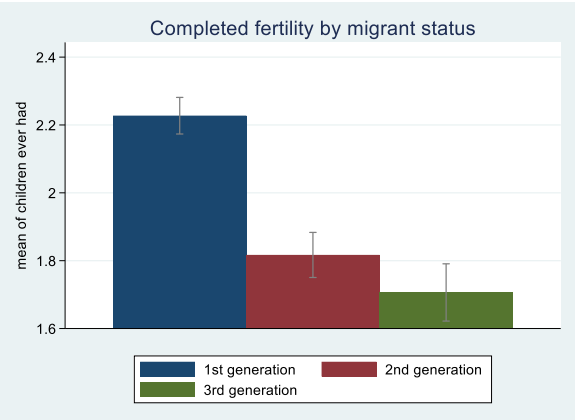
Source: TFRs computed from the World Bank's WDI, 2019

Figure A4.2: Completed Fertility

(a) Weighted data

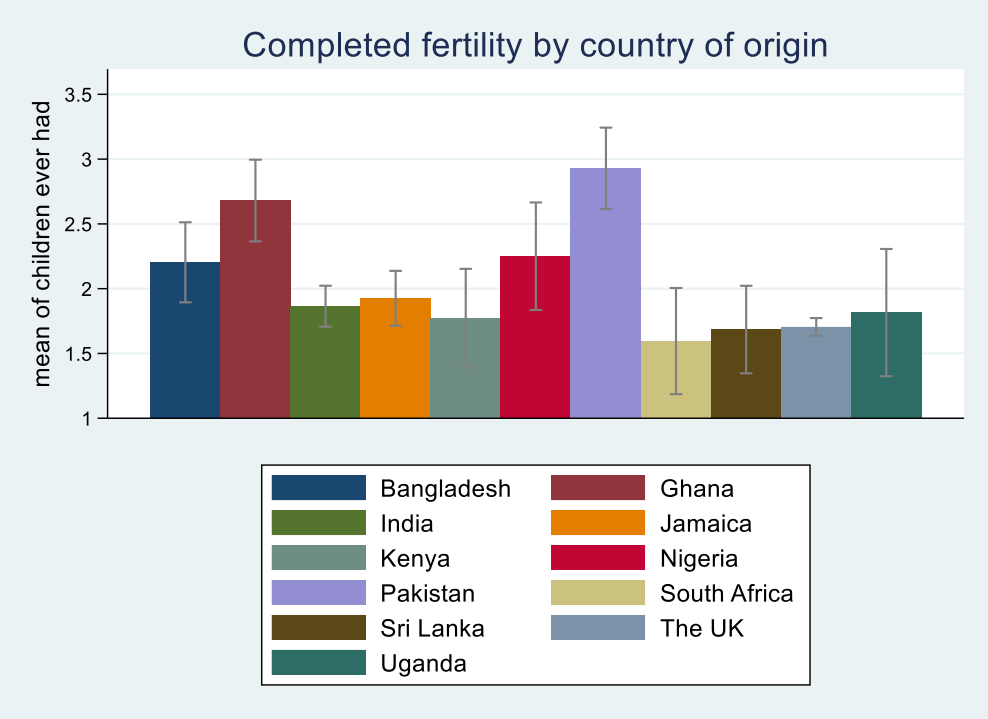


(b) Unweighted data



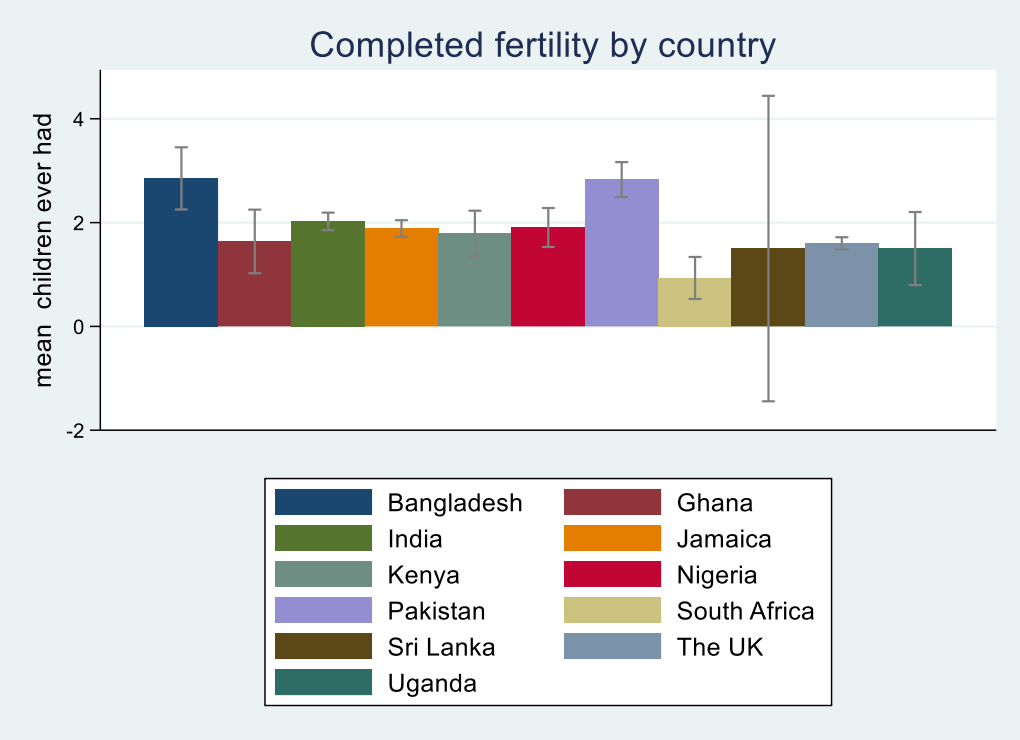
Source: Compiled by author from the UKHLS dataset (2019)

Figure A4.3: Completed fertility by country of origin – full sample.



Source: Compiled by author from the UKHLS dataset (2019)

Figure A4.4: Completed Fertility - Descendants of immigrants (includes 3rd-generation)



Source: Compiled by author from the UKHLS dataset (2019)

Table A4.1a: Comparing Parents' country of ancestry – Second-generation only

Country of origin	**No of obs.**	**Both parents from same country**	**Percentage Difference (%)**
India	257	176	31.5
Pakistan	105	91	13.3
Bangladesh	27	15	44.4
Sri Lanka	2	0	100
Kenya	19	10	47.4
Ghana	22	6	73
Nigeria	53	36	32.1
Uganda	12	3	75
South Africa	15	2	87
Jamaica	361	180	50.1
Total obs.	**883**	**519**	**41.2**

Source: Compiled by author from the UKHLS dataset (2019)

Table A4.2b: Comparing Parents' country of ancestry – Sample includes child migrants

Country of origin	**No of obs.**	**Both parents from same country**	**Percentage Difference (%)**
India	374	295	21.1
Pakistan	198	172	13.1
Bangladesh	102	77	24.5
Sri Lanka	10	5	50
Kenya	60	13	78.3
Ghana	35	11	68.6
Nigeria	61	43	30.0
Uganda	40	5	87.5
South Africa	29	3	89.6
Jamaica	504	261	48.2
Total obs.	**1438**	**885**	**38.5**

Source: Compiled by author from the UKHLS dataset (2019)

Table A4.2: NBM Estimations with the 1981 values of TFR

Dep. Var.: Completed fertility	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
Fertility rate in 1981	0.0881***	0.110***	0.108***	0.108***	0.0959***
	(0.017)	(0.016)	(0.016)	(0.016)	(0.015)
Left school at age 16 or younger		0.101*	0.0915*	0.0894*	0.0564
		(0.040)	(0.039)	(0.038)	(0.040)
Number of Siblings			0.0444***	0.0428**	0.0360***
			(0.006)	(0.006)	(0.006)
Birth cohorts:					
1944 - 1950				0.498**	0.376*
				(0.165)	(0.173)
1951 - 1960				0.234*	0.182
				(0.091)	(0.093)
1961 - 1970				0.116	0.107
				(0.060)	(0.060)
Father working when woman was 14					-0.146**
					(0.047)
Mother working when woman was 14					-0.159***
N	870	855	855	855	855

Linearized Standard errors in parentheses; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Columns (2) to (5) also include age and age squared. All specifications include region of residence and survey year dummies, and a constant term.

Table A4.3: Estimates for completed Fertility (Sample with expanded second-generation immigrants)

Dep. Var: Completed fertility	(1)	(2)	(3)	(4)	(5)
Fertility rate in 1971	0.0902***	0.109***	0.105***	0.105***	0.0880***
	(0.022)	(0.019)	(0.019)	(0.018)	(0.018)
Left school at age 16 or younger		0.134***	0.114**	0.114**	0.0940*
		(0.036)	(0.037)	(0.036)	(0.037)
No of siblings			0.0404***	0.0397***	0.0343***
			(0.005)	(0.005)	(0.005)
1944 - 1950				0.317*	0.248
				(0.134)	(0.136)
1951 - 1960				0.278**	0.259**
				(0.097)	(0.096)
1961 - 1970				0.175*	0.171*
				(0.068)	(0.068)
Father working					-0.0826*
					(0.041)
Mother working					-0.142***
					(0.029)
Constant	0.379**	-3.822***	-3.364***	-2.078*	-2.080*
	(0.138)	(0.694)	(0.663)	(0.897)	(0.894)
N	1427	1391	1391	1391	1391

Standard errors in parentheses * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
Columns (2) to (5) also include age and age squared. All specifications include region of residence and survey year dummies, and a constant term.

Table A4.4: Percentage change in expected completed fertility – results for TFR in 1971

Response Variables (X)	b	t	P>|t|	**%**	%StdX	SDofX
TFR in 1971 (cultural proxy)	0.0880	4.808	0.000	**9.2**	7.0	0.772
Number of Siblings	0.0343	6.354	0.000	**3.5**	9.2	2.554
Left school at age 16 or younger	0.0940	2.545	0.011	**9.9**	4.6	0.4655
Birth year cohorts:						
1944 – 1950	0.2479	1.821	0.069	**28.1**	6.3	0.2234
1951 – 1960	0.2586	2.681	0.008	**29.5**	12.5	0.4253
1961 – 1970	0.1706	2.519	0.012	**18.6**	9.3	0.5004
Father had a job when woman was 14	-0.0826	-1.996	0.047	**-7.9**	3.3	0.4118
Mother had a job when woman was 14	-0.1416	-4.950	0.000	**-13.2**	6.6	0.4983

Computation is based on the estimates from specification (5), Table A4.2. The table shows the estimates for completed fertility (**b**) and their transformation into percentages (**%**).

Chapter Five

5. Conclusion

The central aim of this dissertation has been to investigate whether, and how, the labour market and fertility decisions of women in developing countries are influenced by their own cultural preferences and beliefs (it also looked at the fertility outcomes of immigrants in a developed country). The research merges individual-level data with ethnicity names to investigate the relationship between culture and female labour force participation, and fertility behaviour.

Specifically, the question addressed in Chapter 2 is whether cultural norms (represented by rules of descent and historical modes of settlement) can promote or hinder a woman's capacity to engage in market production either through enterprise ownership or receiving a wage for any labour carried out. Culture's effect was empirically tested using survey data for 13 sub-Saharan African countries combined with information on ethnic groups and levels of trust for existing legal and regulatory institutions. The chapter exploits the huge disparity between the patrilineal, matrilineal, and mixed descent systems as well as the disparity between a nomadic ancestry and a sedentary settlement pattern to capture the exogenous impact of culture on the labour market and fertility outcomes of women in sub-Saharan Africa. Restricting the sample to women in urban areas, it estimated the effect of culture on labour force participation, entrepreneurship, and paid labour as well as the effect of culture's interaction with formal institutions.

Overall, the findings support the hypothesis that cultural norms can explain variations in economic outcomes. They specifically reveal that women of all descent groups have about

the same rate of labour force participation, although women of matrilineal descent and those of mixed descent have a slightly higher probability of labour force participation than women of patrilineal descent. In terms of paid labour and self-employment, the matrilineal effect is very small and not statistically significant, suggesting that women from both the matrilineal and the patrilineal descent systems were equally likely to be paid for labour activity or set up their own small business ventures. On the other hand, having a nomadic ancestry, irrespective of current conditions, was associated with a lower probability of female labour force participation (including own enterprise and paid labour) than a history of sedentary settlements.

The interpretation and generalization of these findings are, however, subject to certain limitations. Firstly, the results presented in this study are for a sample of countries within sub-Saharan Africa. It is, therefore, possible that the inclusion (or exclusion) of certain countries could bias the results in one direction or the other. Secondly, it is important to also note that the institutional variables used in this analysis are based on the opinions and perceptions of people and may not be very precise in measuring the quality of formal institutions. Further investigations using a different set of institutional variables could help validate the observed effects. Furthermore, the spectacular outcomes produced by the nomadic culture should be taken cautiously as they may well be driven by the relatively small proportion of nomadic women in the sample. The 'statistical invisibility' (Randall, 2015) of nomadic populations in Africa is indeed a serious barrier to the research on the effect of nomadism on a wide range of outcomes. Nevertheless, future research will seek to extend this investigation by examining the relationship between the nomadic versus the sedentary way of life (including descent rules) and the fertility intensions of women in Africa.

Despite these limitations, the findings from this research have important policy implications. Particularly important is finding that the systematic economic disadvantage faced by women of nomadic ancestry relative to women of sedentary ancestry is considerably reduced when culture is interacted with formal institutions. This indicates that the presence of strong formal institutions is a necessary condition for improving the economic wellbeing of women in Africa irrespective of their cultural backgrounds. A good place to begin could be committing to a more inclusive and credible data collection program to eliminate the so-called 'statistical invisibility' of minority groups within the population. In addition, policies and intervention programs which promote, for example, greater access to financial and physical capital for women, protection of property rights for disadvantaged groups would mitigate the effect of cultural limitations and promote equal opportunities for women in Africa.

Chapter 3 exploits the uniqueness of three norms of female premarital sexual behaviour to analyse the relationship between culture and a woman's age at first birth as well as the quantum of births in developing countries. Basing my analysis on the same data configuration as chapter 2, I estimate the effects of a cultural emphasis on early female marriage, a cultural emphasis on female virginity at marriage, and a culture in which none of these is emphasized but female premarital sex is weakly censured, on the age at first birth and the number of children. The findings in this chapter show that each premarital norm has a strong effect on the outcomes. Generally, and compared to the culture in which female premarital sex is weakly censured, the cultural emphasis on early female marriage is associated with a higher fertility rate and an early onset of motherhood. This finding could be regarded as an explanation for the high rate of fertility, including adolescent fertility, in sub-Saharan Africa. The emphasis on female virginity at marriage is, interestingly, associated

with a lower fertility rate and a late commencement of childbearing compared with the culture that is tolerant of female premarital sex.

There are some caveats to the generalization of the findings in this chapter. In the first instance, although the research scope has been the SSA and MENA sub-regions not all countries in these sub-regions had the necessary information either from the Demographic and Health Surveys or Afro-barometer surveys (only Turkey could be included for the Middle East). Therefore, there is potential that the exclusion of a country, say Morocco or Libya, could bias the results in a certain direction. Further research could explore these relationships with a different dataset and/or methodology. A second issue lies with the choice of institutional variables which, as earlier noted, may not capture the true state of formal institutions in these areas. A possible direction for future research could be the use of alternative measures of formal institutions to show the nature of culture's interactions with formal institutions. It will also be interesting to see how this effect changes over time, an insight which a panel analysis may provide. The next step in the current research, however, is to investigate how each premarital norm influences the uptake of modern contraceptive methods by women in developing countries. It will also explore how the preference for male children could affect early childbirth, early marriage and completed fertility.

The limitations apart, there are particularly important findings from this chapter. The effects of the respective cultural emphases on the onset of childbearing and the quantum of births per woman are clear cut. Especially important is the distinctly opposite effects from the cultural emphasis on early female marriage and the emphasis on female virginity at marriage. They show that not only do the women and girls have distinct cultural

characteristics, but they also make very different fertility choices which is interesting from a policy perspective. In addition, the importance of strong formal institutions is revealed in the way it interacts with each cultural proxy. The outcomes from the cultural emphasis on female virginity at marriage seem to respond more to changes in the quality of formal institutions than they do for the cultural emphasis on early marriage. For a meaningful impact, therefore, policies which target fertility reduction and reproductive health care, for example, should be grounded on a good understanding of these cultural differences. The knowledge of how and where each cultural emphasis is strongest is key to a successful implementation of health and educational support programs for women and girls in such areas. In addition, policies which promote female education and career development will be more effective in raising the opportunity cost of childbearing and thus delay the onset of motherhood in the areas where early female marriage is highly valued. When young women and girls can access educational resources easily and can thus pursue their dreams, they will be less inclined to settle for an early marriage and motherhood. Lastly, societies where female premarital sex is not frowned at should be the focus for education of the girl-child and reproductive health education programs.

Finally, in chapter 4 I take an exploratory look at the influence of ancestry culture on the fertility behaviour of descendants of immigrants in the United Kingdom. The chapter builds on Fernandez and Fogli's (2009) study of second-generation immigrant women in the U.S, to investigate the impact of country-of-origin total fertility rates (TFRs) on the completed fertility of second-generation ethnic minority women in the UK. Using household-level survey data combined with country averages of TFR, I estimate the effect of lagged values of total fertility rates from source countries (TFR in 1971 and 1981) on completed fertility, finding that there is a positive impact of country-of-ancestry values of TFR on completed

fertility. This finding is robust to the use of different samples and cultural proxies and not only confirms the portability and strength of cultural norms on fertility behaviour, but it also provides some evidence of cultural transmission (Bisin and Verdier, 2011) across immigrant generations in the UK.

The findings in this chapter are also subject to limitations, chief of which is that the data sample includes women below the age of 45 who may still be bearing children. This may account for the lower effect of culture on the completed fertility of the youngest birth cohort. A sample with a higher age at completed fertility would be the ideal option but this was not feasible for this study because of the very small proportion of second-generation immigrants in the data. A further sample restriction would have substantially reduced the statistical power of my analysis. Given this, therefore, caution is advised when generalizing the findings in this chapter.

Overall, the findings support the hypothesis that culture is an important determinant of the fertility outcomes of immigrants and their descendants in developed countries. It also suggests that a strong institutional environment alone may not be a sufficient incentive for immigrants from high fertility countries to have less children. In all, this dissertation provides valuable evidence of the broad relevance of culture to studies in economics. It has shown that cultural preferences can explain a variety of economic outcomes whether in a developing or a developed country. Further research could, however, examine the impact of similar indigenous norms on higher-order generations of immigrants in the UK to gain insight on the strength of cultural transmission across time using the same data or a different data set.

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