Economics
The Open-Access, Open-Assessment E-Journal

Vol. 8, 2014-41 | November 24, 2014 | http://dx.doi.org/10.5018/economics-ejournal.ja.2014-41

Values and Labor Force Participation in the Nordic Countries

Axel Hall and Gylfi Zoega

Abstract
The Nordic countries are known for their success in combining an extensive welfare state with high labor force participation. This is explained by the origins and organization of their welfare states, which can be traced to a set of values and beliefs that emphasize the right of women to participate in the labor market. These values are shared by individuals born in other European countries of Nordic parents and may have origins in the Nordic countries' Lutheran heritage.

JEL J21 J22
Keywords Values; employment; taxes; beliefs

Authors
Axel Hall, Reykjavik University, Reykjavik, Iceland
Gylfi Zoega, ✉ University of Iceland, Reykjavik, Iceland, gz@hi.is

Citation Axel Hall and Gylfi Zoega (2014). Values and Labor Force Participation in the Nordic Countries. *Economics: The Open-Access, Open-Assessment E-Journal*, 8 (2014-41): 1—43. http://dx.doi.org/10.5018/economics-ejournal.ja.2014-41

Received February 13, 2014 **Published as Economics Discussion Paper** March 7, 2014
Revised October 10, 2014 **Accepted** November 18, 2014 **Published** November 24, 2014

1 Introduction

This paper is about beliefs and values in the Nordic countries of Denmark, Finland, Iceland, Norway, and Sweden – in particular, those having to do with the participation of women in the market economy. We attempt to explain how these countries have managed to combine high levels of taxation and high rates of female labor force participation with relatively high fertility rates.[1]

What sets the Nordic countries apart from most other advanced countries is that the conflict between motherhood and participation in the labor market was addressed in the design of their welfare states by enabling working women to become mothers. We argue that the reason for this lies in the values found in these countries – values that also have a direct impact on women's education and labor market participation.

2 Culture

Following tradition, we define culture as a system of beliefs, norms, and values that social groups transmit from one generation to another. Scholars in a variety of disciplines have tended to agree that, from one country to another, there are cultural differences in beliefs about the role of women in the home and the labor market.[2] These beliefs are passed on from one generation to another, making individuals suffer a loss of utility if they deviate from the norms, as is described by Akerlof (1980), Bernheim (1994), and Lindbeck (1997). Moreover, women who prefer to stay at home in a society that values their participation in the labor market may find it difficult to do so due to unfavorable income comparisons and the lack of company of other housewives when other women have joined the labor market, as in the tipping models proposed by Shelling (1971).Women who do not

[1] Ahn and Mira (2002) show that, for seven high female participation rate countries (Denmark, Finland, Norway, and Sweden, in addition to the US, the UK, and Canada), fertility rates began to rise around 1985, following a period of decline. Del Boca and Locatelli (2006) highlight the contrast between the Nordic countries, where fertility rates and women's labor force participation rates are both high, and Southern Europe, where both rates are significantly lower.

[2] See, among others, Nussbaum and Glover (1995), Pasternak et al. (1997), Harrison and Huntington (2000), and Nanda (2000).

participate in the labor market may even feel marginalized, even as 2nd-class citizens.

Guiso et al. (2006) document the effect of religion and ethnic origin on culture. They trace differences in the level of trust towards fellow citizens among Americans to their religion and ethnic origins. They find that individuals of Scandinavian origin had higher levels of trust, reflecting the higher level of trust in their countries of origin. Furthermore, they find that Protestants and Catholics place greater importance on teaching children to be thrifty and are less in favor of redistribution of income than other survey respondents.

Fortin (2005) uses data from the World Values Surveys to explore the relationship between gender role attitudes and women's labor market outcomes for OECD countries and finds that anti-egalitarian views have a strong negative association with female employment rates and the gender pay gap. Ingelhart and Norris (2005) argue that perceptions of the appropriate division of labor in the home and in paid employment are shaped by the predominant culture, which they define as the social norms, beliefs, and values existing in society, and that these in turn depend on the degree of modernization of the economy and religious traditions. Wealthy societies tend to have secular rather than traditional values, as do Protestant societies.

According to Oskarson (1995), Nordic women tend to be more left-leaning in politics than are women in other parts of the world. Ingelhart and Norris (2003) attribute this gender gap in voting behavior to culture: in particular, women have moved to the left ideologically because of a process of shifting towards more egalitarian attitudes. Cultural factors may explain why women are better represented in the parliaments of the Nordic countries than in most other countries. Ingelhart (1981) finds that there is a strong positive relationship between the proportion of women in parliament and a scale that measures traditional versus modern values, indicating that differences in values explain differences in the political participation of women.

The five Nordic countries were among the first to give women a universal and equal right to vote and to stand as candidates in national elections. Women acquired this right in Finland in 1906. Norwegian women gained the right to vote in 1913, Danish and Icelandic women in 1915, and Swedish women in 1921. Universal suffrage was preceded by women's acquisition of legal majority (i.e., the right to own property and make decisions on labor market participation, and

being deemed equal in terms of parenthood). The world's first female members of parliament were elected in Finland in 1906, Denmark became only the second country in the world to have a female minister in 1924, and Iceland was the first country to elect a female head of state in 1980. These steps set the stage for later institutional reforms that facilitated women's participation in the labor force.

There is evidence that attitudes towards women's participation in the labor force are passed on from generation to generation. Vella (1994) used Australian data and found that women's attitudes towards working develop in their youth. Reimers (1985) showed how married black women in the United States have a higher propensity to participate in the labor market, after adjusting for other factors. She attributed this to cultural differences rooted in the historical experience of blacks in America. Antecol (2000) studied male and female labor force participation by ethnic group in the US. She found a positive correlation between the gender wage gaps of first-generation immigrants and wage gaps in the countries of origin and concluded that cultural factors mattered. Fernándezet al. (2004) explored the effect of working mothers on family attitudes; in particular, the attitude of sons towards their wives' participation in the labor force. These authors postulate that growing up with a working mother either affects a son's attitudes towards having a working wife or makes him a better partner to a working wife. Using World War II as a natural experiment, they show that the mobilization rate at the state level in the United States was positively associated with the labor supply of women of child-bearing age, which then affected the labor supply of women belonging to the next generation, apparently by changing the attitudes and behavior of their sons. Algan and Cahuc (2005) explored values and employment rates by sex and age in a group of developed countries. They found that a stronger preference for family relations in Southern Europe reduces the labor supply of women, as well as that of the young and the old. Fernández (2007) and Fernández and Fogli (2009) examined work and fertility behavior of second-generation American women in 1970, relating this to past female labor force participation, attitudes, and total fertility rates from the country of ancestry as proxies for culture. They found that these cultural proxies had an effect on the behavior of individuals who were all born and raised in the United States and hence facing the same institutional environment.

In a recent paper, Burda et al. (2013) studied the pattern of determinants of gender differences in the total amount of work, which is the sum of work done in

the market and at home. They found that in wealthy non-Catholic countries the gender difference in total work was statistically insignificant, while women's total work significantly exceeded men's in Catholic countries as well as in middle- or lower-income countries. They attributed this pattern to social norms and found that work differences across genders correlated positively with the proportion of survey respondents who agreed that men should have priority in the labor market when jobs are scarce. The same pattern was found among immigrants in the United States, where the values in the country of origin correlated with gender work differences.

3 Values in the history of the Nordic welfare state

The roots of the Scandinavian welfare system can be traced to the first half of the 20th century. The path to equalization of labor market opportunities can be split into two phases. Markkola (2010) characterizes the period from the 1860s to the 1920s as a struggle for formal equality; i.e., guaranteeing that men and women have the same political and economic rights, including education, suffrage, and the right to hold public office. Women were granted legal majority in Norway, Denmark, and Iceland by 1900, in Sweden in 1921, and in Finland in 1929. The five Nordic countries were also among the first to grant women a universal and equal right to vote and to stand as candidates in national elections. Melby et al. (2006) describe how the Nordic countries were ahead of other European countries in passing marriage legislation that enhanced women's individual rights and ended a husband's legal power over his wife.

It was not until the 1950s and 1960s that the second phase started, when legislation was passed to facilitate women's labor force participation, such as separate taxation for married couples and a universal, publicly funded system of child care, maternity leave and, eventually, paternity leave. However, it can be argued that the first phase – granting formal rights to women at the beginning of the 20th century – set the stage for the legislation passed in the second half of the century (see Jonsson 2004). However, labor markets in the Nordic countries are still among the most sex-segregated – there are female- and male-dominated professions and the former tend to pay a lower salary. This affects the choice

between maternal and paternal post-childbirth leave, making the former more common than the latter.

Concerns over declining population numbers became important in the Nordic countries in the first half of the 20th century and contributed to the second phase of equalization of labor market opportunities in the post-war era. In response to the population challenge in Sweden, sociologist Alva Myrdal argued that women should be encouraged and enabled to combine work and motherhood. In collaboration with her husband, Gunnar Myrdal (1934), she managed to change the ideas of the ruling Swedish socialists and reframe the debate, shifting the focus from women's right to work to their right to have children. In the 1930s, committees were established in Sweden, as well as in Denmark, Finland, and Norway, with the aim of finding ways to prevent women's paid employment from reducing their fertility and to avoid restricting their access to the labor market (see Bjornson and Haavet 1994). This policy change called for public programs for family planning, child care, and division of labor within the family. In Sweden, many of the ideas proposed by the Myrdals were formalized by the Government Committee on Women's Work.

Alva Myrdal's writings on the Swedish welfare state reveal how values affected the choice of institutions in Sweden. In a book published in 1941 (Alva Myrdal, *Nation and Family*, 1994), following up on her earlier book with Gunnar Myrdal (Alva Myrdal and Gunnar Myrdal, *Kris i befolkningsfragan*, 1934), she developed two tenets that shaped her argument. The first tenet is that family policy must be an objective of all social programs; that is to say, it cannot be assigned to any one social program. The second is that the institutional design requires knowledge of values as well as facts. Thus social values deserve the same rigorous analysis as observable facts and should not be considered any less important. Values are the foundation on which institutions and social policies should be constructed. In Sweden, these values included an emphasis on women's right to work and to combine family and paid work.

In a nutshell, Myrdal described a consensus on resolving the conflict between employment and motherhood by enabling working women to have children rather than by removing mothers from the labor force. Thus the Swedish Committee on Women's Work "opposed any and every effort to prevent married women by law from keeping or seeking gainful employment outside the home" (Myrdal 1941: 410). Instead, the institutions of society should be constructed so as to help women

adjust to the demands of marriage and children and to invest in vocational training. In this way, "This disharmony in the relation between marriage and gainful employment was considered to be at the bottom of many of women's problems. How shall life be planned so as to reconcile these two factors?" writes Myrdal (Myrdal 1941: 420), and expresses the hope that the reforms being implemented in Sweden will help women to combine motherhood and paid work more smoothly.

Values also preceded institutions in other Nordic countries. Jonsson (2004) describes the evolution of Iceland's pre-school system. The establishment of child care in Iceland dates from the 1930s, but it was not until the 1960 that it gained serious momentum. The main driving forces were urbanization; the demand by employed women for child care, which originated in values that emphasized gender equality and women's right to work, and a belief that children would benefit from contact with their peers in terms of their maturation and social development.

One milestone reached in the Nordic countries during this period was the taxation of married couples as separate individuals. It was only in 1964 that married partners were taxed separately in Norway, in 1970 in Denmark, in 1971 in Sweden and in Iceland in 1978 (Jonsson 2004). Family-oriented welfare policies only became established in the 1960s. These consisted of facilitating women's participation in the labor market by guaranteeing children access to pre-school and providing support for single mothers. In Denmark, the first piece of legislation on pre-school child care was passed in 1964. Finland, Iceland, and Sweden passed such legislation in 1973 and Norway in 1975. Immervoll and Barber (2006) show that the ratio of child care costs to average wages is much lower in the five Nordic countries than in France, and especially in the US.[3] Laws guaranteeing maternity leave were passed during the same period. In Sweden, women were given three months' maternity leave in 1954; this was extended to six months in 1974 and 12 months in 1989. In Denmark, they were given 11 weeks in 1956, with an extension to 14 weeks in 1972. In Finland, women were given 54 days in 1964; this has now been extended to 10½ months. In Norway, they were given 10 weeks in 1956, with

[3] According to Kristjansson (2008), the cost of keeping two children in pre-school for a couple earning average wages is 19% of income in the US, 18% in France, 9% in Denmark, 8% in Finland, 12% in Iceland, 11% in Norway, and 6% in Sweden. Every child is guaranteed entry in Denmark, Finland, and Sweden, and although there is no guarantee in Iceland, the supply of day care is adequate.

an extension to 12 weeks in 1977, followed by a gradual extension to 42 weeks. In recent years, paternity leave has been introduced in these countries (see Jonsson, 2004).[4] In addition, the system of taxes and benefits that form the welfare system is internalized by labor unions and taken into account during wage negotiations.[5]

Numbers on women's labor force participation show that it was only in the 1950s (and especially the 1960s) that Nordic women entered the labor market en masse, a trend that accelerated in the 1970s and 1980s. Thus, between 1910 and 1970, women's participation rates were low, at 25–50%, owing to the very low participation rates of married women, which were around 10% until the 1940s (Jonsson, 2004). The rising labor force participation among women in the post-war decades can be traced in part to falling reservation wages due to an increasing supply of child care services, changes in tax systems, and technological advances in household production; i.e., the introduction of dishwashers and washing machines (see Coen-Pirani et al. 2010; Greenwood et al. 2005). Rising levels of education among women also played a role in narrowing the wage gap between men and women and expanding the supply of more interesting and stimulating jobs offered to women in new sectors better suited to female employment. However, although these trends can be found in most Western countries, there has been little sign of convergence in female participation rates across countries, which suggests a cultural role.

Values and attitudes regarding mothers' participation in the labor force are currently reflected in the structure of the Nordic welfare state. The main difference between the structure of government spending in Nordic and continental European

[4] Pronzato (2009) finds that paid parental leave increases the probability of remaining at home after the birth of a child. Del Boca and Locatelli (2006) find that social policies can help explain differences in the ability of women to combine employment and child rearing across countries. Gustafsson et al. (1996) studied labor force participation among women in the UK, Germany, the Netherlands, and Sweden between 1985 and 1993 and found the participation rate was considerably lower around the birth of the second and third child in all countries except Sweden.

[5] O'Connor et al. (1999) describe the role of the state and the market in affecting gender equality in several countries. They find scant evidence of linkages between state, families, and the market in the US; a similar system although with somewhat stronger linkages between families and markets in Canada (for example, in the provision of maternity benefits); and the same applying to Britain, where a commitment to gender equality in the workforce is missing. These authors find that Australia has gone further in influencing markets in order to enforce family responsibility. However, low female employment rates set Australia apart from the Nordic countries.

countries is the higher proportion of spending on the provision of public services in the Nordic countries and the smaller share of cash transfers (see Sachs 2011). Moreover, in terms of cash transfers, social support for the working-age population is contingent on the applicant's being either employed or actively searching for a job. Thus benefits depend largely on participation in the labor market. Mjøset (2001) describes how Nordic welfare states developed differently from continental European welfare states. While the latter remained transfer states, the Nordic welfare states produced social services allowing citizens, especially women, to join the labor market.

4 On the origins of attitudes towards working women

A recent paper by Alesina et al. (2013) traces cultural differences to the type of agriculture practiced in different countries. The authors trace the historical origins of current differences in attitudes towards the role of women in society to traditional – or pre-industrial – agricultural practices. According to their thesis, societies that practiced plough agriculture requiring masculine muscle strength during the pre-industrial period valued women's labor market participation less than societies that practiced shifting cultivation. It follows that societies where plough agriculture was practiced developed a gender division of labor and the belief that the natural place for women was the home. These beliefs and values were then passed from one generation to another, outlasting the plough agriculture that generated them and producing a positive correlation in the data between plough use in the past and current attitudes reflecting gender inequality.

This thesis cannot explain, however, why the Nordic countries differ from other European countries. In all five Nordic countries, participation rates are high and attitudes towards women's participation favorable, yet the forms of agriculture practiced in these countries in pre-industrial times varied. While plough agriculture was practiced in Sweden, Denmark, and parts of Norway, Iceland did not have a climate suitable for plough-positive crops such as wheat, barley, and rye. In Finland, too, using the plough was difficult because in large parts of the country the soil is so rocky that it was very troublesome to plough, as is described by Loudon (1825). In contrast, Sweden was better suited to plough agriculture and benefited from its natural resources of iron in producing ploughs for use in

agriculture. As a result, plough agriculture spread across Sweden during the Middle Ages (see Myrdal and Morell 2011).[6] Explaining cultural attitudes towards women's labor force participation in terms of plough use in pre-industrial times should therefore predict internal differences among the Nordic countries rather than setting them apart from other European countries.

Another hypothesis is that of Fernández et al. (2004), who posit that women of child-bearing age increased their labor force participation during World War II in the US, instilling in their sons a changed attitude towards women's participation, which then affected the participation of the next generation of women, happily married to understanding and helpful husbands. But this theory does little to explain the higher participation rates in the Nordic countries. Only Finland participated formally in World War II, while Sweden remained neutral and Denmark and Norway were quickly overrun by German forces in May 1940. In contrast, all of continental Europe (except Switzerland, Spain, and Portugal) and the United Kingdom participated directly in the war, which should have resulted in higher labor participation among women in these countries than in the Nordic countries.

Doepke and Tertilt (2009) propose an explanation for greater economic rights for women that is not based on cultural factors. They argue that higher returns to human capital made men want to increase the educational level of women for two reasons. First, a higher level of education for women would increase their bargaining power vis-à-vis their husbands, which enabled them to care better for their children and endow them with greater human capital. Second, the fall in the number of children in the West made it more important that daughters be well educated so as to ensure that they would not be exploited by their husbands. We explore this hypothesis further at the end of this section.

In our view, a more convincing explanation for the uniqueness of the Nordic countries can be found in religion, as all five are predominantly Lutheran (in contrast to other European countries) and have very small Catholic populations. The values and beliefs promoted by the Lutheran Church in the Nordic countries were imported from Germany. They spread first from Germany to the Danish regions bordering Germany, where the Protestant Reformation was first

[6] Jensen (2003) and Astill and Langdon (1997) document evidence for the use of ploughs in Denmark and southern Norway going back to the early Middle Ages.

implemented in the cities of Haderslev and Törninglehn by Christian III (see Lockhart 2007), who, after assuming the Danish throne in 1536, had the Catholic bishops arrested and confiscated their property. The Reformation was then forced upon Norway and Iceland, which were part of Denmark at the time, against the will of the majority of the population.[7] The Reformation was also imposed from above in Sweden, and Finland, then part of Sweden, became Lutheran as a result. An important driving force was the state's confiscation of the property of the Catholic Church. The effects of the Reformation were felt immediately. The adoration of saints was rejected, as were fast days and celibacy, and the approach towards poverty relief gradually changed.

The Lutheran church had a great impact in all the Nordic countries, as is emphasized by numerous scholars as an important explanation for the similarities among the Nordic states and the Nordic type of welfare system (see, among others, Knudsen 2000, and Stenius 1997). Most importantly, the Lutheran church contributed to an understanding of work ethics and equality. As is pointed out by Markkola (2010), the goal of full employment may come from the Lutheran view of work as a calling, and the desire for equality may derive from the Lutheran tradition of a priesthood of all believers.

The Lutheran church in the Nordic countries has been a state church since the Reformation, which reached them during the period from 1520s to the 1550s. Markkola (2010) points out that clergy represented the state at the local level, while the church order had political importance at the state level. The church contributed in this way to the conformity and homogeneity of Nordic societies (see introduction to Christiansen et al. 2005). The high proportion of the population belonging to the Lutheran church[8] and its status as a state church opens up the possibility that attitudes towards women's labor force participation have religious origins, at least in part.

---

[7] Violent clashes between the followers of a Protestant bishop in the southern part of Iceland and a Catholic bishop in the northern part of the country ended in the defeat of the latter.

[8] As of 1 January 2013, 79.1% of Danes were members of the National Church (Statistics Denmark); 76.2% of Norwegians were members of the state Church of Norway at the end of 2012 (Statistics Norway); 67.5% of Swedes are members of the Lutheran church (Svenska kyrkan); about 79% of the population belong to the Lutheran Church of Iceland (Statistics Iceland); and 76.4% of Finns were members of the Church (Lutheran church member statistics).

But why would the Lutheran church promote values conducive to women's participation in the labor market? And is there any empirical evidence supporting this hypothesis? According to Max Weber (2001), Luther imbued daily worldly activity with religious significance by defining the fulfillment of worldly duties as the only way to be acceptable to God. Thus, according to Weber, the German word "Beruf" and the English word "calling" imply that people are called to perform tasks set by God. These values affected public policy. While the Roman Catholic Church had looked favorably upon giving money to the needy, the Lutherans Church believed that beggars should be made to work, and those who were unwilling to work should not receive food! (See Kjærgaard 1991). Moreover, Luther elevated the role of women as wives and mothers and stated that men and women were equal under God and could serve God in many capacities, including motherhood and various types of religious and non-religious occupations. Luther had a more positive attitude towards women than did many earlier religious thinkers, asserting that both men and women are God's creation and that neither sex should disrespect the other (see Karant-Nunn and Wiesner-Hanks 2003).

Gudmundsdottir (2007) describes how Lutheran doctrine departed from Roman Catholicism in several respects that contributed to women's taking a more proactive role in society. Women were encouraged to leave convents and find men to marry and raise families with because they could serve God better as active members of society than within the confines of nunneries. Luther also emphasized universal education, including the education of women, and wrote that fathers should participate in rearing their children.[9] Universal literacy was advocated by the Lutheran Church, which placed much greater emphasis on Bible reading and delivery of sermons in the vernacular.[10] According to Luther, individuals of all vocations – men and women alike – can serve God. Or, in the words of Weber (1905), in Luther "there remains, more and more strongly emphasized, the statement that the fulfillment of worldly duties is under all circumstances the only way to live acceptably to God. It and it alone is the will of God, and hence every

[9] Danish historian Bente Rosenbeck (1998) finds that Protestantism has contributed to a culture that places emphasis on girls' education and women's rights.

[10] Tabellini (2010) uses the literacy rate at the end of the 19th century, as well as political institutions in place over the past several centuries, as instruments for values conducive to a higher income per capita. However, it could be argued that the literacy rate is not an exogenous variable but instead reflects the influence or absence of the Protestant religion in each region.

legitimate calling has exactly the same worth in the sight of God."[11] This change elevated women's role within the church and may have opened the door for greater engagement in society.[12] Most importantly, both work and parenthood were understood to constitute a calling or vocation.

It should be noted that, according to Martin Luther's writings, a woman's calling should be carried out in the household. In the agricultural society of 16th century Europe, work in the household was an important input into production. Sterna (2009) finds that the "down side of the peculiarly Protestant "good news" to women was the exclusiveness of marriage as the basis for the holy vocation. No other options received a theological blessing" (page 33). Therefore, Lutheran doctrine was not directly supportive of women's participation in the labor markets of the late 19th century and early 20th centuries, and indeed, it was debated whether it provided support for women's labor market participation. Karant-Nunn and Wiesner-Hanks (2003) attribute to Luther the view that women are less rational, more inclined towards showing emotions, and more easily led astray. However, his writings are more sympathetic to women than those of Catholic clergymen who "had written and spoken harshly against the corrupting influence of women, perhaps to justify their own state of chastity" (see Karant-Nunn and Wiesner-Hanks 2003: 11). According to Sterna (2009), the new view of marriage and the notion of Christian vocation and the priesthood of all believers changed the role of women in the direction of greater personal freedom, something that happened both immediately and gradually over the centuries.

Sterna (2009) describes how the novelty of the reformers' views on women's role in society can clearly be found in the new role of pastors' wives, the first women to have an acknowledged position in secular life. Their duties extended beyond the household. They provided food, care, and shelter to the congregations, and they helped run hospitals, orphanages, and schools. They offered shelter to refugees and students, and they participated in cultural life and the ministry of the church. Here the lines between private and public duties were not clear. Pastors'

---

[11] Max Weber, *The Protestant Ethic and the Spirit of Capitalism* (1905), Chapter III, Luther's Conception of the Calling.
See http://www.marxists.org/reference/archive/weber/protestant-ethic/ch03.htm.

[12] Margaret Inglehart (1981) found that political activism among women was greater in Protestant countries than in Catholic countries, a finding that she attributed to the Catholic Church's being more hierarchical and authoritarian than Protestant churches.

households became social centers of communities, often organized and maintained by women. Therefore, something changed during the Reformation "in women's sense of themselves, even if very little changed or changed for the better in their social condition. That change did have its roots in the spiritual experience of women (King 1991, 238–239)."

Hammar (2003) gives a religious background to the debate on women's role in society in the Nordic countries. While Luther himself had not in fact approved any other calling for women than their role within the household in the agricultural society of the 16th century, early Swedish feminists used theological arguments to make the case for equal rights to higher education and participation in the labor market. At issue was the apparent contradiction between the Lutheran notion of equality before God and its conservative view of equality in society, according to which men should monopolize public offices. Hammar recounts that Fredrika Bremer (1801–1865) was first to publicly challenge the then-current religious framework that determined the nature of women's calling. She claimed that Christianity was the key to women's emancipation because it had freedom as a cornerstone – in particular, freedom to speak directly to God. For women, this, together with the emphasis on calling, served as the argument for participation in Christian missions in Africa.

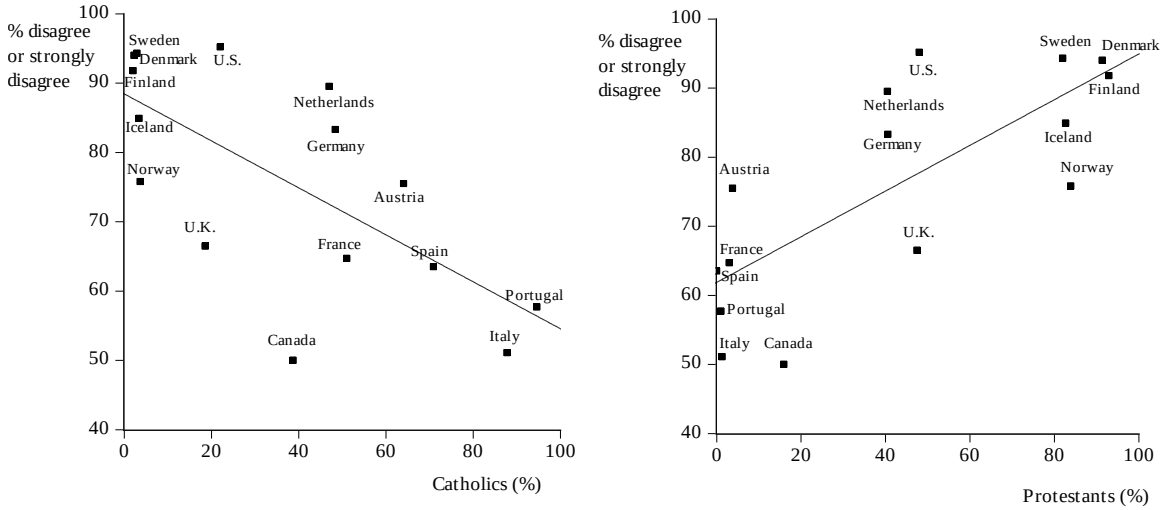
Okkenhaug (2003) describes the participation of Nordic women in Protestant missionary missions in North Africa in the 19th century, which offered them freedom to take part in activities outside the home. In Norway, there were direct links between the women's missionary movement and the feminist movement in the early 20th century. Prominent women in the mission movement were inspired by the feminist movement, which became a strong force in Norway in the 1880s. The issue at stake was the division of labor between male and female workers. Educated women did not want to yield to male colleagues, who sometimes had less education than they themselves did. Predelli (2003) discusses how, through their role as missionaries, women were able to go beyond written and unwritten rules on gender-specific behavior.

But what do the data reveal about the relationship between religions and attitudes towards women's work? In Figure 1, we take data from the European Social Survey and plot the proportion of respondents who disagreed with the statement that "men should have more rights to a job than women when jobs are scarce" (sum of proportion who disagreed and disagreed strongly) against the

proportion of respondents who are Catholics and Protestants. There is a clear downward-sloping relationship between the proportion of survey respondents who disagree with the statement that "men should have more rights to a job than women when jobs are scarce" and the proportion of Catholics and a positive relationship between the proportion who disagree and the proportion of Protestants.[13] The Nordic countries are in the upper left-hand corner of the graph to the left and in the upper right-hand corner of the graph to the right, making the relationship stronger.

To test further for the effect of religion on values, we can compare the values of Protestants and Catholics in Germany, a country where each of the two groups represents around 30% of the population. Of the Protestant population, 40% belong to Lutheran congregations. Protestantism is concentrated in the north and

Figure 1. Religion and disagreement with men's having greater right to a job



Source: European Social Survey (http://nesstar.ess.nsd.uib.no), 2010. Vertical axes measure the percentage disagreeing or strongly disagreeing with the statement "men should have more rights to a job than women when jobs are scarce." Horizontal axes measure the proportion of the population who are Roman Catholic (left-hand panel) and Protestant (right-hand panel).

[13] A univariate regression explains 50% of the variation of the proportion disagreeing in the left-hand side panel and 56% of the variation in the right-hand side panel.

east, while Roman Catholicism is concentrated in the south and west. A comparison of the values of individuals raised in the same country but belonging to different religious denominations may reveal whether Protestants are more supportive of women's right to work.[14] Table 1 shows the responses of Protestants and Roman Catholics to the same statement (that men should have greater right to a job), with each group divided into two subgroups according to the intensity of their religious beliefs. The table shows that, among those who claim to be religious Protestants, more disagree strongly with the statement. Thus, among religious Protestants, 58.7% either disagree or disagree strongly, as opposed to 33.4% of Roman Catholics. A weaker version of this pattern is found in the "slightly religious" group.

The European Social Survey provides data at the regional level (NUTS 1). Table 2 ranks regions according the proportion of respondents who disagree with

Table 1. Germany: Percentage agreeing or disagreeing with the statement "men should have more rights to a job than women when jobs are scarce"

Religious intensity	Roman Catholic (%)	Protestant (%)
Very religious		
Agree strongly	3.3	3.4
Agree	41.1	26.8
Neither agree nor disagree	22.1	11.1
Disagree	5.0	31.6
Disagree strongly	28.4	27.1
Slightly religious		
Agree strongly	1.4	4.7
Agree	12.8	8.5
Neither agree nor disagree	24.0	21.3
Disagree	41.0	36.0
Disagree strongly	20.8	29.6

Source: European Social Survey, 2010 (http://nesstar.ess.nsd.uib.no). Observations: 1029.

[14] Cultural remnants of the old Communist society of East Germany remain. Adler and Brayfield (1997) use data from the 1991 German Social Survey to examine East-West differences in work values among German women and find a regional gap between the east and the west. Women born in East Germany are more likely than West German women to consider employment to be important.

Table 2. Percentage disagreeing with the statement "men should have more rights to a job than women when jobs are scarce."

Germany	Hamburg	100	France	Ouest	87.7	Germany	Nordrhein-West.	81.3	Russia	Central Federal Dist.	75
Sweden	Ostra Sverige	98.1	UK	East Midlands	87.2	Estonia	Eesti	80.8	Serbia	Vojvodina	74.9
Iceland	Iceland	97.8	UK	West Midlands	87.2	Bulgaria	Yugo. i yuzhna ts.	80.4	Bulgaria	Severna i izto.	74.5
Denmark	Danmark	97.7	Netherlands	Noord-Nederland	86.9	Germany	Hessen	80	Ukraine	North	73.9
Sweden	Norra Sverige	97.6	France	Bassin Parisien	86.7	Switzerland	Schweiz	80	Italy	Sud	73.7
Sweden	Sodra Sverige	97.5	Netherlands	Oost-Nederland	85.9	UK	East of England	80	Malta	Malta	73
Norway	Norge	97.1	Netherlands	Zuid-Nederland	85.8	Belgium	Wallonne	79.9	Ukraine	East	72.3
Spain	Canarias	97	UK	South West	85.7	Austria	West Ostereich	79.7	Russia	North West federal dist.	72.2
Finland	Manner-Suomi	96.9	France	Est	85.6	Romania	Macroregiunea doi	79.6	Czech Rep.	Ceska Rep.	72
Germany	Sachsen	96.8	Slovenia	Slovenija	85.4	Italy	Centro	79.4	Russia	Privol. federal dist.	71.9
Germany	Thuringen	94.8	Italy	Nord-Est	85.1	Poland	Poludniowo	79.4	Ukraine	Centre	71.6
Spain	Comunidad de Madrid	94	Ireland	Ireland	84.4	Austria	South	79.3	Slovakia	Slov. Rep.	71.2
UK	Yorks. and the Hum,	93	Belgium	Bruxelles	84.3	Italy	Isole	78.4	Ukraine	South	71.2
UK	South East	92.6	Germany	Sachsen-Anhalt	84	Russia	Far East fed. dist.	78.3	Rumenia	Macroregiunea unu	71.1
Germany	Niedersachsen	92.1	Belgium	Vlaams gewest	83.8	Serbia	Centralna Srbija	78.2	Russia	Urals federal dist.	70.5
Germany	Brandenburg	91.7	France	Mediterranean	83.3	UK	North East	78.2	Ukraine	West	70.2
France	Ile de France	91.5	Hungary	Alfold es Eszak	83.3	Germany	Baden-Wurttem.	78	Albania	Albania	69.9
UK	London	91.4	Poland	Pol.-Zach.	83	Germany	Berlin	77.6	Macedonia	Poranes. Rep. Mak.	69.9
UK	Wales	91.1	Latvia	Latvija	82.9	Portugal	Continente	77.6	Bosnia/Herz.	Bosna i Herceg.	69.4
Germany	Saarland	90	Spain	Centro	82.6	Romania	Macroreg. trei	76.8	Germany	Bremen	69.2
Netherlands	West-Nederland	89.5	UK	Scotland	82.6	Spain	Sur	76.4	Romania	Macroregiunea patru	69
Croatia	Hrvatska	88.9	Italy	Nord-Ovest	82.5	Poland	Wschodni	76.3	Russia	South Federal district	67.1
Germany	Schleswig-Holstein	88.9	Poland	Region Polud.	82.5	Greece	Attiki	76.2	Russia	Siberian fed. dist.	66.7
France	Centre-Est	88.7	Lithuania	Lietuva	82.3	Belarus	Belarus	76.1	Greece	Voreia Ellada	66.6
Spain	Noreste	88.6	Austria	East	81.9	Kosovo	Kosovo	76.1	Moldovia	Moldova	62
France	Sud-Ouest	88.3	Spain	Noroeste	81.9	Germany	Bayern	75.8	Georgia	Georgia	61.9
UK	Northern Ireland	88.2	Spain	Este	81.9	Poland	Cent.	75.8	Cyprus	Kypros	61.6
Luxembourg	Luxembourg	88.1	Poland	Region Poln.	81.8	Germany	Meck.Vorp.	75.5	Greece	Kentriki Ellada	58
Hungary	Kozep-Magyaror.	88	Montenegro	Montenegro	81.7	France	Calais	75.2	Greece	Nisia Aigaiou, Kriti	57.3
Hungary	Dunantul	87.9	UK	North West	81.5	Germany	Rheinland-Pfalz	75	Armenia	Armenia	49.3
									Azerbaijan	Azerbaijan	22.8

Source: European Values Survey (http://www.europeansocialsurvey.org).

the statement that "men should have more rights to a job than women when jobs are scarce:" The six regions in the Nordic countries (Sweden has two, north and south) are at the top of the list, alongside the German region Hamburg. While Northern European regions tend to be in the upper half of the table, Southern Europe tends to be in the lower half. In Germany, regions in the north and east of the country tend to disagree more with the statement than regions in the south and the west of the country, which is consistent with the more strongly Protestant regions disagreeing more and the more strongly Catholic disagreeing less.

Thus Bayern and Rheinland-Pfalz are low on the list. [15] Eastern European nations are found in the lower half of the table, with the exception of the Baltic countries, Hungary, and parts of Poland, which are closest to the Western European countries. We next run a regression of the proportion disagreeing with the statement on the proportion belonging to different religious denominations in each region.

Table 3. Explaining differences in attitudes towards women's participation in the labor market using regional data

Dependent variable = percentage disagreeing with the statement "men should have more rights to a job than women when jobs are scarce."		
	estimate	t-statistic
Constant	184.9	85.35
Roman Catholic	-0.062	2.01
Protestant	0.09	2.08
Muslim	-0.16	2.52
Hindu	0.78	1.59
Orthodox	-0.21	5.95
Azerbaijan (control)	48.7	10.21
R-squared = 0.69, F = 42.6, Obs. = 121		

Note: Estimation method: Least squares with White heteroskedasticity-consistent standard errors & covariance.

[15] An exception to this pattern is Bremen which is close to the bottom of the list.

The results from Table 3 indicate that Catholics, members of the Orthodox Catholic Church, and Muslims disagree less with the statement and Protestants disagree more.[16]

We now go back to the World Values Survey and use data on 21,000 individuals, taken from the 1990–91 and 1999–2000 surveys, and use a host of variables to explain which individuals disagree with the statement that "when jobs are scarce, men should have more right to a job than women." The data suffer from the weakness that no distinction is made between groups of Protestants, including Lutherans.[17] The dependent variable in all regressions is a binary variable that takes the value one for those individuals who disagree with the statement that men should have more right to a job. The explanatory variables include the age and sex of individuals (1 for women and 0 for men); a binary variable for marital status (1 if married) and binary variables for religion (1 if the individual belongs to a religious group), where religion is captured by two variables, one variable for Catholics and one for Protestants; the number of years of education; and a time dummy for the period 1999–2000 to capture changes in the values over time.

The results are shown in Table 4. Columns (1) and (2) have the results of pooled regression, while columns (3), (4) and (5) have the results of fixed effect regressions. Column (1) has the personal attributes as regressors, and in column (2) the cross products of the sex variable and of the other five regressors are also included. Column (3) only has the fixed effects for each country, in column (4) the personal attributes are added, and in column (5) we do as in column (2) and add the cross products of the sex variable and each of five other variables.

In column (1), disagreement with the statement decreases with age; it is stronger for women than men, and weaker for married individuals; it varies directly with the level of formal education; it is stronger in the 1999–2000 survey than in the 1990–1991 survey; and it is stronger for the two religious groups than for non-religious individuals and stronger for Protestants than for Catholics.

[16] Azerbaijan appears as a noticeable outlier on scatterplots and is assigned a dummy variable so as not to bias the other coefficients. Algan and Cahuc (2005) also found that Muslims and Catholics disagreed less with the statement that men should have more right to a job than women when jobs are scarce.

[17] Thus Lutherans in the Nordic countries are labeled as Protestant, even though a separate category for the latter exists in the WWS. Our sample includes only nine Lutherans, none of whom reside in the Nordic countries.

Table 4. Estimated equation explaining the percentage disagreeing with the statement that "men should have more right to a job than women when jobs are scarce."

	Pooled				Fixed effects						
	(1)		(2)		(3)		(4)		(5)		Proportion
	estimate	z-stat.	estimate	z-stat.	estimate	z-stat.	estimate	z-stat.	estimate	z-stat.	Lutheran***
Constant	-0.10	0.48	-0.17	0.85	0.45	15.51	-0.08	0.40	-0.15	0.76	
Age	-0.003	0.81	-0.003	0.89			-0.003	0.94	-0.004	1.02	
Age_squared	-0.0001	3.94*	-0.0001	3.92*			-0.0001	3.32*	-0.0001	3.35*	
Sex (1 if female)	0.21	11.17*	0.37	6.25*			0.23	11.78*	0.38	6.1*	
Married (1 if married)	-0.13	5.98*	-0.06	2.04*			-0.07	3.3*	0.02	0.60	
Catholic (1 if catholic)	0.13	4.7*	0.19	4.6*			0.03	0.62	0.07	1.41	
Protestant (1 if prot.)	**0.69**	**21.5***	**0.79**	**16.77***			**0.08**	**1.81****	**0.12**	**2.01***	
Education (years)	0.33	16.41*	0.31	10.63*			0.43	19.35*	0.41	12.95*	
Time	0.59	3.11*	0.58	3.08*			1.01	5.14*	1.01	5.16*	
Sex_marriage			-0.11	2.87*					-0.16	3.99*	
Sex_catholic			0.04	0.91					0.04	0.99	
Sex_protestant			-0.19	2.89*					-0.07	1.00	
Sex_education			-0.11	1.92**					-0.09	1.49	
Belgium					-0.22	6.28	-0.35	5.33*	-0.35	5.36*	0.0
Canada					0.26	7.02	-0.08	1.28	-0.08	1.32	0.5
Czech					-0.48	14.62	-0.48	6.56*	-0.48	6.64*	0.5
Denmark					0.71	15.50	0.55	6.73*	**0.56**	6.74*	**80.7**
Finland					0.34	8.55	0.36	4.62*	**0.36**	4.61*	**81.8**
France					-0.07	1.82	-0.31	4.48*	-0.32	4.56*	0.0
Germany					-0.20	6.30	-0.56	8.83*	-0.57	8.86*	15.5
Greece					0.15	3.11	-0.49	6.98*	-0.50	7*	0.0
Hungary					-0.36	9.60	-0.33	4.35*	-0.34	4.41*	2.1
Iceland					1.06	19.02	0.85	9.51*	**0.85**	9.51*	**58.7**
Ireland					0.00	0.00	0.03	0.38	0.02	0.32	0.0
Italy					-0.39	11.18	-0.70	11.01*	-0.70	11.03*	0.0
Japan					-1.23	32.35	-1.82	20.63*	-1.82	20.65*	0.0
Luxembourg					-0.03	0.71	-0.40	5.56*	-0.40	5.61*	0.3
Netherlands					0.28	6.61	0.08	1.00	0.08	0.95	12.6
Norway					0.36	8.79	NA		NA		**82.1**
Poland					-0.76	21.46	-0.89	13.2*	-0.90	13.33*	0.2
Portugal					-0.26	6.48	-0.39	5.51*	-0.39	5.53*	0.0
Slovakia					-0.68	19.27	-0.71	10.61*	-0.71	10.68*	7.4
Slovenia					-0.15	3.99	-0.31	4.14*	-0.31	4.18*	0.0
Spain					-0.12	3.73	-0.36	5.77*	-0.36	5.77*	0.0
Sweden					0.90	20.91	0.66	7.46*	**0.66**	7.47*	**71.4**
Switzerland					-0.33	7.10	NA		NA		0.1
Turkey					-0.84	25.91	NA		NA		0.0
UK					-0.10	2.70	-0.31	4.37*	-0.31	4.35*	0.1
USA					0.16	4.56	0.00		0.00		2.4
Number of obs.	21527		21527		91017		21527		21527		
LR chi2(8)	2257.42		2276.58		11025.33		3935.36		3956.59		
Pseudo R2	0.0821		0.0828		0.09		0.1431		0.1439		
Estimation method: Probit. *) significant at 5% level; **) significant at 10% level.											
Note: Norway, Switzerland and Turkey omitted because of collinearity in (4) and (5).											
***) The Lutheran World Federation 2010 Membership Figures.											

Source: World Values Survey. Survey on http://www.worldvaluessurvey.org.

Column (2) indicates that married women are less opposed to the statement than women overall, and that Protestant women are less opposed than Protestants overall. Column (3) gives the results when only country fixed effects are included. The fixed effects reveal the same pattern: that the Nordic nations disagree more with the statement than any other nation. Controlling for country fixed effects in columns (4) and (5) and including the personal attributes does not change the results qualitatively from columns (1) and (2). However, the coefficient of the religious variables is smaller and less significant; the coefficient for Catholics becomes insignificant, while the one for Protestants remains significant but is smaller when the country fixed effects are included. Comparing columns (3), (4) and (5), the pattern found in the country fixed effects remains similar and does not change significantly when personal attributes are added in columns (4) and (5). However, the size of the fixed effects for the Nordic countries becomes smaller and much less statistically significant.

The continued significance of the fixed effects in columns (4) and (5) does not have to suggest that the inclusion of religion as a personal attribute fails to explain the cross-country differences, as the data do not distinguish Lutherans from other Protestants. Also, those claiming not to be religious may have been affected by the Lutheran faith through their cultural heritage. In column (6) we have indicated Lutherans as the proportion of each country's population. A comparison of the country fixed effects in (3), (4) and (5) and the proportion of Lutherans in column (6) shows a clear correlation, in that the Nordic countries have the largest fixed effects, as well as the highest Lutheran proportion of the population.[18]

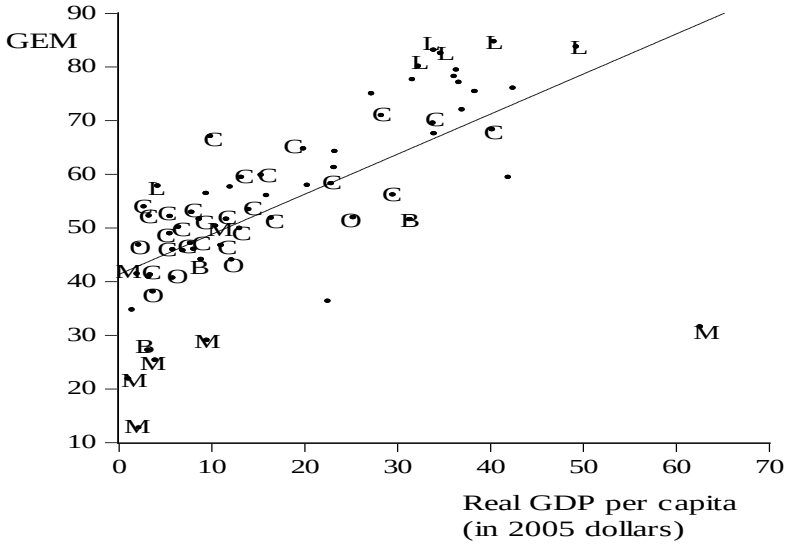
Finally, we turn to the hypothesis of Doepke and Tertilt (2009) that higher returns to human capital make men want to increase the educational level of women, implying a positive relationship between the economic rights of women and real GDP per capita. Doepke et al. (2012) present a scatter diagram that links a gender empowerment measure (GEM, an index constructed by the United Nations Development Program) to real GDP per capita in a sample of 66 countries and find

[18] Note that the sample size of the first fixed effects model is larger than that of the other models. The explanation for the fall in the number of observations when right-hand side variables are added is the following: When the educational variable is added, we lose 37,000 observations because 37,000 individuals do not report their educational level. When the religious dummy variables are added, we lose an additional 26,000 observations. We also lose some observations, but far fewer, when age, sex and marriage are added.

an upward-sloping relationship consistent with their hypothesis. Figure 2 depicts this relationship using their data, where the letter *L* is superimposed on the dots for the Lutheran countries, the letter *C* on those denoting the Roman Catholic countries, the letter *M* for Muslim countries, *B* for Buddhist countries, and the letter *O* for the Orthodox Catholic Church countries.[19]

A clear upward-sloping relationship is visible in the figure. But there is also a clustering of the letters denoting the different religions. Thus the five Nordic Lutheran countries are at the top of the figure, with higher GEM values than their levels of real GDP per capita would lead us to predict. The Muslim countries are at the bottom of the figure, with lower GEM levels than their output levels would predict – the United Arab Emirates being the large outlier in the lower right-hand corner – and the Buddhist countries are also below the cluster of other countries.

Figure 2. Gender empowerment, real GDP per capita, and religion



Source: Doepke et al. (2012) and the Penn World Table.

[19] A letter is only assigned to a country if at least 50% of its population belongs to a given denomination.

The Buddhist country in the middle of the figure is Japan.[20] The Orthodox Catholic Church countries fall slightly below the regression line, while the Roman Catholic ones are located not far from it. However, we should note that there are Roman Catholic countries – Austria, Belgium, and Ireland – with levels of GDP per capita similar to those in the five Nordic countries, but with lower levels of GEM.

Table 5 shows the results of a regression of the GEM level (0-100) on real GDP per capita (measured in thousands of US dollars) and dummy variables for the different religious affiliations.

We first include real GDP per capita and dummy variables for Protestantism, Roman Catholicism, the Orthodox Catholic Church, Islam, and Buddhism. The estimates indicate that an increase of GDP per capita from 12,000 dollars (such as in Latvia or Russia) to 32,000 dollars (such as in Germany or Finland) would

Table 5. Gender empowerment, religion and real GDP per capita

	estimate	t-statistic	estimate	t-statistic
Constant	48.94	10.71	49.03	10.64
Real GDP per cap. (1000 2005 dollars)	0.50	3.64	0.50	3.59
Protestant	9.99	2.73	5.91	1.59
Roman Catholic	-0.97	0.27	-1.01	0.28
Orthodox	-9.61	2.42	-9.67	2.42
Muslim	-25.25	3.45	-25.29	3.44
Buddhist	-14.56	3.09	-14.61	3.07
Lutheran			7.52	3.03
R-squared	0.76		0.77	
Observations	66		66	

Note: Estimation method: Least squares with White heteroskedasticity-consistent standard errors & covariance.

[20] The two unlabeled observations to its upper right and lower left – Singapore and South Korea – are also influenced by Buddhist culture, although the official proportion of Buddhists is less than 50% in both of these countries.

increase the GEM value by 10. The effect is the same as that deriving from being a Protestant. In contrast, being Orthodox would lower the value by 10, being a Muslim lowers it by 25 and being Buddhist by close to 15. The difference between a Protestant and a Muslim is therefore around 35. This is an effect equivalent to that of a difference in real GDP per capita of 70,000 dollars, which is greater than the difference between the richest country (United Arab Emirates, with 62,000 dollars) and the poorest (Bangladesh, with 1,000 dollars). When a dummy variable for the Lutheran countries is added to the regression, it has a statistically significant coefficient with a value of 7.5 and lowers the value of the Protestant variable, as well as making it less statistically significant. Adding the coefficient of the Protestant and the Lutheran variables, we get an effect greater than 13, which is stronger than for the Protestant variable standing alone. We conclude that, while the thesis of Doepke and Tertilt (2009) clearly has merits, it is consistent with a significant role played by religious values in shaping attitudes towards women's rights.

5 Values and labor supply

The Nordic countries have significantly higher rates of labor force participation for women in the 25–64 age group than France and the US, as well as a lower ratio of male-to-female participation in the under-65 age groups.[21, 22] The higher labor force participation rates and employment rates of women in the Nordic countries are due to higher rates among women with children, with the effect growing as the number of children increases.[23]

---

[21] For the youngest age group, the ratio of the labor force participation rate of men to the labor force participation rate of women ranges from 0.99 in Finland to 1.09 in Denmark and Norway, while it is higher in France and the US: 1.17 in the US and 1.25 in France. For the 25–64 age group, we find that the ratio ranges from 1.07 in Sweden to 1.11 in Denmark and Norway, while it is higher in France and the US. The data also reveal that women in Scandinavia have higher employment rates for the 15–39 and 40–64 age groups. In contrast, for both part-time and full-time women, hours of work tend to be fewer in the Nordic countries than in both France and the US, while unemployment rates are lower than in the continental European countries (Eurostat and BLS).

[22] See Faggio and Nickell (2007) on the pattern of employment in the OECD countries.

[23] Gustafsson et al. (1996) compared women's labor force participation in Germany, the UK, and Sweden, and found that the difference in total labor force participation of women results primarily

The Nordic countries all share a high rate of taxes on labor income; therefore, labor supply should be smaller than in lower-tax countries[24] and a representative-agent model of labor supply cannot explain the high participation rates in the Nordic countries based on differences in the level of taxation alone. Using the representative-agent model presented in Appendix 1 to predict employment assuming identical preferences, we find that such a model under-predicts employment in these countries, as is shown in Table 6.

In order to account for the prediction error, we use values towards women's labor force participation as measured in surveys. Here we use the World Values Survey[25] to measure attitudes towards the participation of women with children in the labor market by using responses to questions about women's right to a job, attitudes towards the effect on pre-school children of having working mothers, and attitudes towards being a housewife. We start with a statement that is used to measure views on the sexes having equal rights to a job: When jobs are scarce, men should have more right to a job than women (% disagreeing). This is followed by two statements that are used to measure views on the impact on children of having working mothers: A pre-school child is likely to suffer if his or her mother works (% disagreeing or disagreeing strongly), and: A working mother can establish just as warm and secure a relationship with her children as a mother who does not work (% agreeing or agreeing strongly). The final question measures views on the role of the housewife: Being a housewife is just as fulfilling as working for pay (% disagreeing or disagreeing strongly).

Table 6 shows actual and predicted hours for the countries, using the representative agent model of Appendix 1 as well as responses to the survey questions. While labor supply in the Nordic countries tends to be under-predicted – these

from two factors: in Germany and the UK, fewer mothers entered the labor force than in Sweden, and those who did so entered later after their first birth than in Sweden. Before the birth of the first child, there is no difference between these countries as regards women's labor force participation rate. See Esping-Andersen (2009) on the change from the model of male-breadwinner households to a more gender-equal model in modern economies.

[24] The tax rates are shown in Table A1 in Appendix 2 that also has detailed derivations.

[25] See http://www.worldvaluessurvey.org. The World Values Survey is organised as a network of social scientists coordinated by a central body, the World Values Survey Association. See Ingelhart (2006).

Table 6. Attitudes towards women's participation in the labor market

	DE	FI	IC	NO	SW	AU	FR	GE	IR	IT	NE	SP	SW	CA	UK	US
Hours, *h*	23	22.6	30.6	20.3	23.1	21.7	18.6	18.4	21.2	20	19	20.8	25.4	24.4	24	26
Predicted *h*	15.1	19.9	21.5	21.5	16.5	21.9	21.7	22	32.1	22.1	24.3	25.3	28.1	26.1	23.8	25.2
Difference	7.9	2.7	9.1	-1.2	6.6	-0.2	-3.1	-3.6	-10.9	-2.1	-4.3	-4.5	-2.7	-1.7	0.2	1.2
Men should have more right to a job than women -- % disagree	87.7	82.2	93.5	79.4	93.1	54.4	67.6	55.7	77	56.8	83.7	65.3	55.7	78.5	63.7	81.3
Pre-school child suffers with working mother-- % disagree or strongly disagree	78.4	56.2	63.5	-	59.9	-	42.3	26.8	-	18.8	54.4	54.3	-	-	53.7	-
Working mother establishing a warm and secure relationship with her children -- % agree or strongly agree	86.4	94.7	85.9	71	84	-	77.3	62	-	64.1	81.1	78.7	-	77.5	73	78.7
Being a housewife is just as fulfilling as working for pay-- % disagree or strongly disagree	45.8	19.1	35.5	-	49.4	-	37.5	53.6	-	45.1	48.6	40.2	-	17.8	38.9	20
Father's origin -- % disagree or strongly disagree that men should have more rights	82.8	79.7	89.4	80.1	91.6	78.5	74.6	75	72.7	59.6	83.8	61.1	70.2	87.5	72.2	81.8
Mother's origin -- % disagree or strongly disagree that men should have more rights	92.3	83.3	92.1	85.5	97.9	76.4	66.9	81.3	69.5	54.1	90.6	63.4	42.1	86.2	74	88.2

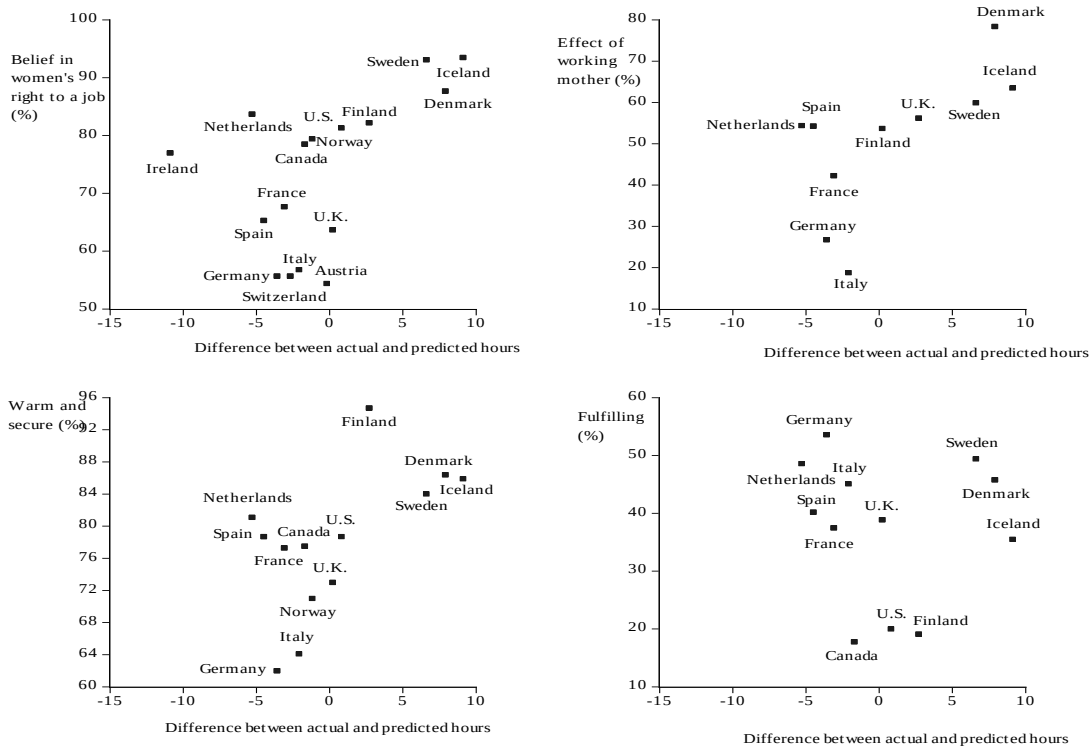
Source: World Values Survey (http://www.worldvaluessurvey.org). Period: 1999, except Norway and Switzerland, for which data from 1996 are used, and Canada and Finland, for which data from 2000 are used. Actual hours worked are taken from the OECD Factbook 2007 and defined as average hours actually worked, hours per week per person in employment. Data on values of children of immigrants born in Europe by nationality are taken from the European Social Survey (http://nesstar.ess.nsd.uib.no) and refer to the question "men should have more rights to a job than women when jobs are scarce"

nations tend to work more than their high tax rates would lead us to expect – the continental European countries have a lower labor supply than the model predicts. Canada, the UK, and the US have labor supplies that more or less conform to the predicted values. The answers to the first question show that Nordic respondents are much more supportive of equal right to a job than their counterparts in Europe and the UK. Also, most of the Nordic countries are more in favor of women's right to work than the average US and Canadian respondent, whereas Norway is in the same range as these countries. Iceland and Sweden are at the top of the list, while Norway is just below the US and well ahead of France. Responses to the second question are not available for Norway and the US but show that, compared to the other countries, a much higher proportion of respondents in Denmark, Finland, Iceland, and Sweden disagree with the statement that pre-school children suffer from having working mothers. They also agree more with the statement in the third question, that working mothers can establish warm and secure relationships with her children (Norway being the exception). Finally, the distinction between the Nordic countries and the rest is not clear as regards the last question, about how fulfilling it is to be a housewife.[26]

Figure 3 shows the association between the prediction error for labor supply and responses to the four survey questions in Table 6. A clear and positive relationship exists between the predication error and responses to all statements apart from "being a housewife is just as fulfilling as working for pay." Note that the Nordic countries can be found in the upper right-hand corner of the charts, while some of the Continental countries are in the lower left-hand corner. The positive relationship disappears when the Nordic countries are dropped from the sample.

[26] Comparable data, reported by Jaumotte (2003) for a wider data set, confirm the special status of the Nordic countries in comparison with a larger set of countries, including Australia, Austria, Poland, and Spain. Of the remaining OECD countries, the Netherlands come close to the Nordic countries in believing in equal rights to a job, while Canada is on par with the Nordics. See International Social Survey Programme 1994 on http://zacat.gesis.org/webview/index.jsp?object=http://zacat.gesis.org/obj/fStudy/ZA2620.

Figure 3. Values and labor supply



Source: World Values Survey. Survey on http://www.worldvaluessurvey.org

These results are consistent with those of Ragan (2013), who also found that Scandinavians should be working more[27] in the market sector than is implied by their tax rates alone. Instead of reverting to cultural variables, this author instead modified the household maximization model so that the public sector subsidizes the provision of a market good that substitutes for household time in the household services production function; i.e., caring for children. This closes the gap betweenactual and predicted work for Norway, while it closes half the gap for Sweden and Finland and somewhat less for Denmark. An employment subsidy has

[27] Ragan found that the Nordic nations should be working 20–45% more than her model predicted based on tax rates alone.

a similar effect in Ragan's model (see also Rogerson 2007). However, such a modeling exercise, apart from failing to explain fully the high level of labor force participation, leaves unanswered the question why the Nordic countries have chosen to structure their public expenditures in this way. As is argued by Heckman (1978), institutions may reflect preferences, and by ignoring this endogeneity, one may bias the empirical estimates of the effect of institutions on behavior. This brings us back to culture, as the history of the Nordic welfare states reveals an important role played by cultural influences.

The issue of endogeneity of preferences remains. Perhaps the structure of public spending in the Nordic countries encourages mothers of young children to participate in the labor market, as is shown by Ragan (2013) and Rogerson (2007), which facilitates their acquiring the values found in the surveys. But examining the preferences of people who were born in other European countries but have one parent from a Nordic country should dispel any doubts about the causal effect of values. The last two lines of Table 6 show the proportion of children of immigrants in Europe that disagree or strongly disagree with the statement that "men should have more rights to a job than women when jobs are scarce."[28] The same pattern emerges for this group. A higher proportion of respondents with either parent coming from one of the Nordic countries disagree with the statement than is the case for respondents whose parents come from most of the other countries. Of the other eleven countries, only the respondents with Dutch, Canadian, and American parents show similar disagreement with the statement. In none of these three countries do more people disagree than respondents with Icelandic, Swedish, and Danish mothers. This was also the case when using World Values Survey numbers of current residents for these same countries – that is, measuring responses to the same question in the sixteen countries – where Finland also had higher rates of disagreement than Canada and the US. Moreover, we have shown that values conducive to women's participation in the labor market pre-dated the institutional changes that facilitated their participation in the post-war period.

[28] The data are taken from the European Social Survey, 2010 (http://nesstar.ess.nsd.uib.no). The possible answers differ slightly from those in the World Values Survey in that respondents choose among "disagree strongly", "disagree", "neither agree nor disagree", "agree", and "agree strongly".

6 Conclusions

Values emphasizing women's right to combine paid work and motherhood underlie the welfare states of the Nordic countries. These values can be found in the writings of the founders of the welfare state in the early 20th century. As a consequence, the combined effect of social policies and institutions in these countries is to facilitate women's participation in the labor force participation. While it is true that institutions such as subsidized child care account partially for the high employment rates in these countries, the question then remains what explains the existence of such institutions. We have shown that values favoring women's labor force participation are widespread in the Nordic countries and are also found among descendants of Nordic people living in other European countries. These values may originate in the religious beliefs of these nations and precede the changes in laws, regulations, and institutions intended to facilitate women's labor market participation in recent decades.

Values and institutions change over time, and participation and policies may no longer present exactly the same pattern as they did before the turn of the millennium. While macroeconomists have explained differences in income per capita by appealing to cultural differences – such as different levels of civic responsibility and trust – we have found that cultural factors may also play a major role in the labor market.

Acknowledgement: We acknowledge the comments and suggestions made by referees and the editor of the journal in an extensive rewriting of the paper. Moreover, we benefited from comments made by readers of the journal during the revision process. We also thank Lars Mjøset, Stefán Ólafsson, Guðmundur Jónsson, and Anna Benassi for comments and Arnaldur S. Kristjansson and Ólafur Halldórsson for research assistance. We are grateful to the University of Iceland Research Fund and The Icelandic Research Fund for financial support.

References

Adler, M.A. and A. Brayfield (1997). Women's work values in unified Germany: Regional differences as remnants of the past. *Work and Occupations* 24 (2): 245–266. http://wox.sagepub.com/content/24/2/245.abstract

Ahn, N. and P. Mira (2002). A note on the changing relationship between fertility and female employment rates in developed countries. *Journal of Population Economics* 15: 667–682. https://ideas.repec.org/a/spr/jopoec/v15y2002i4p667-682.html

Akerlof, G. (1980). A theory of social custom, of which unemployment may be one consequence. *Quarterly Journal of Economics* 94 (4): 749–775. http://www.jstor.org/discover/10.2307/1885667?uid=3737864&uid=2&uid=4&sid=21105245018433

Alesina, A., P. Giuliano and N. Nunn (2013). On the origins of gender roles: Women and the plough. *Quarterly Journal of Economics* 128 (2): 469–530. http://scholar.harvard.edu/alesina/publications/origin-gender-roles-women-and-plough

Algan, Y. and P. Cahuc (2005). *The roots of low European employment: Family cultures?* NBER International Seminar on Macroeconomics. Cambridge: MIT Press. http://www.nber.org/chapters/c0342

Antecol, H. (2000). An examination of cross-country differences in the gender gap in labor force participation rates. *Labor Economics* 7 (4): 409–426. http://directory.umm.ac.id/Data%20Elmu/jurnal/L/Labour%20Economics/Vol7.Issue4.Jul2000/200.pdf

Astill, G.G. and J. Langdon (1997). *Medieval farming and technology: The impact of agricultural change in Northwest Europe*: Brill.

Bernheim, D.B. (1994). A theory of conformity. *Journal of Political Economy* 192 (5): 841–77. http://www.jstor.org/discover/10.2307/2138650?uid=3737864&uid=2&uid=4&sid=21105252542713

Bjørnson, Ø. and I.E. Haavet (1994). *Langsomt ble landet et velferdssamfunn: Trygdens historie 1894-1994*. Ad Notam Gyldenda.

Burda, M., D.S. Hamermesh and P. Weil (2013). Total work and gender: facts and possible explanations, *Journal of Population Economics* 26 (1): 239–261. https://ideas.repec.org/a/ucp/jpolec/v102y1994i5p841-77.html

Christiansen, N.F., K. Petersen, N.E. and P. Haave (Eds.) (2005). *The Nordic model of welfare: A historical reappraisa*l. Copenhagen, Denmark: Museum Tusculanum Press.

Coen-Pirani, D., A. León and S. Lugauer (2010). The effect of household appliances on female labor force participation: Evidence from microdata. *Labour Economics* 17 (3): 503–513.
http://econpapers.repec.org/article/eeelabeco/v_3a17_3ay_3a2010_3ai_3a3_3ap_3a503-513.htm

Del Boca, D. and M. Locatelli (2006). The determinants of motherhood and work status: A survey. IZA Discussion Papers, No. 2414. http://ftp.iza.org/dp2414.pdf

Doepke, M. and M. Tertilt (2009). Women's liberation: What's in it for men? *Quarterly Journal of Economics* 124 (4): 1541–1591.
https://ideas.repec.org/a/tpr/qjecon/v124y2009i4p1541-1591.html

Doepke, M., M. Tertilt, and A. Voena (2012), The economics and politics of women's rights, *Annual Review of Economics* 4: 339–372.
https://ideas.repec.org/a/anr/reveco/v4y2012p339-372.html

Esping-Andersen, G. (2009). *The incomplete revolution: Adapting to women's new roles*. Malden, MA: Polity Press.

Faggio, G. and S. Nickell (2007). Patterns of work across the OECD. *The Economic Journal* 117: F416–440.
http://onlinelibrary.wiley.com/doi/10.1111/j.1468-0297.2007.02062.x/abstract

Fernández, R. (2007). Women, work, and culture. *Journal of the European Economic Association* 5 (2–3): 305–332.
http://onlinelibrary.wiley.com/doi/10.1162/jeea.2007.5.2-3.305/abstract

Fernández, R., A. Fogli and C. Olivetti (2004). Mothers and sons: Preference formation and female labor force dynamics. *Quarterly Journal of Economics* 119 (4): 1249–1299.
http://econpapers.repec.org/article/tprqjecon/v_3a119_3ay_3a2004_3ai_3a4_3ap_3a1249-1299.htm

Fernández, R. and A. Fogli (2009). Culture: An empirical investigation of beliefs, work, and fertility. *American Economic Journal: Macroeconomics* 1 (1): 146–177.
http://econpapers.repec.org/article/aeaaejmac/v_3a1_3ay_3a2009_3ai_3a1_3ap_3a146-77.htm

Fortin, N.M. (2005). Gender role attitudes and the labor-market outcomes of women across OECD Countries. *Oxford Review of Economic Policy* 21 (3): 416–438.
http://www.fiwi.uni-jena.de/wfwmedia/Lehre/GenderEconomics/Fortin+2005+Gender+Role+Attitudes+and+the+Labor+Market+Outcome+of+Women+OxRevEP.pdf

Greenwood, J., A. Seshadri and M. Yorukoglu (2005). Engines of liberation. *Review of Economic Studies* 72 (1): 109–133. https://ideas.repec.org/a/oup/restud/v72y2005i1p109-133.html

Gudmundsdottir, A. (2007). Lúther og konurnar: Um áhrif siðbótar Marteins Lúthers á líf kvenna. In A. Guðmundsóttir and K. Ástgeirsdóttir (Eds.), *Kvennabarátta og kristin trú*. Reykjavik: Hið íslenska bókafélag.

Guiso, L., P. Sapienza and L. Zingales (2006). Does culture affect economic outcomes? *Journal of Economic Perspectives* 20 (2): 23–48. https://ideas.repec.org/a/aea/jecper/v20y2006i2p23-48.html

Gustafsson, S.S., C.M.M.P. Wetzels, J.D. Vlasblom and S. Dex (1996). Women's labor force transitions in connection with childbirth: A panel data comparison between Germany, Sweden and Great Britain. *Journal of Population Economics* 9 (3): 223–246. http://econpapers.repec.org/article/sprjopoec/v_3a9_3ay_3a1996_3ai_3a3_3ap_3a223-246.htm

Hammar, I. (2003). Protestantism and women's liberation in 19th century Sweden. In I. M Okkenhaug, (ed.), Gender (2003), *Race and religion: Nordic missions 1860–1940*. Uppsala: Studia Missionalia Svecana XCI.

Harrison, L.E. and S.P. Huntington (2000). *Culture matters: How values shape human progress*. New York: Basic Books.

Heckman, J.J. (1978). Dummy endogenous variables in a simultaneous equation system. *Econometrica* 46 (4): 931–59. https://ideas.repec.org/a/ecm/emetrp/v46y1978i4p931-59.html

Immervoll, H. and D. Barber (2006). Can parents afford to work? Childcare costs, tax-benefit policies and work incentives. IZA Discussion Paper No. 1932. http://ftp.iza.org/dp1932.pdf

Ingelhart, M. (1981). Political interest in West European women: An historical and empirical comparative analysis. *Comparative Political Studies* 14: 299–326. http://cps.sagepub.com/content/14/3/299.short

Inglehart, R. and P. Norris (2003). *Rising tide: Gender equality and cultural change around the world*. Cambridge: Cambridge University Press.

Inglehart, R. and P. Norris (2005). Modernity and gender equality: A response to Adams and Orloff. *Politics Gender* 1 (3): 482–492. http://journals.cambridge.org/action/displayAbstract?aid=369280

Inglehart, R. (2006). *World values surveys 1981–2004*, Ann Arbor: University of Michigan. http://www.worldvaluessurvey.org.

Jaumotte, F. (2003), Female labor force participation: Past trends and main determinants in OECD countries," OECD Economics Department Working Paper, No. 376. Paris: OECD Publishing. https://ideas.repec.org/p/oec/ecoaaa/376-en.html

Jensen, J. (2003). *The prehistory of Denmark*, Routledge.

Jonsson, G. (2001). Agents and institutions in the creation of the Icelandic welfare state, 1880–1946," Frihed, lighed og tryghed, Rapporter til Det 24. Nordiske Historikerm¢de, Århus 9.–13. August 2001, bind 2: 61–89. http://www.academia.edu/1848266/Agents_and_institutions_in_the_creation_of_the_Icelandic_welfare_state_1880-1946

Jonsson, G. (2004). Hvers kyns velferðarkerfi? Ísland í spegli hinna kvenvænu velferðarkerfa á Norðurlöndum. Fléttur II: Kynjafræði – Kortlagningar, Rannsóknastofa í kvenna- og kynjafræðum.

Karant-Nunn, S.C. and M.E. Wiesner-Hanks (2003). *Luther on women: A sourcebook*. New York: Cambridge University Press.

King, M.L. (1991). *Women of the renaissance*. Chicago: University of Chicago Press.

Kjærgaard, T. (1991). *Den danske revolution 1500–1800. En okohistorisk tolkning*. Copenhagen.

Kristjansson, A.S. (2008). Velferðarkerfið og barnafjölskyldan. Manuscript, University of Iceland.

Knudsen, T. (ed.) (2000). *Den nordiske protestantisme og velfaerdsstaten.* Aarhus: Aarhus Universitets Forlaget.

Lindbeck, A. (1997). Incentives and social norms in household behavior. *American Economic Review* 87 (2): 370–377. https://ideas.repec.org/a/aea/aecrev/v87y1997i2p370-77.html

Lockhart, P.D. (2007). *Denmark, 1513–1660. The rise and decline of a Renaissance monarchy*. Oxford: Oxford University Press.

Loudon, J.C. (1825). *An encyclopedia of agriculture*. London: Longman, Hurst, Rees, Orme, Brown, and Green.

Markkola, P. (2010). Genre, luthéranisme et États-providence Nordiques. *Revue Historie Nordique* 9: 57–70. (Gender, Lutheranism and the Nordic Welfare State).

Melby, K., A. Pylkkanen, B. Rosenbeck and C.C. Wetterberg (2006). The Nordic model of marriage. *Women's History Review* 15 (4): 651–661. http://www.tandfonline.com/doi/abs/10.1080/09612020500530851?journalCode=rwhr20#.VG2szIvuWQo

Mincer, J. and S. Polachek (1974). Family investments in human capital: Earnings of women. In Schultz (ed.), *Marriage, family, human capital, and fertility*. National Bureau of Economic Research, Cambridge, MA.

Mjøset, L. (2001). Employment, unemployment and ageing in the West European welfare states. In P. Pascal and L. Soete (Eds), *Technology and the future of European employment*. Cheltenham: Edward Elgar.

Myrdal, A. and G. Myrdal (1934). Kris i befolkningsfrågan (Crisis in the Population Question).

Myrdal, A. (1941). *Nation and family: The Swedish experiment in democratic family and population policy*. The MIT Press.

Myrdal, J. and M. Morell (eds.) (2011). *The agrarian history of Sweden: From 4000 BC to AD 2000*. Nordic Academic Press.

Nanda, S. (2000). *Gender diversity: Cross-cultural variations.* Prospect Heights, IL: Waveland Press.

Nussbaum, M. and J. Glover (1995). *Women, culture and development*. Oxford: Clarendon Press.

O'Connor, J.S., A.S. Orloff and S. Shaver (1999). *States, markets, families: Gender, liberalism and social policy in Australia, Canada, Great Britain and the United States*. Cambridge University Press.

OECD (2001). *Employment outlook.* Paris. http://www.oecd-ilibrary.org/social-issues-migration-health/oecd-employment-outlook-2001_empl_outlook-2001-en;jsessionid=21pg4a5q0uish.x-oecd-live-02

OECD (2004). Female labor force participation: Past trends and main determinants in OECD countries. OECD Economics Department, May. http://www.oecd.org/social/labour/31743836.pdf

Okkenhaug, I. M. (2003). Gender and Nordic missions in the nineteenth and twentieth centuries. *Scandinavian Journal of History* 28 (2): 73–82.

Olafsson, S. (2003). Contemporary Icelanders – Scandinavian or American. *Scandinavian Review* 91 (1): 6–14. https://notendur.hi.is//~olafsson/contemporaryicelander.pdf

Oskarson, M. (1995). Gender gaps in Nordic voting behaviour. In Lauri Karvonen and Per Selle (eds.), *Women in Nordic politics*. Aldershot: Dartmouth.

Pasternak, B., C.R. Ember, and M. Ember (1997). *Sex, gender, and kinship: A cross-cultural perspective*. Upper Saddle River, NJ: Prentice Hall.

Predelli, L.N. (2003). Contesting the mission's patriarchal gender regime: Single Norwegian missionary women in 19th Century Madagascar. In I. M. Okkenhaug (ed.) *Gender, race and religion: Nordic missions 1860–1940*. Studia Missionalia Svecana XCI.

Prescott, E.C. (2004). Why do Americans work so much more than Europeans? National Bureau of Economic Research Working Paper Series #10316, Cambridge, MA. http://www.nber.org/papers/w10316

Pronzato, C.D. (2009). Return to work after childbirth: Does parental leave matter in Europe? *Review of Economics of the Household* 7(4): 341-360. https://ideas.repec.org/a/kap/reveho/v7y2009i4p341-360.html

Ragan, K.S. (2013). Taxes, transfers and time use: Fiscal policy in a household production model. *American Economic Journal: Macroeconomics* 5(1): 168–192. http://econpapers.repec.org/article/aeaaejmac/v_3a5_3ay_3a2013_3ai_3a1_3ap_3a168-92.htm

Reimers, C.W. (1985). Cultural differences in labor force participation among married women. *American Economic Review* 75 (2): 251–255. https://ideas.repec.org/r/aea/aecrev/v75y1985i2p251-55.html

Rogerson, R. (2007). Taxation and market work: Is Scandinavia an outlier? *Economic Theory* 32(1): 59–85. https://ideas.repec.org/a/spr/joecth/v32y2007i1p59-85.html

Rosenbeck, B. (1998). Nordic women's studies and gender research. In D. von der Fehr, A. G. Jonasdottir and B. Rosenbeck (Eds.), *Is there a Nordic feminism? Nordic feminist thought on culture and society*. London: UCL Press.

Sachs, J.D. (2011). Revisiting the Nordic model: Evidence on recent macroeconomic performance. In Edmund S. Phelps and Hans-Werner Sinn (Eds.). *Perspectives on the performance of the continental economies.* Cambridge, Mass. and London, England: The MIT Press.

Shelling, T. (1971). Dynamic models of segregation. *Journal of Mathematical Sociology* 1 (1): 143–86. http://www.tandfonline.com/doi/abs/10.1080/0022250X.1971.9989794#.VG2vA4vuWQo

Stjerna, K. (2009). *Women and the reformation.* Oxford: Blackwell Publishing.

Stenius, H. (1997). The good life is a life of conformity: The impact of the Lutheran tradition on Nordic political culture. In Sørensen, Øystein & Bo Stråth (Eds.). *The cultural construction of Norden*. Oslo, Stockholm, Copenhagen, Oxford, Boston: Scandinavian University Press.

Tabellini, G. (2010). Culture and institutions: Economic development in the regions of Europe. *Journal of the European Economic Association* 8 (4): 677–716. https://ideas.repec.org/a/tpr/jeurec/v8y2010i4p677-716.html

Vella, F. (1994). Gender roles and human capital investment: The relationship between traditional attitudes and female labor market performance. *Economica* 61 (242): 191-211. https://ideas.repec.org/a/bla/econom/v61y1994i242p191-211.html

Weber, M. (2001). *The Protestant ethic and the spirit of capitalism*. Routledge. London: Classic.

Appendix 1: A representative agent model

Following Prescott (2004), assume that the production function takes the following form:

$$y_t = k_t^{\theta} \left(A_t h_t \right)^{1-\theta} \tag{A1}$$

where y denotes output, k is the stock of capital, A is the level of technology, h is hours of work, and θ denotes the share of capital in output. The representative firm maximizes output net of wage costs wh, where w denotes the real wage, giving the first-order condition

$$w_t = (1-\theta)\frac{y_t}{h_t}. \tag{A2}$$

The labor supply decision is modeled by describing the consumption/labor supply decision of the representative household where preferences over consumption (c) and hours worked (h) now and in the future are described as

$$\sum_{t=0}^{\infty} \beta^t \left[\log(c_t) + \frac{\alpha(1-h_t)^{1-\gamma}}{1-\gamma} \right] \tag{A3}$$

and t denotes time, β is the discount factor reflecting the pure rate of time preference, α is the parameter describing the intensity of the disutility from working, and γ is the inverse of the coefficient of inter-temporal substitution. The per-period time endowment is normalized to one. This means that if, on average, the working-age population works 25 hours a week, then h = 0.25, as there are about 100 hours of non-sleeping time a week. We let the parameter α capture the effect of cultural variables such as attitudes towards women's participation in the labor force.

The optimization is done subject to a constraint:

$$(1+\tau_c)c_t + (1+\tau_i)i_t = (1-\tau_h)w_t h_t + (1-\tau_k)(r_t - \delta)k_t + \delta \cdot k_t + T_t \tag{A4}$$

where τ_c is the tax on consumption, τ_i the tax on investment, τ_h the marginal tax rate on labor income, τ_k the tax rate on net capital income, w_t the real wage, r_t the rental price of capital, δ the rate of depreciation, and T_t denotes transfers.

Solving equation (A4) for consumption and inputting into equation (A3) gives one equation in hours worked. The first order condition becomes

$$\frac{\left(\frac{1-\tau_h}{1+\tau_c}\right)w}{c} = \alpha(1-h)^{-\gamma} \tag{A5}$$

where

$$c = \frac{1-\tau_h}{1+\tau_c}wh + \frac{1-\tau_k}{1+\tau_c}(r-\delta)k + \frac{\delta}{1+\tau_c}k - \frac{1-\tau_i}{1+\tau_c}i + \frac{1}{1+\tau_c}T\,.$$

The left-hand side of equation (A5) shows the marginal benefit of working longer hours h in terms of higher consumption while the right-hand side has the marginal cost of longer hours due to the disutility of working.

Labor and consumption taxes can be combined into a redefined employment tax rate, which is the effective marginal tax rate on labor income τ. It is the fraction of additional labor income that is taken in the form of taxes

$$(1-\tau) = \frac{1-\tau_h}{1+\tau_c} \tag{A6}$$

where (1-τ) is the amount of consumption a worker can obtain net of taxes from a unit earned. This gives an equation for the effective marginal tax rate on labor income

$$\tau = \frac{\tau_h + \tau_c}{1+\tau_c} \tag{A7}$$

Then, assuming that γ=1 gives[29]

$$\frac{1-\tau}{c}w = \alpha(1-h)^{-1} \tag{A8}$$

where the left-hand side has the marginal rate of substitution between consumption and leisure and the right-hand side the marginal rate of transformation. Inserting the solution for w in equation (A2) into equation (A8) gives

[29] The function $\frac{(1-h)^{1-\gamma}}{1-\gamma}$ becomes equal to log(1-*h*) when γ = 1.

$$\frac{h}{1-h} = \frac{(1-\tau)(1-\theta)y}{\alpha c} \tag{A9}$$

which yields an equation for hours worked:

$$h_t = \frac{1-\theta}{1-\theta + \frac{c_t}{y_t}\frac{\alpha}{1-\tau}}. \tag{A10}$$

This expression gives current labor supply as a function of the current value of the fraction of gross income consumed, c_t/y_t, the current tax rate τ_t and the values parameter α. The variable c_t/y_t captures the inter-temporal effect of taxes and other factors on labor supply, whereas the variable $(1-\tau)$ captures the intra-temporal distortion to the relative prices of consumption and leisure.

We assume that there are no differences in values and set α = 1.54 and θ = 0.30 (as in Prescott, 2004) for all the countries to generate the data in Table 6 in text.

Appendix 2: The tax wedge

The theoretical framework has households paying all taxes. Consequently, it is necessary to adjust the national income accounts to be consistent with this framework. The adjustment consists of treating indirect taxes less subsidies as net taxes on final product by removing net indirect taxes as a cost component of GDP and reducing the final product components correspondingly.

We adopt the Prescott (2004) methodology and assume that two-thirds of indirect taxes net of subsidies fall directly on private consumption expenditures and that the remaining one-third is split evenly between private consumption and private investment. Writing OECD variables in capital letters, we have the following expression for indirect taxes on consumption, IT_c:

$$IT_c = \left[\frac{2}{3} + \frac{1}{3}\frac{C}{C+I}\right] IT \tag{A11}$$

where C is OECD private consumption expenditures, I is OECD private investment, and IT is net indirect taxes. In the model, consumption c and output y can now be calculated as

$$c = C + G - G_{mil} - IT_c \tag{A12}$$

and

$$y = GDP - IT \tag{A13}$$

where G_{mil} denotes military expenditures.

There are two taxes on labor income, the income tax τ_{inc} and the social security tax τ_{ss}. The social security tax is calculated as

$$\tau_{ss} = \frac{SST}{(1-\theta)(GDP - IT)} \tag{A14}$$

where SST denotes social security taxes, IT is net indirect taxes, and θ is measured by the share of capital in national income. The (average) income tax rate is calculated as

$$\tau_{inc} = \frac{DT}{GDP - IT - Depreciation} \tag{A15}$$

where DT denotes government revenues from direct taxation. Direct taxes are those paid by households and do not include corporate income taxes. The expression for the consumption tax rate is

$$\tau_c = \frac{IT_c}{C - IT_c} \tag{A16}$$

The Prescott methodology then calculates the marginal labor income tax rate as

$$\tau_h = \tau_{ss} + 1.6 \cdot \tau_{inc} \tag{A17}$$

Equation (A16) can be used to describe the possible reasons proposed for differences in labor supply between countries. These have to do with either the slope of the budget line 1-τ or the slope of the indifference curves.

The tax rates are shown in Table 1. Note that the tax wedge is higher in each of the five Nordic countries than in the US and higher in Denmark, Finland, and Sweden than in France. However, the inter-temporal effect of taxes c_t/y_t tends to be smaller.

Table A1. The intra-temporal tax wedge and the consumption-output ratio 2001–2003

	Denmark	Finland	Iceland	Norway	Sweden	France	U.S.
τ_h	0.62	0.51	0.36	0.39	0.57	0.42	0.31
Social security tax	0.02	0.20	0.05	0.16	0.24	0.27	0.11
Marginal income tax	0.59	0.31	0.30	0.23	0.34	0.16	0.20
τ_c	0.37	0.31	0.30	0.31	0.31	0.20	0.10
1-τ	0.28	0.38	0.49	0.47	0.32	0.48	0.62
c/y	0.69	0.67	0.75	0.61	0.72	0.76	0.81

Source: OECD. Calculations of tax rates are found in Appendix 2.

Appendix 3: The data

Model calibration required data that are described in the table below. Furthermore, for the national income accounts data to be consistent with the theoretical framework, some modifications and assumptions are called for. Table A2 lists the variables used and their sources in the OECD database.

Table A2. The data and their sources

Our ref.	Dataset table or variable:	Currency or other reference	Countries	Years
1	Details of Tax Revenue – Government Total	National currency, current prices, millions	Individual table for each	2001–03
2	11–Government expenditures by function	Same	Same	2001–03
3	1–Gross domestic product	Same	Same	2001–03
4	1–Gross domestic product	USD, constant prices, constant PPPs, OECD base year, millions	Same	2001–03
5	12–Main aggregates of general government	National currency, current prices, millions	Same	2001–03
6	Annual National Accounts – Volume 2, 1970–2005 – Detailed aggregates – Consumption of fixed capital & taxes less subsidies on products	National currency, current prices, millions	All countries in one table	2001–03
7	Labor force survey by sex and age	Population 15-64 annual frequency	Same	2001–03
8	Labor force survey by sex and age	Total Employment annual frequency	Same	2001–03
9	OECD Factbook 2007: Economic, Environmental and Social Statistics	Average hours actually worked. Hours per year per person in employment	Same	2001–03