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Rebecca Morton

Jean-Robert Tyran

Erik Wengström

Øster Farimagsgade 5, Building 26, DK-1353 Copenhagen K., Denmark
Tel.: +45 35 32 30 01 – Fax: +45 35 32 30 00
http://www.econ.ku.dk

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Personality Traits and the Gender Gap in Ideology

Rebecca Morton, Jean-Robert Tyran and Erik Wengström*

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Abstract

What explains the gender gap in ideology, i.e. the observation that women tend to be more leftist than men? We provide new evidence showing that personality traits play a key role. Using a novel high-quality data set, we show that the mediating (i.e. indirect) effects of gender operating through personality traits by far dominate the direct effects of gender. They also dominate other potential differences between the sexes like income or education as explanatory factors. Our findings suggest that women tend to be more leftist than men mainly because they have different personalities, which, in turn, shape their expressed ideology. Taking such mediating effects of personality traits into account explains over three quarters of the observed gender gap in general ideological preferences.

JEL codes: C12, D79

Keywords: Personality traits, political preference, gender

* Morton (corresponding author): Department of Politics, NYU NYC and NYU Abu Dhabi, rebecca.morton@nyu.edu; Tyran: Department of Economics and VCEE, University of Vienna, Austria and Department of Economics, University of Copenhagen, Denmark and CEPR (London). Wengström: Department of Economics, Lund University, Sweden. We gratefully acknowledge generous support for this research from the Carlsberg Foundation. We thank Isabella Mares for helpful suggestions.

Introduction

Considerable evidence shows that women are more likely to express left-leaning political preferences than men.[1] Furthermore, although variations across countries exist, these differences cannot generally be explained by gender differences in religiosity, class, age, or labor force participation.[2]

However, these standard demographic variables are not the only differences between men and women that might explain gender differences in ideological preferences. Substantial data suggests that men and women differ in their personality traits. In particular, cross-country research shows that women are less likely to be emotionally stable and more likely to be extraverts, agreeable, and conscientious.[3] Moreover, recent research has highlighted the importance of personality traits in understanding ideological preferences.[4] If women's personality trait differences affect their ideological preferences, then it may be the case that the ideological gender gap is a consequence of these personality differences.

Given that personality trait differences are argued to be generally formed in childhood with a large genetic component, examining whether the gender gap in ideology can be explained by such differences speaks to the existing debate over whether the ideological gender gap is a decision by women to choose more leftist positions in response to structural institutional changes in marriage that affect adults such as the increase in divorce and unmarried parenthood or a consequence of gender socialization and evolutionary biological differences that are manifested in childhood which affect men and women.[5] In addition, evidence suggests that personality trait differences are larger in countries with higher levels of human development, equal access to knowledge,

[1] See Giger (2009) for a study of 12 European countries, Ingelhart and Norris (2000) for a study of over 60 countries, and Norrander and Wilcox (2008) for evidence from the United States.

[2] See Inglehart and Norris (2000).

[3] See Del Giudice (2009), Feingold (1994), Lippa (2010), and Schmidt et al. (2008).

[4] For work on the so-called Big Five personality traits which we explain in the next section see Alford and Hibbing (2007), Barbaranelli et al. (2007), Caprara et al. (1999, 2006), Carney et al. (2008), Gerber et al. (2010), Gosling et al. (2003), Jost et al. (2003), McCrae (1996), Mehrabian (1996), Mondak and Halperin (2008), Rentfrow et al. (2009), Riemann et al. (1993), Schoen and Schumann (2007), Stenner (2005), and Van Hiel et al. (2000).

[5] We review these literatures in the next Section.

education, and economic wealth, which suggests that these differences across countries could be an explanation for why the gender gap may have increased in the latter half of the twentieth century in a number of countries as development has increased.[6]

In this paper we examine the possibility that personality differences explain the ideological gender gap. We model personality traits as mediating variables between the effect of gender and ideological preferences. Thus, we are able to estimate the indirect effect of gender on ideological preferences through personality trait differences between the sexes. We find that the effects via personality trait differences are generally much more sizeable than those independent of such trait differences, comprising an overwhelming majority of the effects of gender on ideological differences. Thus, our results suggest that personality trait differences can explain a substantial portion of the ideological gender gap.

Our study is distinctive for the data we use to examine these relationships:

First, we use data from Denmark, a westernized developed country where there is a significant gender gap in political attitudes and a high divorce rate.[7] Hence, our data come from a nation in which nonpersonality trait explanations of the gender gap have been argued to be especially relevant and our data provide a strong test of the personality trait explanation for the gender gap.[8] Furthermore, in Denmark political issues are relatively centralized without significant variations at the regional level in educational systems, issues of concern to voters, social groupings, and other factors which can also affect ideological preferences, which allows us to focus more exclusively on the effects of gender and personality traits on ideology and the mediating effect of personality traits. Yet our results can be viewed as generalizable given that the nature of the educational system, economic conditions, and ideological divides are plainly

[6] See Schmitt et al. (2008, 2009) for cross-country comparisons of personality trait differences and Inglehart and Norris (2002) for changes in the gender gap over time.

[7] We present evidence of the gender gap in our empirical analysis. Although calculating cross-country divorce rates is complicated, Divorce Magazine, http://www.divorcemag.com/statistics/statsWorld.shtml estimates that 44.5% of Danish new marriages end in divorce at a divorce rate of 2.7 per 1,000 marriages per year. According to either measure, Denmark is in the set of countries they study with relatively high divorce rates.

[8] Iversen and Rosenbluth (2006) discuss how the gender gap arose earlier in Scandinavian countries than other western countries and trace the relationship between structural and economic changes in these countries and the gender gap.

characteristic of other western developed countries.

Second, our personality measures are drawn from a 60 question set unlike the more limited questions used in most other studies of the relationship between personality and ideology.[9] We therefore have a more precise measure of personality trait differences.

Third, our other data is also more accurate in other ways than in previous studies. Our income data is verified by taxation authorities in contrast to standard self-reported responses to broad income categories. Thus, we do not assign subjects midpoint estimates of income or some other arbitrary income level. We also have verified data from governmental authorities on residency, educational attainment, church membership, age, marital status, and gender of our subjects.

In the next section we review the theoretical and empirical evidence on the gender gap and ideology and the role that personality trait differences may play in explaining that gap. In Section III we present our empirical analysis and in Section IV we discuss the implications of our study for the existing debate over whether the ideological gender gap is due to structural changes in the institution of marriage or a consequence of genetic and socialization differences between men and women.

How Gender Differences in Personality May Affect Ideological Preferences

Much research suggests that individuals' personality traits can be classified into five basic dispositional traits which are typically called the Big Five or OCEAN: Openness, Conscientiousness, Extraversion, Agreeableness, and Emotional Stability (sometimes denoted as the opposite, Neuroticism) [see Borghans et al. (2008), Gerber et al. (2010)]. Openness represents Openness to experience and curiosity about the desire for new experiences and ideas. Conscientiousness indicates the extent that an individual is organized, persistent, and goal motivated. Extraversion is a measure of an individual's sociability, warmth, assertiveness, and activity. Agreeable-

[9] Gerber et al. (2010), for example, use only 10 questions.

ness refers to an individuals' interpersonal orientation and can range from being good-natured, trusting, and gullible to cynical, rude, suspicious, and manipulative. Finally, Emotional Stability is the degree to which an individual is low in anxiety and has a high tolerance for stress. Considerable evidence from psychology suggests that these personality traits have a genetic component and are relatively stable throughout adulthood (although there are some changes in Conscientiousness into late adulthood) [see Borghans et al, p. 976)].[10]

Gender differences in personality traits have been the subject of considerable empirical and theoretical research in the psychology literature since the 1930s as reviewed by Feingold (1994). Women are lower on Emotional Stability, higher on Agreeableness, Extraversion and Conscientiousness than men in most countries.[11] Two main theories have been proffered as to the sources of these personality trait differences: social role explanations and evolutionary explanations.[12]

According to the social role story, personality trait differences arise because women and men are socialized into different roles and appropriate ways of thinking. In early life experiences women are encouraged to not compete or be aggressive, but to be more social and "caring." Women are likely to be encouraged to carry more of the burden in terms of household chores and domestic duties involving taking care of children, the sick, and the elderly. In contrast, men are allowed more freedom to pursue individualistic goals outside the household.[13]

The evolutionary biological story suggests that the differences in how women and men value factors such as sensitivity to others, social status, and risk taking, evolved as women and men faced different pressures and adapted to these pressures in distinctive ways. Women are argued to be more sensitive to others and be more empathetic because their core evolutionary pressure was childbirth and childcare, while men are believed to be more competitive and risk takers because of the pressure to compete with others to attract fertile women. These evolutionary

[10] See Else-Quest et al. (2006), Feingold (1994), McCrae and Costa (1984), and Wilgenbusch and Merrell (1999).

[11] See Brody amd Hall (2000), Byrnes et al. (1999), Feingold (1994), Kring and Gordon (1998), Lippa (2010), Lynn and Martin (1997), Maccoby and Jacklin (1974), and Schmitt et al. (2008, 2009).

[12] See Feingold (1994) and Schmitt et al. (2008) for reviews of the theoretical literature. A third theory is that sex differences in personality traits are largely due to measurement errors. As Schmitt et al. (2008) review, the empirical evidence provides only limited support for this explanation. See also Lippa (2010).

[13] See Eagly (1987) and Ruble and Martin (1998).

forces are argued to have led men and women to develop different psychological mechanisms.[14]

Both explanations are compelling, however, they make different predictions about how personality trait differences may be manifested across countries. That is, the social role explanation suggests that as a country becomes more egalitarian and more prosperous, such that women and men occupy more similar roles, the gender differences in personality traits should become less significant. Thus, these differences should be least evident in industrialized, wealthy countries with high levels of human development. On the other hand, some theorists working from the evolutionary biology explanation suggest that these differences may be more pronounced in such countries because these societies are psychologically closer to hunter-gatherer cultures than are less-developed agricultural or pastoral cultures.[15] Schmitt et al. (2008, p. 170) explain the reasoning for this view: "Agricultural and pastoral cultures, with extremely large disparities in resource distribution, familial isolation, and relative gender inequality, may represent the largest psychological deviations from our hunter-gatherer past ..."

In support of the evolutionary theory, Schmitt et al. (2008, 2009) find in a large cross-cultural study of 55 countries which varied significantly in terms of development that gender differences in personality traits were *larger* with higher levels of human development.[16] They contend that the personality traits of men and women diverge in more developed countries because when social and economic conditions are fortunate, natural divergence due to genetic differences are more likely to be manifested, but that in less developed countries these differences are constrained by environmental conditions. They find that the cross-country differences are mainly explained by differences in personality traits of men rather than women. That is, in less developed countries, men's personality traits are more like women's traits, while women's personality traits vary less across countries. Apparently, in less developed countries the personality traits of men are more

[14] See Buss (1999), Gangestad and Simpson (2000), Gangestad and Thornhill (1997), Tooby and Cosmides (1990).

[15] See Korotayev and Kazankov (2003), Lamb and Hewlett (2005), Lee and Daly (1999), and Schmitt (2005a).

[16] In a similar cross-country comparison, Lippa (2010) also concludes that his results conformed more strongly to the biological model than to social, structural, attributional, or social comparison models.

constrained than those of women.[17]

In this paper we are agnostic as to whether the social role or evolutionary theories are better explanations of gender differences in personality traits. Our starting point is the evidence that such personality trait differences exist, and that they appear to be larger in more developed, westernized cultures, countries in which there is also more likely to exist an ideological gender gap. We now turn to how personality trait differences relate to ideology.

Personality and Ideology

As Knight (2006) documents, political scientists have largely converged on three essential components of a core definition of ideology–coherence, stability, and contrast. Specifically, she finds that political scientists think of ideology as (page 619) "the way a system–a single individual or even a whole society–rationalizes itself. Ideologies may be idiosyncratic ..., impractical, or even delusional, but they still share the characteristics of coherence and temporal stability." Furthermore, Knight finds that formal theorists and empirical researchers (page 625, italics in original) "have converged on a *spatial conceptualization of ideology* as a left-right or liberal-conservative continuum." In our analysis we investigate revealed ideological preferences which we consider as observed responses that individuals provide when asked to either place themselves on such a continuum, designate which political party they support, or take a position on an issue that has a known left/right dimension.

Since Adorno et al's (1950) work on the "authoritarian personality," a number of researchers have contended that there is a link between personality traits and ideological preferences.[18] Recently researchers have begun to investigate the relationship between the Big Five core per-

[17] Schmitt et al. (2008) suggest that these sex differences in personality traits (page 179) "reflect a more general biological trend toward greater dimorphism in resource rich environments and reduced dimorphism in constrained or high stress environmental conditions. ... It is mainly men, not women, who became less neurotic but also less agreeable and conscientious in their self-descriptions. In less fortunate conditions, the innate personality differences between men and women are attenuated. Although, speculative, another illustration of this principle may be seen regarding sex differences in competitiveness: Even when opportunities and incentives for achieving in sport grow in a way to become more equitable, sex differences in the proportion of men to women who run relatively fast increase with greater opportunity. ..."

[18] See for example Altemeyer (1981, 1996), Block and Block (2005), Jost et al (2003), Jost (2006), Lakoff (2006), McClosky (1958), and Pratto et al (1994).

sonality traits and such preferences. Two of the Big Five apparently have strong effects on ideology: Conscientiousness and Openness, in opposite directions. Evidence suggests that individuals who are more Conscientious are more likely to express an overall rightwing ideology, vote for rightwing parties, and express rightwing views on economic policies.[19] As Gerber et al. (2010) point out, these results are consistent with the view that those who are Conscientious are more likely to adhere to traditional norms and rules, and thus should not surprisingly support them. On the other hand, individuals who are high on Openness have been shown to be significantly more likely to be leftist, vote for leftist parties, and support leftist economic policies.[20] The rationale for this relationship is that individuals who are high on Openness are more likely to be accepting of new ideas and proposals that overturn traditional and existing ones.

The other three personality traits have less consistent relationships with ideological preferences. Emotional stability has been sometimes shown to be positively related with conservatism and voting for rightist parties.[21] Here, the reasoning is that individuals who are more neurotic and worried will prefer more leftist policies, particularly economic ones. Most research finds little relationship between Agreeableness and Extraversion and ideological preferences with some notable exceptions. In particular, Morton et al. (2010) find a positive association between Agreeableness and leftist positions using a more extensive personality test than that used in other samples and Gerber et al. (2010) found that Extraverts are more rightwing.[22]

Morton et al. (2010) also show that income serves as a mediating variable between some personality traits and ideological preferences. Specifically, they find that individuals who have

[19] See Barbaranelli et al. (2007), Caprara et al. (1999, 2006), Carney et al. (2008), Gerber et al. (2010), Gosling et al. (2003), Mondak and Halperin (2008), and Stenner (2005). In contrast, Alford and Hibbing (2007) and Mehrabian (1996) do not find a significant relationship.

[20] See Barbaranelli et al. (2007), Capara et al. (1999, 2006), Carney et al. (2008), Gerber et al. (2010), Gosling et al (2003), Jost et al. (2003), McCrae (1996), Meharbian (1996), Mondak and Halperion (2008), Rentfrow et al. (2009), Riemann et al. (1993), Schoen and Schumann (2007), Stenner (2005), and Van Hiel et al. (2000).

[21] See Barabranelli et al. (2007), Carney et al. (2008), Gerber et al. (2010), Gosling et al. (2003), Mondak and Halperin (2008), Morton et al. (2010).

[22] Carney et al. (2008) found in some samples that Agreeableness and Extraversion were associated with conservatism. Gerber et al. (2010) find that although Agreeableness has no significant effect on overall ideology in their more limited personality trait questionaire, they find that it is likely to make one more liberal on economic attitudes, but conservative on social attitudes. Thus, they contend that the previous inconsistent and insignificant findings may be because of these countervailing effects on overall ideology.

higher levels of Emotional Stability are more likely to make higher incomes which indirectly leads these individuals to express more rightwing preferences. They discover weaker evidence that Agreeableness has an indirect effect through income on ideological preferences; as expected, individuals who are more agreeable make lower incomes and this indirectly leads them to express more leftist preferences. Similarly, they find that Conscientiousness has an indirect effect through income on economic policy measures of ideology; individuals who are more conscientious make higher incomes which leads them to express more rightwing views on economic policies. However, these effects are small relative to the direct effects of these variables on ideological preferences and in the same direction.

The Ideological Gender Gap and Personality Traits

Given the widespread interpretation of ideology as a system by which individuals place themselves on a left/right continuum, the ideological gender gap is a difference in how individuals' place themselves on this continuum that appears to be largely explained by gender. That is, when asked questions that attempt to measure how leftist or rightist individuals are by asking their party preferences, their reported preferences, or views on issues that vary in a well established way along the standard left-right division, researchers have found significant differences between the average responses of men and those of women. As noted in the Introduction, these ideological gender gaps exist across a number of countries and cannot be entirely explained by other demographic control variables [Giger (2009), Ingelhart and Norris (2000), and Norrander and Wilcox (2008)].

A number of explanations have been proffered for the so-called gender gap in politics. On the one hand, researchers have highlighted structural institutional changes such as the rise in divorce and unmarried parenthood.[23] These factors are argued to reduce private transfers women receive from men and result in an increase in female support for redistribution by governments and more leftist policies. Evidence which suggests that the ideological gender gap is a relatively

[23] See Edlund and Pande (2002), Edlund et al. (2005), and Iversen and Rosenbluth (2006).

recent phenomenon (until the mid 1960s in the United States and in the late 1970s in Europe women were more rightist than men) supports the structural explanation since the institutional changes in marriage occurred concurrently. Edlund and Pande (2001) find that indeed there is a greater gender gap in voting that is explained by variations in divorce risk in a cross-country comparison. Iversen and Rosenbluth (2006) present a more nuanced view, pointing out that the preferences of married women should depend both on their divorce risks and their outside options. Furthermore, they point out that considering outside options might explain gender ideological differences in Scandinavian countries where the size of government is a major issue (p. 13). In particular, in these countries women are more likely to be employed in the public sector than men. If both spouses are considering their outside options more than family income, then " ... since pay in the public sector is financed by taxing the private sector, the policies affecting relative pay are a perfect example of an area where gender conflict is likely to be intense." They find in a similar cross-country comparison that unmarried women and married women in the labor force are more likely to be leftist, supporting their argument that differences in outside options for men and women coupled with divorce risk explains much of the ideological gender gap.[24]

On the other hand, scholars have suggested that women are more likely to express leftist preferences because of gender socialization or biological differences between the genders, much as researchers have also explained gender differences in personality traits.[25] In support of this argument, Fridkin and Kenney (2007) discover a significant political gender gap in eighth grade students in Arizona and contend that such evidence is most reasonably explained by gender socialization and not by economic factors. However, the differences observed in children might also reflect evolutionary biological factors. Hatemi et al. (2009), in a study of twins,

[24] Norrander and Wilcox (2008) find significant differences in the ideological preferences of married and single women in the United States, with single women more leftist, and argue that in the United States the gap is as much a divide between different types of women as between women and men.

[25] See Chaney et al. (1998), Chen (2001), Chodorow (1978), Conover (1988), Conover and Sapiro (1973), Diekman and Schneider (2010), Jelen et al. (1994), Kaltenthaler et al. (2008), and Studlar et al. (1998) for studies of the ideological gender gap which focus on such explanations.

find support for a genetic explanation of the gender gap for some political preferences. Both the socialization and evolutionary biological explanations suggest then that personality trait differences play an important role in our understanding of the ideological gender gap. That is, these two types of theories suggest that personality traits may act as mediating variables through which gender affects ideological preferences. Furthermore, the research of Schmitt et al. (2008, 2009), discussed above, which shows that personality trait differences between the sexes are more pronounced in more developed countries also provides an explanation for why the gender gap in ideological preferences has become more pronounced in recent years.

In our empirical analysis below we demonstrate that personality traits can explain a substantial portion of the ideological gender gap. Later we address the extent that our results speak to the debate over whether the ideological gender gap is a consequence of structural changes in marriage or due to gender socialization and/or biological differences between men and women.

Empirical Analysis

Data

Our data are from a paid survey conducted through iLEE (internet Laboratory for Experimental Economics) at the Center for Experimental Economics at the University of Copenhagen in spring 2008.[26] A random sample of 22,207 subjects were drawn based on socioeconomic characteristics from the general voting-age population of Denmark, with the assistance of Statistics Denmark (SD) a Danish governmental agency. Hard-copy letters were sent by SD through regular mail, inviting participants to log into iLEE's webpage using a random ID number and to complete the survey within a week. Once subjects logged in, they were informed that the study would take approximately 50 minutes and that they would only be paid if they completed the entire study.

[26] The internet platform is supported by the Carlsberg Foundation. The survey was part of a number of larger combined survey/internet experiment. Some parts were explicitly paid (and payments depended on choices), while others, like the survey reported in this paper, were not explicitly paid. However, overall earnings were only paid out if all parts were completed. Thus, participants had an incentive to complete the entire study, but they did not have an incentive to answer the questions used in this paper in a particular way. Average earnings were approximately 276 Danish Kroner (which as of March 2011 was equivalent to approximately 53 U.S. dollars). 114 of the subjects participated in an experiment in which they were not paid. If we omit these subjects from the analysis the qualitative results are unchanged and the quantitative estimated coefficients are extremely similar.

The survey was conducted in Danish. After completion of the survey, the survey data were sent to SD where they were matched by SD with detailed socioeconomic data (income, education, etc.). The data were then made available to the researchers in a completely anonymous format. Of the subjects contacted, 3,584 logged into the survey, and 1,823 completed all the questions.

The Appendix summarizes the data used in the analysis and compares the sample to the Danish population 18 years old and older. Although there is a high level of internet penetration in Denmark. In general the match between the Danish population and our subjects is good, despite the high drop off rate, with a somewhat over-representation of middle aged individuals.

We use the four questions on ideological preferences of the subjects as our principal dependent variables, which we label our Ideology Measures. All of the questions provided subjects with the choice "Prefer not to answer." We asked two types of questions–general ideological questions and two questions related to economic policy. The first question, which was one of our general ideological measures, concerned voting behavior: "What party would you vote for if there was an election tomorrow?" The subjects could choose one of the nine parties who were eligible for parliament in the 2007 elections, along with the options "Would not vote" and "Would vote blank." The nine parties were ranked on a scale from right to left, with 1 denoting the most extreme rightist party (Danish People's Party) and 9 representing the most extreme leftist party (Unity List – Red – Green Alliance).[27] This variable is labeled *Party* and 1,893 subjects completed this question.

The remaining three questions were taken from the World Values Survey (1999). The second question, which was also a general ideological measure, was a classic ideology question in which the subject had to place herself on a left-right scale: "In political matters, people talk of 'the left' and 'the right.' How would you place your views on this scale, generally speaking?" A

[27] The full ordering of the parties is as follows: 1 = Danish People's Party, 2 = Conservatives, 3 = Liberals, 4 = New Alliance, 5 = Christian Democrats, 6 = Social Liberals, 7 = Social Democrats, 8 = Socialist Peoples Party, and 9 = Unity List – Red – Green Alliance. The ranking was validated by Jørgen Goul Andersen, an expert on Danish political parties. The ranking also corresponds to a ranking of the same Danish parties in Benoit and Laver (2006); Benoit and Laver exclude one new party which we include and include two parties which were no longer electoral contenders when we conducted our analysis.

scale from 1 to 10 was presented with 1 representing extreme left and 10 representing extreme right. For our empirical analysis the scale was reversed such that 10 represented an extreme left position. The re-scaled variable is labeled *Leftist* and 2,028 subjects completed this question.

Our general ideological measures, *Party* and *Leftist*, then, are used in our empirical analysis to determine if an overall or general ideological gender gap exists and can be explained by personality trait differences.

The third and fourth questions related to economic policy of the government and were our economic policy measures. The third question concerned government responsibility for individuals' wellbeing. Subjects were presented with two opposing views placed on either end of a 1-10 scale and asked to place themselves on the scale in accordance with their own views. The two statements were: "People should take more responsibility to provide for themselves" and "The government should take more responsibility to ensure that everyone is provided for." These statements were placed at 1 and 10 respectively. We used answers to this question to create the variable labeled *Econ1* and 2,107 subjects completed this question.

The fourth question concerned preferences for competition and had the same structure as the third question which we used to create the variable labeled *Econ2*. The two opposing statements were: "Competition is good. It stimulates people to work hard and develop new ideas" and "Competition is harmful. It brings out the worst in people." Again, the first statement was placed at 1 and the second statement was placed at 10. 2,106 subjects completed *Econ2*.

We use our economic policy measures, *Econ1* and *Econ2* to determine if an ideological gender gap in economic policy exists and whether it can be explained by personality trait differences. *Econ1* is a question that is especially relevant to structural explanations of the ideological gender gap. That is, the structural explanations argue that when divorce rates and unmarried parenthood are high, women prefer a more interventionist government and a stronger "safety net." *Econ2* picks up differences in views about the role of competition. Other research has found that women appear to have a distaste for competition; specifically, Niederle

and Vesterlund (2007) find that controlling for ability of men and women, women were half as likely to participate in a competition based compensation scheme compared to a noncompetitive one.

Once these questions were completed, subjects were given a Big Five personality test. We used the Big Five personality test NEO PI-R Short Version and the IQ test I-S_T 200R which are copyrighted and administered by the Danish Psychological Publishing Company (Dansk Psykologisk Forlag). The Danish NEO-PI-R Short Version consists of five 12-item scales measuring each domain. The 12 items for each domain are chosen from the original 48 items (of the full NEO-PI-R test) as follows: for each facet the two items (out of eight) with the highest correlation with the total factor score are chosen (this is different from the American 60-item version of NEO-PI-R, called NEO-FFI, where the 12 items with the highest correlation with the total factor score is picked, without regard to which facets the single items belong to). In the Danish short version, all facets are therefore represented equally within each domain. Furthermore, the short version has been shown to be highly correlated with the long one such that Costa and McCrae (2004) conclude that if one only wants to examine the Big Five factors, the short test can be used as easily as the full version.[28]

Subjects were presented with 60 statements and asked to state whether they agree or disagree with each on a 0-4 scale which contained the options "Strongly disagree," "Disagree," "Neutral," "Agree," and "Strongly agree." Using these answers we constructed the five variables that measured personality traits, *BigFiveO* for Openness, *BigFiveC* for Conscientiousness, *BigFiveE* for Extraversion, *BigFiveA* for Agreeableness, and *BigFiveN* for Emotional Stability. In our analysis the first four of these variables, *BigFiveO*, *BigFiveC, BigFiveE,* and *BigFiveA* are measured with higher values representing higher levels of the respective trait, but *BigFiveN* is measured with higher values representing lower levels of Emotional Stability (higher levels of Neuroticism). After completing the survey and tests, subjects were then asked to provide their

[28]The correlations between the short and long tests are as follows: 0.93 for Emotional Stability, 0.90 for Extraversion, 0.93 for Openness, 0.89 for Agreeableness, and 0.91 for Conscientiousness. These estimates are based on a sample of 600 observations [Costa and McCrae (2004)].

bank account numbers and were told that their payment would be transferred to them after the study was concluded.

The data from the survey was combined with demographic data from the Danish government and the results of an IQ test.[29] Our income data is from 2006 and refers to the logged value of total gross income of the individual (salary, pension, capital income, etc.) in thousand Danish Kroner, which is labeled as the continuous variable *Income*. As noted above, our income data is unique for studies of the effects of income on ideology. Furthermore, our income data is individualistic rather than family income and thus allows us to consider explicitly whether women's ideological preferences are affected by their own income, even if married. We omitted individuals with negative values of income due to large capital losses. For robustness, we also considered truncating the data at the lower and upper percentiles, replacing the continuous variable with dummies and including a squared income variable. The qualitative results were robust to these variations.[30]

We also include age, age squared, and age cubed, in order to capture nonlinear relationships between age and our dependent variables. As with income, we also tested the robustness of our results by replacing the continuous age variable with dummies.

Education levels are divided into six categories.[31] Other demographic variables included in the analysis whose names are self-explanatory include: *Female*, *Urban, Parttime, Retired,*

[29] In the IQ test, subjects were presented with 20 questions or puzzles and asked to solve as many as possible within a 10 minute period. The IQ test we used is part of a more extensive test called "IST 2000 R". It contains several modules and we chose to use a part that is a variation of Raven's Progressive Matrices. The advantage of using Raven's Progressive Matrices Test is that it does not depend heavily on verbal skills or other kinds of knowledge taught during formal education. A subject's number of correct answers was used to create our variable measuring performance which we labeled *IQ*. We omitted subjects who scored less than 5 on the IQ test.

[30] Since our income variable includes capital income it arguably measures wealth as well. We also have an independent measure of wealth that includes the value of many assests such as stocks and bonds, housing, and cash holdings at bank accounts. Including the wealth variable does not change our qualitative results.

[31] *EduBasic* for individuals who did not complete a high school degree, *EduHS* for individuals who completed an academic high school degree, but no advanced education; *EduVoc* for individuals who completed vocational education instead of attending an academic high school, and three variables for various levels for advanced university training: *EduAdv1* for individuals who have completed some academic post-secondary education less than a Bachelor's degree, *EducAdv2* for individuals who have completed a Bachelor's degree, and *EducAdv3* for individuals who have completed a Masters or Ph.D. degree. *EduVoc* was omitted in the empirical analysis and served as our baseline case since previous research has suggested that individuals with vocational education have the most rightist ideological preferences. *Student* designated individuals who are currently studying and spanned all the education categories, depending on the extent that they had completed their education.

Unemployed, Married, and *Divorced*. We also include *Couple* for unmarried couples and *Church* for individuals who are members of the Danish Lutheran Church.

Empirical Models

Our main goal is to examine the extent that personality traits serve as mediating variables for *Female* in determining observed ideological preferences. In order to estimate the mediation effects, we used the following procedure. We first estimated four sets of seemingly unrelated regressions. In each set we estimated simultaneously seven equations. In the first five equations the five personality traits serve as the dependent variables. In the sixth equation, *Income* serves as the dependent variable, since given earlier research by Morton et al. (2010), we expect that *Income* serves as a mediating variable for personality traits on ideological preferences. We also expect that Income may serve as a mediating variable between gender and ideological preferences independent of personality traits. In the seventh equation one of the four ideological measures serves as the dependent variable, *Party, Leftist, Econ1,* or *Econ2.* For example, to determine the mediation effect of the Big Five personality traits for the ideological measure *Party* we estimated the simultaneously the following seven seemingly unrelated regressions (other covariates included our demographic variables and measures of education and IQ above):

$$BigFiveO = \alpha_O + \beta_{OF} Female + OtherCovariates + \mu_O \tag{1}$$

$$BigFiveC = \alpha_C + \beta_{CF} Female + OtherCovariates + \mu_C \tag{2}$$

$$BigFiveE = \alpha_E + \beta_{EF} Female + OtherCovariates + \mu_E \tag{3}$$

$$BigFiveA = \alpha_A + \beta_{AF} Female + OtherCovariates + \mu_A \tag{4}$$

$$BigFiveN = \alpha_N + \beta_{NF} Female + OtherCovariates + \mu_N \tag{5}$$

$$\begin{aligned} Income &= \alpha_I + \beta_{IA} BigFiveA + \beta_{IC} BigFiveC + \beta_{IO} BigFiveO \\ &\quad + \beta_{IE} BigFiveE + \beta_{IN} BigFiveN + \beta_{IF} Female + OtherCovariates + \mu_I \end{aligned} \tag{6}$$

$$\begin{aligned} Party &= \alpha_p + \beta_{pA} BigFiveA + \beta_{PC} BigFiveC + \beta_{pO} BigFiveO + \beta_{pE} BigFiveE \\ &\quad + \beta_{pN} BigFiveN + \beta_{pI} Income + \beta_{pF} Female + OtherCovariates + \mu_P \end{aligned} \tag{7}$$

The coefficient β_{pF} in Equation 7 is an estimate then of the direct effect on *Party* of *Female*, controlling for *Income* and personality traits. To determine the indirect effect or mediated effect of *Female* on *Party* through Agreeableness that is not mediated through income, for example, we multiply the coefficient on *Female* in Equation 4, β_{AF} times the coefficient on $BigFiveA$ in the Equation 7, β_{pA}. The indirect effect or mediated effect of *Female* on *Party* through Agreeableness that is also mediated through income is given by $\beta_{AF} \times \beta_{IA} \times \beta_{pI}$. The total indirect effect or mediated effect of *Female* on *Party* through Agreeableness is the sum of these two terms. If a mediation effect has occurred, we expect the indirect effect to be nonzero and have the same sign as the direct effect. If a suppression effect has occurred, we expect the indirect effect to be nonzero and to have the opposite sign from the direct effect.[32] The estimates of these indirect effects via personality trait differences are our estimates of the degree to which personality trait differences can explain the ideological gender gap. The indirect effects of *Female* on *Party* via the other personality traits is similarly defined.

In order to compare the personality trait explanation with the structural explanation of the gender gap, we also estimate the indirect effects of *Female* through *Female*'s direct effect on *Income*, independent of personality trait differences. This effect is estimated by multiplying

[32] See MacKinnon et al. (1995, 2000).

the coefficient on *Female* in Equation 6, β_{IF}, times the coefficient on *Income* in Equation 7, β_{PI}. Some may argue that this is not an appropriate test of the structural explanation and that the structural explanation attempts to explain why a gender gap exists controlling for income differences between men and women. Our estimate of the coefficient on *Female* in Equation 7, β_{PF}, tells us if there is an effect on ideology independent of such differences and may be seen as a more appropriate comparison. Since we do not have variation within our data over those structural variables such as divorce risk, child care provision, etc., which are said to be relevant in cross-country considerations of the structural explanation, we are not able to directly test the structural explanation. However, as discussed in the Introduction, the divorce rate in Denmark is relatively high which implies that our data provide a particularly strong test for nonstructural explanations of the ideological gender gap.

The direct and indirect effects of *Female* on the other ideological measures are similarly defined. Although the estimation of Equations 1-7 provides estimates of the standard errors of the components of the indirect effects, it does not provide an estimate for the standard error of the products of these components. Moreover, the products are likely to be nonnormal and skewed when either a mediation or suppression effect exists. As Shrout and Bolger (2002) discuss, ignoring the skew reduces the power to detect mediation or suppression effects. We therefore used bootstrap measures to determine the standard errors and confidence intervals for the indirect effects as developed by Efron and Tibshirani (1993) and described in Appendix A of Shrout and Bolger.[33]

In our analysis we compute the indirect effects through each of the personality variables, treating the other traits as covariates. We therefore assume that there are no interaction effects among the Big Five variables in determining ideological preferences. Although we use ordinary least squares for this analysis, we also estimated ordered logit and tobit models of these equations independently with little difference in the qualitative results.[34]

[33] See also Preacher and Hayes (2004).

[34] An alternative estimation strategy would be to use an instrumental variable approach as in two-stage least

We summarize the relationships we expect to find between *Female,* personality traits, *Income*, and *Party* in our estimations in Table 1 below. We expect the other ideological measures to have similar relationships. Recall that our ideology measures are coded such that higher values represent more leftist preferences. The top half of the table reports our expectations with regard to the effects of personality traits. The second column in the top half reports our expectations about the effects of *Female* on each of the five personality traits. That is, we expect to find that women are higher on Agreeableness, Conscientiousness, and Extraversion, and lower on Emotional Stability (recall that our measure of Emotional Stability, *BigFiveN*, decreases with higher levels of Stability). The third and fourth columns in the top half report our expectations concerning the effects of each personality trait on *Income* and *Party*, respectively; we expect that higher levels of Conscientiousness and Emotional Stability and lower levels of Agreeableness lead to higher incomes and that higher levels of Agreeableness and Openness will lead to more leftwing preferences, while higher levels of Emotional Stability and Conscientiousness will result in more rightwing preferences.

Table 1: Predicted Relationships in Estimation for *Party*
(Other Ideological Measures are Expected to be Similar)

	Effects of			Indirect Effects of	
	Female on	Traits on		*Female* on *Party* Through Traits	
	Traits	*Income*	*Party*	Indep. of *Income*	Through *Income*
Coefficients	β_{xF}	β_{Ix}	β_{Px}	$\beta_{xF}\beta_{Px}$	$\beta_{xF}\beta_{Ix}\beta_{PI}$
BigFiveO	0	0	+	0	0
BigFiveC	+	+	–	–	–
BigFiveE	+	0	0	–	0
BigFiveA	+	–	+	+	+
BigFiveN	+	–	+	+	+
Residual Effects of *Female* (Indep. of Traits)	β_{IF} –	β_{PI} ?			
Indirect Effects of *Female* (Indep. of Traits)					$\beta_{IF}\beta_{PI}$ +

squares. But doing so would require us to make exclusion restrictions–abitrary assumptions about the variables which would be contrary to our theoretical expectations.

The fifth column in the top half summarizes our predictions about the indirect effects of *Female* via each personality trait on our ideology measures that is not mediated by income. We expect that women's increased tendency to be more Agreeable and less Emotionally Stable will have the indirect effect of increasing their tendency to be leftist, while women's increased tendency to be more Conscientious and more Extraverted will have the indirect effect of decreasing their tendency to be leftist. The sixth column in the top half summarizes the predictions about the indirect effects of *Female* via each personality trait's indirect effect on income. We expect that women's tendencies to be more Agreeable and less Emotionally Stable will lead to lower incomes and thus more leftist preferences, while we expect that women's tendencies to be more Conscientious will lead to higher incomes and thus less leftist preferences.

Finally, the last four rows provide predictions of the effect of *Female* independent of personality trait differences. That is, we expect that women will earn lower incomes than men independent of personality trait differences. We are agnostic as to whether *Female* will have a direct effect on our ideological measures after controlling for the indirect effects via personality traits or income or both. However, we expect that the tendency of women to earn less income, independent of personality traits, will have the indirect effect of making women more leftist than men as well given the structural explanation discussed above. To the extent that we find that there are indirect effects of *Female* on ideological preferences via personality traits (either independent of *Income* or via *Income*) then we find support for the socialization and biological explanations for the gender gap. But to the extent that we find that there are either direct effects of *Female* on ideological preferences independent of personality traits (either independent of *Income* or via *Income*), then we find support for the structural explanations for the gender gap.

Results

Does an Ideological Gender Gap Exist?

Before reporting our estimations of Equations 1-7, we first establish that a gender gap in ideology exists in our data in Tables 2a,b below. Table 2a summarizes the raw differences in our ideological measures between men and women and Table 2b reports on four simple regressions with each ideological measure as a dependent variable and *Female* as an independent variable. We also report on regressions which include our demographic variables as controls (but exclude our personality trait measures). We find indeed an ideological gender gap across all four of our measures and that it is significant. Women are generally about 2/3 of a point more leftist on our ideological scales (recall that *Party* is measured on a 1-9 point scale, while the other measures are on a 10 point scale). When we control for demographic differences, the gap still remains and women are approximately 1/2 of a point more leftist than men across all ideological measures, holding demographics constant.[35] We now turn to our investigation of whether personality trait differences between men and women can explain the gender gap in ideology.[36]

Table 2a: Ideology by Gender

		Ideological Measures			
		Party	*Leftist*	*Econ1*	*Econ2*
Women	Mean	5.42	5.93	5.45	4.41
	Obs.	909	965	1029	1027
Men	Mean	4.73	5.29	4.91	3.75
	Obs.	984	1063	1078	1079

[35] We also estimated the tobit and ordered logit regressions with the same qualitative results.

[36] Furthermore, we estimated separate effects for married and unmarried women in order to determine if the direct effects of *Female* on our ideological measures depend on marital status, as found in previous studies [Iversen and Rosenbluth (2006) and Norrander and Wilcox (2008)]. We found that unmarried women were more leftist on the ideological measure *Party,* controlling for other direct and indirect effects, but little evidence of a difference on the three other ideological measures.

Table 2b: Effect of *Female* on Ideology (Excluding Personality Trait Measures)

	Ideological Measures							
	Party		*Leftist*		*Econ1*		*Econ2*	
Controls Incl.	No	Yes	No	Yes	No	Yes	No	Yes
Coeff.	0.69***	0.54***	0.65***	0.52***	0.54***	0.48***	0.66***	0.64***
Std. Err.	0.12	0.12	0.10	0.10	0.10	0.10	0.08	0.09
R squared	0.02	0.10	0.02	0.09	0.01	0.04	0.03	0.08
Observations	1893		2028		2107		2106	

***Significant at 1% level

Gender Differences in Personality Traits

We estimated versions of Equations 1-7 for each of our four measures of ideology. First we report the results of the estimations of Equations 1-5 in Table 3. Since we used four different measures of ideology and estimated separate seemingly unrelated regressions for each measure, we report only the estimated coefficients for *Female* in each of the four different estimations of Equations 1-5, depending on the ideology measure considered in the seemingly unrelated regression estimation, as identified by the column headings in the table. That is, column 3 presents the results of the estimation of Equations 1-5 when the dependent variable in Equation 7 is *Party*, column 4 presents the results when the dependent variable in Equation 7 is *Leftist*, etc. Although our sample size varies as not all subjects responded to all of the ideological measures we find little variation in results across ideological measures. We included the demographic controls discussed above in the estimation and the full results are available from the authors.

Table 3: Effect of Female on Personality (β_{xF} in Equations 1-5)
(Controls Included)

		Ideological Measure in Equation 7			
Dependent Variable in Equation		*Party*	*Leftist*	*Econ1*	*Econ2*
Equation 1: *BigFiveO*	β_{OF}	0.64**	0.62**	0.51**	0.52**
	Std. Err.	0.27	0.26	0.26	0.26
	R-Sq.	0.11	0.11	0.11	0.11
	Effect Size^{+}	0.10	0.10	0.08	0.09
Equation 2: *Big FiveC*	β_{CF}	0.24	0.25	0.26	0.26
	Std. Err.	0.26	0.25	0.24	0.24
	R-Sq.	0.04	0.04	0.04	0.04
	Effect Size^{+}	0.04	0.04	0.05	0.05
Equation 3: *BigFiveE*	β_{EF}	-0.46	-0.31	-0.49*	-0.48*
	Std. Err.	0.29	0.28	0.28	0.28
	R-Sq.	0.05	0.05	0.05	0.05
	Effect Size^{+}	-0.07	-0.05	-0.08	-0.08
Equation 4: *BigFiveA*	β_{AF}	2.61***	2.64***	2.68***	2.66***
	Std. Err.	0.25	0.24	0.24	0.24
	R-Sq.	0.09	0.09	0.10	0.09
	Effect Size^{+}	0.47	0.48	0.49	0.48
Equation 5: *BigFiveN*	β_{NF}	3.53***	3.37***	3.39***	3.42***
	Std. Err.	0.31	0.30	0.30	11.46
	R-Sq.	0.10	0.10	0.10	0.10
	Effect Size^{+}	0.50	0.48	0.48	0.49
Observations		1893	2028	2107	2106

***Sig. at 1% level, **Sig. at 5% level, *Sig. at 10% level
$^{+}$Std. deviation difference in trait between women and men.

We find that women are significantly more likely to be Agreeable and to have lower levels of Emotional Stability which shows support for some of the previous work on sex differences in personality traits. However, we also find that the women in our sample are significantly more likely to be Open to Experience, in contrast to previous work which typically finds no relationship. Furthermore, unlike previous research which finds that women are more Conscientious and Extraverted, we do not find any evidence of significant differences between men and women in these traits.

In order to determine whether the estimated relationships are meaningful, we also estimated the sizes of the effects of *Female* in terms of the standard deviation difference in each of our personality traits which are also reported in Table 3. We find that the largest effects are by far for the traits of Agreeableness and Emotional Stability. In general, women are approximately half

a standard deviation higher in Agreeableness and half a standard deviation lower in Emotional Stability than men. Thus, we find that there are significant and sizeable personality trait differences between women and men in our sample and that the principal differences appear to be on traits that also have been shown to matter in determining ideological preferences.

Direct Effects on Ideology

We now turn to the results in estimating ideology in the four versions of Equation 7 which are summarized in Table 4 below. The coefficients in this table report the direct effects on each ideology measure of each of the variables listed. Recall that our ideological measures are constructed such that higher values represent more leftist ideological preferences. Somewhat surprising, we find no significant direct or residual effect of *Female* on three of our ideology measures, but a significant positive effect for *Econ2.* The lack of a significant residual effect for three of the ideological measures suggests possible full mediation through the effects of *Female* on our personality trait variables and *Income.*

Table 4: Determinants of Ideology Equation 7 (Direct Effects)
(By Ideological Measure in SUR Est., Controls Included)

		Party	*Leftist*	*Econ1*	*Econ2*
Female	β_{pF}	0.09	0.11	0.09	0.29***
	Std. Err.	0.12	0.10	0.10	0.09
Income	β_{PI}	-0.52***	-0.51***	-0.24**	-0.27***
	Std. Err.	0.11	0.09	0.10	0.09
BigFiveO	β_{PO}	0.06***	0.06***	0.04***	0.02***
	Std. Err.	0.01	0.01	0.01	0.01
Big FiveC	β_{PC}	-0.04***	-0.05***	-0.02**	-0.02***
	Std. Err.	0.01	0.01	0.01	0.01
BigFiveE	β_{PE}	-0.01	-0.005	0.01	-0.02***
	Std. Err.	0.01	0.01	0.01	0.01
BigFiveA	β_{PA}	0.09***	0.09***	0.09***	0.06***
	Std. Err.	0.01	0.01	0.01	0.01
BigFiveN	β_{NA}	0.03***	0.02***	0.03***	0.03***
	Std. Err.	0.01	0.01	0.01	0.01
Observations		1893	2028	2107	2106
R-Squared		0.19	0.21	0.12	0.14

***Sig. at 1% level, **Sig. at 5% level, *Sig. at 1% level

We report the estimated sizes of the effects of a standard deviation change in personality traits on our ideological measures in Table 5 below. Since our variable *Income* is logged, the effect size is nonlinear for changes in non-logged income. We report the effect sizes for a one standard deviation change for income at the 25th percentile, 50th percentile, and 75th percentile. The effect size diminishes with increases in relative income, which is reasonable.

Table 5: Estimated Direct Effect on Leftwing Preferences
(Recall *Party* measured on a 1-9 scale, others on a 1-10 scale)

	Ideological Measure in Equation 7			
One Standard Deviation Change in:	Party	Leftist	Econ1	Econ2
Non-Logged Income at 25th percentile	-0.43	-0.41	-0.19	-0.22
Non-Logged Income at 50th percentile	-0.32	-0.31	-0.14	-0.16
Non-Logged Income at 75th percentile	-0.26	-0.25	-0.12	-0.13
BigFiveO	0.36	0.35	0.23	0.12
BigFiveC	-0.23	-0.28	-0.11	-0.12
BigFiveE	-0.04	-0.03	0.04	-0.15
BigFiveA	0.51	0.50	0.52	0.32
BigFiveN	0.18	0.14	0.20	0.23

In keeping with previous research, we find that *Income* has a significant and negative relationship with all four of our ideological measures, although the effect is twice as high for our overall ideological measures than for our economic policy measures. We also find, as in previous research, that increases in Openness (higher values of *BigFiveO*) and Agreeableness (higher values of *BigFiveA*), decreases in Conscientiousness (lower values of *BigFiveC*) and Emotional Stability (higher values of *BigFiveN*), have the direct effect of leading to higher levels of leftwing preferences across our ideological measures. In contrast to previous research, we find that Extraversion (*BigFiveE*) has no apparent direct effect on our ideology measures with the exception of *Econ2*, where we find the expected negative relationship.[37] Notably, the size of the effect on ideology of a standard deviation change is greatest for Agreeableness and also relatively large for Emotional Stability, the two personality traits on which we find the greatest differences between women and men in the previous section.

[37] Gerber et al. (2010) similarly find that Extraversion has no significant effect on their ideology measures.

Indirect Effects of *Female* on Ideology Independent of Income

Our main contribution is our investigation of the indirect effects of *Female* on ideology through personality traits, which are provided in Tables 6a and b below. Table 6a presents the results for our general ideological measures *Party* and *Leftist* and Table 6b presents the results for economic policy measures *Econ1* and *Econ2*. As noted in the previous Section, we use bootstrap standard errors (with 5,000 bootstrap-samples for each estimation) and corrected for bias in computing the reported 95% confidence intervals of the indirect effects.[38] As Efron and Tibshirani (1993) explain, standard percentile confidence intervals tend to be too narrow. Thus we use the bias corrected bounds which take into account the asymmetries in the distributions of the bootstrap estimates.

Table 6a: Indirect Effects of *Female* on General Ideology Independent of *Income*
(Controls Included, Bias Corrected Confidence Intervals)

Indirect Effects of *Female* via Personality Traits on *Party* Independent of *Income*					
Trait	$\beta_{xF}\beta_{Px}$	Bias	Bootstrap Std. Err.	95% Conf. Interval	
BigFiveO	0.0372**	0.0031	0.0173	0.0057	0.0718
BigFiveC	-0.0098	-0.0002	0.0108	-0.0349	0.0088
BigFiveE	0.0031	-0.0008	0.0054	-0.0025	0.0244
BigFiveA	0.2409**	-0.0032	0.0340	0.1823	0.3159
BigFiveN	0.0912**	0.0030	0.0361	0.0193	0.1577
Total Effect	0.3626**	0.0028	0.0535	0.2568	0.4669
Indirect Effects of *Female* via Personality Traits on *Leftist* Independent of *Income*					
BigFiveO	0.0353**	0.0011	0.0160	0.0070	0.0694
BigFiveC	-0.0125	-0.0004	0.0127	-0.0389	0.0116
BigFiveE	0.0015	2.88e-08	0.0040	-0.0027	0.0156
BigFiveA	0.2370**	-0.0013	0.0306	0.1821	0.3025
BigFiveN	0.0688**	0.0013	0.0284	0.0148	0.1269
Total Effect	0.3301**	0.0010	0.0465	0.2408	0.4236

**Sig. at 5% level established through Confidence Interval Estimation

[38] Given the nonnormal distribution of the test statistic, we do not report other levels of significance.

Table 6b: Indirect Effects of *Female* on Economic Ideology Independent of *Income*
(Controls Included, Bias Corrected Confidence Intervals, *EduVoc* Omitted)

Indirect Effects of *Female* via Personality Traits on *Econ1* Independent of *Income*					
Traits	$\beta_{xF}\beta_{Px}$	Bias	Bootstrap Std. Err.	95% Conf. Interval	
BigFiveO	0.0192	0.0023	0.0116	-0.0006	0.0429
BigFiveC	-0.0051	-0.0008	0.0062	-0.0208	0.0040
BigFiveE	-0.0032	-0.0001	0.0052	-0.0190	0.0037
BigFiveA	0.2504**	0.0002	0.0315	0.1931	0.3155
BigFiveN	0.0949**	-0.0041	0.0304	0.0430	0.1651
Total Effect	0.3562**	-0.0023	0.0463	0.2697	0.4523
Indirect Effects of *Female* via Personality Traits on *Econ2* Independent of *Income*					
BigFiveO	0.0099**	-0.00001	0.0067	0.0008	0.0288
BigFiveC	-0.0057	-7.90e-06	0.0059	-0.0210	0.0032
BigFiveE	0.0005	4.30e-06	0.0007	-0.0003	0.0030
BigFiveA	0.1546**	-0.0004	0.0240	0.1090	0.2035
BigFiveN	0.1142**	0.0002	0.0272	0.0649	0.1712
Total Effect	0.2845**	0.00004	0.0400	0.2075	0.3663

**Sig. at 5% level established through Confidence Interval Estimation

As expected, we find significant positive indirect effects through increased Agreeableness and decreased Emotional Stability of *Female* on all four of our ideological measures, independent of income. That is, we find robust evidence that women's increased tendency to be Agreeable and decreased tendency to be Emotionally Stable, leads to women being more leftist than men. The indirect effect through Agreeableness is the largest, leading to a 0.15-0.24 point difference in ideological preferences that is explained by gender, while the indirect effect through Emotional Stability leads to a 0.07-0.11 point difference in ideological preferences.

Other results we find are unexpected. We find that *Female* has a positive significant indirect effect independent of income through increased Openness in three of our four ideological measures (*Econ1* is the exception). We also find no significant indirect effects independent of income through increased Conscientiousness or Extraversion. As these indirect effects were expected to be negative, lead women to be less leftist than men, then it is not surprising that we find that the total indirect effect independent of *Income* for all personality traits (as reported in the rows marked Total Effect) is significantly positive. Hence, we can conclude that personality trait differences between men and women indirectly lead women to be significantly more leftist by

men independent of income changes. The total indirect effect point difference independent of income ranges between 0.28 and 0.36. We now turn to measuring the indirect effects of female via personality trait differences through income changes in the next subsection.

Indirect Effects of *Female* on Ideology Through Income

We now turn to our estimates of the indirect effects of *Female* through personality trait differences' effects on *Income* and directly through *Income.* We first report our estimations of each version of Equation 6 for each ideological measure in Table 7 below. Columns 3 presents the results of the estimation of Equation 6 when the dependent variable in Equation 7 is *Party*, column 4 presents the results when the dependent variable in Equation 7 is *Leftist*, etc. First, we find significant evidence of direct effects of *Female* on *Income* independent of effects through personality trait differences.[39] Second, we find strong evidence that individuals who are more Agreeable and less Emotionally Stable earn significantly less income, as predicted. We also find significant evidence that individuals who are more Conscientious earn more income in estimations with three of our four ideological measures (*BigFiveC* is significant at the 10% level in the estimation combined with *Party*), which is also expected. As in the previous analysis, we estimate the sizes of these effects which are also reported in Table 7. We find that a standard deviation change in each personality trait has a small effect on income, either increasing or decreasing income by only a few percentage points. In comparison, independent of personality trait differences and controlling for other demographic variables, women in our sample earn on average 20% less than men.

[39] In unreported regressions we found that a difference between the earnings of married and unmarried women. Married women generally earned 29% less than married and unmarried men, while unmarried women generally earned 8% less than men.

Table 7: Determinants of Income (Equation 6)
(By Ideological Measure in SUR Estimation, Controls Included)

Indep. Variables		Ideological Measure in Equation 7			
		Party	*Leftist*	*Econ1*	*Econ2*
BigFiveO	β_{IO}	-0.003	-0.003	-0.003	-0.003
	Std. Err.	0.002	0.002	0.002	0.002
	Effect Size^{+}	-0.02	-0.02	-0.02	-0.02
Big FiveC	β_{IC}	0.004*	0.004**	0.005**	0.005**
	Std. Err.	0.002	0.002	0.002	0.002
	Effect Size^{+}	0.02	0.02	0.03	0.03
BigFiveE	β_{IE}	0.002	0.002	0.002	0.002
	Std. Err.	0.002	0.002	0.002	0.002
	Effect Size^{+}	0.01	0.01	0.01	0.02
BigFiveA	β_{IA}	-0.005**	-0.005***	-0.005**	-0.005***
	Std. Err.	0.002	0.002	0.002	0.002
	Effect Size^{+}	-0.03	-0.03	-0.03	-0.03
BigFiveN	β_{IN}	-0.006***	-0.006***	-0.006***	-0.006***
	Std. Err.	0.002	0.002	0.002	0.002
	Effect Size^{+}	-0.04	-0.04	-0.04	-0.04
Female	β_{IF}	-0.209***	-0.202***	-0.199***	-0.199***
	Std. Err.	0.024	0.023	0.022	0.023
	Effect Size^{+}	-0.20	-0.19	-0.19	-0.19
Controls Included		yes	yes	yes	yes
Observations		1893	2028	2107	2106
R-Squared		0.61	0.61	0.61	0.61

***Sig. at 1% level, **Sig. at 5% level, *Sig. at 1% level
$^{+}$Percentage change in *Income* from a standard deviation change in personality trait or from being *Female*

From our estimations in Tables 3, 5, and 7, we calculate the indirect effects of *Female* on ideology through *Income* both through the indirect effect of *Female* via *Income* independent of personality trait differences and indirectly through personality trait differences' effects on *Income*, which are reported in Tables 8a,b below. The organization of these tables is similar to Tables 6a,b, with Table 8a reporting the indirect effects through *Income* on our general measures of ideology, *Party* and *Leftist* and Table 8b reporting the indirect effects through *Income* on our economic policy measures, *Econ1* and *Econ2*.

Table 8a: Indirect Effects of *Female* on General Ideology Through *Income*
(Controls Included, Bias Corrected Confidence Intervals)

Indirect Effects of *Female* on *Party* Through *Income*						
		Obs. Coeff.	Bias	Bt. Std. Err.	95% Conf.	Interval
Indep. of Traits ($\beta_{IF}\beta_{IP}$)		0.1081**	0.0023	0.0284	0.0560	0.1676
Via Traits	*BigFiveO*	0.0009	-7.60e-06	0.0009	-0.0003	0.0034
($\beta_{xF}\beta_{IX}\beta_{IP}$)	*BigFiveC*	-0.0005	-6.86e-06	0.0007	-0.0031	0.0003
	BigFiveE	0.0005	4.30e-06	0.0007	-0.0003	0.0030
	BigFiveA	0.0066	0.0005	0.0042	-0.0010	0.0156
	BigFiveN	0.0107**	0.0001	0.0048	0.0031	0.0224
	Total	0.0182**	0.0007	0.0071	0.0058	0.0333
Indirect Effects of *Female* on *Leftist* Through *Income*						
Indep. of Traits ($\beta_{IF}\beta_{IP}$)		0.1034**	0.0005	0.0236	0.0608	0.1540
Via Traits	*BigFiveO*	0.0009	-0.0001	0.0008	-0.00004	0.0033
($\beta_{xF}\beta_{IX}\beta_{IP}$)	*BigFiveC*	-0.0006	-2.26e-06	0.0007	-0.0030	0.0003
	BigFiveE	0.0003	0.00001	0.0006	-0.0002	0.0023
	BigFiveA	0.0069**	0.0001	0.0038	0.0003	0.0155
	BigFiveN	0.0104**	-0.0002	0.0041	0.0039	0.0207
	Total	0.0180**	-0.0001	0.0061	0.0074	0.0318

**Sig. at 5% level established through Confidence Interval Estimation

Table 8b: Indirect Effects of *Female* on Economic Ideology Through *Income*
(Controls Included, Bias Corrected Confidence Intervals)

Indirect Effects of *Female* on *Econ1* Through *Income*						
		Obs. Coeff.	Bias	Bt. Std. Err.	95% Conf.	Interval
Indep. of Traits ($\beta_{IF}\beta_{IP}$)		0.0474**	0.0018	0.0227	0.0033	0.0922
Via Traits	*BigFiveO*	0.0003	-8.95e-06	0.0003	-0.00002	0.0016
($\beta_{xF}\beta_{IX}\beta_{IP}$)	*BigFiveC*	-0.0003	-0.00002	0.0004	-0.0018	0.0001
	BigFiveE	0.0003	-7.24e-06	0.0003	-0.00004	0.0019
	BigFiveA	0.0031	0.0001	0.0022	-4.23e-06	0.0090
	BigFiveN	0.0049**	0.0001	0.0030	0.0008	0.1333
	Total	0.0083**	0.0002	0.0045	0.0012	0.0190
Indirect Effects of *Female* on *Econ2* Through *Income*						
Indep. of Traits ($\beta_{IF}\beta_{IP}$)		0.0543**	0.0004	0.0190	0.0181	0.0927
Via Traits	*BigFiveO*	0.0004	-7.18e-06	0.0004	-1.69e-07	0.0017
($\beta_{xF}\beta_{IX}\beta_{IP}$)	*BigFiveC*	-0.0003	-9.85e-06	0.0004	-0.0019	0.0001
	BigFiveE	0.0003	-0.00001	0.0004	-0.0001	0.0017
	BigFiveA	0.0038**	-0.0001	0.0022	0.0005	0.0097
	BigFiveN	0.0056**	0.0001	0.0032	0.0013	0.0144
	Total	0.0098**	0.0001	0.0046	0.0025	0.0209

**Sig. at 5% level established through Confidence Interval Estimation

Our results of the indirect effects of *Female* through *Income* on our ideology measures show support for both the personality trait and structural explanations of the gender gap. First, we find a significant positive indirect effect of *Female* on ideology via reduced *Income* independent

of personality trait differences across all four of our ideology measures. Thus, we find support for the structural explanation of the gender gap via income differences; women make less income and thus they are more likely to express leftist preferences. However, the size of the effect is small, women's reduced income results in an approximately a 0.1 point difference in the general ideological measures of *Party* and *Leftist* and an approximately 0.05 point difference in the economic ideological measures of *Econ1* and *Econ2*.[40]

Second, as expected, we find the indirect effect of *Female* on ideology via the effect of decreased Emotional Stability on *Income* is also significantly positive across all four measures of ideology. Thus, the effect of differences in Emotional Stability between men and women on income differences between the sexes leads to women having more leftist preferences than men. We also find for two of our measures of ideology (*Leftist* and *Econ2*) a significant positive indirect effect via the effect of increased Agreeableness, providing weak evidence that the effect of differences in Agreeableness between men and women on income differences between the sexes also leads to women having more leftist preferences. Yet, these indirect effects through *Income* changes are even smaller than the indirect effects independent of personality traits, ranging from an approximately 0.02 point difference in the general ideological measures and an approximately 0.01 point difference in the economic ideological measures. Furthermore, contrary to predictions, we find no significant indirect effects via *Income* for Conscientiousness, which is not surprising given that we find no significant differences between men and women in Conscientiousness in our sample.

Structural Changes versus Personality Differences

Our analysis has found significant support for both the personality trait and structural explanations of the gender gap in ideology. That is, we find support for indirect effects of *Female*

[40] We also estimated whether there is a difference in the effect of gender on ideology via *Income* between women based on marital status. In unreported analyses available from the authors, we find that the indirect effect of gender on ideology via *Income* was positive and significant for married women, but insignificant for unmarried women. This is largely explained by the fact that married women earned significantly less than unmarried women in our data.

on ideology through income differences independent of personality trait differences which supports the structural explanation and we find support for indirect effects of *Female* on ideology via personality traits directly and via personality traits' effects on income, which supports the personality trait explanation. Which of these effects (and explanations) are larger in explaining the gender gap?

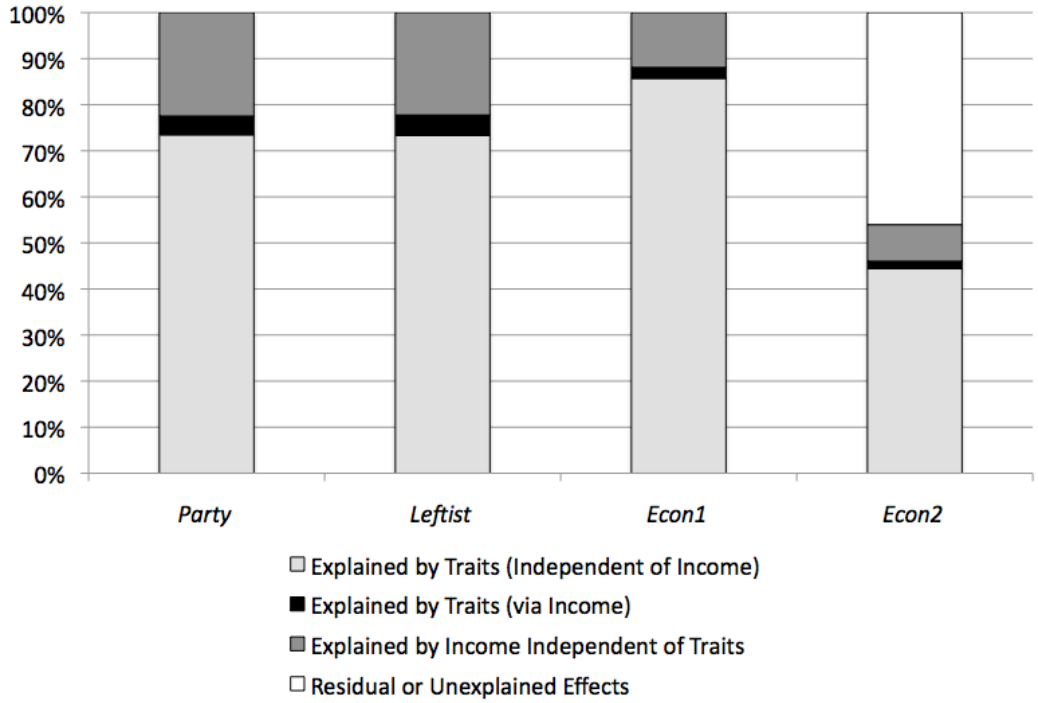
Table 9 and Figure 1 decompose the ideological gender gap according to whether it is explained by personality traits or is unexplained by personality traits by ideological measure.[41] As noted above, only for our ideological measure *Econ2* do we find a significant direct effect of *Female* on ideology independent of either personality trait differences or income differences. Furthermore, as the figure shows, the indirect effects via personality trait differences (adding together the effects via *Income* and independent of *Income*) are much larger and a more sizeable explanation of the gender gap than the indirect effects via *Income* independent of personality trait differences. For our general measures of ideology, *Party* and *Leftist*, the indirect effects via personality trait differences comprise approximately 78% of the gender gap. Hence, we find strong evidence that personality trait differences are a larger factor in explaining the general gender gap in ideology than structural or others influences independent of income differences.

Table 9: Decomposition of Ideological Gender Gap
(Estimated Significant Effects)

		Ideological Measure			
		Party	*Leftist*	*Econ1*	*Econ2*
Explained by Traits	Indep. of Income	0.36	0.33	0.36	0.28
	Via Income	0.02	0.02	0.01	0.01
	Total	0.38	0.35	0.37	0.29
Unexplained by Traits	Indep. of Income	0	0	0	0.29
	Via Income	0.11	0.10	0.05	0.05
	Total	0.11	0.10	0.05	0.34
Total Ideological Gender Gap		0.49	0.45	0.42	0.63
Percent Explained by Traits		0.78	0.78	0.88	0.46

[41] Since the direct effects of *Female* on *Party*, *Leftist*, and *Econ1* were insignificant, they are given a 0 value.

Figure 1: Decomposition of the Ideological Gender Gap



We find somewhat mixed results for our economic policy measures. For *Econ1*, the gap that can be explained by personality trait differences comprise over 88% of the ideological gender gap. Recall that this measure of preferences is particularly relevant to structural explanations of the gap in that it asks individuals their views of government as a "safety net." That is, the structural explanations argue that due to divorce and unmarried parenthood, women are more likely to prefer interventionist policies. While we find indeed that women are more leftist on such policies, we find that the vast majority of the difference between the sexes can be explained by differences in personality traits.

In contrast, for *Econ2* personality trait differences explain only about 46% of the gender gap for *Econ2*. Our slightly different results from the ideological measure *Econ2* are intriguing. Recall that this measure asks subjects their opinions on competition and whether it is "good" or not. As noted earlier, other research has found that women appear to have a distaste for competition, see Niederle and Vesterlund (2007). The residual effect of *Female* on *Econ2* may reflect differences in tastes for competition that are not picked up in our personality trait or

other measures.

In summary, we find strong evidence across ideological measures that personality trait differences are a large factor in explaining the gender gap. And with the exception of *Econ2*, we find strong evidence across ideological measures that personality trait differences are a larger factor in explaining the gender gap in ideology than structural or others influences independent of income differences.

Discussion: Are Male Preference Changes the Source of the Gender Gap?

We have found that differences in personality traits explain a large portion of the ideological gender gap. Women in our sample are more open to experience, more agreeable, and less emotionally stable than men. Individuals with these trait differences tend to be more leftist, largely through a direct effect on ideology but also indirectly through the negative effects these traits have on income. We found indeed evidence which suggests that women are more leftist because of these trait differences.

We also discovered that independent of personality trait differences, women earn less income which makes them more leftist as well. Thus gender has an indirect effect on ideology via income differences holding personality traits constant. This evidence provides some support for alternative structural explanations of the ideological gender gap. Nevertheless, the effects through personality trait differences are in most of our analysis larger than the effects independent of personality trait differences, outweighing non-personality trait effects.

As discussed above, evidence suggests that personality trait differences between men and women are larger in more developed societies. Recall that in particular men's personality traits are different, while personality traits of women are largely similar across degrees of development. Schmitt et al. (2008, 2009) found that among other things, men were less agreeable and more emotionally stable in developed societies. Hence the finding that such differences might explain the gender gap in ideology is not inconsistent with the fact that the gender gap has newly

emerged and has become more pronounced in westernized societies over time.

Moreover, given these variations across countries which are related to institutional and economic development, then the personality trait differences explanation of the gender gap is also structural since personality trait differences appear to be affected by economic institutional changes taking place in westernized societies. Yet, the mechanism by which institutional structure affects ideological preferences is distinctive from the standard structural explanations in which women are more leftist directly because of increased divorce risk and the possible increased negative consequences for women with less viable outside options. That is, changes in institutions affect personality trait development of men, which results in men having more rightist preferences than women, rather than women choosing more leftist positions in response to the changes in institutions governing marriage.

Our results therefore suggest that the focus on how institutional changes have affected women and, as a result, their ideological preferences, should be reconsidered. Attention should also be paid to the sources of the changes in male personality traits that have occurred with institutional change and economic development and how these changes in traits have led to greater gender differences in ideological preferences in westernized societies.

Appendix: Data Summary & Comparison to Danish Population

In Table A1 we present a summary of the variables used in the analysis. Note that since all subjects did not answer all of the ideology questions, we have different numbers of observations for each ideology question estimation. Thus, we present the means and standard deviations for the variables used in each estimation separately, by ideological question. As the data shows, there is little variation across estimations in these variables.

Table A1: Variables Used in Analysis

	Party **Question**		*Leftist* **Question**		*Econ1* **Question**		*Econ2* **Question**	
Variable	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**
Age	47.04	13.98	47.25	13.91	47.05	13.89	47.07	13.89
Female	0.48	0.50	0.48	0.50	0.49	0.50	0.49	0.50
Urban	0.13	0.33	0.13	0.33	0.13	0.33	0.13	0.33
Church	0.86	0.35	0.86	0.35	0.86	0.35	0.86	0.35
Married	0.63	0.48	0.63	0.48	0.63	0.48	0.63	0.48
Couple	0.11	0.32	0.12	0.32	0.12	0.32	0.12	0.32
Divorced	0.08	0.28	0.08	0.27	0.08	0.28	0.08	0.28
EduBasic	0.12	0.32	0.11	0.32	0.11	0.32	0.11	0.32
EduHS	0.06	0.23	0.06	0.23	0.06	0.23	0.05	0.23
EduAdv1	0.07	0.25	0.07	0.25	0.07	0.25	0.07	0.25
EduAdv2	0.27	0.44	0.27	0.45	0.27	0.44	0.27	0.44
EduAdv3	0.15	0.35	0.15	0.35	0.14	0.35	0.14	0.35
Student	0.13	0.34	0.13	0.33	0.13	0.34	0.13	0.34
Parttime	0.12	0.32	0.12	0.32	0.12	0.32	0.12	0.32
Retired	0.13	0.33	0.13	0.33	0.13	0.33	0.13	0.33
Unemployed	0.09	0.28	0.08	0.28	0.08	0.28	0.08	0.28
Income	12.47	0.76	12.48	0.75	12.47	0.75	12.47	0.75
BigFiveA	32.40	5.56	32.41	5.54	32.43	5.53	32.43	5.52
BigFiveC	33.00	5.63	33.01	5.57	33.00	5.56	33.00	5.56
BigFiveE	30.61	6.36	30.53	6.35	30.52	6.34	30.51	6.35
BigFiveN	19.01	7.04	19.00	7.01	19.07	7.02	19.07	7.03
BigFiveO	27.24	6.16	27.28	6.12	27.17	6.14	27.16	6.14
IQ	8.85	2.88	8.86	2.88	8.86	2.89	8.86	2.89
Party	5.06	2.57						
Leftist			5.59	2.21				
Econ1					5.17	2.26		
Econ2							4.08	1.98
Observations	1893		2028		2107		2106	

Table A2 below compares our subjects to the Danish population 18 years old and older. Again, we present separate comparisons for the set of subjects who answered each of the four ideological questions. Note that the Danish census numbers are measured for those who have completed a given educational level and thus we report from our survey the comparison numbers, which are slightly different from those used in the analysis which classifies individuals in an educational category if they have completing or are in the process of completing a particular level. Unfortunately we do not have comparison numbers from the Danish population for our personality trait measures and *IQ*. In fact, the Danish Psychological Publishing Company

agreed partly to allow us to use their measures in order to provide them with better population estimates of these traits.

Table A2: Comparison to Danish Population

	Danish	Ideological Measure			
Characteristic	**Population**	*Party*	*Leftist*	*Econ1*	*Econ2*
Gender*					
Women	50.2%	48.0%	47.6%	48.8%	48.8%
Age*					
18-30	20.2%	14.3%	13.5%	13.3%	13.9%
31-40	19.0%	17.3%	16.8%	16.8%	17.5%
41-50	19.6%	26.9%	25.5%	25.5%	27.5%
51-60	17.8%	23.2%	23.6%	23.6%	23.2%
61-70	15.0%	14.1%	15.0%	15.1%	13.8%
71-80	8.4%	4.1%	5.7%	5.7%	4.1%
Education**					
Basic (up to 10 years)	26.3%	11.8%	11.4%	11.3%	11.4%
High School (up to 12 years)	6.4%	5.7%	5.7%	5.5%	5.5%
Vocational (up to 12 years)	39.1%	34.2%	34.0%	34.9%	34.9%
Short Tertiary (less than 3 years)	5.4%	6.7%	7.0%	6.8%	7.0%
Medium Tertiary (between 3 & 4 years)	15.7%	27.0%	27.3%	27.0%	26.8%
Long Tertiary (more than 4 years)	7.2%	14.5%	14.7%	14.5%	14.4%
Income (DKK per year)					
less than 100,000	13.7%	8.8%	8.7%	8.7%	8.8%
100,000-199,999	26.2%	16.7%	16.4%	16.8%	16.7%
200,000-299,999	23.2%	24.9%	25.1%	25.5%	25.4%
300,000-399,999	20.0%	26.2%	26.3%	26.3%	26.4%
more than 400,000	16.9%	23.3%	23.5%	22.7%	22.7%
Church Membership***					
Member of the state church	82.7%	85.8%	85.7%	86.0%	86.0%

*Gender and Age is based on individuals aged 18-80.
**Education is based on individuals aged 18-69. The education variables for the survey include ongoing education, but these figures are for completed education only.
***Church members is based on individuals aged 20-79.

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