



Department of Economics

Identification and Estimation of Latent Variables and their Effect on Social and Economic Outcomes

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Thesis submitted for assessment with a view to obtaining the degree of
Doctor of Economics of the European University Institute

Florence, June 2010

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Acknowledgements

I would like to thank my supervisor Richard Spady very much. Richard has been a great supervisor in many senses. He has taught me econometrics and motivated me to use item response models to find answers to my research questions. Just as importantly, he has encouraged me to seek new challenges, and showed me that independence and autonomy are essential for good research. I am also grateful to my second supervisor, Luigi Guiso, for valuable input and discussions and for teaching me to both question and to defend my work.

I am especially grateful to Markus Poschke. Without him this thesis would not have been possible. He has always been supportive, encouraging and stimulating, knowing how to keep me going, helping me to solve technical problems, address conceptual issues, always giving me useful advice and the emotional support that I so much needed. It also helped a lot to share the heights and the more stressful moments of writing this thesis with Carolina Villegas. Together we had fun, discovered new topics and new interests and had enjoyable discussions in long coffee breaks and long evenings. Her contagious passion for development had an important influence on my research. Konrad Smolinsky has also helped me a lot to understand and to appreciate the technical aspects of my work. He has been an excellent friend, always ready to give me a hand. I am also very grateful to Lluís Sauri, for his unquestioning support in a world where I felt questioned too often, for encouraging me to get involved in the adventure of the PhD five years ago, and for making me dream about the future and look at my problems with a strong sense of humor.

And also to my family for their understanding, especially when my thesis has been my priority, and for their continued support and encouragement, through the good times and the hard times.

Mayssun El-Attar

Florence, July 2009

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Introduction

Recently, there has been strong interest among economists in the impact of social and cultural factors on economic outcomes. For instance, concepts like culture, social capital or social attitudes have been used to explain several individual and group outcomes such as labor supply, health, financial development or economic growth. In this spirit, in this thesis, I explore differences in individuals' attitudes, their determinants, and their potential to explain individual behavior.

The following are some of the findings. Personal and demographic characteristics, especially education, influence attitudes towards the peace process in the Palestinian-Israeli conflict (Chapter 1). Trust influences the type of child care that mothers use, and this has an effect on female labor supply. Since trust differs across European countries, it may explain differences in female labor supply (Chapter 2). Trust also influences individuals' investment decisions; individuals with less trust tend to invest more in housing and less in financial assets (Chapter 3). Trust and attitudes towards reciprocity affect individuals' civic engagement differently. People with more trust participate more through existing formal institutions. People with high levels of reciprocity also tend to participate more, but if their levels of trust are not so high, they may choose a more informal (less traditional) way of doing it (Chapter 4).

Good measurement of the latent variables (like trust or attitudes towards reconciliation and concessions) is crucial for understanding the effects of individual unobservable traits such as attitudes on observable outcomes, or the effects of observable personal and demographic characteristics on the formation of those attitudes. It also helps overcome the critique sometimes directed at the applied behavioral economics literature that some researchers make claims that go beyond what the statistical results justify. Therefore, one of the goals of this thesis is to use a rigorous measure of these latent variables. To achieve this, I estimate attitudes and the effects of

the individuals' latent traits on specific outcomes using a hierarchical item response model.

Item response theory models

Item response theory (IRT) models have been widely used in psychometrics to measure latent traits like ability, trust or other attitudes using test results or survey outcomes. They allow to obtain quantitative measures of these concepts using all the available information, permit the measurement of several dimensions of the latent attribute, and do not require imposing excessive parametric assumptions. Confirmatory factor analysis has been used for the same purposes as IRT models. The main advantage of IRT models compared to factor analysis is that they deal with discrete outcomes in a more straightforward way. As many answers to survey questions are discrete, IRT models are particularly useful in this context. When using such information, IRT models are thus a very useful tool for economists.

Since the measurement of latent attributes is central to the thesis, it is worth to briefly outline the main assumptions commonly used in the IRT literature.

Unidimensionality. An important assumption in IRT is that the questions used (called “items”) should measure only one latent variable (ability, personality trait or attitude). Only if this assumption is fulfilled is it possible to use the item responses to make statements about the trait level of each person.

Local Independence. This assumption implies that the responses to the items are stochastically independent of each other given the individual's latent trait. This implies that the correlation between two items can only be attributed to the latent trait.

Monotonicity. The probability of a certain item response is a monotonic function of an individual's latent trait. This implies that individuals with higher levels of the latent trait are more likely to choose higher answers (or lower answers, depending on the coding of the questions).

Another important assumption has to do with the relation between the individual's latent trait and the item response probabilities. This relation is expressed by means of the item response function (IRF). The probability of giving an answer of r or smaller to a specific item R as a function of the latent trait a is $Pr(R \leq r|A = a) = G_r(a)$, where $G_r(a)$ is the IRF associated to answer r . The

choice of $G_r(a)$ differs among different types of item response models. In this thesis, these functions are modeled as in Spady (2007, *Semiparametric methods for the measurement of latent attitudes and the estimation of their behavioural consequences*), using the distribution function corresponding to an exponential tilting of second degree of the uniform density. Although parametric assumptions are needed for identification, this approach is much more flexible than traditional ones that use functions such as the logistic function or the normal *cdf*. Another advantage of the approach is that it allows exploiting information about the distribution of the latent variable from personal and demographic characteristics.

The resulting measure of the latent trait (trust, reciprocity or attitudes towards concessions or reconciliation) takes into account several dimensions of the latent concept, exploits personal information that may be informative and is conceptually cleaner than the distant proxies or demographic characteristics often used in previous work.

Overview of the thesis

The first paper explores the formation of Palestinians' attitudes towards a peace process with a particular focus on the role of education. Understanding the factors that shape attitudes towards peace is important in order to be successful in negotiations or in implementing a peace agreement. In particular, there is disagreement about the role of education. While some authors have linked violent and extreme positions to ignorance and to low market opportunities, others have found that education is positively correlated with being a member of a terrorist group. To better understand the role of education I propose to decompose the attitudes towards peace into two dimensions; attitudes towards reconciliation and attitudes towards concessions. This multidimensional construct provides new meaningful insights about the role of education in the two dimensions.

The results of the paper indicate that education is positively related to attitudes towards concessions but negatively to attitudes towards reconciliation. This negative relationship has been strengthening over the years in the sample (2001-2006). What possibly drives the negative effect of education on attitudes towards reconciliation is a higher level of frustration for more educated individuals due to low labor market opportunities. This is consistent with the result that attitudes towards reconciliation of individuals with high education closely follow the evolution of the overall economic

situation, while specific regional factors (construction of the Wall) influence attitudes towards reconciliation for individuals with low education only.

The evidence presented in the second chapter suggests that trust matters for mothers' choice of child care technology. In extension, it may also affect their decision to participate in the labor market. Labor force participation differs significantly across countries, particularly for women. There is a large literature trying to understand which factors drive labor force participation of prime-age women, and what can explain differences across countries. Recent papers have considered the possibility of heterogeneity in preferences, introducing elements like culture, beliefs, or the degree of religiosity in explaining women's participation and fertility decisions. Since I show that there are large differences in trust across countries, trust is a candidate explanation for differences in the use of formal child care and in female participation rates across countries. This chapter provides empirical evidence for this hypothesis using data for married women with children younger than 12 from 26 European countries.

In chapter 3 I test the hypothesis that trust influences households' investment in housing, using data for Spain. For most households, real estate is the main portfolio component, while only a small percentage of households own a significant amount of risky assets. This pattern is particularly pronounced in Spain. Trust has already been shown to matter for households' portfolio choice by affecting expected returns from risky investments. Less trustful individuals expect lower returns and hold less risky assets. Such a mechanism could affect housing as an important portfolio component. Using data from the European Social Survey (ESS) and from the Survey of Household Finances (EFF) conducted by the Bank of Spain, I show that households with less trust invest less in financial assets and more in housing. Trust also affects the share of wealth invested in risky assets positively.

In the last chapter, I study the effect of an individual's level of social capital on different measures of individual civic engagement, classified by their degree of formality. There is a public debate about the participation of individuals in the development of civil society. While participation in some traditional associations (like political parties) has declined in many European countries, affinity and commitment to new social movements remains fairly constant. Although the idea that social capital enhances civic and political participation is commonly spread, there

is not much robust evidence on the relationship between the components of social capital (such as trust or reciprocity) and individuals' democratic attitudes and civic participation. In this paper I use agents' attitudes towards trust, and norms and values of reciprocity as a measure of social capital. The analysis is performed using data for Germany, which constitutes a good unit of analysis because of its differences in the past political experiences, that have given rise to differences in the composition of social capital. I find that although both components of social capital are associated with civic engagement, their importance differs depending on how it is exercised. Individuals with more trust in others and in institutions choose more institutional ways of participating. People with high levels of reciprocity will also tend to participate more but if their levels of trust are low, they may choose a more informal (less traditional) way of doing so.

CHAPTER 1

Could education promote the Israeli-Palestinian peace process?

ABSTRACT. This paper explores Palestinians' attitudes towards a peace process and their determinants, with a particular focus on the role of education. Understanding the factors that shape attitudes towards peace is important in order to be successful in negotiations or in implementing a peace agreement. In the literature, there is particular disagreement about the role of education. While some authors have linked violent and extreme positions to ignorance and to low market opportunities, others have found that education is positively correlated with being a member of a terrorist group. To better understand the role of education I decompose the attitudes towards peace into two dimensions; attitudes towards reconciliation and attitudes towards concessions. To measure these attitudes, I use a flexible item response model proposed by Spady (2007), which allows to take into account the multidimensionality of the concepts. The results show that education has a positive effect on attitudes towards concessions but a negative effect on attitudes towards reconciliation. This may occur because relative to a situation of peace, highly educated individuals are more strongly affected by current depressed economic conditions in Palestine. They therefore have more to gain from a peace agreement and may thus be more willing to make concessions. At the same time, they may be more frustrated and therefore less willing to reconcile. I also find that their attitudes to reconciliation move closely with aggregate economic conditions, while those of less educated individual are also influenced by local factors such as the construction of the separation barrier in their region of residence.

KEYWORDS. conflict resolution, education, latent attitudes, item response models.

JEL CLASSIFICATION. I20, O15, O53.

1.1. Introduction

The Arab-Israeli conflict has been considered one of the most complex and emotion-laden historical problems of the twentieth century. This dispute between the State of Israel and the Palestinians living under Israeli occupation has played a critical role not only in Middle East politics, but also at the world level (see Freedman 1979).

Repeatedly, a two state solution has been proposed, consisting in an independent Palestinian state next to the state of Israel. Several efforts at negotiating such a solution have taken place and failed. According to many polls, large majorities of Israelis and Palestinians would also favor a two state solution.¹ Despite this basic agreement, there are significant areas of disagreement about what constitutes an acceptable solution. First, not all Palestinians and Israelis agree on the concessions they are willing to make in order to reach a peace agreement. Second, there is a problem of credibility; even if a peace agreement is reached, reconciliation between the two societies does not seem easy and therefore each side fears that the other might not keep the basic commitments. As a consequence, the conflict has been going on for many years and the level of violence has been increasing.

The goal of this paper is to analyze Palestinians' attitudes towards a peace process, with a particular focus on how these attitudes vary with personal and demographic characteristics. Attitudes matter. As Jaeger, Klor, Miaari and Paserman (2008) write, "These conflicts, [like the Israeli-Palestinian one,] in which a limited number of fatalities are used to affect negotiations, demoralize the civilian population, or strategically incapacitate the opponent, are largely psychological." Within Palestinian society, there are a variety of views and opinions. Understanding the factors that shape the attitudes of individual Palestinians is important because it can help to identify some important elements for a successful peace process. Recently, there have been some attempts to study the Israeli-Palestinian conflict from this point of view; e.g. Nachtwey and Tessler (2002), Jasso and Meyersson (2004), Friedman (2005) and Jaeger et al. (2008).

While exploring the determinants of Palestinians' attitudes to the conflict more generally, this paper focusses in particular on the role played by education. Often, violent and extreme positions are attributed to ignorance and to low market opportunities. Berman and Laitin (2005) for instance use a 'club good' model to explain the function of voluntary religious organizations as providers of terrorism, where terrorism is seen as a local public good. A possible interpretation of this model is that

¹See results from surveys conducted by the Palestinian Survey Research for the Palestinians and Harry S. Truman Centre for the Israelis.

poverty breeds terrorism as it lowers the outside options of club members. This link can also be found in the work by Bueno de Mesquita (2005), Bueno de Mesquita and Dickson (2007) and Jaeger et al. (2008). In contrast to this, Abadie (2006), Krueger and Maleckova (2003) and Berrebi (2007) find that suicide attackers and participants in violent groups tend to have higher education and living standards above the poverty line. Similarly, using a unique data set detailing the biographies of Palestinian suicide bombers, Benmelech and Berrebi (2007) estimate the returns to human capital in suicide bombing and find that older and more educated suicide bombers are assigned to more important targets and perform better (more casualties and lower probability of failure).

Because the relation between education and political violence is disputed, it is important to analyze its role for attitudes towards a peace process. In this, it is important to clearly distinguish income from education, and personal or family income from GDP per capita or the overall economic situation. While education may drive expected or potential income, this can be quite different from actual income. Indeed, given the currently very depressed returns to education Palestine (shown in Section 1.2.1), education conditional on current income is more likely a measure of an individual's current economic losses from the conflict. Therefore, education and income should not be expected to have similar effects.

For instance, as argued in Section 1.3, if the earnings of educated individuals are more depressed relative to a situation of peace, then they may be more willing to make concessions to reach a peace agreement. At the same time, they may be more frustrated due to past losses and therefore less willing to reconcile. In contrast, it is not clear how current income conditional on education would evolve with a peace agreement; individuals may well all have similar expectations. Similarly, a change in the overall economic situation may affect attitudes differently from a change of an individual's situation relative to other Palestinians. One important contribution of the paper is to pay careful attention to these issues.

The other main contribution of the paper lies in the measurement of the attitudes. I define attitudes towards a peace process as consisting of two components: attitudes towards 'chances for reconciliation and lasting peace in a scenario of successful negotiations' and attitudes 'on positions expressed and concessions discussed in the negotiations.' I develop a new measure of such attitudes, arguing that opinions of individuals about certain aspects of conflict resolution reflect their attitudes in these dimensions. Applying a new methodology by Spady (2007), I measure attitudes towards reconciliation and towards concessions as latent attitudes at the individual level. The data used is a series of item responses concerning

attitudes towards reconciliation and towards concessions from some of the surveys realized by the Palestinian Center for Policy and Survey Research (PSR). This data is particularly useful because questions are very precise and allow distinguishing between attitudes towards reconciliation and towards concessions. I have information about attitudes towards reconciliation for the period 2001-2006 and about attitudes towards concessions for 2003-2006. Assuming that respondents' answers have been determined by their attitudes in these dimensions, the attitudes of individuals making up the sample population can then be given probability distributions, based on their item responses and personal characteristics. From these probability distributions I can infer the relation between individuals' economic and demographic characteristics and their attitudes.

The measure I propose allows for the multidimensionality of attitudes to peace (involving attitudes both towards reconciliation and towards concessions) and takes into account various facets of each of the dimensions. It thus goes beyond the use of a single, specific question, capturing only a single aspect of a particular dimension, as often seen in the literature (e.g. Jaeger et al. (2008)). This is important because a measure of a broad concept such as attitudes towards a peace process arguably improves if it can span several dimensions. In our analysis we use six items (questions) for the reconciliation scale and six for the concessions scale. Each of the items can be seen as reflecting a different dimension of the concept.

The results of the paper indicate that I) There are theoretical reasons for considering attitudes towards peace as composed of two distinct dimensions; attitudes towards reconciliation and attitudes towards concessions. This multidimensional construct provides new meaningful insights about the role of education. II) Education is positively related to attitudes towards concessions. III) In contrast to the results on concessions, education has a negative effect on attitudes towards reconciliation. This negative effect has been strengthening over the years in the sample (2001-2006). IV) What possibly drives the negative effect of education on attitudes towards reconciliation is a higher level of frustration for more educated individuals due to the low labor market opportunities. V) Attitudes towards reconciliation of individuals with high education closely follow the evolution of the overall economic situation. VI) Specific regional factors (construction of the Wall) influence attitudes towards reconciliation for individuals with low education only.

These findings also show that allowing for attitudes to peace to have more than one dimension is important for understanding the problems faced, as shown in particular by the different effect of education in different dimensions. Willingness to

make concessions is a necessary condition to establish peace in a first stage. Reconciliation is also very important. Several authors (e.g. Kulle and Hamber (2000)) have emphasized that a lack of forgiveness may threaten the peace processes in the long run. Bar-Tal (2000) notices that there is not so much attention to the attitudes towards reconciliation. Reconciliation based on mutual trust and acceptance. In this paper we try to capture these several dimensions, for that, Spady's (2007) estimator has proven very useful.

The rest of the paper is structured as follows. Section 1.2 revises briefly the previous evidence on the relationship between individuals' attitudes and the conflict. Section 1.3 presents a simple theoretical argument for treating attitudes towards peace as a composite of two dimensions. This argument will also guide the estimation. In Section 1.4 I describe the methodology used to obtain the measure of the attitudes. In Section 4.4 I present the data used, and I describe the questionnaire items and the personal and demographic characteristics of the respondents that play a role in the estimation of the latent attitudes. In Section 1.6 I obtain the measure of attitudes towards concessions and towards reconciliation and analyze their determinants and their correlation with economic trends. I also investigate the channel through which the events of the conflict can shape attitudes. Finally, Section 4.7 concludes.

1.2. Previous evidence on the relationship between individuals' attitudes and the conflict

The Israeli-Palestinian conflict has generated a considerable amount of social research. Most of this research implicitly assumes that the conflict shapes individuals' attitudes, and that these attitudes have an effect on individuals' behavior. Eckstein and Tsiddon (2004) for instance argue that in the presence of terrorist activity, individuals value the future less relative to the present. They show that these changes in individuals' preferences influence macroeconomic aggregates. Concretely, they lead to lower investment and lower income and consumption in the long run.

Zussman and Zussman (2006) evaluate the net effect of the Israeli counterterrorism policy on attitudes and on the economy. They argue that assassinating members of Palestinian terrorist organizations can be counterproductive if it increases Palestinians' motivation for future attacks. Their idea is that it is possible to find moral objections to this type of policy, and these moral objections can affect Palestinians' attitudes and therefore increase retaliation. To evaluate the effect of this policy, they exploit the forward-looking and information-aggregating nature of

asset markets. Using reactions of the Israeli stock market to news of counterterrorism operations, they find that assassinations of low-ranked members of Palestinian terrorist organizations are perceived as counterproductive. The opposite is true for assassinations of senior leaders.

Berrebi and Klor (2006, 2007) argue that terror attacks affect Israeli public opinion, which in turn has an effect on election outcomes. To study the relation between Palestinian militant groups and the Israeli political system they present a theoretical model where Palestinians commit terror attacks and Israelis elect governments. The model predicts that support for Israel's right-wing party increases after periods of severe terrorism, and that the expected level of terrorism is higher when a left-wing party is in power. They show empirical evidence that supports these results.

The work of Jaeger and Paserman (2006, 2007) focuses on trying to explain the dynamics of the violence. They find that Israel reacts in a predictable way to Palestinian attacks, while Palestinian actions do not appear to be related to Israeli violence. Their conclusion is that a cessation of Palestine violence against Israel may lead to an overall reduction in the level of violence. This result suggests that it is essential to understand the factors that shape Palestinians' attitudes towards peace and towards the resolution of the conflict.

However, Palestinians' attitudes have not been studied very much. Nachtwey and Tessler (2002) notice that "Only a small portion of this research [on the Palestinian-Israeli conflict] has explored the determinants of popular attitudes towards the conflict, however, the factors that shape Palestinian public opinion have been particularly neglected." They study the degree to which economic expectations change individuals' attitudes towards peace. Recently there have been some other attempts to study the conflict from this point of view. Jasso and Meyersson (2004) study the effects of identity and social distance on support for key provisions of the Roadmap, and Friedman (2005) studies the determinants of Palestinians' attitudes towards diplomacy and attacks. Similar to Nachtwey and Tessler (2002) they find that the economic impact of future peace exerts a positive effect but that individuals' current economic situation plays only a modest role. Jaeger et al. (2008) study how violence in the Second Intifada influences public opinion. They find evidence that Israeli violence against Palestinians temporarily leads to more support for radical factions and to more radical attitudes towards the conflict.

An area where important advances are possible is the measurement of individuals' attitudes. Clearly, concepts like attitudes towards peace, towards reconciliation or towards violence are inherently difficult to measure. Using only one question (e.g. 'what party do you support?' or 'Do you think that lasting peace with Israel

is possible?') is restrictive. It is difficult to believe that these partial measures are sufficient for capturing wider concepts like attitudes towards peace. The approach I use overcomes these limitations by incorporating more than one dimension of the attitudes towards peace, and by measuring each dimension using responses to more than one question.

Contentwise, an important question that this paper tackles concerns the link between attitudes and education. This issue is intimately linked to some important features of the Palestinian labor market.

1.2.1. Labor market and returns to schooling

The Palestinian economy is characterized by a labor market that is completely dependent on the Israeli market, and strongly influenced by political and social events. Palestinian unemployment and domestic wage respond to job opportunities and wages in Israel. Angrist (1995) analyzes the Palestinian labor market over the period 1981-1987 and finds that over that period, the unemployment rate of college graduates increased strongly, while returns to education declined substantially. The college premium fell from was 40% at the beginning of the period to 20% between 1984 and 1987. Angrist (1995) shows that changes in labor supply explain an important part of this development. The number of Palestinian college graduates increased sharply following the opening of Palestinian institutions of higher education, which had been totally absent before 1972.

Sayre (2001a) studies the same period and stresses some demand factors that also explain part of the dramatic changes in returns to schooling. He argues that the reduction of demand for skilled Palestinian workers by the Arab Gulf countries, the increase in demand for unskilled Palestinian workers in Israel and changes in labor demand coming from changes in the volume of international trade can explain part of the changes observed during this period. Using a slightly different empirical approach, Sayre (2001b) finds that while supply changes could still account for most of the decrease in returns to schooling, demand shocks could explain as much as one-third of the change in the returns to a college. For similar reasons, the return to college remained low in the period 1995-2001 (Sayre and Miller 2004). Unemployment and wages in the Palestinian Territories continue to depend on the Israeli economy and are driven by closures, job permits, changes in the demand of low skilled workers, etc.

Angrist (1995) and Sayre (2001a) also link the bad labor market prospects for educated Palestinians from 1981 to 1988 to the uprising of the first Intifada. Sayre and Miller (2004) link the similar situation experienced by the Palestinian economy during 1995-2001 to the uprising of the second Intifada.

Although recently some papers have analyzed the effects of conflict and in particular border closures with Israel on the Palestinian economy and in particular the labor market (see Bulmer (2003), Miaari and Sauer (2006) or Maio and Nando) none of these studies report returns to schooling for the period under analysis in this paper (2001-2006). But economic conditions have worsened since 2000. Despite other factors that may affect the Palestinian economy, the World Bank (2003, 2004, 2005, 2007, 2008) repeatedly reported that the closures and restrictions on movements related to Israeli security concern have harmed the Palestinian economy and increased unemployment and poverty. Figure 1.1 shows rough estimates of the college premium in the Palestinian territories for the period under analysis. This figure shows that the college premium during this period has gone from 16% to 30%. This is much lower than the college premium in the U.S., which is around 60% in this period (Goldin and Katz 2007).

This literature suggests that the depressed opportunities faced by highly educated Palestinians could shape their attitudes towards the peace process. The next section sets out a simple model showing which relationships we could expect.

1.3. Education and willingness to make concessions and to reconcile

Suppose that Palestinians value consumption and derive value from their relationships with Israelis. These valuations govern their attitudes towards making concessions and towards reconciliation. Assume that the peace process has two stages. In a first stage, Palestinians and Israelis have to reach an official settlement or resolution and stop direct violence. Success depends on a negotiation process and on individuals' attitudes towards concessions on both sides. The second stage of the peace process consists in a normalization of the relationship between Palestinians and Israelis. This stage involves reconciliation and psycho/social healing. (these stages are also described in Gawerc (2006)).

Suppose that in the first stage of the conflict, Palestinians have the choice of how many concessions to make. Denote the choice of concessions by $s \in \mathbb{R}_0^+$. Making concessions may lead to a peace agreement with Israel, with the probability p of an agreement increasing in the amount of concessions made. However, the “marginal product” of concessions in increasing the probability of an agreement is decreasing and goes to zero in the limit ($p' > 0$, $p'' < 0$, $0 \leq p(0) < 1$, $\lim_{s \rightarrow \infty} p(s) \leq 1$). As a consequence, there is no finite amount of concessions that leads to an agreement with probability 1.

Individual Palestinians expect income of $w(e)$ after a peace agreement, which increases with the individual's education e . They currently earn \bar{w} . Reflecting

the evidence discussed above, current income and returns to education are both depressed ($\bar{w} < w(e)$, $\bar{w}'(e) = 0$ for all e). For simplicity, current returns to education are set to zero.

Whereas making concessions could raise future incomes, it also has a psychological (and possibly also a real) cost c_i per unit of concessions. This differs across individuals. It may depend on demographics, but also vary in unobserved ways. While in principle, the cost could vary systematically with education, we abstract from this. Individuals then choose their optimal level of concessions by choosing s to maximize the objective function $p(s)w(e) + (1 - p(s))\bar{w} - c_i s$.² The optimal s is the theoretical counterpart to the willingness to concede we measure in the data. The optimal amount of concessions, if interior, then satisfies $p'(s)[w(e) - \bar{w}] = c_i$. Because $p' > 0$, $p'' < 0$, $w' > 0$ and $w(e) > \bar{w}$, the optimal s increases in education and decreases in the cost of concessions. More educated individuals have more to gain from concessions, so they are willing to invest more.

Palestinians also value the quality of the relationships they have with people around them. This includes Israelis, and this allows for an analysis of the willingness to reconcile. Reconciliation requires effort, but has benefits in terms of improving the quality of relationships, and possibly also has economic benefits. Denote these benefits by $R(r; e)$, where r denotes efforts to reconcile. The benefits depend on education because economic benefits of reconciliation are likely to vary with education. Assume that the marginal product of efforts at reconciliation, R' , is positive but decreasing ($R'(\cdot, e) > 0$, $R''(\cdot, e) < 0$ for all e).

Engaging in reconciliation also has a psychological cost, as it may be hard to reconcile with people if past experience with them was bad. This cost increases in the level of frustration experienced due to the conflict. This psychological cost can be seen as hate generated because Palestinians see Israel as responsible for their miseries, roots of hatred in self-defense and vengeance. (Glaeser (2002) study the formation of hate). The experimental literature on reciprocity (see Fehr and Schmidt (2005)) confirms that subjects forgo rewards if that allows them to punish people who have behaved unfairly, particularly by rejecting unequal offers in ultimatum games. Concretely, as stated above, this hate and frustration may be linked to the poor labor market conditions and therefore may vary with individuals' level of education. Model this by assuming that the cost of reconciliation effort $c(e)$ increases in frustration due to the conflict, and that frustration is driven by the difference between potential and actual wages. Then $c(e) = f(w(e) - \bar{w})$, $f' > 0$ and $c'(e) > 0$. Individuals then set their optimal amount of reconciliation to maximize its benefits

²If this was about actions, not attitudes, this would of course be a strategic game, where Israeli actions also matter for payoffs.

net of the psychological cost. This yields the optimality condition $R'(r; e) = c(e)$. Individuals engage in reconciliation up to the point where the marginal benefit equals the marginal cost. More educated individuals prefer a higher level of reconciliation if the benefits from it increase strongly enough with education. If benefits do not rise strongly with education, in contrast, more educated individuals prefer a lower level of reconciliation, as reconciliation is costly for them because of the frustration they have endured due to the depressed labor market conditions.

The link between attitudes towards reconciliation and the general economic losses such as the impact of the conflict on employment opportunities and returns to schooling has been suggested previously. Morrow 2000 argues that forgiveness and reconciliation in the context of ethnopolitical conflict could be considered an issue for society as a whole because personal injuries committed by the parties in conflict are often understood as the grief not only of individuals but of whole communities.

1.4. Measuring individuals' attitudes

1.4.1. The Item Response Model

In this section, I define a model for estimating the latent attitudes towards a peace process. The model used in this paper is a hierarchical item response model³ estimated following the approach proposed by Spady (2007). The model is represented graphically in Figure 4.2.

From the considerations in the previous section, every individual has attitudes towards concessions and towards reconciliation that depend on the potential payoffs and costs they face. That is, the optimal s implies an attitude towards concessions A_C and the optimal r an attitude towards reconciliation A_R . Together, these attitudes constitute the individual's predisposition towards a peace process. They also cause responses to survey questions on the issue. Finally, they also underlie agents' behavior; e.g. their political decisions or their propensity to engage in violence. The analysis of the impact of the attitudes on actions is left for future research.

From the model, education and other factors that systematically affect costs and payoffs affect the willingness to make concessions and the willingness to reconcile. Solving the optimality conditions for the optimal choices then leads to the empirical specification

$$A_C = h_C(e, X, \epsilon_C) \tag{1.1}$$

$$A_R = h_R(e, X, \epsilon_R) \tag{1.2}$$

³See Steele and Goldstein (2007) for an overview of this type of item response models.

where X is a vector of covariates that captures differences in individuals' costs or preferences. The empirical specification thus reflects the idea that individual characteristics and experiences as well as community characteristics can be related to individuals' attitudes towards reconciliation and towards concessions. It is also assumed that these characteristics do not affect the answers directly, but only through their effect on the attitudes.

Equations (1.1) and (1.2) constitute a structural model with the following underlying assumptions: (1) the expressions of agreement and disagreement on questions about conflict resolution ('item responses') reflect corresponding attitudes of the responder; (2) the 'attitudes' are enduring individual-specific attributes, given the individual's characteristics and environment; and (3) each one of the series of item responses used is determined by a single attitude only (attitudes towards reconciliation and attitudes towards concessions respectively).

The variables used to estimate the individual attitudes and those included in X are discussed in Section 4.4. Before that, I describe how to obtain the likelihood function used to measure the attitudes towards reconciliation and to obtain the correlates with the individual personal characteristics. The likelihood function and the estimation method used for the analysis of the attitudes towards concessions is the same. It only differs in the use of different questions. I denote the items used to construct the reconciliation scale as R and the items used to construct the concessions scale as C .

1.4.2. Structural Representation

Consider a system of M measurements R_m , ($m = 1 \dots M$) for a latent factor A :

$$\begin{aligned} R_1 &= g_1(A, U_1) \\ &\vdots \\ R_M &= g_M(A, U_M) \end{aligned}$$

where A is univariate, $U_m \sim U(0, 1)$ and $g_m(\cdot)$ is weakly increasing in U and strictly increasing in A . It is also assumed that $U_i \perp U_j \forall i \neq j$ and $U_i \perp A \forall i$ which implies that conditional on A the responses are independent ($R_i \perp R_j | A$).⁴

Personal characteristics may affect the way this latent variable is distributed in the population. We assume that individual characteristics, and particularly education, may affect the latent variable A , but do not affect the measurements R_m

⁴These assumptions correspond to the standard assumption in item response theory (IRT); unidimensionality (A is unidimensional), monotonicity ($g_m(A, U_m)$ is strictly increasing in A) and local independence. See (C.R) Rao and S Sinharay (2007) for a review of parametric IRT.

directly. (They can of course affect them via A .) Consider the linear case

$$A = h(X, \epsilon) = X\beta + \epsilon \quad (1.3)$$

where $\epsilon \sim N(0, 1)$ and $\epsilon \perp X$. Assume also that $U_m \perp \epsilon$ and $U_m \perp X$.

Denoting a realization of A by a , consider the following threshold representation for a given response variable:

$$g_m(a, u_m) = \begin{cases} 1 & \text{if } Q_0(a) < u_m \leq Q_1(a) \\ 2 & \text{if } Q_1(a) < u_m \leq Q_2(a) \\ 3 & \text{if } Q_2(a) < u_m \leq Q_3(a) \\ 4 & \text{if } Q_3(a) < u_m \leq Q_4(a) \end{cases}$$

where $Q_r(a)$, $r = \{1, 2, 3, 4\}$, are thresholds functions for item m , and $0 = Q_0(a) < Q_1(a) < Q_2(a) < Q_3(a) < Q_4(a) = 1$. Figure [reff:BoxesExample](#) shows the graphical representation of the functions $Q_r(a)$. This figure shows that higher item responses are associated to higher values of a , i.e. if $a_2 > a_1$ then the item responses of a_2 population stochastically dominate a_1 . Thus, higher item responses are associated to higher values of a . This assumption implies that the lines that indicate the probability of answering k or higher in item j given a have to be downward sloping. Of course, they cannot cross if probabilities are to be non-negative.

The model is identified if the structure, together with the restrictions of the model, delivers the distribution of observables:

$$S = \{g(A, U), F_{U|A}\} \Rightarrow F_{R|A},$$

where $F_{U|A}$ denotes the cumulative distribution function of a random variable U conditional on A . From the identification result, the following equality follows:

$$F_{U|A}(Q_r(a)|A = a) = F_{R|A}(r|A = a)$$

and because of the uniformity of the error term

$$Q_r(a) = F_{R|A}(r|A = a) = Pr(R \leq r|A = a).$$

$Q_r(a)$ thus is a conditional cumulative distribution function.

The way of modeling $Pr(R \leq r|A = a)$ differs among different types of item response models. In this paper these functions are modeled as in Spady (2007), using the distribution function corresponding to an exponential tilting of second degree of the uniform density,

$$G_r(a) = \frac{\int_0^a e^{\tau_1 \gamma_1(u) + \tau_2 \gamma_2(u)} du}{\int_0^1 e^{\tau_1 \gamma_1(u) + \tau_2 \gamma_2(u)} du} \quad (1.4)$$

where the functions $\gamma_1(u)$ and $\gamma_2(u)$ are 2 basis functions, chosen to be (shifted) Legendre polynomials and τ_1 and τ_2 are the parameters estimated. From $G_r(a)$ we obtain $Q_r(a)$ as $Q_r(a) = 1 - G_r(a)$.

To ensure that the lines do not cross, they are constructed as products of the estimated distribution functions. Consider an item m with 4 possible answers, so $r = \{1, 2, 3, 4\}$, $Q_4(a) = 1$ and $Q_0(a) = 0$ by definition. Assume $Q_3(a)$, $G_2(a)$ and $G_1(a)$ are distribution functions estimated as described above. Then $Q_2(a) = [1 - G_2(a)]Q_3(a)$ and $Q_1(a) = [1 - G_1(a)]Q_2(a)$.⁵

To build the likelihood function, the conditional probability of a response r , $Pr(R = r|A = a)$, is obtained as

$$\begin{aligned} Pr(R = r|A = a) &= Pr(R \leq r|A = a) - Pr(R \leq r - 1|A = a) \\ &= Q_r(a) - Q_{r-1}(a) \end{aligned}$$

To simplify notation, denote $Pr(R = r|A = a)$ as $p(r|a; \tau_r)$.

The likelihood function for N independent observations then is

$$\begin{aligned} p(r_1, r_2, \dots, r_M|X; \beta, \tau) &= \prod_{n=1}^N \int p(r_1, r_2, \dots, r_M|a, \tau_{m,r}) f(a|X; \beta) da \\ &= \prod_{n=1}^N \int p(r_1|a; \tau_{1,r}) p(r_2|a; \tau_{2,r}) \dots p(r_M|a; \tau_{M,r}) f(a|X; \beta) da. \end{aligned}$$

Because of the assumption of conditional independence of the responses, it is possible to express the likelihood function as a product of the conditional item probabilities. β is a vector of parameters that indicates the effect of X on the mean of A . τ parameterizes the distribution $Q_r(a; \tau_{m,r})$ that enters $p(\cdot)$. With two-parameter exponential tilting, it consists of elements $\tau_{m,r} = (\tau_{m,r}^1, \tau_{m,r}^2)$.

The integral in the likelihood function has no general closed form solution. The integration is thus carried out using Gauss-Hermite quadrature at 200 grid points. Quadrature methods approximate the integral as a weighted sum of function values evaluated over a grid of points so that

$$\int f(x) dx \approx \sum_q w_q f(x_q)$$

Gaussian quadrature rules choose not only the weights, but also the evaluation points or abscissæ, and can achieve higher precision with a fix number of points. To ensure that we can take into account even distributions with small variance, Gaussian quadrature has been applied to 5 different segments of the grid, with the segment in the middle having a higher concentration of points. A Newton-Raphson algorithm is

⁵This also implies that the stochastic dominance is strengthened to dominance in hazard order.

used to maximize the log-likelihood function. Concretely, we use the BFGS method which builds an approximation to the Hessian in the course of iteration. However, analytic results are used to evaluate the Hessian after convergence in order to obtain more accurate standard errors.⁶

1.4.3. Identification

The model is defined as the structure

$$S = \{g(A, U), F_{U|A}\}$$

with

$$F_{U|A}(Q_r(a)|A = a) = F_{R|A}(r|A = a)$$

and the restrictions described above: $U_m \sim U(0, 1)$, $g_m(\cdot)$ is weakly increasing in U and strictly increasing in A , $U_i \perp A \forall i$, $U_i \perp U_j \forall i \neq j$, $f(a)$ is assumed to be known. The model identifies $g_m(\cdot)$ if $\forall (S^*, S^0)$, $S^* \neq S^0$,

$$F_{U|A}^*(Q_r^*(a)|A = a) = F_{R|A}^*(r|A = a)$$

$$F_{U|A}^0(Q_r^0(a)|A = a) = F_{R|A}^0(r|A = a)$$

and $F_{R|A}^*(r|A = a) \neq F_{R|A}^0(r|A = a)$.

Douglas (2001) shows that nonparametric item response models are only identifiable in an asymptotic sense, i.e., when the number of items tends to infinity. For parametric models, this reduces to showing that the number of constraints of the form:

$$p(r_1, r_2, \dots, r_M) = \int p(r_1, r_2, \dots, r_M|a, \tau_{m,r})f(a)da$$

generated by the different combinations of responses limits the values of the parameters to a unique set. If $Q_r(a)$ were modeled nonparametrically, the degrees of freedom would be much greater than the number of constraints, considering that the value of the function at each point may be viewed as a separate parameter and the constraints derived from the manifest distributions are not sufficient to identify $Q_r(a)$. The set up of this paper is parametric; $Q_r(a; \tau)$ is modeled as a function of two parameters. The model identifies $g_m(\cdot)$ if the estimates of the two parameters τ are unique for each $Q_r(a; \tau)$.

There are $4^6 - 1 = 4094$ possible constraints in the model of attitudes towards reconciliation, and 63 parameters to be estimated. As the degrees of freedom are larger than the parameters to be estimated, the model identifies the functions $g_m(\cdot)$.

⁶For a general discussion about estimation procedures for multilevel generalized linear models see Rodriguez (2008).

The same is true for the model of attitudes towards concessions, where there are $3^7 - 1 = 2186$ constraints and 55 parameters to be estimated.

1.5. Data

The data comes from the public opinion surveys designed and conducted by the Palestinian Center for Policy and Survey Research (PCPSR). This institution conducted public opinion polls from 2000 to 2008, collecting information about attitudes and values of a representative sample of Palestinians in the West Bank and the Gaza Strip, including East Jerusalem. The surveys used in this paper are the ones that include exactly the same questions about attitudes towards reconciliation: December 2001 (poll #3), May 2002 (poll #4), April 2003 (poll #7), March 2005 (poll #15) and December 2006 (poll #22). These surveys also include information about personal and demographic characteristics. To measure attitudes towards concession I use data for December 2003 (poll #10), December 2005 (poll #18), and December 2006 (poll #22). The only survey that contains information on both concessions and reconciliation is the one for December 2006.

This data set is particularly useful because questions are very precise and allow distinguishing between attitudes towards reconciliation and towards concessions. The items reflecting attitudes towards reconciliation emphasize that the questions refer to steps that the Palestinians could take once the state of Palestine was established. The items reflecting attitudes towards concessions refer to key issues such as final borders, the status of Jerusalem, refugees, and the security arrangements that have been recurrently brought up during peace negotiations (the Geneva Initiative, the Clinton Parameters and the Taba Negotiations). This distinction is important because the use of more general questions can lead to misleading conclusions. For instance, measuring attitudes towards peace using the support for the continuation of peace negotiations as in Abu Sada (1998) is problematic because individuals' answers are also affected by other factors like their confidence in the leaders involved in the negotiations. The use of party identification as a way to infer attitudes, as used for example in Jaeger et al. (2008), can also lead to wrong conclusions since other issues like a person's degree of religiosity or the current ruling party's level of corruption can play a role. Hence, the precise wording of the questions in the survey used here makes more precise measurement possible and makes the data set particularly useful. The full wording of the questions/items used to estimate the individuals' latent attitudes is shown in the appendix.

Summary statistics of the responses to these items are presented in Table 1.1. Items on reconciliation have four possible answers (scale from 1 to 4) and items on

concessions have three possible answers (scale from 1 to 3). A higher score corresponds to a more positive attitude towards reconciliation or concessions. Even among the items referring to one attitude, answering behavior varies over these items. Considering for instance the question "Would you support to adopt a school curriculum in the Palestinian state that recognizes Israel and teaches school children not to demand the return of all Palestine to the Palestinians?" and the question "In case of a two state solution, would you support to open borders to free movement of people and goods?", the mean answer differs strongly, at 1.71 for the first question and 3.04 for the second. This indicates that different items carry information on respondents' attitudes to a varying degree, or capture different aspects. Thus, by focussing on just one questions, or on a narrow subset of questions, valuable information may be lost. This is also indicated by the pairwise correlation coefficients for the items shown in Table 1.2; correlations are positive but far from perfect.

The theoretical model suggests that some demographic variables are informative about the individual attitudes. Therefore, they are also used in the estimation. A descriptive analysis of these variables is shown in Table 1.3. This table shows an increase in the percentage of individuals with high levels of education and with a high degree of religiosity. The theoretical justification for the inclusion of personal and demographics characteristics in the estimation is the following:

Education. As seen above, the role of education in shaping attitudes towards a peace process is not well understood in the existing literature. The goal of this paper is to shed some light on the connection of education with Palestinians' attitudes. To measure education I use three dummy variables: Low education (elementary education or less), medium education (preparatory or secondary education) and and high education (college or more).

Religion: personal piety. Tessler and Nachtway (1998) state that "the theoretical linkage between religion and international politics is based on the assumption that religion plays a crucial role in shaping both the normative orientation of individuals and their understanding of the surrounding world." They find that different dimensions of religiosity have different effects on individuals' attitudes towards politics or towards international conflicts. They find that support for political Islam and religious activism have a strong effect on an individual's political views, while personal piety is unrelated to those views. Unfortunately, I am not able to distinguish between these two dimensions of religiosity. The surveys only contain information on the degree of personal piety. The measure of personal piety used are three dummy variables based on the answer to the following question: "How often do you pray? 1) every day, 2) only on Friday or occasionally, 3) rarely or never."

Economic determinants: household income/family size. The relation between individuals' current economic situation and their attitudes is a priori ambiguous. It could be that individuals who are currently doing well believe that this will allow them to benefit more from economic opportunities arising with peace. It may, however, also motivate them to avoid change, and pit them against an agreement, whereas the poor might support it in the hope of an improvement in their situation, and because they have little to lose. On the other hand, they may be frustrated due to their economic situation, and not believe in the benefits of an agreement. In this sense, Nachtwey and Tessler (2002) find that currently unsatisfied individuals tend to be against an agreement. In addition, there is some new evidence finding little relationship between hate crimes in general and economic conditions.⁷ It is possible that this relationship (or its absence) also holds for attitudes towards reconciliation.

We measure household income using three dummies: Low Income (monthly income per person in the household $\leq 125\$$), medium income (income per person between 125 and 450\$) and high income (income per person $> 450\$$).

Age. Since attitudes might change over the life cycle due to personal experience but also due to national and global developments, the age of respondents can be informative.⁸

Working for the Public Sector. The public sector continues to be an important source of employment in Palestine. In 2003, public sector employment (by the Palestinian Authority and by municipalities) accounted for an estimated 26 percent of total employment in the West Bank and Gaza. For many young men coming from poor families this is the only route of social mobility. Therefore, working for the public sector is also an indication of how well the individual is doing. In addition, working in the public sector may of course by itself influence attitudes.

Being unmarried. Being unmarried in Palestine can be a source of frustration. Marriage is important because in Palestine, it represents the key to adulthood. It also is a religious obligation. Marriage is expensive; some families have to save all their lives to afford the wedding of their children.⁹ Since the economic situation has been deteriorating in the last years, it is possible that individuals who cannot afford marriage seek outlets for their frustration, translating into more negative attitudes towards reconciliation.

⁷See Krueger and Maleckova (2003). Green, McFalls and Smith (2001) provide a survey of the literature on hate crimes.

⁸Note that the variable used is age standardized by its mean, and standardized age squared over 100.

⁹For an illustration, see 'The wedding shortage', Navtej Dhillon, Newsweek.com, March 2007. This article explains why the Middle East has the lowest rates of marriage in the developing world.

We also control for gender and region of residence as they can influence the experiences faced during life.

1.6. Results

In this section I use the methodology explained above to infer the relationship between demographics and attitudes towards concessions and towards reconciliation. I then use the construction of the separation barrier to explore the channel through which the conflict affects attitudes towards reconciliation differently across education groups.

1.6.1. Attitudes towards concessions

Table 1.4 shows the effect of the personal characteristics on the mean of the probability distribution of attitudes towards concessions for a given person. They correspond to the coefficient vector β in equation (3.10). The effects are additive, which means that statements such as ‘more educated people have more positive attitudes towards concessions’ must be understood in a ‘*ceteris paribus*’ sense (Spady 2006). Coefficients describe deviations from a ‘standardized’ person. This is a male who lives in Hebron, has the mean age of the sample, is married, has a medium level of income per family member, is not a refugee, has low education and prays very often.

Results show that education is positively related to attitudes towards concessions. This finding is in line with the argument advanced above that more educated people could have more to gain from an agreement that eases the constraints on the Palestinian economy and therefore have more to gain from concessions.

Family income also matters; families with lower income tend to support the concessions discussed in the peace talks. Again, controlling for education, these might be the ones who have most to gain (or least to lose) from an agreement. The degree of religiosity reduces the willingness to make concessions.

Other authors have found that education has a negative impact on attitudes towards continuing with the peace negotiations after the Oslo agreements (Abu Sada 1998) or towards the Road Map (Jasso and Meyersson 2004). These authors explain this result by the fact that better educated respondents have more access to information and are therefore more aware of the problems of the possible agreements. Because of the different questions used to measure the attitudes, it is difficult to compare their results with the ones in this paper. The questions used in those papers are related to a particular moment in time and to a particular negotiation process. It seems likely that the individuals’ answers take into account other factors like the strength of the Palestinian leaders or the international and Israeli political

situation. The questions used in this paper to measure attitudes towards concessions are more atemporal in the sense that they are related to the key elements that have recurrently been subject of negotiation in peace talks. Therefore they provide more reliable information on individuals' general attitudes towards concessions.

1.6.2. Education and attitudes towards reconciliation

The previous section described results about willingness to make concessions obtained using a collection of items C_m . In this section I measure 'attitudes towards reconciliation' using a different collection of items R_m .

Results are presented in Table 1.5. It is clear that they differ substantially from those for concessions. In particular, education is negatively correlated with attitudes towards reconciliation. This negative effect has strengthened over the years in the sample (2001-2006). Figure 1.4 shows the evolution of the effect of education over time. The coefficient on the high education dummy is significantly negative in all years except for 2001, and becomes stronger (more negative) over time. The coefficient on the medium education dummy is less negative, but evolves very much in parallel with the high education coefficient. (The omitted group is low education.)

These results lend support to the idea that the depressed market opportunities of highly educated workers and the frustration generated by the difference between expected and actual wages matter for attitudes towards reconciliation (assuming that Palestinians attribute this lack of opportunities to the conflict and the interdependence with Israel). This hypothesis also fits with the strengthening of the education coefficient that accompanies the deterioration of the political and economic situation over the sample.

Reconciliation, economic expectations, and political events: It is instructive to consider the evolution of attitudes over time in more detail. Figure 1.4 plots the coefficients associated to the high and medium education variables obtained from the different samples together with the evolution of the economic growth and the GDP per capita. From visual inspection, it is clear that attitudes of the highly educated individuals and GDP per capita or economic growth move together closely over time.

In particular, the fall in GDP per capita from the beginning of the second Intifada in 2000 until 2002 is accompanied by a steep drop in the attitudes towards reconciliation of the highly educated. Afterwards, as GDP per capita recovers following the Road Map conference, attitudes also improve again briefly, only to deteriorate again from 2003 onwards. They reach a low point in 2006, the year Hamas wins the Parliamentary elections. The international response to that victory again caused an important drop in GDP per capita. Overall, since the start of the Second Intifada

in 2000, per capita GDP in Palestine has fallen by about a third, from \$1621 in 1999 to \$1129 by the end of 2006. Attitudes of the highly educated have evolved in a similar way. More formally, the correlation between the coefficients on the education variables for the different years and GDP per capita or economic growth is positive and in almost all the cases statistically significant (see Table 1.6).

Because the evolution of GDP is closely linked to political events (the Intifada, peace talks), it is not clear whether the close link between GDP and attitudes of the educated is due to the evolution of GDP or whether politics is a common driving force. There is also the third possibility of attitudes driving some political events. All this indicates that there is a strong interdependence between politics and economics in the West Bank and Gaza, and that there is an interdependence between the socio-economic situation and attitudes towards reconciliation.

Although economic factors are often mentioned and may matter at the aggregate level, we find that family income does not have a significant effect on attitudes towards reconciliation. So relative income (conditional on education) is not significantly related to these attitudes. This suggests that it is overall and not individual economic deprivation that is closely related to attitudes.

These results are similar to results obtained in the literature on education and violence. For instance, Krueger and Maleckova (2003) and Berrebi (2007) both find that “having a living standard above the poverty line or a secondary school or higher education is positively associated with participation in violent groups.” Although our explanation relates low willingness to reconcile to the lack of opportunities in the labor market, the results are also consistent with the hypothesis stated by these authors that more highly educated individuals have a more acute awareness of the political situation, resulting in deeper moral concerns and a more negative attitude towards reconciliation. This hypothesis fits well with the strengthening of the education coefficient that accompanies the deteriorating political and economic situation.

Finally, both Krueger and Maleckova (2003) and Berrebi (2007) point out the possibility that the positive relationship between education and violence could be related to the content of the education. For instance, Stern (2000) explains how religious schools in Pakistan can induce students to get involved in violence and terrorism. In the case of Palestine it is unlikely that the education system itself negatively affects attitudes to reconciliation. In 2006 around 67 percent of students were enrolled in Palestinian Authority public schools, 27.2 percent in schools run by the United Nations (UNRWA), and 6.2 percent in private or NGO-run schools, including those linked to Hamas and other groups.¹⁰ Figure 1.5 shows the evolution

¹⁰Source: ‘Factbox – Facts about Palestinian schools,’ Reuters Foundation, September 2006.

of the distribution of schools of each type during 2001 to 2007. The share of private schools is small and stable over the period. So even if religious schools gained importance among private schools, this can only be a minor phenomenon. Although it is true that the curriculum of Palestinian public schools has been criticized for containing anti-Semitic stereotypes, this refers to primary and secondary schools only.¹¹ Therefore, if the content of education was radicalizing students, it should have an effect on the whole sample. It is implausible that it mainly affects the most highly educated individuals.

Another factor that is strongly related to attitudes towards reconciliation is the degree of religiosity (measured as the frequency with which the individual prays). The results indicate that in 2001, the attitudinal differences between individuals with different degree of religiosity were weak. With time, differences become more clear. More religious people tend to be less favorable to reconciliation. Causality is not clear, since we do not know if people with more negative attitudes towards reconciliation become more religious or if more religious individuals changed their attitudes toward reconciliation.

Being female, being a refugee, working for the public sector, or being unmarried do not have significant effects. The influence of age is not clear.

Overall, educated or religious individuals are less in favor of reconciliation with Israel, with the effects of education and religion strengthening over time. In the next section, we have a closer look at the effect of education.

1.6.3. The effect of the separation barrier on attitudes towards reconciliation

In the previous sections I have linked the negative effect of education to the frustration derived from the general economic losses such as the impact of the conflict on employment opportunities and returns to schooling. In this section I will give more evidence in line with the idea that are events at the national, not local level matter for attitudes. For this, I exploit the construction of the separation wall and regional fatalities.

In June 2002 the Israeli authorities began building a barrier (wall) along the border of the West Bank with Israel. The Israeli government has declared that the objective of the wall is to protect Israeli citizens from the attacks of suicide bombers. The trajectory of the wall is depicted in Figure 1.6. The first parts were built in the northern West Bank districts of Jenin, Tulkarem and Qalqilia. At the end of

¹¹This has led to the introduction of new textbooks in 2000, but the sample of individuals under analysis has not been affected by this. For more information on the old and new textbooks see Brown (2001).

July 2003 Israel also started building a wall in the northern and eastern parts of Jerusalem and Bethlehem. After that, the wall continued south to Hebron. To build the wall, Palestinian land has been expropriated. In addition, the wall at times extends far into the West Bank, leaving parts of it inaccessible or disrupting circulation between villages.

The effects of the separation barrier on the Palestinians is twofold. Firstly, it affects Palestinians who live nearby, particularly their ability to travel freely within the West Bank and to access work in Israel, or to access other services (health, education or religious sites). Its presence also reduces arable land. Therefore the separation barrier directly affects the population of the localities through which the wall passes, resulting in localized economic losses. Secondly, many Palestinians see the separation barrier as an attempt to artificially create a border, creating ‘facts on the ground.’ Therefore, the wall can also affect Palestinians generally, not only locally, causing moral and existential concerns.

The construction of the wall helps to explore the channel through which education affects attitudes towards reconciliation. Controlling for the disruption caused by the construction of the wall in an individual’s region of residence allows to capture the local effect of the wall. This can be done separately by group of education, giving an indication of how the experience of personal losses shapes attitudes for different groups of education. Any additional effect of education on attitudes should then be due to other, more general concerns.

This analysis is possible because the data indicate in which region individuals live. In addition, I use measures of the evolution of the length of the wall, the areas of land left on the Israeli side of the wall (in most of the cases, this land has been confiscated) and the areas that have become enclaves.¹²

I have this information for July 2003, February 2005, and July 2006. The first two dates correspond quite closely to the moments in time when the surveys have been conducted (maximum difference of three months). For 2006, the difference is larger. To deal with this, I assume that the parts of the wall that were under construction in July 2006 were completed by the time of the survey, in December 2006. To construct the measures of the effect of the wall, I use the following index:

$$WE_{R,t} = \frac{Wall_{R,t}}{Border_R} + \frac{OutsideLand_{R,t} + Enclaves_{R,t}}{TotalArea_R} \quad (1.5)$$

where $WE_{R,t}$ refers to the effect of the wall in region R in time t , $Wall_{R,t}$ is the length of the wall in time t expressed in *km*, and $Border_R$ refers to the length of the

¹²Sources: These measures have been computed with information from the U.N. Office for the Coordination of Humanitarian Affairs in the Occupied Palestinian Territory and the Palestinian Environmental NGO’s network.

Green Line border for region R expressed in km . The $OutsideLand_{R,t}$ is the area of the region that at time t remains between the Green Line and the wall and the $Enclaves_{R,t}$ are the areas that, at time t , have become enclaves due to the route of the wall. These areas are divided by the total area of the region and they are all expressed in km^2 . Figure 1.6 and tables 1.7, 1.8 and 1.9 show the evolution of the construction of the wall and the measures used to construct the index. While it is not obvious if the functional form chosen is optimal for fitting disruptions suffered by individuals living in adjacent regions, it receives some support from evidence suggesting that other possible measures of the effect of the wall are correlated with the index constructed here. Using data for 2005, Figure 1.7 shows the relation of $WE_{R,t}$ for 2005 with the number of buildings destroyed and with the amount of land that has been expropriated. The correlation between $WE_{R,t}$ and the two alternative measures is 0.61 and 0.57 respectively.¹³

With this measure I can then test whether living close to the wall and being exposed to its effects affects attitudes. Because the effect of the wall differs across regions and over time, it can be distinguished from just a year effect and from regional effects. In addition, because deviations of the wall from the Green Line are mainly guided by the placement of Israeli settlements and by the location of natural resources, the index is exogenous.¹⁴

Results are reported in Table 1.10. The first column shows results for the whole sample. It confirms the effects found above; more educated or more religious people are less in favor of reconciliation. In addition, we find that living in areas strongly affected by the wall does not make people less favorable to reconciliation. Although negative, the coefficient is statistically significant only at a 15% level. Splitting the sample by education (low and medium levels of education vs high levels of education) produces interesting results. While other signs and levels of significance are largely unchanged, effects of living close to the wall are smaller and less significant for people with high levels of education.

¹³Note that it was not possible to directly use these alternative measure in our analysis since they are available only for 2005. Moreover, they are not available for the region of Toubas.

¹⁴The Government of Israel maintains that the following considerations are taken into account when determining the route of the wall: continuity in order to be operational, creation of controlled areas, minimum damage to the landscape, avoidance of the inclusion of Palestinian villages in the areas of the security fence, and minimal disruption in the daily life of the population residing near the wall. See the Israeli Ministry of Defense's website: www.seamzone.mod.gov.il. Concerning the settlements, Ariel Sharon's cabinet agreed to extend the wall to encircle Jewish settlements deep in the West Bank (see 'Israeli cabinet extends 'security fence'', The Guardian, October 2 2003). The International Court of Justice Report of 8 September 2003 (E/CN.4/2004/6) also points out that the Wall incorporates illegal Israeli settlements that form the subject of negotiations between Israel and Palestine.

The result that personal losses due to the wall have a weaker effect on attitudes of people with higher education may arise for several reasons. One possibility is that the wall must be affecting certain occupations more than others. Low educated individuals are more likely to be farmers, a group particularly strongly affected by the wall, both because of the loss of arable land and because of the disruption of transport routes.¹⁵

Overall, education is negatively related to attitudes towards reconciliation, in contrast to the effect found for personal losses. The presence of the wall thus cannot be the driving force behind the negative effect of education. More educated people seem to react to something else. The evolution of the education coefficient over time suggests that a more acute perception of the political and socioeconomic situation could be driving their attitudes towards reconciliation with Israel.

1.7. Conclusion

Given the importance of the Israeli-Palestinian conflict, hints about why it is so hard to resolve are very valuable. In this paper, I have used Palestinian survey data to explore the determinants of Palestinians' attitudes towards the peace process, understood as attitudes towards possible concessions they might be willing to make to achieve a settlement, and attitudes towards reconciliation in case of such a settlement. Because of the breadth of the object to be measured, the use of more than one dimension is natural. This is confirmed by the empirical analysis of the joint distribution of attitudes. Concerning the determinants, we focus particularly on education because of its ambiguous role in previous literature.

On economic grounds, more educated people could be expected to have more to gain from a peace process, in particular in the context of the repressed Palestinian economy. The empirical analysis indeed confirms that controlling for current family income more educated people are more willing to make concessions. This could be understood as an investment in peace, allowing the dividends of peace to be reaped later on.

The effect of education on attitudes towards reconciliation is disputed in previous work. Some authors argue that less educated people are more prone to violence and hatred, while others find the opposite: more educated people are more likely to be involved in violent groups. I find results more consistent with the latter stream of the literature, and then probe a bit deeper to identify a channel.

Individuals engage in reconciliation up to the point where the marginal benefit equals the marginal cost. The cost of reconciliation may be linked to the frustration

¹⁵See B'Tselem report on the effects of the wall. B'Tselem is the information center for human rights in the occupied territories.

endured due to the depressed labor market conditions, and therefore may be larger for highly educated individuals, explaining why highly educated individuals prefer lower levels of reconciliation.

At the macro level, it is clear that there is a strong interdependence between politics and economics, and between the socio-economic situation and attitudes towards reconciliation. While economic deprivation may not be associated with worse attitudes towards reconciliation at the individual level, periods of economic stagnation or contraction coincide with worsening attitudes at the national level. At the same time, the significantly negative effect of education on attitudes towards reconciliation strengthens. I can identify that this is not due to direct, local effects of the separation barrier. It hence seems plausible that events at the national level drive attitudes of people with high education. Knowing that are not personal losses what strengthens the negative attitudes towards reconciliation but rather the general situation, may be important for the peace process. Education and economic aid may not be sufficient remedies.

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Appendix

Appendix 1.A. Original wording of the questions/items used

Items used for estimating attitudes towards reconciliation

- After reaching a peace agreement between the Palestinian side and Israel and the establishment of a Palestinian state that is recognized by Israel, the following are steps may be taken in order to enhance relations between the State of Israel and a Palestinian State. For each of the suggested steps please tell me whether you support or oppose it:
 - Open borders to free movement of people and goods.
 - Create joint economic institutions and ventures.
 - Create joint political institutions (such as a parliament. designed eventually to lead to a confederate system)
 - Take legal measures against incitement against Israel.
 - Adopt school curriculum in the Palestinian state that recognizes Israel and teaches school children not to demand return of all Palestine to the Palestinians.
- After reaching a peace agreement between the Palestinian side and Israel and the establishment of a Palestinian state that is recognized by Israel, would you, under these conditions of peace, invite an Israeli colleague to visit you in your home?

Items used for estimating attitudes towards concessions

The individuals are informed of the permanent compromise settlement, then they are ask what do they think of each of the following items (Do they agree or disagree with them):

- Withdrawal to 1967 borders with territorial swap. (An Israeli withdrawal from all of the Gaza Strip and the evacuation of its settlements. But in the West Bank, Israel withdraws and evacuates settlements from most of it, with the exception of few settlement areas in less than 3% of the West Bank that would be exchanged with an equal amount of territory from Israel in accordance with the attached map show map.)
- A state without an army but with international forces. (An independent Palestinian state would be established in the areas from which Israel withdraws in the West Bank and the Gaza Strip; the Palestinian state will have no army, but it will have a strong security force but an international multinational force would be deployed to insure the safety and security of the

state. Both sides will be committed to end all forms of violence directed against each other.)

- East Jerusalem as capital of the state of Palestine after it is divided. (East Jerusalem would become the capital of the Palestinian state with Arab neighborhoods coming under Palestinian sovereignty and Jewish neighborhoods coming under Israel sovereignty. The Old City (including al Haram al Sharif) would come under Palestinian sovereignty with the exception of the Jewish Quarter and the Wailing Wall that will come under Israeli sovereignty.)
- Refugees with five options for permanent residence. (With regard to the refugee question, both sides agree that the solution will be based on UN resolutions 194 and 242 and on the Arab peace initiative. The refugees will be given five choices for permanent residency. These are: the Palestinian state and the Israeli areas transferred to the Palestinian state in the territorial exchange mentioned above; no restrictions would be imposed on refugee return to these two areas. Residency in the other three areas (in host countries, third countries, and Israel) would be subject to the decision of the states in those areas. The number of refugees returning to Israel will be based on the average number of refugees admitted to third countries like Australia, Canada, Europe, and others. All refugees will be entitled to compensation for their "refugeehood" and loss of properties.)
- End the conflict. (When the permanent status agreement is fully implemented, it will mean the end of the conflict and no further claims will be made by either side. The parties will recognize Palestine and Israel as the homelands of their respective peoples.)
- A sovereign state with security arrangements. (The Palestinian state will have sovereignty over its land, water, and airspace. But Israeli will be allowed to use the Palestinian airspace for training purposes, and will maintain two early warning stations in the West Bank for 15 years. The multinational force will remain in the Palestinian state for an indefinite period of time and its responsibility will be to insure the implementation of the agreement, and to monitor territorial borders and coast of the Palestinian state including its international border crossings.)

Appendix 1.B. Tables and Figures

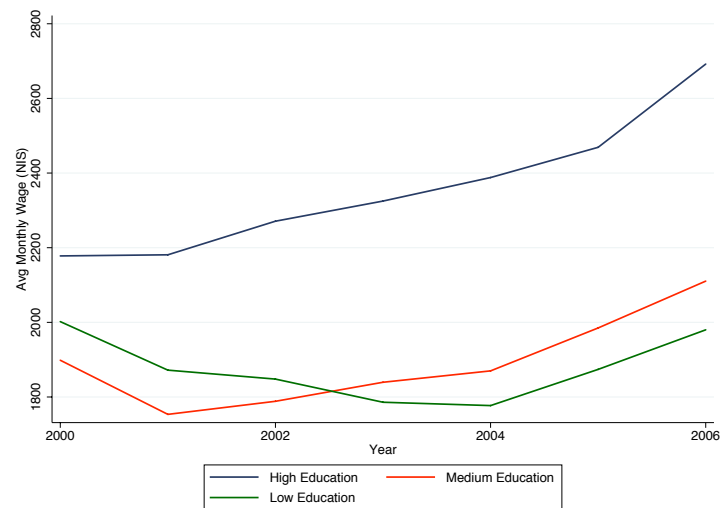


FIGURE 1.1. Average Monthly Wage in NIS for wage employees in the Palestinian Territory. Period: 2000-2006. Source: Palestinian Central Bureau of Statistics.

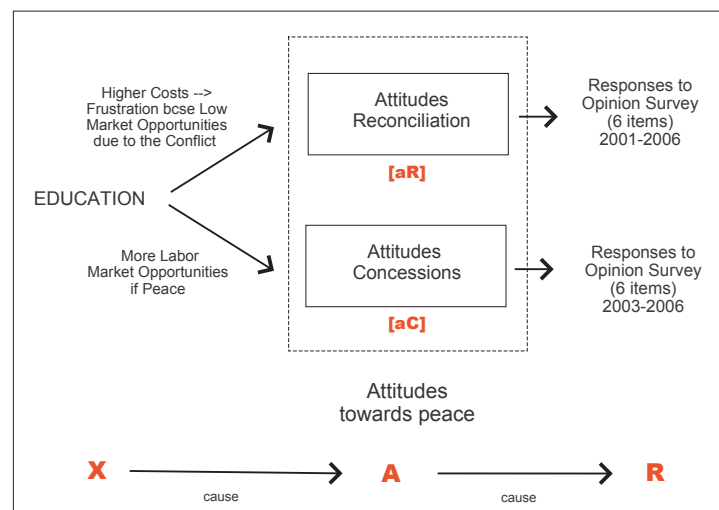


FIGURE 1.2. Diagram of the underlying process.

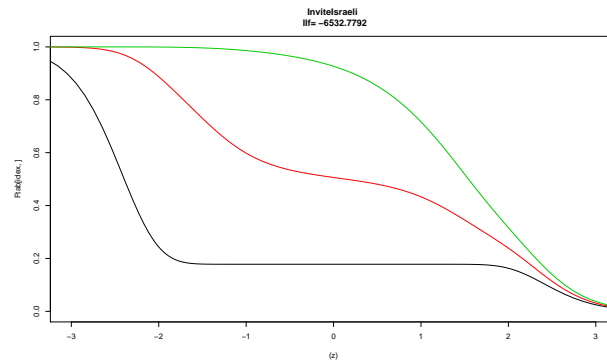


FIGURE 1.3. Probability Distributions of answering 1, 2, 3 or 4 in the item 'Invite an Israeli'

TABLE 1.1. Descriptive statistics for survey questions on reconciliation and concessions

Reconciliation			Concessions		
Items	Mean	Std.Dev	Items	Mean	Std.Dev
Borders	3.038	0.718	Borders 67	2.458	0.729
Eco Inst.	2.781	0.760	No Army	2.110	0.769
Pol Inst.	2.220	0.785	Jerusalem	2.241	0.790
No Incitement	2.282	0.776	Refugees	2.233	0.781
Curriculum	1.714	0.665	End Conflict	2.337	0.670
Invite Israeli	2.155	0.867	Security	2.072	0.867
Obs	6121		Obs	3509	
Scale	1-4		Scale	1-3	

The survey realized in 2003 does not contain the item 'Invite an Israeli'

Table 1.2: Pairwise correlation coefficients for the items used to build the reconciliation and concessions scale

Reconciliation Items (2001-2006)	Borders	Economic Institutions	Political Institutions	No Incitement	Curriculum	Invite Israeli
Borders	1					
Eco Inst	0.556	1				
Pol Inst	0.284	0.425	1			
Non Incitement	0.278	0.362	0.462	1		
Curriculum	0.114	0.205	0.367	0.395	1	
Invite Israeli	0.217	0.288	0.242	0.255	0.239	1

Concessions Items (2003-2006)	Borders 1967	No Army	Jerusalem	Refugees	End Conflict	Security
Borders 1967	1					
No Army	0.363	1				
Jerusalem	0.385	0.449	1			
Refugees	0.350	0.386	0.471	1		
End Conflict	0.453	0.344	0.447	0.478	1	
Security	0.442	0.418	0.416	0.435	0.508	1

The survey realized in 2003 does not contain the item 'Invite an Israeli', this results do not include this survey.

Table 1.3: Descriptive Analysis of the Personal and Demographic Characteristics.

Variable	2001			2002			2003			2005			2006		
	Mean	Std. Dev.		Mean	Std. Dev.		Mean	Std. Dev.		Mean	Std. Dev.		Mean	Std. Dev.	
Female	0.499	0.500		0.495	0.500		0.497	0.500		0.480	0.500		0.504	0.500	
Age	35.576	13.229		35.894	13.523		36.626	13.952		35.682	12.621		35.786	13.164	
Refugee	0.440	0.497		0.445	0.497		0.436	0.496		0.476	0.500		0.454	0.498	
Low Education	0.310	0.463		0.242	0.429		0.282	0.450		0.187	0.390		0.178	0.383	
Med Education	0.530	0.499		0.565	0.496		0.554	0.497		0.572	0.495		0.599	0.490	
High Education	0.160	0.367		0.193	0.395		0.164	0.371		0.240	0.427		0.223	0.416	
Unmarried	0.210	0.407		0.213	0.409		0.205	0.404		0.227	0.419		0.228	0.420	
High Praying	0.382	0.486		0.371	0.483		0.399	0.490		0.836	0.371		0.832	0.374	
Med Praying	0.379	0.485		0.370	0.483		0.382	0.486		0.072	0.258		0.079	0.270	
Low Praying	0.239	0.427		0.259	0.438		0.219	0.414		0.093	0.290		0.089	0.285	
Public Sector	0.090	0.286		0.117	0.322		0.111	0.314		0.121	0.327		0.142	0.350	
Low Income	0.311	0.463		0.311	0.463		0.333	0.472		0.309	0.462		0.298	0.458	
Med Income	0.536	0.499		0.479	0.500		0.526	0.500		0.518	0.500		0.504	0.500	
High Income	0.094	0.292		0.135	0.342		0.073	0.260		0.151	0.359		0.174	0.379	
Jenin	0.078	0.268		0.067	0.250		0.076	0.265		0.068	0.251		0.061	0.239	
Toubas	0.010	0.101		0.007	0.081		0.009	0.094		0.008	0.090		0.022	0.147	
Tulkarm	0.052	0.223		0.042	0.202		0.049	0.216		0.050	0.219		0.048	0.215	
Qalqilia	0.026	0.160		0.024	0.155		0.025	0.157		0.025	0.157		0.031	0.174	
Salfit	0.017	0.128		0.017	0.130		0.017	0.130		0.016	0.127		0.032	0.177	
Nablus	0.093	0.290		0.090	0.287		0.088	0.284		0.091	0.288		0.086	0.281	
Ramallah	0.076	0.265		0.086	0.280		0.083	0.276		0.073	0.261		0.070	0.256	
Jerusalem	0.074	0.261		0.081	0.274		0.076	0.265		0.098	0.297		0.094	0.292	
Jericho	0.007	0.084		0.008	0.090		0.008	0.090		0.008	0.090		0.022	0.147	
Bethlehem	0.050	0.218		0.051	0.219		0.051	0.219		0.050	0.219		0.047	0.211	
Hebron	0.145	0.352		0.141	0.348		0.141	0.348		0.143	0.350		0.136	0.343	
Jabalia	0.064	0.245		0.068	0.251		0.066	0.249		0.068	0.253		0.064	0.244	
GazaCity	0.129	0.336		0.134	0.340		0.135	0.342		0.134	0.340		0.126	0.332	
KhanYounis	0.075	0.264		0.076	0.265		0.074	0.262		0.075	0.263		0.072	0.259	
DeirAlBaleh	0.056	0.231		0.057	0.232		0.050	0.218		0.050	0.217		0.047	0.213	
Rafah	0.048	0.213		0.051	0.221		0.051	0.221		0.042	0.201		0.041	0.198	
Num. Observations	1262			1227			1224			1228			1180		

TABLE 1.4. Effect of Personal Characteristics on the Attitudes towards Concessions.

Variables	2003		2005		2006	
	Coefficient	S.E	Coefficient	S.E	Coefficient	S.E
Female	0.320	(0.072)	0.285	(0.076)	0.057	(0.078)
Age	0.004	(0.004)	0.003	(0.004)	0.010	(0.004)
Agesq.01	-0.007	(0.016)	0.040	(0.018)	0.019	(0.018)
Refugee	-0.125	(0.080)	-0.285	(0.089)	0.037	(0.084)
Med Education	0.188	(0.084)	0.360	(0.088)	0.521	(0.097)
High Education	0.170	(0.120)	0.209	(0.120)	0.548	(0.129)
Unmarried	0.079	(0.111)	-0.015	(0.114)	0.029	(0.114)
Low Income	-0.058	(0.077)	0.180	(0.088)	0.210	(0.090)
High Income	0.143	(0.139)	0.172	(0.113)	-0.045	(0.113)
Med Praying	0.240	(0.179)	0.387	(0.168)	0.403	(0.138)
Low Praying	0.411	(0.136)	0.232	(0.143)	0.335	(0.172)
Public	0.007	(0.122)	0.214	(0.125)	0.053	(0.128)
Jenin	0.252	(0.172)	0.255	(0.170)	0.073	(0.156)
Toubas	0.875	(0.350)	-0.038	(0.303)	0.531	(0.237)
Tulkarm	0.186	(0.168)	0.081	(0.167)	0.236	(0.218)
Qalqilia	0.739	(0.154)	0.285	(0.321)	1.122	(0.185)
Salfit	0.106	(0.257)	0.956	(0.288)	0.025	(0.171)
Nablus	0.372	(0.162)	0.325	(0.154)	0.375	(0.173)
Ramallah	0.631	(0.122)	0.235	(0.128)	1.064	(0.167)
Jerusalem	-0.067	(0.155)	0.353	(0.155)	0.417	(0.147)
Jericho	0.851	(0.347)	0.164	(0.230)	1.338	(0.228)
Bethlehem	-0.319	(0.185)	0.333	(0.170)	0.370	(0.199)
Jabalia	0.075	(0.153)	0.058	(0.218)	0.241	(0.208)
Gaza City	0.118	(0.139)	0.087	(0.149)	0.438	(0.139)
KhanYounis	-0.354	(0.164)	0.241	(0.182)	0.967	(0.160)
Deir Al Baleh	0.737	(0.155)	0.514	(0.203)	0.450	(0.225)
Rafah	-0.067	(0.224)	-0.031	(0.177)	0.644	(0.256)

Table 1.5: Effect of Personal Characteristics on the Attitudes towards Reconciliation.

Variables	2001		2002		2003		2005		2006	
	Coefficient	S.E	Coefficient	S.E	Coefficient	S.E	Coefficient	S.E	Coefficient	S.E
Female	-0.058	(0.073)	-0.032	(0.067)	-0.003	(0.068)	-0.066	(0.066)	-0.341	(0.071)
Age	0.011	(0.004)	0.005	(0.004)	0.008	(0.004)	0.007	(0.004)	0.002	(0.004)
Agesq.01	-0.049	(0.018)	-0.040	(0.019)	-0.005	(0.016)	-0.023	(0.022)	-0.038	(0.016)
Refugee	0.175	(0.082)	-0.062	(0.084)	-0.244	(0.080)	0.022	(0.081)	0.063	(0.078)
Med Education	-0.239	(0.082)	-0.461	(0.082)	-0.157	(0.083)	-0.248	(0.085)	-0.589	(0.079)
High Education	-0.349	(0.117)	-0.555	(0.101)	-0.271	(0.105)	-0.414	(0.098)	-0.889	(0.103)
Unmarried	0.075	(0.114)	-0.088	(0.101)	-0.059	(0.113)	-0.011	(0.104)	-0.010	(0.106)
Low Income	0.059	(0.080)	-0.058	(0.076)	-0.016	(0.078)	-0.141	(0.079)	0.004	(0.080)
High Income	-0.101	(0.126)	0.094	(0.105)	-0.037	(0.149)	0.076	(0.098)	0.116	(0.101)
Med Praying	-0.064	(0.080)	-0.187	(0.077)	0.238	(0.079)	0.223	(0.136)	0.117	(0.120)
Low Praying	0.197	(0.089)	0.088	(0.086)	0.368	(0.096)	0.296	(0.120)	0.399	(0.129)
Public	-0.262	(0.144)	-0.252	(0.097)	-0.209	(0.112)	0.066	(0.105)	0.100	(0.105)
Jenin	-0.658	(0.149)	-0.533	(0.187)	0.231	(0.141)	-0.852	(0.162)	-0.827	(0.187)
Toubas	-0.681	(0.239)	-0.536	(0.343)	0.126	(0.585)	-1.116	(0.718)	0.055	(0.320)
Tulkarm	-0.708	(0.193)	-0.211	(0.171)	0.641	(0.207)	-0.407	(0.167)	-0.473	(0.135)
Qalqilia	-1.056	(0.154)	-0.464	(0.337)	1.048	(0.372)	-1.049	(0.307)	-0.366	(0.269)
Salft	-1.012	(0.193)	-0.559	(0.437)	0.880	(0.384)	-1.084	(0.259)	-0.202	(0.200)
Nablus	-0.917	(0.131)	-0.268	(0.117)	-0.363	(0.133)	-0.849	(0.146)	-0.289	(0.141)
Ramallah	-1.148	(0.121)	-0.636	(0.166)	0.978	(0.163)	-0.765	(0.130)	-0.487	(0.177)
Jerusalem	-0.774	(0.144)	-0.348	(0.173)	0.729	(0.150)	-0.888	(0.140)	-0.132	(0.140)
Jericho	-0.835	(0.166)	0.345	(0.313)	-0.043	(0.488)	-0.401	(0.395)	-0.076	(0.285)
Bethlehem	-0.694	(0.173)	-0.098	(0.152)	-0.046	(0.181)	-0.079	(0.173)	0.409	(0.151)
Jabalia	-0.283	(0.201)	0.370	(0.149)	0.393	(0.148)	-0.500	(0.159)	-0.477	(0.156)
Gaza City	-0.579	(0.159)	0.153	(0.119)	0.201	(0.136)	-0.091	(0.118)	-0.316	(0.116)
Khan Younis	-1.033	(0.171)	-0.299	(0.187)	0.388	(0.147)	-0.462	(0.140)	-0.236	(0.172)
Deir Al Baleh	-0.234	(0.190)	0.375	(0.136)	0.367	(0.165)	-0.500	(0.171)	-0.236	(0.197)
Rafah	-1.252	(0.165)	-0.385	(0.210)	0.383	(0.173)	-0.771	(0.168)	0.070	(0.155)

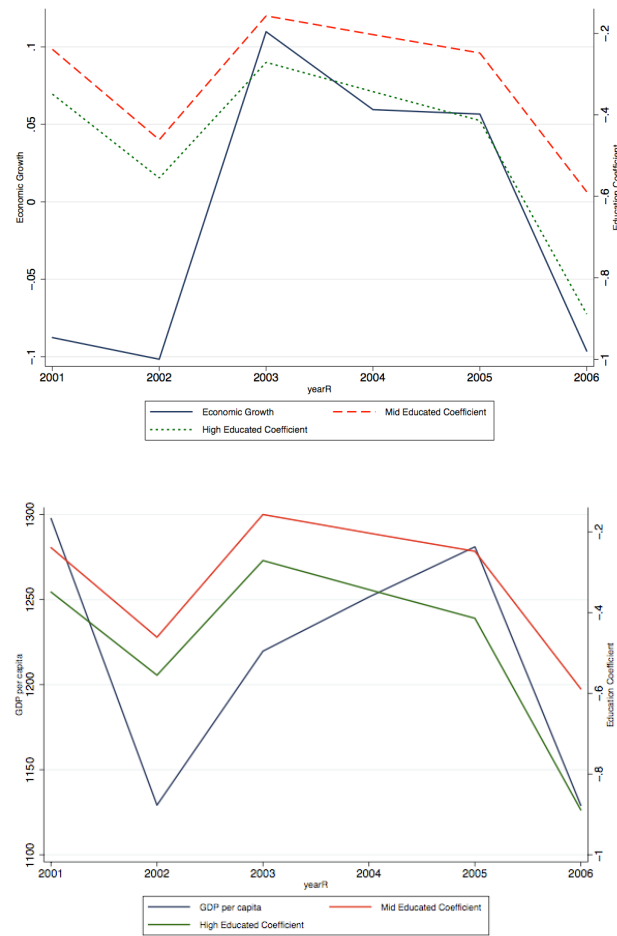


FIGURE 1.4. Evolution of the effect of education and its relation with Economic Growth and GDP pc.

TABLE 1.6. Correlations between economic conditions and the willingness to reconcile of educated individuals.

	Med Educ Coefficient	High Educ Coefficient	Med Educ Coefficient	High Educ Coefficient
per capita GDP	0.002 (0.001)	0.002 (0.001)		
growth rate			1.370 (0.569)	1.560 (0.895)
constant	-2.625 (0.795)	-3.269 (1.240)	-0.303 (0.050)	-0.455 (0.078)
R ²	0.679	0.561	0.592	0.432
observations	6	6	6	6

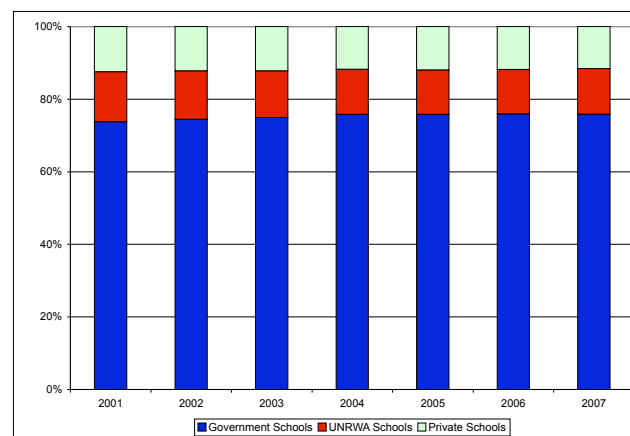
FIGURE 1.5. Distribution of the schools by supervising authority.
Source: Palestinian Education Ministry.

TABLE 1.7. Summary of the wall and its effects in 2003, by region.

	Total Area (km^2)	Area Outside (km^2)	Area Enclaves (km^2)	Green Line Border (km)	Wall (km)	WE Index
Jenin	587.838	33.891	0.000	50.02	61.421	1.286
Toubas	352.811	0.000	0.000	13.092	0.000	0.000
Tulkarm	243.586	23.135	0.000	29.867	37.321	1.345
Nablus	615.314	0.000	0.000	0.000	0.000	0.000
Qalqilia	155.235	24.423	15.662	18.458	46.16	2.759
Salfit	211.175	0.000	0.000	5.598	4.003	0.715
Ramallah	849.188	0.000	0.000	46.283	0.000	0.000
Jericho	651.958	0.000	0.000	0.000	0.000	0.000
Jerusalem	345.277	0.000	0.000	27.375	15.856	0.579
Bethlehem	637.548	0.000	0.000	22.245	10.475	0.471
Hebron	1007.135	0.000	0.000	91.817	0.000	0.000
Jabalial	0.000	0.000	0.000	0.000	0.000	0.000
Gaza City	0.000	0.000	0.000	0.000	0.000	0.000
Khan Younis	0.000	0.000	0.000	0.000	0.000	0.000
Deir Baleh	0.000	0.000	0.000	0.000	0.000	0.000
Rafah	0.000	0.000	0.000	0.000	0.000	0.000

TABLE 1.8. Summary of the wall and its effects in 2005, by region.

	Total Area (km^2)	Area Outside (km^2)	Area Enclaves (km^2)	Green Line Border (km)	Wall (km)	WE Index
Jenin	587.838	36.104	0.000	50.02	65.19	1.365
Toubas	352.811	2.68	0.000	13.092	12.608	0.971
Tulkarm	243.586	23.135	0.000	29.867	37.321	1.345
Nablus	615.314	0.000	0.000	0.000	0.000	0.000
Qalqilia	155.235	24.423	15.662	18.458	56.75	3.333
Salfit	211.175	0.000	0.000	5.598	18.134	3.239
Ramallah	849.188	7.761	0.000	46.283	26.31	0.578
Jericho	651.958	0.000	0.000	0.000	0.000	0.000
Jerusalem	345.277	0.000	0.000	27.375	25.176	0.920
Bethlehem	637.548	0.000	0.000	22.245	10.475	0.471
Hebron	1007.135	2.325	0.000	91.817	14.658	0.162
Jabalial	0.000	0.000	0.000	0.000	0.000	0.000
Gaza City	0.000	0.000	0.000	0.000	0.000	0.000
Khan Younis	0.000	0.000	0.000	0.000	0.000	0.000
Deir Baleh	0.000	0.000	0.000	0.000	0.000	0.000
Rafah	0.000	0.000	0.000	0.000	0.000	0.000

TABLE 1.9. Summary of the wall and its effects in 2006, by region.

	Total Area (km^2)	Area Outside (km^2)	Area Enclaves (km^2)	Green Line Border (km)	Wall (km)	WE Index
Jenin	587.838	36.104	0.000	50.02	65.19	1.365
Toubas	352.811	2.68	0.000	13.092	12.608	0.971
Tulkarm	243.586	23.135	0.000	29.867	37.321	1.345
Nablus	615.314	0.000	0.000	0.000	0.000	0.000
Qalqilia	155.235	37.318	15.662	18.458	56.75	3.416
Salfit	211.175	13.567	0.000	5.598	25.86	4.684
Ramallah	849.188	84.521	1.512	46.283	59.158	1.379
Jericho	651.958	0.000	0.000	0.000	0.000	0.000
Jerusalem	345.277	93.466	13.883	27.375	80.724	3.260
Bethlehem	637.548	8.815	0.000	22.245	10.475	0.485
Hebron	1007.135	12.71	0.000	91.817	64.757	0.718
Jabalia	0.000	0.000	0.000	0.000	0.000	0.000
Gaza City	0.000	0.000	0.000	0.000	0.000	0.000
Khan Younis	0.000	0.000	0.000	0.000	0.000	0.000
Deir Baleh	0.000	0.000	0.000	0.000	0.000	0.000
Rafah	0.000	0.000	0.000	0.000	0.000	0.000

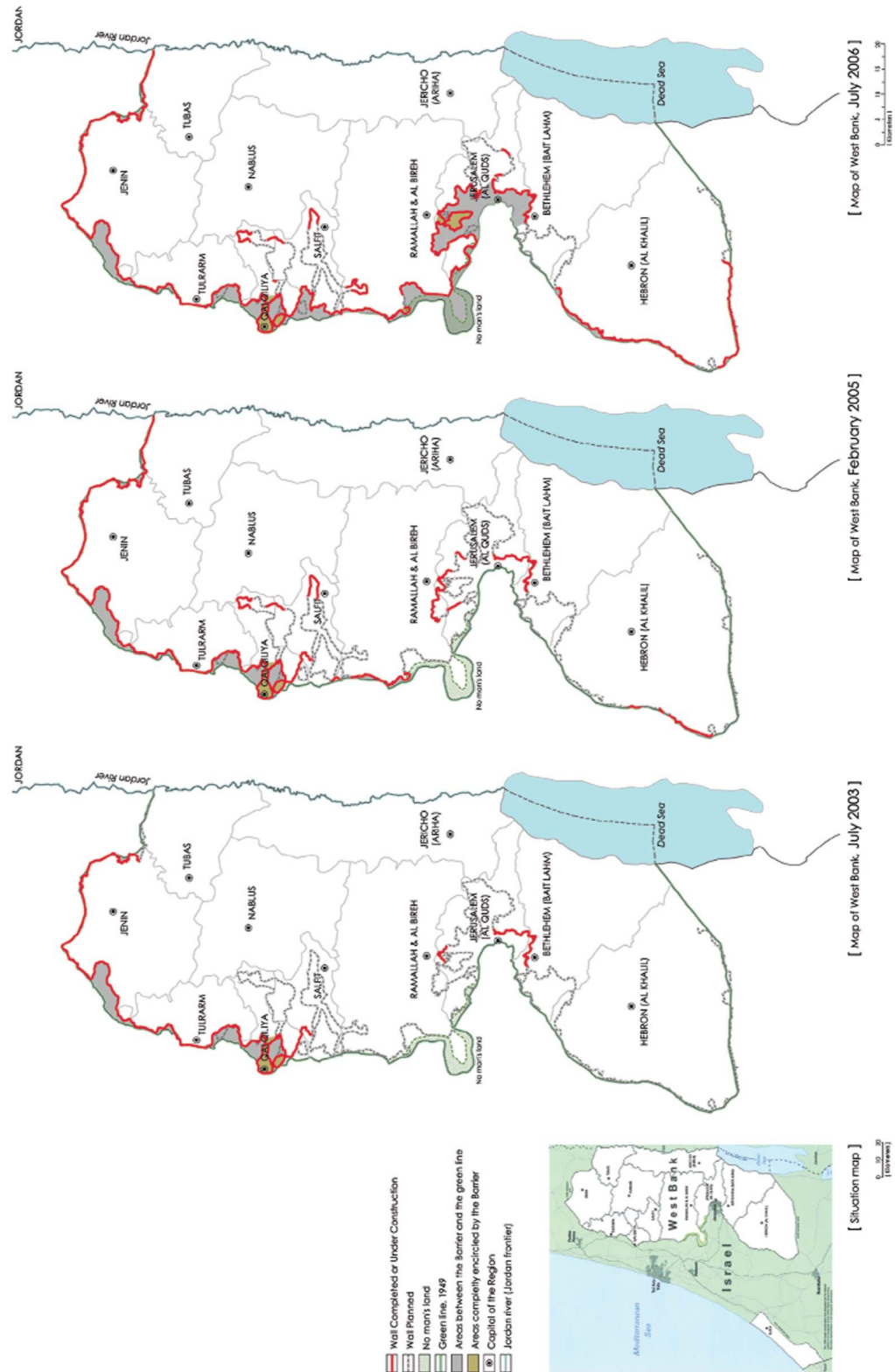


FIGURE 1.6. Evolution of the Separation Barrier.

Table 1.10: The effect of the wall on the attitudes towards reconciliation.

Variables	All Sample No Wall		All Sample With Wall		All Sample With Interactions		Low and Medium Education		High Education	
	Coef.	S.E	Coef.	S.E	Coef.	S.E	Coef.	S.E	Coef.	S.E
Wall			-0.042	(0.031)	-0.112	(0.050)	-0.046	(0.033)	-0.010	(0.066)
Wall*Med Educ					0.084	(0.049)				
Wall*High Educ					0.104	(0.063)				
Year 2002	-0.352	(0.046)	-0.352	(0.068)	-0.348	(0.048)	-0.407	(0.052)	-0.460	(0.113)
Year 2003	-0.368	(0.046)	-0.356	(0.073)	-0.350	(0.050)	-0.431	(0.052)	-0.355	(0.125)
Year 2005	0.128	(0.051)	0.149	(0.068)	0.150	(0.055)	0.052	(0.059)	0.112	(0.136)
Year 2006	-0.250	(0.051)	-0.211	(0.092)	-0.207	(0.062)	-0.291	(0.067)	-0.250	(0.138)
Female	-0.052	(0.032)	-0.052	(0.034)	-0.051	(0.032)	-0.089	(0.037)	0.063	(0.077)
Age	0.005	(0.002)	0.006	(0.002)	0.006	(0.002)	0.009	(0.002)	0.005	(0.005)
Agesq.01	-0.032	(0.007)	-0.032	(0.009)	-0.032	(0.007)	-0.029	(0.008)	-0.050	(0.021)
Refugee	0.020	(0.034)	0.021	(0.034)	0.023	(0.034)	0.032	(0.038)	-0.117	(0.079)
Med Education	-0.315	(0.037)	-0.316	(0.073)	-0.338	(0.044)				
High Education	-0.458	(0.052)	-0.460	(0.093)	-0.489	(0.060)				
Unmarried	0.009	(0.047)	0.008	(0.048)	0.010	(0.047)	-0.054	(0.055)	0.031	(0.100)
Low Income	-0.020	(0.035)	-0.021	(0.038)	-0.021	(0.035)	0.012	(0.038)	-0.106	(0.100)
High Income	0.051	(0.051)	0.051	(0.052)	0.050	(0.051)	0.056	(0.063)	-0.081	(0.089)
High Praying	-0.463	(0.044)	-0.466	(0.063)	-0.463	(0.046)	-0.477	(0.050)	-0.692	(0.103)
Med Praying	-0.403	(0.045)	-0.404	(0.074)	-0.401	(0.048)	-0.478	(0.051)	-0.415	(0.110)
Public Sector	-0.081	(0.058)	-0.082	(0.058)	-0.082	(0.058)	-0.045	(0.082)	-0.204	(0.079)
Regional dummies	yes		yes		yes		yes		yes	
Num Observations	6121		6121		6121		4923		1198	

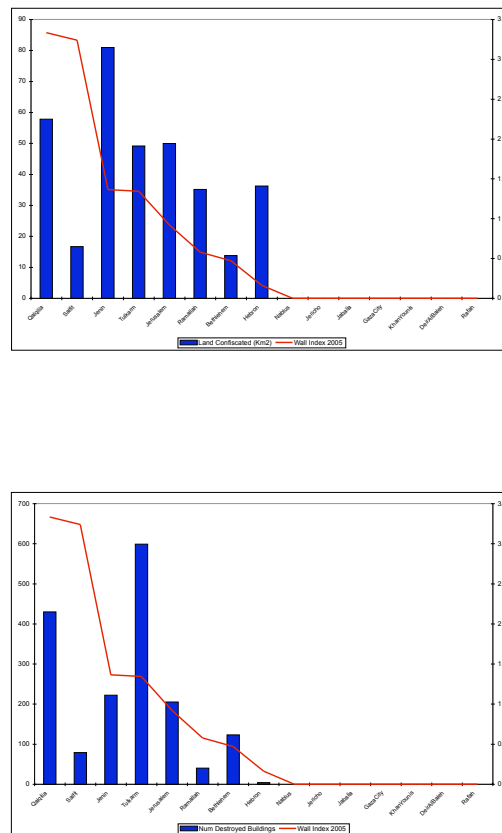


FIGURE 1.7. Correlation between the index used and other possible measures of the effect of the wall. The number of buildings destroyed refer to the number of establishments in different sectors which were totally closed as a result of the wall, the confiscated land is the total area confiscated by Israeli forces to construct the wall (usually taken by military order). Source: PCBS – Survey on the Impact of the Expansion and Annexation Wall on the Socio-Economic Conditions of Palestinian Localities which the Wall Passes Through, June 2005.

CHAPTER 2

Trust, child care technology choice and female labor force participation

ABSTRACT. This paper investigates whether trust has an effect on the choice of child care technology and on female labor force participation. Mothers with less trust in others may decide to stay at home with their child instead of working. To do this, I sketch a simple model to show why this effect may be taking place, I measure trust using the European Social Survey and I test its influence on the choice of child care technology. To measure trust, I use a hierarchical item response model proposed by Spady (2007). Compared to other measures of trust, using this technique has several advantages: allows the aggregation of information from several questions and exploits additional information from personal and demographic characteristics. It also imposes very few parametric assumptions. The results show that trust matters for the degree of externalness of the child care technology people choose. It can therefore be a possible explanation for differences in female labor force participation across countries and across sociological groups.

KEYWORDS. trust, child care, labor force participation, latent attitudes, item response models.

JEL CLASSIFICATION. J13, J22, D10.

2.1. Introduction

Labor force participation differs significantly across countries, particularly for women. Prime-age women are one of the demographic groups with the lowest participation rate in Europe. This is particularly pronounced in Mediterranean countries, less so in Nordic ones (Algan and Cahuc 2005).

There is a large literature trying to understand which factors drive labor force participation of prime-age women, and what can explain differences across countries. One factor that has been proposed are differences in social policies that lead to differences in availability and cost of non-parental child care.¹ These papers find that social policies can help to reduce the incompatibility between labor market participation and child care, and therefore induce higher female labor participation rates. In a cross-country perspective, this type of studies presupposes that women in different European countries have the same preferences, but face different possibilities due to different social policies across countries, leading to different choices.

More recent papers have considered the possibility of heterogeneity in preferences, introducing elements like culture, beliefs, or the degree of religiosity in explaining women's participation and fertility decisions. Examples of this are Algan and Cahuc (2005), Fernandez, Fogli and Olivetti (2004) and Berman, Iannaccone and Ragusa (2006). Fogli (forthcoming) notes that "a theory based on purely technological differences across countries would have a hard time in explaining the large amount of heterogeneity observed in employment rates across European countries. In this respect, it is important to explore the role played by differences in preferences." Del Boca and Locatelli (2006) in their survey on the determinants of motherhood and work status conclude that while the importance of social policies is well established in the literature, the role of culture is still an open question in this field.

This paper contributes to this literature by investigating whether trust can affect the choice of child care technology and labor force participation in the sense that mothers with less trust in others may decide to stay at home with their child instead of working. To do this, I sketch a simple model to show why this effect may be taking place, measure trust using the European Social Survey, and analyze its influence on the choice of child care technology.

¹See e.g. Del Boca (2002) for Italy, Baizn, Billari and Michielin (2002) for Spain, Laroque and Salani (2005) for France, Del Boca and Sauer (2006) comparing France, Spain and Italy, and Del Boca and Wetzel (2007) comparing several European countries.

Since the main explanatory variable of my analysis is trust, it is important to measure it well.² Therefore, I use a hierarchical item response model proposed by Spady (2007) methodology to measure trust. This method allows measuring trust directly as a latent attitude at the individual level, assuming that opinions of individuals about trust reflect their attitudes in this dimension. The attitudes of individuals making up a sample population can then be given probability distributions, based on their item responses and personal characteristics. Very few parametric assumptions are needed for this. The resulting measure of trust is conceptually cleaner and more consistent with theory than the distant proxies or demographic characteristics often used in previous work.

The measure of trust is obtained using a series of item responses from the European Social Survey, obtaining measures of trust for married women with children younger than 12 from 26 European countries. Trust is found to significantly impact their child care choices.

The rest of the paper is structured as follows. Section 2 presents some of the work done relating social attitudes to fertility and participation decisions, and gives a brief overview of different ways of measuring social attitudes used previously. Section 3 presents a simple theoretical model that will guide the estimation. In Section 4 I describe the methodology used to obtain the measures of trust. Section 5 presents the data used, and I describe the questionnaire items and the personal and demographic characteristics of the respondents that play a role in the estimation of the latent attitudes. In Section 6 I obtain the measure of trust and I analyze its determinants as well as the variation of trust across countries. In Section 7 I study the relationship between the trust and child care technology choice. Finally, Section 8 concludes.

2.2. Relevance and Measurement of Social Attitudes

There has been strong interest among economists in the impact of social and cultural factors on economic or social outcomes (Knack and Keefer (1997), Guiso, Sapienza and Zingales (2004)). Concepts like trust and beliefs have been used to explain several individual and group outcomes such as health, financial development, or economic growth. Recently, individual social attitudes have been introduced in the analysis of female labor force participation and fertility; some papers have analyzed how beliefs about what should be the role of women in society can explain

²Most of the literature about social attitudes faces the critique that sometimes researchers' claims are in excess of what is justified by the statistical exercises reported (Durlauf and Fafchamps 2004).

part of the differences in female labor force participation rates across time (Fernandez et al. (2004) and Fogli and Veldkamp (2007)) and across countries (Algan and Cahuc (2005)).

One of the main problems of the literature that studies the role of concepts related to social attitudes is the measurement of such attitudes. Clearly, concepts like trust are inherently difficult to measure. There have been different approaches to solve this measurement problem, some involving the use of proxies, others using experimental economics. The next few paragraphs give a brief overview of these approaches and critiques to them.

One of the most common approaches to measuring social attitudes and concepts like trust has been the use of “indirect” indicators. An example of this approach is the work of Putnam (1993), who analyzes the impact of social capital on economic performance using the number of readers of the local newspaper, the voter turnout in referendums, and the participation rate in political elections as proxies for social capital. Also Guiso et al. (2004) uses this approach. To study how trust affects portfolio choice decisions, he uses electoral participation and blood donation as proxies for regional levels of trust.

Fernandez and Fogli (2005) find that cultural differences have a significant effect in explaining fertility and female labor force participation. They study second generation immigrants to the US, using lagged values of the total fertility rate in the mother’s country of origin as a proxy for culture.

While this approach may allow to identify the impact of social attitudes on economic outcomes, it still does not allow for direct measurement of social attitudes. This makes it more difficult to determine the effect of which specific social attitude I are actually observing. It is also less useful for the analysis of the determinants of social attitudes, or for comparative or policy-focussed perspectives.

Other authors have studied the effect of religious participation and beliefs. Barro and McCleary (2002) study to what extent religious participation and beliefs influence economic performance and political institutions. In the same vein, Berman et al. (2006) study the effect of changes in religiosity on fertility for European Catholic countries. These authors find that what matters are not changes in beliefs and preferences for children, but rather the decrease in the social services offered by the Catholic institutions.

Another approach used in the literature is to measure regional trust as the percentage of people in the population that claim to trust others. Usually these papers use the World Values Survey (WVS) or the European Values Survey (EVS) and their question: ‘Generally speaking, would you say that most people can be trusted

or that you cannot be too careful in dealing with people?’ Individual responses are then aggregated to a macro measure.

Examples of this approach are found in Knack and Keefer (1997) and Zak and Knack (2001) who find that trust and civic norms have a strong impact on economic performance, or in Beugelsdijk and van Schaik (2004) who also find that at the regional level, trust and voluntary work are related to economic growth. Also La Porta, Lopez-de-Silanes and Shleifer (1997) and Fukuyama (1995) follow this approach to examine the effect of trust in organizations.

This approach is similar to the one used by Algan and Cahuc (2005). These authors use the WVS and the International Survey Program to obtain information about differences in family attitudes and their effect on the employment rates of different demographic groups. They find that participation in the labor market is particularly low for demographic groups whose labor market participation is discouraged by families’ perceptions. One of these are prime-age women.

The scope of these studies is necessarily limited when a good measure of the individual level of trust is required. Measuring individual trust using only the answer to one question would be imperfect. It is difficult to believe that this can be a good measure for such a broad concept (for a critique of this approach see Glaeser, Laibson, Sheinkman and Soutter (2000) and Glaeser, Laibson and Sacerdote (2002)). The approach I use overcomes this limitation by measuring trust using responses to more than one question. By analyzing the individual and country-level determinants of trust, it also addresses the critique of lack of cross-country comparability of the original trust-based measures aired by Fine (2001).

Experimental economics is also concerned with measuring concepts such as trust. Since Berg, Dickhaut and McCabe (1995), different authors have designed trust game experiments to explain differences in trust across individuals of specific demographic groups. An example of that is Glaeser et al. (2000), they ask the standard question about generalized trust to a sample of Harvard undergraduates, this group of students is then asked to play the trust game. They find that the ones who claim to trust more people are not always the ones who trust more others. This may question the reliability of using survey data. The problem is of course that experiments rely in a very small and specific sample and it results difficult to make generalizations. At the same time it seems plausible that using more questions about trust, and not only one, it is possible to measure better trust as a latent attitude of the individuals.

The methodology for measuring trust used in the present paper represents a different view in the factor analysis and item response models; it allows not to

impose inessential assumptions and the use of categorical or discrete answers to the questions used as a basis for the measurement (Spady 2007). The result of applying this methodology will be the estimation of the probability distribution at individual level, and will be used to infer the relation between trust and different types of child care used by the households.

2.3. Determinants of Child Care Choice

I will sketch a simple model to show the link between individual trust and the choice of child care technology. Suppose that a mother's utility is given by $U(I, H)$, where I is her income and H is the well-being of her child. U increases in I and in H . Income can be obtained by working. For the mother to be able to work, someone else needs to take care of the child. Several types of child care are available, each with its cost C and expected benefit in terms of well-being of the child.

These types of child care can be ordered by their degree of "externalness" e to the family: The mother can stay at home and take care of the child herself (least external), leave the child with the grandparents or other family members (somewhat external), pay someone (e.g. a baby sitter) to take care of the child at home (more external) or bring the child to a different place (say a kindergarten) paying for the service (most external).

Benefits of child care have two components, the well-being/good treatment of the kid h , and acquisition of education and social skills b_i . Suppose that there is a probability p_i that the child is not treated well that increases with externalness. The cost of child care depends on features specific to the country and to the family, such as pricing and availability of kindergartens, or distance to grandparents and other family members.

Trust T affects benefits of child care in two ways. It reduces the mother's assessment of the probability p_i that the child is not treated well, and it increases the assessment of the amount of social skills the child will acquire further away from the family, i.e. $\partial p_i(e)/\partial T < 0$ and $\partial^2 b_i/(\partial e \partial T) > 0$. So higher trust raises the expected benefit of child care further away from the family compared to close to it.

In this setting, women are more likely to stay at home with their child when their potential wage is low, cost of external childcare is high, or they have a low level of trust. A higher potential wage makes choice of more external childcare more likely, just as higher trust. The optimal level of externalness then depends on the shape of the cost of childcare. Fundamentally, it seems reasonable to suppose that these costs rise with externalness. This can be reversed in countries where external childcare is heavily subsidized (e.g. free kindergartens) or in families that are very

dispersed, so that it would be very costly to have grandparents take care of a child. So personal and demographic characteristics and a country's institutions interact in determining child care choices.

2.4. Empirical Approach

In this section, I set up the model used for estimating the latent attitude that I identify as trust and its effect on the externalness of the type of child care used. ESS respondents indicate the degree of externalness in answering this question: “Thinking about the youngest child in the household, I would like to ask you about his/her usual child care, not counting lessons in school. By child care I mean care carried out by anyone other than yourself or your current husband/wife/partner. Using this card, what is the main type of childcare that the youngest child receives? Please select only one.”

Just as in Section 3, I consider four different types of child care technology that can be ordered by their degree of “externalness” e to the family: The mother can stay at home and take care of the child herself (type 1, least external), leave the child with the grandparents or other family members (type 2, somewhat external), pay someone (e.g. a baby sitter) to take care of the child at home (type 3, more external) or bring the child to a different place (say a kindergarten) paying for the service (type 4, most external).³

The theoretical model implies that there is an underlying latent variable “desired externalness”. Let this be e^* . There is a match from the latent variable, e_i^* , to the observed one, $e_i \in \{1, 2, 3, 4\}$, representing the four different types of child care defined above. According to this model, desired externalness will be a function of social benefits of child care, probability of failure, the costs of child care and the expected wage in the labor market:

$$e_i^* = f(SB, PF, CC, W) + \varepsilon_i \quad (2.1)$$

$$e_i = j \text{ if } \gamma_{j-1} < e_i^* \leq \gamma_j \quad (2.2)$$

for unknowns γ_j with $\gamma_0 = -\infty$, $\gamma_1 = 0$ and $\gamma_4 = \infty$. The probability that technology j is chosen is the probability that the latent variable e_i^* lies between two boundaries γ_{j-1} and γ_j . We assume that ε_i is i.i.d. standard normal, so I will estimate an ordered probit model.

³In the data, I define child care to be of type 1 if the mother's main activity is house work and taking care of children and the answer to the question is ‘no child care needed’, type 2 when the answer is ‘grandparents or other family members’, type 3 when the answer is ‘Paid child care, looked after at carer's or own home’ and type 4 if the answer is ‘Paid nursery or child care, looked after somewhere other than home’.

The components that influence mothers' decisions will be proxied by the following explanatory variables:

Expected Wage in the Labor Market (W). The expected wage influences the decision to participate in the labor market, and therefore the choice of child care. This is important not only for the effect on the decision of working or not (and therefore the choice between child care technology 1 and the others), but also because a higher wage in the labor market makes the use of more expensive child care more affordable. I will proxy the expected wage with **mother's education**. The marginal utility derived from consumption made possible by the wife's income also depends on the **husband's income**. If this is higher, the benefit from female participation is lower.

Costs of Child Care (CC). These can differ across individuals because of personal and family circumstances, and across countries because of different social policies. While in some countries child care is free for almost the whole population, in others the availability of public child care is very restricted and is basically reserved to people who have economic problems. As a measure of these costs I include an OECD indicator of the out-of-pocket **child care costs** for a lone parent (full-time care at a typical child care center).⁴ This indicator is computed using as average 'family net income' the sum of gross earnings plus cash benefits minus taxes and social contributions. All fee reductions, including free pre-school or child care for certain age groups, are taken into account as rebates. Unfortunately, the information is not available for all countries (see Table 2.8). Nevertheless, I believe that these social policies are quite homogenous at the country level, and I expect that I can capture them by including **country fixed effects** in the regressions. I also allow for the possibility that in cities the availability of formal child care can be higher, so I include a dummy that takes value 1 if the household lives in a **city**. The utility cost of child care expenditure will be different for families with different incomes. For that reason, I control for the **income of the household**. More specifically, I use the **husband's income** since the entire households' income includes the mothers' income, so using it would induce problems of endogeneity.⁵

Probability of Failure (PF). Mothers assume that the probability of failure or of misbehavior of the person taking care of the child rises with externalness. From the model, however, I expect that mothers with more **trust** will attach a lower probability to misbehavior of the person taking care of the child. I also include

⁴OECD Indicators 2007 – Benefits and Wages.

⁵I know if the percentage of the family income generated by the respondent (the mother) is none, very small, under a half, about a half, over a half, very large, all. We attribute the rest to the husband.

a dummy that is 1 if the **grandmother was working** when the mother was 14. Following the idea of Fernandez and Fogli (2005), I think that personal experiences can influence mothers' beliefs about how much harm can come from leaving the children with strangers. Therefore I expect these variables to have a negative effect on the expected probability of failure, and a positive effect on the desired degree of externals.

Social Benefits (SB). More external child care can yield social benefits in the form of education the child can receive from a well-trained person taking care of the child, and in the form of social skills the child can gain from interaction with other children. It is possible that parents with higher education will tend to give more importance to this type of benefits. Therefore, I include in the ordered probit the **education of the parents**. As described in the theoretical model, I also expect **trust** to affect expected social benefits positively.

If trust was observable, estimating equation 2.1 would be straightforward. But since trust is not observable, the estimation becomes less trivial. As stated above, concepts like trust are inherently difficult to measure. In this paper I measure trust using the item response model developed by Spady (2007). This estimation technique proves very useful for obtaining a measure of trust using all the information available (answers to questions about trust and personal and demographic characteristics) and allowing for a flexible functional form. Next, I give a brief description of Spady's (2007) method used here.

2.4.1. The measurement of trust

2.4.1.1. The underlying process. Figure 4.2 shows a diagram of the underlying process that I have in mind for measuring trust. I suppose that every individual has some amount of trust. This attitude directly causes the responses to certain survey questions. It also has an effect on the individuals', in this case the choice of child care technology.

Demographic and personal characteristics may also be informative about the way in which trust is distributed in a population; individual characteristics and experiences as well as community characteristics can be related to how much people trust each other. I assume that these characteristics do not affect the answers directly. If they have an effect it is through their effect on the attitudes I am measuring here. These characteristics can however affect the behavior of the individual (e.g. child care technology choice) directly, and this will be taken into account in the analysis.

The theoretical justification of the personal and demographic characteristics used in our estimation is the following:

Age. Since attitudes might change over the life cycle due to personal experience but also due to national and global developments, the age of respondents can be informative. In addition, there may be cohort effects. Since the data set is only a cross section, it is unfortunately impossible to disentangle life cycle and cohort effects.

Political orientation (left vs right). Information about respondents' political orientation can be informative about their attitudes. The expected sign is not immediately clear here, since on the one hand, one could think that more conservative people attach more importance to traditions and have a stronger feeling of belonging to a community. That could increase the level of trust in others. On the other hand, however, left-wing parties define themselves by their concern for the wellbeing of others, and this could affect left-leaning respondents' attitude to trust.⁶

Living in a village. As argued e.g. by La Porta et al. (1997), repeated interaction and small size of a local community can enhance trust and the sharing of norms and values of reciprocity. In particular, this could be the case for people living in villages.

Income. Since most determinants of income are also included as controls, the income coefficient should mainly reflect luck. Here it seems reasonable that people that faced more negative shocks have lower levels of trust and possibly also of reciprocity.

Belonging to a group that historically felt discriminated. Members of a group that has felt discriminated will probably not expect to be treated fairly in the future and therefore will trust less. The question used here is: "Would you describe yourself as being a member of a group that is discriminated against in this country? (yes/no)"

I also control for education and country of residence as they can influence the experiences faced during life.

2.4.1.2. Methodology and Estimation. Given the underlying process described above, I can apply the estimation methodology developed by Spady (2007). This method allows to obtain quantitative measures of latent attitudes without imposing specific parametric assumptions. The only assumptions needed are that (1) the expressions of agreement and disagreement on questions about trust ('item responses') reflect corresponding attitudes of the responder; (2) the 'attitudes' are enduring individual-specific attributes, given the individual's characteristics and environment. We will use a series of item responses, and I will assume that this series

⁶The question used from the EES is: "In politics people sometimes talk of "left" and "right." Where would you place yourself on this scale, where 0 means the left and 10 means the right?"

has been determined by the attitude in trust. The attitudes of individuals making up a sample population can then be given probability distributions, based on their item responses and characteristics.

As described above, I use 8 item responses with 3 categorical responses each, stemming from 2.290 married women with children. In that case there are $3^8 = 6561$ cells or possible combinations of responses. I assume that the item responses are determined by the individual's attitude on trust a . The probability of a particular response pattern (or cell) conditional on a is simply the product of the constituent item probabilities. That is (for m items):

$$p(r_1, r_2, \dots, r_m|a) = p(r_1|a)p(r_2|a)\dots p(r_m|a). \quad (2.3)$$

To make more efficient use of the information available, I also exploit the information from personal and demographic characteristics. I assume that individual i has certain characteristics W_i , and that the distribution $f(\cdot)$ of the latent attitude can be influenced by these characteristics W_i , that means $f(a|W_i)$. Concretely, as the theoretical model implies, suppose that W gives rise to social experiences, and consequently attitudes may change; the attitudes are then reflected in item responses:

$$p(r_1, r_2, \dots, r_m|W) = \int p(r_1, r_2, \dots, r_m|a)f(a|W)da \quad (2.4)$$

$$= \int p(r_1|a)p(r_2|a)\dots p(r_m|a)f(a|W)da \quad (2.5)$$

Equation 4.3 is used to estimate simultaneously how W affects a and how a affects item responses. It is specified that $f(a|W)$ is represented by a $N(\mu(W), 1)$,⁷ where

$$\mu(W) = W\beta. \quad (2.6)$$

So a is normal with a mean that is a linear function of the characteristics W . Equation 4.4 implies that $f(a|W)$ is a $N(0, 1)$ for the 'standardized respondent' and that the different groups of the population, characterized by different W , are also normally distributed with possibly different values of location μ .⁸

Results of this estimation are illustrated in Figure 3.7. This figure shows the resulting item response models estimated using equations 4.3 to 4.4 for the items selected to represent the trust scale. The first box shows the probability of answering

⁷Although it is methodologically possible, for simplicity I will not allow for scale variation.

⁸The "standardized respondent" will be a Greek married women who lives in a town or city, is 35.8 years old, has secondary education and medium income, has intensity of religion of 5.2, a value of 5.14 on a left-right scale of self-proclaimed political attitude, and who does not belong to a discriminated group(This is not the average person but the reference person.)

1, 2 or 3 in item 1 as a function of an individual's attitude a (trust), where the lowest line represents the probability of answering 1, the difference between the second and the lowest one the probability of answering 2, and the difference between 1 and the second line the probability of answering 3. The other boxes show the same for the other items.

The item response model is estimated by maximum likelihood, subject to the constraint that the distribution functions (the lines that indicate the probability of answering j in item k in Figure 3.7) be downward sloping and not crossing. The probability densities of the item responses as a function of the attitude are approximated using exponential tilting of second degree. Subtracting the cumulative distributions corresponding to these densities from 1, we obtain downward sloping lines. The units of measurement are then transformed into $[-\infty, \infty]$ by the normal distribution function. To ensure that they do not cross, the lines of the boxes are constructed as products of the first lines.

The integration for the probability of a particular outcome for individual i ($p(r_1, r_2, \dots, r_m|W) = \int p(r_1|a)p(r_2|a)\dots p(r_m|a)f(a|W)da$) has been carried out using a Gaussian quadrature at 200 grid points. To ensure that even the distributions with small variances are collected, the gaussian quadrature has been applied to 5 different segments of the grid, with the one in the middle having more points.

The parameters obtained are the ones describing the distribution functions as well as the parameters associated to the personal characteristics (indicating the effect on location relative to the probability distribution of the 'standardized respondent'). Since the estimation is done using exponential tilting of second degree, for each distribution function there are two parameters being estimated. The parameters associated to the personal characteristics are shown in Table 4.5.

2.4.2. Obtaining the Individual Level of Trust

One of the advantages of the methodology that I am using is that I can calculate the distribution of estimated trust for each individual. Applying Bayes' Law, the distribution of the attitude a for an individual person, given his answers and personal characteristics is:

$$f(a|W, r) = \frac{f(a, r|W)}{p(r|W)} = \frac{p(r|a, W)f(a|W)}{p(r|W)} = \frac{p(r|a)f(a|W)}{p(r|W)} \quad (2.7)$$

The elements of this expression have all been estimated previously; $p(r|W)$ is given as $\int p(r|a)f(a|W)da$ in equation 4.3.

Note that in estimating $f(a|W, r)$ I use all the information; both the personal characteristics and the item responses. It seems reasonable to think that $f(a|W, r)$

will be the most informative measure that can be obtained. To illustrate the effect of personal characteristics and item responses on our measure consider as an example the four respondents represented in Figure 2.4. The left panel shows the probability distribution of trust for two women who gave the same responses (the answers were $[1, 1, 1, 1, 1, 1, 1, 1]$), but who differ in their personal characteristics. Respondent A is a Spanish mother, she is 34, has high income, tertiary studies, lives in a city and does not belong to a discriminated group. On the intensity of religion scale (0-10) she situates herself at level 0 and on the left-right scale she situates herself at 7. Respondent B is a Ukrainian mother, she is 28, has secondary education, low income, lives in a village and does not belong to a discriminated group. On the intensity of religion scale (0-10) she situates herself at level 5 and on the left-right scale she situates herself as 9. The figure shows that while the two give the same responses, the probability distribution of trust for respondent A lies further to the right. This is because despite the fact that they give the same answers, Respondent A's personal characteristics are associated with higher levels of trust than those of Respondent B.

The right panel of Figure 2.4 shows the probability distribution of two Greek women, with very similar personal characteristics (they are between 30 and 35 years old, live in a city, have medium income and secondary studies and do not belong to a discriminated group. On the intensity of religion scale (0-10) they situate themselves at level 6 or 7 and on the left-right scale they situate themselves as 5) but they give very different responses to the items (Respondent C answers $[1, 1, 1, 3, 2, 1, 1, 1]$, and Respondent D answers $[3, 3, 3, 2, 3, 1, 1, 1]$.) Here, clearly the item responses drive the estimates of trust.

2.5. Data

To estimate the attitudes on trust I use the second wave of the European Social Survey (ESS). The ESS is a recent data set covering 26 European Countries in 2004. It provides rich information on social attitudes. In this round, the questionnaire includes, for the first time, a module on 'economic morality'. This module is designed to investigate the normative and moral culture of markets and consumption in European countries and is useful for us because it contains some questions about the level of trust and confidence in business and state/government institutions. In addition, the ESS also contains information about some demographic variables. In accordance with the theoretical model, some of these (described below) will also be used in the estimation. In this paper I have restricted my sample to married women

with children younger than 12. After this selection, Slovenia is removed from the sample since were left with only two observations for this country.

To measure the attitudes in shared trust I choose eight questions/items related to this scale. The original wording of the questions/items used to estimate the individual's latent attitudes towards trust is shown in the appendix, just as the original wording of the question about different types of child care.

Summary statistics of the responses to the these items are presented in Table 4.2. Scales are recoded such that each item has three possible answers (1-3 scale).⁹ A higher score corresponds to a higher level of trust. Even inside each scale the answering behavior varies over these items. Considering for instance the question "How much do you trust public officials?" and the question "Can politicians be trusted?", the means range from 2.20 to 1.55. This indicates that different items carry information on respondents' attitudes to a varying degree. Thus, by focussing on just one or on a narrow subset of these items, valuable information might be lost. This is also indicated by the pairwise correlation coefficients for the items shown in Table 4.4; correlations are positive but far from perfect.

Table 4.3 contains summary statistics of the personal and demographic characteristics that I expect to be related to an individual's level of trust, as well as with the type of child care used. Whether these relationships hold in the data is an empirical question on which this analysis can shed some light.

2.6. Results

2.6.1. How Personal and Demographics Characteristics relate to Trust

Table 4.5 shows the effect of W on the location (μ) of a . The effects are additive, which means that statements such as 'more educated people have more trust in others' must be understood in a *ceteris paribus* sense (Spady 2006). The effect of age¹⁰, intensity of Religion and the left-right scale are shown in Figure 2.3.

The factors that affect trust most strongly are the level of education and belonging to a discriminated group. The signs of the coefficients are as expected: Belonging to a discriminated group has a strong negative effect on trust. Lower levels of education also affect the level of trust negatively. I do not find a significant effect for the different income levels, nor for living in a village. Age matters; younger and older mothers have less trust than the middle-aged. This result is similar to the ones obtained by Putnam (2000) and by Glaeser et al. (2002). These authors find that this U-shaped profile is predicted by their model of social capital accumulation

⁹The recoding does not matter for our estimation.

¹⁰Notice that the variables presented in the tables are $Age = Age - mean(Age)$ and $Age.01 = (Age - mean(Age))^2/100$, the same for intensity of religion and left-right scale

over the life cycle. In the present case, the cross-sectional nature of the data does not allow us to distinguish whether this pattern is due to this life cycle pattern or to cohort effects. The intensity of religion also has the expected effect, with more religious mothers trusting others more. As to political orientation, what matters is more a distinction between the center and extremes than between right and left: people that identify with more extreme values have less trust in others. The level of trust decreases particularly rapidly for those that identify with the far-left. The highest value is reached in the center-right. It is important to notice that in determining a person's level of trust, these effects taken together can neutralize or reinforce each other. For instance, religiosity is positively correlated with belonging to a discriminated group, and these two effects can neutralize each other.

2.6.2. Trust Across Countries

Country characteristics such as differences in institutions, in labor market conditions, or in income and ethnical inequality also affect trust, as captured by the country fixed effects. These coefficients, shown in Table 4.5, make it clear that European countries differ quite a lot.¹¹ The coefficient is largest for the Nordic countries, and lowest in the Eastern European countries. Since the level of trust of each country also depends on the characteristics of its inhabitants, individuals' characteristics need to be taken into account in studying the realized distribution of trust across countries, and it is not enough to look at the coefficients reported in Table 4.5. For this reason, Table 2.5 reports country averages of individuals' mean trust. To make the means comparable to the coefficients, both measures are normalized so that they range from 0 to 1.

The order of the ranking varies only slightly between the two different measures. This indicates that the country dummies explain quite a lot of the differences in levels of trust. This result fits with those obtained in experimental frameworks. Henrich, Boyd, Bowles, Camerer, Fehr, Gintis, McElreath, Alvard, Barr, Ensminger, Henrich, Hill, Gil-White, Gurven, Marlowe, Patton and Tracer (2005) provide evidence that individuals from different cultures behave differently in ultimatum games and public good games, and Bornhorst, Ichino, Schlag and Winter (2005) find that there are significant differences between Southern and Northern Europeans in terms of trust in a trust game experiment with PhD students from different European countries. As Holm and Danielson (2005) say, all this evidence may be an indication that "trust operates differently in different cultures, even in relatively homogeneous groups."

This is also clear from the map in Figure 2.5 which shows the pattern of the levels of trust across countries. Countries have been grouped according to their

¹¹Note that the reference country is Turkey.

value of the indices reported in Table 2.5. The changes in the rankings when using the two different indices do not affect which countries are included in each group, underlining again that it is mainly country-specific, not individual-specific, factors that matter for cross-country differences.

2.6.3. Testing the Relationship between Trust and Child Care Technology Choice

Table 2.7 shows the results of the estimation of equation 2.1. To perform this estimation I use an ordered probit. The model is estimated for three different samples, the first consisting of all the countries, the second of all the countries except the Nordic countries, and the third of the Nordic Countries only. I am forced to exclude Turkey from the sample since in this country almost nobody uses the more external forms of child care (See Table 2.6). The availability of child care in Turkey is so low that it is difficult to assume that for most of the mothers the use of external child care constitutes a feasible choice.

In the full sample, I observe that trust has a non-linear, significantly positive effect on the externalness of child care, i.e. higher trust increases the probability of leaving the child with a more external type of child care. At high levels of trust, increments in trust cease to have an effect, as captured by the non-linearity. When I separate the sample, I observe that the effect of trust is linear for the non-Nordic countries. As average trust is significantly lower in these countries, the non-linearity, which occurs for high levels of trust, cannot be identified here. In the Nordic countries, in contrast, trust has no effect on the degree of externalness of child care. Several factors could be driving this result. First, the effect of trust on externalness can only be identified if a change in the type of child care can occur. However, in practice, the menu of child care choices is limited; if trust in the Nordic countries is generally high and as a consequence most people choose the most external type of child care (as shown in Table 2.6), people who would prefer even more external child care do not have such an option. Secondly, it could be that social policies are such that the cost of child care is so low that the most external choice is dominant for most people independently of trust. A low gender wage gap could have a similar effect. This suggests that cost is not the only factor leading to the choice of high levels of externalness of child care and high female labor market participation in the Nordic countries compared to the rest of Europe. Trust can also be an important explanatory factor.

The remaining variables take the expected sign. The coefficient on grandmother's labor market participation is positive and significant even for the Nordic countries. The husband's income is negatively associated to the degree of externalness, so the

effect on the marginal utility of consumption gained by a mother's labor market participation outweighs that on the affordability of child care. This is similar to findings in the literature that male wages are positively related to fertility and negatively to women's participation.¹² Education has a positive effect on externalness. This is true both for a higher degree held by the mother (though not for a secondary degree) and for a secondary or higher degree held by the partner. Columns IV to VI show the same specification but this time controlling for household income instead of husband's income. Although the effect of trust remains similar, this specification could suffer from endogeneity problems as the entire households' income includes the mothers' income. This endogeneity could explain the differences in education coefficients.

Most of the country dummies included in the regressions are also significant. Hence, factors other than trust and the other controls also matter in explaining child care choices; data on the cost of child care in different countries would help to shed more light on this. For that purpose I use a measure of out-of-pocket child care costs for a lone parent using full-time care at a typical child care center calculated by the OCDE. Unfortunately, I do not have this information for all the countries of the sample. Therefore, I perform the analysis using only the countries for which I have this information. Table 2.8 shows the measure of child care cost per country and the sample of countries for which I have this information. The first two columns of Table 2.9 compare the results of all the sample including country fixed effects and the ones obtained using the sample of countries for which I have information on child care costs. I observe that the effect of trust is larger and still significant and that the child care costs have a significantly negative effect on the degree of externalness. For the rest of specifications (discussed below) I also perform the analysis for the reduced group of countries and including the child care cost measure. The effect of child care costs is always significant, but the interpretation of this coefficient requires care since it could be picking up other variables with country variation.

Culture and trust: In measuring trust, it has been shown that political orientation, belonging to a group that historically felt discriminated, and intensity of religion are among the variables related to trust. It is possible that these variables are correlated with certain cultural perceptions about the role of women in the family. To verify this possibility, I include a proxy for these cultural differences in our regression. The proxy takes the value 1 if the woman thinks that the mother should

¹²For evidence for various countries, see Carliner, Robinson and Tomes (1980) on Canada, Ermisch (1989) on the UK, Colombino and Di Tommaso (1996) and Di Tommaso (1999) on Italy, and Hotz and Miller (1988) on the US.

reduce work in favor of family obligations.¹³ Columns III and IV of Table 2.9 show the results of including this variable, excluding and including child care costs respectively. The results indicate that the variable is important in determining the degree of desired externalness. However, the effect of trust remains positive and significant. It also retains the non-linear pattern found before.

I also verify the effect of including the variables reflecting political orientation, feeling of belonging to a discriminated group, and intensity of religion in the regressions. The results are shown in columns V and VI of Table 2.9. The coefficient on belonging to a discriminated group and intensity of religion are negative and significant for both specifications. The effect of trust, however, remains positive and significant.

The role of education: It could be argued that trust should play less of a role for more educated mothers. For instance, it may be that more educated mothers feel more able to specify what type of education they want for their children and more able to enforce it. Trust should then matter less for their decision.

To test this hypothesis, I separate the sample between mothers with higher education and mothers with primary or secondary education. The results obtained are shown in Table 2.10. Indeed, the more highly educated mothers do not rely on trust when taking the decision about the degree of externalness desired. The results hold when controlling for costs of child care. Trust remains very significant for mothers with lower levels of education.

Trust and female participation in the labor market: The previous results show that trust increases the probability of using a more external type of child care. If this transition is from child care by the mother to child care by someone else, this means that more trust can encourage labor market participation. To explore this possibility with more detail, Table 2.11 shows the results of a probit estimation where the dependent variable is equal to 1 if mother's main activity is paid work and 0 otherwise. The results confirm that trust increases the probability that mothers participate in the labor market. Previously I have identified a possible channel; they have a higher predisposition to use more external forms of child care.

2.7. Conclusion

The evidence presented in this paper suggests that trust affects mothers' choice child care technology. In extension, it may also affect their decision to participate in the labor market. Since the results show strong differences of trust across countries,

¹³The exact wording is "A woman should be prepared to cut down on her paid work for the sake of her family."

trust could also be a possible explanation for the differences in the use of formal child care and in female participation rates across countries.

Although it would be desirable to formally take into account additional factors such as policies affecting the cost of child care or gender discrimination in the labor market, this paper raises the issue that the level of confidence of citizens with their institutions and with other citizens may have important implications for female labor force participation.

Results are obtained using a new item response model for measuring individuals' attitudes (here, trust). Item response theory models are conceptually cleaner than previously used methods since they allow estimating trust directly (and not a proxy) as a latent attitude and using a simple theoretical model. The item response model used in this paper does also allow to consider a very flexible functional form. In line with the idea that generalized trust is a broad idea, the model allows to build the individual measure using different dimensions of trust, avoiding problems of other papers that use more partial measures.

In measuring the individual level of trust, I exploit information on individuals' attitudes contained in survey responses, and information from personal and demographic characteristics. This allows to see the probability distribution of the latent attitude, conditional on these characteristics. In particular, education, age, intensity of religion, political orientation, and being from a discriminated group can explain part of the distribution of trust. Regional characteristics are also very important in explaining differences of trust across Europe.

The findings of this paper imply that social policies affecting the cost and availability of child care are not the only factor that facilitates the use of formal child care and promotes labor market participation of mothers; trust and any policies affecting it also matter. Enhancing trust may also make social policies more effective, particularly in countries with low levels of trust such as the Eastern European countries. This could be achieved by increasing trust in institutions, but also by raising levels of education, and by reducing discrimination.

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Appendix

Appendix 2.A. Original wording of the questions/items used

- Generally speaking, would you say that most people can be trusted, or that you can't be too careful in dealing with people?¹⁴ (Score of 0 to 10, where 0 means you can't be too careful and 10 means most people can be trusted.)
- Do you think that most people would try to take advantage of you if they got the chance, or would they try to be fair?¹⁵ (Score of 0 to 10, where 0 means most people would try to take advantage of me and 10 means most people would try to be fair.)
- Would you say that most of the time people try to be helpful or that they are mostly looking out for themselves?¹⁶ (Score of 0 to 10, where 0 means people mostly look out for themselves and 10 means people mostly try to be helpful.)
- Please tell me how much you personally trust each of the institutions I read out. (Score of 0 to 10, where 0 means you do not trust an institution at all, and 10 means you have complete trust.)
 - the legal system
 - politicians
- How much would you trust the following groups to deal honestly with people like you? (Score of 1 to 5, where 1 means you distrust and 5 means you trust a lot.)
 - plumbers, builders, car mechanics and other repair people¹⁷
 - financial companies such as banks or insurers.
 - public officials¹⁸

¹⁴Can't be too careful: need to be wary or always somewhat suspicious.

¹⁵Take advantage: exploit or cheat; fair: in the sense of treat appropriately and straightforwardly.

¹⁶The intended contrast is between self-interest and altruistic helpfulness.

¹⁷Builders include all kinds of tradespeople who work on building sites.

¹⁸Public officials refers to both government officials, such as custom officers and to local officials, such as housing/building regulators etc.

Appendix 2.B. Tables and Figures

TABLE 2.1. Descriptive Statistics of the items used to estimate the Trust Scale.

Variable	Mean	Std. Dev.	Min	Max
Most People Trusted	1.962	0.837	1	3
Most People Fair	2.157	0.820	1	3
Most People Helpful	1.874	0.803	1	3
Trust Legal System	2.080	0.835	1	3
Trust Politicians	1.552	0.704	1	3
Trust Repair People	2.125	0.838	1	3
Trust Banks	2.109	0.835	1	3
Trust Public Officials	2.202	0.782	1	3

TABLE 2.2. Pairwise Correlation Coefficients for the items used to build the two scales.

Question	Trust People	People Fair	People Help	Legal System
Trust People	1.000			
People Fair	0.545	1.000		
People Help	0.426	0.429	1.000	
Legal System	0.254	0.215	0.232	1.000
Politicians	0.252	0.194	0.201	0.445
Repair Things	0.135	0.163	0.140	0.119
Banks	0.134	0.152	0.1160	0.121
Public Officials	0.160	0.185	0.133	0.250
Question	Politicians	Repair Things	Banks	Public Officials
Politicians	1.000			
Repair Things	0.113	1.000		
Banks	0.154	0.401	1.000	
Public Officials	0.198	0.340	0.468	1.000

TABLE 2.3. Descriptive Statistics for the Personal and Demographic Characteristics.

Variable	Mean	Std. Dev.
Age	35.584	6.923
Primary Degree	0.129	0.336
Secondary Degree	0.513	0.500
Higher Degree	0.357	0.479
City	0.320	0.467
Intensity Religion	5.496	2.814
Left-Right	5.589	5.159
Discriminated Group	0.067	0.249
Average Income	32601.52	29418.70
Husband's Income	21970.01	21776.23
Partner Primary Degree	0.310	0.463
Partner Secondary Degree	0.420	0.494
Partner High Degree	0.258	0.438
Grandma Working	0.551	0.497

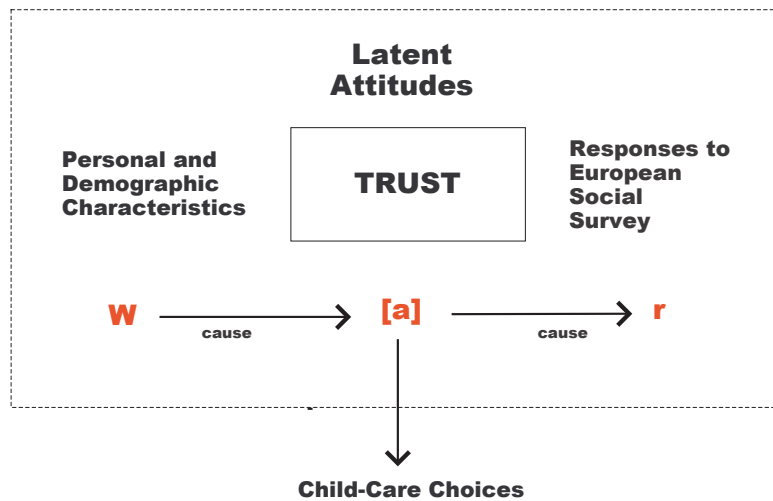


FIGURE 2.1. Diagram of the underlying process.

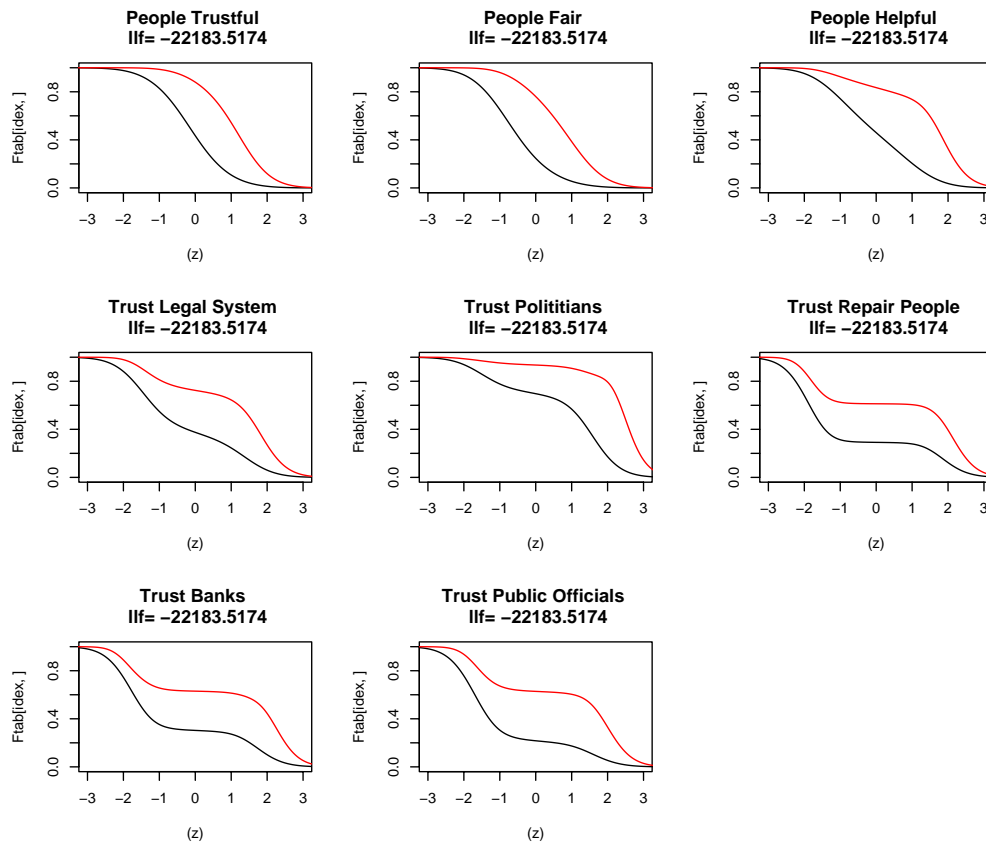


FIGURE 2.2. Estimates of the item response model for the items constituting a scale on shared trust.

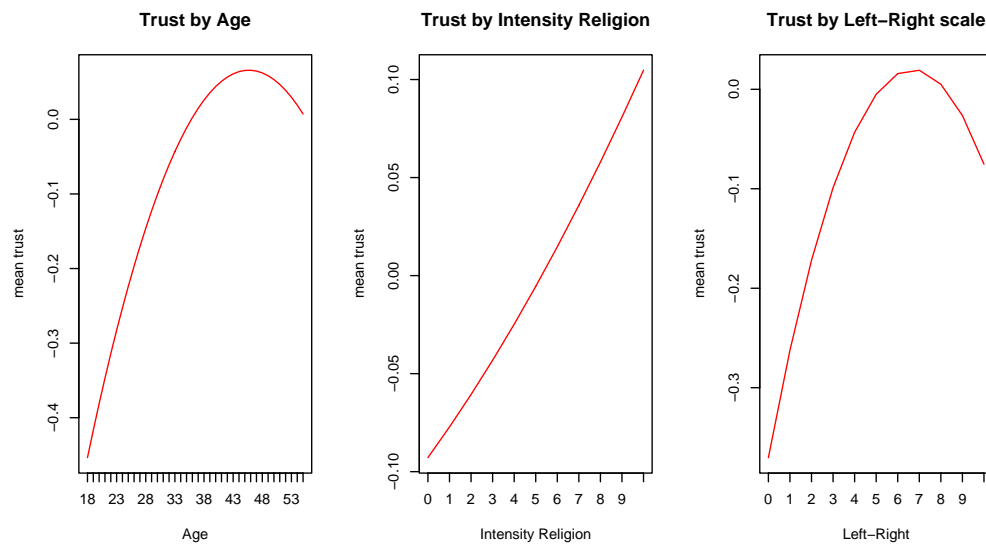


FIGURE 2.3. The effect of the three continuous demographic variables: Age, Intensity of Religion, Left-Right Scale.

TABLE 2.4. Estimated Coefficients for Personal and Demographic Characteristics in Trust Scale.

Variable	Standard Errors			
	Coefficient	Outer Product	Hessian	White Robust
Age	0.0103	0.0039	0.0036	0.0035
Agesq.01	-0.0752	0.0320	0.0305	0.0293
Income1	-0.1056	0.0806	0.0756	0.0732
Income3	0.0050	0.0662	0.0626	0.0608
PrimaryDegree	-0.3028	0.0889	0.0834	0.0808
HigherDegree	0.3215	0.0587	0.0544	0.0521
Village	0.0113	0.0530	0.0492	0.0468
IntensityReligion	0.0281	0.0100	0.0095	0.0092
IntRelig.01	0.3743	0.2868	0.2656	0.2516
DiscriminatedGroup	-0.4876	0.1030	0.0942	0.0882
LeftRight	0.0226	0.0120	0.0115	0.0115
LeftRight.01	-0.0313	0.0159	0.0156	0.0158
Austria	0.9958	0.1465	0.1430	0.1479
Belgium	0.5473	0.1569	0.1469	0.1479
Switzerland	1.1304	0.1236	0.1282	0.1419
Chez Republic	0.1046	0.1341	0.1351	0.1445
Germany	0.3995	0.1123	0.1205	0.1388
Denmark	1.9314	0.1470	0.1260	0.1193
Estonia	0.4844	0.1607	0.1574	0.1611
Spain	0.1402	0.1539	0.1443	0.1441
Finland	1.4525	0.1161	0.1186	0.1304
France	0.3210	0.1433	0.1260	0.1215
Great Britain	0.5209	0.1216	0.1331	0.1532
Greece	-0.5820	0.1217	0.1195	0.1212
Hungary	-0.0409	0.1629	0.1439	0.1335
Ireland	0.7222	0.1179	0.1177	0.1276
Iceland	1.4234	0.2514	0.1929	0.1610
Luxembourg	0.2671	0.1885	0.1676	0.1565
Netherlands	0.9396	0.1246	0.1158	0.1170
Norway	1.5071	0.1406	0.1226	0.1156
Poland	-0.2285	0.1549	0.1309	0.1223
Portugal	-0.2553	0.1465	0.1398	0.1434
Sweden	1.0094	0.1268	0.1404	0.1611
Slovakia	-0.0193	0.2006	0.1631	0.1430
Ukraine	-0.1569	0.1722	0.1607	0.1592
Italy	-0.4836	0.1978	0.2113	0.2487

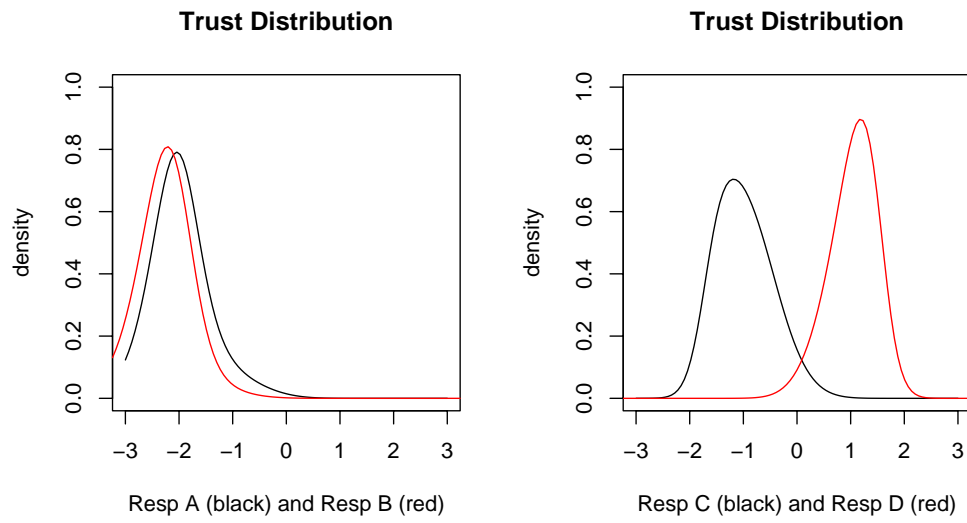


FIGURE 2.4. Probability density distribution of the latent attitudes for different respondents.

TABLE 2.5. Differences in trust levels across countries.

Region	Regional Coefficient (normalized:0-1)	Trust Index (normalized: 0-1)
Greece	0.000	0.000
Italy	0.039	0.020
Turkey	0.232	0.033
Portugal	0.130	0.048
Poland	0.232	0.110
Slovakia	0.232	0.160
Hungary	0.232	0.174
Ukraine	0.232	0.178
Czech Republic	0.273	0.210
Spain	0.232	0.252
Luxembourg	0.232	0.301
France	0.359	0.358
United Kingdom	0.439	0.378
Germany	0.391	0.382
Estonia	0.424	0.398
Belgium	0.449	0.452
Ireland	0.519	0.537
Netherlands	0.605	0.586
Austria	0.628	0.597
Sweden	0.633	0.618
Switzerland	0.232	0.648
Iceland	0.798	0.814
Finland	0.809	0.815
Norway	0.831	0.818
Denmark	1.000	1.000

TABLE 2.6. Percentage of mothers using different types of technology (differences across samples).

	All countries included*	Non Nordic countries	Nordic countries	Turkey
Mother Home	37.69	42.15	19.38	83.87
Family Member	39.21	40.74	32.96	14.92
Baby-Sitter	6.86	6.79	7.13	0.81
Kindergarten	16.24	10.32	40.53	0.40
Sample Size	2090	1841	449	248

This sample does not include Turkey.

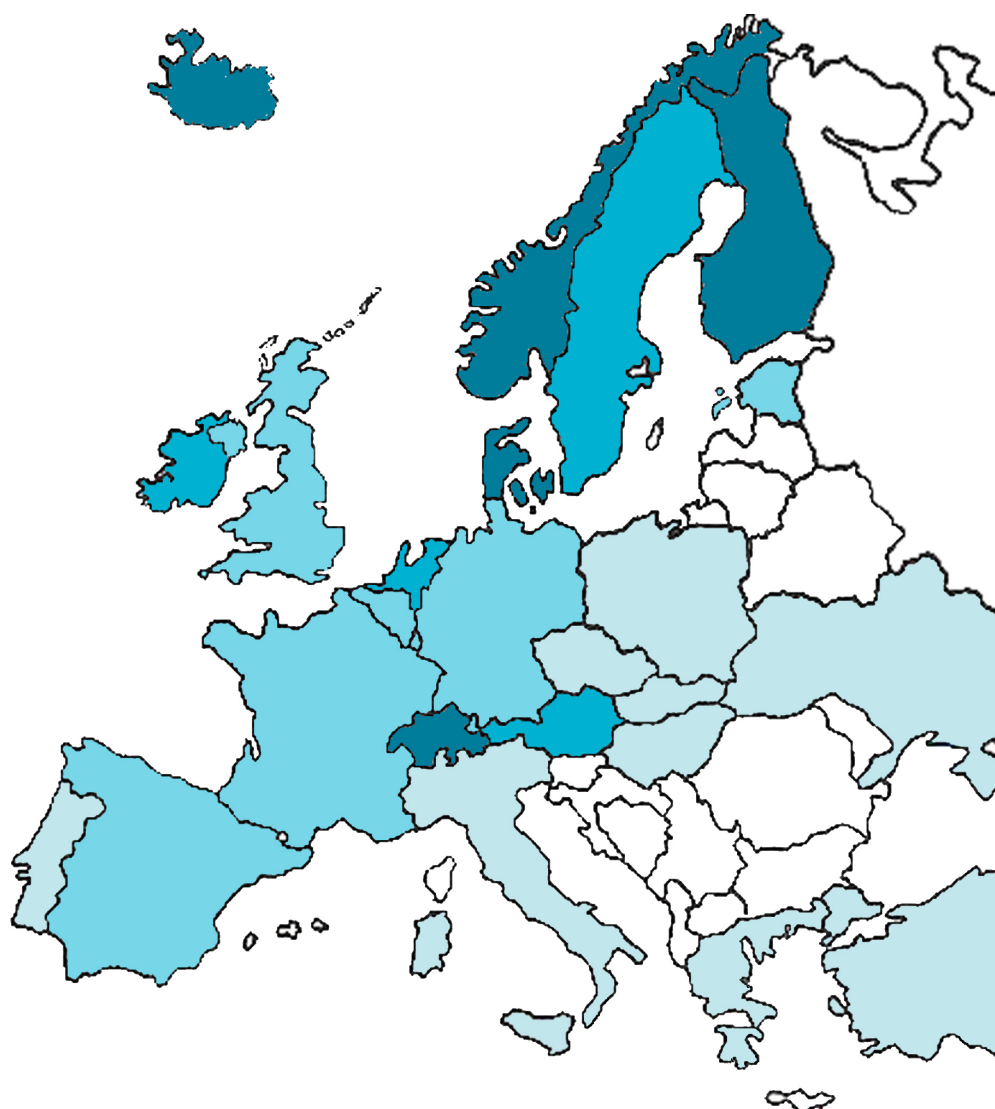


FIGURE 2.5. Trust across Europe: from dark (more trust) to light (less trust)

Table 2.7: Ordered Probit Estimation for Child Care Technology Choice.

Child Care Type	(I) All	(II) Non Nordic	(III) Nordic	(IV) All	(V) Non Nordic	(VI) Nordic
Trust	0.072 (0.036)	** (0.038)	* (0.165)	0.078 (0.036)	** (0.037)	** (0.165)
Trust ²	-0.034 (0.017)	* (0.023)	-0.032 (0.049)	-0.039 (0.017)	** (0.023)	* (0.049)
Income Husband /1000	-0.008 (0.001)	*** (0.002)	*** (0.003)			
Income House- hold/1000				0.003 (0.001)	*** (0.001)	** (0.002)
Age	0.013 (0.004)	*** (0.004)	*** (0.009)	* (0.004)	*** (0.004)	** (0.009)
City	0.075 (0.067)	0.036 (0.074)	0.193 (0.163)	0.064 (0.067)	0.037 (0.074)	0.168 (0.162)
Second. Educ	0.174 (0.106)	0.172 (0.108)	-0.466 (0.748)	0.183 (0.106)	0.192 (0.108)	* (0.751)
High Educ	0.548 (0.115)	*** (0.120)	*** (0.755)	0.544 (0.115)	*** (0.120)	*** (0.759)
Partner Second	0.163 (0.066)	** (0.072)	*** (0.172)	0.113 (0.066)	* (0.072)	* (0.171)
Partner High	0.177 (0.077)	** (0.087)	** (0.182)	0.037 (0.077)	0.046 (0.086)	-0.022 (0.182)
Grandma worked when mother 14	0.233 (0.055)	*** (0.060)	*** (0.138)	** (0.055)	*** (0.060)	*** (0.139)
Country Dummies	yes	yes	yes	yes	yes	yes
LR-Chi ²	536.3	277.5	68.8	512.7	238.6	71.8
pseudo-R ²	0.10	0.66	0.02	0.09	0.06	0.07
N	2290	1841	449	2290	1841	449

Standard errors in parentheses; stars indicate significance at 10 (*), 5 (**), and 1 (***) percent levels, respectively.

TABLE 2.8. Out-of-pocket child care costs for a lone parent: full-time care at a typical child care centre.

Country	Child care fee	Child care benefit/ rebates	Tax reduction	Other benefits	Net cost	Net cost, % family net income
Norway	18.0	-18.9	-2.9	0.0	-3.8	-5.76
Hungary	0.0	0.0	0.0	0.0	0.0	0.00
Portugal	27.8	-26.4	-0.1	0.0	1.3	2.00
Netherlands	8.0	0.0	-2.9	-3.3	1.7	3.00
Belgium	12.5	-8.7	-1.8	0.0	1.9	3.53
Greece	3.7	-0.9	-0.1	0.0	2.7	4.58
Finland	3.1	0.0	0.0	0.0	3.1	4.15
Sweden	3.4	0.0	0.0	0.0	3.4	4.85
Luxembourg	7.7	-4.2	0.0	0.0	3.4	4.84
Germany	6.2	-2.1	-0.5	0.0	3.6	6.81
France	6.7	0.0	-1.7	0.0	5.0	8.75
Austria	5.8	0.0	0.0	0.0	5.8	9.28
Denmark	11.4	-5.4	0.0	0.0	6.0	8.48
Poland	9.3	-4.1	0.0	4.1	9.3	12.69
UK	47.8	-26.0	0.0	-12.0	9.9	14.37
Czech Republic	10.3	0.0	0.0	0.0	10.3	14.71
Iceland	12.5	-2.1	0.0	0.0	10.4	13.54
Slovak Republic	11.3	0.0	0.0	0.0	11.3	17.10
Switzerland	15.0	0.0	-1.1	0.0	13.9	22.70
Ireland	49.6	-5.0	0.0	0.0	44.6	51.75

Results are for 2004. Two children aged two and three. 'Family net income' is the sum of gross earnings plus cash benefits minus taxes and social contributions. All fee reductions, including free pre-school or child care for certain age groups, are shown as rebates where possible. Source: OECD tax-benefit models.

TABLE 2.9. Ordered Probit Estimation for Child Care Technology
Choice: Including cost of child care and other cultural variables.

Child Care Type	All (I)	CC Cost (II)	Culture (III)	Culture CC Cost (IV)	Other culture (V)	Other culture CC Cost (VI)	
Trust	0.073 ** (0.036)	0.162 *** (0.036)	0.069 * (0.036)	0.156 *** (0.036)	0.065 * (0.037)	0.152 *** (0.036)	
Trust ²	-0.034 ** (0.017)	-0.020 (0.017)	-0.034 ** (0.017)	-0.021 (0.017)	-0.033 * (0.017)	-0.013 (0.018)	
Income Husb. /1000	-0.007 *** (0.001)	-0.005 *** (0.001)	-0.007 *** (0.001)	-0.005 *** (0.001)	-0.008 *** (0.001)	-0.005 *** (0.001)	
Age	0.013 (0.004)	0.016 *** (0.004)	0.013 *** (0.004)	0.016 *** (0.004)	0.013 *** (0.004)	0.016 *** (0.004)	
City	0.048 (0.067)	-0.030 (0.070)	0.061 (0.067)	-0.020 (0.070)	0.059 (0.067)	-0.013 (0.070)	
Second Educ	0.183 * (0.106)	0.038 (0.109)	0.174 * (0.106)	0.024 (0.109)	0.162 (0.106)	0.004 (0.110)	
High Educ	0.548 *** (0.115)	0.492 *** (0.119)	0.538 *** (0.115)	0.474 *** (0.119)	0.530 *** (0.115)	0.480 *** (0.119)	
Partner Second	0.146 ** (0.066)	-0.010 (0.064)	0.141 ** (0.066)	-0.018 (0.064)	0.150 ** (0.066)	-0.016 (0.064)	
Partner High	0.166 ** (0.077)	0.050 (0.078)	0.160 ** (0.077)	0.050 (0.078)	0.177 *** (0.077)	0.054 (0.078)	
Grandma worked	0.213 *** (0.054)	0.282 *** (0.053)	0.210 *** (0.054)	0.281 *** (0.053)	0.209 *** (0.055)	0.263 *** (0.053)	
Child care cost		-0.011 *** (0.002)		-0.011 *** (0.002)		-0.010 *** (0.002)	
Mother cut work			-0.251 *** (0.077)	-0.310 *** (0.081)			
Left-Right					0.003 (0.005)	-0.017 (0.013)	
Discriminated Group					-0.252 ** (0.105)	-0.238 (0.108)	**
Intensity Religion					-0.016 * (0.009)	-0.039 (0.009)	***
Country Dummies	yes		yes		yes		
LR-Chi ²	524.34	233.22	535.15	247.95	533.87	259.37	
pseudo-R ²	0.09	0.05	0.10	0.05	0.10	0.05	
N	2290	2030	2290	2030	2290	2030	

Standard errors in parentheses; stars indicate significance at 10 (*), 5 (**), and 1 (***) percent levels, respectively.

TABLE 2.10. Ordered Probit Estimation for Child Care Technology
Choice: Analyzing the role of education

Child Care Type	Low Education		High Education		Low Education		High Education	
Trust	0.129	***	-0.068		0.197	***	0.081	
	(0.043)		(0.070)		(0.041)		(0.070)	
Trust ²	-0.060	***	0.022		-0.053	**	0.029	
	(0.023)		(0.029)		(0.023)		(0.030)	
Income Husband/1000	-0.008	***	-0.007	***	-0.005	***	-0.004	**
	(0.002)		(0.002)		(0.002)		(0.002)	
Age	0.013	***	0.014	**	0.019	***	0.012	*
	(0.005)		(0.006)		(0.005)		(0.007)	
City	0.024		0.098		-0.081		0.048	
	(0.093)		(0.098)		(0.097)		(0.103)	
Partner Second	0.156	**	0.160		-0.019		0.018	
	(0.077)		(0.132)		(0.071)		(0.133)	
Partner High	0.197	*	0.194		0.089		0.058	
	(0.108)		(0.129)		(0.106)		(0.133)	
Grandma worked when mother 14	0.247	***	0.157	*	0.302	***	0.252	***
	(0.071)		(0.087)		(0.067)		(0.085)	
Child care cost					-0.014	***	-0.008	**
					(0.003)		(0.003)	
Country Dummies	yes		yes					
LR- χ^2	259.05		162.26		80.79		41.04	
pseudo- R^2	0.08		0.07		0.03		0.02	
N	1405		885		1258		772	

Standard errors in parentheses; stars indicate significance at 10 (*), 5 (**), and 1 (***) percent levels, respectively.

TABLE 2.11. Probit Estimation for the mother's probability of participating in the labor market.

Mother works (= 1)	(I) All	(II) CC Cost	(III) Low Educ	(IV) High Educ
Trust	0.089 ** (0.042)	0.132 *** (0.040)	0.148 *** (0.049)	-0.086 (0.086)
Trust ²	-0.040 ** (0.020)	-0.033 * (0.020)	-0.056 ** (0.026)	0.017 (0.036)
Income Husband/1000	-0.010 *** (0.002)	-0.006 *** (0.001)	-0.011 *** (0.002)	-0.009 *** (0.003)
Age	0.019 *** (0.004)	0.022 *** (0.004)	0.011 ** (0.005)	0.037 *** (0.008)
City	0.014 (0.078)	-0.093 (0.081)	0.108 (0.106)	-0.055 (0.119)
Second Educ	0.329 *** (0.122)	0.127 (0.122)		
High Educ	0.750 *** (0.134)	0.597 *** (0.134)		
Partner Second	0.205 *** (0.076)	-0.001 (0.073)	0.238 *** (0.088)	0.144 (0.163)
Partner High	0.172 (0.091)	0.029 (0.090)	0.222 * (0.124)	0.155 (0.161)
Grandma worked when mother 14	0.229 *** (0.063)	0.228 *** (0.060)	0.294 *** (0.081)	0.130 (0.106)
Child care cost		-0.006 * (0.003)		
Constant	-1.558 *** (0.242)	-0.937 *** (0.206)	-1.118 *** (0.256)	-1.195 *** (0.396)
Country Dummies	yes		yes	yes
LR- χ^2	327.96	153.57	159.34	112.08
pseudo-R ²	0.10	0.05	0.08	0.10
N	2290	2030	1405	885

Standard errors in parentheses; stars indicate significance at 10 (*), 5 (**), and 1 (***) percent levels, respectively.

CHAPTER 3

Trust and the Choice Between Housing and Financial Assets: Evidence from Spanish Households

ABSTRACT. Trust has been shown to affect households' portfolio choice. We argue that it also influences their investment in housing, which for many households is the main portfolio component. We test this hypothesis using data for Spain. Using data from the European Social Survey (ESS), we estimate individual-level trust as a latent attitude using survey questions on personal attitudes by applying the econometric methodology by Spady (2007). We then combine this information with information about Spanish households' financial decisions from the Survey of Household Finances (EFF) conducted by the Bank of Spain. We find that trust has a positive effect on the share of wealth invested in financial assets and a negative effect on the share of wealth invested in housing. Trust also has an important effect on the share of risky assets in financial assets. Trust can therefore be a possible explanation for the low participation in financial markets and the high percentage of households' wealth invested in real estate.

KEYWORDS. housing, trust, portfolio choice, item response models.

JEL CLASSIFICATION. D1, D8, Z1.

3.1. Introduction

While most of the literature on portfolio choice has focussed on holdings of risky assets, the asset class that actually dominates private asset holdings is real estate. Figure 3.1 shows that in Spain, real estate accounts for a high percentage of assets held at all but the very lowest percentiles of the gross wealth distribution. In fact, as shown in Figure 3.2, the number of households that hold risky assets is almost negligible for most of the wealth distribution, while nearly all households have some real estate from the 20th percentile of the wealth distribution on. Figure 3.3 shows that real estate dominates the portfolios of low and middle class households. Financial assets and risky assets become somewhat important for wealthier households only.

Although housing also dominates households' portfolios in other developed countries, it is particularly important in Spain, making it a good case to study. The percentage of households that are owner occupiers is very large in Spain (82% versus around 70% in the UK, the US and Italy). In addition, the percentage of households owning real estate other than the household's main residence is also higher in Spain (30% versus 22% in Italy, 17% in the United States and 8.5% in the United Kingdom).¹ All this evidence indicates that the pattern that a small percentage of households own risky assets (especially for the low wealth quantiles) while many households own real estate is found across countries, but is particularly pronounced in Spain.

As pointed out by Bover et al. (2005), this situation makes Spanish households more dependent on real estate property prices and makes it more difficult to adjust the composition of their portfolios when facing adverse shocks. This became very evident in the recent (since 2007) period of declining house prices. In such an environment, Oswald's (1996) argument that home ownership raises mobility costs and makes labor market adjustment harder gains particular force. In addition, rates of home ownership matter for monetary policy transmission, interest rate determination, the welfare cost of inflation, and for other macro policies. Households' participation in financial markets also influences the equity premium (see Vissing-Jorgensen and Attanasio (2003) and Heaton and Lucas (1996)). Finally, portfolio composition has effects on the retirement situation and on intergenerational wealth transmission (bequests). For all these reasons, understanding factors behind portfolio composition is important. In particular, it is relevant to understand why Spanish portfolios are so skewed towards real estate.

¹Data from Bover, Martinez-Carrasco and Velilla (2005) who compares Spain with the US, the UK and Italy.

While portfolio choice can have large macroeconomic implications, its determinants are not only “traditional” economic variables: A recent literature finds that social attitudes influence portfolio choice. Different authors have studied the effect of social interactions (as a mechanism through which information can be transmitted) on participation in pension plans (Duflo and Saez (2002)) or in the stock market (Hong, Kubik and Stein (2004)). The effect of trust on portfolio decisions has been studied by Guiso et al. (2004) and Guiso, Sapienza and Zingales (2008). These authors argue that when dealing with risky assets, the individual’s perception of their risk is not only a function of the assets, but also of the subjective characteristics of the investor. The expected return may depend on a series of uncontrollable events that most of the time can be related to human misbehavior. As a consequence, less trustful individuals participate less in financial markets. They test this hypothesis empirically for Italy and the Netherlands.

Pursuing this argument further, we argue in this paper that individuals’ decision about how much to invest in housing versus other financial assets is affected by trust. We sketch a very simple model where housing, while constituting an investment, also yields flow utility from use. Demand for housing is determined simultaneously with demand for other assets. If trust affects the expected return of the risky financial assets, it also determines how much the households invests in housing.

To test this hypothesis empirically, we use data from the European Social Survey (ESS) and from the Survey of Household Finances (EFF) conducted by the Bank of Spain.² While the EFF does not contain information on trust, it can still be used by proceeding in two steps. First, using data from the ESS, we estimate probability distributions of trust for a large set of detailed demographic groups (where the groups are defined for given sets of demographic characteristics: age, education, parents information, gender, number of members in the family...). We then exploit the variation between these groups to identify the effect of trust on the share of wealth invested in housing, in financial assets and in risky financial assets.

For this two-step approach, it is particularly important to have a good measure of trust in the first step. Hence, instead of using partial information or distant proxies as previously done in the literature, we apply a hierarchical item response model by Spady (2007) that, while imposing some parametric assumptions, is highly flexible and still allows to exploit all the information available. Employing this method, we can use information from several questions about trust and about individuals’ demographic characteristics.

²I would like to thank the Bank of Spain, in particular Olympia Bover, for channeling the blind use of regional information, protecting the confidentiality of the EFF, following up my stay in the Research Division as a visiting Ph.D. researcher.

We find that trust has a positive effect on the share of wealth invested in financial assets and a negative effect on the share of wealth invested in housing. We also find that trust has a large effect on the share of financial assets invested in risky assets. In Spain, as opposed to Guiso et al.'s (2004) results for Italy, trust does not affect cash holdings.

The rest of the paper is structured as follows. In Section 3.2 we give a brief overview of the determinants of portfolio choice and remaining puzzles, as established in the literature. Section 3.3 presents a simple theoretical model that will guide the estimation. Section 3.4 shows the structural representation of the empirical model and discusses the measurement of trust. In section 3.5 we present the data used; we describe the questionnaire items and the personal and demographic characteristics of the respondents that play a role in the estimation of trust (ESS). We also describe the dataset with the information about the financial situation of households in Spain (EFF). In section 3.6 we obtain the measures of trust and analyze its determinants. We study the effect of trust on the share of wealth invested in financial assets, housing, and risky assets. Finally, Section 3.7 concludes.

3.2. Puzzles and Determinants of Portfolio Decisions

The theoretical literature on household portfolio decisions has focussed mainly on the choice between risky and non risky financial assets.

The limited stock market participation (called the equity market participation puzzle), while especially strong in Spain, is a stylized fact identified in almost all developed economies. Theoretical research has analyzed and proposed different explanations for this phenomenon: The existence of market imperfections like credit constraints, participation and information costs, the presence of background risk and non-standard preferences.

Some costs for entering the stock market such as broker fees are observable. Others are unobservable, for instance the cost of being aware of the existence of stock markets, and of learning how they work. The fact that wealth and income appear as significant variables in participation regressions (see Vissing-Jorgensen (2002)) has been interpreted as evidence of a role of fixed entry costs. Education also appears significantly, supporting a role of learning costs. (See Bayer, Beheim and Scholz (1996) and Beheim and Garret (2003) for an analysis of the effects of financial education on retirement plans. Guiso and Japelli (2005) find that awareness of the existence of financial assets is affected by education and argue that the lack of awareness can resolve part of the stockholding puzzle.)

The presence of background risk can also have an influence on households' asset allocation. Heaton and Lucas (2000*a*) and Heaton and Lucas (2000*b*) find that households with significant business holdings or ownership of their employer's stock tend to hold a smaller fraction of their liquid financial assets in the form of stocks.

Non-standard preferences and loss aversion have also been invoked to explain the low participation rates in the stock market. The concept of loss aversion comes from prospect theory. It has been demonstrated by Kahneman and Tversky (1979) and refers to the fact that households show a stronger preference for avoiding losses than for making gains. This type of preferences has been used by Barberis, Huang and Santos (2001) and Barberis and Huang (2006) to explain the low participation rates in the stock market. Halissos and Hassapis (2001) and Ang, Bekaert and Liu (2005) use different type of non-standard preferences to explain households' asset allocations.

A different type of explanation is based on behavioral theory, the role of social interaction and social attitudes. Different authors have studied the role of social interaction in portfolio decisions; Madrian and Shea (2001) and Duflo and Saez (2002) study peer effects on saving decisions. The idea is that individuals who work together talk about their pension contributions. This may motivate them to acquire similar levels of savings. Hong et al. (2004) show that social interactions also have an effect on stock market participation. They argue that more sociable potential investors may learn about the existence and the functioning of the stock market from interacting with other investors and that investors derive utility from being able to share the ups and downs of the market with other fellow participants.

In this line of work, Guiso et al. (2008) find evidence that trust is a determinant of portfolio choice decisions. The idea is that investments involve implicit financial contracts. Because these contracts are not perfectly enforceable, trust will play a role. People with less trust will think that there is a high probability of some misbehavior, and they will discount that from the expected return of the investment. Individuals with more trust think that this probability will be lower, and therefore the expected return higher. In that way, not only objective characteristics matter for the investment, but also subjective characteristics of the individuals. These authors argue that this explanation has the advantage of explaining the low participation even among wealthier households, and that it can explain regional variation in participation rates without need of unrealistic assumptions on differences of entry costs across countries.

In the previous section we have seen that housing is the largest component of households' portfolios, which underlines the importance of including housing when

analyzing the portfolio choice decision. Some authors have linked the housing investment decision with the low degree of participation in financial markets. The difficulty in modeling housing investment is due to the fact that differently from financial assets, it has a consumption component. Flavin and Yamashita (2002) consider both components of housing; investment and consumption. Their model predicts that identical households (in their preferences for risk and asset return perceptions) can have very different portfolios because they optimize their portfolios subject to the constraint of housing. The implication of their model is that young people have stronger demands for housing, that this acquisition of housing constitutes a background risk, and that this reduces the participation in other risky assets. Brueckner (1997) suggests that the limited participation in the stock market could be the result of household's rational decisions between the investment in housing, which gives utility from consumption, and other risky investments. Cocco (2004) also shows that investment in housing reduces stock market participation.

In this paper we analyze the effect of trust on portfolio choice decisions. Concretely, and differently from previous studies, we will see trust as a determinant of the decision of allocating assets between financial risky assets and housing. The idea is that people with less general trust attach higher probabilities of misbehavior to financial transactions than to housing transactions. This will then affect their portfolio allocation decision.

3.3. A Simple Model

We will sketch a simple model to show the link between individual trust and the portfolio choice decisions. We construct the model in terms of a household decision about how much to invest in housing versus other assets.

Suppose that agents derive utility from housing h and from consumption c , and that this can be characterized by an instant utility function $u(c, h)$ that is increasing and concave in housing and in consumption and has $\lim_{x \rightarrow 0} u_x(x) = \infty$ and $\lim_{x \rightarrow \infty} u_x(x) = 0$ for $x = c, h$. u_x here denotes the derivative of u with respect to x . Because of very high marginal utility of the first units of housing, all households with positive income will hold some housing.³ Agents' income w_t follows an exogenous process. They discount future utility using a discount factor β . They can save by investing in housing or in two types of financial assets; a risk

³In the data, a small fraction of households does not own any housing. This can be explained by indivisibilities: there is a minimum house size ($h \geq \bar{h}_{\min}$); agents with too small endowments to afford this resort to renting. As in Cocco (2004), we abstract from this in the following. Hu (2001) and Yao and Zhang (2005)) study the effects of renting on portfolio decisions.

free one yielding a return of r^f and a risky asset that yields a stochastic return r , with expected return $E[r_i] = \bar{r}_i > r^f$, and variance σ_r^2 .

Furthermore, suppose that a person's trust τ influences the return they expect from investing in risky assets. For instance, individuals with more social trust will expect with less probability that their bank misbehaves (e.g. asks for unjustified or exaggerated fees or gives them bad advice), or that their broker misbehaves (e.g. runs away with the money invested; the setting used in Guiso et al. (2004)), or that other parties involved in the investment misbehave. Summarize this as $\partial E[r_i|\tau]/\partial\tau > 0$. We do not expect person's trust τ to have a direct effect on the investment in housing.

Assets carried over from the previous period, including housing, can be sold costlessly, and the proceeds can be reinvested or consumed. Let the relative price of housing in terms of consumption goods be q , and let a person's total assets at the beginning of period t be A_{t-1} . With these assets in hand, households then choose current consumption c_t , housing h_t (at price q_t), and current holdings of the risky and the risk-free asset b_t and b_t^f (that will yield returns r_t and r_t^f). The budget constraint then is

$$c_t + q_t h_t + b_t + b_t^f = w_t + r_{t-1} b_{t-1} + r_{t-1}^f b_{t-1}^f + q_t h_{t-1}. \quad (3.1)$$

The subscripts on q reflect that house prices could change over time. Individuals then maximize the expected sum of discounted utility subject to this budget constraint, the realizations of their income process, and initial assets. Since assets are perfectly fungible, a person's expected utility at the beginning of period t depends only on beginning-of-period assets $A_{t-1} \equiv r_{t-1} b_{t-1} + r_{t-1}^f b_{t-1}^f + q_t h_{t-1}$. Denote this value by $V(A)$, given by

$$V(A) = \max_{c, h, b, b^f} \{u(c, h) + \beta V(A')\}. \quad (3.2)$$

In this context, the individual's inter- and intratemporal decisions cannot be separated because the housing choice enters both of them: housing yields utility, but is also a way of transferring resources to the future. The first-order condition for the housing choice then is

$$u_h(c_t, h_t) + \beta q_{t+1} V'(A') = q_t u_c(c_t, h_t). \quad (3.3)$$

Buying more housing yields current utility from housing and future utility from spending accumulated assets, but has a cost in terms of current consumption. As marginal utilities of housing and consumption are convex, the marginal return to investing in housing is a decreasing function of h .

This is not the case for investments in financial assets. The first order condition for the choice of risky assets is given by

$$V'(A) = \beta E[rV'(A')|\tau], \quad (3.4)$$

and the one for riskfree assets is analogous, but does not depend on trust.⁴ Due to the linearity of these conditions, agents invest only in one type of financial assets; risky ones if they have trust high enough such that $E[rV'(A')|\tau] > r^f$, and riskfree ones otherwise.⁵ That is, agents with more trust are more likely to invest in risky assets.

The housing investment decision is depicted in Figure 3.4. Agents allocate the initial units of their savings to housing because of the high utility of use of the first units of housing. They then buy housing up to the level where the return to housing falls below that of financial assets. Remaining savings are invested in financial assets. Up to here we have shown that the level of trust affects the investment in housing through its effect on the expected return on the investment in financial assets. More trust in others raises the expected return to financial assets and thereby makes households invest more in financial assets and less in real estate. In addition, trust could have a direct effect on the expected return of housing. If low-trust individuals expect a higher relative return on housing because they see housing as a particularly safe investment or just because they appreciate living in a castle, then the effect of trust on the housing share in the portfolio will be reinforced. This effect is shown in Figure 3.5.

Note that more risk averse individuals behave in a similar way to low-trust ones: higher risk aversion decreases the expected marginal utility from investing in a risky asset, so they choose lower portfolio shares of risky assets relative to risk free ones, and of financial assets relative to housing. In the empirical section, these two effects will be disentangled.

3.4. Empirical Approach

In this section, we set up the model used for estimating the latent attitude that we identify as trust, and its effects on portfolio choice decisions. We focus particularly on the measurement of trust and its relationship to measures used elsewhere.

⁴Note that the left-hand side of the equation is marginal value, not marginal utility, as resources spent today still need to be allocated between housing and consumption.

⁵In reality, agents invest in both types of assets; in particular, while many people do not hold risky assets, almost everyone who holds financial assets at all holds some riskfree ones in the form of pension investments or life insurances. This could be explained by non-modelled features such as obligatory participation in pension plans or insurance benefits from life insurance that are distinct from asset accumulation considerations.

3.4.1. Structural Representation

Figure 4.2 shows a diagram of the underlying process that we have in mind. We suppose that every individual has some amount of trust. An individual's trust directly causes the responses to certain survey questions. It also has an effect on the individual's behavior, in particular, the individual's portfolio choice decisions. We also claim that demographic and personal characteristics may be informative about the way in which trust is distributed in a population; individual characteristics and experiences as well as community characteristics can be related to how much people trust each other. We assume that these characteristics do not affect the answers directly. If they have an effect on the responses, this is through their effect on trust. These characteristics can however affect the behavior of the individual (e.g. portfolio choice) directly. In the Data section (Section 3.5) we discuss the variables used to construct the measure of trust, and we give a theoretical justification of the personal and demographic characteristics used in our estimation.

The model described has the following structural representation:

$$S = h(X^S, X^\tau, \tau, \mu) \quad (3.5)$$

$$R_1 = g_1(\tau, U_1) \quad (3.6)$$

$$\vdots \quad (3.7)$$

$$R_M = g_M(\tau, U_M) \quad (3.8)$$

$$\tau = m(X^\tau, Z, \varepsilon) \quad (3.9)$$

where S is the household's share of wealth invested in housing, R are the responses to certain survey questions, τ is a direct measure of trust (estimated using the ESS) and assumed to be univariate, X^τ are covariates (age, number of members in the household, income and education, marital status and family background), X^S are other covariates affecting only the portfolio choice decision, and Z are the 17 regional dummies.

We assume that $U_m \sim U(0, 1)$ and $g_m(\cdot)$ is weakly increasing in U and strictly increasing in τ , ($m=1, \dots, M$). It is also assumed that $U_i \perp U_j \forall i \neq j$ and $U_i \perp A \forall i$ which implies that conditional on τ the responses are independent ($R_i \perp R_j | \tau$).⁶

Personal characteristics may affect the way trust is distributed in the population. We assume that individual characteristics, and particularly education, may affect the latent variable τ , but do not affect the measurements R_m directly. (They can of

⁶These assumptions correspond to the standard assumption in item response theory (IRT); unidimensionality (A is unidimensional), monotonicity ($g_m(\tau, U_m)$ is strictly increasing in A) and local independence. See Steele and Goldstein (2007) for a review of parametric hierarchical IRT.

course affect them via τ .) Consider the linear case

$$\tau = m(X^\tau, Z, \varepsilon) = X^\tau \beta + Z\gamma + \varepsilon \quad (3.10)$$

assume $W = (X^\tau, Z)$ where $\varepsilon \sim N(0, 1)$ and $\varepsilon \perp W$. Assume also that $U_m \perp \varepsilon$, $U_m \perp W$, $\mu \perp W$ and $\varepsilon \perp \mu$.

If trust was observable, estimating equation 3.5 would be straightforward. But since trust is not observable, the estimation becomes less trivial. Although very informative of personal and demographic characteristics, the EFF does not contain direct information on trust. Therefore the approach we take is to perform the estimation in two steps using two datasets:

Step I: Using equation 3.6 and equation 3.9 and applying Spady's (2007) methodology we obtain an estimate of individuals' trust and an estimate of $m(\cdot)$. It is desirable to obtain the estimate of $m(\cdot)$ using the maximum amount of information, controlling for different dimensions of individuals' trust and being as flexible as possible. The estimation method proposed by Spady (2007) has proven very useful for this. To obtain this measure of trust we use the ESS.

Step II: We construct a proxy for trust using the estimate of $m(\cdot)$ and the personal and demographic information contained in the EFF. We then estimate the effect of trust on portfolio choice decisions (i.e. equation 3.5). In doing this, the identification of the effect of trust on portfolio choice does not only rely on the functional form of the estimate of $m(\cdot)$, but also on additional instruments. The regional dummies Z provide those instruments. From the measurement of trust in the first step, we know that they are correlated with trust (see Table 4.5) but we assume that once we control for regional housing prices and regional financial development, they are not correlated with the portfolio choice decision. As a robustness check, we also perform Step II using instrumental variables, employing instruments from Tabellini (2006).

Using a two-stage setup with generated regressors always raises issues of consistency and efficiency of the estimates and of consistency of the estimated standard errors. In the present case, which corresponds to Model 2 in Pagan (1984), the estimates are efficient and inference is correct for testing the hypothesis that the coefficient on trust is zero (Pagan 1984, p. 229).

One of the main problems of the literature that studies the effect of social attitudes on economic outcomes is the measurement of these attitudes. Clearly, concepts like trust are inherently difficult to measure. There have been different approaches to this measurement problem, some involving the use of proxies, others using crude measures of trust. We believe that the approach proposed in this paper is the best

way of estimating the effect of trust, given the limitations of the available data. At worst, the measure of trust used in Step II may contain measurement error. However, all other measures used previously in the literature, be they proxies or partial or crude measures, also contain measurement error. In addition, if the limitations of the data leave no choice but to construct a regressor, it is desirable to use a method that uses as much information as possible in a flexible way, as done here. Next, we give a brief overview of the different approaches used previously in the literature, and describe the hierarchical item response model used here.

3.4.2. Other measures of trust

One of the most common approaches to measuring social attitudes and trust has been the use of “indirect” indicators. Since the work of Putnam (1993), several authors have used this approach. One of the most recent examples is the work by Guiso, Sapienza and Zingales (2004*a*, 2004). In the former paper, for instance, these authors proxy trust by common language, border, legal system and genetic-ethnic distance between the population of the two countries. While this approach may allow to identify the impact of social attitudes on economic outcomes, it does not allow for a direct measurement of the attitudes. This makes it hard to know the effect of which specific social attitude we are actually observing.

Another approach used in the literature is to measure regional trust as the percentage of people in the population that claim to trust others. Usually these papers use the World Values Survey (WVS) or the European Values Survey (EVS) and their question: ‘Generally speaking, would you say that most people can be trusted or that you cannot be too careful in dealing with people?’ Individual responses are then aggregated to a macro measure.⁷ This question has also been used to measure trust at individual level (e.g. Guiso et al. 2008). However, it is difficult to believe that the use of only one question can provide a good measure for such a broad concept (for a critique of this approach see Glaeser et al. (2000) and Glaeser et al. (2002)). Fatih, Kalemly-Ozcan and Sorensen (2007) have proposed to measure trust and confidence using several questions; they construct very simple regional indexes averaging individuals’ responses to more than one question. The advantage of this approach is that they use the information contained in several questions, and this is important since we expect different questions to have different information content. The problem of their measure is that it imposes an equal weight for each question

⁷Examples of this approach are found in Knack and Keefer (1997) and Zak and Knack (2001) who find that trust and civic norms have a strong impact on economic performance, or in Beugelsdijk and van Schaik (2004) who also find that at the regional level, trust and voluntary work are related to economic growth. La Porta et al. (1997) and Fukuyama (1995) also follow this approach to examine the effect of trust in organizations.

in the final measure. But if the information content of questions varies, this is not ideal.

Summarizing, all these approaches (proxies or crude measures of trust) suffer from measurement error. The approach we use in the first step overcomes some of the limitations just discussed by measuring trust using responses to more than one question, and by giving them different weights in function of how strongly they reflect individual trust. The methodology for measuring trust used in the present paper is a hierarchical item response model; it allows not to impose inessential assumptions about the importance of each question in the construction of the individuals' level of trust and it specifically takes into account that the answers to the questions used as a basis for measurement are discrete or categorical (Spady 2007).

3.4.3. Measuring trust using an item response model

Given the structural representation described in section 3.4.1 and using equation 3.6 and equation 3.9 and applying an item response model, we obtain an estimate of individuals' trust and an estimate of $m(\cdot)$. The assumptions underlying the model described above are that (1) the expressions of agreement and disagreement on questions about trust ('item responses') reflect corresponding attitudes of the responder; (2) the 'attitudes' are enduring individual-specific attributes, given the individual's characteristics and environment; and that (3) the series of item responses we use are determined by a single attitudes only (trust).

We use 8 item responses with 3 categorical responses each, stemming from 1.156 Spanish men and women older than 18. In that case there are $3^8 = 6561$ cells or possible combinations of responses.⁸

Assumption: *Conditional independence across the item responses.*

Then, the probability of a particular response pattern (or cell) conditional on τ is simply the product of the constituent item probabilities.

$$p(r_1, r_2, \dots, r_m | \tau) = p(r_1 | \tau) p(r_2 | \tau) \dots p(r_m | \tau). \quad (3.11)$$

Assume that individual i has certain characteristics $W_i = (X^\tau, Z)$, and that the distribution $m(\cdot)$ of the latent attitude is affected by these characteristics, so there is a conditional distribution of attitudes $m(\tau | W)$. Concretely, as the theoretical model implies, suppose that W gives rise to social experiences, and consequently attitudes

⁸We have tried the same exercise restricting the items to those who reflect generalized trust and trust to banks and the results of the analysis for the different sociological groups do not change dramatically. Therefore, we believe that the use of the most general definition of trust is more adequate because rules out possible problems of endogeneity.

may change; the attitudes are then reflected in item responses. So we have:

$$p(r_1, r_2, \dots, r_m | W) = \int p(r_1, r_2, \dots, r_m | \tau, W) f(\tau | W) d\tau \quad (3.12)$$

$$= \int p(r_1 | \tau, W) p(r_2 | \tau, W) \dots p(r_m | \tau, W) f(\tau | W) d\tau \quad (3.13)$$

This expression together with the conditional independence assumption implies that conditional on W variables, the dependence across the item responses comes uniquely through τ .

Assumption: τ is sufficient for r .

Consequently, once an attitude τ is given, the personal characteristics W are uninformative. This assumption allows to rewrite equation 3.13 as,

$$p(r_1, r_2, \dots, r_m | W) = \int p(r_1, r_2, \dots, r_m | \tau) f(\tau | W) d\tau \quad (3.14)$$

$$= \int p(r_1 | \tau) p(r_2 | \tau) \dots p(r_m | \tau) f(\tau | W) d\tau \quad (3.15)$$

Equation 4.3 is used to estimate simultaneously how W affects τ and how τ affects item responses. The estimation method used in this paper is the one proposed by Spady (2007). It allows to obtain quantitative measures of latent attitudes imposing flexible parametric functional form. In next section I describe how the estimation of the elements of this expression is performed.

Assumption: If $\tau_2 > \tau_1$ then the item responses of τ_2 population stochastically dominate τ_1 . Thus, higher item responses are associated to higher values of τ .

The stochastic dominance assumption implies that the lines that indicate the probability of answering k or more in item j given τ (shown in Figure 3.7) be downward sloping; of course, they cannot cross if probabilities are to be non negative.

The modelization of these lines give rise to different types of item response models, following Spady (2007) these lines are constructed as the distribution function corresponding to an exponential tilting of second degree of the uniform density,

$$G_i(\tau) = \frac{\int_0^\tau e^{t_1 \gamma_1(u) + t_2 \gamma_2(u)} du}{\int_0^1 e^{t_1 \gamma_1(u) + t_2 \gamma_2(u)} du} \quad (3.16)$$

where the functions $\gamma_1(u)$ and $\gamma_2(u)$ are 2 basis functions, chosen to be (shifted) Legendre polynomials. Subtracting $G(\cdot)$ from 1, I obtain downward sloping lines.

To ensure that the lines do not cross, they are constructed as products of the estimated distribution functions. Assume item j has k possible answers, then

$F(k|\tau) = 1$ by definition. $p(k|\tau) = 1 - F(k-1|\tau)$ where $F(k-1|\tau) = 1 - G_{k-1}(\tau)$; $p(k-1|\tau) = F(k-1|\tau) - F(k-2|\tau)$ where $F(k-2|\tau) = [1 - G_{k-2}(\tau)]F(k-1|\tau)$.⁹

Results of this estimation are illustrated in Figure 3.7. This Figure shows the resulting item response models estimated for the items selected to represent the scale on trust. Each box shows the probability of answering 1, 2 or 3 in a given item as a function of the attitude on trust (x-axis). As an example, take the first box of Figure 3.7. There are two lines. The distance between the x-axis and the first line indicates the probability of answering 1 in item (question) 1 (“Would you say that most people can be trusted?”), the distance between the first line and the second line indicates the probability of answering 2 in item 1, and the distance between the second line and 1 indicates the probability of answering 3.

Assumption: A location shift model for W .

$m(\tau|W)$ is represented by a $N(\mu(W), 1)$,¹⁰ where $\mu(W) = W\beta$. So τ is normal with a mean that is a linear function of the characteristics W . This implies that $m(\tau|W)$ is a $N(0, 1)$ for the ‘standardized respondent’ and that attitudes within the different groups of the population, characterized by different W , are also normally distributed with possibly different values of location μ .¹¹ Because of this normalization, the units of measurement of $p(r|\tau)$ are then transformed into $[-\infty, \infty]$ by applying the inverse normal distribution function. The parameters associated to the personal characteristics are shown in Table 4.5.

3.4.3.1. Estimation. The integration for the probability of a particular outcome for individual i ($p(r_1, r_2, \dots, r_m|W) = \int p(r_1|a)p(r_2|a)\dots p(r_m|a)f(a|W)da$) has been carried out using a Gaussian quadrature at 200 grid points. To ensure that we can collect even the distributions with small variances, the gaussian quadrature has been applied to 5 different segments of the grid, with the one in the middle having more points. A Newton-Raphson algorithm is used to maximize the log-likelihood function. Concretely, we use the BFGS method which builds an approximation to the Hessian in the course of iteration.¹²

We obtain 61 parameters; 29 associated to the personal characteristics (indicating the effect on location relative to the probability distribution of the ‘standardized

⁹This also implies that the stochastic dominance is strengthened to dominance in hazard order.

¹⁰Although it is possible, for simplicity we will not allow W to affect the variance.

¹¹The ‘standardized’ individual is a male who lives in Analucia, is 38.92 years old, lives in a household with 3.35 members, is married and employed, has secondary education, medium income and his father did not have a professional occupation. (This is not the average person but the reference person.)

¹²For a general discussion about estimation procedures for multilevel generalized linear models see Rodriguez (2008).

respondent') and 32 describing the distribution functions (see Figure 3.7). Since we use exponential tilting of second degree, we estimate two parameters per line and box for the distribution functions. The parameters associated to the personal characteristics are the ones used to specify $m(\tau|W)$, and therefore the parameters of interest in our case.

3.5. Data

To estimate the attitudes in trust we use the second wave of the European Social Survey (ESS). The ESS is a recent data set covering 25 European Countries in 2004. In this paper we use the information related to Spain. The ESS provides rich information on several aspects of interest to social scientists. In this round, the questionnaire includes, for the first time, a module on Economic morality: Trust and interactions between producers and consumers. This module is designed to investigate the normative and moral culture of markets and consumption in European countries and is useful for us because it has some questions about the level of trust and confidence in business and state/government institutions. In addition, the ESS also contains information about some demographic variables.

Corresponding to the theoretical model, some of these demographic variables will also be used in the estimation: We include the age of the head of the household, since attitudes might change over the life cycle due to personal experience but also due to national and global developments, the age of respondents can be informative. In addition, there may be cohort effects. Since our data set is only a cross section, it is unfortunately impossible to disentangle life cycle and cohort effects. We also control for gender, education, marital status, region of residence and the number of members in the household and a dummy that takes value 1 if the father of the head had a professional occupation (father professional occupation) as they can influence the experiences faced during life. We include income. Since most determinants of income are also included as controls, the income coefficient should mainly reflect luck. Here it seems reasonable to expect that people who faced more negative shocks have lower levels of trust.

To measure the attitudes in shared trust we choose eight questions/items related to this scale. The original wording of the questions/items we use to estimate the individual's latent attitudes towards trust is shown in the appendix.

Summary statistics of the responses to these items are presented in Table 4.2. Scales are recoded such that each item has three possible answers (1-3 scale).¹³ A higher score corresponds to a higher level of trust. The answering behavior varies

¹³The recoding does not matter for our estimation. See Spady (2006)

over these items. For instance, the mean for the question “Can public officials be trusted?” is 2.178 and the mean for the question “Can politicians be trusted?” is 1.522. This indicates that different items carry information on respondents’ attitudes to a varying degree. Thus, by focussing on just one or on a narrow subset of these items, valuable information might be lost. This is also indicated by the pairwise correlation coefficients for the items shown in Table 4.4; correlations are positive but far from perfect.

Table 4.3 contains summary statistics of the personal and demographic characteristics that we expect to be related to an individual’s level of trust. Whether these relationships hold in the data is an empirical question on which our analysis can shed some light.

For the analysis of portfolio choice decisions we use the 2002 wave of the Spanish Survey of Household Finances (EFF).¹⁴ This survey contains information about incomes, assets, debts and consumption at the household level. The definition of the measures of real estate and financial assets holdings are shown in the appendix. Table 3.5 shows the descriptive statistics of these measures. Descriptive statistics of the other personal characteristics that we think can be useful in explaining the portfolio decisions of the households are shown in Table 3.6.¹⁵

3.6. Results

3.6.1. How Personal and Demographic Characteristics Relate to Trust

The coefficients of Table 4.5 show how the location of the distribution of attitudes depend on covariates. Using the estimated coefficients shown in these tables we can calculate the estimated distribution of the attitudes for different demographic groups. Therefore, we can answer the following question: *What is the effect on the mean of the distribution of trust of changing the reference group’s characteristics in one dimension?*

As an example, Figure 3.8 shows our prediction for two different type of respondents: Respondent A is a 37 years old divorced male with low income and low education who heads a household with 3 members and lives in Cantabria. Respondent B is a 50 year old married male with medium income and high education who heads a household with 4 members and lives in Madrid. We see that the expected

¹⁴The two datasets do not cover exactly the same time period. The field work for the ESS spanned October 2003 to September 2004, while this is from October 2002 to May 2003 for the EFF. However, as trust arises from existing levels of social capital which depreciates only slowly, we do not expect the attitudes of the different sociological groups to change much during this time.

¹⁵A distinguishing feature of the EFF is that the wealthiest households are oversampled. So the upper quantiles of the wealth distribution can also be studied. Since they hold most of the assets, this is particularly important. For a detailed description of the survey see Bover (2004).

trust for the two respondents differs. It is $E[Trust|W] = -0.426$ for Respondent A, and $E[Trust|W] = 0.860$ for Respondent B.

The factor that affects trust most strongly is the level of education, with lower levels of education affecting the level of trust negatively. We also find a significant effect for the different income levels. Richer and poorer households tend to trust less than middle-income households. Age also matters; younger and older individuals have less trust than the middle-aged. This result is similar to the ones obtained by Putnam (2000) and by Glaeser et al. (2002). These authors find that this inverted U-shape is predicted by their model of social capital accumulation over the life cycle. In our case, the cross-section nature of the data does not allow us to distinguish whether this pattern is due to this life cycle pattern or to cohort effects. The effect of the number of household members has the same shape.

It is important to notice that in determining a person's or group's level of trust, these effects taken together can neutralize or reinforce each other. For instance, high education is positively correlated with high levels of income, and these two effects can neutralize each other. Regional characteristics such as differences in institutions, in labor market conditions, or in income and ethnical inequality also affect trust, as captured by the regional fixed effects. These coefficients, shown in Table 4.5, show that there are substantial differences across Spanish regions.

3.6.2. Testing the Effect of Trust on Portfolio Choice

The model presented in section 3 has two distinct implications. The first is that trust raises the share of assets invested in financial assets relative to housing. The second is that it raises the share of risky assets held relative to all financial assets. In this section we will test empirically both implications.

3.6.2.1. Housing vs Financial Assets. We start by testing the hypothesis that trust affects investment decisions in the following way; it increases the proportion of wealth invested in risky financial assets, and therefore in financial assets and decreases the amount of wealth invested in housing. Financial Assets include risky and non-risky assets and housing includes main residence and other real estate. We define risky assets as listed shares, non listed shares, fixed-income securities and mutual funds. As said above, the shares of financial assets and housing in an agent's portfolio are a function of their risk aversion τ_i and their level of trust. For the empirical implementation, suppose that the relationship is linear.¹⁶ The equations

¹⁶It is easy to relax this restriction.

of interest then are:

$$H_i = \gamma_{H0}X_i^S + \gamma_{H1}\tau_i + \gamma_{H2}X_i^\tau + \mu_i^H, \quad (3.17)$$

$$FA_i = \gamma_{FA0}X_i^S + \gamma_{FA1}\tau_i + \gamma_{FA2}X_i^\tau + \mu_i^{FA}, \quad (3.18)$$

$$RA_i = \gamma_{RA0}X_i^S + \gamma_{RA1}\tau_i + \gamma_{RA2}X_i^\tau + \mu_i^{RA}, \quad (3.19)$$

where FA is the household's fraction of its wealth invested in financial assets, RA is the fraction invested in risky assets and H is the fraction invested in real estate. τ_i represents the estimated level of trust. This is constructed combining information on individuals' characteristics with the coefficients obtained previously using the European Social Survey.¹⁷ Here, as well as in the subsequent regressions, we also control for other household characteristics, X_i^τ . We control for income and net wealth, gender, number of household members and children in the household, and age of the head of the household. The latter should capture changes over the life cycle. To control for factors that affect portfolio choice only, X^S includes a self reported measure of risk aversion and the regional average price per square meter in 2002.¹⁸ We also control for regional differences in financial development (included in X^S); we use as a proxy the percentage of private credit over GDP.¹⁹ We expect these characteristics to capture differences in preferences across households as well as possible differences in participation costs (F_i) in financial markets.

Since we have a system of equations with the same regressors, the efficient estimator is a single-equation OLS (see Green (2003) p. 344). In our case, since the dependent variable is censored, we estimate a Tobit model. One may think that in the first two equations we have also an adding up condition if the two dependent variables add to one. This is not the case for all the households; households may own other real assets like jewels, art work or business related to self-employment. Therefore, we show the results without imposing the restriction $\beta_H = -\beta_{FA}$.

Unfortunately, we do not have measures of other latent attitudes, like optimism or expectations about the future economic conditions. Some authors, e.g. Puri and Robinson (2005) and Dominitz and Manski (2005), have found these to significantly affect participation in the stock market. Guiso et al. (2008), however, do not confirm

¹⁷ $\tau_i = f(\text{gender, income, education, marital status, father professional, age, number members, region of residence})$.

¹⁸Source: Ministerio de Fomento, from different property valuations in the whole Spanish territory.

¹⁹We use a common proxy for financial development, but other proxies have also been used like the market capitalization of listed firms and the sum of private credit and market capitalization (as a percentage of GDP). But since the securities market in Spain is at national level, it does not exist this information at regional level. But it must be taken into account that the effect of this variable might be different depending on how we measure it.

this, and find that they do not affect the coefficient on trust in a portfolio choice regression either. Moreover, as our measure of trust relies on several specific questions about trust that are reasonably unrelated to other attitudes, we would expect them not to be a problem for the estimation in the present setting.

Table 3.7 shows the results of the estimated tobit. The first two columns show the result of equations 3.17, 3.18 and 3.19. We observe that trust has a significantly positive effect on the percentage of wealth invested in risky financial assets and in financial assets in general, i.e. higher trust increases the percentage of wealth invested in financial assets. At the same time and as expected we observe that trust has a significantly negative effect on the percentage of wealth invested in housing.

This result indicates that housing gains importance as an asset in the household's portfolios when generalized trust decreases. Households with higher levels of trust, on the other hand, invest less in housing and more in financial assets. It is also interesting to notice that risk aversion is still significant and has a stronger effect than trust. As Guiso et al. (2008), we can say that the result also applies to the richest households, since we control for wealth in the regression. Indeed, these authors argue that trust may be an explanation to why even the rich do not participate in financial markets, and our results square well with theirs.

3.6.2.2. Trust, Risky Assets and Cash. Trust also positively affects the share of financial assets held in risky assets. Here we define risky assets as above. Letting the financial portfolio share of risky assets be $RAFA$ (computed as the value of risky assets divided by the value of financial assets), the empirical specification is

$$RAFA_i = \gamma_{RAFA0}X_i^S + \gamma_{RAFA1}\tau_i + \gamma_{RAFA2}X_i^\tau + \mu_i^{RAFA}, \quad (3.20)$$

where X^τ and X^S are again demographic characteristics.

Guiso et al. (2004) also raise the possibility that households with less trust will not participate in financial markets but will keep money in cash. If that was the case, it would be possible not to find a positive effect of trust on housing but rather in the deposits and accounts usable for payments. For that reason we estimate a similar equation as above but with the dependent variable indicating the share of financial assets that the household owns in cash.

$$C_i = \gamma_{C0}X_i^S + \gamma_{C1}\tau_i + \gamma_{C2}X_i^\tau + \mu_i^C, \quad (3.21)$$

The results of equation these equations are shown in Table 3.7. The fourth column of Table 3.7 shows that trust indeed is positively related to the portfolio share of risky assets. The coefficient on trust is larger than in the regression of risky

assets over wealth (see third column). Note that the specifications are not exactly the same. Instead of net wealth, we include the value of household financial wealth in the regression. The rest of variables of the estimation take the expected sign.

These results are in line with those of Guiso et al. (2008). Even the magnitude of the trust coefficient is quite similar to theirs. (They obtain an effect of trust on risky assets of 0.095, see Table 7.B in page 52, and on stocks of 0.130, see Table 7.A page 51.) Hence, trust is an important determinant of which fraction of the portfolio is invested in risky assets in Spain, too.

The results for equation are shown in the fourth column of Table 3.7. They show that trust does not matter for the decision of holding wealth in the form of cash. This suggests that cash is held for liquidity and not so much as an investment (see also the negative coefficient on employees – they need less liquidity than the self-employed). In any case, while differences in trust lead to different choices of housing and financial assets, they do not significantly affect cash holdings.

3.6.2.3. The Role of Education. In this section we explore if education affects the trust mechanism described in this paper. We expect that more educated people have more information and a better understanding of how financial markets work, so trust may matter less for them.

Therefore we perform the same exercise as above, but include an interaction between trust and years of education.²⁰ The results obtained are shown in Table 3.8. The interaction always takes the opposite sign of the trust coefficient, indicating that education reduces the effect of trust on portfolio choice decisions. The interaction has a stronger effect and is highly significant for the regressions where the dependent variable measures the share of wealth invested in risky assets or the share of financial wealth invested in risky assets. The attenuating effect of education on the trust mechanism is thus less strong for housing and financial assets in general.

We also want to test if a more specific financial education has an effect on the trust mechanism. To proxy financial education we use wealth, assuming that wealthier people either have stronger financial education or easier access to professional financial consulting. This might also mitigate the effect of trust. The results of the previous model including the interaction between trust and wealth are shown in the second panel of Table 3.8. Again, the interaction has the opposite sign of the coefficient on trust in all the regressions. Including this interaction also eliminates the effect of the interaction between trust and education. This suggests that although the effect of trust persists for wealthier people, it is less strong, possibly due to their access to financial consultants.

²⁰The rest of the specification is the same as before, so we do not restate those results.

3.6.3. Endogeneity Concerns

The identification of the effect of trust on the portfolio decisions has relied on the non linearity of the trust measure and on the assumption that the regional dummies, once controlling for regional housing prices and regional financial development, are not correlated with financial decisions. To be able to relax this assumption we estimate the model using instrumental variables. To instrument trust we use the same variables as Tabellini (2006) in his study of the impact of culture on development, the regional literacy rate at the end of the XIXth century and indicators of political institutions in the period from 1600 to 1850.²¹ We also include the number of social and economic charity organizations in the region in 1920.²² Tabellini (2006) argues that “historically more backward regions (with higher illiteracy rates and worse political institutions) tend to have specific cultural traits today: less trust in others, less respect for others, less confidence in the individual.” The validity of the assumption that history is a valid instrument for culture is discussed extensively in his paper, so we do not reiterate it here. Table 3.9 shows the values of the instruments for the Spanish regions.

The results of the IV tobit estimation are shown in Table 3.10.²³ To test the strength of the instruments we report the results of the first-stage regression. They show that the instruments are strongly correlated with our measure of trust. We also show the results of the Wald test for exogeneity. They show that in the first regression, there are no endogeneity problems. Here, it is thus better to use the the tobit without IV estimator since it is more efficient. The coefficient on trust obtained using the instruments is larger (in absolute value) than the one obtained using OLS, but the standard errors are much larger. The other regressions show problems of endogeneity, so the IV estimates are adequate.

Overall, in the specifications where using IV is required, this reinforces the effect of trust. Trust has a positive effect on the share of wealth invested in financial assets, particularly in risky financial assets.

3.7. Concluding Remarks

Households with less trust invest less in financial assets and more in housing. Trust also affects the share of wealth invested in risky assets positively.

²¹Literacy rate: percentage of population over 10 years old able to read and write in 1877, from Nunez (1990).

Institutions: constraints on the executive, from Tabellini (2006).

²²Source: Anuario Estadístico de España. Instituto Nacional de Estadística (INE)

²³For this estimation we use Amemiya Generalized Least Squares (AGLS) estimators for tobit with endogenous regressors (see Amemiya (1974) and Newey (1987)).

This paper presents new empirical evidence on how the level of confidence of citizens with their society in general (institutions and other citizens) may have important implications in economic outcomes; the mechanism explored here is trust as a determinant of households' share of wealth invested in financial or housing markets. Individuals with less trust tend to invest more in housing and less in financial assets. Since there is empirical evidence showing that trust differs across European countries, it is possible to think that this effect may also be at work across countries. Compared to other European countries, Spain has low levels of trust.²⁴ As a consequence, the effect of trust on the share of housing in individuals' portfolios could be especially important in Spain. This may lead to less developed financial markets and a more vulnerable economy, as portfolios heavy on real estate can be adjusted less easily. Improving institutions or raising levels of education can raise levels of trust.

²⁴Knack and Keefer (1997), Bornhorst et al. (2005) and El-Attar (2007) find that levels of trust are higher in Northern European than in Southern European countries.

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Appendix

Appendix 3.A. Original wording of the questions/items used

Original wording of the questions/items used to estimate trust

- Generally speaking, would you say that most people can be trusted, or that you can't be too careful in dealing with people?²⁵ (Score of 0 to 10, where 0 means you can't be too careful and 10 means most people can be trusted.)
- Do you think that most people would try to take advantage of you if they got the chance, or would they try to be fair?²⁶ (Score of 0 to 10, where 0 means most people would try to take advantage of me and 10 means most people would try to be fair.)
- Would you say that most of the time people try to be helpful or that they are mostly looking out for themselves?²⁷ (Score of 0 to 10, where 0 means people mostly look out for themselves and 10 means people mostly try to be helpful.)
- Please tell me how much you personally trust each of the institutions I read out. (Score of 0 to 10, where 0 means you do not trust an institution at all, and 10 means you have complete trust.)
 - the legal system
 - politicians
- How much would you trust the following groups to deal honestly with people like you? (Score of 1 to 5, where 1 means you distrust and 5 means you trust a lot.)
 - plumbers, builders, car mechanics and other repair people²⁸
 - financial companies such as banks or insurers.
 - public officials²⁹

Definition of the financial variables used in the empirical analysis

- **Total Assets** is the value of Real Assets and Financial Assets.
- **Real Assets** is the value of Real Estate, Jewellery, Works of Art, Antiques and the value of Business related to self-employed.
- **Real Estate** is the value of Main Residence and Other Estate Properties.

²⁵Can't be too careful: need to be wary or always somewhat suspicious.

²⁶Take advantage: exploit or cheat; fair: in the sense of treat appropriately and straightforwardly.

²⁷The intended contrast is between self-interest and altruistic helpfulness.

²⁸Builders include all kinds of tradespeople who work on building sites.

²⁹Public officials refers to both government officials, such as custom officers and to local officials, such as housing/building regulators etc.

- **Financial Assets** is the value of Listed Shares, Unlisted Shares, Fixed-Income Securities, Mutual Funds, Pensions and Life Insurance and Accounts and Deposits usable for payments.
- **Risky Assets** is the value of Listed Shares, Unlisted Shares, Fixed-Income Securities and Mutual Funds.
- **Cash** refers to Accounts and Deposits usable for payments.

Appendix 3.B. Tables and Figures

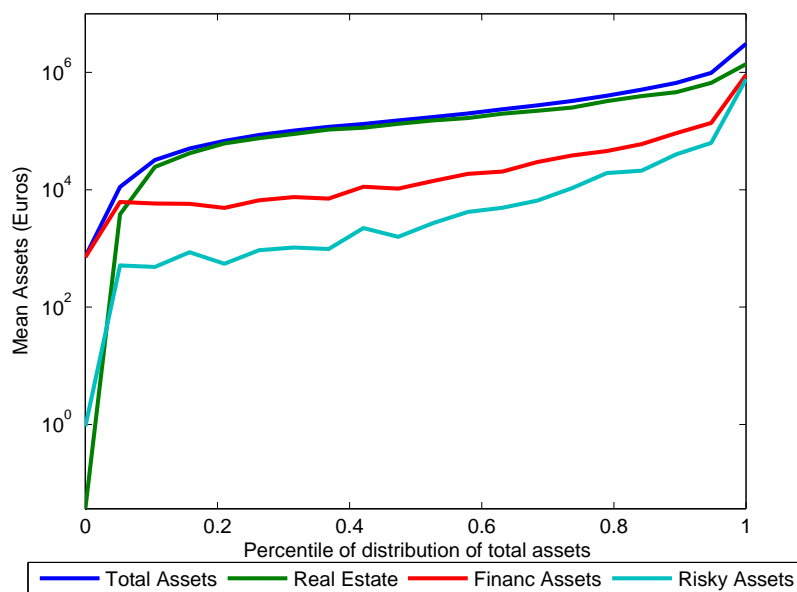


FIGURE 3.1. The Spanish Wealth Distribution.

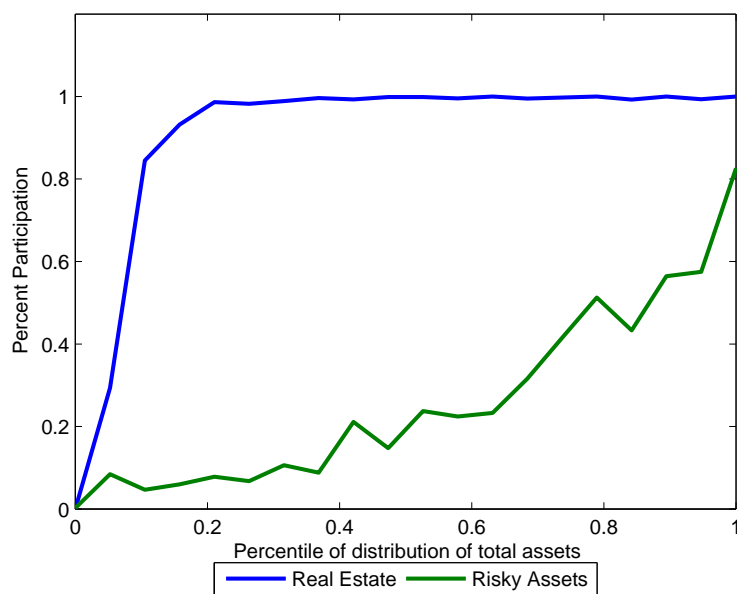


FIGURE 3.2. Participation Rates on Real Estate and Risky Assets.

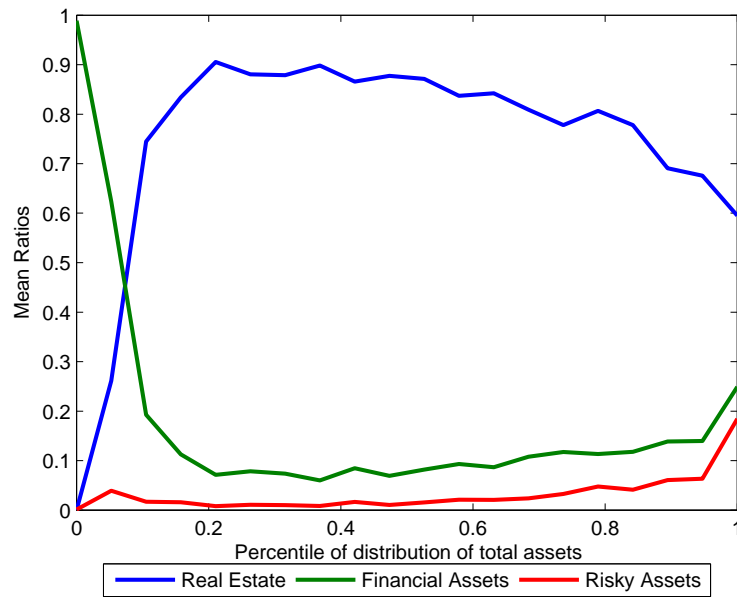


FIGURE 3.3. Real Estate, Financial Assets and Risky Assets Shares in Household Portfolios.

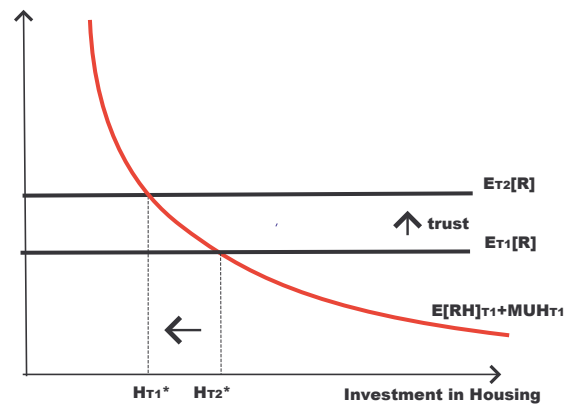


FIGURE 3.4. Investment in housing and financial assets affected by trust (Indirect Effect).

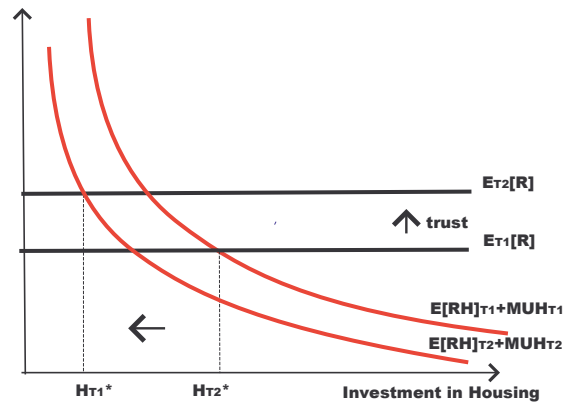


FIGURE 3.5. Investment in housing and financial assets affected by trust (Indirect and Direct Effect).

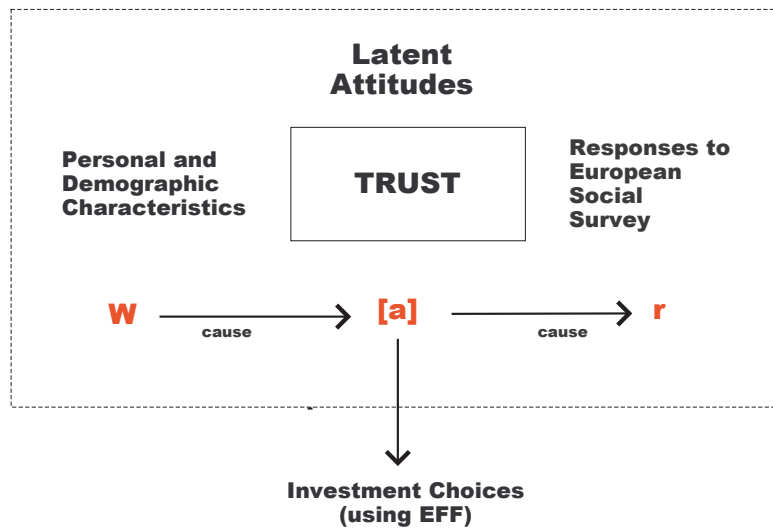


FIGURE 3.6. Diagram of the underlying process.

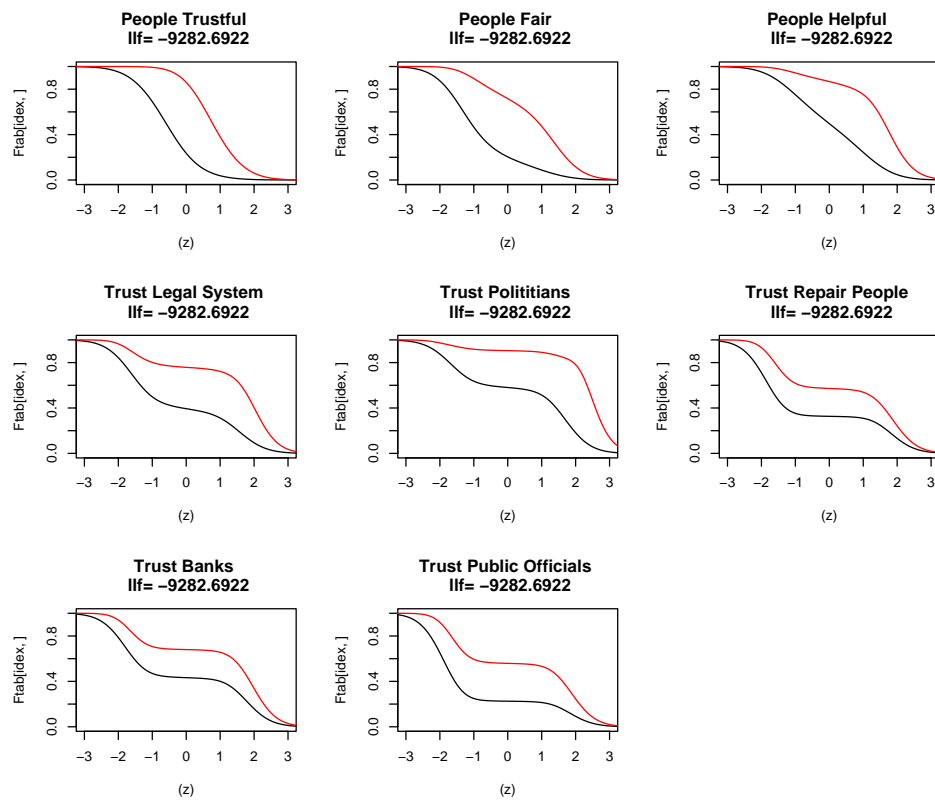


FIGURE 3.7. Estimates of the item response model for the items constituting a scale on shared trust.

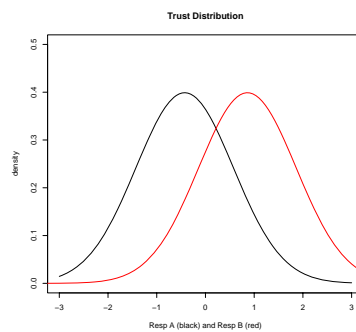


FIGURE 3.8. Estimated probability distribution for the distribution of two individuals' attitudes towards trust.

TABLE 3.1. Estimated Coefficients for Personal and Demographic Characteristics in Trust Scale.

Variable	Coefficient	S.E.	Variable	Coefficient	S.E.
Divorced	-0.198	0.194	Cantabria	-0.145	0.247
Single	-0.039	0.111	PaisVasco	-0.155	0.184
Female	-0.090	0.069	Navarra	0.759	0.291
Age	0.010	0.004	Rioja	0.301	0.262
Age.01	-0.053	0.026	Aragon	0.249	0.236
Num Members	0.065	0.032	Madrid	0.358	0.133
Num Members.01	-2.875	0.941	Castilla Leon	0.071	0.173
Low Income	-0.124	0.149	Castilla Mancha	0.377	0.177
High Income	-0.241	0.114	Extremadura	0.459	0.299
Primary Degree	-0.026	0.093	Catalunya	0.061	0.126
High Degree	0.432	0.092	Valencia	0.002	0.139
Unemployed	-0.266	0.152	Baleares	-0.240	0.208
Father Professional	0.158	0.124	Murcia	-0.125	0.231
Galicia	0.201	0.170	Canarias	-0.117	0.201
Asturias	-0.060	0.238			

Age is the difference between the individual's age and mean age, and Age.01 is the square of this, divided by 100. The 'standardized' individual is a male who lives in Madrid, is 38.92 years old, lives in a household with 3.35 members, is married and employed, has secondary education, medium income and father who does not have a professional occupation.

TABLE 3.2. Descriptive Statistics of the items used to estimate the Trust Scale.

Variable	Mean	Std. Dev.	Min	Max
Most People Trusted	1.914	0.773	1	3
Most People Fair	2.029	0.772	1	3
Most People Helpful	1.657	0.747	1	3
Trust Legal System	1.829	0.796	1	3
Trust Politicians	1.522	0.671	1	3
Trust Repair People	2.072	0.872	1	3
Trust Banks	1.875	0.867	1	3
Trust Public Officials	2.178	0.808	1	3

TABLE 3.3. Pairwise Correlation Coefficients for the Items Used to Build the Trust Scale.

	People Trust	People Fair	People Help	Legal System	Poli- titians	Repair People	Banks	Public Officials	Trust Inx
MP Trust	1.00								
MP Fair	0.43	1.00							
MP Help	0.38	0.30	1.00						
T LS	0.18	0.13	0.15	1.00					
T Polit	0.14	0.09	0.10	0.45	1.00				
T Repair	0.12	0.10	0.11	0.11	0.04	1.00			
T Banks	0.11	0.06	0.10	0.14	0.14	0.35	1.00		
T POff	0.12	0.06	0.09	0.18	0.11	0.29	0.40	1.00	
Trust Inx	0.85	0.65	0.60	0.35	0.28	0.26	0.24	0.26	1.00

TABLE 3.4. Descriptive Statistics for the Personal and Demographic Characteristics used for Measuring Trust (ESS).

Demographics	Mean	Std. Dev.	Regions	Mean	Std. Dev.
Single	0.347	0.476	Galicia	0.055	0.229
Divorced	0.047	0.211	Asturias	0.029	0.169
Married	0.587	0.493	Cantabria	0.011	0.105
Num Members	3.349	1.313	PaisVasco	0.051	0.220
Unemployed	0.056	0.230	Navarra	0.015	0.120
Low Income	0.145	0.352	Rioja	0.008	0.088
Medium Income	0.662	0.473	Aragon	0.028	0.164
High Income	0.193	0.395	Madrid	0.136	0.343
Father Professional	0.087	0.281	Castilla Leon	0.079	0.269
Primary Degree	0.270	0.444	Castilla Mancha	0.071	0.257
Secondary Degree	0.477	0.500	Extremadura	0.023	0.151
Higher Degree	0.237	0.425	Catalunya	0.113	0.317
Female	0.480	0.500	Valencia	0.095	0.294
Age	38.92	17.25	Baleares	0.024	0.154
			Andalucia	0.183	0.386
			Murcia	0.035	0.185
Sample Size	1156		Canarias	0.043	0.204

Low Income: <12000 euros/year; High Income: >90000 euros/year. Primary degree is 1 if the head has less than secondary education, and higher degree is 1 if the head has a university degree or more.

TABLE 3.5. Descriptive Statistics of the Financial Variables (EFF).

Value	Quantiles				
	Mean	Std.Dev	0.25	0.50	0.75
Total Assets	475267	4133216	79400	162311	354608
Real Assets	340309	3125796	71796	148821	300000
Real Estate	254833	488857	65000	138000	275051
Financial Assets	134958	1242326	1703	9000	41095
Risky Assets	104453	1214906	0	0	6000
Non Risky Assets	30505	95466	1460	6000	24000
Cash	8249	25242	901	3000	7500
Share ^a	Mean	Std.Dev	0.25	0.50	0.75
Real Assets	0.788	0.299	0.752	0.923	0.980
Real Estate	0.737	0.317	0.639	0.870	0.970
Financial Assets	0.212	0.299	0.020	0.077	0.248
Risky Assets	0.051	0.131	0.000	0.000	0.023
Non Risky Assets	0.161	0.277	0.014	0.048	0.143
Cash	0.101	0.246	0.006	0.018	0.052

^a Share refers to the variable divided by Total Assets.

TABLE 3.6. Descriptive Statistics of the Variables Used in the Portfolio Choice Analysis (EFF).

Variable	Mean	Std. Dev.	Variable	Mean	Std. Dev.
Risk Aversion	3.70	0.58	Num Children	0.90	1.08
Income	40355	76021	Num Members	2.77	1.34
Net Wealth	463778	4216161	Years Education	13.64	7.27
Female	0.35	0.48	Employee	0.32	0.47
Age Head	57.65	15.62	Num Obs.	4999	

TABLE 3.7. Tobit estimation for portfolio choice.

	RE/W	FA/W	RA/W	RA/FA	C/FA
Trust	-0.048 *** (0.015)	0.043 *** (0.013)	0.055 *** (0.019)	0.128 *** (0.040)	0.017 (0.030)
Risk Aversion	0.042 *** (0.007)	-0.035 *** (0.006)	-0.073 *** (0.007)	-0.108 *** (0.015)	-0.016 (0.013)
Housing Price	-0.045 *** (0.015)	0.076 *** (0.013)	0.038 ** (0.019)		
Financial Development	0.002 *** (0.000)	-0.002 *** (0.000)	-0.002 *** (0.000)	0.000 (0.001)	0.000 (0.000)
Income	-0.122 *** (0.039)	0.075 ** (0.035)	0.209 *** (0.081)	-0.019 (0.015)	0.054 *** (0.012)
Income ²	0.004 * (0.002)	-0.002 (0.002)	-0.008 ** (0.004)		
Net Wealth	0.923 *** (0.101)	-0.936 *** (0.022)	-0.089 *** (0.022)		
Net Wealth ²	-0.036 *** (0.001)	0.037 *** (0.001)	0.007 *** (0.001)		
Financial Wealth				0.238 *** (0.007)	-0.259 (0.005)
Female	0.022 *** (0.008)	-0.006 (0.007)	-0.011 (0.010)	0.012 (0.022)	-0.023 (0.016)
Age Head	0.002 (0.002)	0.004 ** (0.002)	-0.003 (0.002)	-0.008 (0.005)	-0.009 ** (0.004)
Age Head ²	0.000 (0.000)	0.000 (0.000)	0.000 ** (0.000)	0.000 * (0.000)	0.000 *** (0.000)
Num Members	0.016 *** (0.006)	-0.018 *** (0.005)	-0.022 *** (0.008)	0.004 (0.018)	-0.013 (0.013)
Num Children	-0.012 ** (0.007)	-0.003 (0.006)	0.017 * (0.009)	0.008 (0.020)	-0.003 (0.015)
Years Education	-0.003 *** (0.001)	0.006 *** (0.001)	0.007 *** (0.001)	0.010 *** (0.002)	-0.003 (0.001)
Employee	0.082 *** (0.009)	-0.012 (0.008)	-0.024 ** (0.012)	-0.077 *** (0.025)	-0.068 *** (0.019)
Constant	-5.801 *** (0.247)	5.480 *** (0.211)	-1.080 ** (0.459)	-1.917 *** (0.207)	2.922 *** (0.155)
Sigma	0.240 (0.003)	0.212 (0.002)	0.236 (0.005)	0.491 (0.010)	0.436 (0.007)
Log Likelihood	-326.6	281.6	-1076.9	-2107.0	-2732.2
Pseudo-R ²	0.865	1.139	0.462	0.410	0.431
Sample Size	4999	4999	4999	4999	4999

Standard errors in parentheses; stars indicate significance at 10 (*), 5 (**), and 1 (***) percent levels, respectively.

TABLE 3.8. Tobit estimation for portfolio choice. The Role of Education

	RE/W	FA/W	RA/W	RA/FA	C/FA
Trust	-0.092 *** (0.029)	0.079 *** (0.025)	0.169 *** (0.042)	0.427 *** (0.088)	-0.100 (0.062)
Trust*Education	0.003 * (0.001)	-0.002 * (0.001)	-0.006 *** (0.002)	-0.016 *** (0.004)	0.007 ** (0.003)
Log-Likelihood	-324.9	283.0	-1072.2	-2099.6	-2729.7
Pseudo-R2	0.866	1.139	0.464	0.412	0.431
Sample Size	4999	4999	4999	4999	4999
	RE/W	FA/W	RA/W	RA/FA	C/FA
Trust	-0.440 *** (0.092)	0.493 *** (0.077)	0.489 *** (0.114)	0.716 *** (0.170)	-0.703 *** (0.115)
Trust*Education	0.000 (0.002)	0.001 (0.001)	-0.005 ** (0.002)	-0.014 *** (0.004)	0.000 (0.003)
Trust*Wealth	0.032 *** (0.008)	-0.038 *** (0.007)	-0.028 *** (0.009)	-0.032 * (0.015)	0.071 *** (0.011)
Log-Likelihood	-316.4	300.0	-1067.1	-2097.4	-2708.7
Pseudo-R2	0.869	1.147	0.466	0.413	0.436
Sample Size	4999	4999	4999	4999	4999

Standard errors in parentheses; stars indicate significance at 10 (*), 5 (**), and 1 (***) percent levels, respectively.

TABLE 3.9. Instruments and Variables with Regional Variation.

	Average Regional Housing Price	Literacy Rate 1887	Early Political Institutions	Charity Organizations 1920
Andalucía	914.97	26.25	1	0.118
Aragon	1013.62	29	3	0.039
Asturias	985.89	40.5	1	0.021
Baleares	1525.95	21	1	0.058
Canarias	1218.04	18.5	1	0.018
Cantabria	1183.22	40.5	1	0.021
Castilla Leon	1012.56	48.5	1	0.236
Castilla La Mancha	681.00	29	1	0.042
Catalunya	1553.95	32	3	0.182
Extremadura	557.25	20	1	0.027
Galicia	800.08	27.5	1	0.051
Madrid	1973.78	62	1	0.294
Murcia	747.40	21	1	0.018
Navarra	1290.22	45.5	1	0.021
Pais Vasco	1900.44	48.5	1	0.042
Rioja	1061.41	45.5	1	0.021
Valencia	877.26	21	3	0.097

Charity Organizations in 1920 is measured relative to the population, multiplied by 1000

Table 3.10: IV Tobit estimation for portfolio choice.

Dependent Vble	Trust	RE/W	FA/W	RA/W	Trust	RA/FA	C/FA
Trust		-0.077* (0.046)	0.078 (0.033)	** 0.298 (0.059)	***	0.768 (0.176)	*** 0.122 (0.072)
Literacy	0.010 (0.001)	***			0.004 (0.001)	***	
Institutions	0.015 (0.003)	***			-0.008 (0.003)	***	
Charity Org	-0.037 (0.071)				0.224 (0.080)	***	
Excluded (Prob>F)	0.000				0.000		
Wald Test		0.382	0.098	0.000		0.000	0.166
for Exogeneity							
Log-PseLike.		240.8	2631.7	-498.8		-1813.0	471.9
Sample Size		4999	4999	4999		4999	4999

Standard errors in parentheses; stars indicate significance at 10 (*), 5 (**), and 1 (***) percent levels, respectively.

CHAPTER 4

Trust and Reciprocity: Social Capital and Civic Participation

ABSTRACT. This paper measures the influence of social capital on different ways of individual civic engagement. Although the idea that social capital increases the probability that an individual will engage in civic participation is widespread in the literature, there is not much robust evidence on the relationship between the components of social capital (such as trust or reciprocity) and individuals' civic participation. One of the reasons for this lack of evidence is the difficulty of obtaining good measures of social capital and its components. In this spirit, we propose to measure individuals' attitudes to trust and reciprocity using data from the European Social Survey and applying the methodology proposed by Spady (2007). This methodology allows to aggregate information from several questions and makes use of individuals' personal and demographic characteristics. It also allows for a multi-dimensional measure of social capital as suggested by theory, and it is free of parametric assumptions. The measure of the components of social capital that we propose is conceptually cleaner and more consistent with theory than the proxies or demographic characteristics often used in previous work. The results show that although both components of social capital rise civic engagement, their importance differs depending on the degree of institutionalization of the practice itself.

KEYWORDS. social capital, civic engagement, item response models.

JEL CLASSIFICATION. C43, O15, Z1.

4.1. Introduction

Recently, there has been strong interest among economists in the impact of social and cultural factors on economic or social outcomes. (Knack and Keefer (1997), Guiso et al. (2004)). For instance, the concept of social capital has been used to explain individual and group outcomes such as health, financial development or economic growth. Social capital may also have important positive externalities. For instance, in their study of the importance of education for democracy, Glaeser, Ponzetto and Shleifer (2006) conclude that the theory that fits best with their empirical findings says that education is a means to acquire social capital, and that it is social capital that raises civic participation. This fits with the frequent use of voting turnout as a proxy for social capital (e.g. Guiso et al. 2004). Yet, while the idea that social capital enhances civic and political participation is widespread, there is not much robust evidence on the relationship between the components of social capital (such as trust or reciprocity) and individuals' democratic attitudes and civic participation.

This is despite great current interest in the determinants of civil engagement and political participation, motivated by the decline in participation in some traditional associations (like political parties) observed in many European countries over the last decade. Sources and consequences of this development are not immediately obvious as at the same time, affinity and commitment to new social movements has remained fairly constant (see Gaiser and de Rijke 2008).

To shed some light on this issue, this paper measures the impact of social capital on different measures of individual civic engagement. In this, we distinguish trust and reciprocity as components of social capital, and we take into account various forms of civic engagement of more or less "traditional" character, or degree of institutionalization. It results that while both components of social capital increase civic engagement, their effects differ depending on the degree of institutionalization of the practice under consideration.

To be able to tackle this topic, a good definition of the concept of social capital is needed. Following Durlauf and Fafchamps's (2004) analysis of the leading definitions of social capital,¹ three main underlying ideas related to the concept of social capital can be distinguished: (1) social capital generates positive externalities; (2) these externalities arise through *trust* and through norms and values of *reciprocity* and their effect on expectations and behavior; (3) shared trust, norms and values can be influenced by individual characteristics and experiences as well as community characteristics.

¹Their references are Coleman (1990), Putnam (1993), Ostrom (2000) and Putnam (2000).

In this perspective, a measure of social capital can be based on agents' levels of trust, and their norms and values of reciprocity. The concept of "social capital" then embodies the intuitive notion of consistent underlying attitudes that affect personal and community interactions. These underlying attitudes are not observable and are usually thought to matter by affecting "how people spend their resources on others, how much people invest in each other, and how people can mobilize the resources of others" (van Schaik 2002). These types of individual behavior lead to positive externalities.

Good measurement of social capital is particularly important to overcome one of the critiques directed at the social capital literature, that is that sometimes the claims done by some researchers are in excess of what is justified by the statistical exercises reported (Durlauf and Fafchamps 2004). Barro and McCleary (2002) similarly claim that although the arguments about the importance of social capital seem reasonable on an a priori basis, much of the work in this literature is impressionistic, rather than quantitative or rigorous. Also Van Deth (2002), after doing an analysis of the empirical research on social capital, claims that there is the need for the application of multi-method and multi-level strategies to obtain good measures of this concept.

Therefore, one of our goals here is to develop a new measure of the two main components of social capital as defined above: trust and norms and values of reciprocity. We argue that the opinions of individuals about trust and norms of reciprocity reflect their attitudes in these two dimensions, and that social capital is an aggregate of these attitudes. One of the main contributions of this paper is the use of a new methodology that allows to measure these two attitudes directly. This results in a measure of the components of social capital that is conceptually cleaner and more consistent with the theory than the distant proxies or demographic characteristics often used in previous work. The analysis is performed using data for Germany. Germany constitutes a good unit of analysis because its past political experience has given rise to substantial heterogeneity in social capital.

The methodology that we will use in this paper is the one proposed by Spady (2007), which allows us to get quantitative measures of latent attitudes imposing very few parametric assumptions. The only assumptions needed are that (1) the expressions of agreement and disagreement on questions about trust and norms and values of reciprocity ('item responses') reflect corresponding attitudes of the responder; (2) the 'attitudes' are enduring individual-specific attributes, given the individual's characteristics and environment. (3) We will use two different series of

item responses, and we will assume that each series has been determined by a single attitude. The attitudes of individuals making up a sample population can then be given probability distributions, based on their item responses and characteristics. These probability distributions can then be used to infer the relation between attitudes and economic outcomes, be it at the individual or at the aggregate level.

With measures of trust and reciprocity in hand, we analyze their determinants and their impact on political interest, participation in elections, political involvement, political group membership in Germany and other more occasional forms of participation like signing a petition or contacting the government or the police. We find that individuals with more trust and more reciprocity tend to participate more in their societies. Although both components have a positive effect, individuals with higher levels of trust tend to participate more in more institutionalized activities.

The rest of the paper is structured as follows. In Section 4.2 we present the conceptual framework for social capital, and give a brief overview of measures of social capital previously used in the literature. Section 4.3 presents the underlying model that will guide the estimation, and we describe the methodology used to obtain the measures of the components of social capital. In Section 4.4 we present the data used and describe the questionnaire items and the personal and demographic characteristics of the respondents that are related to their latent attitudes. In Section 4.5 we analyze the results obtained from the measurement of trust and reciprocity. Their relationship to different ways of civic engagement is analyzed in Section 4.6. Finally, Section 4.7 concludes.

4.2. Social Capital: the conceptual framework

Apart from the empirical literature, there has also been a growing interest in the theoretical and conceptual bases of social capital. Starting from the seminal contributions of Coleman (1990), Putnam (1993), there has been a proliferation of slightly different approaches and definitions. Durlauf and Fafchamps (2004) review this literature and extract the principal components, stressing the following three main underlying ideas: (1) social capital generates positive externalities, (2) these externalities are achieved through *trust*, and *norms* and *values* of reciprocity and their consequent effects on expectations and behavior, (3) shared trust, norms, and values arise from informal forms of organizations based on social networks and associations. We adopt (1) and (2) and generalize (3) in the sense that while Durlauf and Fafchamps refer basically to the experience of participating in informal forms of organizations based on social networks and associations, we look for a more general approach and assume that there are other characteristics and experiences that may

also have an influence on the level of social capital. We will consider these three main ideas as the 'structural' aspects of the concept and we will let them be the guide of our empirical approach. Note that (2) implies that there are two dimensions to social capital.

One main problem of the literature about social capital has been its measurement. Clearly, concepts like trust, norms and values are inherently difficult to measure. There have been different approaches to this, some involving the use of proxies, that have not always been very rigorous or conceptually satisfactory. The next few paragraphs give a brief overview of these approaches and critiques to them.

To our knowledge, there are three main approaches to the study of the impact of social capital on economic outcomes. Two of them proxy social capital, using outcomes or individual characteristics, and another one uses partial measures from value surveys.

Proxies for Social Capital: Outcomes. There are many studies that measure social capital through "indirect" indicators. Sometimes these indicators can be related to the outcomes of social capital, instead of its components as identified by the theoretical literature. One example of this approach is the work of Putnam (1993) who uses the number of local newspaper's readers, the voter turn-out in referendums and the percentage of votes on the political elections as proxies in the analysis of the impact of social capital on economic performance. The problem with this approach is that it is not clear what effect is being identified, as the proxies themselves may be related to the outcome that is analyzed. In more recent work, Guiso et al. (2004) avoids this problem. They identify the effect of social capital on financial development by using particular, arguably unrelated outcomes (electoral participation and blood donation) as proxies for social capital.

While this approach may allow to identify the impact of social capital on economic outcomes, it still does not allow for direct measurement of social capital. This makes it less useful for analysis of the determinants of social capital, or for comparative or policy-focussed perspectives.

Other authors have studied the effect of religious participation and beliefs; like Barro and McCleary (2002) who study to what extent religious participation and beliefs influence economic performance and political institutions. In this line Berman et al. (2006) studies the effect of changes in religiosity on fertility for European Catholic countries. These authors find that actually are not the changes in beliefs and therefore in preferences for children what matter, but rather the decrease in the social services that Catholic institutions used to offer.

Proxies for Social Capital: Individual Characteristics. Other papers have used the participation in social networks as a measure of social capital. A seminal contribution to this vast literature is the already cited Putnam (1993), who uses the number of voluntary organizations (sport clubs and cultural circles) in a region as a proxy for social capital. The problem with this approach is that it does not take into account the multidimensional character of social capital and that the focus on some type of network causes loss of generality, which can compromise the effectiveness of the analysis. Another problem is that there are no theoretical studies that have provided an explanation of the mechanism through which trust within groups generalizes to the entire society.

Other authors like Easterly and Levine (1997) and more recently Alesina, Devleeshauer, Easterly, Kurlat and Wacziarg (2003) study the impact of ethnic, linguistic and religious heterogeneity on the quality of institutions and growth. They believe that more demographic diversity could bring more political instability, poor quality of institutions, badly designed economic policy and disappointing economic performance. Barro and McCleary (2002) study to what extent religious participation and beliefs influence economic performance and political institutions.

In our opinion these studies jump one step in the process. We believe that the channel at work here is that the degree of fragmentation or religious participation has an effect on individual latent attitudes (shared trust, and norms and values of reciprocity), and that these attitudes affect behavior and therefore economic outcomes. Whereas demographics may provide a clue towards a society's values and attitudes, a more direct approach can be used, estimating latent attitudes.

Partial Definitions: Survey responses. Another approach used in this literature is to measure social capital as the percentage of people in the population that claim to trust others. Usually these papers use the World Values Survey (WVS) or the European Values Survey (EVS) and their question: 'Generally speaking, would you say that most people can be trusted or that you cannot be too careful in dealing with people?' Individual responses are then aggregated to a macro measure.

Examples of this approach are found in Knack and Keefer (1997) and Zak and Knack (2001) who find that trust and civic norms have a strong impact on economic performance or in Beugelsdijk and van Schaik (2004) who also find that at the regional level, trust and voluntary work are related to economic growth. Also La Porta et al. (1997) and Fukuyama (1995) follow this approach to examine the effect of trust in industrial organizations.

The scope of these studies is necessarily limited since they use only one dimension of social capital: trust. Moreover, the measurement is imperfect, since they use only

the answer to one question. It is difficult to believe that these are good measures for the wider concept of social capital, which by definition is a compilation of diverse attitudes. The approach we use overcomes these limitations by incorporating more than one dimension of social capital, and by measuring each using responses to more than one question. By analyzing the individual and country-level determinants of social capital, it also addresses the critique of lack of cross-country comparability of the original trust-based measures aired by Fine (2001).

Our approach offers a new dimension to the study of the social capital. We develop a more complete measure of the components of social capital, and not just proxy for it using either outcomes, demographic characteristics, or partial aspects of social capital. This new measure allows us to obtain the probability distribution of social capital for each individual. At the same time this approach takes into consideration the possible influence of individual characteristics and experiences as well as community characteristics. Measuring social capital and understanding what social characteristics lead to more social capital seems useful and important since social capital is related to positive outcomes.

As a result, an individual measure of social capital and its distribution (not just the mean) can be characterized, and the importance of its level and dispersion for economic and social outcomes can be investigated.

4.3. Measuring Trust and Reciprocity using an Item Response Model

In this section, we set up a simple model that will allow us to estimate the latent attitudes that we identify as the components of social capital and that captures the three underlying ideas pointed out above. We also explain the methodology that we use to obtain these estimates.

4.3.1. Setting up the empirical model and some desired properties

Figure 4.2 shows a diagram of the underlying process that we have in mind. We suppose that every individual has some amount of social capital, which will be a compilation of his/her attitudes on *trust* and on *norms* and *values* of reciprocity. These attitudes directly cause the responses to certain survey questions, and have an effect on the behavior of agents. This behavior may generate positive externalities for society. In this paper, we will focus on the measurement of social capital and we will relate it to political engagement.

We also claim that demographic and personal characteristics may be informative about the way in which latent attitudes are distributed in a population; individual characteristics and experiences as well as community characteristics can be related

to how much people trust each other or how much people share values or accept norms. We assume that these characteristics do not affect the answers directly. If they have an effect it is through their effect on the attitudes we are measuring here.

In the Data section we will discuss the variables we use to construct these two scales and we will give a theoretical justification of the personal and demographic characteristics used in our estimation.

Given the restrictions implied by the theoretical model, we can apply the estimation methodology developed by Spady (2007). Given the model we have in mind, we would like our measure (1) to conform to the notion that there are two dimensions to social capital, (2) to reproduce a given set of cell means or probabilities (relative frequencies of the items used) and (3) to be able to take into account the information embodied into the demographic and personal characteristics. The next paragraphs detail how this can be achieved, following Spady's (2007) approach.

4.3.1.1. Desired Property I: Two dimensions of social capital. To estimate the two main components of social capital at the individual level we assume that we can find a collection of questions and the corresponding responses (called 'items') that depend solely on the individual's trust. We can find another collection of 'items' that depend solely on the individual's norms and values of reciprocity. The attitude in each dimension will be inferred from answers to these collections of items. We believe that the probability distribution of the responses is determined solely by an individual's value on each attitude scale. Therefore individuals with the same value for the attitude have the same probability distribution of responses for the items that solely reflect that attitude. This means that we expect individuals that have more trust in others (to focus on one scale, for the sake of concreteness) to answer, on average, higher values on the items defining the 'trust' scale (by convention, higher values indicate more trust in others). Given a collection of responses, the mapping from attitudes to responses can be inverted, resulting in probability distributions over attitudes, conditional on the responses. Probability distributions over attitudes a for responses indicating more trust then *stochastically dominate* the distribution for responses indicating less trust.² A final point to note is that since item responses are categorical, the 'scaling' of a is arbitrary.³

4.3.1.2. Desired Property II: Reproducing Relative Frequencies of the Item Responses. The second desired property of our measure is that it should

²A formal exposition of how this stochastic dominance structure across items determines a *monotonic scale representation* is contained in Spady (2006).

³Spady (2007) shows that the 'scaling' of a is arbitrary, in the sense that if a figure such as Figure 4.1 exists for a particular scheme of assigning numbers to a , then there will be figures with the required properties for any strictly monotonically increasing transformation of a .

reproduce a given set of cell means or probabilities (relative frequencies of the items used). This is the goodness-of-fit criterion of the estimator employed here.

For concreteness, focus again on the trust scale. For that scale, we will use a collection of 8 items, each of them with 3 categorical responses, therefore there are $3^8 = 6561$ possible combinations of responses. Each of these combinations occurs with some relative frequency. We call these relative frequencies ‘cells.’⁴ For a particular value of the attitude on trust, say a , there is a probability distribution of item responses, and therefore a probability distribution over these 6.561 ‘cells’ that depends solely on the individual attitude on trust. The probability distribution generated by our measure should match the relative frequencies observed in the sample.

As an example consider a hypothetical case with only two item responses with 3 categorical responses each, and 100 individuals. Table 4.1 represents the table with the relative frequencies for these two items. In that case we have $3^2 = 9$ cells or possible combinations. Concerning the ordering of the responses, since we assume that higher values indicate more trust in others, we could order the combination of responses as a function of the level of trust that they represent.

In the example we believe that the two items are determined by the individual’s attitude on trust a . The probability of a particular response pattern (or cell) conditional on a is simply the product of the constituent item probabilities.⁵ That is, we assume (for m items),

$$p(r_1, r_2, \dots, r_m | a) = p(r_1 | a)p(r_2 | a) \dots p(r_m | a). \quad (4.1)$$

We can represent the results in Figure 4.1. The first box shows the probability of answering 1, 2 or 3 in item 1 as a function of an individual’s attitude a , where the lowest line represents the probability of answering 1, the difference between the second and the lowest one the probability of answering 2, and the difference between 1 and the second line the probability of answering 3. The second box shows the same for item 2.

The model will have a better fit when the estimated probabilities represented in Figure 4.1 have a good match with Table 4.1. The requirement that the responses of those with more trust in others stochastically dominate those with less trust in others is precisely that the lines in Figure 4.1 have to be weakly decreasing, and they must not cross.

⁴For the case of norms and values of reciprocity, we use 6 items, each one with 3 categorical responses. In that case we have $3^6 = 729$ ‘cells’

⁵We assume independence across the item responses.

4.3.1.3. Desired Property III: Including Demographic Characteristics in the Estimation. The latent attitudes that we are estimating are not observable. What we can actually observe are the item responses and observable individual characteristics (such as age, education, income, etc.). We now assume that individual i has certain characteristics W_i , and that the distribution $f(\cdot)$ of the latent attitudes can be influenced by these characteristics W_i , that means $f(a|W_i)$. Concretely, as the theoretical model implies, suppose that W gives rise to social experiences, and consequently attitudes may change; the attitudes are then reflected in item responses. So we have:

$$p(r_1, r_2, \dots, r_m|W) = \int p(r_1, r_2, \dots, r_m|a)f(a|W)da \quad (4.2)$$

$$= \int p(r_1|a)p(r_2|a)\dots p(r_m|a)f(a|W)da \quad (4.3)$$

Equation 4.3 is used to estimate simultaneously how W affects a and how a affects item responses. We specify that $f(a|W)$ is represented by a $N(\mu(W), \sigma(W))$, where

$$\mu(W) = W\beta \quad (4.4)$$

$$\log(\sigma(W)) = W\gamma \quad (4.5)$$

That means that a is normal with a mean that is a linear function of the W variables and a standard deviation whose logarithm is linear in the same W variables. Equations 4.4 and 4.5 imply that $f(a|W)$ is a $N(0, 1)$ for the 'standardized respondent' and that the different groups of the population, characterized by different W , are also normally distributed with possibly different values of location μ and scale σ .⁶

4.3.2. Estimation Method

We will estimate the item response models by maximum likelihood, subject to the constraint that the distribution functions (the lines that indicate the probability of answering j in item k) be downward sloping and not crossing.

The probability densities of the item responses as a function of the attitude are approximated using exponential tilting of second degree. Exponential tilting of degree n involves approximating a density function using the product of the uniform pdf and a polynomial of degree n . Subtracting the cumulative distributions

⁶The 'standardized respondent' will be a single man who lives in a town or city, is 46.68 years old, has primary education, has an intensity of religion of 3.8, a value of 4.48 on a left-right scale of self-proclaimed political attitude, and who does not belong to a discriminated group. (This is not the average person but the reference person.)

corresponding to these densities from 1, we obtain downward sloping lines. The units of measurement are then transformed into $[-\infty, \infty]$ by the normal distribution function. To ensure that they do not cross, the lines of the boxes are constructed as products of the first lines.

The probability of a particular outcome for individual i then is given by the expression $p(r_1, r_2, \dots, r_m|W) = \int p(r_1|a)p(r_2|a)\dots p(r_m|a)f(a|W)da$. This integration has been carried out using a gaussian quadrature at 200 grid points. To ensure that we can collect even the distributions with small variances, the gaussian quadrature has been applied to 5 different segments of the grid, with the one in the middle having more points.

The parameters obtained are the ones describing the distribution functions as well as the parameters associated to the personal characteristics (2 per characteristic, indicating effect on location and scale). Since we use exponential tilting of second degree, we estimate two parameters per line and box for the distribution functions.

4.4. Data and Descriptive Statistics

To estimate social capital we use the second wave of the European Social Survey (ESS). The ESS is a recent data set covering 25 European Countries in 2004/05. We use the information related to Germany because we think that the differences in past political experiences of its regions can have lead to differences in the social capital components' distributions. This makes this country particularly interesting. The ESS provides rich information on several aspects of interest to social scientists. In this round, the questionnaire includes, for the first time, a module on Economic morality: Trust and interactions between producers and consumers. This module is designed to investigate the normative and moral culture of markets and consumption in European countries and is useful for us because it has some questions about the level of trust and confidence in business and state/government institutions, and solicits general normative statement from individuals. In addition, the ESS also contains information about some demographic variables. Corresponding to the theoretical model, some of these (described below) will also be used in the estimation.

To measure the two components of social capital, shared trust, and norms and values of reciprocity, we choose questions/items related to them. The original wording of the questions/items we use to estimate the individual's trust and reciprocity are shown in the appendix.

Summary statistics of the responses to the considered items are presented in Table 4.2. Scales are recoded such that each item has three possible answers (1-3 scale).⁷ The low (high) score corresponds to a lower (higher) level of trust or norms of reciprocity. Even inside each scale the answering behavior varies over these items. Considering for instance the question "Most People would try to be fair" and the question "Can politicians be trusted?", the means range from 2.19 to 1.35. This indicates that different items carry information on respondents' attitudes to a varying degree. Thus, by focussing on just one or on a narrow subset of these items, valuable information might be lost. Table 4.4 show the pairwise correlation coefficients for the items used to build the two scales.

Table 4.3 contains summary statistics of the personal and demographic characteristics that we expect to be related to an individual's level of social capital. The reasons why we would expect these factors to be related and to give us extra information about the latent attitudes are given in the following. Whether these relationships hold in the data is an empirical question on which our analysis can shed some light.

Intensity of religion. Barro and McCleary (2002) study to what extent religious participation and beliefs influence economic performance and political institutions. It seems plausible that possible effects of religion on economic outcomes are via social capital. The concept of religion is linked to the concept of community and presupposes immaterial links between members of the community. So it could be argued that more religious people will tend to have a higher level of shared trust and will share more norms and values of reciprocity. Empirical evidence also suggests this idea: Guiso, Sapienza and Zingales (2003) find that religious affiliation and participation is positively correlated with attitudes that are more favorable to cooperation and economic growth. Moreover, survey evidence shows that religious participation is associated with charitable giving and volunteering (Putnam (2000), Brooks (2003) and Brooks (2005)). The question we use from the EES is: "Regardless of whether you belong to a particular religion, how religious would you say you are?" (Scale from 0 to 10.)

Age. Since attitudes might change over the life cycle due to personal experience but also due to national and global developments, we think that the age of respondents can be informative. In addition, there may be cohort effects. Since our data set is only a cross section, it is unfortunately impossible to disentangle life cycle and cohort effects.

⁷The recodification does not matter for our estimation.

Political orientation (left vs right). We believe that the information about the political orientation can be informative of the attitudes of the person. On the one hand we could think that more conservative people attach more importance to traditions and have a stronger feeling of belonging to a community. That could increase the level of trust in others, and increase the level of social capital associated to these people. On the other hand, left-wing parties define themselves by their concern for the wellbeing of others, and therefore may have stronger values of reciprocity. The question we will use from the EES is: "In politics people sometimes talk of "left" and "right". Where would you place yourself on this scale, where 0 means the left and 10 means the right?"

Living in a village. As argued e.g. by La Porta et al. (1997), repeated interaction and small size of a local community can enhance trust and the sharing of norms and values of reciprocity. In particular, this could be the case for people living in villages.

Income. Since most determinants of income are also included as controls, the income coefficient should mainly reflect luck. Here it seems reasonable that people that faced more negative shocks have lower levels of trust and possibly also of reciprocity.

Discrimination. Members of a group that has historically felt discriminated will probably not expect to be treated fairly in the future and therefore may trust less. The question we will use from the EES is: "Would you describe yourself as being a member of a group that is discriminated against in this country? (yes/no)"

We also control for gender, education, marital status and region of residence, as they can influence the experiences faced during life.

4.5. Estimates of trust and reciprocity

Figure 4.3 shows the estimates for the item response models (equations 4.3 to 4.5) for the items representing the Trust scale. Table 4.5 shows the effect of W on the location (μ) and scale (σ) of a .

The effects are additive, which means that statements such as 'females have more trust in others' must be understood in a 'ceteris paribus' sense Spady (2007). The effect of Age,⁸ Intensity of Religion and the left-right scale are shown in Figure 4.4. The main points of interest are the following:

⁸Notice that the variables presented in the tables are

- (1) The hierarchy (most important first) among social concepts in determining trust is as follows: belonging to a discriminated group, education, group of income and gender.
- (2) The signs of the coefficients are close to what we would expect: belonging to a discriminated group has an important negative effect on trust.
- (3) Education is important, with a positive effect on trust.
- (4) Women trust more than men.
- (5) People with higher income levels also tend to have more trust.
- (6) Age has an effect on trust. The young and the old have more trust than the middle-aged.
- (7) The intensity of religion has the expected effect, more religious people tend to trust others more.
- (8) As to political orientation, people that identify with more extreme values have less trust in others. The level of trust decreases particularly rapidly for those that identify with the far-right. This effect is stronger than that of belonging to a discriminated group. The highest value is reached in the center-left.

The second part of Table 4.5 gives the estimates of the demographic and personal variables on the variability or heterogeneity (σ) of the attitude trust. The main points of interest are the following:

- (1) Being female reduces heterogeneity.
- (2) Trust varies less among older respondents.

Table 4.6 shows the estimated effects of demographic and personal variables on norms and values of reciprocity. Though many signs are similar to the ones obtained for trust, a few are different, and the hierarchy of the effects is not the same. As before, the effects of the three continuous variables are shown in Figure 4.6. We highlight the following points:

- (1) In determining the attitudes on norms and values of reciprocity, the hierarchy among personal and demographic concepts is as follows: belonging to a discriminated group matters most, then the level of education, then gender, being married and income.
- (2) Belonging to a discriminated group reduces the disposition to accept norms and values of reciprocity.
- (3) Education is an important determinant, with a strong positive effect.
- (4) Women have a significantly higher acceptance of norms and have higher values of reciprocity.
- (5) Low income respondents are less disposed to follow norms of reciprocity.

- (6) About Age, we see that the curve takes a very different shape than that for trust. Here, the shape is much more linear, indicating that older people (but not the young) tend to believe that rules and norms of reciprocity are more important.
- (7) The effect of religion is similar compared to that for trust; more religious people tend to have higher values of norms and values of reciprocity.
- (8) The effect of political orientation is similar to the case of trust; right-wing people value less the norms and the idea of reciprocity. Being extreme left-wing is also negatively related to norms and values of reciprocity. Again the highest value is reached in the center-left. Moreover, being left-wing is positively correlated with the level of education, reinforcing this effect even more.

The second part of Table 4.6 shows the heterogeneity of the different social groups in their attitude to reciprocity. The main result here is that the groups of women, of married people, and of older people are all more homogenous.

Using the estimated coefficients shown in Tables 4.5 and 4.6 we can calculate the estimated distribution of the attitudes for different demographic groups. Therefore, the question that can be answered with Figures 4.7 and 4.8 is: *How does changing the reference group's characteristics in one dimension affect its distribution of attitudes?*

These figures show the estimated attitude distribution of the reference group (black line) and the estimated attitude distribution of other groups that have the same characteristics except for the one under analysis (blue and red lines). In the panel for different levels of income, the blue line represent households with a low income and the red line households with high income. In the panel for different levels of education, the blue line represents the individuals with secondary education, the red line those with tertiary education.

From all these figures we can infer the distribution of trust and reciprocity for some “ideal types”, shown in Figure 4.9. The figure at the left corresponds to a young, single, low-education, low-income, non-religious, right-wing male who lives in Berlin. The figure in the middle corresponds to an old married female with secondary education, average income, right-wing political attitudes, who is intensively religious and lives in a Bavarian village. The third one corresponds to a married middle aged man, highly educated and with high income, politically in the center, moderately religious, living in a metropolitan area of Nordrhein-Westfalen. Without considering their answers, Figure 4.9 shows the distribution we would infer for those types of people.

4.5.1. Comparisons across respondents

Up to now we have considered the distribution of attitudes across members of specific demographic groups. One of the advantages of the methodology that we are using is that we can obtain the estimated distribution of both attitudes for each individual. Applying Bayes' Law, the distribution of the attitude a for an individual person given his answers and personal characteristics is

$$f(a|W, r) = \frac{f(a, r|W)}{p(r|W)} = \frac{p(r|a, W)f(a|W)}{p(r|W)} = \frac{p(r|a)f(a|W)}{p(r|W)} \quad (4.6)$$

The elements of this expression have all been estimated previously; $p(r|W)$ is given as $\int p(r|a)f(a|W)da$ in equation 4.3.

It is interesting to notice that in estimating $f(a|W, r)$ we use all the information we have; the personal characteristics and the item responses. One could think that thanks to the exercise performed up to now, it would be sufficient to use only the personal characteristics to know the distribution of a for each respondent. In that case we would be saying that it is enough to compute $f(a|W)$. The problem is that if someone gives surprising answers, then it might be that $f(a|W, r)$ will have higher dispersion than $f(a|W)$. Its estimated location can also be moved. Therefore it seems reasonable to think that $f(a|W, r)$ will be the most informative measure we can get.

Consider an example. Respondent 21 is a married woman, is 53 years old, has high income, tertiary studies, lives in a city or town and does not belong to a discriminated group. On the intensity of religion scale (0-10) she situates herself at level 9 and on the left-right scale she situates herself as 3. Respondent 115 is a single woman, she is 35 years old, has a high income, tertiary education, lives in a city or town and does not belong to a discriminated group. In the intensity of religion scale she situates herself at level 0 and in the left-right scale she situates herself at 5. The vector of responses for trust and reciprocity scales are [2, 1, 1, 1, 2, 1, 1, 2] and [2, 2, 2, 3, 2, 2] respectively for respondent 21 and [3, 3, 2, 3, 3, 2, 2, 2] and [1, 2, 2, 2, 2, 2] for respondent 115.

Figure 4.10 clearly shows the importance of using two different dimensions of social capital: While respondent 21 has a higher level of reciprocity compared to trust, this is the opposite for respondent 115. Hence, using only one dimension can be misleading. This confirms the commonly accepted idea that social capital is a multidimensional concept and that using only partial measures is not sufficient for obtaining a general characterization of an individual's level of social capital.

4.5.2. Comparisons across regions

To study how the distribution of trust and reciprocity varies across regions in Germany, it is not enough to look at the coefficients reported in Tables 4.5 and 4.6. These coefficients represent the fixed effect of each region, so they could reflect e.g. differences in institutions, in labor market conditions, or in income and ethnic inequalities. But it is clear that the level of trust and reciprocity of each region will also depend on the characteristics of its inhabitants. In Figure 4.11, we show the pattern of region fixed effects (figures at the left) and the pattern of levels of trust and reciprocity across regions (figures at the right).

It is clear that differences due to regional specificities are not so important. The regions colored in grey are the ones for which the coefficient is not significantly different from the reference region, Bavaria. The coefficient is significantly higher for regions colored in black, and significantly lower for those colored light grey.

When using the individual measures of the attitudes,⁹ different patterns emerge. The Eastern regions exhibit a lot of heterogeneity that is difficult to synthesize. There is more of a clear pattern for the regions in the West. For trust, we observe that there is an East-West division (within the West). For reciprocity, there is a North-South division. As a conjecture and for future work, this pattern might come from differences in religion. If the intensity of religion does not affect reciprocity in the same way for the different type of religions, then it is possible that this pattern reflects differences between catholics and protestants.

4.5.3. A Two-Dimensional Index of Social Capital

The definition of social capital that we use says suppose that social capital has two components; trust and reciprocity. We have used a collection of items $r[a_t]$ and $r[a_r]$ to estimate ‘attitudes on trust’ and ‘attitudes on reciprocity’, with no overlap of items. In this section we would like to estimate the joint distribution $f(a_t, a_r|W)$ of these two components. For this, we proceed under the following assumptions:

$$p(r[a_t]|a_t, a_r, W) = p(r[a_t]|a_t, W) \quad (4.7)$$

$$p(r[a_r]|a_t, a_r, W) = p(r[a_r]|a_r, W) \quad (4.8)$$

Thus we assume that if we know the attitude on trust, the knowledge of the attitude on reciprocity is irrelevant to the responses pertaining to the trust scale. Therefore

⁹Mean levels of Trust: white (<0), light grey (0-0.1), grey (0.1-0.2) and black (+0.2). Mean levels of Reciprocity: light grey (0-0.2), grey (0.2-0.4) and black (+0.4).

we can write:

$$p(r_1, r_2, \dots, r_M|W) = \int \int p(r_1, r_2, \dots, r_M|a_t, a_r) f(a_t, a_r|W) da_t da_r \quad (4.9)$$

$$= \int \int p(r_1|a_t) p(r_2|a_t) \dots p(r_m|a_t) p(r_{m+1}|a_r) \dots \quad (4.10)$$

$$p(r_M|a_r) f(a_t a_r|W) da_t da_r, \quad (4.11)$$

where the $[r_1 \dots r_m]$ are the responses to trust and $[r_m + 1 \dots r_M]$ are the responses to reciprocity. The elements $p(r_1|a_t) \dots p(r_m|a_t)$ and $p(r_{m+1}|a_r) \dots p(r_M|a_r)$ have already been estimated. We have specified $f(a_t, a_r|W)$ as having normal margins. For this exercise a_t and a_r have been scaled to be uniforms $(0, 1)$ separately. We can completely specify $f(a_t, a_r|W)$ in the original ‘normal’ space by simply supplying the missing covariance between a_t and a_r , and this is made to depend on W . The specification used is:

$$\rho(W) = \frac{\exp(W\delta) - 1}{\exp(W\delta) + 1} \quad (4.12)$$

Figures 4.12 and 4.13 show the estimated joint density function. Notice that trust and reciprocity have been scaled on $(0, 1)$, i.e. as ‘percentiles’, and the height of the figure is the corresponding density. We observe that trust and reciprocity are positively correlated since the density at $(1, 1)$ and $(0, 0)$ is very high, while the density at $(1, 0)$ and $(0, 1)$ is very low. If the joint distribution was perfectly uniform, the plot would be a horizontal line at 1. This graph also shows that there is an large amount of people situated in the middle of the distribution.

4.6. The Effect of Social Capital on Civic Engagement

The theoretical literature has argued that social capital generates positive externalities. The spillovers of social capital have been considered important for explaining economic outcomes. For example, social capital is thought to increase the probability that an individual will engage in civic participation, taking part in decisions on policy issues that affect the economic and social outcomes. This may occur for instance through higher voting turn-out. This increase in civic participation can improve the decision making and the quality of political decisions. By this process, social capital creates an externality that may benefit all citizens.

To test this hypothesis we study the relationship between individuals’ trust and reciprocity and the probability that they participate actively in the society. We compute the mean of the estimated probability distribution of trust and reciprocity for each individual, and we then use these estimates to explain civic participation.

We classify civic participation as a function of its formality. We use as indicators the following questions:

- Are you a member of any political party? (Yes/No)
- Did you vote in the last national election in [month/year]? (Yes/No)
- How interested would you say you are in politics? (scale from 1 to 4)
- During the last 12 months, have you contacted a politician, government or local government official?
- During the last 12 months, have you signed a petition?
- During the last 12 months, have you boycotted certain products?

Tables 4.7, 4.8 and 4.9 present the findings for the relationship between trust and reciprocity and civic participation. These tables show a positive association between the components of social capital and the political engagement variables. They also show that trust and reciprocity can explain part of the effect often attributed to human capital. The coefficient associated to human capital, although still significant, shrinks when the variables reflecting social capital are introduced in the regression. This result gives support to the hypothesis formulated by Glaeser et al. (2006). They sustain that more educated individuals tend to be politically more active because due to their higher levels of social capital, they have lower costs of socialization.

The tables also show that the different components of social capital can have a different effect on the different forms of participation. We find that people with more trust in others, and in institutions, choose “more institutional” ways of participating. Figure 4.14 shows the effect of trust and reciprocity on the different forms of participation. People with high levels of reciprocity will also tend to participate more, but if their levels of trust are not so high, they may choose a more informal (less traditional) way of doing it.

There are good reasons to think that people who trust others more and who share more norms and values of reciprocity will tend to participate more, and to have more interest in politics. It is possible that more traditional forms of participation lead to higher personal benefits. They might help people’s careers, for instance. Then individuals with more trust in institutions will expect a higher return from their participation. This explanation is consistent with the results that we obtain. A different explanation could be that people who think that others act helpfully and in a decent way, find the need to participate and invest time in producing collective goods, as a matter of ethics. If this hypothesis was true, then we would expect to find a significant effect of trust in the more informal ways of participating. This is not what we observe, see Table 4.9.

It is also possible that people whose acceptance of norms and values of reciprocity is higher may see participation in politics as a duty. And they participate even in activities that are less rewarding individually. This could explain the stronger effect of reciprocity in explaining the participation in less traditional ways.

For the regions in the East, the low participation in elections can be explained by a lower level of trust. This could reflect the fact that institutions have changed recently in these regions. Individuals may show low levels of trust because of their idea of the former institutions and because of the unknownness of the new ones.

4.7. Conclusions

In this paper we have applied a new methodology to measure the components of social capital: trust and reciprocity. This methodology is conceptually cleaner than previously used methods since it allows estimating social capital directly (and not a proxy) as a latent attitude, describing a simple underlying model, and without imposing parametric assumptions. In line with the theoretical literature on social capital, the model allows social capital to be multi-dimensional (using trust and reciprocity as its dimensions), avoiding problems of other papers that use more partial measures.

In measuring the components of social capital, we exploit information on agents' attitudes contained in survey responses, and information from personal and demographic characteristics. This allows to see the probability distribution of the latent attitudes, conditional on these characteristics. In particular, education, gender, age, income, intensity of religion, political orientation, and being from a discriminated group can explain part of the distribution of trust and reciprocity. Regional characteristics, on the other hand, do not explain much about these attitudes in Germany.

There is a growing literature on the impact of social capital on social and economic outcomes. In this paper, we have focussed on measuring its impact on civic and political engagement, finding that trust and reciprocity have different effects on different forms of civic participation. People with more trust in others, and in the institutions, choose more institutional ways of participating. People with high levels of reciprocity also tend to participate more, but if their levels of trust are not so high, they may choose a more informal way of doing so. For the regions in the East, the low participation in elections can be explained by a lower level of trust.

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Appendix

Appendix 4.A. Original wording of the questions/items used

Items used to estimate the individuals' attitudes on trust:

- Generally speaking, would you say that most people can be trusted, or that you can't be too careful in dealing with people?¹⁰ (Score of 0 to 10, where 0 means you can't be too careful and 10 means most people can be trusted.)
- Do you think that most people would try to take advantage of you if they got the chance, or would they try to be fair?¹¹ (Score of 0 to 10, where 0 means most people would try to take advantage of me and 10 means most people would try to be fair.)
- Would you say that most of the time people try to be helpful or that they are mostly looking out for themselves?¹² (Score of 0 to 10, where 0 means people mostly look out for themselves and 10 means people mostly try to be helpful.)
- Please tell me how much you personally trust each of the institutions I read out. (Score of 0 to 10, where 0 means you do not trust an institution at all, and 10 means you have complete trust.)
 - the legal system
 - politicians
- How much would you trust the following groups to deal honestly with people like you? (Score of 1 to 5, where 1 means you distrust and 5 means you trust a lot.)
 - plumbers, builders, car mechanics and other repair people¹³
 - financial companies such as banks or insurers.
 - public officials¹⁴

¹⁰Cant be too careful: need to be wary or always somewhat suspicious.

¹¹Take advantage: exploit or cheat; fair: in the sense of treat appropriately and straightforwardly.

¹²The intended contrast is between self-interest and altruistic helpfulness.

¹³Builders include all kinds of tradespeople who work on building sites.

¹⁴Public officials refers to both government officials, such as custom officers and to local officials, such as housing/building regulators etc.

Items used to estimate the individuals' attitudes on norms and values of reciprocity:

- How much do you agree or disagree with this statement: Citizens should spend at least some of their free time helping others. (Score of 1 to 5, where 1 means agree strongly and 5 means disagree strongly.)
- How wrong, if at all, do you consider the following ways of behaving to be? (Score of 1 to 4, where 1 means not wrong at all and 4 means seriously wrong.)
 - Someone making an exaggerated or false insurance claim.
 - A public official asking someone for a favor or bribe in return for their services.
- How much do you agree or disagree with these statements about how people see rules and norms?
 - If you want to make money you can't always act honestly.
 - Occasionally, it is alright to ignore the law and do what you want to do.

Appendix 4.B. Tables and Figures

TABLE 4.1. Table with relative frequencies for a 2 item example.

		r_1		
		1	2	3
r_2	1	0.16	0.12	0.05
	2	0.11	0.18	0.10
	3	0.03	0.11	0.14

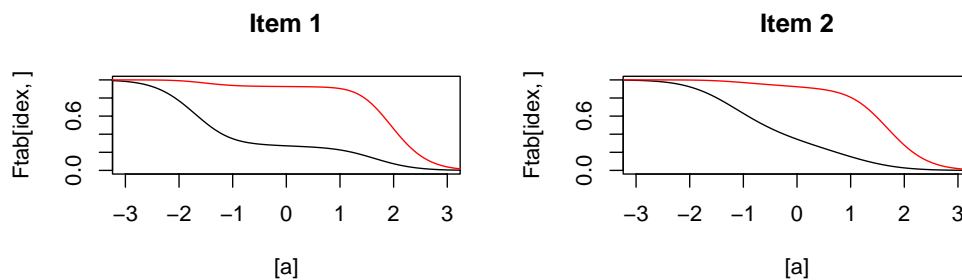


FIGURE 4.1. Probability Distributions of answering 1, 2 or 3 in the two items considered as example

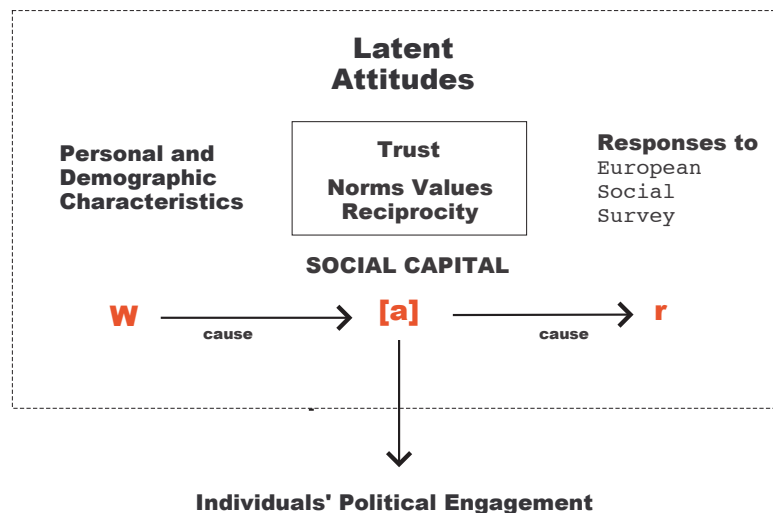


FIGURE 4.2. Diagram of the underlying process.

TABLE 4.2. Descriptive Statistics of the questions used from the ESS.

Variable	Obs	Mean	Std. Dev.	Min	Max
Shared Trust					
Most People Can be Trust	1880	1.889	0.808	1	3
Most People are Fair	1880	2.194	0.784	1	3
Most People are helpful	1880	1.791	0.769	1	3
Trust Legal System	1880	2.105	0.835	1	3
Trust Politicians	1880	1.354	0.597	1	3
Trust Repair People	1880	2.059	0.848	1	3
Trust Banks	1880	1.853	0.825	1	3
Trust Public Officials	1880	2.218	0.762	1	3
Reciprocity					
Better More Time Helping Others	1880	1.851	0.583	1	3
Better Not Cheat Taxes	1880	1.863	0.653	1	3
Bad Make False Insurance	1880	2.080	0.632	1	3
Bad Public Official Bribe	1880	2.708	0.515	1	3
Possible Make Money Honesty	1880	2.353	0.600	1	3
Obey Law Always	1880	2.218	0.762	1	3

TABLE 4.3. Descriptive Statistics for the Personal and Demographic Characteristics.

Variable	Mean	Std. Dev.	Min	Max
Female	0.482	0.500	0	1
Married	0.568	0.496	0	1
Age	42.961	13.269	18	65
Low Income	0.110	0.312	0	1
Medium Income	0.484	0.500	0	1
Highe Income	0.221	0.415	0	1
Primary Degree	0.091	0.288	0	1
Secondary Degree	0.659	0.474	0	1
Higher Degree	0.248	0.432	0	1
Village	0.280	0.449	0	1
Intensity Religion	3.702	2.923	0	10
Discriminated Group	0.040	0.197	0	1
Left-Right	4.449	1.792	0	10

Table 4.4: Pairwise Correlation Coefficients for the items used to build the two scales.

Shared Trust	MPTrust	MPFair	MPHelp	TLS	TPol	TRepair	TBanks	TPublicOff
MPTrust	1.000							
MPFair	0.450	1.000						
MPHelp	0.376	0.427	1.000					
TLS	0.221	0.214	0.171	1.000				
TPol	0.278	0.224	0.226	0.326	1.000			
TRepair	0.140	0.169	0.155	0.076	0.090	1.000		
TBanks	0.158	0.165	0.150	0.165	0.161	0.344	1.000	
TPublicOff	0.204	0.185	0.193	0.245	0.228	0.254	0.383	1.000
Reciprocity	MoreHelp	NotCheatTax	NotRecipe	NotFalsInsur	NotBribe	MoneyHonesty	ObeyLaw	
MoreHelp	1.000							
NotCheatTax	0.124	1.000						
NotFalsInsur	0.125	0.278	0.376	1.000				
NotBribe	0.071	0.108	0.117	0.289	1.000			
MoneyHonesty	0.066	0.196	0.177	0.191	0.092	1.000		
ObeyLaw	0.011	0.133	0.062	0.107	0.069	0.204	1.000	

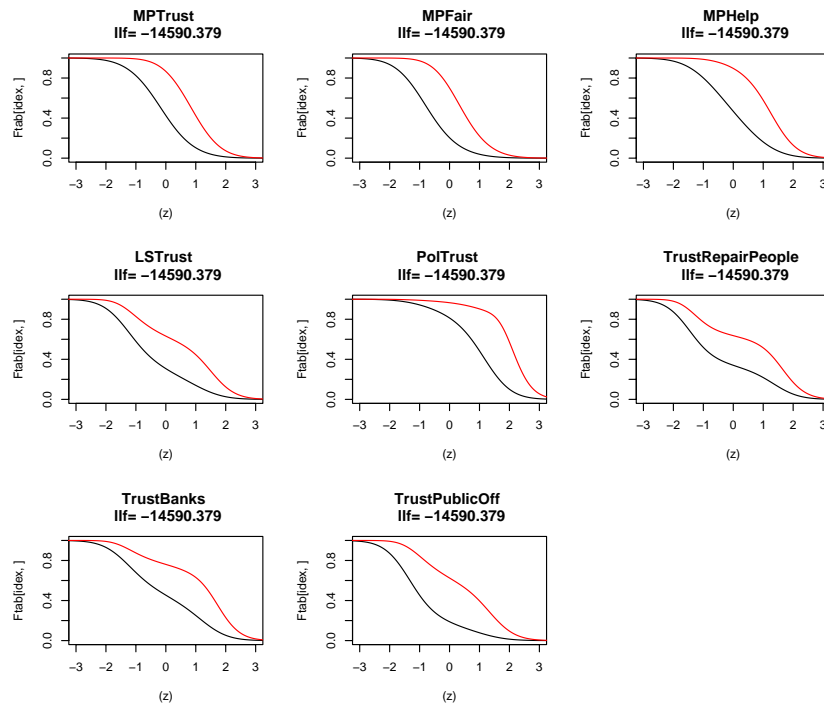


FIGURE 4.3. Estimates of the item response model for the items constituting a scale on shared trust.

TABLE 4.5. Estimated Coefficients for the Personal and Demographic Characteristics. Trust Scale.

	Standard Errors			
Mean	Coefficient	Outer Product	Hessian	White Robust
Married	-0.0360	0.0538	0.0531	0.0572
Female	0.0924	0.0452	0.0430	0.0444
Age	-0.0003	0.0018	0.0018	0.0019
Agesq.01	0.0311	0.0124	0.0119	0.0122
Income1	-0.1006	0.0673	0.0728	0.0824
Income3	0.1306	0.0584	0.0536	0.0512
PrimaryDegree	-0.3727	0.1940	0.2226	0.2638
HigherDegree	0.2748	0.0532	0.0501	0.0496
Village	0.0374	0.0520	0.0498	0.0500
IntensityReligion	0.0489	0.0090	0.0090	0.0094
IntRelig.01	0.0490	0.2936	0.2777	0.2749
DiscriminatedGroup	-0.5853	0.1166	0.1150	0.1175
LeftRight	-0.0348	0.0126	0.0124	0.0129
LeftRight.01	-1.3923	0.4078	0.4208	0.4556
Schleswig-Holstein	0.0626	0.1461	0.1432	0.1460
Hamburg	-0.0614	0.2539	0.1776	0.1338
Niedersachsen	0.0785	0.0933	0.0922	0.0961
Bremen	-0.2093	0.3457	0.2885	0.2501
Nordrhein-Westfalen	0.1838	0.0731	0.0746	0.0803
Hessen	-0.0032	0.1006	0.1035	0.1107
Rheinland-Pfalz	0.2387	0.1201	0.1257	0.1381
Baden-Württemberg	0.1050	0.0868	0.0876	0.0919
Saarland	0.3032	0.2501	0.2241	0.2070
Berlin	-0.1931	0.1040	0.1027	0.1065
Brandenburg	0.0247	0.1048	0.1142	0.1333
Mecklenburg-Vorpommern	0.3119	0.1245	0.1186	0.1166
Sachsen	0.0541	0.0967	0.0929	0.0954
Sachsen-Anhalt	0.0327	0.1011	0.1014	0.1069
Thüringen	0.0774	0.1169	0.1058	0.1023
Variance	Coefficient	Outer Product	Hessian	White Robust
Married	-0.1925	0.0559	0.0514	0.0507
Female	-0.1563	0.0542	0.0492	0.0489
Age	0.0068	0.0022	0.0021	0.0021
Agesq.01	-0.0606	0.0157	0.0140	0.0136

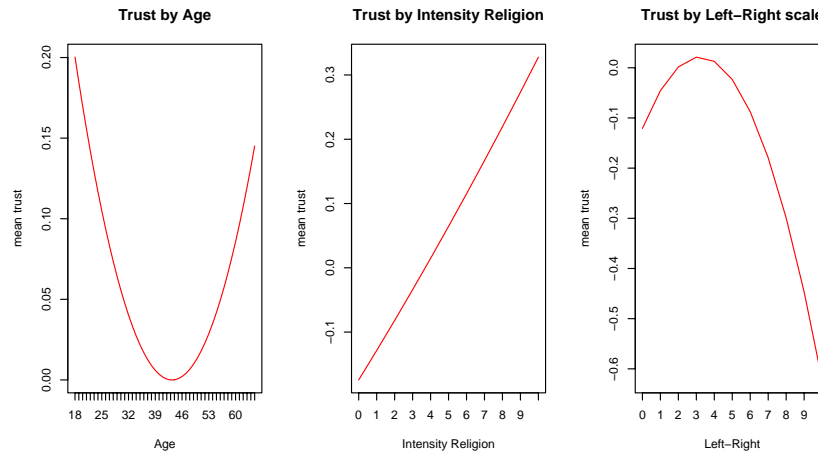


FIGURE 4.4. The effect of the three continuous demographic variables: Age, Intensity of Religion, Left-Right Scale.

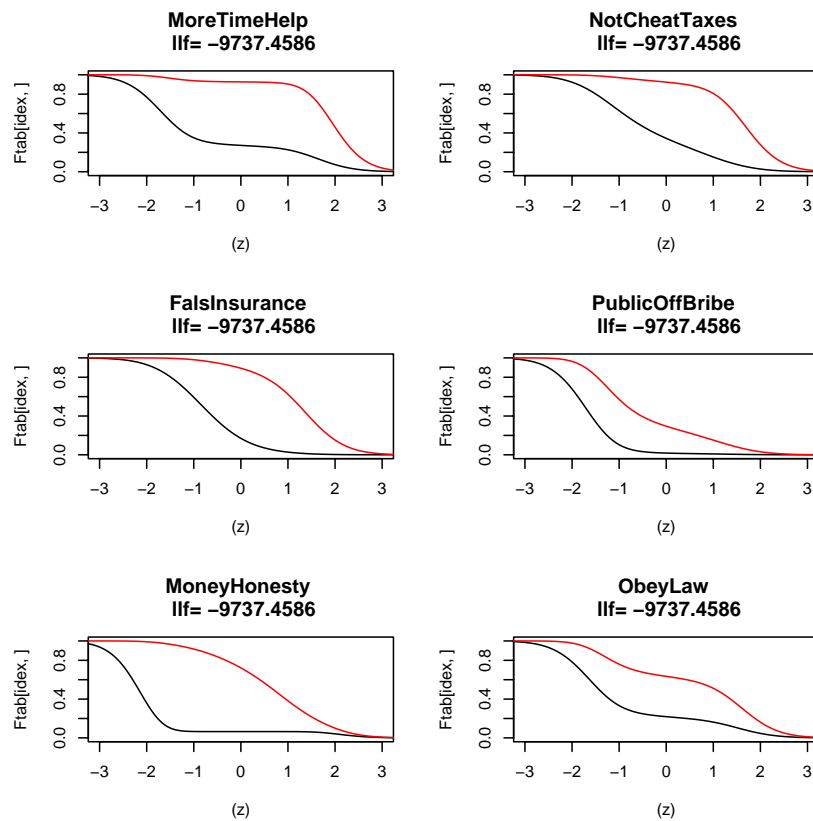


FIGURE 4.5. Estimates of the item response model for the items constituting a scale on norms and values of reciprocity.

TABLE 4.6. Estimated Coefficients for the Personal and Demographic Characteristics. Norms and Values of Reciprocity Scale.

	Standard Errors			
Mean	Coefficient	Outer Product	Hessian	White Robust
Married	0.1152	0.0604	0.0573	0.0594
Female	0.2726	0.0505	0.0497	0.0556
Age	0.0123	0.0022	0.0021	0.0021
Agesq.01	-0.0085	0.0133	0.0134	0.0156
Income1	-0.0365	0.0865	0.0789	0.0749
Income3	0.0707	0.0597	0.0577	0.0598
PrimaryDegree	-0.4546	0.2423	0.2428	0.2504
HigherDegree	0.2236	0.0556	0.0530	0.0536
Village	-0.0210	0.0558	0.0538	0.0545
IntensityReligion	0.0486	0.0095	0.0095	0.0102
IntRelig.01	0.4914	0.2899	0.2865	0.2978
DiscriminatedGroup	-0.2847	0.1408	0.1247	0.1194
LeftRight	-0.0228	0.0131	0.0132	0.0141
LeftRight.01	-0.7852	0.4295	0.4471	0.5004
Schleswig-Holstein	0.1503	0.1716	0.1513	0.1380
Hamburg	0.4867	0.1810	0.1860	0.2006
Niedersachsen	0.1882	0.1121	0.0998	0.0937
Bremen	0.2589	0.2784	0.3031	0.3453
Nordrhein-Westfalen	0.0391	0.0803	0.0807	0.0859
Hessen	-0.0240	0.1210	0.1112	0.1078
Rheinland-Pfalz	-0.0721	0.1391	0.1393	0.1442
Baden-Württemberg	0.0282	0.0953	0.0945	0.0982
Saarland	0.4291	0.2214	0.2434	0.2720
Berlin	-0.0394	0.1126	0.1106	0.1137
Brandenburg	-0.1876	0.1197	0.1211	0.1292
Mecklenburg-Vorpommern	0.6073	0.1445	0.1259	0.1189
Sachsen	0.3692	0.1007	0.0972	0.0976
Sachsen-Anhalt	0.0237	0.1112	0.1092	0.1134
Thüringen	0.2026	0.1135	0.1098	0.1110
Variance	Coefficient	Outer Product	Hessian	White Robust
Married	-0.2103	0.0689	0.0582	0.0528
Female	-0.2133	0.0672	0.0570	0.0520
Age	-0.0035	0.0030	0.0027	0.0027
Agesq.01	-0.0662	0.0182	0.0165	0.0161

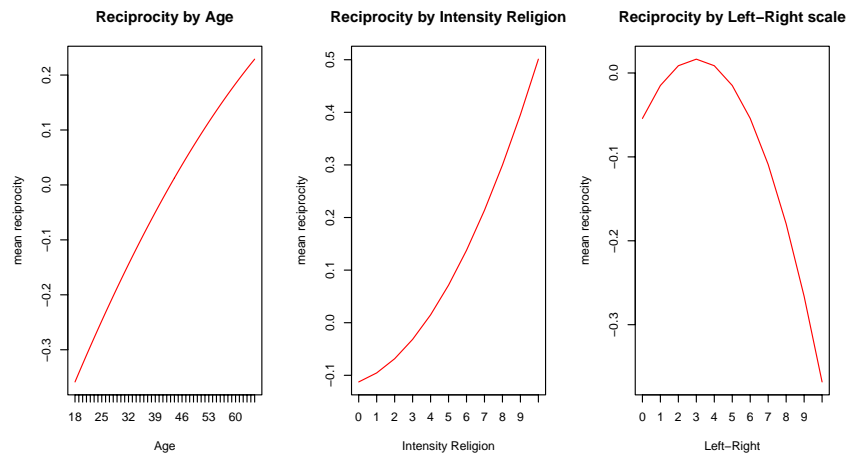


FIGURE 4.6. The effect of the three continuous demographic variables: Age, Intensity of Religion, Left-Right Scale

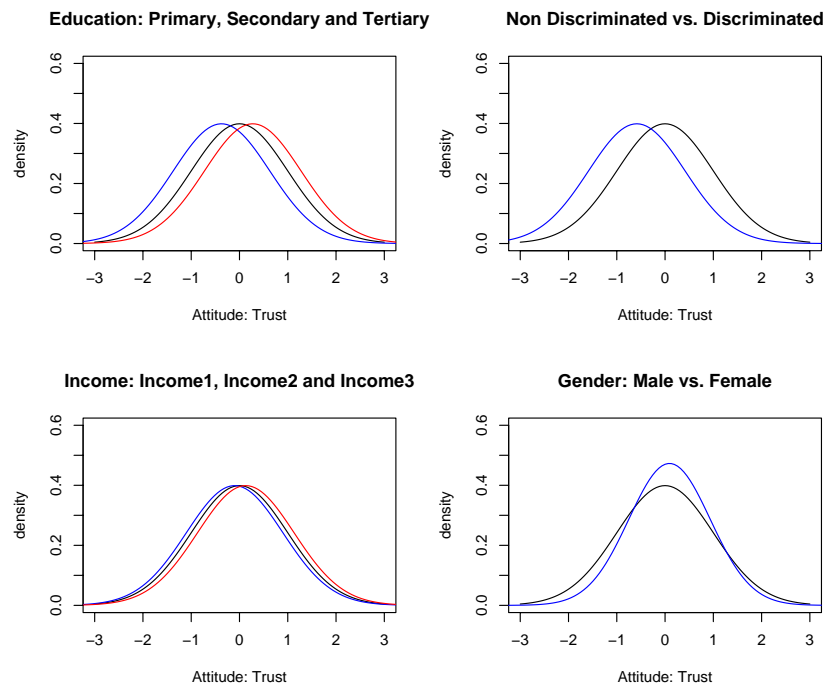


FIGURE 4.7. Effects of demographics on the attitudes on Trust

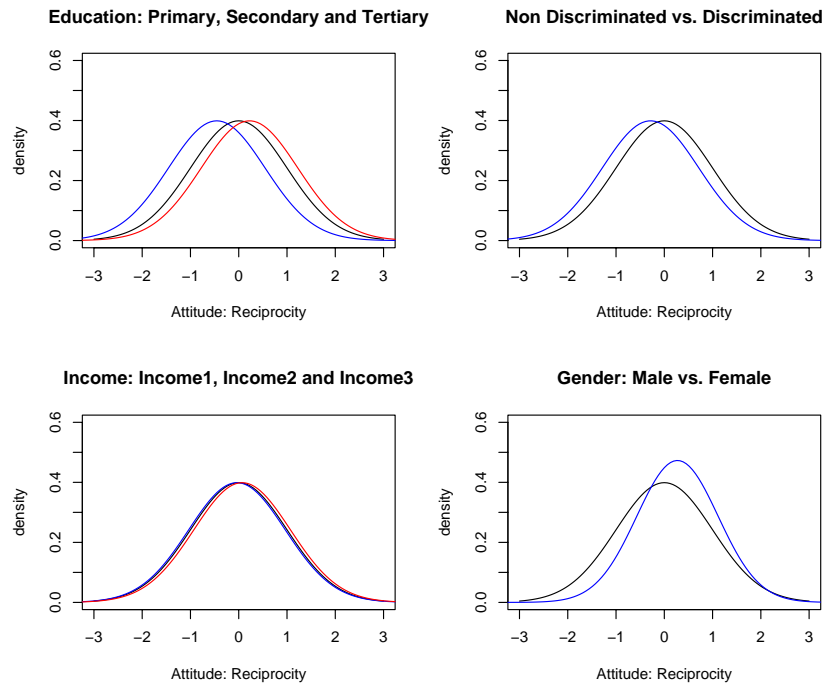


FIGURE 4.8. Effects of demographics on the attitudes on Norms and Values of Reciprocity

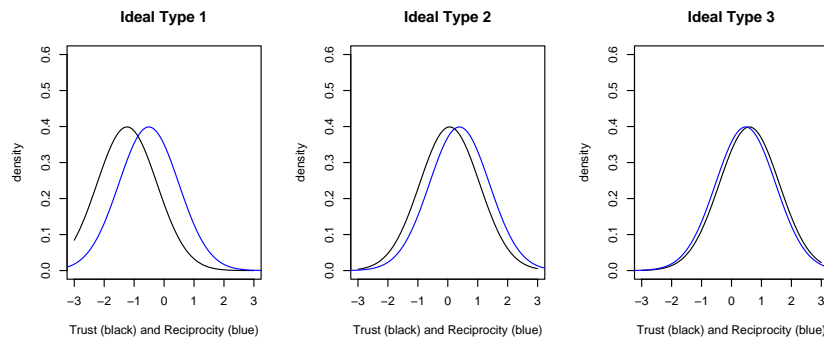


FIGURE 4.9. Distribution of Trust and Reciprocity for some individual ideal types

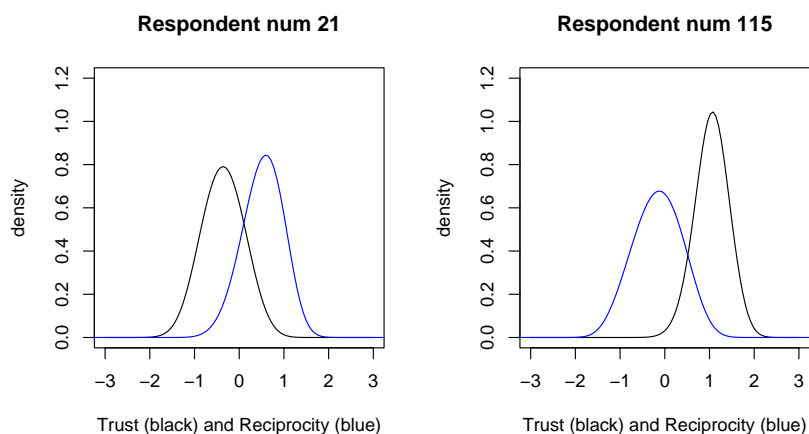


FIGURE 4.10. Probability density distribution of the latent attitudes for two respondents.

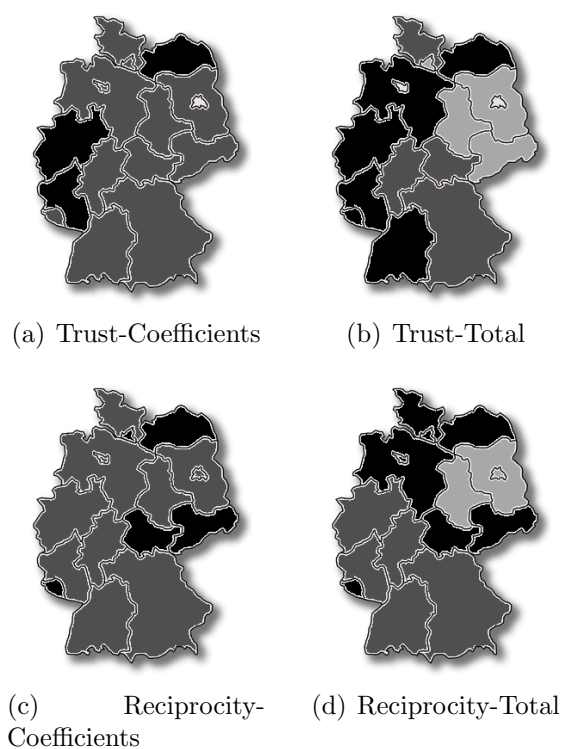


FIGURE 4.11. Level of Trust and Reciprocity for each region from grey (less scale) to black (more scale)

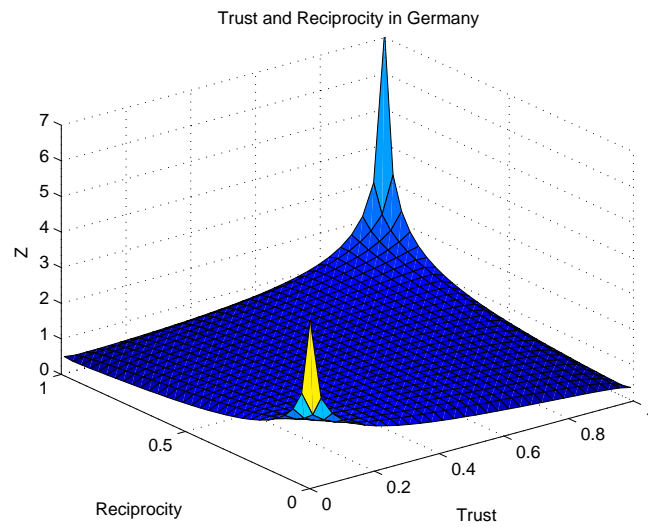


FIGURE 4.12. Joint Distribution of Trust and Reciprocity, scaled to uniform marginals.

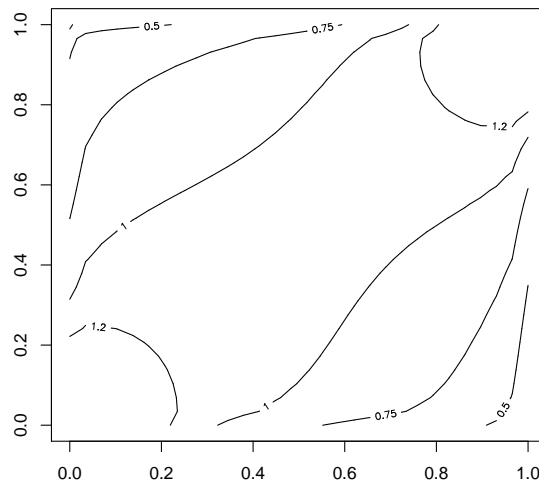


FIGURE 4.13. Contourplot of the Joint Distribution of Trust and Reciprocity. Scaled to uniform marginals.

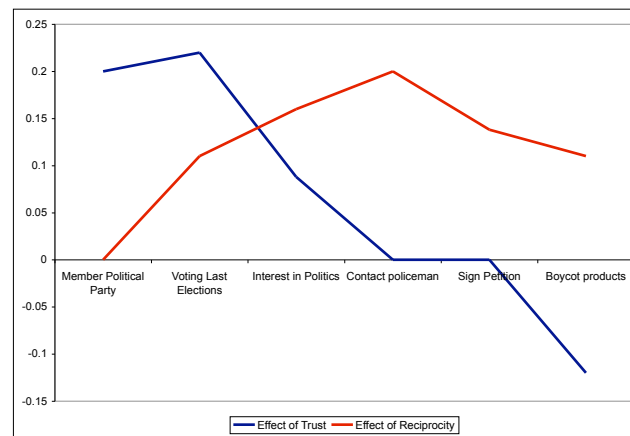


FIGURE 4.14. The effect of Trust and Reciprocity on different forms of civic participation.

Table 4.7: Probit estimation: trust, reciprocity and civic participation (I).

	Member Political Party				Voted Last Elections			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Trust		0.239 *** (0.081)		0.202 ** (0.086)		0.247 *** (0.050)		0.222 *** (0.052)
Reciprocity			0.227 ** (0.101)	0.142 (0.107)			0.186 *** (0.060)	0.110 * (0.063)
Age	0.009 ** (0.005)	0.010 ** (0.005)	0.007 (0.005)	0.008 (0.005)	0.022 *** (0.003)	0.023 *** (0.003)	0.019 *** (0.003)	0.021 *** (0.003)
Low Income	0.006 (0.204)	0.042 (0.205)	0.057 (0.203)	0.070 (0.205)	-0.299 *** (0.102)	-0.280 *** (0.103)	-0.286 *** (0.103)	-0.275 *** (0.103)
High Income	0.350 *** (0.129)	0.321 ** (0.130)	0.333 *** (0.130)	0.316 ** (0.130)	0.369 *** (0.099)	0.330 *** (0.100)	0.351 *** (0.100)	0.323 *** (0.100)
Low Educ	0.008 (0.224)	0.022 (0.227)	0.026 (0.227)	0.031 (0.229)	-0.856 *** (0.110)	-0.853 *** (0.110)	-0.842 *** (0.110)	-0.845 *** (0.110)
High Educ	0.050 (0.132)	0.004 (0.133)	0.004 (0.134)	-0.019 (0.135)	0.339 *** (0.095)	0.280 *** (0.096)	0.301 *** (0.096)	0.264 *** (0.097)
Female	-0.185 (0.116)	-0.231 ** (0.118)	-0.249 ** (0.120)	-0.264 ** (0.121)	-0.029 (0.070)	-0.079 (0.071)	-0.095 (0.073)	-0.113 (0.074)
City	-0.132 (0.125)	-0.133 (0.127)	-0.136 (0.126)	-0.134 (0.128)	0.050 (0.075)	0.063 (0.075)	0.048 (0.075)	0.061 (0.075)
East	-0.007 (0.119)	0.031 (0.121)	-0.008 (0.120)	0.026 (0.122)	-0.147 ** (0.072)	-0.116 (0.073)	-0.144 ** (0.072)	-0.118 (0.073)
Constant	-2.231 *** (0.235)	-2.286 *** (0.238)	-2.165 *** (0.240)	-2.236 *** (0.243)	-0.066 (0.127)	-0.104 (0.128)	0.033 (0.131)	-0.042 (0.133)
Observations	1880	1880	1880	1880	1880	1880	1880	1880

Table 4.8: Ordered Probit and Probit estimation: trust, reciprocity and civic participation (II).

	Interest in Politics				Contacted government			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Trust		0.126 *** (0.036)		0.088 ** (0.038)		0.067 (0.054)		0.016 (0.057)
Reciprocity			0.192 *** (0.045)	0.160 *** (0.047)			0.205 *** (0.068)	0.198 *** (0.072)
Age	0.016 *** (0.002)	0.016 *** (0.002)	0.013 *** (0.002)	0.013 *** (0.002)	0.009 *** (0.003)	0.009 *** (0.003)	0.006 ** (0.003)	0.007 ** (0.003)
Low Income	-0.273 *** (0.083)	-0.259 *** (0.083)	-0.256 *** (0.083)	-0.250 *** (0.083)	-0.295 ** (0.149)	-0.289 * (0.149)	-0.276 * (0.149)	-0.276 * (0.149)
High Income	0.250 *** (0.064)	0.231 *** (0.064)	0.233 *** (0.064)	0.223 *** (0.064)	0.145 (0.091)	0.136 (0.091)	0.127 (0.091)	0.125 (0.091)
Low Educ	-0.473 *** (0.091)	-0.468 *** (0.091)	-0.456 *** (0.091)	-0.456 *** (0.091)	-0.344 * (0.178)	-0.340 * (0.178)	-0.333 * (0.180)	-0.332 * (0.180)
High Educ	0.358 *** (0.062)	0.330 *** (0.063)	0.320 *** (0.063)	0.307 *** (0.063)	0.492 *** (0.085)	0.475 *** (0.086)	0.451 *** (0.086)	0.448 *** (0.087)
Female	-0.228 *** (0.051)	-0.251 *** (0.051)	-0.293 *** (0.053)	-0.298 *** (0.053)	-0.018 (0.076)	-0.032 (0.077)	-0.081 (0.079)	-0.082 (0.079)
City	0.131 ** (0.054)	0.140 ** (0.054)	0.136 ** (0.054)	0.142 *** (0.054)	-0.352 *** (0.086)	-0.347 *** (0.086)	-0.349 *** (0.086)	-0.348 *** (0.086)
East	-0.010 (0.053)	0.008 (0.053)	-0.006 (0.053)	0.006 (0.053)	0.144 * (0.078)	0.155 ** (0.079)	0.144 * (0.079)	0.147 * (0.079)
Constant					-1.603 *** (0.156)	-1.611 *** (0.156)	-1.523 *** (0.159)	-1.528 *** (0.160)
Observations	1880	1880	1880	1880	1880	1880	1880	1880

Table 4.9: Probit estimation: trust, reciprocity and civic participation (III).

	Sign a petition				Boycott Products			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Trust		-0.018 (0.042)		-0.050 (0.045)		-0.096 ** (0.046)		-0.122 ** (0.049)
Reciprocity			0.119 ** (0.054)	0.138 ** (0.056)			0.062 (0.059)	0.108 * (0.062)
Age	-0.001 (0.002)	-0.001 (0.002)	-0.003 (0.002)	-0.003 (0.002)	1.36E-04 (0.003)	2.71E-05 (0.003)	-0.001 (0.003)	-0.002 (0.003)
Low Income	-0.110 (0.099)	-0.112 (0.099)	-0.098 (0.099)	-0.102 (0.099)	-0.181 (0.114)	-0.194 * (0.115)	-0.175 (0.115)	-0.187 (0.115)
High Income	0.030 (0.075)	0.033 (0.075)	0.020 (0.075)	0.026 (0.075)	0.203 *** (0.078)	0.219 *** (0.079)	0.198 ** (0.078)	0.213 *** (0.079)
Low Educ	-0.180 (0.110)	-0.181 (0.110)	-0.168 (0.110)	-0.168 (0.110)	-0.541 *** (0.138)	-0.547 *** (0.138)	-0.533 *** (0.138)	-0.536 *** (0.138)
High Educ	0.309 *** (0.072)	0.313 *** (0.073)	0.285 *** (0.073)	0.293 *** (0.073)	0.225 *** (0.076)	0.248 *** (0.077)	0.213 *** (0.077)	0.233 *** (0.077)
Female	0.149 ** (0.060)	0.152 ** (0.060)	0.111 * (0.062)	0.114 * (0.062)	0.094 (0.065)	0.111 * (0.066)	0.074 (0.068)	0.080 (0.068)
City	0.179 *** (0.064)	0.178 *** (0.064)	0.182 *** (0.064)	0.179 *** (0.064)	0.282 *** (0.068)	0.276 *** (0.068)	0.284 *** (0.068)	0.277 *** (0.068)
East	0.061 (0.062)	0.058 (0.063)	0.063 (0.062)	0.056 (0.063)	-0.275 *** (0.069)	-0.288 *** (0.070)	-0.273 *** (0.069)	-0.290 *** (0.070)
Constant	-0.500 *** (0.116)	-0.498 *** (0.116)	-0.444 *** (0.119)	-0.428 *** (0.119)	-0.802 *** (0.127)	-0.789 *** (0.127)	-0.772 *** (0.130)	-0.733 *** (0.131)
Observations	1880	1880	1880	1880	1880	1880	1880	1880