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1. Prologue

1.1 Research Question and Outline

Since Baumol's (1968) call to arms, entrepreneurship research has undergone a remarkable development. By now it seems as if the Schumpeterian entrepreneur had (re-)conquered its position in economic sciences (c.f. Schumpeter, 1912, 93). The entrepreneur's relevance for economic growth is barely denied (Baumol, 2004; Wennekers and Thurik, 1999; Reynolds, 1997). Particularly, her contribution to innovation is widely acknowledged (Acs and Audretsch, 1990; Audretsch 1995). A growing community of scholars regularly meets at entrepreneurship conferences to advance the field. Numerous journals deal with the issue, and research on entrepreneurship constantly transcends the traditional boundaries between the academic disciplines by combining management questions with the economics' view and by integrating e.g. psychological and sociological approaches. Nevertheless, the mission has not been accomplished yet. So far, no general theory on entrepreneurship exists. The channels by which entrepreneurs contribute to innovation and growth are still not exhaustively explored (c.f. Fritsch, 2011a). Neither are the determinants of entrepreneurship. Along this line, the question arises whether entrepreneurship is a universal instrument, or if country specific factors might play a decisive role and have to be taken care of. This thesis will contribute to this discussion by analyzing interactions between institutions and entrepreneurship. It will empirically assess institutional factors influencing the occupational choice of becoming an entrepreneur, the effects of institutional changes on people's attitude towards entrepreneurship, and how entrepreneurial preferences evolve in different institutional settings.

Even more remarkable than the developments in the academic field is the development of policies geared towards entrepreneurship. It seems as if entrepreneurship was one of the few subjects where research and policy development go hand in hand. Indeed, various countries nowadays impose policies to support entrepreneurship. The goals of such policies are widespread. In the context of developing countries, entrepreneurship policies aim at building up very basic market structures, e.g. by micro financing (Baumol et al., 2007, 133-184). Transition economies support entrepreneurship in order to catch up technologically (Smallbone and Welter, 2001; OECD, 1998). Accordingly, not even the socialist Cuba can afford to do without entrepreneurship anymore. Industrialized countries, on the other hand, strive to preserve their lead by fostering entrepreneurship in order to organize the innovation process more effi-

ciently. Thus policy makers aim at bridging the gap between (basic) research and its (economic) application – with entrepreneurship, inter alia (e.g. ECOM, 2004; 2003). But the effectiveness of entrepreneurship policies is still in question. The thesis in hand addresses this issue by investigating conditions for and effects of policies for entrepreneurship support. The evaluation of entrepreneurship policies fits well into the major context, since policies' effectiveness depends on the institutional framework they are executed in – just as policies themselves may alter institutions, thus potentially contributing to the entrepreneurial dynamics related to institutional change.

Many policy makers seem to have the success story of Silicon Valley in mind when they implement entrepreneurship policies – with Silicon Valley being the ideal-typical manifestation of economic growth that materializes out of a process of creative destruction. But Silicon Valley is rather difficult to mimic, as Leslie and Kargon (1996) set out. They precisely portray how even Frederick Terman, the former provost of Stanford university and thus one of the "fathers" of Silicon Valley, failed in reproducing his own (i.e. the Silicon Valley's) success at other sites in the US. One reason for his failure lies in the differences in the institutional framework at the different locations. Interestingly, the Korea Advanced Institute of Science and Technology in South Korea turned out to be the most successful duplicate of Silicon Valley Terman set up with strong support of the Korean government. Thus institutions are seemingly relevant for the success of entrepreneurship policies. Moreover, the institutional framework can be assumed to have an independent effect on entrepreneurship apart from policies as well (e.g. Acs and Audretsch, 1989; 1987;). This does not only refer to laws and regulations potentially influencing entrepreneurial success (e.g. Djankov et al., 2002). Institutions also imply a notion of culture, norms, and values. For instance, the story of Silicon Valley cannot be told without referring to the "entrepreneurial spirit" at work around Santa Clara. This spirit is probably not as vivid at all other places in the world (c.f. Tiessen, 1997). Thus policy makers may set laws and regulations, but they must consider such soft factors when designing effective entrepreneurship policies. Consequently, these factors must not be disregarded when analyzing entrepreneurship policies. The interrelation between "hard" and "soft" institutional factors will be discussed in detail throughout this thesis.

In the following chapters I will analyze the interplay between entrepreneurship and institutions from different points of view. Particularly, I will address the effects of explicit and of implicit institutions on entrepreneurship. In the course of this thesis I will also investigate the

effectiveness of some policy measures for entrepreneurship support. Eventually I will turn to causes and effects of institutional change by itself. The whole thesis is inspired by the work of Audretsch and Fritsch (2002). They identify four different types of regional “growth regimes” in Germany conditional on the entrepreneurial activity they observe in the West German planning regions (almost equivalent to labor market regions). These regimes vary significantly over time and so do the importance and the effectiveness of entrepreneurship in the respective regions (c.f. Nelson and Winter 1982; Winter 1984). This raises the question how different regimes do actually affect entrepreneurship, and where the regimes’ differences result from. Subsequently, I understand “regime” as set of rules that dominate a regional market. More generally, a regime is a set of institutions prevalent in a certain region. Accordingly, this thesis will approach the question "*How do institutions influence entrepreneurship?"*, and, given the results obtained by Audretsch and Fritsch, "*Where do regional differences in the institutional framework for entrepreneurship come from?"*

Following North (1990; 1991) I differentiate between explicit institutions, i.e. formally ascribed rules, regulations and “modi operandi”, and implicit institutions, i.e. informal rules resulting from culture and tradition that latently affect market interactions. Chapter 2 expands on this distinction and investigates the implicit institutions’ influence on entrepreneurship by exploiting the German history of separation and reunification as a quasi-natural experiment. Chapter 3 picks up on the results and thoroughly analyzes persistent differences between East and West Germany to explore how institutions affect entrepreneurial preferences. Chapter 4 shifts the focus towards explicit institutions and analyzes educational effects on entrepreneurship, thus explaining where differences in the preferences for entrepreneurship between East and West Germany result from. Chapter 5 explicitly analyzes an adjustment in the explicit institutions regarding university education by evaluating some policy measures for supporting academic entrepreneurship. Chapter 6 eventually shifts the focus towards the institutional dynamics itself and investigates the role of information dissemination in the process of institutional change. Chapter 7 concludes. This introductory chapter proceeds by discussing the potential effects of explicit and implicit institutions on entrepreneurship in more depth; thus giving a more detailed overview over the subsequent chapters along this line.

1.2 Institutions and Entrepreneurship

Baumol (1990) argues that the economic effects of entrepreneurship crucially depend on the institutional framework entrepreneurship takes place in. If the institutions provide adverse incentives, entrepreneurs concentrate on rent seeking behavior which eventually leads to a welfare loss. Only if the institutions understood as "rules of the game" grant high enough payoffs for productive endeavors and guarantee that the entrepreneur can appropriate its profit, then entrepreneurship is allocated to productive means. Consequently, the rule of market, protection of property rights and equal justice can be understood as basic requirements on the institutional setup to enable productive entrepreneurship (c.f. Acemoglu and Johnson 2005; Acemoglu et al. 2005; Scully, 1988). But institutional influences on entrepreneurship go beyond these basic requirements. Saxenian (1994) demonstrates that differences between the development of Silicon Valley and Route 128 not least stem from differences in the institutions prevalent at the respective sites. As Gilson (1999) points out, California and Massachusetts differ in their legal institutions. While Massachusetts enforces covenants not to compete, California does not, thus facilitating labor mobility and consequently knowledge transfers. Apart from that, Saxenian (1994) more generally discusses differences in the market structure, particularly in the organization of the value chain. But she also stresses the importance of social ties and business culture, which are rather "soft" and informal factors that nevertheless affect entrepreneurship. In line with this reasoning, Baumol (1990) points out that the entrepreneur's reputation may play a role as non-pecuniar benefit when individuals choose their preferred occupation.

Both formal and informal factors influencing entrepreneurship can be subsumed under the term 'institutions'. „Institutions are the humanly devised constraints that structure political, economic and social interaction. They consist of both informal constraints (sanctions, taboos, customs, traditions and codes of conduct), and formal rules (constitutions, laws, property rights)" (North 1991, 97). I refer to the set of formal rules as explicit institutions, since they are explicitly codified, publicly known and usually include instruments to sanction deviant behavior. On the contrary, I consider North's "informal constraints" to be implicit institutions, since they are usually not codified and often not codifiable. Nevertheless, implicit institutions are known to the market actors and affect their behavior. Typically, implicit institutions result from cultural norms and traditions and are transmitted by social interaction. Deviant behavior is of course not justiciable, but it is sanctioned socially, e.g. by obstruction. This can effec-

tively ensure liability, as Ellickson (1991) points out. He shows how farmers in Shasta County regulate land use and settle disputes over livestock without referring to explicit laws but adhere to implicit norms instead. Thus very generally, norms and values that are prevalent in certain regional communities affect decisions made at regional markets by determining which actions are considered to be appropriate. And evidently, norms and values should influence peoples' choice of occupation (Busenitz and Lau, 1996). Anyhow, the institutional effects on entrepreneurship, particularly the effects of implicit institutions, are not exhaustively explored yet.

With respect to the regulatory framework for entrepreneurship, it is the explicit institutions that can directly be influenced by policy makers. But a "regime" as described by Audretsch and Fritsch (2002) goes beyond that. A regime can be understood as the aggregate of implicit and explicit institutions in its entity (c.f. Boettke and Coyne, 2009). Consequently, it is the interplay of explicit and implicit institutions that determines how entrepreneurship-friendly the rules of the game at some regional market are – or if the regime regulating some market poses a hurdle to entrepreneurship. Essentially, regimes may differ with regard to a regions' economic structure and consequently its labor market conditions, thus providing more or less opportunities to begin an entrepreneurial endeavor. Moreover, subsidies and grants are explicit measures that can contribute to regimes' differences and their effects on entrepreneurship. But implicit norms and values as they might e.g. result from culture and tradition are also part of a regional regime. If, for instance, entrepreneurs have a high prestige in one region while in another region entrepreneurs are rather seen as expropriators, then this has a significant influence on the potential (non-pecuniary) benefits from becoming an entrepreneur at these two regional labor markets. The thesis at hand will discuss this issue from different points of view and empirically disentangle the effects of explicit and of implicit institutions on entrepreneurship.

Even though institutions are regarded to be quite stable, Audretsch and Fritsch (2002) observe significant changes in the regional growth regimes over time. It is fair to assume that explicit institutions are more time variant, since they can be influenced by policy and promptly adapt to developments of the economic environment, while implicit institutions are arguably less dynamic (Williamson, 2000). Indeed, this thesis shows that socio-cultural developments leading to changes in the implicit institutions may take several generations. Since a regime's effects do not exclusively result from the effective sum of its institutions, but rather from the

interaction of explicit and implicit institutions (Weingast, 1997; 1995) this should be a relevant policy issue. If entrepreneurs are for instance held in high esteem according to a culture's norms and values, this could multiply the effects of policies applied to support entrepreneurship. Whether policies on the other hand can make up for a potentially bad reputation of entrepreneurs is questionable. But even if the entrepreneur is in best social standing, this will probably not persuade people to start an entrepreneurial endeavor if the economic conditions do not provide sufficient opportunities for entrepreneurship. Hence a regime's efficiency eventually depends on complementarities of its explicit and implicit institutions. This complex relation will be problematized repeatedly in the course of the thesis at hand.

In the subsequent chapters I will detail on the differences between regional regimes with respect to their explicit and implicit institutions. First, I will further discuss the interaction of explicit and implicit institutions and pin down the implicit institutions' influence on entrepreneurship. In a next step, I will analyze the formation of implicit institutions more thoroughly and further investigate their effect on individuals' entrepreneurial preferences. Subsequently, I will expand on the formation of entrepreneurial preferences and investigate how education affects the intention to become an entrepreneur, thus shifting the focus towards explicit institutions. Hereafter I will explicitly assess the effect of different policy measures on entrepreneurship. The analysis of entrepreneurship education at universities and its influence on students' entrepreneurial intentions eventually rounds out this line of argument by investigating the outcome of a change in the explicit institutions. Throughout the course of analysis, a couple of questions on institutional change arise that cannot be entirely assessed in the respective chapters. Given the institutions' influence on entrepreneurship, can institutions be altered to affect entrepreneurship? How could this be done, and how long would it take? Hence I conclude my thesis with a chapter that addresses these questions in a more general context. Assuming that voting behavior is another manifestation of norms and values prevalent in some regional regime, I will investigate institutional change by analyzing the effects of information and its dissemination on electoral outcomes.

1.3 Explicit Institutions, Implicit institutions, and Entrepreneurship

Chapter 2 approaches the question if implicit institutions affect entrepreneurship. Usually, the effects of implicit and explicit institutions are difficult to disentangle, since both types of institutions typically vary simultaneously. The analysis in chapter 2 works out the effect of implicit institutions by exploiting the German history of separation and reunification as quasi-

natural experiment. For 45 years East and West Germany were governed by two diametrical regimes. In the West, the Federal Republic of Germany (FRG) granted individual freedom, property rights and the rule of the market. In the East, the German Democratic Republic (GDR) established a socialist system with one party rule and a centrally planned economy. But the separation did not only lead to different explicit institutions. The implicit institutions, i.e. societal norms and values, diverged as well, particularly since the Socialist Party in the East tried very hard to influence its people's worldview and to shape its citizens' beliefs. Since East Germans' mobility was forcefully restricted by the Iron Curtain, this socialist treatment can be regarded to be exogenous – and hence used for empirical investigations.

Indeed chapter 2 confirms that implicit institutions significantly differ between East and West Germany, even years after reunification. This is assumed to be the result of the socialist treatment of the East German group of individuals. Furthermore, this analysis reveals a significant correlation between various norm and value variables and an individual's probability to be an entrepreneur. Accordingly, the differences in the implicit institutions between East and West Germany should translate into differences in the propensity to become an entrepreneur – and there is strong evidence that this is indeed the case. Societal norms and values apparently influence the individuals' interest in entrepreneurship and their desire to become an entrepreneur. Due to the socialist treatment in the GDR, implicit institutions in East Germany are still very much affected by socialist norms and values. According to these institutions, East Germans are significantly less inclined to start an entrepreneurial endeavor – nevertheless they do. Actually, the start-up rates are significantly higher in East Germany than in West Germany. This is indicative of the implicit institutions' relevance for entrepreneurship in relation to other factors: Implicit institutions affect the individual desire to become an entrepreneur. But it seems as if the "hard", explicit institutional factors like sales market structure or labor market conditions were more important for the decision to start an own business (c.f. Blanchflower et al.,2001; Blanchflower and Oswald, 1998). At least this is the case in East Germany, where the reunifications' aftermath granted manifold opportunities for entrepreneurship (c.f. Reynolds et al., 2005) – but also caused necessities for lots of people to carve out a career in self-employment (c.f. Kirzner, 1973).

Anyhow, the German reunification provides an outstanding opportunity to investigate institutional influences on entrepreneurship in a quasi-experimental setup. Hence I use this approach repeatedly throughout this thesis. As Alesina and Fuchs-Schündeln (2007) argue, the division

of German exogenously separated parts of the country that were quite similar in their economic development up to the end of World War II (c.f. Bach and Trabold 2000; Frijters et al. 2004; Fuchs-Schündeln and Schündeln 2005; Fuchs-Schündeln 2008). At the latest with the closing of the Berlin wall in 1961 people could not evade the socialist treatment in the Eastern part of Germany any more. This treatment included the implementation of explicit and implicit socialist institutions that were hostile towards entrepreneurship. But also the German reunification in 1990 occurred as exogenous shock. Even those East Germans who rallied against the regime and demanded their individual liberties could not foresee the unprecedented development. Consequently, nobody anticipated that East Germany would entirely adapt the explicit institutions of West Germany at one go in 1990. „Moreover, institutions typically change incrementally rather than in discontinuous fashion“ (North 1990, 6). As a consequence, particularly the individuals in East Germany took some time to familiarize themselves with the implicit institutions inherent to the market economy. Accordingly, the East German treatment group holds on to norms and values that were shaped by the regime of the GDR. On that note history disentangled explicit and implicit institutions in Germany exogenously, thus providing a unique opportunity to analyze institutional influences on entrepreneurship.

1.4 Regional Differences in Implicit Institutions and the Formation of Entrepreneurial Preferences

Chapter 3 picks up the previous chapter's results and explores the implicit institutions inherited from socialism in East Germany more thoroughly, thus linking individual level variables to the institutional level (c.f. Busenitz et al. 2000). In order to better understand how norms and values translate into the decision to become an entrepreneur, this chapter investigates how East Germans' preferences differ from the West German preference structure. As compared to the West German control group, East Germans tend more to rely on the state, favor welfare state interventions and are overall more skeptical towards competition and performance incentives. Accordingly, East Germans are less inclined to engage in entrepreneurship. These preferences are arguably the outcome of the socialist experience, i.e. the treatment with the explicit and particularly implicit institutions of the GDR. Chapter 3 shows that the East Germans' skepticism towards some basic norms of the market economy and their state reliant preferences cannot be explained by the idiosyncratic heterogeneity of individuals or by differences in the economic conditions alone, but are indeed the result of the state controlled socialization under a socialist regime.

Anyhow, chapter 3 also discusses a potential second channel by which the socialist regime might have affected norms, values and preferences in East Germany, i.e. selective migration. In the early years after the Second World War up to the closing of the Berlin wall the latest, migration from Russian occupied East Germany to the increasingly sovereign West Germany was still possible, albeit at increasing costs. There is strong evidence that particularly skilled, libertarian and self-reliant individuals took their chances to move on from socialism to the free market economy. Consequently, differences in the preference structure, especially with respect to state- or self-reliance, must to some degree result from this migration induced change in the composition of the East German population. This vote by feet casted by a selective, self-reliant group of individuals is another effect of socialism. But after the final closing of the inner German border, the socialist regime did not cease to propagate socialist values in order to educate what the ruling party considered to be good citizens. Consequently, even the East German cohorts born decades after the Iron Curtain closed (and migration stopped) show a pronounced treatment effect of exposure to socialist institutions, as chapter 3 confirms in line with chapter 2.

As long as preferences differ between regions, e.g. between East and West Germany, this is a clear indication that institutions differ as well. And if norms and values differ this hints at differences in the implicit institutions. This is of particular interest against the findings from chapter 2 that start up rates are higher in East Germany than in comparable West German districts. The results from chapter 3 suggest that even more East Germans would ceteris paribus become entrepreneurs if they had the same preferences as the average West German, i.e. if implicit institutions between East and West Germany were the same. But up till now the implicit institutions in East Germany still present a barrier to entrepreneurship. Thus the high start up rates in East Germany must be ascribed to the turbulence related to the reunification process and the exceptional economic conditions in East Germany (c.f. Fritsch, 2004). This reasoning also fits the results of Schindele (2010). She shows that East Germany is "catching up" in terms of self employment shares, but that the rate of convergence is rather low. The comparably high but decreasing rate of start-ups found in chapter 2 could be related to this process.

This leads to the question whether implicit institutions will converge to an all-German level sometime. The analysis in chapter 2 shows that people do adapt to the institutions of the community they live in, e.g. if they move from East to West Germany. It is rather the dynam-

ics of this process which is in question. Now that the explicit institutions are similar all over Germany, it is mainly the implicit institutions that have not entirely reunified. But since people grow up under similar conditions, are socialized and educated within one economy, they are likely to become more equal in the norms and values they adhere to. Nevertheless, Alesina and Fuchs-Schündeln (2007) predict that it will take 20 to 40 years until East Germans' preferences will equal the preference structure of their West German counterparts (c.f. Barro and Sala-i-Martin,1991). The process of socialization and education leading to a convergence of norms, values and preferences will be the analyzed in chapter 4, with an explicit focus on educational effects on entrepreneurship.

1.5 Institutional Change, Entrepreneurship, and Education

Chapter 4 shifts the focus towards the effects of explicit institutions on entrepreneurship. More precisely, this chapter analyzes the effects of education on entrepreneurial preferences, i.e. the intention to become an entrepreneur. Though, chapter 4 expands on the previous chapters methodologically. Chapter 2 and 3 show that treatment with socialist institutions has a negative influence on entrepreneurship. Socialism sustainably shaped implicit institutions that were opposed to entrepreneurial values and continue to affect the East German treatment group. Thus, East Germans still express less self-reliant preferences and are less willing to become an entrepreneur. But how did the socialist regime manage to generate such a long-lasting effect? Chapter 4 approaches this question by investigating the effects of socialist education on the entrepreneurial intentions of university students in reunified Germany. By comparing the subsample of university students that received pre-university education in the GDR with university students that always went to school in the FRG, chapter 4 identifies education as channel by which the socialist treatment affects East Germans' attitude towards entrepreneurship. Moreover, this chapter confirms that the institutional effects derived in chapters 2 and 3 do not only result from selective migration, an issue discussed in chapter 3, but also from the ongoing treatment with socialism in the GDR after the closing of the Iron Curtain.

Chapter 4 analyzes German university students' entrepreneurial intentions conditional on whether they went to school in East or in West Germany. Noticeably, university students are interesting study subjects, since, given their qualification, they provide a promising subject pool for "high impact entrepreneurship" (Acs, 2008). The sampling of the analysis ensures that students that went to school in East Germany got at least some years of socialist education in the GDR. Controlling for a variety of idiosyncratic factors it turns out that this treat-

ment sustainably crowded out entrepreneurial spirit. Students who went to school in the GDR are significantly less likely to have entrepreneurial intentions than students who were continuously educated in the free market economy. This effect holds if only students at West German universities are considered, i.e. students that study in a similar institutional environment but went school under different regimes. Eventually, it turns out that East German students who got a full socialist treatment, i.e. that were educated in the GDR all the time until finishing high school, show a more pronounced treatment effect and are less likely to have entrepreneurial intentions than the partial treatment group of East German students who got at least some years of schooling in reunified Germany after the GDR ceased to exist.

Accordingly, it is indeed the education under the socialist regime of the GDR that affected individuals' preferences with regard to entrepreneurship. More specifically, a socialization in line with the implicit institutions of the GDR and the pre-university schooling in the stately organized educational system crowded out the entrepreneurial spirit of contemporary university students, an otherwise rather mobile and arguably quite open-minded subsample of the population. On the other hand, schooling under the libertarian regime of the Federal Republic after reunification elicits the entrepreneurial intentions of East German university students. Apparently, individual preferences for entrepreneurship can be affected by educational measures, thus potentially providing an opportunity to foster the convergence of implicit institutions between East and West Germany. The effectiveness of educational measures with respect to students' preferences towards entrepreneurship will be assessed in chapter 5 more thoroughly.

1.6 Universities, Policies and Educational Effects on Entrepreneurial Preferences

Chapter 5 turns to the effects of policy-induced adjustments in the institutional framework on entrepreneurship. This chapter investigates how changes in the educational system affect individuals' attitude towards entrepreneurship as occupational alternative. Given the results from the previous chapter it is reasonable to assume that policy can influence people's preferences towards entrepreneurship. Using the same dataset but another subsample as chapter 4, chapter 5 assesses the effectiveness of different measures of entrepreneurship education applied at German universities. In 1998 the Federal Government of Germany introduced the "EXIST" program to support academic entrepreneurship (c.f. Astebro and Bazzazian, 2011). With this program, universities can get public funding to include entrepreneurship education into their portfolio. At the same time, an increasing number of universities started to establish

chairs for entrepreneurship at their sites. This is another measure to integrate entrepreneurship education into a university's curriculum. While pre-university education turned out to have an effect on university students' entrepreneurial intentions in chapter 4, chapter 5 explicitly analyzes the effect of entrepreneurship education at universities on students' attitude towards an occupational future as entrepreneur.

The least one might expect from measures of entrepreneurship education applied at universities is that they improve the students' information on opportunities and challenges related to an occupation as entrepreneur. But chapter 5 reveals that the application of any of the measures under investigation does not necessarily increase the probability that students have made up their minds on whether they would like to become an entrepreneur in the future. On the contrary, students at universities that participate in the EXIST program or at universities that have a chair for entrepreneurship are even less likely to express an opinion on this question than students at any other university. So either entrepreneurship education puzzles the students and particularly the wannabe entrepreneurs, or it triggers a thought process in which students give up unreflecting prejudices on entrepreneurship in favor of an indifferent attitude (c.f. Oosterbeek et al. 2010). Anyhow, if a university applies both measures simultaneously, i.e. a university participates in the publicly funded EXIST program for entrepreneurship support and has a chair for entrepreneurship, then students are significantly more likely to be able to state whether they consider entrepreneurship to be an occupational alternative for themselves. So apparently only this intense treatment with several measures of entrepreneurship education really helps students to update their beliefs and make up their minds on whether they would like to become an entrepreneur in the future.

In general, the simultaneous application of both measures has an independent effect on the students' attitude towards entrepreneurship. If both measures are applied, this leads to a significant increase in the students' overall interest in entrepreneurship. Nevertheless, students at universities that participate in EXIST and have a chair for entrepreneurship are significantly less likely to have concrete entrepreneurial intentions. However, these students with entrepreneurial intentions have some comparatively promising attributes. Even though all EXIST universities do in general succeed in eliciting the desire to become an entrepreneur, it seems that only universities that fully institutionalize entrepreneurship education and develop a strong focus on this issue manage to create an entrepreneurial culture, thus achieving the predefined policy goals. Using a rich dataset, the analysis in chapter 5 comprehensively controls for po-

tential confounds and relates the differences in the measures' effects to differences in the measures' effectiveness. Indeed, there are strong indications that the measures selectively affect different types of students. So on the whole, chapter 5 clearly shows that education does influence individuals' preferences, more precisely, that measures of entrepreneurship education at universities do affect students' attitude towards entrepreneurship as occupational alternative. But different educational measures affect students' preferences differently. Consequently, the institutional framework at the university sites turns out to be decisive for the effectiveness of entrepreneurship education.

By now, all chapters have confirmed the relevance of institutions for entrepreneurship. But they have also unveiled certain difficulties in assessing the dynamics related to institutional change. Exploiting German history as quasi natural experiment, chapter 1 reveals that the implicit institutions in East Germany still show the effects of the socialist treatment in the GDR. Chapter 2 pins this effect down to a negative influence of state reliant preferences on entrepreneurship. Thus the socialist regime shaped implicit institutions which outlived the system's collapse and still affect individual preferences, which in turn influence the individual's entrepreneurial intentions. This necessarily raises the question if and when institutions will converge. Chapter 3 explains that the socialist regime affected individual preferences and implicit institutions by education, and shows that educational measures help to adjust norms and values between East and West Germany. Anyhow, it remains unclear how effective educational measures can be as means to foster institutional conversion. Chapter 4 shows that education affects the attitude towards entrepreneurship and discusses the institutions' informational function that helps people to make up their minds. It furthermore identifies differences in the effectiveness of different measures of entrepreneurship education. But the concrete mechanism by which information translates into preferences cannot be explained.

All investigations so far touch the question how institutions themselves change, a question that goes beyond the focus of the empirical investigations presented in chapters 2-5. Since the implicit institutions inherited from the GDR turn out to be a barrier to entrepreneurship, the transition process in East Germany could probably be fastened by increasing the dynamics of institutional change. Education seems to be one means to achieve this aim, but this can be assumed to have rather long term effects. Anyhow, information seems to play an important role in the process of institutional change, particularly with respect to the change of implicit institutions. But information affects individuals quite selectively and can even yield adverse

effects, as chapter 5 expounds. In an endeavor to understand the mechanisms of institutional change a little bit better, this thesis finally takes up a more general point of view on this issue. Shifting the focus away from entrepreneurship, the last chapter investigates the process of institutional change itself and analyzes the relevance of information for the transformation of implicit institutions.

1.7 Information Dissemination and Institutional Change

The previous chapters show that information affects people's preferences, and that this might contribute to institutional change. In chapter 6, I shift the focus away from entrepreneurship and more generally explore the processes leading to a change of preferences and (implicit) institutions. Chapter 3 uses, in line with Alesina and Fuchs-Schündeln (2007), (self reported) election behavior to proxy implicit institutions by differentiating left wing party votes from right wing party votes. In the last chapter of the thesis in hand I expand on this approach. Indeed, the German multi party system reflects a couple of social cleavages that correspond to norms and values and thus can be used as a proxy for implicit institutions. Accordingly, election patterns are regionally sticky to a fair degree (Voigtlaender and Voth, 2012), with partisan voters habitually electing the party representing their value preferences. For instance, voters of the Liberal Party usually adhere to libertarian values and individualistic norms, while votes for the Christian Democratic Party rather represent Christian values and conservative norms. Nevertheless, voters change their minds from time to time and elect a different party when they do not feel represented by their previous favorite anymore. Information should be particularly important for this variance in the voting behavior. Anyhow, if it turns out that a region's political majorities have changed persistently, this indicates a shift in the importance of certain norms and values and consequently a potential change in the implicit institutions prevalent in that region.

Chapter 6 takes up these considerations by investigating the effect of the introduction of a new information medium, i.e. the internet, on voting behavior. The technological shock induced by the Internet caused a significant upheaval in the market for media, thus radically altering the way in which information is disseminated. The internet provides information in large scale at broad scope and at low cost. People can self-select information on whatever topic they are interested in, any time. Consequently, the new medium should affect the way in which people form an opinion. This could again influence people's preferences and mindsets. These preferences are most obviously expressed in the decision to elect a particular party and

thus the norms and values this party stands for. Indeed, chapter 6 finds a significant effect of the introduction of the Internet on election outcomes. Interestingly, it is particularly the established parties that benefit from the Internet. Small parties rather lose vote shares. Moreover, parties from the extreme right wing of the political spectrum lose ground if the Internet advances while extreme left wing parties are rather unaffected. Apart from that, the introduction of the Internet leads to a reduction of the election turnout. This indeed hints at the connection to the formation of implicit institutions, since the implicit rule to cast one's vote is less obeyed in regions where the Internet is intensely used as source of information. This result also resembles the results obtained in chapter 5, where more information provided on entrepreneurship led to an increase in the indifference towards entrepreneurship. Eventually, Chapter 6 finds significant differences in the election patterns between East and West Germany, again supporting the result that implicit institutions differ between both parts of the country.

Amongst others, the analysis of chapter 6 points out the difficulties related to the measurement of Internet effects on economically relevant outcomes. First, there is the selection problem related to Internet use that is solved in chapter 6 by using data on Internet availability instead. Second, there is the problem of simultaneity that is reduced by using regional control variables as well as region fixed effects. Moreover, time trends have to be taken care of by exploiting the panel structure of the election data. Nevertheless, this procedure cannot entirely rule out that unobserved heterogeneity might drive the results and that the estimations suffer from an omitted variable bias. Chapter 6 addresses these concerns quite thoroughly by using a distance based Instrumental Variables approach to identify the causal effect of the Internet on voting behavior, thus approximating the effect of the change in information dissemination on implicit institutions. Hence the last chapter also rounds out this thesis methodologically: The IV approach used in chapter 6 completes the set of methods used in the previous chapters, i.e. the exploitation of the quasi-natural experiment provided by German history in the first chapters, and the diff-in-diff approach utilized in chapter 5, to assess institutional effects on entrepreneurship.

2. Explicit Institutions, Implicit institutions, and Entrepreneurship[1]

2.1 Introduction

In 1956, Soviet Union premier Nikita Khrushchev, when addressing Western ambassadors, said "we will bury you". At the time, such a threat did not seem farfetched; after all, the USSR had just won the space race by launching Sputnik and the West was, indeed, running scared. There was a general consensus that the central planning taking place in the Soviet Union would produce persistently high growth rates (Moore, 1992). However, after some 30 years, it became clear that this fear, at least, was baseless. As nicely set out by Audretsch (2007), the socialist planned economy did well at large-scale mass production but lost ground when it came to the creativity necessary for new ideas and growth-enhancing innovation. The socialization of profits worked against Schumpeter's pioneer rent as motivation for entrepreneurial action and hence individuals lacked any incentive to build on existing knowledge and develop new ideas. Accordingly, technological progress leading to economic growth was comparatively slow, which eventually led to the system's collapse. In the long run, the free market economy proved to be superior, not the least because it provided individual freedom for entrepreneurial activity.

The general history of these two economic systems is amongst others a lesson in the importance of prevailing institutions to entrepreneurship. Delving a little deeper and following North (1990), at least two different kinds of institutions can be discerned. First are the explicit institutions in the form of laws e.g. regarding property rights and individual freedom. Second are the implicit institutions, in the form of prevailing values and norms, which e.g. help determine an individual's risk attitude or capacity for opportunity recognition. The collapse of the former socialist countries led to a change in the explicit institutions, with many of these countries heading in the direction of a market economy. A paramount example of this development can be seen in reunified Germany, where the former socialist eastern part of the country fully adopted the explicit institutions of the West. But did the implicit institutions transform as well? A large body of literature suggests that societal norms and values develop over time, are quite persistent, and change only gradually over the course of one or two generations (Halaby, 2003; Alesina and Fuchs-Schündeln, 2007; Rainer and Siedler, 2009).

[1] This chapter is based on Bauernschuster, Stefan, Falck, Oliver, Gold, Robert and Heblich, Stephan (2012), Explicitly Implicit. How Institutional Differences Influence Entrepreneurship, in: R. Crescenzi and M. Percoco (Eds.), *Geography, Institutions and Regional Economic Performance*, Berlin: Springer, forthcoming.

This chapter's goal is to assess the influence of the socialist regime in the former GDR on implicit institutions which in turn affect the decision to become an entrepreneur. Given the intuitive, complex interaction between explicit and implicit institutions, it does not seem feasible to design policy aimed at enhancing entrepreneurial activity, e.g. in former socialist countries, without disentangling these institutions and their effects. In order to do so, we draw upon Germany's recent history, which provides us with a quasi-natural experiment to study the effects of implicit institutions on entrepreneurship. In today's reunified Germany, citizens from both the former German Democratic Republic (GDR) as well as from the Federal Republic of Germany (FRG) face a similar explicit institutional framework for entrepreneurs. However, the legacy of a divided Germany may result in persistent differences in the implicit institutions potentially overshadowing future developments.

In particular, we expect that the experience of a socialist environment, along with an education and socialization according to communist values, will continue to influence the attitudes of individuals who were raised in the former GDR (cf. Mortimer and Lorence, 1979; Hout, 1984). As the implicit institutions prevailing in the GDR were hostile toward a market economy, it seems plausible to suppose that they also influence economic decisions such as the choice to become an entrepreneur. Therefore, we suspect that individuals who were born and raised in East Germany possess less entrepreneurial spirit than their fellow citizens in West Germany.

It is a challenge for analysis as well as for policy design that these effects cannot be found in macro-level data. Using the German Social Insurance Statistic we compare the number of firm foundations in East German regions to that of West German regions and show that start-up rates are persistently higher in East Germany. The reason for macro-level data not revealing the negative effects of the socialist regime on entrepreneurship is quite obvious: The conditions and opportunities available in each part of the country differ significantly, which can be explained by an ongoing catch-up process resulting from the implementation and development of market structures after reunification.

Yet the individual motivation to become an entrepreneur as it is influenced by implicit institutions should still vary despite the catch-up process and all the economic incentives offered to affect the same. Everything else equal, we assume East Germans to possess less entrepreneurial spirit than their West German counterparts. Using micro-level data from the German General Social Survey (ALLBUS), a socioeconomic survey conducted on a sample of the German

micro-census, we compare East and West Germans on a set of different norm and value variables and find substantial differences. Moreover, we can show that these differences are strongly associated with the probability of being an entrepreneur.

Further, we would like to make the point that regional heterogeneity is not the only channel for our results. There is more to the legacy of the socialist regime than "just" a poor and less developed economic environment. This is demonstrated by looking at the subsample of individuals who were born in East Germany but migrated to West Germany after the fall of the Iron Curtain. Even this selective subsample shows a clear effect of the treatment with socialist norms and values negatively associated with entrepreneurship. As an anti-test we look at those individuals who were born in East Germany but emigrated to West Germany in the early days of the GDR before the Berlin Wall was build, and hence are less likely to have absorbed socialist values. As expected, the subsample of early East-West movers does not differ from West Germans born in the FRG in the same way the late East German movers do. This anti-test gives further support for our hypothesis that the socialist regime in the former GDR created an environment with implicit institutions hostile to entrepreneurship – and that these institutions sustainably crowded out entrepreneurial spirit in East Germany.

The remainder of the chapter is organized as follows. Section 2.2 develops in more detail the role of explicit and implicit institutions in entrepreneurial activity. Section 2.3 introduces the German history of separation and reunification as quasi-natural experiment. Section 2.4 describes the differences in entrepreneurial activity between East and West Germany based on macro-level data. Section 2.5 uses micro-data to analyze the effect of the socialist regime on a whole set of societal norms and values and shows that these implicit institutions are negatively associated with entrepreneurship to a substantial degree. Section 2.6 concludes.

2.2 Entrepreneurship and Institutional Incentives

2.2.1 What Drives Entrepreneurship?

The decision to start a business and become an entrepreneur is influenced by various factors, not least by personal characteristics. As Kihlstrom and Laffont (1979) show, these include an individual's risk attitude as well as his or her motivation (Schumpeter, 1912) and skills (Lazear, 2005), along with the ability to spot niches in the market (Kirzner, 1973), raise finan-

cial resources (Michelacci and Silva, 2007; Guiso et al., 2004), and networking ability (Sanders and Nee, 1996; Stuart and Sorenson, 2005).[2]

The decision to start a business is also influenced by external characteristics based in the surrounding institutional framework. This is made obvious in Saxenian's (1994) comparison between the evolution of Silicon Valley in California and Route 128 in Boston, Massachusetts. Much of Silicon Valley's greater success compared to Route 128 is the result of institutional factors. Apparently, the absence of legal restrictions on job mobility and the resulting diffusion of knowledge led to a vertically disintegrated, entrepreneurial business culture in Silicon Valley, where new ideas quickly result in new firms (cf. Gilson, 1999; Klepper, 2009). Public research facilities, leading to increased knowledge flows, and public funding are another example of institutional factors that stimulate entrepreneurship. By contrast, an extensive welfare system could affect individual risk-aversion and (leisure) time preferences in ways that lessen the incentive to become an entrepreneur (Parker and Robson, 2004; Fölster, 2002).

Both personal and external characteristics are factors in an individual's decision-making process, but their relative importance depends on the person's psychological makeup. For instance, entrepreneurial individuals are expected to be more risk accepting, self-confident, and independent (cf. Blanchflower and Oswald, 1998; Camerer and Lovallo, 1999; Parker, 2004). Accordingly, individuals with strong entrepreneurial intentions are likely to overcome financial or other constraints, whereas less entrepreneurial individuals might be discouraged more easily. An individual's self-image is strongly influenced by his or her education and overall socialization (Halaby, 2003; Falck et al., 2009), which determine how the person understands the prevailing social norms and habits, which in turn shape the individual's view of *who he or she is* and what the individual and others *should* or *should not* do (Bernhard et al., 2006). Accordingly, these non-codified social obligations act as implicit institutions that do not explicitly prescribe individual behavior, but nevertheless have a crucial impact on economical decisions and actions (North, 1991). Particularly, they affect an individual's tendency to have a rather entrepreneurial or a rather bureaucratic job orientation (Miller and Swanson, 1958).

[2] For an overview, see Parker (2004).

2.2.2 Implicit Institutions and Entrepreneurship

We define implicit institutions as the mindsets individuals develop by being exposed to their society's norms, values and traditions. With regard to entrepreneurship, these implicit institutions might influence an individual's desire to be an entrepreneur, as well as his or her risk attitude and capacity for opportunity recognition. Consider an individual growing up in an environment of freedom, liberalism, and self-realization. This person might never have read about Schumpeter's (1912) entrepreneurial virtues, but he or she will certainly have a better understanding of them, even if not explicit, than will an individual growing up in an egalitarian society where competition and individual self-realization are proscribed (cf. Alesina and Fuchs-Schündeln, 2007). In an environment where self-reliance and self-realization are not rewarded by the expectation of future profits, most people would rather work 9 to 5 for predictable wages. The resulting increase of risk aversion and decrease of individual incentive will eventually crowd out the entrepreneurial spirit altogether.

It is this situation that describes the business environment prevalent in the former socialist countries of the Eastern Bloc. These planned economies had no room for entrepreneurial activity and their suppressive political regimes favored communist ideals and egalitarianism over liberalism and individuality. Private property was nationalized and for nearly 50 years people were raised and educated according to socialist values — a period long enough to develop the belief that conformity was the norm, individuality a form of deviance.[3] Thus, implicit institutions rejecting entrepreneurship were established and internalized over a fairly long period, making them unlikely to vanish over night, regardless of how the rest of the world changed. Everything else equal, individuals from Eastern Germany should consequently show a lower propensity to become an entrepreneur than their fellow citizens from the West, thus confirming the hypothesis that implicit institutions do exert influence on the individuals' occupational choice.

2.3 German Reunification as a Quasi-Natural Experiment

German separation and its termination through reunification can be viewed as an exogenous shock (Bach and Trabold, 2000; Frijters et al., 2004; Fuchs-Schündeln and Schündeln, 2005; Fuchs-Schündeln, 2008). After World War II, Germany was divided into two parts. At this

[3] Eventually, this lack of individual incentives also contributed to the low level of productivity in Eastern Bloc countries (VanArk ,1996), particularly to the lack of productivity of the GDR as compared to the FRG (VanArk, 1995).

time, both parts of the country were mostly indistinguishable with respect to economic measures (Alesina and Fuchs-Schündeln, 2007), but diverged diametrically afterwards. By 1952, the inner German border was so fiercely guarded that it was extraordinary difficult for East Germans to enter West Germany. The city of Berlin was the only place where it was still feasible to cross the border. However, the building of the Berlin Wall in 1961 closed even this gate. During the following decades, the two German states developed very differently. Under the influence of the Western Allies, West Germany became a democratic state with a free market economy, whereas East Germany turned into a socialist, centrally planned economy under the influence of the Soviet Union. Naturally, these diametrical contexts influenced their inhabitants' worldviews and attitudes toward the state and society. And as a consequence, the East and West Germans were not only physically separated by walls and barbed-wire fences but became also separated from each other by their implicit institutions. It was only when the Berlin Wall fell in 1989 and Germany was subsequently reunified that this sharp separation came to an end.

German reunification in 1990 resulted in the present situation where all Germans, regardless of whether they were raised in the GDR or the FRG, now share a common democratic constitution that guarantees the rule of law, property rights, and (economic) freedom. In other words, all market actors in Germany today operate within a very similar institutional framework. However, implicit institutions (i.e., mindsets and value systems) cannot be changed by edict and we therefore expect persisting differences in the social norms and values prevalent in these two formerly separated parts of Germany. Considering that the socialist ideology systematically oppressed entrepreneurship and entrepreneurial virtues, the suspected differences in implicit institutions between East Germans and West Germans should result in systematic differences in the desire to become an entrepreneur that continue to exist years after the German reunification.

2.4 Empirics on the Macro Level

2.4.1 Analytical Framework

We hypothesize that implicit institutions have an influence on the decision to start a business and become an entrepreneur. Since East Germans were brought up in a socialist country, we suppose they may be more critical toward entrepreneurship than their fellow citizens who grew up in the Federal Republic of Germany. All else equal, this should be expressed by a smaller number of entrepreneurs in the eastern part of Germany as compared to the western

part. However, this ceteris paribus condition is difficult to fulfill due to substantial structural differences between East and West Germany, as we detail next.

As "agents of change and growth" (OECD, 1998, 11), entrepreneurs are expected to play a crucial role in the transition from a central planned economy, such as that of the former GDR, to a free market economy, such as it now exists in reunified Germany. "Entrepreneurs not only seek out potentially profitable economic opportunities but are also willing to take risks to see if their hunches are right" (OECD, 1998, 11). The immense structural change that occurred in East Germany following the "jump start" of reunification (Sinn and Sinn, 1992) certainly created a great set of opportunities to start up new businesses and firms. Hence, the very first years after reunification are characterized by intense entrepreneurial activity in the East German regions. Implementation of a market economy in the former socialist region resulted in the privatization of state-owned firms as well as in new firm startups in all sectors. It was, in short, an extraordinary promising time to become an entrepreneur. The absence of an established market structure, not to mention the lack of competitors, was fertile ground for new ventures.

We use data provided by the German Social Insurance Statistics to examine differences in the level of entrepreneurial activity as measured by firm foundations. The Social Insurance Statistics requires each employer to report certain information, e.g., qualifications, about every employee subject to obligatory social insurance. The information collected can be transformed into an *establishment file* that provides longitudinal information about the establishments and their employees.[4]

Since the decision to become an entrepreneur is, amongst others, subject to regional heterogeneity, we try to identify regions in West Germany and in Each Germany that are similar with regard to the regional factors driving entrepreneurship. Accordingly, we concentrate on regions in West Germany that are close to the former border with East Germany. Before reunification, these FRG regions were classified as peripheral and they received reduced public infrastructure investment. The private sector also invested rather modestly in the border region and consequently, these regions were economically underdeveloped and still are to a great extent. Despite all these problems, a few of these regions near the former border always have and continue to do quite well. We omit these particular border regions from our analysis. Instead, we concentrate on the border regions that are classified as development regions under

[4] For a detailed description of this data, see Fritsch and Brixy (2004). A detailed description of how the number of start-ups is computed is provided by the authors upon request.

Objective 2 from 2000-2006 (respectively, Objective 5b from 1994-1999) of the European Structural Funds. To compensate for the gap resulting from the exclusion of the non-funded regions, we additionally include the Objective 2 regions in eastern Bavaria, which did not lie on the inner German border but border on the Czech Republic, former CSFR. Thus, these regions also faced the problems inherent to being on the outskirts of the free world, hemmed in by the Iron curtain.

Table 1: Descriptive Statistics for Area under Investigation

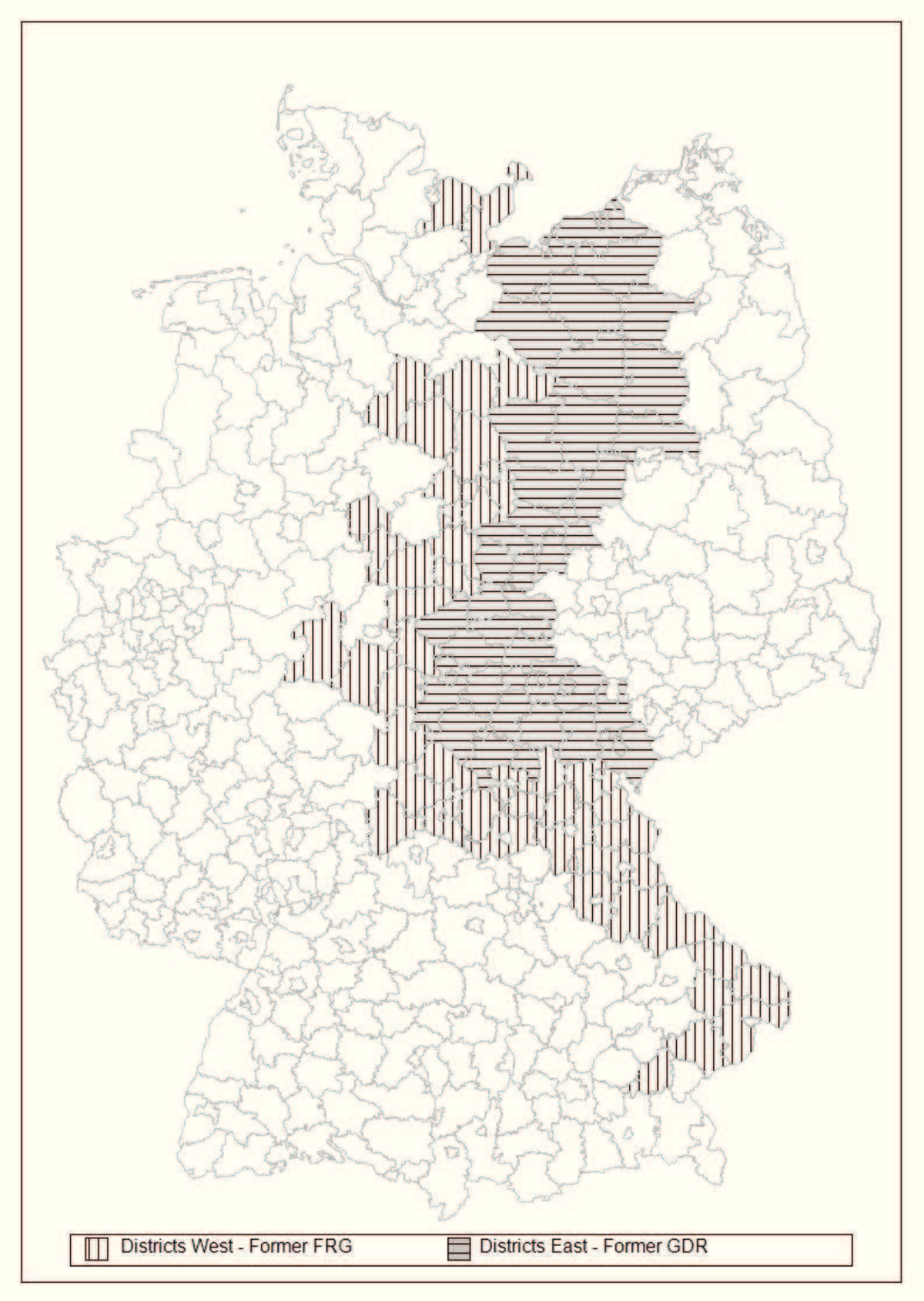
	East			West		
Number of regions (NUTS3)	47			50		
	Min.	Mean	Max.	Min.	Mean	Max.
Total no. of firms	1,170	3,047	7,337	1,480	3,009	6,390
No. of firms in manufacturing	91	322	977	115	363	687
Total no. of employees	16,424	18,969	115,063	11,681	36,704	109,056
No. of employees in manufacturing	2,119	6,448	17,138	2,677	12,376	61,546
Total no. of start-ups	103	329	1272	105	276	745
No. of start-ups in manufacturing	4	23	79	3	19	53
Total no. of firm shutdowns	0	279	1160	0	198	739
No. of shutdowns in manufacturing	0	23.33	97	0	19	57
Inhabitants	44,076	108,160	237,833	49,462	124,086	266,070
Population density	40	252	1,170	42	204	1,534
GDP	834,195	1,904,423	5,811,596	858,014	2,814,694	9,005,517
GDP per capita	12.06	17.51	30.14	12.78	23.05	73.89

Notes: Figures refer to the 47 East German and 50 West German (former) border districts depicted in Figure 1.

The whole area of the former GDR falls into Objective 1 of the Structural Funds, thus making it eligible for public funding of economic development. We concentrate on the East German districts that adjoin the former inner-German border plus those districts that adjoin these border districts. These regions along the border are similar to their western counterparts with respect to geography and natural resources. Furthermore, their situation in the GDR was comparable to the conditions to the western districts in one important aspect: all of these districts were located at the far end of the respective country. Thus, the border region is most suitable for comparing East and West Germany, since the districts within these regions are most simi-

lar to each other. Table 1 reports some descriptive statistics for the observed districts which are graphically depicted in Figure 1.

Figure 1: Area under Investigation



2.4.2 Differences in Start-Up Rates

To assess differences in the entrepreneurial activity between East and West Germany, we begin with a comparison of the start-up activities for every region and for each year from 1999 to 2004. In doing so, we calculate two different start-up rates by dividing the number of start-ups by number of employees and number of firms in manufacturing respectively. According to our hypothesis, implicit institutions should have a negative effect on start-up rates in the eastern regions if all confounding factors were the same. However, as Table 2 reveals, this effect cannot be found using macro data. In fact, the start-up rates in the eastern regions exceed the western start-up rates in every year of analysis, regardless of how the rate is calculated.

Table 2: Start-Up Rates in Manufacturing: Comparison between East and West German Districts

		1999	2000	2001	2002	2003	2004
Number of	West	20.54	21.38	17.80	18.88	17.82	16.76
start-ups in	East	33.32	23.36	20.72	21.96	19.70	19.19
manufacturing	Diff.	12.78***	1.98	2.92**	3.08*	1.88	2.43*
Start-up rate I	West	0.205	0.208	0.177	0.186	0.188	0.190
(labor market	East	0.544	0.384	0.346	0.360	0.329	0.325
approach, %)	Diff.	0.339***	0.176***	0.169***	0.175***	0.140***	0.135***
Start-up rate II	West	5.626	5.909	5.150	5.456	5.293	5.162
(ecological	East	9.629	7.125	6.694	7.123	6.585	6.682
approach, %)	Diff.	4.003***	1.216***	1.544***	1.666***	1.291***	1.519***

Notes: Table reports district averages for the 47 East German and 50 West German (former) border districts depicted in Figure 1. Start-up rate I is calculated by dividing the number of start-ups in manufacturing by the number of employees in manufacturing. Start-up rate II is calculated by dividing the number of start-ups in manufacturing by the overall number of firms in manufacturing. Both start-up rates are reported in percent. * denotes 10% level of significance, ** denotes 5% level of significance, *** denotes 1% level of significance.

Overall, the number of startups in manufacturing decreases in both West and East Germany, albeit not uniformly. Over time, the difference between the eastern and the western districts loses its significance. If we follow a labor market approach and calculate *start-up rate I* as the number of startups in manufacturing divided by the number of employees in manufacturing, we see a decline in both the West and the East over time. The difference between East and West decreases but remains significant. Under this start-up rate, the probability that an employee in the East German regions founds a business in manufacturing is continuously higher, even 14 years after reunification. If we take an ecological approach[5] and calculate *start-up rate II* as the number of startups divided by the number of manufacturing firms in the respec-

[5] For a comparison of the labor market approach and the ecological approach, see Audretsch and Fritsch (1994).

tive regions, we obtain a slightly different result with more variance. This start-up rate is relatively stable in the western districts, but experiences a remarkable decline in the eastern districts from 1999 to 2000. After 2000, the rate seemingly decreases in the eastern area even though it continues to be significantly higher than the start-up rates in the western area.

All together, these regional data do *not* show that implicit institutions inherited from the socialist era in Eastern Germany have a negative influence on the start-up activity in the eastern parts of the country. There are three possible reasons for this counterintuitive result. It might be that (1) implicit institutions do *not* vary between the two regions at all. Or, perhaps it is that (2) implicit institutions *do* differ between the two regions, but do not affect entrepreneurship. Alternatively, it could also be that (3) implicit institutions are significantly different in East as compared to West Germany and do hinder entrepreneurship in eastern Germany, but that this effect is *overcompensated* by the prevailing transition process.

Which of these is true, cannot be satisfyingly examined using district-level data. This is because the transition process is still in progress and the turbulence induced by reunification still blurs macro-level data (Barro and Sala-i-Martin, 1991; Fritsch, 2004; Schindele, 2010). We see significant differences in both opportunity entrepreneurship (cf. Reynolds et al., 2005) as well as necessity entrepreneurship (cf. Kirzner, 1973) in the eastern part of our area under investigation. The figures presented in Table 3 provide even more evidence that East Germany is experiencing an ongoing development process that distorts the empirical analysis of aggregated data.

Table 3: Persisting Differences between East and West German Districts

		1999	2000	2001	2002	2003	2004
GDP	West	2,713	2,755	2,825	2,838	2,851	2,906
(million Euro)	East	1,810	1,846	1,893	1,927	1,947	2,004
	Diff.	903***	910***	932***	911***	904***	903***
GDP per capita	West	22.17	22.52	23.13	23.25	23.34	23.89
(thousand Euro)	East	16.28	16.70	17.32	17.84	18.17	18.76
	Diff.	5.88***	5.82***	5.81***	5.42***	5.17***	5.13***
Firms in	West	377.36	374.62	366.4	358.8	353.24	345.18
manufacturing	East	346.81	335.15	324.91	315.26	307.00	300.53
	Diff.	30.55	39.47	41.49*	43.54*	46.24*	44.6*
Employees in	West	12,649	12,675	12,673	12,350	12,081	11,829
manufacturing	East	6,324	6,488	6,549	6,503	6,419	6,404
	Diff.	6,324***	6,186***	6,124***	5,847***	5,662***	5,425***
Shutdowns in	West	28.24	28.16	29.38	28.22	.	.
manufacturing	East	38.38	34.45	35.89	31.26	.	.
	Diff.	10.14***	6.29**	6.51**	3.04	.	.
Inhabitants	West	123,999	124,078	124,149	124,230	124,146	123,911
	East	110,009	109,375	108,579	107,783	106,996	106,218
	Diff.	13,990*	14,703*	15,570**	16,447**	17,149**	17,692**

Notes: Table reports district averages for the 47 East German and 50 West German (former) border districts depicted in Figure 1. * denotes 10% level of significance, ** denotes 5% level of significance, *** denotes 1% level of significance.

In the remainder of this chapter, we hence face up to the problems of macro-level data and turn to micro-level data instead to further investigate the role of implicit institutions in entrepreneurship.

2.5 Empirics at the Micro Level

In order to examine our hypothesis that implicit institutions developed under the socialist regime of the GDR negatively influence entrepreneurship, we now adjust our empirical strategy and turn to micro-level data. First, we show that the socialist regime in the former GDR really changed societal norms and values related to entrepreneurship. Second, we collect evidence that these brought about implicit institutions indeed have a negative impact on an individual's propensity to become an entrepreneur.

To these ends, the German General Social Survey (ALLBUS) is a valuable data source.[6] The dataset is based on biennial, representative surveys of the German population conducted through personal interviews. ALLBUS covers a wide range of topics pivotal to empirical research in social sciences. A core set of questions is asked in every wave of the survey, with various sets of additional questions added in different years.[7]

2.5.1 Entrepreneurial Attitudes of East and West Germans

We use the 1991 wave, which contains information on individual risk attitude with regard to job security, and the 1994, 1998, 2000 and 2004 waves, which contain information on individual's norms and values expectedly related to entrepreneurship. A first look at variables concerning individual attitudes towards the state's responsibility (norms), the economy and society (values), as well as risk-aversion reveal significant differences in implicit institutions between East and West Germans.

Table 4 shows simple mean comparisons of a whole set of value and norm variables between West Germans and East Germans. Briefly summing up the results, the descriptive analysis clearly and consistently shows that East Germans tend to be less self-reliant and more reliant on the state; reveal a rather skeptical attitude towards the market economy; and show higher levels of risk-aversion than their West German counterparts. As can be seen in the last column of Table 4, t-tests confirm that these differences are all significant at a 1 percent level. Thus, implicit institutions as shaped by the socialist regime appear to exist in the eastern parts of Germany even years after reunification.

[6] The ALLBUS program was financially supported by the German Research Foundation (DFG) from 1980 to 1986 and in 1991. Further surveys were financed on a national and federal state (Laender) level via the GESIS network (Gesellschaft Sozialwissenschaftlicher Infrastruktureinrichtungen).
[7] Terwey et al. (2007) provide detailed information on the ALLBUS surveys in general and present all variables available in the cumulated dataset from 1980 until 2006.

Table 4: Differences in Attitudes between East and West Germans

	East Germans	West Germans	Difference
	Level of agreement on a scale from 1(fully agree) to 4(don't agree at all)		
Role of Enterprise*:* *"Employers' profits foster the economy."* (obs.: 900 and 1,704)	2.206 *0.031*	1.972 *0.020*	0.234 ***
Welfare State: *"The current social security system reduces work incentives."* (obs.: 900 and 1,700)	2.992 *0.031*	2.485 *0.023*	0.507 ***
Fairness*: "Economic profits are distributed fairly in Germany."* (obs.: 887 and 1,674)	3.363 *0.021*	2.942 *0.018*	0.421 ***
Income Differences*: "Income differences give incentives to work hard."* (obs.: 2,304 and 3,210)	2.564 *0.019*	2.293 *0.015*	0.271 ***
Rank Differences*: "Rank differences are performance based and hence acceptable."* (obs.: 2,324 and 3,196)	2.727 *0.019*	2.464 *0.015*	0.262 ***
Status Differences: *"Social status differences are just – by and large"* (obs.: 2,341 and 3,208)	3.221 *0.016*	2.629 *0.015*	0.592 ***
State Intervention*: "The state has to care for employment and price stability even if this cuts the rights of employers."* (obs.: 894 and 1,688)	1.951 *0.030*	2.287 *0.022*	-0.336 ***
National Assistance: *"The state has to care for the sick, poor, old and unemployed."* (obs.: 2,380 and 3,267)	1.437 *0.013*	1.802 *0.013*	-0.366 ***
Performance: *"Everybody should get the money one needs - regardless of any performance."* (obs.: 2,327 and 3,230)	2.639 *0.020*	2.754 *0.016*	-0.115 ***
	East Germans	West Germans	Difference
	Level of importance on a scale from 1 (not important) to 7 (very important)		
Risk Attitude: "How important is a secure job to you?" (obs.: 631 and 859)	6.661 0.029	6.087 0.047	0.574***

Notes: In the cells below the respective questions we report the number of observations in parentheses. The first number refers to East Germans, i.e., individuals who currently live in East Germany. The second number refers to West Germans. Column 1 and Column 2 depict group means for East Germans and West Germans respectively, while Column 3 shows mean differences; standard errors are given in italics; * denotes 10% level of significance, ** denotes 5% level of significance, *** denotes 1% level of significance.

2.5.2 Occupational Choice and Entrepreneurial Attitude

In order to assess whether these implicit institutions are indeed associated with the decision to become an entrepreneur, we include the attitude variables depicted in Table 4 into an occupational choice equation. Although we believe that they are all related with the decision to become an entrepreneur, we deliberately choose only eight of the ten attitude variables to include in a multivariate setting. The reason for this is that two of the variables might severely suffer from reverse causality, namely the statement on the "Role of enterprise" and the "Intervention of the state". It might very well be that being an entrepreneur positively affects the agreement to the statement that employers' profits foster the economy. The same is true for the state intervention variable: Being an entrepreneur might drive the statement that the state has to care for employment and price stability *even if this cuts the rights of employers*. Since we do not know how this potential reverse causality problem might bias the coefficients of the other attitude variables of interest, we do not include them in our estimations.

The estimated occupational choice equation is described by Equation (1):

$$\Pr(y_i = 1 \mid \cdot) = \alpha + \beta_1 att_i + X_i \beta_2 + \varepsilon_i \qquad (1)$$

where $\Pr(y_i = 1 \mid \cdot)$ is the conditional probability of being an entrepreneur. y is an indicator variable that takes the value of unity if person i is an entrepreneur and takes the value 0 if person i is dependently employed. att is the level of agreement with the statements revealing attitudes. X is a set of control variables that might influence a person's occupational choice, i.e., we include control variables for gender, home ownership, marital status, nationality, education, working experience, and individual unemployment history. All control variables except working experience differ significantly between East and West Germany. Finally, we include a dummy for East Germany and year dummies if appropriate. We estimate occupational choice equations by simple probit models.

In order to make use of all information on the attitude variables available over the years, we run four estimations, where each single estimation includes, in addition to the controls, only those attitude variables having a perfect overlap with respect to the years they were collected. In particular, we run a probit occupational choice model for the year 1991 using the "Risk attitude" variable. Another probit estimation is executed for the years 1994 and 2004 where we have got information on the "Welfare state" and "Fairness" attitudes. The third estimation

uses information on the "Performance" and "National assistance" attitudes for the years 1991, 1994, 2000, and 2004, whereas the final estimation exploits information on "Income differences", "Rank differences", and "Status differences" attitudes provided in the years 1991, 1994, 1998, 2000, and 2004. The results of the models are reported in Table 5.

Table 5: Occupational Choice of Becoming an Entrepreneur

	Cross section	Repeated cross section	Repeated cross section	Repeated cross section
	1991	1994, 2004	1991, 1994, 2000, 2004	1991, 1994, 1998, 2000, 2004
Risk Attitude	-.020 ***			
	.004			
Welfare State		-.034 ***		
		.006		
Fairness		-.017 **		
		.008		
Performance			.016 ***	
			.004	
National Assistance			.029 ***	
			.005	
Income Differences				-.004
				.004
Rank Differences				-.014 ***
				.005
Status Differences				-.015 ***
				.005
Controls	Yes	Yes	Yes	Yes
No. of observations	1,591	2,911	6,276	7,285
Wald test	93.21 ***	150.73***	333.45***	372.38***
Pseudo R^2	0.112	0.078	0.079	0.078

Notes: The table reports probit marginal effects where the dependent variable occupational status is unity for entrepreneurs and zero for employees. The variable "Risk attitude" refers to the question "How important is a secure job for you?", where the level of importance ranges from 1 (not important) to 7 (very important). The variable "Welfare state" refers to the statement "The current social security system reduces work incentives." The variable "Fairness" refers to the statement "Economic profits are distributed fairly in Germany.", "Performance" refers to the statement "Everybody should get the money he needs – regardless of any performance.", "National Assistance" refers to the statement "The state has to care for the sick, poor, old and unemployed.", "Income Differences" refers to the statement "Income differences give incentives to work hard.", "Rank Differences" refers to the statement "Rank differences are performance based and therefore acceptable.", and "Status Differences" refers to the statement "Social status differences are just – by and large." All these statements could be evaluated on a scale from 1 (fully agree) to 4 (disagree). Robust standard errors are given in italics. * denotes 10% level of significance, ** denotes 5% level of significance, *** denotes 1% level of significance.

As can be seen from Table 5, the coefficients on all the attitude variables under investigation point to the direction we would suspect and are precisely estimated. Almost all of them are found statistically significant at a 1% level. Summing it up, the results suggest that a lack of self-reliance, a skeptical attitude towards the market economy, as well as risk-aversion is associated with a lower probability of being an entrepreneur. Accordingly, implicit institutions are indeed associated with an individual's propensity to start an entrepreneurial endeavor.

In order to assess whether the differences in implicit institutions between East and West Germans shown in Table 4 translate into differences in the individual probability to become an entrepreneur, we compute predicted values following Equation (2), where we should see a higher probability to become an entrepreneur for West Germans than for East Germans:

$$\Phi(\alpha + \beta_1 att_{mean,west} + X_{mean,west}\beta_2) > \Phi(\alpha + \beta_1 att_{mean,east} + X_{mean,west}\beta_2) \quad (2)$$

To compute the betas, we run a probit model on the sample of West Germans in our dataset. In order to isolate the marginal effects of the differences in implicit institutions, we assume that West Germans and East German do not differ in the distribution of the control variables as well as in the effect of all variables on entrepreneurship. However, they do differ in the distribution of our attitudes variables as we have shown above. We compute the predicted values according to Equation (2) for the four probit equations presented in Table 5 separately. The estimation results are reported in Table 6.

Table 6: Predicted Probabilities of Being an Entrepreneur

	East Germans (in percent)	West Germans (in percent)	Difference (in percentage points)
Probit 1 (1991)	5.8	7.8	-2.0
Probit 2 (1994, 2004)	7.2	9.0	-1.8
Probit 3 (1991, 1994, 2000, 2004)	7.4	8.8	- 1.4
Probit 4 (1991, 1994, 1998, 2000, 2004)	7.8	9.3	- 1.5

Notes: The table reports predicted probabilities of being an entrepreneur for East and West Germans conditional the attitude variables reported in Table 5. Probit 1 contains the variable "Risk attitude" (How important is a secure job for you). Probit 2 uses the variables "Welfare state" (The current social security system reduces work incentives) and "Fairness" (Economic profits are distributed fairly in Germany). Probit 3 conditions on "Performance" (Everybody should get the money he needs – regardless of any performance) and "National Assistance" (The state has to care for the sick, poor, old and unemployed). Probit 4 uses the variables "Income Differences" (Income differences give incentives to work hard), "Rank Differences" (Rank differences are performance based and therefore acceptable) and "Status Differences" (Social status differences are just – by and large).

As we can see from Table 6, the differences in implicit institutions translate into differences in the probability of becoming an entrepreneur. Across all four specifications we observe that the socialist regime in the former GDR made East Germans less likely to become entrepreneurs than West Germans. The differences in the probabilities of becoming an entrepreneur show up clearly and amount up to 2 percentage points. Not surprisingly, the largest difference can be found in the first specification, where we use data on risk attitudes which are only available in 1991, i.e., shortly after the German reunification. The effects of the socialist regime on entrepreneurship (via implicit institutions) are substantial: norms and values developed under the socialist regime make people between 16% and 26% less likely to be an entrepreneur.

Of course, it is important to note that we cannot claim to identify causal effects of implicit institutions on entrepreneurship here because, despite of controlling for well-known and important determinants of occupational choice, unobserved characteristics might be correlated with the risk attitude, norm and value variables and at the same time have an impact on an individual's occupational choice, which would cause the error term to be correlated with the variable of interest. However, what we can show so far is that the socialist regime led to an environment where we find implicit institutions to be negatively associated with entrepreneurship, without knowing the details about the accurate channels though.

2.5.3 What's the Channel? - More than "Just" (Un-)Observed Regional Characteristics?

So far, we can argue that the socialist regime in the former GDR left an environment where societal norms and values are prevalent which are negatively associated with entrepreneurship. One might argue that the substantial norm and value differences are mainly due to observable and unobservable labor market heterogeneity, since e.g. the level of unemployment in East Germany is much higher than it is in West Germany. Note in this context that our dataset includes only the dependently employed and entrepreneurs; the unemployed are excluded. Nevertheless, even for those who are employed, economic conditions may differ a lot between East and West Germany with the consequence that e.g., people living in East Germany might on average be more afraid of getting unemployed than those living in West Germany which could influence their norms and values. In a next step, we would like to show that there is more behind the norm and value differences than this, i.e., we set out to demonstrate that the legacy of the socialist regime is not "just" unobserved regional characteristics which affect implicit institutions.

Therefore, we refine our analysis to concentrate on those East Germans who moved to West Germany after 1989 (late movers) and compare them to born and raised West Germans. These movers had been socialized in the former GDR and thus had been "treated" with the communist ideology but were now confronted with the same economic conditions as their West German counterparts in their new West German residences.

This strategy could be reasonably criticized on the grounds that the group of movers might be subject to a selection bias, i.e. that movers are in general energetic and self-reliant and thus different in attitude compared to the average East German. Indeed, simple descriptive statistics show that East Germans who moved to West Germany after the fall of the Berlin Wall are on average younger (35.6 vs. 39.5) and better qualified than the average East German; moreover, there is a relatively high share of males (57.1% vs. 53.1%) and singles (45.5% vs. 31.5%) in this subgroup. Furthermore, OLS regressions of our norm and value variables on the individuals' characteristics show that on average singles are less risk averse; and that being male and young is associated with less reliance on the state (as depicted in the question whether the current social security system reduces work incentives). However, note that the selectivity of the group of movers should consequently work against us by reducing the differences in norms and values between East and West Germans. This means that any remaining differences for this subgroup mark a lower bound and are likely to be more pronounced in the overall East German sample.

The mean values of the societal norms and value variables presented in Table 7 are in line with our expectation that the subgroup of East German movers should show smaller differences to West Germans than other East Germans. But even if the selection problem, which works against us, is present to some degree, we still find differences even between this selective East German subgroup and West Germans. All differences continue to run in the same direction as before and most of them are still statistically significant. Thus, these differences support the view that we indeed have an effect of the socialist ideological treatment on implicit institutions, which does not merely go through the channel of observable and unobservable characteristics of a comparatively poor economic environment.

Table 7: Differences between West Germans and East German Late Movers

	East German late movers	West Germans	Difference
	Level of agreement on a scale from 1(fully agree) to 4(don't agree at all)		
Role of Enterprise*:* *"Employers' profits foster the economy."* (obs.: 58 and 1,704)	2.190 *0.114*	1.972 *0.020*	0.218 **
Welfare State: *"The current social security system reduces work incentives."* (obs.:59 and 1,700)	2.746 *0.117*	2.485 *0.023*	0.261**
Fairness*: "Economic profits are distributed fairly in Germany."* (obs.: 59 and 1,674)	3.169 *0.088*	2.942 *0.018*	0.227 ***
Income Differences*: "Income differences give incentives to work hard."* (obs.: 97 and 3,210)	2.485 *0.087*	2.293 *0.015*	0.192 **
Rank Differences*: "Rank differences are performance based and hence acceptable."* (obs.:100 and 3,196)	2.490 *0.086*	2.464 *0.015*	0.026
Status Differences: *"Social status differences are just – by and large"* (obs.: 100 and 3,208)	2.880 *0.079*	2.629 *0.015*	0.251 ***
State Intervention*: "The state has to care for employment and price stability even if this cuts the rights of employers."* (obs.: 59 and 1,688)	2.102 *0.110*	2.287 *0.022*	-0.185 *
National Assistance: *"The state has to care for the sick, poor, old and unemployed."* (obs.: 99 and 3,267)	1.737 *0.073*	1.802 *0.013*	-0.065
Performance: *"Everybody should get the money one needs - regardless of any performance."* (obs.: 100 and 3,230)	2.650 *0.094*	2.754 *0.016*	-0.104
	East German late movers	West Germans	Difference
	Level of importance on a scale from 1 (not important) to 7 (very important)		
Risk Attitude: *"How important is a secure job to you?"* (obs.: 14 and 631)	6.857 *0.097*	6.087 *0.047*	0.770***

Notes: In the cells below the respective questions we report the number of observations in parentheses. The first number refers to late East German late movers, i.e., East Germans that were born in the former GDR but moved to West Germany not before 1989. The second number refers to West Germans. Column 1 and Column 2 depict group means for late East German movers and West Germans respectively, while Column 3 shows mean differences; standard errors are given in italics; * denotes 10% level of significance, ** denotes 5% level of significance, *** denotes 1% level of significance.

The number of observations for East Germans who moved to West Germany after 1989 is not large, but still provides insightful results. To obtain these observation figures, we collapsed information on norms and values, if it was available, for different points in time. Note the great difference in the attitude towards risk between East German movers and West Germans. This information on risk attitude is only gathered in 1991. Consequently, we only observe those East German movers who moved to West Germany between 1989 and 1991, i.e., right after the fall of the Berlin Wall. This explains both the low number of observations as well as the great gap in the means. When this information was collected, these movers did not have much time to adapt to West German norms and values. Rather, this is the group for which the socialist past was still very recent indeed.

In a last step, we include the level differences in the attitude variables into occupational choice probit models and compute marginal effects for the East German late movers and the West Germans according to Equation (3):

$$\Phi(\alpha + \beta_1 att_{mean,west} + X_{mean,west}\beta_2) > \Phi(\alpha + \beta_1 att_{mean,east,mover} + X_{mean,west}\beta_2) \qquad (3)$$

Just as described above, we compute the betas by running a probit model on the sample of West Germans. Again, we assume that West Germans and East German migrants do not differ in the distribution of the control variables as well as in the effect of all variables on entrepreneurship in order to isolate the effect of the differences in implicit institutions on entrepreneurship. Estimation results are reported in Table 8.

Table 8: Predicted Probabilities of Being an Entrepreneur

	East German late movers (in percent)	West Germans (in percent)	Difference (in percentage points)
Probit 1 (1991)	5.2	7.8	-2.6
Probit 2 (1994, 2004)	8	9.0	-1.0
Probit 3 (1991, 1994, 2000, 2004)	8	8.8	- 0.8
Probit 4 (1991, 1994, 1998, 2000, 2004)	8.7	9.3	- 0.6

Notes: The table reports predicted probabilities of being an entrepreneur for East Germans that moved to West Germany not before 1989 (late movers) and West Germans conditional the attitude variables reported in Table 5. Probit 1 contains the variable "Risk attitude" (How important is a secure job for you). Probit 2 uses the variables "Welfare state" (The current social security system reduces work incentives) and "Fairness" (Economic profits are distributed fairly in Germany). Probit 3 conditions on "Performance" (Everybody should get the money he needs – regardless of any performance) and "National Assistance" (The state has to care for the sick, poor, old and unemployed). Probit 4 uses the variables "Income Differences" (Income differences give incentives to work hard), "Rank Differences" (Rank differences are performance based and therefore acceptable) and "Status Differences" (Social status differences are just – by and large).

A comparison of the probabilities of being an entrepreneur between West Germans and East German late movers reveals that under the assumptions mentioned above, on average, the likelihood of being an entrepreneur is higher for West Germans than for East Germans who were socialized in the GDR but moved to West Germany after the fall of the Berlin wall. These differences are on average less pronounced now, especially when allowing for a greater time span after reunification, than they were before when comparing West Germans to all East Germans. However, they are still considerable and vary in a range from 0.6 to 2.6 percentage points. By looking at this selective subgroup, we can conclude that the socialist regime in the former GDR led to implicit institutions which are negatively associated with entrepreneurship and that this legacy of the socialist regime not only runs via the channel of observable and unobservable characteristics of a poor and less developed economic environment. Indeed, it is interesting to observe that even for this very selective subgroup we find evidence for the socialist treatment which is negatively associated with entrepreneurship.

As an anti-test, we concentrate on those East Germans who moved to West Germany before the Berlin Wall was built, i.e. not later than 1961 (early movers). Generally, these individuals were socialized in the same economic and political system as the West Germans and we thus expect that their attitudes will not differ from West German attitudes in the same way as the attitudes of the later movers (i.e., East Germans who moved after the fall of the Berlin Wall and thus lived under a well established socialist regime). Simple mean comparisons of the attitudes variables presented in Table 9 support our view that the early movers indeed do not differ from West Germans in a way people adherent to socialist institutions would.

For a few variables, we do not find any difference at all between these early movers and West Germans. Still, we observe differences on some attitude variables. But bear in mind that these differences are fully in line with what we would expect when comparing this mobile, probably more self-reliant subgroup of movers to the average West German. It is only the significant difference in the attitude toward the welfare state that might seem puzzling at first sight. However, note that also this subgroup is selective on the controls in a way that should work against us. Amongst others, early East German movers are on average older than the average West German (51.3 vs. 39.6). Since regressions show that agreeing to the statement that the current social security system reduces work incentives is a concave function of age, the resulting difference in this attitude variable between early movers and West Germans should not be too distressing.

Table 9: Differences between West Germans and East German Early Movers

	East German early movers	West Germans	Difference
	Level of agreement on a scale from 1(fully agree) to 4(don't agree at all)		
Role of Enterprise*:* *"Employers' profits foster the economy."* (obs.: 37 and 1,704)	1.757 *0.131*	1.972 *0.020*	-0.215 *
Welfare State: *"The current social security system reduces work incentives."* (obs.:37 and 1,700)	2.892 *0.163*	2.485 *0.023*	0.407***
Fairness*: "Economic profits are distributed fairly in Germany."* (obs.: 35 and 1,674)	2.943 *0.108*	2.942 *0.018*	0.001
Income Differences*: "Income differences give incentives to work hard."* (obs.: 77 and 3,210)	2.078 *0.092*	2.293 *0.015*	-0.215 **
Rank Differences*: "Rank differences are performance based and hence acceptable."* (obs.:78 and 3,196)	2.333 *0.101*	2.464 *0.015*	-0.131 *
Status Differences: *"Social status differences are just – by and large"* (obs.: 79 and 3,208)	2.519 *0.095*	2.629 *0.015*	-0.110
State Intervention*: "The state has to care for employment and price stability even if this cuts the rights of employers."* (obs.: 34 and 1,688)	2.500 *0.148*	2.287 *0.022*	0.213 *
National Assistance: *"The state has to care for the sick, poor, old and unemployed."* (obs.: 80 and 3,267)	1.938 *0.098*	1.802 *0.013*	0.135 *
Performance: *"Everybody should get the money one needs - regardless of any performance."* (obs.: 80 and 3,230)	2.813 *0.104*	2.754 *0.016*	0.059
	East German early movers	West Germans	Difference
	Level of importance on a scale from 1 (not important) to 7 (very important)		
Risk Attitude: *"How important is a secure job to you?"* (obs.: 26 and 631)	6.269 *0.269*	6.087 *0.047*	0.182

Notes: In the cells below the respective questions we report the number of observations in parentheses. The first number refers to late East German early movers, i.e., East Germans that were born in the former GDR but moved to West Germany already before 1962. The second number refers to West Germans. Column 1 and Column 2 depict group means for late East German movers and West Germans respectively, while Column 3 shows mean differences; standard errors are given in italics; * denotes 10% level of significance, ** denotes 5% level of significance, *** denotes 1% level of significance.

2.6 Conclusions

The goal of this chapter is to disentangle the effects of explicit and implicit institutions on individuals' entrepreneurial intentions. Explicit institutions can change rather quickly; implicit institutions, however, here defined as societal values and norms, develop and change much more slowly. To identify the effect of implicit institutions on an individual's entrepreneurial intentions requires a quasi-natural experiment, that is, a situation where people now living under the same explicit institutions were raised and socialized under different regimes and thus — assumedly — developed different observable values and norms. In this regard, Germany provides a suitable experimental setup due to its unique history of separation into two distinct systems and states, the socialist GDR and the non-socialist FRG, following World War II. Because, according to Alesina and Fuchs-Schündeln (2007), both parts of the country were quite comparable before this split, observable differences after the separation are in all probability driven by the prevailing ideologies in each part, which gradually produced different values.

We suppose that the socialist regime in the former GDR influenced implicit institutions in a way which is negative for entrepreneurship. However, comparing the start-up rates of East Germany with those of West Germany, we find that entrepreneurial activity is higher in the former GDR than it is in the regions that always belonged to the FRG. This result holds if we focus on the corridor along the former inner-German border, thus encompassing only regions having similar natural conditions and equal experience with being located so close to the Iron Curtain. This higher level of entrepreneurial activity appears to be the result of significant differences in both opportunity and necessity entrepreneurship in East Germany, and thus obscures the hypothesized effect of the socialist regime on implicit institutions negatively affecting entrepreneurship. Indeed, we see some evidence of economic development convergence with West Germany in the former GDR, but the eastern part of the country is still "catching up". In the face of this transition, comparatively many people found their own business, even if their job orientation is not exceedingly entrepreneurial. Whether opportunity or necessity entrepreneurship is dominant within this process might be an interesting question for further research.

Using micro-level data, we show that the socialist regime in the former GDR had indeed a causal effect on implicit institutions, i.e., a whole set of different norm and value variables. Further analyses clearly reveal that these implicit institutions were shaped in a way which is

negatively associated with entrepreneurship. To analyze whether the influence of the socialist past runs merely via the channel of observable and unobservable labor market characteristics, i.e., a generally bad economic environment, in East Germany, we switch the focus to those individuals who were born in East Germany and then migrated to West Germany after the fall of the Berlin Wall.[8] We find that the socialist legacy can even be found in this very selective subgroup of East Germans. Hence, we suggest that the differences in implicit institutions are not merely driven by bad economic conditions in East Germany. Further, we conduct an anti-test and look at those who left the GDR in the early days (before the Berlin Wall was built) and moved to West Germany. We find that the early movers, who did not live under the influence of the socialist regime, do not differ from West Germans in the way the late movers' treatment group does.

Our analyses suggest that implicit institutions in the form of values and norms prevail over and above explicit institutions. Individuals in a presently similar environment but who were socialized under different ideologies do differ in their underlying mindsets. These differences can affect economic decisions, perhaps most especially the decision about whether to start a business. This finding should be a particularly important consideration in the design of policies geared toward stimulating entrepreneurial activities. Our findings strongly advise against too-general catch-all policies. Some facets of entrepreneurship are no doubt universal, such as the necessary financing. However, our study shows that the incentives to become an entrepreneur are also affected by social factors which might vary between regions. Growing up under a socialist regime appears to be one such factor. According to Alesina and Fuchs-Schündeln (2007), underlying values, or in our terms, implicit institutions, can take several generations to change. Supporting this change might be another policy issue.

[8] See for migration patterns of East Germans Burda (1993), Burda et al. (1998), and Hunt (2006).

3. Regional Differences in Implicit Institutions and the Formation of Entrepreneurial Preferences[9]

3.1 Introduction

Countries in Central and Eastern Europe (CEE) have experienced dramatic changes in the last decades. After the Eastern Bloc collapsed, most of the currently existing states gradually adopted the rules of Western market economies, which triggered a dynamic catch-up process enabling CEE economies to modernize and grow. Nevertheless, it is often argued that the socialist past of these economies still casts a shadow over their current development, posing an obstacle to the ongoing transition process. The experience of more than 40 years of central planning heavily affected the economic structures in these countries and crowded out entrepreneurial spirit, which eventually led to the systems' economic collapse (cf. Audretsch, 2007).

This lack of entrepreneurial spirit can at least in part be ascribed to a lack of self-reliance (Schumpeter, 1912) and a lack of preferences for independence and competition (Blanchflower and Oswald, 1998). These preferences, which in the following are referred to as 'state-reliant preferences', were developed over several decades of socialist education and socialization in a centrally planned economy and will presumably not change overnight. Consequently, the lack of entrepreneurial spirit may still be present today and have a dampening effect on these countries' growth path. However, empirically the legacy of the socialist past is often difficult to pin down since institutions change only slowly and therefore, state-reliant preferences might also be an outcome of still rather market unfriendly current institutions in CEE countries.

In this chapter, we exploit the German reunification as an ideal setup for the analysis of how a socialist regime influenced individuals' preferences. In contrast to other socialist countries, the German Democratic Republic (GDR) adopted the institutions of a market economy quasi overnight when reunifying with West Germany. We can thus rule out simultaneity issues, i.e. that current market-unfriendly institutions affect individuals' preferences, and vice versa. Taking China as an example it is not obvious whether the slowly changing institutions boost

[9] This chapter is based on Bauernschuster, Stefan, Falck, Oliver, Gold, Robert and Heblich, Stephan (2012), The Shadows of the Socialist Past: Lack of Self-Reliance Hinders Entrepreneurship, *European Journal of Political Economy*, 28, 485-497.

the Chinese entrepreneurial spirit; or whether the increasing number of entrepreneurs demands more independence and thus induces institutional reforms.[10]

We find empirical evidence that the socialist regime in the former GDR did have an effect on state-reliant preferences and that these preferences are persistent even years after the breakdown of the GDR. Our analysis shows that East Germans (born and) living in the regions of the former socialist GDR are less self-reliant than their West German counterparts who have always lived in the democratic FRG. These shadows of the past loom large and are not explained by individual characteristics or by differences in economic development between East and West Germany alone.

To further assess whether the analyzed preference differences affect individuals' entrepreneurial spirit, we test the impact of state-reliance in the context of an occupational choice equation (Kihlstrom and Laffont, 1979). We find that state-reliance is indeed negatively associated with the likelihood of being an entrepreneur. This association is particularly strong when looking at entrepreneurs with employees as compared to self-employed individuals that do not employ further employees. In this way, the shadows of the socialist past hinder entrepreneurship. Our finding can also cast light on results from the Global Entrepreneurship Monitor country report for Germany in 2000 (Sternberg et al., 2000). While experts evaluate the entrepreneurial prospects in East Germany even better than in West Germany, this feeling is not prevalent in the overall East German population. Our empirical analysis suggests that a lack of entrepreneurial spirit bred by the socialist regime might at least partly be responsible for this puzzle.

Why was the socialist regime in the GDR so successful in shaping individuals' preferences and why are these preferences so persistent after the breakdown of the GDR? Education and socialization were controlled by the state to a fairly high degree in the GDR. Nor was education restricted to just children and adolescents. Minors were educated in day care facilities, schools, and in the socialist youth organization (FDJ). Adults received their socialist education in the state-owned companies and cooperatives they worked for and at public cultural facilities. Marxism as scientific method and Marxist economic theory were prominent subjects. Furthermore, people were also taught that they should cherish the collective more than the individual, trust the Socialist party completely[11], and believe that the state was always

[10] For a discussion of entrepreneurship in China, see Koll (2011).
[11] A popular song in the GDR sung at official gatherings was entitled "The party is always right".

acting in their best interests. This education was complemented by injunctions and warnings about the "decadent" and "imperialistic" West. People were "treated" with this socialist propaganda for more than one generation and it is hard to believe that 40 years of extreme treatment with Marxist theory and communist ideology would not affect their worldview. Their constant indoctrination, observation, and experiences with the peculiarities of a centrally planned economy, as well as being witness to steady opposition toward the Western world should have influenced peoples' beliefs about the role of the state, their role as an individual within society, and their expectations about which goals they might and should achieve in their lives. Hence the preferences were deliberately manipulated in an intense way unthinkable in an individualistic society.[12]

In the wake of the German reunification, the "jump start" (Sinn and Sinn, 1992) or "shock treatment" (Brezinski and Fritsch, 1995) with institutions of a market economy had drastic consequences for the East German economy. Many East German firms went bankrupt and the unemployment rate rose to more than 20 percent. As wages rose rapidly despite the low productivity in East Germany, West German firms had little incentive to open new branches in East Germany.[13] Consequently, the vast majority of new businesses had been set up by East Germans even though they were confronted with these unfavorable economic conditions (Fritsch, 2004). In addition to economic necessities, McMillan and Woodruff (2002) or Estrin et al. (2006) put forward another argument in favor of the entrepreneur as an agent of change in transition economics. They argue that, in the transition from a socialist regime to a market economy, entrepreneurs have to be the main actors while existing firms are less well placed to be the engine of structural change because they are themselves the outcomes of the planning system.[14]

Having the unfavorable economic conditions in East Germany in mind, one might wonder whether preferences are affected by prevailing economic conditions in East Germany that differ from West German economic conditions (Galor and Michalopoulos, 2011; Hoorn and Maseland, 2010). To overcome this issue, we could compare West Germans' preferences with preferences of those East Germans who moved to West Germany after reunification and thus live in the same economic environment. However, these movers presumably are a very selec-

[12] See Kornai (1992) for a detailed analysis of the political economy of socialist economies.
[13] Exceptions are entrepreneurs with social ties to East Germany (Burchardi and Hassan, 2011).
[14] For further discussions of entrepreneurship in the post-socialist transition economies, see Acs and Audretsch (1993), Bergmann and Sternberg (2007), Earle and Sakova (2000), Hanley (2000), Johnson and Loveman (1995), or Smallbone and Welter (2001).

tive group of East Germans. We thus follow Alesina and Fuchs-Schündeln (2007) and compare preferences of East Germans with those of West Germans conditional on the prevailing economic conditions in East and West Germany.[15]

Our chapter is closely related to the literature that empirically exploits discontinuities due to the event of German reunification, e.g. in precautionary savings (Fuchs-Schündeln and Schündeln, 2005), life satisfaction (Fuchs-Schündeln, 2009) or market access (Redding and Sturm, 2008). While these authors exploit discontinuities due to the event of the German reunification, we emphasize the persistence of preferences shaped under the past socialist regime. Thus, our chapter is also related to the literature that show that differences in preferences between East and West Germans are persistent even after reunification and change only slowly ((Alesina and Fuchs-Schündeln, 2007) for redistributive preferences; (Rainer and Siedler, 2009) for trust; (Bauernschuster and Rainer, 2012) for sex role attitudes).

Finally, for the first time in the economic literature, we investigate an additional channel through which the socialist regime could have had effects. Nearly 3 million individuals fled from the Russian occupational zone (which would later become East Germany) in the time span ranging from the end of World War II to the construction of the Berlin Wall in 1961. With communism looming, one could well imagine that individuals that fled from the Russian occupational zone were more self-reliant and had stronger preferences for independence than the average East German and that consequently, the people that remained in East Germany were less self-reliant than the average West German already before the socialist propaganda actually set in. We provide some pieces of evidence for this channel which has so far not been considered in the economic literature exploiting the German division and reunification as a natural experiment. In fact, it was shown that East and West Germany did not differ in many aspects (economic development, voting behavior) before the war (Alesina and Fuchs-Schündeln, 2007). However, the large movements in the aftermath of World War II have been neglected.

The remainder of the chapter proceeds as follows. Section 3.2 introduces our data and provides evidence that the socialist regime in the GDR bred state-reliant preferences, while Section 3.3 investigates the association between state-reliant preferences and entrepreneurship. Section 3.4 discusses an alternative channel through which the socialist regime could have

[15] Runst (2011) analyzes culture and entrepreneurship in East Germany; however, he abstracts from differences in regional conditions.

had an impact on its population even before the socialist propaganda set in. Section 3.5 concludes.

3.2 State-Reliance in East and West Germany

To explore our hypothesis that the lack of self-reliance developed under the socialist regime of the former GDR negatively influence entrepreneurship today, we first provide evidence that the socialist regime in the former GDR really did have an effect on preferences related to self-reliance or state-reliance. Second, we collect evidence that these "manipulated" preferences are indeed meaningful and, third, that they are negatively associated with an individual's propensity to become an entrepreneur.

The German General Social Survey (ALLBUS) is a valuable data source in this pursuit.[16] The data set is based on biennial, representative surveys of the German population conducted through personal interviews. ALLBUS covers a wide range of topics pivotal to empirical research in the social sciences. A core set of questions is asked in every wave of the survey, with various sets of additional questions complementing the survey in different years.[17] Since we are interested in the occupational choices of interviewees, we retain only entrepreneurs and employed workers in our sample and exclude non-working, unemployed or retired individuals. For entrepreneurs, we can observe whether the entrepreneur is "merely self-employed" without any employees or whether the entrepreneur employs any workers. In a first step, we do not further exploit this information and count every self-employed respondent as entrepreneur; however, later in this chapter, we will distinguish between these different kinds of entrepreneurs. In order to enhance our East versus West German comparison, we drop all observations from non-Germans from our sample as well as all observations from individuals living in Berlin.[18] We use the 1991, 1994, 1998, 2000, and 2004 waves, which contain information on individuals' preferences as to state-reliance or self-reliance.

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[16] The ALLBUS program was financially supported by the German Research Foundation (DFG) from 1980 to 1986 and in 1991. Further surveys were financed on a national and state (*Laender*) level via the GESIS network (*Gesellschaft Sozialwissenschaftlicher Infrastruktureinrichtungen*).

[17] Terwey et al. (2007) provide detailed information on the ALLBUS surveys in general and present all variables available in the cumulated data set from 1980 until 2006.

[18] In particular for our regional covariates, it would have been difficult to clearly distinguish between West Berlin (which was part of the former Federal Republic of Germany) and East Berlin (which was part of the former German Democratic Republic).

Table 1: Descriptive Statistics

Occupational status	Employed worker	0.90	[10,622]	Living in…	Schleswig Holstein	0.03	[347]
	Entrepreneur	0.10	[1,231]		Hamburg	0.02	[197]
Gender	Male	0.58	[6,886]		Lower Saxony	0.08	[922]
	Female	0.42	[4,967]		Bremen	0.01	[66]
Schooling	No or lower secondary	0.33	[3,948]		North Rhine Westfalia	0.17	[1,986]
	Medium secondary	0.39	[4,544]		Hesse	0.06	[721]
	Higher secondary	0.09	[1,114]		Rhineland Palatinate	0.04	[468]
	University	0.19	[2,185]		Baden Wuerttemberg	0.10	[1,166]
Previous joblessness	None	0.79	[9,353]		Bavaria	0.14	[1,649]
	Up to a year	0.13	[1,481]		Saarland	0.01	[112]
	More than a year	0.08	[980]		Brandenburg	0.07	[839]
Marital status	Not married	0.35	[4,117]		Mecklenburg Western Pomerania	0.04	[526]
	Married	0.65	[7,734]		Saxony	0.11	[1,310]
House owner or tenant	Tenant	0.49	[5,732]		Saxony Anhalt	0.07	[780]
	House/flat owner	0.51	[5,933]		Thuringia	0.06	[764]
Age	Mean (in years)	40.32	[11,842]	East or West	East Germany	0.36	[4,219]
	Standard deviation (in years)	*11.03*			West Germany	0.64	[7,634]
Real income	Mean (in €)	1,550.50	[10,013]				
	Standard deviation (in €)	*1,019.68*					

Notes: Unless otherwise specified, the figures present percentage shares; numbers of observations are given in square brackets. Euro values are inflation-adjusted with 2005 as the baseline year. The association of preferences expressing self-reliance and entrepreneurship

Table 1 presents descriptive statistics of the sample underlying the analyses of this chapter. 90 percent of all individuals in our sample are employed workers whereas 10 percent are entrepreneurs. Our sample consists of 58 percent males and 42 percent females. Most of the observed individuals (39 percent) have medium secondary schooling ("Realschulabschluss"), 33 percent have no or lower secondary schooling ("Hauptschulabschluss"), 9 percent have higher secondary education ("Abitur") yet no university education, and 19 percent have a university degree. 79 percent of all individuals in our sample had not been unemployed by the time of the interview; 13 percent had been unemployed less than a year by the time of the interview, and 8 percent had had unemployment spells adding up to more than a year by the time of the interview. 65 percent of all individuals in our sample are married and live together with their partners, while 35 percent are single. 51 percent own a house or a flat while the remaining 49 percent are tenants. On average, individuals are 40.32 years old and earn 1,550.50 Euros per month.

Observations are distributed fairly across all German federal states with 36 percent living in East Germany and 64 percent in West Germany. We use this information on whether an individual currently lives in East or West Germany in our estimations; however, later, we also draw on more precise information on whether an individual that currently lives in East Germany (West Germany) was actually born in East Germany (West Germany).

Table 2 provides an overview of the variables depicting preferences with respect to state-reliance or self-reliance (and as a closely related concept also with respect to competition) that we analyze in this chapter. For the sake of brevity, we label these preferences state-reliant preferences (or self-reliant preferences).

Table 2: Questions Revealing Preferences With Respect to State-reliance, Self-reliance, and Competition

Do you agree?
1) "The state has to care for the sick, poor, old, and unemployed."
2) "Everybody should get the money he needs — regardless of any performance."
3) "Income differences give incentives to work hard."
4) "Rank differences are performance based and therefore acceptable."
5) "Differences in social status are just — by and large."
6) "Economic profits are distributed fairly in Germany."
7) "The current welfare system reduces work incentives."

Notes: Information on replies to statements 1) and 2) is available in the ALLBUS survey for the years 1991, 1994, 2000, and 2004. Information on replies to statements 3), 4), and 5) is available in the ALLBUS survey for the years 1991, 1994, 1998, 2000, and 2004, whereas information on replies to statements 6) and 7) is available in the ALLBUS survey for the years 1991 and 2004.

Originally, interviewees could express their level of agreement with statements 1) to 7) in Table 2 by picking one of four responses: “fully agree”, “rather agree”, “rather don’t agree”, and “don’t agree at all”. Figure 1 presents the distributions of the preference variables for East and West Germans. From these graphs, some first visual evidence appears that East Germans are more state-reliant than West Germans. For example, there are substantially more East Germans than West Germans who fully agree to the statement that the state should care for the sick, poor, and unemployed. Slightly more East Germans fully agree that everybody should get the money he needs – regardless of any performance. Further, East Germans are less likely to agree to the statement that the welfare system reduces work incentives. Moreover, we observe far more East Germans completely disagreeing with the statements that economic profits are distributed fairly in Germany, or that rank differences or differences in social status are acceptable and fair. More East Germans than West Germans do not agree at all with the statement that income differences provide incentives to work hard. Altogether, Figure 1 provides first pieces of evidence that state-reliance is more common a phenomenon among East Germans than among West Germans.

Figure 1: Preferences Expressing State-Reliance/Self-Reliance for West and East Germans

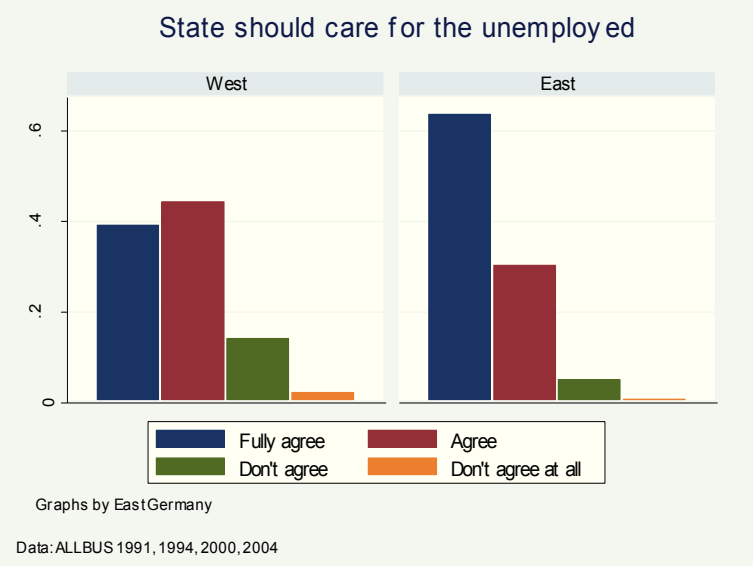


Figure 1 (continued): Preferences Expressing State-Reliance/Self-Reliance for West and East Germans

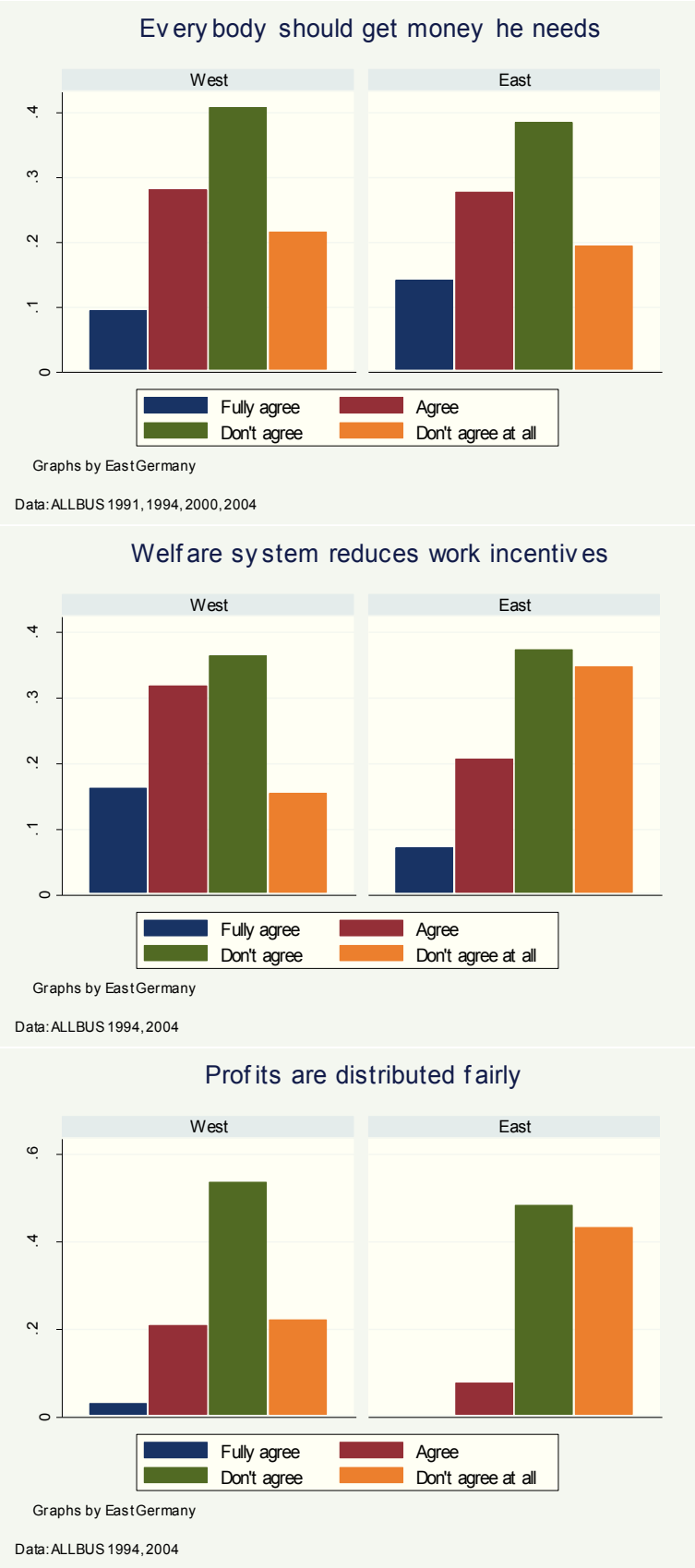
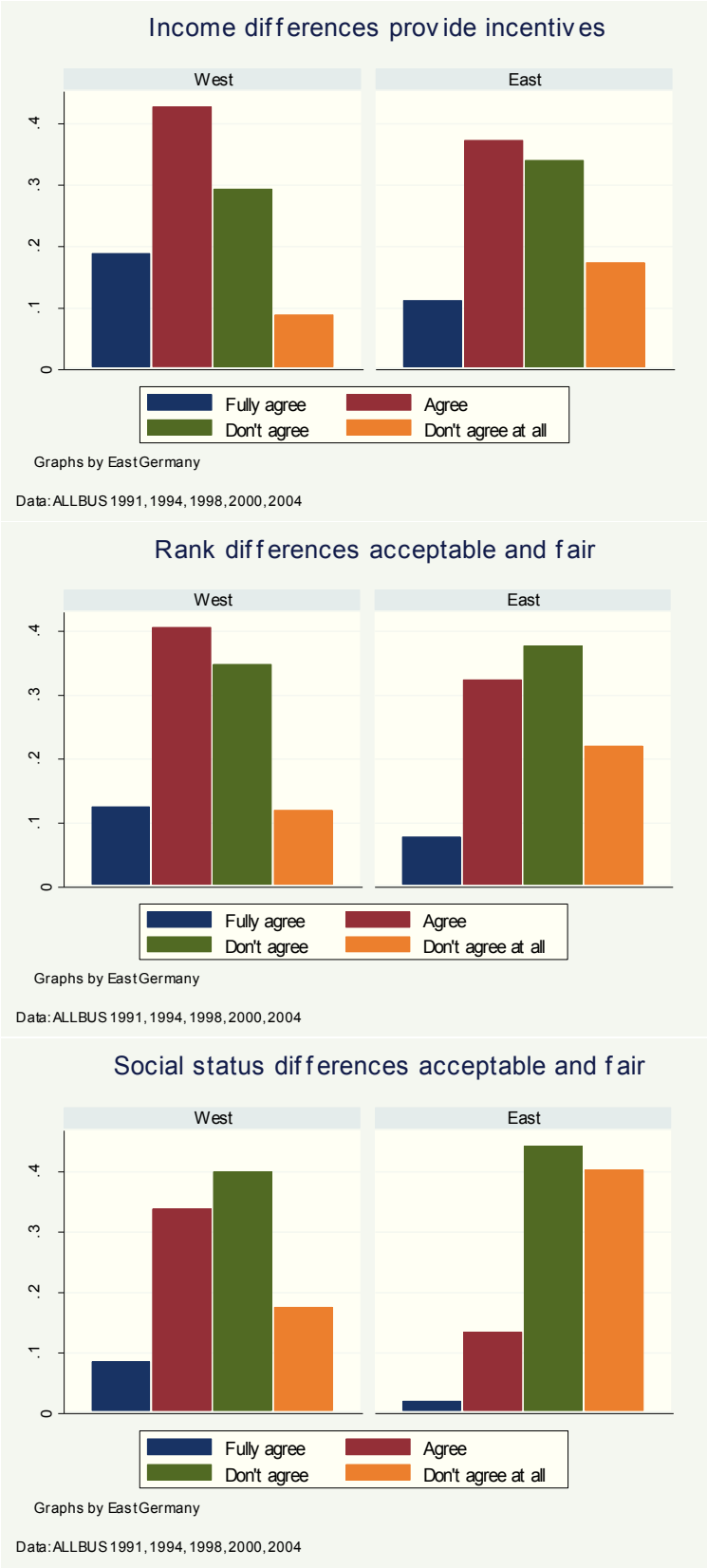


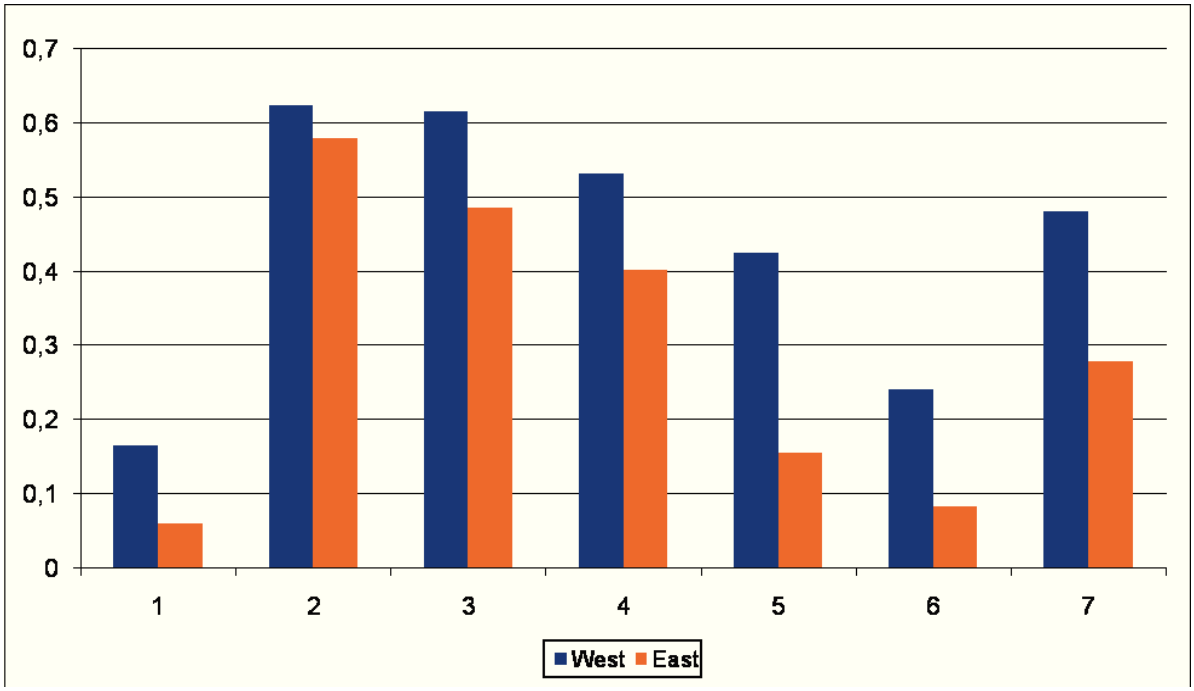
Figure 1 (continued): Preferences Expressing State-Reliance/Self-Reliance for West and East Germans



Notes: The graphs show distributions of preferences expressing state-reliance for West Germans and East Germans. Statement 1): N = 3,695 for West and N = 2,349 for East; statement 2): N = 3,652 for West and N = 2,296 for East; Statement 3): N = 4,476 for West and N = 2,652 for East; statement 4): N = 4,466 for West and N = 2,669 for East; statement 5): N = 4,483 for West and N = 2,704 for East; statement 6): N = 1,887 for West and N = 881 for East; statement 7): N = 1,920 for West and N = 889 for East; statement.

To ease interpretation, we now group the two agreement levels "fully agree" and "rather agree" together to represent individuals who agree to the respective statement. The two disagreement levels "rather don't agree" and "don't agree at all" are grouped together to capture individuals who disagree. We then create seven dummy variables, which take on the value of unity for interviewee replies reflective of rather self-reliant preferences, and are zero for rather state-reliant preferences. To be more specific, we expect individuals having more self-reliant (and therefore less state-reliant) preferences to disagree to statements 1) and 2), whereas they should agree to statements 3) through 7).

Figure 2: Self-Reliant Preferences for West and East Germans – Adjusted Measures



Notes: The figure presents mean levels of disagreement with statements 1) and 2) of Table 1, mean levels of agreement with statements 3) through 7) of Table 1. Statement 1): N = 3,695 for West and N = 2,349 for East; statement 2): N = 3,652 for West and N = 2,296 for East; Statement 3): N = 4,476 for West and N = 2,652 for East; statement 4): N = 4,466 for West and N = 2,669 for East; statement 5): N = 4,483 for West and N = 2,704 for East; statement 6): N = 1,887 for West and N = 881 for East; statement 7): N = 1,920 for West and N = 889 for East. The observations for statements 1) and 2) are drawn from the years 1991, 1994, 2000, and 2004. The observations for statements 3), 4), and 5) are drawn from the years 1991, 1994, 1998, 2000, and 2004, whereas the observations for statements 6) and 7) are drawn from the years 1991 and 2004.

Descriptive statistics for these adjusted preference variables are shown in Figure 2. East Germans show significantly lower levels of self-reliance than West Germans. For example, only 6 percent of East Germans disagree to the statement that the state should care for the sick, poor, and unemployed, while this number is 16 percent for West Germans. 62 percent of all individuals from West Germany disagree that everybody should get the money he needs – regardless of any performance, compared to 58 percent of East Germans. 62 percent of West Ger-

mans hold the opinion that income differences provide an incentive to work hard. This number drops to 49 percent for East Germans. Similarly, while 53 percent of West Germans agree to the statement that rank differences are performance based and therefore acceptable, only 40 percent of East Germans think this is true. Differences in social status are regarded as being fair by 42 percent of all West Germans, yet only by 16 percent of all East Germans. Moreover, whereas 48 percent of West Germans think that the current social security system reduces work effort, only 28 percent of East Germans do so. Although these descriptive statistics provide first evidence supporting our hypothesis that the socialist regime in the former GDR made people more state-reliant and less reliant on their own skills and abilities, they should be interpreted with caution. East and West Germans might differ in many other characteristics that are correlated with the preferences we are interested in. Unobserved heterogeneity could thus account for the preference differences rather than the socialist past.

To address the possibility that unobserved heterogeneity might drive the preference differences, we run multivariate probit regressions where we take the adjusted preference variables as our outcomes and include a wide range of control variables on an individual level. Specifically, we control for gender, age (and its square), education (lower secondary, medium secondary, higher secondary, or university), and family status (married and living with spouse or single). Furthermore, to proxy wealth, we include the logarithm of an individual's net monthly income[19] as well as a dichotomous variable that is unity for house or flat owners and zero for tenants. The house owner variable should also be a good proxy for an individual's mobility (DiPasquale and Glaeser, 1999). Moreover, we account for an individual's employment history by including a categorical control variable that describes the individual's unemployment spells during the 10 years preceding the interview (none, less than a year, more than a year). Keep in mind that our sample is restricted to entrepreneurs and employees; thus current unemployed individuals are not included in the sample. Our variable of interest is a dummy variable that equals unity if a respondent is East German. The results of probit regressions with standard errors clustered at the state level are displayed in Table 3.

[19] We compute real income by using the income in 2005 as the baseline and adjusting nominal income information from other years by the inflation rate.

Table 3: Preference Differences between East and West Germans

	Preference (1)		Preference (2)		Preference (3)		Preference (4)	
	mfx	std.err.	mfx	std.err.	mfx	std.err.	mfx	std.err.
East	-0.097***	0.009	-0.020*	0.011	-0.103***	0.012	-0.087***	0.016
Female	-0.015**	0.008	-0.016	0.015	-0.059***	0.019	-0.054***	0.020
Education								
Medium secondary	0.041***	0.012	0.120***	0.018	-0.090***	0.014	-0.092***	0.012
Higher secondary	0.045***	0.015	0.140***	0.027	-0.104***	0.026	-0.114***	0.029
University	0.050***	0.014	0.138***	0.027	-0.096***	0.019	-0.179***	0.017
Age	0.010***	0.001	0.006	0.004	-0.013***	0.004	-0.011***	0.004
Age squared (*1,000)	-0.090***	0.019	-0.086**	0.039	0.160***	0.051	0.157***	0.046
Unemployment in previous 10 years								
Less than a year	0.021	0.017	-0.015	0.027	-0.060***	0.023	-0.062***	0.024
More than a year	-0.001	0.020	-0.092***	0.023	-0.071***	0.016	-0.049*	0.029
Married	-0.000	0.010	0.013	0.014	0.026***	0.010	0.026*	0.014
House or flat owner	0.013*	0.007	0.055***	0.017	0.015	0.017	0.040**	0.019
Log real personal income	0.032***	0.008	0.056***	0.009	0.024*	0.014	0.025**	0.013
Year dummies	Yes		Yes		Yes		Yes	
N	5,1		5,025		5,914		5,916	
Log pseudolikelihood	-1,721.59		-3,251.21		-3,940.48		-3,939.51	

Notes: The table reports probit average marginal effects (mfx); standard errors are clustered at the state level. The omitted categories are male, no/lower secondary education, no unemployment spells during the last 10 years, single, and tenant. Our outcome variables correspond to the seven preference variables presented in Table 2 and are coded as dummy variables that take on the value of unity for interviewee replies that are rather self-reliant, and zero for rather state-reliant preferences (cf. Figure 2). ***, **, * denote significance at the 1%, 5%, and 10% level, respectively.

Table 3 (continued): Preference Differences between East and West Germans

	Preference (5)		Preference (6)		Preference (7)	
	mfx	std.err.	mfx	std.err.	mfx	std.err.
East	-0.231***	0.020	-0.125***	0.014	-0.181***	0.043
Female	-0.025**	0.012	-0.002	0.022	-0.054***	0.017
Education						
Medium secondary	-0.005	0.015	-0.014	0.015	-0.027	0.021
Higher secondary	-0.021	0.022	-0.052**	0.025	-0.060*	0.032
University	-0.032**	0.013	-0.032	0.017	-0.115***	0.021
Age	-0.003	0.002	-0.011**	0.004	-0.012	0.008
Age squared (*1,000)	0.056**	0.028	0.136***	0.051	0.160*	0.092
Unemployment in previous 10 years						
Less than a year	-0.020	0.022	-0.001	0.021	0.002	0.036
More than a year	-0.067***	0.019	-0.029	0.027	-0.067	0.042
Married	-0.005	0.011	0.007	0.011	-0.028	0.018
House or flat owner	0.036***	0.014	0.026	0.017	0.013	0.019
Log real personal income	0.093***	0.014	0.075***	0.012	0.022	0.025
Year dummies	Yes		Yes		Yes	
N	5,966		2,39		2,424	
Log pseudolikelihood	-3,399.06		-1,064.66		-1,559.99	

Notes: The table reports probit average marginal effects (mfx); standard errors are clustered at the state level. The omitted categories are male, no/lower secondary education, no unemployment spells during the last 10 years, single, and tenant. Our outcome variables correspond to the seven preference variables presented in Table 2 and are coded as dummy variables that take on the value of unity for interviewee replies that are rather self-reliant, and zero for rather state-reliant preferences (cf. Figure 2). ***, **, * denote significance at the 1%, 5%, and 10% level, respectively.

The emerging picture is remarkably similar to the one seen in Figure 2. Controlling for a wide range of individual characteristics in multivariate regressions does not affect our previous descriptive result that East Germans exhibit less self-reliance (but more state-reliance) than their West German counterparts. As can be seen from column (1) of Table 3, the probability of disagreeing with the statement that the state should care for the sick, poor, and unemployed is by 10 percentage points lower for East Germans. In column (4), we see that the likelihood of agreeing to the statement that rank differences are performance based and therefore acceptable is 9 percentage points lower for East Germans than for West Germans. As another example, for East Germans, the probability of acknowledging that the current social security system reduces work effort is 17 percentage points lower than for West Germans. Indeed, comparing the descriptive statistics and the point estimates of the multivariate regressions in detail, we find that the size of the preference gap is barely affected by the inclusion of individual control variables in a multivariate setting.[20]

To this point, we can argue that the socialist regime in the former GDR created an environment in which we observe a lack of self-reliance. However, it could be argued that the substantial differences in preferences expressing state-reliance are mainly due to local labor market heterogeneity, since, e.g., the level of unemployment is much higher while GDP per capita is much lower in East Germany than it is in West Germany. We already control for a wide range of individual characteristics and restrict our sample to entrepreneurs and employed workers, i.e., unemployed individuals are not included in our sample. Nevertheless, even for those who are employed, economic conditions may differ a lot between East and West Germany, with the consequence that people living in East Germany might, for example, have a greater fear of unemployment than those living in West Germany, which might in turn influence their preferences. In short, we can imagine that individuals in economically poorer regions might have different preferences toward state-reliance / self-reliance than individuals living in more prosperous regions. Therefore, in a next step, we investigate whether the differences in state-reliance are driven merely by regional heterogeneity, i.e., regional economic conditions that differ between East and West Germany, or whether the shadow of the socialist regime reaches deeper and further.

[20] We do not find any systematic differences in the association of age and preferences between East and West Germany. Age is probably not a good proxy for an individual's socialist indoctrination because the intensity of socialist propaganda varied over the existence of the GDR.

To control for regional economic heterogeneity, we include the unemployment rate as well as GDP per capita by state in our multivariate regressions.[21] The data are provided by the German Federal Statistical Office. Similar to this approach, Alesina and Fuchs-Schündeln (2007) use net payments between states from the German regional transfer system (*Laenderfinanzausgleich*) and other regional financial redistributions to control for regional heterogeneity in an investigation of preferences for redistribution. The figures of Alesina and Fuchs-Schündeln (hereafter, AFS) are available for two years, 1997 and 2002, and are highly correlated with our regional control variables. Indeed, the pairwise correlation coefficient between the unemployment rate and the AFS net transfers on a federal state level for 1997 (2002) is -.94 (-.94); the correlation coefficient between real GDP per capita and the AFS net transfers for 1997 (2002) is -.64 (-.66).[22]

The results of the regressions that account for regional heterogeneity are presented in Table 4. For six out of seven attitude variables, we continue to find that East Germans differ from West Germans in the expected direction. Only for responses to the statement that everybody should get the money he need (regardless of any performance), the East dummy switches its sign but is not significantly different from zero (column (2) of Table 4). Although in some cases the size of the East German coefficient decreases once we control for regional heterogeneity, the differences are still economically substantial and in five out of seven cases statistically significant at conventional levels. Overall, it seems that the shadow of the socialist past reaches deep and cannot be explained by mere differences in the economic prosperity between East and West Germany. Despite accounting for differences in unemployment rates and GDP per capita, East Germans are far more state-reliant (and less self-reliant) than West Germans.[23]

[21] GDP per capita is expressed in real terms, i.e., we account for inflation and take 2005 as the baseline year.
[22] An alternative to including regional covariates might be looking at East Germans who lived under the socialist regime but moved to West Germany after the collapse of the GDR. Indeed, these East-West movers now face the same economic environment than West Germans, and an analysis of this subsample supports our results. However, at the same time this subsample of individuals that left East Germany is a highly selective one, which might blur our analysis. Therefore, we stick to the strategy of including regional covariates rather than focusing on a very selective and small group of individuals in our data.
[23] We have also used our repeated cross-section data to investigate any dynamics in the preference differences between East and West Germans in the years after reunification; yet, no clear picture emerges. For some variables, we observe a convergence process in line with Alesina and Fuchs-Schuendeln (2007), for other variables, we observe constant and partly even increasing differences over time, which is similar to the findings of Bauernschuster and Rainer (2011).

Table 4: Preference Differences between East and West Germans Including Regional Economic Controls

	Preference (1)		Preference (2)		Preference (3)		Preference (4)		Preference (5)		Preference (6)		Preference (7)	
	mfx	std.err.	mfx	std.err.	mfx	std.err.	mfx	std.err.	mfx	std.err.	mfx	std.err.	mfx	std.err.
East	-0.071***	0.021	0.056	0.044	-0.079**	0.033	-0.062	0.045	-0.130***	0.033	-0.148***	0.031	-0.134**	0.063
Individual level controls	Yes		Yes		Yes		Yes		Yes		Yes		Yes	
Year dummies	Yes		Yes		Yes		Yes		Yes		Yes		Yes	
Regional level controls	Yes		Yes		Yes		Yes		Yes		Yes		Yes	
N	5,100		5,025		5,914		5,916		5,966		2,390		2,424	
Log pseudo likelihood	-1,718.02		-3,244.70		-3,938.32		-3,937.20		-3,393.23		-1,064.13		-1,559.54	

Notes: The table reports probit average marginal effects (mfx); standard errors are clustered at the state level. The following control variables are included: gender, age (and its square), education, previous unemployment spells, marital status, a dummy for house/flat owners, the logarithm of real personal income, year dummies, the regional unemployment rate and real GDP per capita. Our outcome variables correspond to the seven preference variables presented in Table 2 and are all coded as dummy variables that take on the value of unity for interviewee replies that are rather self-reliant, and zero for rather state-reliant preferences (cf. Figure 2). ***, **, * denote significance at the 1%, 5%, and 10% level, respectively.

In all our regressions, we include an individual's real income as a control variable. However, living expenses differ significantly between East and West Germany. Since living expenses are lower in East Germany than in West Germany, an individual living in East Germany could be wealthier than an individual living in West Germany although real income might be the same. Unfortunately, there are no data available on purchasing power parities on a state level for our period of observation. The measure available, an individual's real income, is therefore only an imperfect proxy for wealth that might due to its lack of purchasing power relevance absorb some useful variation between East and West Germany. Moreover, we observe many missing values for this income variable; indeed, roughly 13 percent of all interviewees do not report their monthly income.

For these two reasons, we now drop the income variable from our regressions while still controlling for all other individual level covariates, the year dummies, the regional unemployment rate as well as the regional GDP per capita. The results of these alternative specifications are depicted in Table 5. All coefficients have the expected sign with seven out of eight being statistically significant at the conventional levels. The point estimates are universally larger than the more conservative estimates presented in Table 4. Moreover, they tend to be more precisely estimated due to the larger number of observations. Still, in the rest of the chapter, in order to be cautious, we stick to the more conservative specifications where we include an individual's monthly income as well as regional unemployment and GDP per capita as covariates.

Table 5: Preference Differences between East and West Germans without Income Control

	Preference (1)		Preference (2)		Preference (3)		Preference (4)		Preference (5)		Preference (6)		Preference (7)	
	mfx	std.err.	mfx	std.err.	mfx	std.err.	mfx	std.err.	mfx	std.err.	mfx	std.err.	mfx	std.err.
East	-0.081***	0.020	-0.001	0.041	-0.113***	0.028	-0.129***	0.041	-0.192***	0.025	-0.171***	0.036	-0.158***	0.066
Individual level controls	Yes		Yes		Yes		Yes		Yes		Yes		Yes	
Year dummies	Yes		Yes		Yes		Yes		Yes		Yes		Yes	
Regional level controls	Yes		Yes		Yes		Yes		Yes		Yes		Yes	
N	5,863		5,771		6,931		6,938		6,991		2,711		2,749	
Log pseudo likelihood	-2,018.76		-3,740.70		-4,598.02		-4,634.79		-4,024.72		-1,224.87		-1,771.69	

Notes: The table reports probit average marginal effects (mfx); standard errors are clustered at the state level. The following control variables are included: gender, age (and its square), education, previous unemployment spells, marital status, a dummy for house/flat owners, year dummies, the regional unemployment rate and real GDP per capita. Our outcome variables correspond to the seven preference variables presented in Table 2 and are all coded as dummy variables that take on the value of unity for interviewee replies that are rather self-reliant, and zero for rather state-reliant preferences (cf. Figure 2). ***, **, * denote significance at the 1%, 5%, and 10% level, respectively.

As explained earlier, for ease of interpretation, we have coded our outcome variables as simple dichotomous variables. However, it is at least interesting also to exploit the full categorical information for all the preference variables in one specification. To this end, we run ordered logit regressions for all our outcome variables. Again, the East dummy is the variable of interest while we control for the full set of individual level covariates, year dummies, the regional unemployment rate and GDP per capita. Table 6 presents the marginal effects of the ordered logit regressions separately for all categories of the outcome variables.

From column (1) of Table 6 we can see that East Germans are 16.1 percentage points more likely to "fully agree" to the statement that the state should care for the sick, poor, and unemployed, while they are 10.5 percentage points less likely to "rather agree" with this statement, 4.9 percentage points less likely to tick "rather don't agree", and 0.7 percentage points less likely to tick "don't agree". Take as another example column (5) of Table 6, where the outcome variable is agreement to the statement that differences in social status are just. East Germans are 3.5 percentage points less likely to "fully agree" with that statement and 10.5 percentage points less likely to "rather agree". Instead, they are 3.7 percentage points more likely to rather not agree to that statement and 10.2 percentage points more likely not to agree.

Table 6: Preference Differences between East and West Germans: Ordered Logit Marginal Effects

	Preference (1)		Preference (2)		Preference (3)		Preference (4)		Preference (5)		Preference (6)		Preference (7)	
	mfx	std.err.	Mfx	std.err.	mfx	std.err.	mfx	std.err.	mfx	std.err.	mfx	std.err.	mfx	std.err.
Fully agree	0.161***	0.052	-0.025	0.017	-0.027**	0.012	-0.015	0.012	-0.034***	0.006	-0.018***	0.006	-0.072***	0.022
Rather agree	-0.105***	0.035	-0.043	0.028	-0.027*	0.013	-0.041	0.030	-0.105***	0.022	-0.116***	0.034	-0.104***	0.039
Rather don't agree	-0.049***	0.015	0.017	0.013	0.031**	0.014	0.019	0.014	0.037***	0.010	-0.020	0.018	0.048***	0.015
Don't agree	-0.007***	0.003	0.051	0.033	0.022**	0.011	0.038	0.028	0.102***	0.022	0.154***	0.050	0.127**	0.053
Individual level controls	Yes		Yes		Yes		Yes		Yes		Yes		Yes	
Year dummies	Yes		Yes		Yes		Yes		Yes		Yes		Yes	
Regional level controls	Yes		Yes		Yes		Yes		Yes		Yes		Yes	
N	5,100		5,025		5,914		5,916		5,966		2,390		2,424	
Log pseudo likelihood	-4,817.73		-6,357.12		-7,395.75		-7,276.53		-6,926.21		-2,455.51		-3,082.41	

Notes: The table reports ordered logit marginal effects (mfx) separately for all categories of the outcome variables; standard errors are clustered at the state level. The following control variables are included: gender, age (and its square), education, previous unemployment spells, marital status, a dummy for house/flat owners, year dummies, the regional unemployment rate and real GDP per capita. Our outcome variables correspond to the seven preference variables presented in Table 2. ***, **, * denote significance at the 1%, 5%, and 10% level, respectively.

If our preferences for self-reliance/ state-reliance are indeed caused by the socialist regime in the former GDR, we should find preference differences not only on an aggregated regional level between East and West Germany, but individuals in every single East German state should be different from their West German counterparts. We test whether this is true by substituting our variable of interest, i.e., the East dummy, by a vector of East German state dummies. The results of this exercise clearly support our hypothesis. As compared to their West German counterparts, individuals from every single East German state exhibit higher levels of state-reliance than the average West German. The detailed results of these regressions are available from the authors upon request. Further, in order to account for even more regional characteristics, we include a categorical variable that captures the size of the community an individual lives in (seven categories ranging from "less than 2,000" up to "more than 500,000"). Our results are virtually unaffected by this alternative specification.

Our East dummy depicts whether an individual currently lives in East Germany or in West Germany. However, to be more precise, we actually would like to have a variable that captures whether an individual lived in East Germany during the socialist regime, i.e., was treated with the socialist propaganda. For the subsample of the years 1991, 1994, 2000, and 2004, the ALLBUS data provide information that let us distinguish whether an individual that currently lives in East Germany was also born in East Germany or not. The same information is available for West Germans. We draw on this information to build a dichotomous variable that takes the value of unity for individuals who were born and currently live in East Germany (East-East), and is zero for individuals that were born and currently live in West Germany (West-West). Taking this modified East-West variable instead of the rough East dummy, we re-run our regressions – first only including the individual level controls and the year dummies, and then also adding the unemployment rate and real GDP per capita as covariates. As can be seen in Table 7 and Table 8, the results of these estimations are very similar to the results obtained before when using the residence based East dummy.

Table 7: Preference Differences between East and West Germans (East-East vs. West-West)

	Preference (1)		Preference (2)		Preference (3)		Preference (4)		Preference (5)		Preference (6)		Preference (7)	
	mfx	std.err.	mfx	std.err.	mfx	std.err.	mfx	std.err.	mfx	std.err.	mfx	std.err.	mfx	std.err.
East	-0.109***	0.011	-0.025*	0.013	-0.088***	0.015	-0.062***	0.017	-0.239***	0.026	-0.126***	0.016	-0.189***	0.045
Individual level controls	Yes		Yes		Yes		Yes		Yes		Yes		Yes	
Year dummies	Yes		Yes		Yes		Yes		Yes		Yes		Yes	
Regional level controls	No		No		No		No		No		No		No	
N	4,530		4,463		4,429		4,433		4,457		2,130		2,154	
Log pseudo likelihood	-1,516.68		-2,878.61		-2,954.01		-2,950.53		-2,538.89		-914.33		-1,384.01	

Notes: The table reports probit average marginal effects (mfx); standard errors are clustered at the state level. The main variable of interest "East" is unity for individuals born and currently living in East Germany, and is zero for individuals born and currently living in West Germany. The following control variables are included: gender, age (and its square), education, previous unemployment spells, marital status, a dummy for house/flat owners, the logarithm of real personal income, and year dummies. Our outcome variables correspond to the seven preference variables presented in Table 2 and are all coded as dummy variables that take on the value of unity for interviewee replies that are rather self-reliant, and zero for rather state-reliant preferences (cf. Figure 2). ***, **, * denote significance at the 1%, 5%, and 10% level, respectively.

Table 8: Preference Differences between East and West Germans (East-East vs. West-West) Including Regional Controls

	Preference (1)		Preference (2)		Preference (3)		Preference (4)		Preference (5)		Preference (6)		Preference (7)	
	mfx	std.err.	mfx	std.err.	mfx	std.err.	mfx	std.err.	mfx	std.err.	mfx	std.err.	mfx	std.err.
East	-0.079***	0.022	0.076**	0.038	-0.033	0.044	-0.038	0.045	-0.116***	0.042	-0.134***	0.037	-0.161**	0.069
Individual level controls	Yes		Yes		Yes		Yes		Yes		Yes		Yes	
Year dummies	Yes		Yes		Yes		Yes		Yes		Yes		Yes	
Regional level controls	Yes		Yes		Yes		Yes		Yes		Yes		Yes	
N	4,530		4,463		4,429		4,433		4,457		2,130		2,154	
Log pseudo likelihood	-1,512.66		-2,871.57		-2,949.04		-2,948.79		-2,532.95		-913.96		-1,383.77	

Notes: The table reports probit average marginal effects (mfx); standard errors are clustered at the federal level. The main variable of interest "East" is unity for individuals born and currently living in East Germany, and is zero for individuals born and currently living in West Germany. The following control variables are included: gender, age (and its square), education, previous unemployment spells, marital status, a dummy for house/flat owners, the logarithm of real personal income, year dummies, the regional unemployment rate and real GDP per capita. Our outcome variables correspond to the seven preference variables presented in Table 2 and are all coded as dummy variables that take on the value of unity for interviewee replies that are rather self-reliant, and zero for rather state-reliant preferences (cf. Figure 2). ***, **, * denote significance at the 1%, 5%, and 10% level, respectively.

In a next step, we ask whether our self-reported preferences truly reflect what individuals believe. Bertrand and Mullainathan (2001) point out that survey answers are not always very meaningful. To test whether our preference variables reflect actual attitudes and actions, we draw on a strategy employed by AFS. They show that in those German states where people exhibit stronger preferences for redistribution, the vote share of the leftist party is much higher than in other states where people are less in favor of redistribution.[24] Thus if our attitude variables are meaningful, they should be strongly correlated with voting behavior. Those who are more self-reliant and less reliant on the state should be more likely to vote for the more rightist and liberal parties (CDU or FDP), whereas more state-reliant individuals should be more likely to vote for the more leftist parties (SPD or PDS[25]). Our micro data set allows us to test the association between preferences expressing state-reliance and voting behavior on an individual level.

Table 9: State-Reliance and Voting Behavior ("Sonntagsfrage")

		Vote for PDS/SPD					
		(1)		(2)		(3)	
		mfx	std.err.	mfx	std.err.	mfx	std.err.
Preferences							
	(1)	-0.096***	0.025				
	(2)	-0.043**	0.017				
	(3)			-0.007	0.016		
	(4)			-0.038**	0.017		
	(5)			-0.094***	0.018		
	(6)					-0.111***	0.030
	(7)					-0.072***	0.024
Individual level controls		Yes		Yes		Yes	
Year dummies		Yes		Yes		Yes	
Regional level controls		Yes		Yes		Yes	
N		3,526		4,070		1,648	
Log pseudo likelihood		-2,264.83		-2,617.83		-1,009.25	

[24] Moreover, AFS show that before World War I, World War II, and German separation, in 1898, the Social Democrats gained similar vote shares in East and West Germany. However, the Zentrum party, i.e., the largest party in the West at that time, was even more in favor of state intervention than the Conservative party, which was the largest party in the East aside from the Social Democrats.

[25] PDS is the successor party of the SED, the ruling party in the former GDR, whereas SPD has been the big labor party in West Germany. CDU is the Christian Democrats, FDP is the Liberal Democrats.

Table 9 (continued): State-Reliance and Voting Behavior ("Sonntagsfrage")

		Vote for CDU/FDP					
		(5)		(6)		(7)	
		mfx	std.err.	mfx	std.err.	mfx	std.err.
Preferences							
	(1)	0.090***	0.024				
	(2)	0.078***	0.017				
	(3)			0.050***	0.016		
	(4)			0.089***	0.016		
	(5)			0.148***	0.016		
	(6)					0.165***	0.029
	(7)					0.137***	0.023
Individual level controls		Yes		Yes		Yes	
Year dummies		Yes		Yes		Yes	
Regional level controls		Yes		Yes		Yes	
N		3,526		4,070		1,648	
Log pseudo likelihood		-2,250.91		-2,483.45		-1,016.56	

Notes: The table reports probit average marginal effects (mfx) using robust standard errors. The following control variables are included: gender, age (and its square), education, previous unemployment spells, marital status, a dummy for house/flat owners, the logarithm of real personal income, regional unemployment rate, regional GDP per capita, and year dummies. Our value variables correspond to the seven preference variables presented in Table 2 and are all coded as dummy variables that take on the value of unity for interviewee replies that are rather self-reliant, and zero for rather state-reliant preferences (cf. Figure 2). ***, **, * denote significance at the 1%, 5%, and 10% level, respectively.

To this end, we exploit information in the ALLBUS survey, where individuals are asked which party they would vote for if there were general elections the subsequent Sunday ("Sonntagsfrage"). We create two dummies as our outcome variables. The first takes on the value of unity for those saying they would vote for the more rightist/liberal parties (CDU and FDP); zero otherwise. The second outcome variable is unity for individuals stating they would vote for the more leftist parties; zero otherwise. We include all covariates from the previous regressions, i.e., gender, age (and its square), education, previous unemployment spells, marital status, a dummy for house/flat owners, the logarithm of real personal income, year dummies, as well as the unemployment rate and GDP per capita on the state level. The results of these voting regressions are displayed in Table 9. Clearly, the results provide multivariate evidence that our attitudes are truly meaningful since they are strongly correlated with expressed voting behavior. To check the robustness of these associations, we used a different voting variable as our outcome, where individuals were asked to state which party they voted for in the last general elections. The results are virtually identical to those presented in Table 9.

In summary, our multivariate results provide evidence that preferences expressing state-reliance that were shaped under the socialist regime are prevalent in East Germany even years after reunification; the past does indeed cast a long shadow upon the present. These differences in preferences between East and West Germans are meaningful and are not explained by individual characteristics or by regional economic heterogeneity alone.

3.3 State-reliance and entrepreneurship

To assess whether the analyzed preferences expressing self-reliance/state-reliance are indeed associated with the decision to become an entrepreneur, we include these preference variables into an occupational choice equation. The estimated occupational choice model is:

$$\Pr(y_i = 1 \mid \cdot) = \alpha + \beta_1 v_i + X_i \beta_2 + \varepsilon_i , \qquad (1)$$

where $\Pr(y_i = 1 \mid \cdot)$ is the conditional probability of being an entrepreneur. y is an indicator variable that takes on the value of unity if individual i is an entrepreneur and 0 if individual i is an employed worker. v is a dummy preference variable, which is unity for individuals who exhibit preferences expressing self-reliance, and which is zero for individuals with preferences rather expressing state-reliance. X is a set of control variables that might influence an individual's occupational choice and preferences. Here, we include the same control variables as in our earlier regressions — gender, age (and its square), education, marital status, previous unemployment spells, the house/flat owner dummy, and year dummies — as well as our regional controls, i.e., unemployment rate and real GDP per capita on the federal state level. In contrast to the previous specifications, we no longer include an individual's income since this variable is itself an outcome of occupational choice and thus would bias our results. Since the outcome is a dichotomous variable, the occupational choice equation is estimated by probit models using heteroskedasticity robust standard errors.

In column (1) of Table 10, we present the results of a simple occupational choice model without any regional controls and without any preference variables. The results are in line with previous empirical research in entrepreneurship. Women are less likely to become entrepreneurs than men. Education is positively associated with the likelihood of becoming an entrepreneur. Although not statistically significant, there is a tendency for experience to pay off, i.e., age is positively associated with entrepreneurship. Individuals with short unemployment spells during the last 10 years are more likely to become entrepreneurs than those without any

unemployment spells. This is in line with the fact that the eligibility for many public start-up subsidies is linked to previous unemployment of the applicant. It also seems that singles are more likely to become entrepreneurs, possibly because any risk involved in such an endeavor is theirs alone, i.e., they are not responsible for the safety, financial or otherwise, of a partner or family. Alternatively, one could say that being married shows a time allocation preference for family. House or flat owners are more likely to become entrepreneurs, perhaps due to the immobility implied by such ownership, which might well hinder an individual from changing occupational status.

In column (2) of Table 10, we additionally account for regional heterogeneity by including the unemployment rate and real GDP per capita at the state level as control variables. We can see that the regional unemployment rate tends to be positively correlated with entrepreneurship, although this association is statistically insignificant. The coefficient on GDP per capita, on the other hand, is highly significant and positively associated with entrepreneurship. Thus, we observe more entrepreneurship in wealthier regions. The coefficients of the individual level covariates are hardly affected by the inclusion of these regional level control variables.

We now use our preference variables to investigate whether the state-reliance (or the lack of self-reliance) that was shaped by the socialist regime is an additional channel through which entrepreneurship is negatively affected. To make use of all information on the preference variables available over the years, we run three estimations, where each single estimation includes, in addition to all controls used in the estimations before, only those preference variables having a perfect overlap with respect to the years they were collected. Specifically, we run a probit occupational choice model on repeated cross-sectional data of the years 1991, 1994, 2000, and 2004, where information on the preference variables (1) and (2) is available (column (3) of Table 10). Column (4) of Table 10 presents the results for an occupational choice model using repeated cross-section data for the years 1991, 1994, 1998, 2000, and 2004, where we have information on our preference variables (3), (4), and (5). Another probit estimation is executed for the years 1994 and 2004 where we have information on the preference variables (6) and (7) (column (5) of Table 10.

Table 10: The Association of Preferences Expressing Self-Reliance and Entrepreneurship

	Entrepreneur (1)		Entrepreneur (2)		Entrepreneur (3)		Entrepreneur (4)		Entrepreneur (5)	
	mfx	std.err.	mfx	std.err.	mfx	std.err.	mfx	std.err.	mfx	std.err.
Preferences										
(1)					0.055***	0.011				
(2)					0.024***	0.008				
(3)							0.010	0.008		
(4)							0.018**	0.008		
(5)							0.034***	0.008		
(6)									0.017	0.015
(7)									0.055***	0.012
Female	-0.036***	0.006	-0.035***	0.006	-0.027***	0.008	-0.032***	0.007	-0.029**	0.012
Education										
Medium secondary education	0.038***	0.006	0.041***	0.006	0.037***	0.009	0.051***	0.008	0.057***	0.014
Higher secondary education	0.074***	0.011	0.074***	0.011	0.078***	0.017	0.088***	0.016	0.065***	0.024
University education	0.086***	0.008	0.087***	0.008	0.071***	0.012	0.093***	0.011	0.081***	0.018
Age	0.002	0.002	0.002	0.002	0.004	0.002	0.006**	0.002	0.002	0.004
Age squared (*1,000)	0.020	0.019	0.019	0.019	-0.002	0.028	-0.025	0.027	0.030	0.044
Prev. Unemployment										
Less than a year	0.029***	0.010	0.030***	0.010	0.057***	0.015	0.053***	0.014	0.079***	0.022
More than a year	-0.018*	0.010	-0.017*	0.010	-0.012	0.014	-0.012	0.013	-0.007	0.021
Married	-0.012*	0.007	-0.010	0.007	-0.015	0.010	-0.012	0.009	-0.004	0.015
House owner	0.039***	0.006	0.038***	0.006	0.043***	0.008	0.047***	0.008	0.040***	0.012
Unemployment rate			0.001	0.001	0.003**	0.001	0.003***	0.001	0.005**	0.002
GDP per capita			0.154**	0.063	0.229***	0.087	0.272***	0.085	0.296*	0.170
Year dummies	Yes		Yes		Yes		Yes		Yes	
N	11,557		11,557		5,742		6,655		2,668	
Log pseudo likelihood	-3,642.48		-3,637.83		-1,768.80		2,104.50		-888.31	

Notes: Table reports probit average marginal effects using robust standard errors. The omitted categories are West Germany, male, no/lower secondary education, no unemployment spells during the last 10 years, single, and tenant. Our value and attitude variables correspond to the seven values and attitudes presented in Table 2 and are all coded as dummy variables that take on the value of unity for interviewee replies that are rather self-reliant, and zero for rather state-reliant preferences. ***, **, * denote significance at the 1%, 5%, and 10% level, respectively.

All coefficients of our preference variables show the expected sign, with five out of seven being statistically highly significant. Again, the size of the value and attitude coefficients is economically substantial. For example, switching from agreeing with the statement that the state has to care for the sick, poor, and unemployed to disagreeing is associated with an increase in the likelihood of becoming an entrepreneur of 5.5 percentage points. Remember that for this variable, the disagreement gap between East and West Germans was roughly 7.1 percentage points (column (1) of Table 4). Accordingly, if East Germans developed the same preferences on this issue as West Germans, the share of entrepreneurs in East Germany would increase by 0.39 percentage points. Given that the unconditional difference in entrepreneurship rates for the subsample of individuals answering this preference question is 1.1 percentage points, eliminating the disagreement gap on this question would reduce the difference in entrepreneurship rates by 35 percent. With respect to the statement that differences in social status are just (by and large), switching from disagreement to agreement results in a 3.4 percentage point increase in the propensity to become an entrepreneur. In other words, if East Germans reached the average West German preference level on this issue, the share of entrepreneurs in East Germany would increase by roughly 0.44 percentage points and reduce the differences between East and West German entrepreneurship rates by 34 percent – the unconditional difference in entrepreneurship rates for the subsample of individuals answering to this preference question is 1.3 percentage points.

We ran several specification checks in order to test the robustness of our findings. One concern might be that East and West Germans have different connotations when confronted with the preference questions. To investigate this potential threat to our empirical results, we have added an East dummy as well as interactions of the East dummy with the preference variables to the occupational choice equations. For all seven preference variables, the interaction effect is not significantly different from zero which makes us confident that East Germans and West Germans do not interpret the questions on their preferences systematically differently. Another concern might be that an individual's unemployment history or regional unemployment might have different effects on an individual's decision to become an entrepreneur in East and West Germany. This could for example be the case when public start-up subsidies are more easily given to East German unemployed individuals than to West German unemployed individuals. Therefore, we have included the East dummy as well as interactions of the East dummy with an individual's previous unemployment history and with the regional unemployment rates in further specifications of our occupational choice equations. In a specifica-

tion similar to the one presented in column (5) of Table 10, the interaction of the variable indicating individual unemployment of less than a year with the East dummy is significant at the 10 percent level. All the other eight interactions are far from conventional significance levels. Further and most importantly, our finding of the negative effect of state-reliant preferences on entrepreneurship is not affected by this exercise.

Since ALLBUS provides us with information on whether an entrepreneur employs any workers or not, we can analyze whether we find any heterogeneity in the effects of state-reliance on entrepreneurship. To this end, we split the previous outcome variable to generate an alternative outcome variable that is unity for all entrepreneurs with more than one employed worker, and zero for employed workers. A further outcome variable is unity for all entrepreneurs with no or one employed worker, and zero for employed workers. We run probit models where we regress these two alternative outcome variables on the preferences expressing self-reliance/state-reliance, our individual level covariates, year dummies, and regional covariates. The results presented in Table 11 show that preferences expressing self-reliance are more strongly associated with being an entrepreneur with more than one employee (upper panel) than with being an entrepreneur with no or one employee (lower panel). Note that adding the preference coefficient from the upper panel to the respective coefficient of the lower panel gives the coefficient for the standard outcome variable entrepreneur (irrespective of the number of employed workers) since all outcome variables are dichotomous and therefore, the coefficients present percentage points.

Table 11: The Association between Preferences Expressing Self-Reliance and Entrepreneurship/ Self-employment

		Entrepreneur (more than 1 employee)					
		(1)		(2)		(3)	
		mfx	std.err.	mfx	std.err.	mfx	std.err.
Preferences							
	(1)	0.046***	0.008				
	(2)	0.013**	0.006				
	(3)			0.008	0.006		
	(4)			0.010	0.006		
	(5)			0.023***	0.006		
	(6)					0.022**	0.011
	(7)					0.059***	0.010
Individual level controls		Yes		Yes		Yes	
Year dummies		Yes		Yes		Yes	
Regional level controls		Yes		Yes		Yes	
N		5,443		6,288		2,501	
Log pseudo likelihood		-1,046.58		-1,230.74		-484.86	

		Self-employed (up to 1 employee)					
		(1)		(2)		(3)	
		mfx	std.err.	mfx	std.err.	mfx	std.err.
Preferences							
	(1)	0.013	0.009				
	(2)	0.013**	0.007				
	(3)			0.002	0.006		
	(4)			0.010	0.007		
	(5)			0.015**	0.007		
	(6)					-0.004	0.013
	(7)					0.004	0.010
Individual level controls		Yes		Yes		Yes	
Year dummies		Yes		Yes		Yes	
Regional level controls		Yes		Yes		Yes	
N		5,439		6,294		2,523	
Log pseudo likelihood		-1,071.70		-1,298.05		576.54	

Notes: The table reports probit average marginal effects (mfx) using robust standard errors. In the upper panel, the outcome variable is a dummy variable that is unity for entrepreneurs with more than one employee, and zero for employees. In the lower panel, the outcome variable is a dummy variable that is unity for entrepreneurs with no or at most one employee, and zero for employees. The following control variables are included: gender, age (and its square), education, previous unemployment spells, marital status, a dummy for house/flat owners, the logarithm of real personal income, year dummies, the regional unemployment rate, and the regional GDP per capita. Our value variables correspond to the seven values and attitudes presented in Table 2 and are all coded as dummy variables that take on the value of unity for interviewee replies that are rather self-reliant, and zero for rather state-reliant preferences (cf. Figure 2). ***, **, * denote significance at the 1%, 5%, and 10% level, respectively.

Our estimates yield average effects of the socialist regime on individuals' state-reliance which in turn influence entrepreneurship. However, as nicely outlined by Wyrwich (2010), East German regions considerably differ with respect to the industrial history before and during German separation. Therefore, one might suspect that the impact of the socialist regime on preferences expressing self-reliance/state-reliance and in turn on entrepreneurship could be heterogeneous across East German regions. Unfortunately, ALLBUS does not allow any small scale regional comparisons. However, in an attempt to address potential regional heterogeneity due to differences in the industrial history, we draw on historic data on the share of entrepreneurs in 1907, i.e., before World War I, World War II, and German separation, at the federal state level. We run the preference estimations separately for the subsample of individuals living in federal states with above average shares of entrepreneurs in 1907 on the one hand and with below average shares of entrepreneurs in 1907 on the other hand. No clear picture emerges, i.e., we do not find that the impact of the socialist regime was systematically different in regions with a historically high share of entrepreneurs as compared to regions with a historically low share of entrepreneurs. This does not necessarily mean that there is no regional heterogeneity but rather that given the data at hand we cannot satisfactorily address any issues concerning regionally heterogeneous impacts of the socialist regime in this chapter. For future work, it would certainly be interesting to analyze the legacy of the socialist past with more refined, regionally small scale data.

3.4 The Socialist Regime and State-Reliant Preferences: A Discussion of an Alternative Channel

Last but not least, we would like to draw attention to a channel which has been neglected so far in the economic literature on the effects of the socialist regime on individuals' preferences. AFS analyze data from the general elections in 1898 and argue that before separation, individuals living in regions that would later become West Germany were, if anything, more in favor of state intervention than individuals living in regions that would later become East Germany. However, after the end of World War II, hundred thousands of people left what was then the Soviet zone of occupation (SZO) and should become the GDR in 1949. By 1961, when the Berlin Wall was built, more than 2.75 million people had left the SZO, or the GDR respectively, to live in West Germany (Falck et al., 2011). This constitutes a substantial fraction of the whole population living in the SZO in 1945 (roughly 17 percent). It seems natural

to argue that those individuals that fled from the RSO are not a random draw from the whole population but a self-selected sample.

Data from an additional retrospective survey in the German micro-census 1971, which covers a representative 1 percent sample of the whole German population, allows investigating some characteristics of those individuals that left the Russian zone of occupation and the GDR in its early days. The descriptive statistics from Table 12 reveal some peculiarities of those early East-West movers. They were clearly better educated than the average West German and far more often held white collar jobs or were civil servants. Thus, it seems that the socialist regime already had its effect on its population before the Berlin Wall was actually built. One could well imagine that the people that remained in East Germany were less self-reliant than the average West German already before the socialist propaganda did set in. This could of course be interpreted as an early effect of the (approaching) socialist regime and thus as an alternative channel of how the socialist regime had an impact on its population.

Table 12: Descriptives of West Germans and Early East-West Movers

		Local West Germans	Early East-West movers
Demographics			
	Female	60.4	57.4
	Age 1950 (mean)	42.6	40.3
	Married	64.9	70.4
Highest Education			
	Basic school	64.3	44.6
	Secondary school	25.8	38.9
	High school	1.3	3.2
	Technical school	4.8	9.1
	University	1.4	3.0
Assets			
	Real estate 1939	48.5	40.3
Occupation 1939			
	Unemployed	0.3	0.2
	Unskilled worker	20.5	15.4
	Entrepreneur (agricultural)	3.6	2.0
	Entrepreneur (non-agricultural)	4.9	5.4
	Civil servant	2.7	3.9
	Civil servant (qualified)	1.4	3.7
	White collar worker	13.9	24.6
	Craftsman	12.8	13.0
	Pensioner, other non-employed	2.7	2.6
	Family worker	7.7	4.4
	Housewife	29.4	24.8
N		146,786	5,633

Notes: Unless otherwise stated, the table reports percentage shares. Early East-West movers are individuals who moved from East Germany to West Germany before the year 1961, i.e., before the construction of the Berlin Wall. The sample is restricted to those individuals who have completed education in 1939 and reported an occupation in 1939. Data: MZU (1971). The German micro census provides official representative statistics of the population and the labor market in Germany. It has a sampling fraction of one percent of the German population.

Unfortunately, we do not have any data on preferences expressing self-reliance or state-reliance of movers measured at the time these individuals fled. This data could possibly provide further information on the possible selection effect. Yet, we can identify 129 individuals in the ALLBUS data who were born in East Germany and moved to West Germany before the Berlin Wall was built. For these early East-West movers, we can measure preferences expressing state-reliance in the 1990s and 2000s and compare their stated preferences to those of West Germans. Figure 3 depicts these statistics – first for all early East-West movers compared to all individuals born in and currently living in West Germany, and then for a matched sample of early East-West movers and individuals born in and currently living in West Germany.

Figure 3: Preferences Expressing State-Reliance/Self-Reliance for West Germans and Early East-West Movers

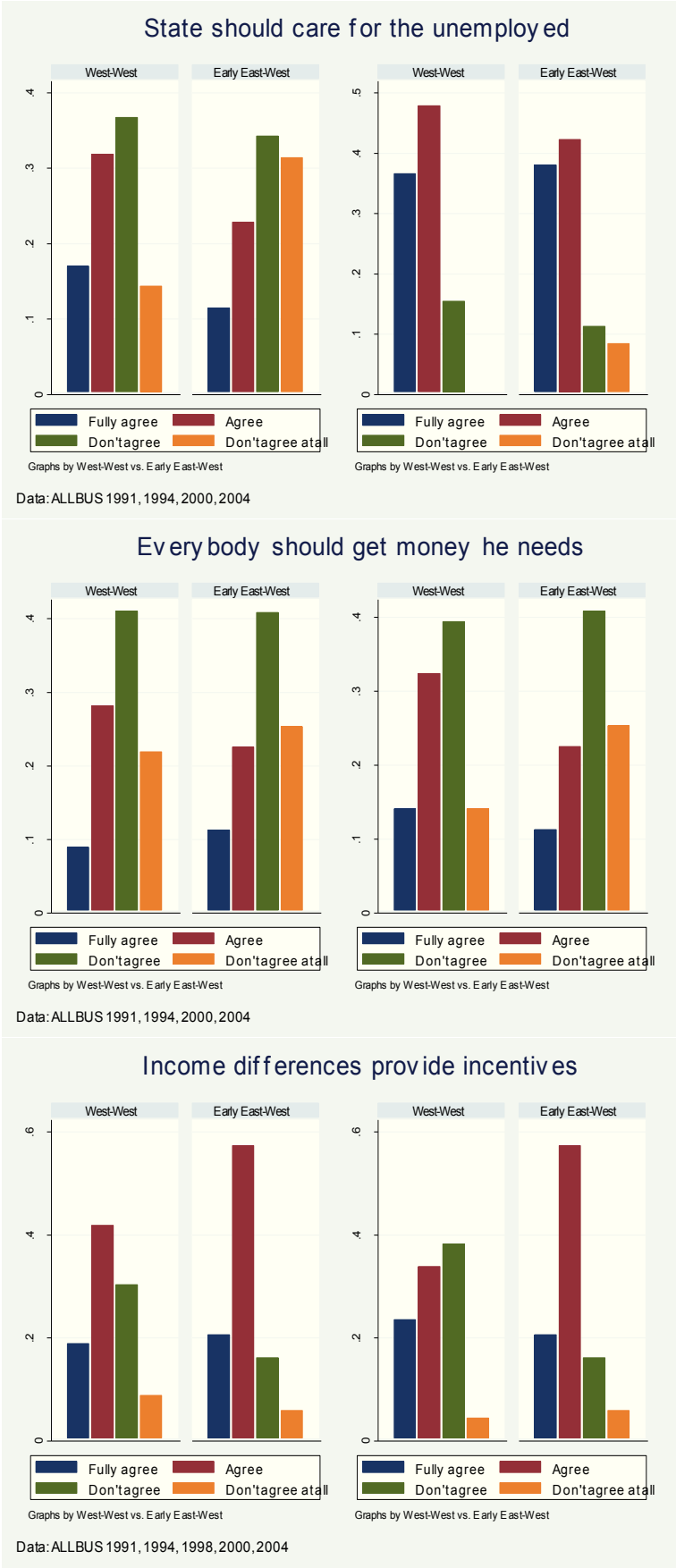


Figure 3 (continued) : Preferences Expressing State-Reliance/Self-Reliance for West Germans and Early East-West Movers

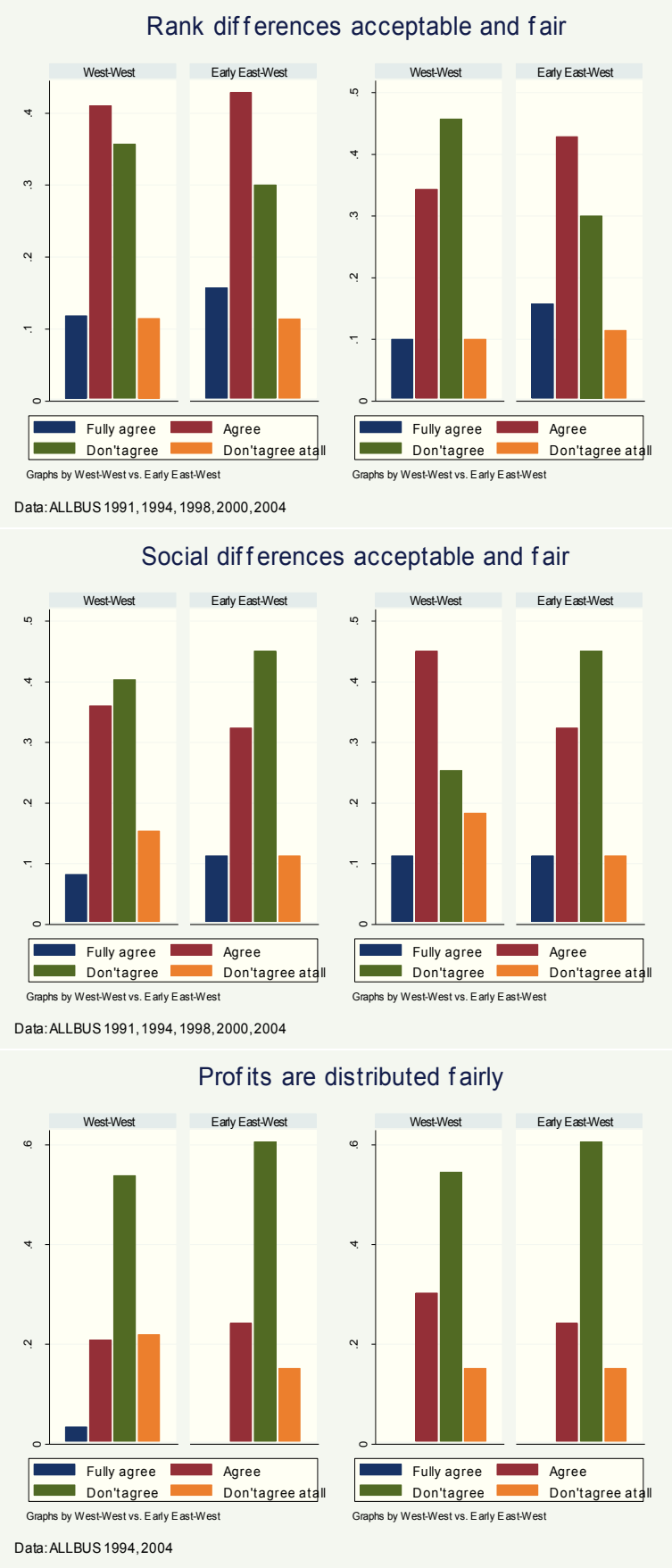
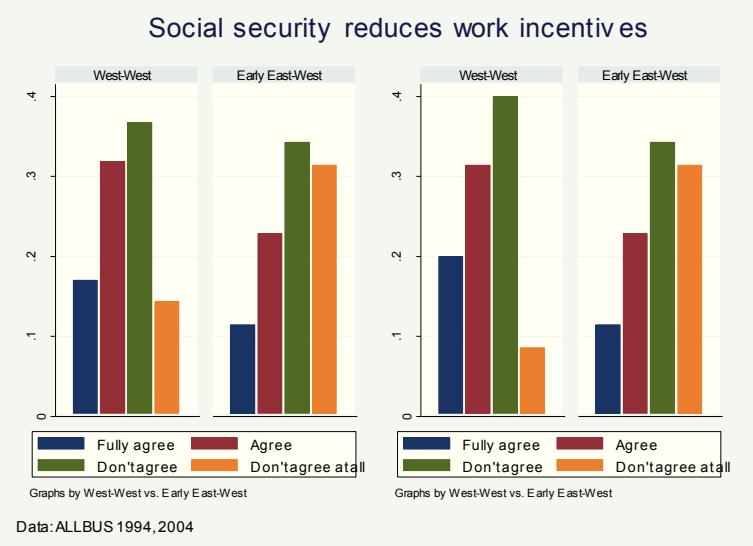


Figure 3 (continued): Preferences Expressing State-Reliance/Self-Reliance for West Germans and Early East-West Movers



Notes: The graphs show distributions of preferences expressing state-reliance for individuals born in and currently living in West Germany (West-West) and for individuals born in East Germany that moved to West Germany before the Berlin Wall was built in 1961 (Early East-West). The left graph in each picture shows the distributions for the whole sample, whereas the right graph in each picture shows the distributions for a nearest neighbor matched sample that ensures that individuals from both groups are equally old.

We use nearest neighbor propensity score matching in order to ensure that individuals from both groups are on average equally old. The general picture of the difference between West Germans and the early East-West movers is very similar for the unmatched and the matched sample. Because the numbers of observations are very low, we do not draw any rigorous conclusions from this exercise. Still, the graphs might provide some further tentative but suggestive evidence that the individuals that fled from the Russian occupation zone were a selected sample of more self-reliant individuals. Early East-West movers more often than West Germans do not agree at all to the statements that the state should care for the sick, poor and unemployed, or that everybody should get the money he needs. Further, they are more likely than West Germans to agree to the statement that income differences provide incentives to work hard, and that rank differences are performance based and therefore acceptable. At the same time, however, early East-West movers less often than West Germans think that the current welfare system reduces work incentives, which we would interpret as a rather state-reliant preference. Thus, in the end, the question to what extent the socialist regime had already an effect on the structure of its population even before the Berlin Wall was built remains somewhat open and gives room for future research.

3.5 Conclusion

Our analysis shows that East Germans living in the regions of the former socialist GDR express significantly lower self-reliant preferences than do their West German counterparts. These effects of the socialist regime are large in size and are not explained by individual characteristics or by differences in economic development between East and West Germany alone. We investigate the economic relevance of the differences in individuals' state-reliant / self-reliant preferences and find that state-reliant preferences are negatively associated with entrepreneurship. If entrepreneurs are the agents of change in transition economies, our finding of a negative association between state-reliance and entrepreneurship suggests that state-reliant preferences persisting in East Germany as a shadow of the socialist past might slow down the transition process.

Although our chapter collects some convincing pieces of evidence for state-reliant preferences hindering entrepreneurship in East Germany, we should keep in mind some caveats. First, the rich individual level data of ALLBUS provides us with valuable and extensive information on individuals' state-reliant / self-reliant preferences. However, the data also come at a cost since they do not allow us to address any questions of small-scale regional heterogeneity. One could for example imagine that the impact of the socialist regime was less strong in some smaller regions that had bred an entrepreneurial culture historically. With our data, these small-scale regional heterogeneities remain hidden under an average effect of the socialist regime over all regions. A further caveat emerges due to the fact that the ALLBUS data do not come with a panel structure. Therefore, we cannot observe transitions into entrepreneurship but can only exploit information on whether an individual is an entrepreneur at the time of the interview. Thus, we cannot completely rule out reverse causality, i.e., that preferences might also to some degree be influenced by occupational status. However, given the fact that preferences seem to be highly time-persistent while entrepreneurship is a highly dynamic process reverse causality is arguably a minor issue.

Last but not least, we challenge the idea that all preference differences between East Germans and West Germans are necessarily the outcome of being socialized by the propaganda of the socialist regime in the former GDR. Our alternative explanation for differences in preferences between East and West Germans for which we find first evidence is that differences were already present before the socialist socialization actually set in. More precisely, we find that selection in terms of migration in the period between the end of World War II and the con-

struction of the Berlin Wall in 1961 might have played a large role. This argument has so far been ignored in the economic literature dealing with German separation and reunification. It seems worthwhile for future research to explore in more detail differences in preferences, norms and attitudes between East and West Germany that were already in place before the socialist propaganda actually set in. Further, one might pose the question to which extent the border between East and West Germany was really exogenous in the first place.

4. Institutional Change, Entrepreneurship, and Education[26]

4.1 Introduction

In the United States, it seems that you cannot move without bumping into one; in Europe, they are fervently longed for; all over the world, universities are suspected of being their breeding ground—entrepreneurs, those mystical beings who are believed to have such a positive influence on innovation and economic growth—are enjoying a global demand. As to what drives the entrepreneur, Schumpeter quite romantically describes it as "the will to conquer," "the dream and the will to found a private kingdom," and "the joy of creating, of getting things done" (1912, 93). All well and good, but it does not explain where these Schumpeterian *entrepreneurial endowments* (cf. Lazear, 2005) come from. In this chapter, we shed some light on this crucial question.

Are entrepreneurs born or made? Is it nature or nurture that is responsible for entrepreneurial endowments? We argue that such endowments are the result of a combination of innate genetics as well as education, i.e. socialization, and schooling. In this article, we focus on the role of socialization and (pre-university) schooling, i.e., adolescents' education in a broader sense and, thus, focus on the early (in the lifecycle) formation of entrepreneurial endowments. Early entrepreneurial endowments, unfortunately, are not directly observable, so we look at something that is—the *entrepreneurial intentions* of university students, i.e., their desire to become an entrepreneur in future. In this context, Falck et al. (2009) show that entrepreneurial intentions expressed in adolescence strongly predict future *actual entrepreneurship*. We concentrate on university students, since this subject pool represents an important source for *innovative* entrepreneurship contributing to economic development. In this chapter, we focus on some input factors for the production of academic entrepreneurs, i.e. on the entrepreneurial endowments of students when entering universities. These endowments represent the basis for further entrepreneurship education at universities, an issue that has become increasingly popular not only at business schools (Katz, 2003).

To identify a causal effect of endogenous entrepreneurial endowments from socialization and schooling on entrepreneurial intentions, we exploit the 1990 (re-)unification of the Federal

[26] This chapter is based on Falck, Oliver, Gold, Robert and Heblich, Stephan (2011), Entrepreneurship Education, in: David B. Audretsch, Oliver Falck, Stephan Heblich and Adam Lederer (Eds.), *Handbook of Research on Innovation and Entrepreneurship*, Cheltenham: Edward Elgar, 486-499.

Republic of Germany (FRG) and the German Democratic Republic (GDR) as quasi-natural experiment. We compare German university students in reunified Germany who were educated in the East (former GDR) to those who were educated in the West (non-reunified FRG). These two sets of students had radically dissimilar forms of socialization and schooling before 1990. Conditional on various background factors, we consider education under the East German system of a planned economy as socialist treatment. We assume that being treated with a socialist ideology in younger years "cured" any entrepreneurial inclination. Accordingly, *ceteris paribus*, university students raised and educated in the GDR should be less interested in becoming entrepreneurs than fellow students brought up in the market-based economy of the FRG.

We find, in a first step, significantly lower entrepreneurial intentions among the treatment group of East German university students after reunification. This result is robust with the inclusion of university fixed effects and various control variables. In a second step, we focus on a subsample of those students who finished secondary education while Germany was still divided. When comparing the entrepreneurial intentions of East German students who finished secondary education under the socialist regime with those of West German students, the treatment effect is even stronger. We cautiously interpret this as positive effect of a change in the schooling system on individual entrepreneurial endowments. These findings suggest that policy makers can influence entrepreneurial endowments via the school system. In a third step, we assess the problem of selection into universities by restricting our sample to students from either East or West Germany who are attending a West German university that is not located in the region where they received their secondary education. This procedure should avoid a bias that could arise from comparing mobile students from East Germany to students in West Germany who did not move because mobility is possibly related to the presence or absence of entrepreneurial characteristics, for example, attitudes toward risk. As the treatment effect of an education under a socialist regime remains significant, we are confident that we do indeed measure a causal effect.

The remainder of the chapter is organized as follows. Section 4.2 reviews some major contributions that analyze the formation of entrepreneurial endowments prior to university education. Section 4.3 introduces our empirical strategy, and Section 4.4 describes our data set. In Section 4.5, we present our analyses of the impact of schooling and socialization on university

student entrepreneurial intentions. Section 4.6 concludes by discussing the implications of our work and offers some suggestions for further research.

4.2 The Formation of Entrepreneurial Endowments

Economic research on what drives the formation of cognitive and non-cognitive skills usually adopts a life-cycle perspective, that is, every individual has certain innate biological characteristics that influence his or her endowments. Nicolaou et al. (2008) and Nicolaou and Shane (2009) analyze this in the context of entrepreneurship and their results suggest that genetic factors are an important explanation of individual differences in ability to identify entrepreneurial opportunities and for an overall tendency to become an entrepreneur. With these characteristics as the foundation, socialization and schooling further contribute to the development of entrepreneurial endowments.

As for socialization influences, parental role models are first and foremost. The fact that young children spend most of their time with their parents helps to explain the strong impact of parental background on the predilection for a certain occupation; or, as Marshall (1920) put it, "as years pass on, the child of the working man learns a great deal from what he sees and hears going on around him." Following research by Aldrich et al. (1998), Dunn and Holtz-Eakin (2000), and Hout and Rosen (2000), entrepreneurial parents leave an especially pronounced mark on their children due to "their ability to provide contact between their children (while the children are relatively young) and the business workplace. … As the child receives continued exposure to the family business, he picks up, almost without realizing it, a working knowledge of how to run a business enterprise" (Lentz and Laband, 1990, 564). Fairlie and Robb (2007) take this one step farther and directly attribute the "entrepreneurial" effect to adolescent work experience in the family business.

Children's peers also play an important role in the process of socialization (Banduras, 1977) and could very well have an impact on the formation of entrepreneurial endowments (Falck et al., 2009). Let us assume that some of a child's peers think of themselves and others as future entrepreneurs, although perhaps not with that exact terminology. These peers believe it would be "cool" to be their own boss, run their own business, and not take orders from anyone else. These children are quite likely adventurous, fun to hang out with, and "leaders of the pack" (cf. Akerlof and Kranton, 2002). And leadership, argues Baumol (1968), is one of the major

ingredients of entrepreneurial success.[27] A child's entrepreneurial peers may playfully reinforce entrepreneurial endowments, setting the stage for Schumpeter's "will to conquer" and "will to found a private kingdom".

There is not much literature directly on the influence of education on entrepreneurial endowments, aside from the now common idea that human capital has a positive impact on entrepreneurship (Evans and Leighton, 1989). However, following Lazear's (2005) idea of entrepreneurs being "jacks-of-all-trades" who possess a balanced portfolio of cognitive and non-cognitive skills, extra-curricular activities might be more conducive to entrepreneurial endowments than math or science.

Along this line, Falck and Woessman (2010) argue that competition between schools results in school administrators being innovative with regard to courses, teaching methods, and, especially, extra-curricular activities, and that these latter can complement student qualifications beyond baseline educational goals. Such extra-curricular activities are likely to encourage or enhance entrepreneurial endowments such as social skills, innovativeness, or the willingness to put ideas into action, all of which have the potential to shape student intention to become an entrepreneur. Consistent with their hypothesis, the authors find cross-country evidence for a positive effect of competition from private schools on system-wide student entrepreneurial intentions at the national level. In a similar study at the national level, Sobel and King (2008) observe that voucher programs in the United States create greater rates of youth entrepreneurship relative to traditional public schools without such programs.

These initial findings suggest that both socialization and schooling contribute to the development of those cognitive and non-cognitive skills and abilities generally falling under the rubric of entrepreneurial endowments. In the following section, we develop our empirical strategy to assess this issue and introduce our large sample of German university students. Based on this sample, we analyze the effect of socialization and schooling on individual entrepreneurial endowments. Specifically, we focus on how socialist education influences student desire to become an entrepreneur.

[27] The entrepreneur's job is "to locate new ideas and to put them into effect. He must lead, perhaps even inspire; he cannot allow things to get into a rut and for him today's practice is never good enough for tomorrow. … He is the individual who exercises what in the business literature is called 'leadership'" (Baumol, 1968, 65).

4.3 Empirical Strategy

Our empirical strategy for identifying the impact of schooling and socialization on individual entrepreneurial endowments is threefold. First, we analyze the joint pre-university impact of socialization *and* schooling by comparing university students who were raised in West Germany to university students who were at least partly raised in East Germany before reunification in 1990. Here, our identification is based on the fact that these two groups experienced different educational treatments. East German university students were (at least partly) treated with socialization and schooling in a planned economy; West German students were treated with socialization and schooling in a free market economy.[28]

In a second step, we restrict our sample to university students who completed their secondary education before reunification in 1990. In this sample, university students were completely socialized and schooled either in a planned economy or in a free market economy. To address the problem of selection into universities, we restrict, in a third step, our sample to mobile students at West German universities, that is, those who left their "familiar" environment in either West or East Germany to attend a university located in West Germany.[29] By focusing on mobile East and West German students, we deal with a potential bias that could arise from the fact that mobility might be related to the presence or absence of other entrepreneurial characteristics, for example, risk aversion. This leaves us with the following estimation equation for the different samples of university students:

$$I_{imut} = \alpha + \alpha_m + \alpha_u + \alpha_t + \beta_1 D_{imut} + X_{imut}\beta_2 + \varepsilon_{imut}$$

where the dependent variable I_{imut} is a binary variable that equals unity if student *i* studying major *m* at university *u* in survey wave *t* reports that he or she certainly wants to become an entrepreneur and zero otherwise. University student entrepreneurial intention is our "as-close-as-possible" measure for entrepreneurial endowments. The explanatory variable D_{imut} is a dummy variable that equals unity if the university student was socialized and schooled in a German state formerly belonging to the GDR and zero if he or she went to school in West Germany. The matrix X_{imut} includes a set of individual characteristics and family background variables (cf. Parker, 2004 for an extensive overview). A detailed list of all control variables

[28] Note that we exclude students who completed secondary school in a country other than Germany from the whole analysis.

[29] Note that West Germany is far from being equally familiar to West German students as there are considerable cultural differences between German regions, the result of Germany being heavily fragmented until 1870 (cf. Falck et al., 2010).

is provided in Table A1 of the Appendix. Finally, we include a whole set of major fixed effects α_m, university fixed effects α_u, and survey wave fixed effects α_t; ε_{imut} is an error term. As our outcome variable is binary, we use both probit and linear probability models. We cluster our standard errors at the university level (cf. Moulton, 1986).

4.4 Data

The data for our empirical analyses are derived from a survey regularly conducted among university students in Germany. The survey is part of a research project on the situation of students at German universities (*Studiensituation und studentische Orientierung*). The project is based at the University of Konstanz and is supported by Germany's Federal Ministry of Education and Research. The entire dataset is comprised of 10 waves of recurring surveys of university students. The university panel started in the winter term 1982/83 and was repeated every second or third year, with the most recent wave carried out during the 2006/07 winter term. Overall, the survey has 87,946 observations from 29 German universities, technical universities, and universities of applied sciences and covers questions about the study progress, work and learning habits, leisure time activities, attitudes, and job preferences. Included questions provide information about student family background and schooling. Information about demographic variables, such as age or gender, is also available. Altogether, the survey thus draws a rich picture of the conditions and perspectives of students at German universities. Descriptive statistics of our sample and the main variables of interest are provided in Table 1.

Table 1: Descriptive Statistics

	all students	raised in FRG	raised in GDR
Observations	23,543	17,953	5,514
Share of students with entrepreneurial intentions	22.82	23.52	20.53
Age (mean)	24.99	25.59	23.04
Share of female students	41.22	38.95	48.58
Average number of children	0.102	0.102	0.100
Marital status			
married	7.3	7.56	6.44
single, with permanent partner	49.71	49.99	49.01
single, without permanent partner	42.23	41.63	43.94
widowed/divorced	0.77	0.82	0.60
Share with at least one self-employed parent	24.47	25.81	20.22
Term (mean)	6.442	6.880	4.989
Majors			
linguistic and cultural studies	2,950	2,367	570
psychology	420	324	95
pedagogic	1,653	1,226	422
sport	254	165	89
law	1,735	1,176	556
social sciences	545	435	107
economic sciences	3,582	2,691	879
mathematics & natural science	3,497	2,878	616
medicine	1,823	1,381	440
agronomy, forestry, nutrition science	480	341	135
engineering	5,700	4,259	1,427
arts	655	546	109
other	163	112	49
Survey waves			
wave 5: 1992/93	8,709	6,61	2,053
wave 6: 1994/95	8,035	6,262	1,759
wave 7: 1997/98	6,799	5,081	1,702

We focus on the three waves (Wave 5–7) conducted after reunification in 1990, which were collected in winter terms 1992/93, 1994/95, and 1997/98, giving us 23,542 observations. We restrict our analysis to this period to ensure that students educated in East German schools experienced at least several years of organized socialist treatment. Since we want to exploit the rich portfolio of possible control variables, we address a number of missing values in our multivariate regressions by imputing missing values of the control variables; replace missing

values with the variable mean in the case of metric variables; and creating an additional category for missing values in the case of categorical variables. Values are not imputed for either our dependent variable or for our explanatory variable of interest: the East-West indicator or for the university site, which we use to calculate cluster-robust standard errors. As this procedure does not directly effect the estimations of the coefficients of the respective variables, it enables us to make use of the full sample. Table 2 shows the students' distribution among the 23 universities (U) and universities of applied sciences (UAS) contained in the dataset.

Table 2: Observations by University

	all students	**raised in FRG**	**raised in GDR**
U Berlin (TU)	1,556	1,230	324
U Bochum	1,548	1,524	20
U Essen	1,196	1,188	5
U Frankfurt	1,506	1,472	29
U Freiburg	1,779	1,744	31
U Hamburg	2,216	2,160	53
U Karlsruhe	1,842	1,815	24
U München (LMU)	2,059	2,036	22
UAS Coburg	421	364	57
UAS Essen	299	290	6
UAS Frankfurt	477	469	8
UAS Hamburg	874	852	18
UAS Kiel	494	476	17
UAS Koblenz	416	407	9
UAS München	1,201	1,179	15
U Dresden	1,115	106	1,005
U Leipzig	1,295	153	1,140
U Magdeburg	687	35	647
U Potsdam	435	99	334
U Rostock	526	94	432
UAS Erfurt	209	37	172
UAS Magdeburg	198	23	173
UAS Stralsund	149	18	128

4.5 Results

Following the three-fold strategy introduced in Section 4.3, we initially estimate the effect of socialization and schooling in East and West Germany, respectively, where we consider being partly raised in East Germany before reunification as non-entrepreneurial treatment. The upper part of Table 3 provides our basic estimations where we stepwise include controls. All estimations include university fixed effects, survey wave fixed effects, and major fixed effects. We report both probit (Table 3a) and linear probability (Table 3b) specifications.

Table 3a: Probit Estimations for the Whole Sample

	(1)	(2)	(3)	(4)	(5)
All Students					
Raised in GDR	-0.052***	-0.050***	-0.054***	-0.044***	-0.042***
	(0.012)	(0.013)	(0.013)	(0.012)	(0.013)
Controls:					
Education	no	yes	no	no	yes
Socialization	no	no	yes	no	yes
Job Experience & Perspectives	no	no	no	yes	yes
Individual Characteristics	yes	yes	yes	yes	yes
No. of Obs.	22195	22195	22195	22195	22195
Pseudo R^2	0.056	0.076	0.071	0.070	0.105
All Students Who Finished School Before 1990					
Raised in GDR	-0.082***	-0.073***	-0.090***	-0.077***	-0.073***
	(0.019)	(0.017)	(0.019)	(0.018)	(0.016)
Controls:					
Education	no	yes	no	no	yes
Socialization	no	no	yes	no	yes
Job Experience & Perspectives	no	no	no	yes	yes
Individual Characteristics	yes	yes	yes	yes	yes
No. of Obs.	10733	10733	10733	10733	10733
Pseudo R^2	0.059	0.073	0.073	0.075	0.104

Notes: The table reports probit models with marginal effects at the sample mean. The dependent variable, entrepreneurial intention, is unity if a student reports that he or she definitely wants to become a self-employed entrepreneur or freelancer, zero otherwise. All specifications include university fixed effects, survey wave fixed effects, and major fixed effects. The control variables are described in more detail in Table A1 in the appendix. Cluster (university) robust standard errors are reported in parentheses. *denotes 10% level of significance, **denotes 5% level of significance, ***denotes 1% level of significance.

Table 3b: OLS Estimations for the Whole Sample

	(1)	(2)	(3)	(4)	(5)
All Students					
Raised in GDR	-0.052***	-0.052***	0.054***	-0.045***	-0.045***
	(0.012)	(0.013)	(0.013)	(0.012)	(0.013)
Controls:					
Education	no	yes	no	no	yes
Socialization	no	no	yes	no	yes
Job Experience & Perspectives	no	no	no	yes	yes
Individual Characteristics	yes	yes	yes	yes	yes
No. of Obs.	22195	22195	22195	22195	22195
Pseudo R^2	0.059	0.075	0.076	0.074	0.106
All Students Who Finished School Before 1990					
Raised in GDR	-0.077***	-0.068***	-0.085***	-0.074***	-0.071***
	(0.017)	(0.015)	(0.018)	(0.017)	(0.016)
Controls:					
Education	no	yes	no	no	Yes
Socialization	no	no	yes	no	yes
Job Experience & Perspectives	no	no	no	yes	yes
Individual Characteristics	yes	yes	yes	yes	yes
No. of Obs.	10733	10733	10733	10733	10733
R^2	0.062	0.074	0.077	0.079	0.105

Notes: The table reports OLS estimation results where the dependent variable, entrepreneurial intention, is unity if a student reports that he or she definitely wants to become a self-employed entrepreneur or freelancer, zero otherwise. All specifications include university fixed effects, survey wave fixed effects, and major fixed effects. The control variables are described in more detail in Table A1. Cluster (university) robust standard errors are reported in parentheses. *denotes 10% level of significance, **denotes 5% level of significance, ***denotes 1% level of significance.

In both panels of Table 3, Column (1) considers only those individual characteristics related to demographic variables of the respondents. The results suggest that East German students are significantly less likely to report entrepreneurial intentions than their West German counterparts. In a next step, in Column (2), we add controls for the students' previous and current education. Among other things, we control for grades in the high school certificate, grades in intermediate examinations, and assess whether the respondents started their university studies immediately after finishing secondary school. In Column (3), we control for the student socialization. Specifically, we control for parental schooling and parental current occupation. In Column (4), we estimate a model containing control variables for the students' previous job experiences and future job prospects. For instance, we add a variable on prior occupation, current occupation, and topic of study, as well as perceived problems in the future job market. Finally, in Column (5), we estimate a fully specified model containing all the control varia-

bles mentioned above. Across all specifications, the treatment effect remains robust, i.e., it shows a significantly negative effect of socialist socialization and schooling on university student entrepreneurial intention.

In the bottom part of Table 3, we run the same regressions conducted in the upper part of the table, but focusing on the subgroup of students who completed secondary school while Germany still was divided and thus received either pure socialist or pure libertarian schooling and socialization. We expect these results differ from the whole sample of students that also includes East German students who received a mixed education, or, in other words, who received at least some entrepreneurial treatment. Indeed, the impact of socialist education is stronger for those students who went to school exclusively in the GDR. Consequently the socialist treatment effect is smaller for those who at least had some years of schooling in reunified Germany.

In Table 4, we repeat the estimations from Table 3 for the subsample of students in West German university locations. Hence we exclude students at East German universities since the specific economic environment in the formerly socialist part of Germany might affect their entrepreneurial intentions. Moreover, we concentrate on those mobile students who finished school in East or West Germany and chose to attend a West German university located away from home. This procedure should mitigate the bias arising from comparing mobile students from East Germany to students in West Germany who did not move because mobility is possibly related to the presence or absence of certain entrepreneurial characteristics, for example, risk aversion. We use the full set of control variables for all specifications and report probit results (left panel) and linear probability model results (right panel) in Table 4.

Table 4: Probit and OLS Estimations for the Subsample of West German University Locations

	Probit			OLS		
	(1)	(2)	(3)	(1)	(2)	(3)
All Students in the West						
Raised in GDR	-0.062***	-0.072***	-0.063***	-0.063***	-0.073***	-0.063***
	(0.012)	(0.013)	(0.015)	(0.013)	(0.013)	(0.014)
Controls:						
Education	yes	yes	yes	yes	yes	yes
Socialization	yes	yes	yes	yes	yes	yes
Job Exp. & Perspectives	yes	yes	yes	yes	yes	yes
Individual Characteristics	yes	yes	yes	yes	yes	yes
No. of Obs.	13033	7618	5340	13033	7618	5349
Pseudo R^2	0.099	0.102	0.110	0.100	0.104	0.111
Students in the West Who Finished School Before 1990						
Raised in GDR	-0.074***	-0.075***	-0.067***	-0.071***	-0.073***	-0.064***
	(0.018)	(0.020)	(0.020)	(0.018)	(0.019)	(0.019)
Controls:						
Education	yes	yes	yes	yes	yes	yes
Socialization	yes	yes	yes	yes	yes	yes
Job Exp. & Perspectives	yes	yes	yes	yes	yes	yes
Individual Characteristics	yes	yes	yes	yes	yes	yes
No. of Obs.	6834	4114	3004	6834	4119	3009
(Pseudo) R^2	0.097	0.105	0.117	0.099	0.106	0.119

Notes: Marginal effects are reported at the sample mean. The dependent variable, entrepreneurial intention, is unity if a student reports that he or she definitely wants to become a self-employed entrepreneur or freelancer, zero otherwise. All specifications include university fixed effects, survey wave fixed effects, and major fixed effects. The control variables are described in more detail in Table A1. Cluster (university) robust standard errors are reported in parentheses *denotes 10% level of significance, **denotes 5% level of significance, ***denotes 1% level of significance.

We consider different measures for mobility. Column (1) considers all mobile students at West German university locations who report that the university is not in their hometown. In a second step, we consider those students who report that they are at least 50 kilometers away from their hometown and, as shown in Column (2), the effect becomes stronger. In a third step, we retain only West German students who went to a different federal state to attend university (Column (3)). Here, we find an effect similar to that reported in Column (1). Overall, the results do not significantly change with a focus on those students who completed a pure GDR socialist education before the 1990 reunification. The results are presented in the lower

part of Table 4. For this group, the coefficients are again somewhat higher. Continuing to find significant effects of schooling and socialization in the subsample of mobile East and West German university students at the same West German university suggests that selection into universities is not predominant in our analysis.

Given that our results remain extremely robust to all specifications and control variables, we are confident that we can interpret the effect of being schooled and socialized in a non-entrepreneurial environment as having a causal effect on the entrepreneurial intentions of university students. Being raised in a non-entrepreneurial environment decreases the likelihood of having entrepreneurial intentions between around 4 and 7 percentage points. Given that the mean share of students with entrepreneurial intentions is about 23 percent, this effect is economically important. Accordingly, we conclude that entrepreneurial education may indeed strengthen entrepreneurial endowments. When further distinguishing between the overall effect from socialization and the effect of schooling, we find that even a short period of schooling in a non-socialist regime increases the entrepreneurial intentions of university students, which again supports the idea that education in a market economy can have an impact on entrepreneurial intentions. Hence we conclude that education, either by parents, peers, or schools, can result in an enhancement of entrepreneurial endowments.

4.6 Conclusions

Our findings for a sample of German university students suggest that both socialization and schooling contribute to the development of entrepreneurial endowments that eventually impact on student intention to become an entrepreneur. In an attempt to learn more about the relative importance of socialization and schooling, we use the quasi natural experiment resulting from the years around German reunification to consider the affect of pre-university education on student entrepreneurial intention. Using surveys of university students who experienced at least part of their secondary education under the socialist GDR regime and students from West Germany who were schooled under an education system that embraced the values of a market economy, we find significant differences in entrepreneurial intentions. Furthermore, East German students completing their secondary education before reunification in 1990 have lower entrepreneurial intentions than those completing their secondary education after reunification. These results are robust for different specifications within groups of students at West German universities where we stepwise exclude less alike students and, thus, rule out selection into university and related biases.

Our findings suggest that entrepreneurial intentions are, to some extent, determined endogenously in the process of socialization and schooling. Our results further suggest that policy-makers can influence entrepreneurial endowments via the schooling system. However, at this point, we can only confirm that changes in the education system might effect on entrepreneurial endowments, but we cannot draw any conclusions about the most effective design for increasing these endowments. Determining this requires further empirical research.

The results from our study of the subsample of university students who finished their secondary education either in the GDR or in unified Germany, respectively, shows that teaching the values of a free market economy can affect the formation of entrepreneurial intentions, i.e., the interesting in becoming an entrepreneur. This initial finding makes us confident that a specialized entrepreneurship education could increase entrepreneurial endowments, i.e., develop the preconditions necessary for the development of this desire. However, work on how entrepreneurial courses at school influence individual entrepreneurial intentions does not go beyond case studies and thus there is great scope for future research. Furthermore, the impact of entrepreneurship courses at universities must be investigated much more thoroughly.

5. Universities, Policies and Educational Effects on Entrepreneurial Preferences[30]

5.1 Introduction

From a humanist point of view universities are the strongholds of academic freedom and knowledge. But universities have probably always been seen as an instrument to foster economic development as well, at least in modern times. Already in the 19th century policy planers in the US established land grant universities to induce economic growth by advancing agricultural techniques. Against the background of the Industrial Revolution, European countries built up a system of polytechnic universities to improve the education of engineers and scientists. Following the notions of Romer (1986), Krugman (1991) and Grossman and Helpman (1991), the role of universities as potential source of knowledge spillovers has attracted the attention of policy makers again in the recent decades. Accordingly, governments around the world have implemented policies to facilitate the knowledge dissemination from universities to the private sector. Thus Etzkowitz and Leydesdorff (2000, 110) speak of a "third mission" of academia, the "mission of economic development in addition to research and teaching".

One way in which universities can fulfill this mission is academic entrepreneurship. Indeed academic entrepreneurship can directly generate knowledge spillovers via university spin-offs. There is ample evidence for the importance of university spin-offs for economic development (c.f. Drucker and Goldstein, 2007). But entrepreneurship is very generally seen as driving force behind economic growth, and academics are a promising source for high-technology start-ups in general (Fritsch, 2011b). In this sense universities might have a long-dated impact on economic development not only by directly generating start-ups, but also by educating the entrepreneurs of the future. Consequently policy programs for supporting academic entrepreneurship are plentiful (c.f. Kuratko, 2005; Katz, 2003). They do not only target university spin-offs but strive to create an "entrepreneurial spirit" at universities that should raise students' awareness for entrepreneurial opportunities and get students' interested in an occupation as entrepreneur, either directly after graduation or in the future. Even though concrete measures for entrepreneurship education at universities are therefore numerous, there is little empirical evidence yet on the effectiveness of such measures.

[30] This chapter is based on Gold, Robert (2012), Entrepreneurship Education for Academics: How Universities Affect Students' Entrepreneurial Intentions, mimeo.

This chapter evaluates the effect universities have on their students' entrepreneurial intentions, i.e. the students' propensity to aspire an occupation as entrepreneur. This question has become prominent since more and more universities have established measures of entrepreneurship education to support academic entrepreneurship. In Germany, the prevalent measures are the introduction of chairs for entrepreneurship and the participation in the federally funded "EXIST" program for entrepreneurship support at universities. I focus on these measures and the effects a university as organizational entity has on the body of students enrolled at this university. Using survey data on up to 27 German universities I assess whether universities that apply any or both of the most common measures for entrepreneurship education affect their students' attitude towards the question whether they would like to be permanently employed as entrepreneur in the future in a diff-in-diff framework. Exploiting a comprehensive set of individual level control variables and additionally controlling for time invariant and time variant differences in the institutional framework I find university effects on the students' ability to express an opinion on whether they would take entrepreneurship as occupational alternative into account, on the students' overall interest in an entrepreneurial occupation as well as an influence on the students' propensity to have concrete entrepreneurial intentions. However, my analysis also reveals significant differences between the effects of the different measures applied.

The remainder of this chapter is organized as follows. Section 5.2 derives this chapter's contribution from the literature on university effects on entrepreneurship. Section 5.3 explains the empirical strategy with regard to the measures of entrepreneurship education under investigation. Section 5.4 introduces the data. Section 5.5 presents and discusses the empirical results. Section 5.6 concludes.

5.2 University Effects on Entrepreneurship

The relevance of entrepreneurship for economic development is widely acknowledged (c.f. Parker, 2009). The major purpose of entrepreneurship is to sustain an innovative economic environment, either by directly introducing new products to the market (c.f. Van Praag and Versloot, 2008) or by exerting competitive pressure on incumbent firms (Aghion et al., 2009). Academic entrepreneurship is of particular interest in this respect, since academics are seen as valuable source for high-tech firm entry. Hence academic entrepreneurship could be a driving force behind the process of creative destruction as described by Schumpeter (1942, 83; c.f. Aghion and Howitt, 1998; 1992). Indeed, academic entrepreneurship is recognized as one

means by which knowledge created at universities can be transferred to economic use in the industry (Mueller, 2006). Accordingly, many empirical studies focus on university spin-offs when analyzing academic entrepreneurship and the relevance of universities for (regional) economic growth (Djokovic and Souitaris, 2008).

Universities support economic performance in several ways (Drucker and Goldstein, 2007). Against notions of the "knowledge based economy", their role as knowledge source has attracted the interest of scholars as well as practitioners. Of course there exist various channels by which the public knowledge embodied in universities can be transferred to private use. Universities engage in collaborative research and generate patents and licenses (Henderson et al., 1998), thus providing core assets for corporate innovations (Mansfield and Lee, 1996). Above all, they provide well educated labor force that has been trained with state-of-the-art technologies as major input to the economy. With all these channels universities potentially generate knowledge spillovers that foster innovation and growth (Audretsch and Feldman, 1996; Acs et al., 1992; Jaffe, 1989). In this respect university spin-offs, i.e. the creation of firms by academic staff employed at a university, are a very direct way to bridge the gap between basic research and its application.

This facet of academic entrepreneurship has gained major attention, but university spin-offs are not the only way by which academics can become entrepreneur. Several academics decide to start an enterprise years after they have been employed in wage work (Mueller, 2010; Acs 2008; c.f. Evans and Leighton, 1989). In many cases it could be very reasonable to train one's own skills in wage work before starting an entrepreneurial endeavor. After all, the entrepreneurial return crucially depends on the least developed skill (Lazear, 2004) thus requiring successful entrepreneurs to be "jacks of all trades" with a balanced set of abilities (Lazear, 2005). Hence whenever an academic self-selects into entrepreneurship, university education might affect this decision since it lays down the qualifications for future occupational choices (c.f. Unger et al., 2011). Apart from inseminating skills and technical knowledge, getting students interested in entrepreneurship is an essential feature of entrepreneurial education at universities. For instance, creating "entrepreneurial awareness" is a major goal of many entrepreneurship courses. Anyhow, entrepreneurship courses must not necessarily lead to an increase in the participants' willingness to become an entrepreneur (Oosterbeek et al., 2010). In general, neither the goals nor the means of courses on entrepreneurship are very well evaluated (c.f. Astebro and Bazzazian, 2011). However, entrepreneurship education does not exclusive-

ly target students enrolled in entrepreneurship courses. Many universities apply measures of information and consulting on entrepreneurship that potentially address a large body of students from different fields of study. This is relevant, since particularly science students but also engineers are regarded to be a promising source for high-tech entrepreneurship (c.f. Souitaris et al., 2007) .

This chapter analyzes university effects on the students' overall attitude towards entrepreneurship as occupational alternative. Thus I do *not* investigate if the measures applied lead to an increase in the number of academics that become entrepreneur. But it is not farfetched to assume that having an interest in entrepreneurship and even more having entrepreneurial intentions are a prerequisite for future academic entrepreneurship of university graduates. Falck et al. (2010) show that entrepreneurial intentions expressed already during adolescence are a good predictor for future entrepreneurship. In general, measuring university effects on the decision to become an entrepreneur would require a long term study, since this occupational choice might occur years after graduation. Ideally a study like that would identify new firms that would not have been founded if the founder would not have been treated with the respective measures of entrepreneurship education, and additionally control for the start-ups success. For the measures at hand, the corresponding data is not available yet. Thus, I eventually investigate in how far universities succeed in raising their students' awareness of an occupation as entrepreneur, an effect that would be in line with the goals of entrepreneurship education – and that bears the potential for affecting the students' occupational choice anytime in their life cycle.

In the end the self-selection of academics into entrepreneurship is the result of an occupational choice of these individuals. This choice is probably influenced by their genetic predispositions, possibly leading to a situation where "natural born entrepreneurs" follow their genetic imprint and found their own enterprise (Nicolaou and Shane, 2009). More generally, it is likely that some natural endowments with regard to skills but also with regard to character or preferences (Rauch and Frese, 2007; Beugelsdijk and Noorderhaven, 2005; Mueller and Thomas, 2001; Steward et al. 1998; Brandstätter 1997) affect the occupational choice people make. But it is not very reasonable to assume that this choice is purely exogenous. It is much more likely that the formation of occupational preferences is a process related to the accumulation of skills and the development of individual preferences and character traits (Roberts et al., 2003; Robins et al., 2001). Consequently, the desire to become an entrepreneur could be

influenced by educational measures, and an academic's desire to become an entrepreneur should be influenced by measures of entrepreneurship education employed at the universities s/he visited.

This raises two interrelated questions: Can some policy maker influence people's entrepreneurial intentions? And, if yes: should she do so? This second question goes far beyond the interest of this study. But seemingly entrepreneurship support, specifically the support of academic entrepreneurship, is a policy issue in European countries. Policies are designed to equalize a suspected undersupply of entrepreneurs, particularly of innovative entrepreneurs in a Schumpeterian sense. One measure to increase the supply of entrepreneurs is arguably education, i.e. the training of skills that are relevant for future entrepreneurs (c.f. Unger et al., 2011) as well as adjustments to the curricula in order to arouse individual's interest in entrepreneurship as occupational alternative to wage work. So very generally, entrepreneurship education should help to improve the selection of individuals into entrepreneurship. Consequently, this could lead to a situation where more academics self-select into entrepreneurship and contribute to innovation and growth. But it might very well be that not the number of entrepreneurs but their quality justifies policy intervention. In principle, one would optimally like to see a situation where those academics select themselves into entrepreneurship that can use their endowments more productive in self-employment than in wage work. This relates to the individual occupational choice from a micro perspective. An individual should choose self-employment if this occupation maximizes its income over the lifetime, particularly as compared to an activity as an employed person. This conjecture allows for the inclusion of non-pecuniary utility gains from entrepreneurship, e.g. some benefits from the very fact of being "one's own boss" that might increase entrepreneurs' life satisfaction (Benz and Frey 2008; Hamilton, 2000). Apparently, these potential gains from entrepreneurship are difficult to discount for an individual ex ante. Anyhow, entrepreneurship education could help students to better predict benefits and challenges of entrepreneurial endeavors, thus helping to decrease the uncertainty related to occupational choices.

There is not much evidence yet on the effects of entrepreneurship education at universities. Oosterbeek et al. (2010) show that a Dutch program for entrepreneurship education had no effect on the students' self-assessed entrepreneurial skills and that this program even decreased their intention to become an entrepreneur. The authors speculate that this might be due to a formation of more realistic expectations on entrepreneurship. But Oosterbeck et al.

explicitly point out that their results are difficult to generalize, since the data stems from only one school. Falck et al. (2011) show that pre-university education significantly affects students' entrepreneurial attitudes. This chapter contributes to this literature by examining the effects of different measures of entrepreneurship education applied at German universities.

5.3 Measures of Entrepreneurship Education at Universities

Entrepreneurship has led quite a miserable existence at German universities both in research and in teaching for a long time. But starting in the mid 90es, the issue became more and more prominent. On the one hand, the academic community became interested in entrepreneurship as research field. Consequently, there were also efforts to include entrepreneurship into the academic curricula. This development was led by the FGF (Foerderkreis Gruendungsforschung), an (academic) society for the advancement of entrepreneurship research, education and policy in Germany. But the private sector supported this development as well, e.g. by (initially) endowing chairs for entrepreneurship. As a result, more and more universities established chairs for entrepreneurship, usually at economics or at engineering departments (FGF, 2008). Moreover, policy makers became aware of the relevance of entrepreneurship for the knowledge transfer from research into economic use. Thus against the background of the "High-Tech-Strategy for Germany", the Federal Ministry of Economics and Technology introduced the EXIST (*Existenzgruendungen aus der Wissenschaft* / university-based business start-ups) program in 1998 to improve the "entrepreneurial culture" at German universities and to increase the number of academic start-ups (BMWI, 2006). This simultaneous development of establishing more and more chairs for entrepreneurship at German universities and the building up of a supportive infrastructure induced by EXIST can be used to assess whether universities that apply those measures succeed in affecting students' attitude towards entrepreneurship as occupational alternative.

Universities can potentially affect their students' attitudes towards different occupations in various ways. First and foremost teaching can be expected to have an effect on these attitudes. Courses on entrepreneurship facilitate certain skills and knowledge that can be helpful in an entrepreneurial endeavor, thus potentially lowering the entry barrier into entrepreneurship. Apparently, the existence of a chair for entrepreneurship is a sufficient condition for the existence of entrepreneurship courses at a university. But it is by no means necessary. Certainly other chairs can offer entrepreneurship courses as well. Anyhow, the introduction of a specific chair for entrepreneurship represents a long term interest in this topic. Above all, it involves

some financial commitment of the university to establish a chair to incorporate entrepreneurship into the university's curriculum. Thus chairs for entrepreneurship are a way to sustainably implement entrepreneurship education since they tie some profound knowledge on the issue to a university. Moreover, chairs usually offer interdisciplinary lectures and events on entrepreneurship that are not part of the mandatory curriculum and address a larger auditorium of students. For instance chairs often engage in business plan seminars or invite external speakers for talks that are not exclusively attended by students enrolled in entrepreneurship classes. Accordingly, if a chair for entrepreneurship exists at a university, students are potentially treated with information on chances and challenges related to entrepreneurship. This should help them to update prior beliefs on entrepreneurial occupations and to make up their minds about whether entrepreneurship could be an occupational alternative for themselves.

The first chair for entrepreneurship at a German university was established in 1998 (FGF, 1998). In the same year, the EXIST program started with a competition where universities could apply for funding with proposals on how to implement supportive measures for entrepreneurship at their respective sites (BMWI, 2006). In the following years EXIST became a driving force behind the efforts of many universities to include entrepreneurship education into their portfolio. As diverse as the specific initiatives within the EXIST program might be, they usually include the implementation of an information office on entrepreneurship at the university campus, the organization of informational events on entrepreneurship and the provision of a network of internal and external partners to support academic entrepreneurship. Again, the participation in the EXIST program is no prerequisite to support wannabe entrepreneurs at universities. But the program structure requires a certain institutional commitment to entrepreneurship education thus indicating that any participating university indeed is willing to address the issue sustainably. As compared to the chairs for entrepreneurship, EXIST usually offers a broader scale and scope of events including general information as well as more specific coaching right up to concrete consulting of academic start ups. Moreover, EXIST typically involves the establishment of regional networks including partners outside the university (c.f. Minniti, 2005; Shane and Cable, 2003). Consequently EXIST more generally addresses the entire body of students while chairs usually have a stronger focus on certain faculties. Apart from the informational issues, EXIST provides concrete start-up advice, a feature not necessarily offered by chairs for entrepreneurship. Thus I expect some differences in the measures' effects.

Both measures, the introduction of chairs for entrepreneurship and the participation in the EXIST program, relate to the most important dimensions of entrepreneurship education at German universities. The first dimension refers to teaching, i.e. the imparting of knowledge and skills that might be relevant for funding and for running a firm (Davidson and Honig, 2003; Bates, 1990). The second dimension relates to supportive services for students interested in becoming an entrepreneur, particularly consulting, financial aid and the provision of potential partners. Both measures very basically imply an information function. As compared to universities that do not engage in entrepreneurship education, it is more likely that at universities that have a chair for entrepreneurship or that participate in the EXIST program the students get into contact with the topic "entrepreneurship", a treatment that might affect their attitude towards entrepreneurship as occupational alternative.

Both the establishment of chairs for entrepreneurship as well as the introduction of the EXIST program virtually took place simultaneously at German universities, yet not uniformly. In my analysis I will make use of the time structure related to the introduction of these measures for entrepreneurship education. In the course of time I observe universities that apply none of the measures, chairs, EXIST – or both measures at once. This group of universities that apply both measures is of special interest for my analysis. It is a clear indication of a strategic focus on entrepreneurship if a university has a chair for entrepreneurship and additionally participates in the EXIST program, since this involves significant financial and personnel effort. Thus I expect those "entrepreneurial universities" to have a particularly pronounced effect on students' attitude towards entrepreneurship.

I subdivide attitudes towards entrepreneurship into three different outcomes, i.e. opinion on entrepreneurship (the student can make any statement on whether s/he would consider entrepreneurship as occupational alternative), interest in entrepreneurship (the student makes any positive statement), and entrepreneurial intentions (the student states that s/he certainly wants to become entrepreneur). Furthermore, I distinguish three different types of universities according to the measures of entrepreneurship education they apply. First, there are universities that have a chair for entrepreneurship. Second, there are universities that participate in the EXIST program. Third, there are universities that apply both measures, i.e. that participate in the EXIST program and simultaneously have a chair for entrepreneurship. Universities that apply none of the measures form the control group. Since universities apply different measures at different points in time, the universities' classification is dynamic. But my data

ensures that in the baseline year of analysis (winter term 1997/98) none of the universities observed applies any of the measures yet.

Overall, I expect all three measures, i.e. chairs for entrepreneurship, participation in the EXIST program and the combination of both, to affect students' attitude towards entrepreneurship as occupational alternative. Particularly, I expect all measures to increase the probability that students express an opinion on whether they would like to become an entrepreneur, either positive or negative. All measures should increase the information students have on entrepreneurship, thus they all should help students to make up their minds on the question if entrepreneurship could be an occupational alternative for themselves (c.f. Graevenitz et al, 2010). Furthermore, I expect all measures to be positively related to the students' propensity to be interested in entrepreneurship as occupational alternative, i.e. to have a positive opinion on this issue. All measures are designated to increase the "entrepreneurial spirit" at universities, hence I assume that they encourage a couple of students to take a future as entrepreneur into account. Eventually, I expect all measures to affect the students' entrepreneurial intentions, i.e. the probability that students state that they certainly want to become entrepreneur in the future. Anyhow, I have no clear prediction on the direction of this effect, since any valuable information on entrepreneurship should also lead to a situation where some students give up unfeasible business ideas. Consequently, the direction of the university effect on entrepreneurial intentions crucially depends on the quality of the information provided as well as the students' predisposition. Finally, I expect universities that apply both measures to have the strongest effect on students' attitude towards entrepreneurship.

5.4 Data

I use data from the students' survey of the research group for university research at the University of Konstanz (*Studiensituation und studentische Orientierung*) to measure students' attitude towards entrepreneurship. This survey regularly asks students at up to 27 German universities about their personal situation, study experience and job orientation. The survey started in winter term 1982/83, the last survey took place in winter term 2009/10 but is not available yet. Overall, approximately 96,000 students from all fields of study participated in eleven survey waves. The survey is funded by the Federal Ministry of Education and Research. I use data from the last wave before the introduction of the first chair for entrepreneurship in Germany conducted in winter term 1997/98 (wave 7) to the last wave available conducted in winter term 2006/07 (wave 10). This ensures that in the baseline year none of the

universities has established any of the measures of entrepreneurship education under investigation. Furthermore, wave 7 is the first survey year that explicitly asks for the students' willingness to become an entrepreneur and not only for its willingness to be self-employed in the future. Waves 7 to 10 were conducted every three years at up to 27 full universities and universities of applied sciences all across Germany, where the same 22 universities are contained in each wave.[31] This leaves me with 33,726 observations from four consecutive survey waves.

Figure 1: University sites and number of observations differentiated by university type. Wave 9 of student survey conducted in winter term 2003/04.

Notes: AG Hochschulforschung, University of Konstanz, in BMBF (2005, 9). The map shows the 27 universities contained in the dataset at the maximum.

[31] I did the same analysis with this balanced sample of 22 universities. Since the results are quasi identical, I use the full, unbalanced sample of 27 universities.

I am interested in the students' attitude towards entrepreneurship as occupational alternative. Each survey contains the question "In which area do you want to be permanently employed in the future?" with one subcategory "entrepreneur (own firm/trade/services)". Answer options are "Yes, for sure", "Yes, perhaps", "Rather not" and "Certainly not" with an additional option "I do not know".[32] Overall, 33,024 out of 33,726 students answered this survey question. I use this question on entrepreneurship as occupational alternative to construct three outcome variables. First, I investigate whether the different measures of entrepreneurship education at universities affect the probability that students do have an opinion on entrepreneurship at all. This outcome variable is zero if a student answers "I do not know" on the given question and unity otherwise. Second, I assess whether the university measures affect the students probability to have an interest in entrepreneurship as occupational alternative. This outcome variable is unity if the student chooses a positive answer, i.e. "Yes, perhaps" or "Yes, certainly", and zero otherwise. In a final step I focus on university effects on students' entrepreneurial intentions. Here the outcome variable is unity if the student answers that s/he certainly wants to be permanently employed as entrepreneur in the future, and zero otherwise. Table 1 presents some descriptive statistics on the full dataset and the three groups of students that correspond to the previously defined outcome variables.

[32] These are 5 distinct answer categories, not different values on a Likert scale.

Table 1: Descriptives

	All Observations	with opinion on entrepreneurship	with interest in entrepreneurship	with entrepreneurial intentions
Number of observations	33,726	30780	15305	4080
Wave 7 (1997/98)	7,271 (21.56%)	6,690 (21.73%)	3,615 (23.62%)	1,115 (27.33%)
Wave 8 (2000/01)	8,130 (24.11%)	7,455 (24.22%)	3,781 (24.70%)	1,105 (27.08%)
Wave 9 (2003/04)	9,975 (29.58%)	9,021 (29.31%)	4,398 (28.74%)	1,201 (29.44%)
Wave 10 (2006/07)	8,350 (24.76%)	7,614 (24.74%)	3,511 (22.94%)	659 (16.15%)
Field of studies:				
linguistics and cultural stud.	5,303 (15.79%)	4,708 (15.35%)	1,507 (9.88%)	307 (7.54%)
psychology	745 (2.22%)	661 (2.16%)	267 (1.75%)	73 (1.79%)
pedagogy and social issues	2,815 (8.38%)	2,473 (8.06%)	812 (5.32%)	151 (3.71%)
sports	465 (1.38%)	425 (1.39%)	210 (1.38%)	48 (1.18%)
jurisprudence	2,036 (6.06%)	1,888 (6.16%)	925 (6.06%)	236 (5.80%)
social science	1,832 (5.45%)	1,693 (5.52%)	822 (5.39%)	205 (5.04%)
maths and natural science	5,433 (16.17%)	4,979 (16.23%)	2,321 (15.22%)	545 (13.39%)
Medicine	2,682 (7.98%)	2,280 (7.43%)	773 (5.07%)	215 (5.28%)
agronomy, forestry, nutrition	684 (2.04%)	645 (2.10%)	430 (2.82%)	158 (3.88%)
engineering	5,582 (16.62%)	5,271 (17.19%)	3,484 (22.84%)	975 (23.96%)
arts and music	1,052 (3.13%)	958 (3.12%)	466 (3.06%)	125 (3.07%)
economic sciences	4,584 (13.65%)	4,353 (14.19%)	3,067 (20.11%)	992 (24.37%)
misc.	379 (1.13%)	336 (1.10%)	168 (1.10%)	40 (0.98%)
Academical semester (mean)	7.33	7.34	7.15	7.17
Age (mean)	24.68	24.62	24.61	24.88
Female	18,053 (53.68%)	16,158 (52.61%)	6,703 (43.90%)	1,600 (39.28%)
Marital status:				
married	2,089 (6.22%)	1,843 (6.01%)	831 (5.45%)	254 (6.24%)
single with perm. partner	17,442 (51.94%)	15,951 (52.00%)	7,900 (51.79%)	2,168 (53.29%)
single w/o permanent partner	13,819 (41.15%)	12,669 (41.30%)	6,421 (42.09%)	1,603 (39.41%)
widowed/divorced	231 (0.69%)	210 (0.68%)	102 (0.67%)	43 (1.06%)
With children	2,070 (6.15%)	1,817 (5.91%)	843 (5.51%)	264 (6.48%)
Any parent entrepreneur	5,329 (16.17%)	4,883 (16.20%)	2,963 (19.77%)	952 (23.89%)
At universities with chair	10,211 (30.28%)	9,327 (30.30%)	4,724 (30.87%)	1,185 (29.04%)
At EXIST universities	10,774 (31.95%)	9,802 (31.85%)	4,560 (29.79%)	1,004 (24.61%)
At EXIST universities with chair for entrepreneurship	5,338 (15.83%)	4,866 (15.81%)	2,345 (15.32%)	510 (12.50%)

Notes: Table presents number of observations for the full sample (Column 1) and the subsamples of students that express an opinion on the question whether they would like to be permanently employed as entrepreneur in the future (Column 2), that have an interest in an entrepreneurial occupation (Column 3), and that certainly want to be permanently employed as entrepreneur in the future (Column 4). Share of observations given in parentheses refers to the overall number of observations (Line 1) by subsample.

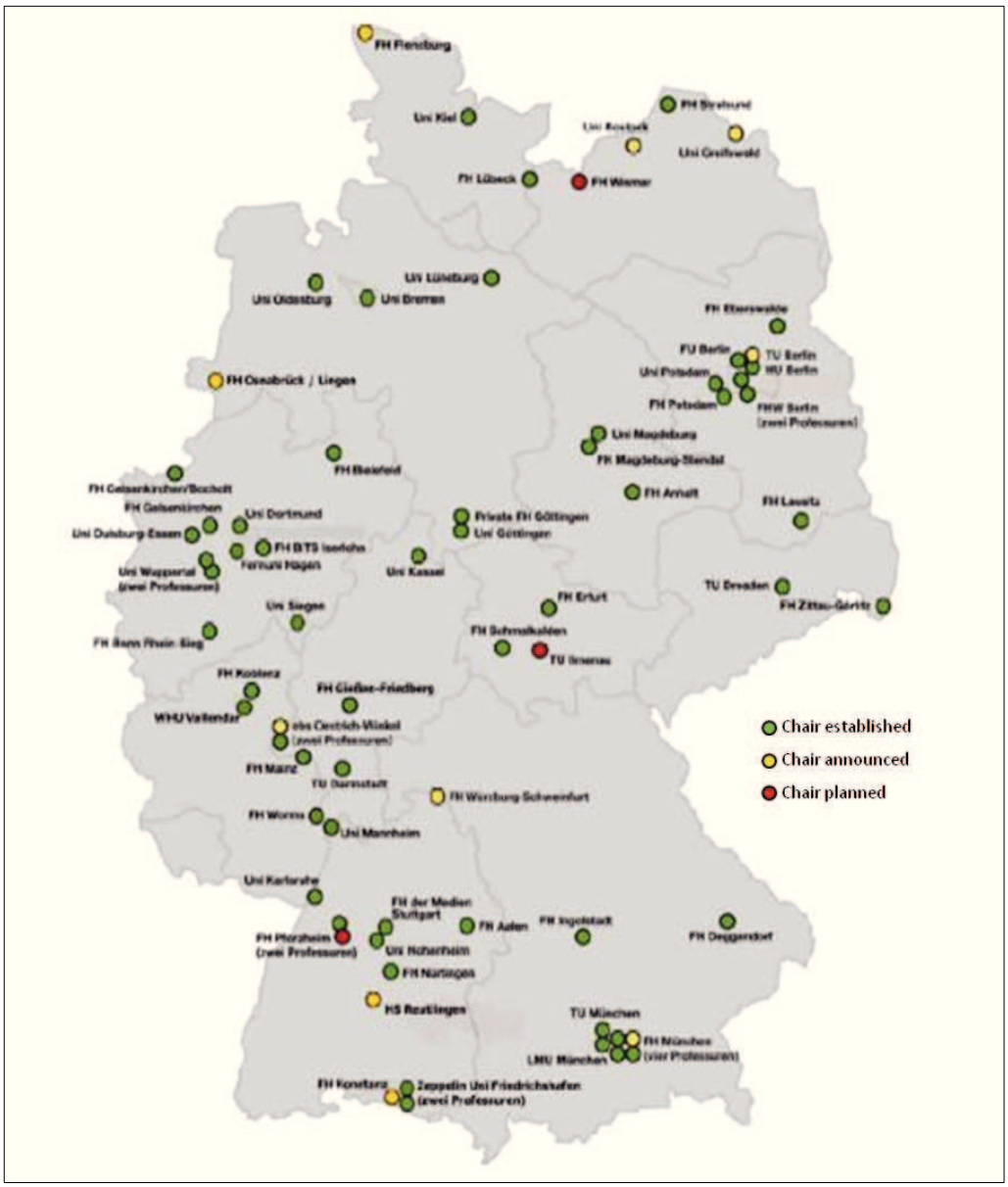
In order to assess university effects on the students' attitude towards entrepreneurship, I concentrate on three measures of entrepreneurship education: I identify universities that have a chair for entrepreneurship and take this as one measure (chair). Moreover, I identify those

universities that participate in EXIST and take this as second measure (EXIST). Eventually, I include the interaction effect of both measures, i.e. the simultaneous existence of a chair for entrepreneurship and the participation in the EXIST program, as third measure for university effects (chair*EXIST).

To identify chairs for entrepreneurship, I use the reports on chairs for entrepreneurship in German speaking countries published by the society for the promotion of entrepreneurship research (Foerderkreis Gruendungsforschung, FGF). Since 1998 the academic association FGF regularly publishes reports that enlist all chairs for entrepreneurship at universities in Germany, Austria, Switzerland and Liechtenstein (FGF 1998; 1999; 2000; 2001; 2002; 2004; 2008). In 1998, the FGF report accounts for two existing chairs for entrepreneurship in Germany, while many more are already in the process of being established at that time. The latest report from November 2011 accounts for 86 chairs for entrepreneurship at German universities. I observe chairs for entrepreneurship for the first time in wave 8 (winter term 2000/01) at 7 out of 23 universities. This share raises up to 13 out of 25 universities in my last wave 10 (winter term 2006/07).

Based on the FGF reports I cross-checked the year of a chairs' implementation with the chairs' web pages and, if necessary, contacted the chairs directly. So my identification of chairs for entrepreneurship principally rests on the FGF identification, but I made two adjustments: First, the FGF lists the "Institute for Innovation Research, Technology Management and Entrepreneurship" at the Ludwigs-Maximilian-University Munich (LMU) as Entrepreneurship chair from 2004 on. In the earlier reports this chair which was established in December 1998 is accounted for as "non-explicit chair for entrepreneurship". Anyhow, I count the LMU as having a chair for entrepreneurship from wave 8 on (2000/01). The chair already mentioned in the FGF report 1998 developed a strong focus on entrepreneurship over time, sothat ex post it seems to be appropriate to account for this chair as entrepreneurship chair from the beginning on. This is particularly true since in 2000 the privately endowed ODEON center for entrepreneurship opened in at Munich University with the collaboration of this chair, so that from wave 8 on their definitely existed an institutionalized entrepreneurship education at the LMU. Second, the chair for entrepreneurship and sales at the University of Applied Sciences Stralsund is enclosed in the FGF report 2008 for the first time. The chair was established in 1996 as chair for marketing and management and changed its name and its focus in 2000. Thus, I count this chair as entrepreneurship chair from wave 8 on.

Figure 2: Chairs for Entrepreneurship at German universities in 2008



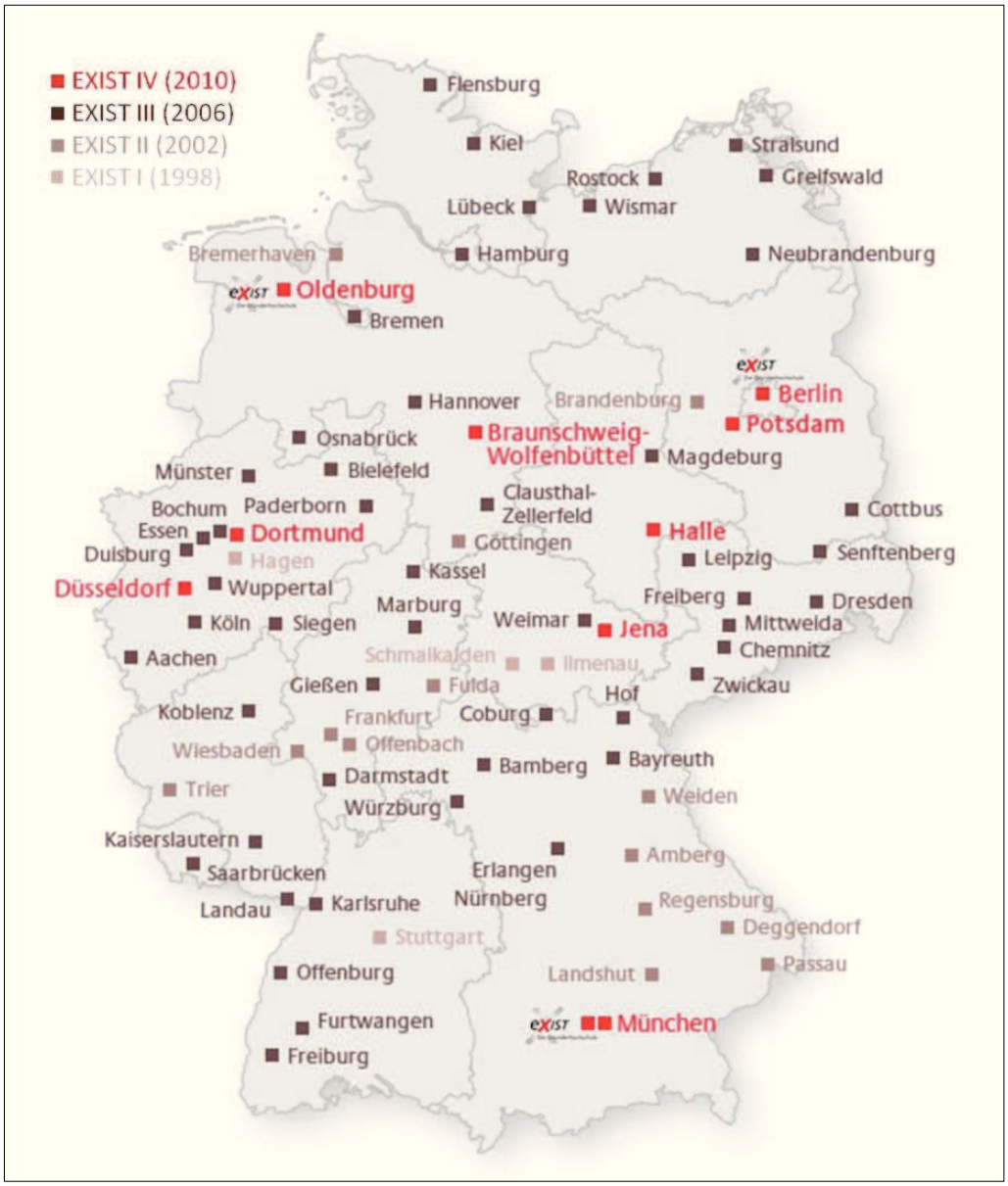
Notes: FGF (2008, 9). The map shows Universities and Universities of Applied Sciences (FH) that have established or announced a chair for entrepreneurship, or are planning to do so in April 2008.

I draw information on the universities participating in the EXIST program from the program's homepage.[33] EXIST started in 1998 with a competition. Universities were asked to apply together with regional partners for a five year funding to foster academic entrepreneurship in their region. Out of 109 applicants a jury eventually chose 5 winners that got public funding of more than 20 Mio. Euro to realize their plans (BMWI, 2006). This necessarily included the implementation of an organizational structure for entrepreneurship support at the participating universities. In my data I observe one of these EXIST I universities, i.e. the Technical Univer-

[33] www.exist.de, retrieved October 11th 2011. I cross checked the information provided by EXIST with the homepages of the participating universities and made no adjustments.

sity Dresden. In 2002 the jury chose additional 10 regional networks around universities for funding under EXIST II. The resulting 15 networks received more than 25 Mio. Euro (ibid.). My data contain observations from 8 universities apart from the TU Dresden that participated in this second EXIST period. Finally, in a third funding period starting 2006, EXIST supported projects on fostering academic entrepreneurship at 47 universities with approximately 40 Mio. Euro (BMWI, 2010). Accordingly, in my data all but 4 universities participate in EXIST III. Since 2010 there is a fourth EXIST funding period going on, but this is not relevant for my analysis anymore.

Figure 3: Universities Participating in the EXIST Program by Program Phase.



Notes: EXIST (2011). The map shows universities participating in the EXIST program by the last program phase they participated in.

Like the existence of a chair for entrepreneurship hints at the existence of an institutionalized teaching in entrepreneurship, a university's participation in the EXIST program hints at the existence of an institutionalized entrepreneurship support at these sites. As compared to universities with chairs for entrepreneurship, EXIST universities are arguably more likely to spread information on entrepreneurship across single faculties' boundaries. Eventually, there are some universities that apply both measures of entrepreneurship education. Apparently, these universities strive to thoroughly institutionalize expertise in the field of entrepreneurship and to develop a strategic focus on entrepreneurship education. Thus I include the interaction effect between the existence of a chair and the participation in EXIST as third measure to assess whether universities that strongly engage in entrepreneurship education have a particular effect on students' occupational attitude. Table 2 illustrates the universities' classification with respect to the measures of entrepreneurship education they apply.

Table 2: Number of Observations and Measures of Entrepreneurship Education Applied by University

University	wave 7	wave 8	wave 9	wave 10	University	wave 7	wave 8	wave 9	wave 10
Berlin – TU	452	499	466	409	Muenchen - UAS	325	390	309	297
Chair	0	0	0	0	Chair	0	0	1	1
EXIST	0	0	0	1	EXIST	0	0	0	1
Bochum – UNI	431	499	480	450	Dresden - TU	493	548	588	713
Chair	0	0	0	0	Chair	0	1	1	1
EXIST	0	0	0	1	EXIST	0	1	1	1
Essen – UNI	289	327	352	266	Leipzig - UNI	474	610	641	638
Chair	0	0	0	1	Chair	0	0	0	0
EXIST	0	0	0	1	EXIST	0	0	0	1
Frankfurt – UNI	469	446	497	540	Magdeburg - TU	163	266	287	249
Chair	0	0	0	0	Chair	0	1	1	1
EXIST	0	0	1	0	EXIST	0	0	0	1
Freiburg – UNI	571	513	626	566	Potsdam - UNI	214	295	329	260
Chair	0	0	0	0	Chair	0	0	0	1
EXIST	0	0	0	1	EXIST	0	0	1	1
Hamburg – UNI	674	591	706	514	Rostock - UNI	287	355	313	261
Chair	0	0	0	0	Chair	0	0	0	0
EXIST	0	0	0	1	EXIST	0	0	1	1
Karlsruhe – TU	621	528	584	433	Erfurt - UAS	136	157	152	124
Chair	0	1	1	1	Chair	0	1	1	1
EXIST	0	0	0	1	EXIST	0	0	0	0
Muenchen - UNI	619	863	895	654	Magdeburg - UAS	107	151	114	164
Chair	0	1	1	1	Chair	0	0	1	1
EXIST	0	0	0	1	EXIST	0	0	0	0
Coburg – UAS	118	142	123	129	Stralsund - UAS	88	148	124	102
Chair	0	0	0	0	Chair	0	1	1	1
EXIST	0	0	0	1	EXIST	0	0	1	1
Essen – UAS	95	90	113	0	Kaiserslautern -UNI	0	0	309	207
Chair	0	0	0	-	Chair	-	-	0	0
EXIST	0	0	0	-	EXIST	-	-	0	1
Frankfurt – UAS	97	118	159	139	Kassel - UNI	0	0	312	397
Chair	0	0	0	0	Chair	-	-	1	1
EXIST	0	0	1	0	EXIST	-	-	1	1
Hamburg – UAS	242	263	268	249	Oldenburg - UNI	0	0	317	272
Chair	0	0	0	0	Chair	-	-	0	1
EXIST	0	0	0	1	EXIST	-	-	0	1
Kiel – UAS	141	142	119	113	Regensburg - UNI	0	0	483	0
Chair	0	0	0	0	Chair	-	-	0	-
EXIST	0	0	1	1	EXIST	-	-	1	-
Koblenz – UAS	108	133	149	123					
Chair	0	1	1	1					
EXIST	0	0	0	1					

Notes: Observations by university and survey wave. UNI and TU (Technical University) denote full university. UAS denotes university of applied sciences. Chair is unity if university has a chair for entrepreneurship. EXIST is unity if a university participates in the EXIST program.

5.5 Results

5.5.1 University Effects on Students' Attitude towards Entrepreneurship

The least one could expect from the introduction of measures for entrepreneurship education at universities is that they help students to form an opinion on entrepreneurship as occupational alternative. The average German student enters university directly after secondary school. Entrepreneurship is usually not part of the teaching at German schools. Thus it should make a difference if a chair for entrepreneurship, an institutionalized entrepreneurship support via EXIST or both measures exist at a university. The existence of any measure should increase the probability that students are confronted with entrepreneurship as occupational alternative. I assume that this informational treatment helps students to make up their minds. Accordingly, I expect students treated with educational measures to be less likely to be indifferent towards entrepreneurship than students at universities where no institutionalized entrepreneurship education exists.

Thus in a very first step I use probit regressions to estimate a student's probability to have an opinion on entrepreneurship as occupational alternative conditional on the existence of a chair for entrepreneurship, the universities' participation in the EXIST program and the simultaneous existence of both measures at a university according to Equation 1.

Equation 1: Probit Estimation

$$\Pr(Y_{imut}=1|.)=\alpha+\alpha_m+\alpha_u+\alpha_t+\alpha_{ut}+\ldots$$
$$\ldots \quad +\beta_1(chair)_{ut}+\beta_2(EXIST)_{ut}+\beta_3(chair*EXIST)_{ut}+X_{imut}\beta_4+\varepsilon_{imut}$$

My outcome variable Y_{imut} is zero if a student *i* studying major field *m* at university *u* in survey year *t* answers "I do not know" when asked whether s/he would like to be an entrepreneur in the future, and unity if s/he expresses an opinion. I simultaneously include three explanatory variables: $(chair)_{ut}$ is unity if a university *u* has a chair for entrepreneurship in survey year *t*. $(EXIST)_{ut}$ is unity if a university *u* participates in the EXIST program in survey year *t*. The interaction term $(chair*EXIST)_{ut}$ is unity if a university *u* in survey year *t* simultaneously participates in the EXIST program and has a chair for entrepreneurship.

I include a set of baseline control variables on idiosyncratic attributes into the matrix X_{imut} and will stepwise expand this matrix to control for study-related issues, job related issues, individual characteristics and the students' social network. Overall, the survey data provides rich information on students' personal characteristics potentially affecting their attitude towards entrepreneurship. Additionally, I include university fixed effects α_u to account for time invariant differences between the universities in this dynamic differences-in-differences approach. Furthermore, I use major fixed effects α_m to control for time invariant differences between 13 aggregated fields of study. Survey year fixed effects α_t account for time variant factors influencing the outcomes at all universities alike. Eventually, I include the interaction effect of survey year fixed effects and university fixed effects α_{ut} to control for time variant factors affecting the outcomes at each university differently. Amongst others, this interaction effect accounts for changes in the sample composition at the different universities that are not captured by the other control variables, but also for time-variant university-specific differences in the measures under investigation.[34] In line with Moulton (1986), I cluster the standard errors ε_{imut} on the highest level of aggregation, i.e. the university level. Results are reported in Table 3.

In the subsequent tables Column (1) presents the results of the baseline model where I add some demographic controls and variables on the students' personal background into the regressions.[35] Consequently, I always control for students' age and gender. To account for familial liabilities I include variables on the students' marital status and a dummy variable indicating whether the students have children. Since parents might be relevant role models (c.f. Aldrich et al., 1998; Dunn and Holtz-Eakin, 2000; Hout and Rosen, 2000) I add controls for the parents' education (5 categories) as well as the parents' occupation (5 categories). Additionally, I include a dummy variable that equals unity if any of the students' parents is an en-

[34] In a different set of estimations not reported here I checked for potential lags in the effectiveness of the introduction of chairs for entrepreneurship. Anyhow, I did find no evidence for the existence of a particular lag structure. Since I can only roughly account for the time span between the date some chair was established and the date the survey took place, I prefer to control for university specific time-variant effects by the introduction of fixed effects instead. These fixed effects also capture time variant differences in the realization of the EXIST program.

[35] A detailed description of all control variables can be found in Table A2 in the appendix.

trepreneur.[36] Eventually, I control for the students' aspired degree (8 categories, e.g. Master, Bachelor, Diploma), her study progress and whether s/he already holds an academic degree.

5.5.1.1 University Effects on Students' Opinion on Entrepreneurship

Already the baseline regressions in column (1) of Table 3 suggest that all measures affect the students' opinion on entrepreneurship. Anyhow, the results are somewhat surprising. Indeed, students at universities that have a chair for entrepreneurship are significantly less likely to express a distinct opinion towards this occupational alternative. The same is true for students at universities that participate in the EXIST program. Only at universities with a fully institutionalized entrepreneurship education, i.e. universities that do participate in EXIST and do have a chair for entrepreneurship, are students more likely to be able to make up their minds about entrepreneurship as occupational alternative.

Table 3: University Effects on Students' Opinion on Entrepreneurship as Occupational Alternative

	(1) baseline	(2) course of studies	(3) job expectations	(4) individual character.	(5) social network	(6) all controls
opinion on entrepreneurship						
chair	-0.091***	-0.080***	-0.138***	-0.064***	-0.086***	-0.087***
	(0.003)	(0.003)	(0.005)	(0.004)	(0.004)	(0.006)
EXIST	-0.081***	-0.077***	-0.082***	-0.082***	-0.062***	-0.070***
	(0.004)	(0.004)	(0.004)	(0.005)	(0.004)	(0.007)
chair*EXIST	0.046***	0.041***	0.050***	0.047***	0.037***	0.041***
	(0.002)	(0.003)	(0.002)	(0.003)	(0.002)	(0.005)
Controls						
Baseline	Yes	Yes	Yes	Yes	Yes	Yes
Study related	No	Yes	No	No	No	Yes
Job related	No	No	Yes	No	No	Yes
Individual	No	No	No	Yes	No	Yes
Social Network	No	No	No	No	Yes	Yes
Observations	31,241	29,399	30,189	29,598	30,578	26,759
Pseudo R-squared	0.0376	0.0434	0.0445	0.0455	0.0388	0.0553

Notes: Table reports probit marginal effects at the sample mean where the dependent variable 'opinion on entrepreneurship' is unity if student gives any positive or negative answer to the question "Do you want to be permanently employed as entrepreneur in the future" and zero if s/he answers "I do not know". All specifications include university fixed effects, survey wave fixed effects, fixed effects for the students' major field of studies and the interaction effect of university indicator and survey wave. The control variables are described in more detail in Table A2 in the appendix. Cluster (university) robust standard errors are reported in parentheses. *denotes 10% level of significance, **denotes 5% level of significance, ***denotes 1% level of significance.

[36] Entrepreneur is a subcategory of the occupational category self-employed (c.f. Table A2 in the appendix).

In the other columns of Table 3 I stepwise include further control variables that account for the specific situation of the individual students (c.f. Table A2 in the Appendix). Column (2) presents results that additionally control for factors related to the students' studies like his motives for deciding on his major, her final grade at secondary school, or if any of his or her major or minor subjects includes either engineering, or science, or economics. In column (3) I include variables that refer to the students' future job. In this column I control amongst others for a student's job expectations, perceived problems at the job market and on how well the student feels informed about the labor market. In column (4) I exploit a set of variables that control for the students' individual characteristics like her attitudes towards competition and performance, whether he has personal or financial problems or how important several areas of life are to her. Column (5) shows the results of an estimation that controls, additionally to the baseline controls, for the students' social network, i.e. how often they have contact to their peers, their family and others, and for some extra-curricular activities. Eventually, column (6) presents the results of an estimation that includes all control variables from the previous estimations.[37] Throughout all specifications I find a robust and significant positive effect of the coexistence of chairs and EXIST on the probability to have an opinion on entrepreneurial occupations. This result is in line with the expectations. But I do also find robust and significant negative effects of chairs and EXIST in general. Accordingly, the implementation of a chair for entrepreneurship as well as the participation in EXIST that go in hand with numerous informational events on entrepreneurship do reduce the students' ability to express a clear opinion on whether they would take an occupation as entrepreneur into account.

5.5.1.2 University Effects on Students' Interest in Entrepreneurship

In a next step I dwell upon the students' opinion on entrepreneurship and look at a more distinct outcome: I repeat the previous estimations but focus on the students' interest in entrepreneurship. So Y_{imut} is unity if a student gives a positive answer ("Yes, perhaps"; "Yes, certainly") when asked whether s/he would like to be permanently employed as entrepreneur in the future, and zero otherwise. Results are shown in Table 4.

Again, it is only the universities with fully institutionalized entrepreneurship education, i.e. universities that have a chair for entrepreneurship and participate in the EXIST program, that

[37] Anyhow, I lose quite many observations when I use the full set of control variables due to accumulated missing values. I will deal with this problem later on. Up to now I urge cautiousness when interpreting the results of the estimations presented in column (6).

match the assumptions on the effects on their students' attitude towards entrepreneurship as occupational alternative. The simultaneous existence of both measures significantly increases the probability that students are interested in becoming an entrepreneur. The main effects of universities with chairs for entrepreneurship or of universities that participate in the EXIST program are much less robust and do very much depend on individual circumstances. There is some indication that both measures could crowd out the interest in entrepreneurship. At least the results show that only "entrepreneurial universities" that focus on entrepreneurship education by simultaneously applying both measures indeed get students interested in entrepreneurship as occupational alternative.

Table 4: University Effects on Students' Interest in Entrepreneurship as Occupational Alternative

	(1) baseline	(2) course of studies	(3) job expectations	(4) individual character.	(5) social network	(6) all controls
interest in entrepreneurship						
chair	-0.038***	-0.020***	-0.061***	0.002	-0.043***	-0.009
	(0.005)	(0.006)	(0.005)	(0.006)	(0.006)	(0.009)
EXIST	-0.000	-0.026**	-0.027***	0.005	-0.001	-0.075***
	(0.010)	(0.011)	(0.009)	(0.011)	(0.010)	(0.011)
chair*EXIST	0.062***	0.075***	0.108***	0.063***	0.055***	0.143***
	(0.016)	(0.022)	(0.011)	(0.019)	(0.017)	(0.015)
Controls						
Baseline	Yes	Yes	Yes	Yes	Yes	Yes
Study related	No	Yes	No	No	No	Yes
Job related	No	No	Yes	No	No	Yes
Individual	No	No	No	Yes	No	Yes
Social Network	No	No	No	No	Yes	Yes
Observations	31,241	29,399	30,189	29,598	30,578	26,759
Pseudo R-squared	0.110	0.131	0.149	0.120	0.112	0.162

Notes: Table reports probit marginal effects at the sample mean where the dependent variable 'interest in entrepreneurship' is unity if student gives any positive answer to the question "Do you want to be permanently employed as entrepreneur in the future" and zero otherwise. All specifications include university fixed effects, survey wave fixed effects, fixed effects for the students' major field of studies and the interaction effect of university indicator and survey wave. The control variables are described in more detail in Table A2 in the appendix. Cluster (university) robust standard errors are reported in parentheses. *denotes 10% level of significance, **denotes 5% level of significance, ***denotes 1% level of significance.

5.5.1.3 University Effects on Students' Entrepreneurial Intentions

Eventually, I further narrow down my focus on the most distinct outcome, i.e. the students' entrepreneurial intentions. Here Y_{imut} is unity if a student answers "Yes, certainly" when s/he

is asked whether s/he would like to be permanently employed as entrepreneur in the future, and zero otherwise. Results are reported in table 5.

Once again, I find a significant and robust effect of universities that apply both measures of entrepreneurship education on students' entrepreneurial intentions. Interestingly, applying both measures reduces the probability that students' certainly want to become an entrepreneur in the future. This finding is in line with Oosterbeek et al. (2010) who measure a negative effect of a program for entrepreneurship education at students' entrepreneurial intentions at a Dutch college. In contrast the participation in the EXIST program and the related provision of entrepreneurship support and consulting alone does affect the students' entrepreneurial intentions positively. Taken by itself, the existence of a chair does not seem to influence the students' entrepreneurial intentions. So it is the EXIST universities that foster entrepreneurial intentions – but if these universities additionally have a chair for entrepreneurship, this significantly reduces the students' desire to become an entrepreneur.

Table 5: University Effects on Students' Entrepreneurial Intentions

	(1) baseline	(2) course of studies	(3) job expectations	(4) individual character.	(5) social network	(6) all controls
entrepreneurial intention						
chair	-0.002	0.011***	-0.006**	0.002	-0.004	0.004
	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)	(0.004)
EXIST	0.078***	0.073***	0.085***	0.089***	0.088***	0.078***
	(0.006)	(0.006)	(0.007)	(0.007)	(0.006)	(0.007)
chair*EXIST	-0.079***	-0.078***	-0.076***	-0.081***	-0.085***	-0.076***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Controls						
Baseline	Yes	Yes	Yes	Yes	Yes	Yes
Study related	No	Yes	No	No	No	Yes
Job related	No	No	Yes	No	No	Yes
Individual	No	No	No	Yes	No	Yes
Social Network	No	No	No	No	Yes	Yes
Observations	31,241	29,399	30,189	29,598	30,578	26,759
Pseudo R-squared	0.0376	0.0434	0.0445	0.0455	0.0388	0.0553

Notes: Table reports probit marginal effects at the sample mean where the dependent variable 'entrepreneurial intention' is unity if students answer "Yes, certainly" to the question "Do you want to be permanently employed as entrepreneur in the future" and zero otherwise. All specifications include university fixed effects, survey wave fixed effects, fixed effects for the students' major field of studies and the interaction effect of university indicator and survey wave. The control variables are described in more detail in Table A2 in the appendix. Cluster (university) robust standard errors are reported in parentheses. *denotes 10% level of significance, **denotes 5% level of significance, ***denotes 1% level of significance.

With regard to the comprehensive set of control variables, I can state that it is particular students that study any subject from the field of economics that have entrepreneurial intentions. Anyhow, students with a strong interest in their subject and students with an above average grade from school are less likely to have entrepreneurial intentions. Students with at least one parent who is entrepreneur are significantly more likely to have entrepreneurial intentions themselves. Students who are looking for a secure job are significantly less likely to have entrepreneurial intentions, while looking for a job with high income, responsibility, the possibility to lead people, where one can act independently and realize one's own ideas are positive predictors for the desire to become an entrepreneur. Furthermore, students with entrepreneurial intentions are less likely to expect problems in finding a job. Anyhow, students who certainly want to be employed as entrepreneur in the future have more problems with their studies and take their future job more serious than their studies. Eventually, having intense contact to one's peers is negatively correlated with entrepreneurial intentions, while students who have often contact to people from the aspired occupational field are more likely to certainly wanting to become an entrepreneur.

5.5.1.4 Robustness

By now it is a little bit dissatisfactory that I lose so many observations when I include all control variables on study situation, job perspectives, individual characteristics and social network into the regressions. Anyhow, not all controls are equally important for all outcomes. Thus as robustness check and to sum up the previous results, I repeat the estimations on opinion on entrepreneurship, interest in entrepreneurship and entrepreneurial intention but retain only those control variables that turned out to have a significant effect on the respective outcome.[38] These regressions control for idiosyncratic differences between the students by exploiting the rich information given by the comprehensive survey questions in the best possible way. Results with this selection of significant control variables can be found in Table 6 in the columns with odd numbers.

But one might speculate that the effects of universities on students' attitude towards entrepreneurship as occupational alternative could still be driven by unobserved heterogeneity. Differences between the universities that result from differences in the economic environment at the universities' sites already cancel out since I include university fixed effects. By now I also include fixed effects for the students' field of studies and the survey wave to control for field

[38] Those variables are indicated in Table A2 in the appendix.

specific and calendar time specific influences. Moreover, with the interaction effects of university and survey year I account for time variant institutional differences between the universities. But there might still be time variant factors rooted in the institutional environment of the different university sites that selectively drive the outcomes of certain groups of students. Such factors could drive both, the probability that a student studies at a university that applies measures of entrepreneurship education and the students' attitude towards entrepreneurship. In order to address this issue I make further use of the panel structure of my data and add a full set of interaction effects to thoroughly control for potential confounds of differences and changes in the institutional framework at the university sites. Thus in a final step I additionally include the interaction effect between the university indicator and the indicator for the students' major subject, the interaction effect between the field of studies and the survey year and the interaction effect between university indicator, field of study indicator and the survey year into my regressions according to Equation 2.

Equation 2: Probit Estimation with Full Set of Interaction Effects

$$\Pr(Y_{imut}=1|.) = \alpha + \alpha_m + \alpha_u + \alpha_t + \alpha_{ut} + \alpha_{um} + \alpha_{mt} + \alpha_{umt} + \ldots$$
$$\ldots \quad + \beta_1(chair)_{ut} + \beta_2(EXIST)_{ut} + \beta_3(chair * EXIST)_{ut} + X_{imut}\beta_4 + \varepsilon_{imut}$$

In this equation α_{um} explicitly controls for differences between universities with respect to different fields of study, e.g. a particular focus of some universities on certain subjects. α_{mt} takes time variant differences between the thirteen fields of study into account as they might result from changes in the labor market conditions. Eventually α_{umt} controls for time variant differences between the faculties as they might e.g. result from changes in the academic staff. Estimation results with this full set of interaction effects are reported in Table 6 in the columns with even numbers. While these regressions further reduce unobserved heterogeneity by accounting for time invariant as well as time variant differences in the institutional conditions and the various university sites, they clearly reach the limit of what is possible with the data at hand.[39]

[39] In fact, I did all estimations also with this full set of interaction effects. I actually lose several observations due to the small number of observations in some cells. Consequently, I regard these estimations as robustness check and rely on the estimations according to Equation 1 instead. The coefficients presented in Table 6 summarize the estimations results according to Equation 2 that are fully in line with the previous results quite well. Further results from estimations according to Equation 2 are available from the author upon request.

Table 5: Summary of University Effects on Students' Attitude towards Entrepreneurship and Robustness Check

	(1) **Opinion.** All sign. Controls (Equation 1)	(2) **Opinion.** Full set of Int. Effects (Equation 2)	(3) **Interest.** All sign. Controls (Equation 1)	(4) **Interest.** Full set of Int. Effects (Equation 2)	(5) **Intention.** All sign. Controls (Equation 1)	(6) **Intention**. Full set of Int. Effects (Equation 2)
Attitude towards entrepreneurship						
chair	-0.076***	-0.091***	-0.042***	-0.083*	0.002	0.034
	(0.004)	(0.025)	(0.007)	(0.047)	(0.003)	(0.021)
EXIST	-0.075***	-0.045**	-0.018*	-0.027	0.072***	0.026**
	(0.004)	(0.021)	(0.010)	(0.035)	(0.006)	(0.013)
chair*EXIST	0.043***	0.030**	0.071***	0.131***	-0.069***	-0.039***
	(0.002)	(0.015)	(0.014)	(0.019)	(0.003)	(0.012)
Controls						
Baseline	All	All	All	All	All	All
Study related	Selection	Selection	Selection	Selection	Selection	Selection
Job related	Selection	Selection	Selection	Selection	Selection	Selection
Individual	Selection	Selection	Selection	Selection	Selection	Selection
Social Network	Selection	Selection	Selection	Selection	Selection	Selection
Observations	30,338	29,428	28,538	28,505	28,829	28,296
Pseudo R-squared	0.0476	0.0756	0.160	0.177	0.166	0.185

Notes: Table reports probit marginal effects at the sample mean. Dependent variable 'opinion on entrepreneurship as occupational alternative' in Colums (1) and (2) corresponds to Table 3. Dependent variable 'interest in entrepreneurship as occupational alternative' in Colums (3) and (4) corresponds to Table 4. Dependent variable 'entrepreneurial intentions' in Colums (5) and (6) corresponds to Table 5. All specifications include university fixed effects, survey wave fixed effects, fixed effects for the students' major field of studies and the interaction effect of university indicator and survey wave. Columns (2), (4) and (6) additionally include interaction effects between university and major field of studies, survey wave and major field of studies, and university and major field of studies and survey wave. The control variables are described in more detail in Table A2 in the appendix. Cluster (university) robust standard errors are reported in parentheses. *denotes 10% level of significance, **denotes 5% level of significance, ***denotes 1% level of significance.

By now I can conclude that the most important measures of entrepreneurship education at German universities, i.e. the establishment of chairs for entrepreneurship and the participation in the EXIST program do affect a university's students' attitude towards entrepreneurship as occupational alternative. If a university fully institutionalizes entrepreneurship education by applying both measures simultaneously, this has an independent additional effect on the students' attitude towards entrepreneurship. Anyhow, the measures affect students' attitude towards entrepreneurship as occupational alternative differently.

The existence of a chair for entrepreneurship per se reduces the likelihood that students can express an opinion on whether they would like to be permanently employed as entrepreneur in the future. Moreover, students at universities with chair for entrepreneurship less often con-

sider becoming an entrepreneur in the future to be an option than students at universities without chair for entrepreneurship. Anyhow, this decrease in the overall interest in entrepreneurship does not translate into a decrease in the likelihood of having entrepreneurial intentions. Indeed, this outcome is unaffected by the existence of a chair for entrepreneurship. Accordingly, the existence of a chair for entrepreneurship does not seem to discourage students with concrete entrepreneurial intentions, but rather to dissuade students from seeing entrepreneurship as kind of an occupational backup option with the result that less students can clearly decide on whether they might be willing to take some remote entrepreneurial opportunity.

The effect of the participation in the EXIST program is somewhat different. Quite surprisingly, the participation in EXIST, in other words the provision of informational services for students interested in entrepreneurship and the establishment of entrepreneurship consultancies, decreases the likelihood that students express a clear opinion on whether they would like to be employed as entrepreneur in the future or not. So the increase of information about entrepreneurship at EXIST universities seems indeed to increase the students' indifference towards this occupational alternative. But unlike chairs for entrepreneurship, the EXIST program does not significantly affect the students' propensity to be interested in entrepreneurship. Although the EXIST measure does not affect the overall interest in entrepreneurship as occupational alternative, it nevertheless increases the likelihood that students express a distinct entrepreneurial intention. This is an indication that EXIST specifically affects wannabe entrepreneurs and indeed succeeds in eliciting entrepreneurial desires.

Eventually, the simultaneous provision of both measures has the most pronounced effect. Universities that provide large scale of information on entrepreneurship at broad scope, i.e. universities that participate in the EXIST program and have a chair for entrepreneurship, significantly affect students' attitude towards entrepreneurship at all outcome levels. Students enrolled at those "entrepreneurial universities" are more likely to be able to express a clear opinion on whether they would consider becoming an entrepreneur in the future, and they are significantly more likely to be interested in this occupational alternative. So far, only universities that apply both measures have the ex ante expected effect on their students' attitude towards entrepreneurship. Although these universities increase their students' interest in entrepreneurship, they do not fill them with enthusiasm for a career as entrepreneur. On the contrary, students' at EXIST universities that also have a chair for entrepreneurship are significantly less likely to have entrepreneurial intentions than students at any other university. This could

be an indication that these “entrepreneurial universities” also raise the students’ awareness of the challenges related to entrepreneurship.

Since all measures include an improved provision of information on entrepreneurship as occupational alternative I expected that all measures would help students to form an opinion on the question whether they would like to be employed as entrepreneur in the future. But only universities that apply both measures fulfill this expectation. Of course, my initial presumption could be wrong. Perhaps the average student already has some predefined opinion on entrepreneurship when entering university, and the measures make her update her initial beliefs. The negative effect of chairs for entrepreneurship on interest in entrepreneurship would be in line with this reasoning. It could be that the improved information on entrepreneurship makes students give up some naïve visions about what life might be like as independent entrepreneur, but that only the full treatment at EXIST universities with chair really help them to form a new opinion. Anyhow, since I do not observe the students’ initial attitude towards entrepreneurship before starting their studies I cannot investigate this process of opinion formation further.

Another puzzle is the difference between the measures of entrepreneurship education on the students’ entrepreneurial intentions, particularly the difference between the EXIST main effect and the interaction effect between EXIST and chair. The existence of a chair for entrepreneurship alone that reduces the overall interest in entrepreneurship does not affect the concrete intention to become an entrepreneur in the future. This is most probably the result of a more restricted scope of the chair effect, since chairs usually address students of particular faculties. EXIST universities do anyhow significantly increase their students entrepreneurial intentions, although these universities do not affect the overall interest in this occupation. Apparently, the EXIST measure rather selectively affects students with a strong entrepreneurial affinity. EXIST universities that also have a chair for entrepreneurship do in contrast decrease their students’ entrepreneurial intentions although they manage to raise the overall interest in this occupation. If the combination of the EXIST measure with the chair measure was efficient in practice, this could be the outcome of an improved selection where only those students would express entrepreneurial intentions who do indeed have good chances to succeed as entrepreneur. In order to better understand these differences, I now turn my focus to these students with entrepreneurial intentions only.

5.5.2 Selective Effects on Students with Entrepreneurial Intentions

In a final step I take a closer look at students who state that they certainly want to become an entrepreneur in the future (hereafter also referred to as "entrepreneurial students"). If entrepreneurship education really helps students to update their beliefs on entrepreneurship, then it should be a different (since more selective) group of students that have entrepreneurial intentions at universities that apply measures of entrepreneurship as compared to universities that do not apply such measures. But the previous results also suggest that students with entrepreneurial intentions could differ between universities that apply different measures. Particularly the differences between the EXIST main effect and the interaction effect for EXIST universities that also have a chair for entrepreneurship (hereafter also referred to as "entrepreneurial universities") is interesting. If it was true that EXIST universities attracted more students from different fields to entrepreneurship, then this should translate into distinctive characteristics of the entrepreneurial students at EXIST universities. If EXIST universities with chair for entrepreneurship really succeeded in dissuading the least promising wannabe entrepreneurs, then students with entrepreneurial intentions should be particularly skilled at these entrepreneurial universities.

To investigate these differences, I restrict my data to the subsample of students with entrepreneurial intentions only. I use the baseline regressions according to equation 1 and regress a couple of individual characteristics on the university measures. The resulting coefficients indicate in how far the measures of entrepreneurship education do selectively affect certain types of students. To ease the interpretation of the results I additionally present the correlation between the respective individual attribute and having entrepreneurial intentions at all for the full sample. The subsequent tables report the regression results for different sets of outcome variables.

Table 6: Differences between Students with Entrepreneurial Intentions by University Type – Study Situation

	final grade (school) above average	afflicted by performance requirements	fears s/he will not accomplish studies	plans abandoning studies	afflicted by personal problems	afflicted by financial prospects	dislikes being a student
Students with entrepreneurial intention							
chair	-0.080***	0.070***	-0.001	0.074***	0.027	-0.026	0.939***
	(0.019)	(0.020)	(0.022)	(0.023)	(0.017)	(0.021)	(0.006)
EXIST	0.151***	0.135***	0.251***	0.619***	0.113***	-0.199***	0.995***
	(0.021)	(0.024)	(0.035)	(0.068)	(0.019)	(0.014)	(0.001)
chair*EXIST	-0.168***	-0.231***	-0.183***	-0.038***	-0.093***	0.360***	-0.213***
	(0.026)	(0.017)	(0.034)	(0.005)	(0.014)	(0.118)	(0.008)
Observations	3,788	3,828	3,834	3,334	3,812	3,791	2,899
Pseudo R-squared	0.0982	0.0879	0.0671	0.180	0.0786	0.121	0.147
All students							
entrepreneurial	-0.096***	0.024***	0.027***	0.009***	0.015**	0.019**	0.010**
intention	(0.010)	s(0.007)	(0.007)	(0.003)	(0.007)	(0.007)	(0.004)
Observations	30,958	31,116	31,142	31,122	31,075	30,930	30,842
Pseudo R-squared	0.0999	0.0669	0.0324	0.0713	0.0360	0.0804	0.0630
Controls							
Baseline	All	All	All	All	All	All	All

Notes: Table reports probit marginal effects at the sample mean. Dependent variable "final grade (school) above average" is unity if a student's final grade in his/her high school diploma is above the survey wave's average, zero otherwise. "Afflicted by performance requirements" is unity if a student gives top 2 value positive answer to the question "How much do you feel afflicted by your studies' performance requirements?", zero otherwise. "Fears s/he will not accomplish studies" is unity if a student gives top 2 value positive answer to the question "In how far do you agree: I fear that I might not finish my studies at all", zero otherwise. "Plans abandoning studies" is unity if a student gives top 2 positive answer to the question "Do you seriously think about abandoning your studies?", zero otherwise. "Afflicted by personal problems" is unity if a student gives top 2 value positive answer to the question "How much do you feel afflicted by personal problems?", zero otherwise. "Afflicted by financial prospects" is unity if a student gives top 2 value positive answer to the question "How much do you feel afflicted by your financial situation after graduation?", zero otherwise. "Dislikes being a student" is unity if a student gives top 2 value negative answer to the question "Taken all together, do you like being a student?", zero otherwise. All specifications include university fixed effects, survey wave fixed effects, fixed effects for the students' major field of studies and the interaction effect of university indicator and survey wave. The control variables are described in more detail in Table A2 in the appendix. Cluster (university) robust standard errors are reported in parentheses. *denotes 10% level of significance, **denotes 5% level of significance, ***denotes 1% level of significance.

Only at EXIST universities do entrepreneurial students have had significantly better grades at school, while at other universities with measures for entrepreneurship education students are even less likely to have graduated from secondary school with a grade above average, an item already negatively correlated with having entrepreneurial intentions in general. Nevertheless, students with entrepreneurial intentions at EXIST universities are more likely to feel afflicted by the performance requirements of their respective studies. This goes so far that they fear not be able to finish their studies at all and are also have a higher probability to plan to giving up their studies. Entrepreneurial students at EXIST universities more often state that they have personal problems even though they are less likely to feel afflicted by their financial prospects. Consequently, at EXIST universities entrepreneurial students are significantly more inclined to generally dislike their situation as student.

With respect to these characteristics, entrepreneurial students at entrepreneurial universities are the exact opposite. Although they tend to have had worse grades at school they feel less afflicted by their studies than other students with entrepreneurial intentions, are more confident that they will finish and hence less likely to think about abandoning their studies. They are also less inclined to feel afflicted by personal problems but more concerned with their financial situation. Consequently, they are also less likely to dislike their studies. Accordingly, it seems as if students with entrepreneurial intentions at EXIST universities had some problems with their studies, while entrepreneurial students feel more comfortable with their overall situation at universities that additionally have a chair for entrepreneurship.

Table 7: Differences between Students with Entrepreneurial Intentions by University Type – Course of Studies

	has changed major subject	has changed university	does not study intensely	strong interest in field of studies	seeks comprehensive knowledge	wants to improve society	wants to delay working life
Students with entrepreneurial intention							
chair	-0.098***	-0.026**	0.094***	0.036**	0.294***	-0.067***	0.078***
	(0.014)	(0.013)	(0.027)	(0.017)	(0.017)	(0.023)	(0.027)
EXIST	0.136***	0.039**	0.117***	-0.251***	-0.210***	0.108***	0.891***
	(0.040)	(0.018)	(0.014)	(0.020)	(0.031)	(0.013)	(0.009)
chair*EXIST	0.008	-0.088***	-0.076***	0.149***	0.403***	-0.011	-0.239***
	(0.094)	(0.014)	(0.006)	(0.021)	(0.048)	(0.039)	(0.003)
Observations	3,751	3,768	3,723	3,845	3,832	3,829	3,546
Pseudo R-squared	0.113	0.148	0.0783	0.0683	0.0545	0.0509	0.0801
All students							
entrepreneurial	0.015**	-0.003	0.016***	-0.022**	0.044***	0.025***	-0.002
intention	(0.007)	(0.007)	(0.006)	(0.009)	(0.008)	(0.009)	(0.005)
Observations	31,063	30,913	31,157	31,194	31,145	31,126	31,095
Pseudo R-squared	0.0884	0.0995	0.0453	0.0416	0.0407	0.0321	0.0319
Controls							
Baseline	All	All	All	All	All	All	All

Notes: Table reports probit marginal effects at the sample mean. Dependent variable "has changed major subject" is unity if a student gives positive answer to the question "Have you changed your major subject in the course of your studies?", zero otherwise. "Has changed university" is unity if a student gives positive answer to the question "Have you changed the university you study at in the course of your studies?", zero otherwise. "Does not study intensely" is unity if a student gives top 2 value negative answer to the question "In how far do you agree: I work intensely and much for my studies", zero otherwise. "Strong interest in field of studies" is unity if a student gives top 2 positive answer to the question "In how far do you regard studies at a university to be useful to yourself: To learn more about the selected field", zero otherwise. "Seeks comprehensive knowledge" is unity if a student gives top 2 value positive answer to the question "In how far do you regard studies at a university to be useful to yourself: To develop a generally educated character?", zero otherwise. "Wants to improve society" is unity if a student gives top 2 value positive answer to the question "In how far do you regard studies at a university to be useful to yourself: To become able to contribute to the improvement of the society?", zero otherwise. "Wants to delay working life" is unity if a student gives top 2 value negative answer to the question "In how far do you regard studies at a university to be useful to yourself: To delay the working life as long as possible?", zero otherwise. All specifications include university fixed effects, survey wave fixed effects, fixed effects for the students' major field of studies and the interaction effect of university indicator and survey wave. The control variables are described in more detail in Table A2 in the appendix. Cluster (university) robust standard errors are reported in parentheses. *denotes 10% level of significance, **denotes 5% level of significance, ***denotes 1% level of significance.

Regarding the course of studies, entrepreneurial students at EXIST universities are more likely to have changed their major subject and even the university they study at. Still they honestly admit that they do not study intensely and much. It fits into the picture that these students are less inclined to have a strong interest in their field of studies. But they are interested in acquiring comprehensive general knowledge neither. Strong motives for studying are rather the wish to improve society and the desire to procrastinate work life. Again, students with entrepreneurial intentions at entrepreneurial universities differ significantly from those at EXIST universities. They are less likely to have changed the university they study at. They reject the statement that they do not study intense and much, but express a strong interest in their field of studies, an interest that is negatively correlated with the overall propensity to have entrepreneurial intentions. But they also want to acquire comprehensive general knowledge, a desire already positively correlated with the overall probability to have entrepreneurial intentions. Improving the society is of no particular interest for entrepreneurial students at entrepreneurial universities. But different from students at EXIST universities, they are significantly less likely to use their study time to procrastinate work. Overall, students with entrepreneurial intentions at EXIST universities with additional chair for entrepreneurship seem to be focused on their studies and interested in knowledge acquisition, while entrepreneurial students at EXIST universities tend to be more erratic.

Table 8: Differences Between Students with Entrepreneurial Intentions by University Type – Job Perspectives

	secure job is important	high income is important	well informed about start up opportunities	well informed about labor market	yet decided on future occupation	expects no difficulties on labor market	labor market flexibility
Students with entrepreneurial intention							
chair	-0.248***	-0.078***	-0.081***	0.003	0.028	0.013	0.048***
	(0.022)	(0.023)	(0.019)	(0.026)	(0.021)	(0.017)	(0.014)
EXIST	-0.068***	-0.230***	0.208***	0.046**	0.084***	0.241***	0.118***
	(0.025)	(0.023)	(0.027)	(0.021)	(0.032)	(0.050)	(0.010)
chair*EXIST	-0.136***	-0.130***	-0.236***	-0.105	-0.129	-0.193***	-0.146***
	(0.026)	(0.047)	(0.010)	(0.064)	(0.145)	(0.029)	(0.032)
Observations	3,843	3,844	3,829	3,817	3,704	3,840	3,826
Pseudo R-squared	0.0790	0.0753	0.0634	0.0560	0.0918	0.125	0.0827
All students							
entrepreneurial	-0.045***	0.147***	0.111***	0.028***	0.080***	0.078***	0.000
intention	(0.008)	(0.009)	(0.007)	(0.010)	(0.009)	(0.010)	(0.007)
Observations	31,187	31,195	31,057	31,119	30,529	31,155	31,089
Pseudo R-squared	0.0457	0.0606	0.0914	0.0332	0.123	0.106	0.0575
Controls							
Baseline	All	All	All	All	All	All	All

Notes: Table reports probit marginal effects at the sample mean. Dependent variable "secure job is important" is unity if a student gives top 2 value positive answer to the question "What is important for you with respect to a job: Job security", zero otherwise. "High income is important" is unity if a student gives top 2 value positive answer to the question "What is important for you with respect to a job: High income", zero otherwise. "Well informed about start up opportunities" is unity if a student gives top 2 value positive answer to the question "How well do you feel informed about possibilities to start an own business?", zero otherwise. "Well informed about labor market" is unity if a student gives top 2 value positive answer to the question "How well do you feel informed about the labor market in your aspired field of occupation?", zero otherwise. "Yet decided on future occupation" is unity if a student gives positive answer to the question "Have you already decided on your future occupation?", zero otherwise. "Expects no difficulties on labor market" is unity if a student answers "hardly any difficulties to find a job" to the question "How do you evaluate your job perspectives after graduation?", zero otherwise. "Labor market flexibility" is unity if a student gives top 2 value positive answer to the question "If you had problems to realize your occupational plans due to the labor market conditions after graduation, what would you do: I would be willing to accept greater burdens (e.g. move, commute)", zero otherwise. All specifications include university fixed effects, survey wave fixed effects, fixed effects for the students' major field of studies and the interaction effect of university indicator and survey wave. The control variables are described in more detail in Table A2 in the appendix. Cluster (university) robust standard errors are reported in parentheses. *denotes 10% level of significance, **denotes 5% level of significance, ***denotes 1% level of significance.

Interestingly, all three measures of entrepreneurship education decrease the probability that a student with entrepreneurial intentions is looking for an occupation with high job security. While job security is rather unimportant for entrepreneurial students in general, entrepreneurial students at universities with entrepreneurship education seem to be even more prone to take occupational risks. Moreover, while overall students with entrepreneurial intentions are looking for an occupation with high income, entrepreneurial students at universities with entrepreneurship education are less likely to rate high income as important. This hints at some informational success of all measures, since students with entrepreneurial intentions at universities with measures for entrepreneurship education seem to have somewhat more realistic expectations with regard to challenges and opportunities of an entrepreneurial endeavor than students with entrepreneurial intentions at a university from the control group.

Anyhow, it is only the students at EXIST universities that do indeed feel well informed about start up opportunities. Students at universities with chair for entrepreneurship as well as students at entrepreneurial universities are significantly less likely to feel well informed about possibilities to found their own enterprise than entrepreneurial students at any other university. Whether this striking result is actually driven by differences in the quality of the information provided cannot be evaluated here. Moreover, students at EXIST universities are more likely to state that they are well informed about the labor market in their field. Additionally they are more likely to have decided on their future occupation with certainty. Entrepreneurial students at EXIST universities do not expect difficulties on the labor market and tend to be flexible with regard to their future occupation, i.e. they are more inclined to “accept major burdens, e.g. move” when facing problems on the labor market. Entrepreneurial students at entrepreneurial universities are less relaxed with respect to their job expectations, but they are also less flexible. Thus overall, students at EXIST universities seem to be somewhat better prepared for the labor market.

Table 9: Differences between Students with Entrepreneurial Intentions by University Type – Job Expectations

	job is very important for life	job aspiration: realize own ideas	job aspiration: decide independently	job aspiration: lead other people	job aspiration: help other people	unimportant for job: usefulness to society	job should grant advancement
Students with entrepreneurial intention							
chair	0.032*	0.025*	-0.034**	0.081***	0.025	0.162***	-0.090***
	(0.017)	(0.013)	(0.017)	(0.022)	(0.022)	(0.013)	(0.022)
EXIST	-0.126***	0.127***	0.041***	-0.186***	0.180***	-0.082***	-0.267***
	(0.035)	(0.014)	(0.012)	(0.028)	(0.026)	(0.010)	(0.030)
chair*EXIST	0.140	-0.425***	-0.149***	0.288***	-0.193***	0.146***	0.140***
	(0.089)	(0.048)	(0.025)	(0.059)	(0.042)	(0.054)	(0.031)
Observations	3,837	3,844	3,827	3,843	3,839	3,805	3,838
Pseudo R-squared	0.0450	0.0663	0.0618	0.0410	0.0926	0.0763	0.0832
All students							
entrepreneurial	0.128***	0.139***	0.180***	0.194***	0.028**	0.017***	0.142***
intention	(0.010)	(0.009)	(0.007)	(0.008)	(0.013)	(0.005)	(0.009)
Observations	31,123	31,191	31,202	31,190	31,169	31,135	31,164
Pseudo R-squared	0.0336	0.0397	0.0371	0.0493	0.124	0.0657	0.0787
Controls							
Baseline	All	All	All	All	All	All	All

Notes: Table reports probit marginal effects at the sample mean. Dependent variable "job is very important for life" is unity if a student gives top 2 value positive answer to the question "How important are the following areas of life to you: job and work", zero otherwise. "Job aspiration: realize own ideas" is unity if a student gives top 2 value positive answer to the question "What is important for you with respect to a job: To be able to realize own ideas", zero otherwise. "Job aspiration: decide independently" is unity if a student gives top 2 value positive answer to the question "What is important for you with respect to a job: To be able to decide independently", zero otherwise. "Job aspiration: lead other people" is unity if a student gives top 2 value positive answer to the question "What is important for you with respect to a job: Ability to lead other people", zero otherwise. "Job aspiration: help other people" is unity if a student gives top 2 value positive answer to the question "What is important for you with respect to a job: To be able to help other people", zero otherwise. "Unimportant for job: usefulness to society" is unity if a student gives top 2 value negative answer to the question "What is important for you with respect to a job: To be able do something that is useful to society", zero otherwise. "Job should grant advancement" is unity if a student gives top 2 value positive answer to the question "What is important for you with respect to a job: opportunity for advancement", zero otherwise. All specifications include university fixed effects, survey wave fixed effects, fixed effects for the students' major field of studies and the interaction effect of university indicator and survey wave. The control variables are described in more detail in Table A2 in the appendix. Cluster (university) robust standard errors are reported in parentheses. *denotes 10% level of significance, **denotes 5% level of significance, ***denotes 1% level of significance.

Nevertheless, students with entrepreneurial intentions at EXIST universities are less likely to evaluate job and occupation to be very important for their lives. For them having a job where they can realize their own ideas and act independently is of principal concern. Leading other people is anyhow not essential to them. Another driving force for their job aspiration is to find an occupation where they can help other people. Consequently, finding a job that is useful to society is not unimportant for them. But they are seemingly not motivated by the desire to carve out a career. Students with entrepreneurial intentions at entrepreneurial universities have somewhat different job expectations. While finding a job that allows to realize own ideas or to decide independently are strong predictors for having entrepreneurial intentions in general, entrepreneurial students at entrepreneurial universities are less likely to expect this feature from their future occupation. For them leadership is an important job component. They are not looking for a job where they can help other people and are more likely to regard a job's usefulness to society to be unimportant. All together entrepreneurial students at universities that apply both measures of entrepreneurship education seem to be more likely to evaluate their job prospects from a career point of view. Their counterparts at EXIST universities associate more altruistic goals with their job but also strive for independence.

Table 10: Differences between Students with Entrepreneurial Intentions by University Type – General Features

	any subject science	any subject engineering	any subject economics	any parent entrepreneur	female
Students with entrepreneurial intention					
chair	-0.525***	0.992***	0.107***	0.079***	0.121***
	(0.008)	(0.001)	(0.022)	(0.018)	(0.025)
EXIST	-0.556***	-0.243***	-0.103***	-0.095**	-0.266***
	(0.008)	(0.015)	(0.014)	(0.040)	(0.027)
chair*EXIST	0.982***	0.588***	-0.114***	0.290	0.226***
	(0.001)	(0.102)	(0.021)	(0.180)	(0.057)
Observations	3,556	3,048	3,817	3,853	3,837
Pseudo R-squared	0.124	0.212	0.174	0.0428	0.148
All students					
entrepreneurial	-0.029***	-0.001	0.069***	0.087***	-0.111***
intention	(0.009)	(0.003)	(0.009)	(0.008)	(0.010)
Observations	30,863	30,084	31,095	31,267	31,241
Pseudo R-squared	0.150	0.361	0.164	0.0216	0.135
Controls					
Baseline	part	part	part	part	part

Notes: Table reports probit marginal effects at the sample mean. Dependent variable "any subject science" is unity if a student studies any major or minor subject from the field of science, zero otherwise. "Any subject engineering" is unity if a student studies any major or minor subject from the field of engineering, zero otherwise. "Any subject economics" is unity if a student studies any major or minor subject from the field of economic sciences, zero otherwise. "Any parent entrepreneur" is unity if a student's father or mother is self-employed entrepreneur (no freelancer), zero otherwise. "Female" is unity if a student is female, zero otherwise. All specifications include university fixed effects, survey wave fixed effects, fixed effects for the students' major field of studies and the interaction effect of university indicator and survey wave. The control variables are described in more detail in Table A2 in the appendix. Cluster (university) robust standard errors are reported in parentheses. *denotes 10% level of significance, **denotes 5% level of significance, ***denotes 1% level of significance.

Eventually, I take a look at some very general issues that I used as baseline control variables in the previous estimations. These regressions analyze some fundamental differences between the groups of students with entrepreneurial intentions at the different types of universities. First, the composition of the group of entrepreneurial students with respect to their field of studies attracts some notice. In general, it is most of all economics students that express entrepreneurial intentions. Students from the field of sciences are significantly less likely to have such intentions. At universities with only a chair for entrepreneurship, it is even less probable that students with entrepreneurial intentions come from the field of science. But as compared to all other students with entrepreneurial intentions, at these universities entrepreneurial students are more likely to study engineering or economics. This result probably re-

flects the comparably limited focus of most chairs for entrepreneurship that concentrate on certain faculties. At universities that do not only have a chair for entrepreneurship but also participate in the EXIST program, entrepreneurial students are significantly less likely to study economics. At these universities students with entrepreneurial intentions not only recruit from the field of engineering, but also science students are significantly more inclined to have entrepreneurial intentions. The composition of the group of entrepreneurial students at EXIST universities is entirely different. They are significantly less likely to come from the fields of science, engineering, or economics. Also children of entrepreneurs are less often among them. But male students even more probably belong to the group of students with entrepreneurial intentions at EXIST universities. With respect to gender, universities with chairs for entrepreneurship and particularly entrepreneurial universities have significantly more female students in the group of entrepreneurial students, a promising result since female students are usually significantly less likely to have entrepreneurial intentions.

Altogether these results indicate that EXIST universities in general manage to raise their students' entrepreneurial intentions, but that they attract particular students to entrepreneurship. These students are neither very focused on their studies, nor are they extraordinarily self-interested. Moreover, they do come from field of studies that are not the stereotypical sources of high-tech entrepreneurship. By now means do I want to speculate about their chances of entrepreneurial success. Indeed, I do not have any information on that. It is just worth noticing that EXIST universities manage to foster entrepreneurial intentions by attracting a larger variety of students to entrepreneurship as occupational alternative.

EXIST universities that also have a chair for entrepreneurship on the contrary do reduce the overall probability that students' have entrepreneurial intentions. But the remaining group of students with entrepreneurial intentions can be regarded to be a selective one as well. They are very focused on their studies and driven by career considerations. But they are also somewhat less flexible and expect problems on the labor market, so it cannot be ruled out that some of them see entrepreneurship as a fallback option. Anyhow, they are significantly more likely to study engineering or science, two promising fields for academic entrepreneurship. This is some indication that the overall reduction in the students' entrepreneurial intentions could indeed be the result of discouraging students with not too serious intentions. The composition of the remaining group of entrepreneurial students does at least not contradict the suggestion that entrepreneurial students at entrepreneurial universities are particularly skilled

for entrepreneurship. However, the results are not sufficiently conclusive to make a strong claim on the quality of entrepreneurial students at entrepreneurial universities yet.

5.6 Conclusions

This chapter shows that measures for entrepreneurship education applied at universities do significantly affect students' attitude towards entrepreneurship as occupational alternative – and that different measures affect students' attitude differently. Interestingly, the establishment of a chair for entrepreneurship reduces the probability that students can express an opinion on the question whether they would like to be permanently employed as entrepreneur in the future. Moreover, this measure makes students less likely to be interested in entrepreneurship as occupational alternative. This could be the result of students becoming more sensitive for the challenges related to entrepreneurial endeavors when treated with the information provided by the chairs. Even though chairs do not affect the students' overall probability to have concrete entrepreneurial intentions, the group of students with entrepreneurial intentions at universities with chair for entrepreneurship is somewhat selective. Chairs for entrepreneurship particularly affect students from the fields of economics and engineering, i.e. students from the faculties the chairs usually belong to.

Universities that participate in the EXIST program and thus provide a variety of informational and consultative services also increase the probability that students are indifferent towards the question whether they would like to become an entrepreneur in the future. While these universities have no effect on the students' overall interest in entrepreneurship, they significantly increase the probability that students have concrete entrepreneurial intentions. The group of students with entrepreneurial intentions is anyhow quite specific. EXIST universities attract students to entrepreneurship whose subjects are usually somewhat distinct to stereotypical entrepreneurial endeavors. Thus it seems that EXIST universities succeed in eliciting entrepreneurial intentions among students that usually do not tend to have a strong interest in entrepreneurship. Whether this is an actual success cannot be evaluated here. Anyhow, it is evident that EXIST universities spread the "entrepreneurial spirit" comparably widely.

The most conclusive effect on students' attitude towards entrepreneurship is obtained by universities that fully institutionalize entrepreneurship education, i.e. universities that participate in the EXIST program and have a chair for entrepreneurship. Only at these entrepreneurial universities are students significantly more likely to be able to express an opinion on whether

they consider entrepreneurship to be an occupational alternative for themselves. Furthermore, these universities succeed in increasing the overall interest in entrepreneurship. But interestingly, students at entrepreneurial universities are significantly less likely to have concrete entrepreneurial intentions. When looking at this selective group it turns out that the reduction of the overall share of students with entrepreneurial intentions could indeed be the result of students giving up unrealistic and even naïve beliefs on this occupation. Moreover, entrepreneurial universities also succeed in getting female students and particularly students from the field of science interested in entrepreneurship.

Controlling for a variety of potential confounds in a diff-in-diff-framework I assess significant university effects on the students' attitude towards entrepreneurship. But the channels of these effects remain somewhat unclear. It could be that the educational treatments make students change their attitudes on entrepreneurship. But the application of measures of entrepreneurship education could also lead to a selection of particular students into certain types of universities. The resulting differences in the students' attitude towards entrepreneurship would be university effects either way – but since I cannot account for the potential selection bias, the results have to be interpreted with caution. Further research is needed to assess in how far measures of entrepreneurship education causally affect students' attitude, and by what extend they attract particular students to specific universities.

This study suggests that only universities with a strong focus on entrepreneurship succeed in establishing an "entrepreneurial culture" at their sites. This is a clear indication that entrepreneurship education requires some effort and a broad commitment to succeed. Apparently, those universities that fully institutionalize entrepreneurship education arouse the students' interest in entrepreneurship and help them to make up their minds. Whether this leads to an increase in the number of academic startups is another question. Given the results at hand one could at least suspect that entrepreneurial universities might perhaps not increase the total number of academic entrepreneurs, but they may indeed contribute to an improved selection of skilled academics into entrepreneurship. In any case, the results obtained in this chapter propose that the education of academic entrepreneurs is a strategic task that cannot be fulfilled by offering the one or the other entrepreneurship course alone.

6. Information Dissemination and Institutional Change[40]

6.1 Introduction

A growing body of literature analyses the political economy of mass media. This literature shows that the emergence of newspapers, the radio and television gradually facilitated the distribution of information among larger and larger shares of the population thus changing the way people think about politics and, as a consequence, the way people vote. This effect is largely attributed to selection and filtering during the editorial process of media production which eventually influence the formation of voters' opinions. It seems that more information provided by mass media comes at the cost of a potential media-induced bias as scale economies in the provision of information imply some concentration of media outlets. Biases may e.g. arise from media actively supporting a certain political ideology (cf. DellaVigna and Kaplan 2007; Durante and Knight, 2012); or the media might concentrate on political issues of general interest at the expense of local topics since the media serve increasingly integrated markets (Snyder and Strömberg, 2010; Gentzkow, 2006).

The emergence of the Internet as the new mass medium of the 21st century now changes the market of mass media substantially. Information can be distributed at high speed, low cost, and broad scope and as a result, there is egalitarian access to the production and the consumption of news (cf. Prat and Strömberg, 2011). The unanswered question is whether the possibility to avoid editorial filtering did indeed influence political preferences and voting behavior. We might expect a more differentiated supply of information but it might just as well be the case that editorial offices of existing media outlets employ the Internet to distribute their news at an even larger scale. Unfortunately, little is yet known about the role of the Internet with the result that "some of the allegedly greater democracy in cyberspace is based more on hope and hype than on careful research" (Putnam, 2000, p.173).

This chapter analyzes the effect of the new mass medium Internet on voting behavior. We combine rich panel data on German elections with unique telecommunication data that document the availability of broadband Internet access across roughly 12.000 German municipalities.[41] The panel structure of our data allows us to compare voting behavior before the Internet

[40] This chapter is based on Falck, Oliver, Gold, Robert and Heblich, Stephan (2012), E-Lections: Voting Behavior and the Internet, CESifo Working Paper No. 3827 / IZA Discussion Paper No. 6545.

[41] Broadband Internet access provides a speed of at least 1 Mbit/s. We explicitly concentrate on broadband Internet access as necessary standard to access information through the Internet. At lower rates, it is not possible to

era (before the year 2000) to voting behavior after the Internet era began (after the year 2003).[42] Based on this data, we analyze three potential effects of the Internet on voting behavior: (i) the effect of the Internet on voter turnout since mass media are considered to be an effective measure for mobilization; (ii) the relative importance of the Internet for established parties since the introduction of new media might challenge the established parties' (often exclusive) presence in traditional media; and (iii) whether the Internet provides small parties at the left and right fringes a new platform to promote their political ideologies since the traditional media often filter information on these rather extreme parties and their political goals.

In all cases, the effect of the Internet on voting behavior is not entirely clear *a priori* and the identification of a causal relation is additionally complicated by endogeneity concerns. Rolling out the infrastructure for high-speed Internet is quite costly what makes it efficient to exploit scale economies in densely populated areas. Accordingly, the mere correlation between Internet availability and voting behavior is rather uninformative because it might just as well reflect selective migration to agglomerated areas. If, for instance, people in urban areas were more (less) interested in politics or political participation, OLS estimates would be upward (downward) biased. We resolve this endogeneity problem by exploiting exogenous variations in the transmission capacity of the preexisting voice-telephony network the Internet builds up upon.[43]

Our identification strategy exploits the incidence that the first generation of DSL broadband technology in Germany was entirely built on the existing telephone network which was not fully supporting the DSL technology.[44] The traditional public switched telephone network is based on copper wires which were rolled out long before the Internet era with the officially defined goal to provide universal telephone service to all German households. For our purpose, the relevant part of the telephone network is the copper wires that connect households to a main distribution frame (MDF). The maximal distance between households and the MDF is 10 kilometers (6.21 miles). As the exact distance did not affect the quality of telephone ser-

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effectively access online newspapers and similar information sources.

[42] Broadband Internet infrastructure was initially rolled out in Germany between the years 2000 and 2004. Consequently, we discard this "rollout period" from our analysis.

[43] This strategy is similar to other identification strategies that exploit exogenous variation in technological possibilities to determine the effects of comparable media on voting behavior and political participation. For instance, Strömberg (2004a) uses geological features that affect the quality of radio reception as instruments for the share of households with a radio and Olken (2009) exploits topographical differences that affect signal strength to identify the effect of exposure to television.

[44] Digital subscriber line (DSL) is the dominant Internet technology in Germany. DSL includes all technologies that employ the wires of a local telephone network to transmit digital data.

vices, the layout of this last connection part was mostly determined by the availability of buildings to host MDFs. In contrast to telephone services, the capacity of the DSL technology does depend on the length of the copper wire between the household and the MDF. When surpassing a threshold of 4.2 kilometers (2.61 miles), DSL technology is no longer feasible and parts of the copper wire need to be bypassed with fiber wire. This involves costly earthworks as wires are rolled out subsurface in Germany and as result, the probability of a municipality having access to broadband Internet decreases above the threshold. We exploit this structural break at the threshold of 4.2 kilometers as exogenous explanation for a systematically lower availability of DSL.

Another distance related instrument exploits "wrongly" connected municipalities as source of exogenous variation in the availability of DSL. About 6% of the municipalities in Germany were connected to an MDF at a distance of more than 4.2 kilometers even though there existed a MDF closer to this municipality at a distance below the threshold. The choice of these "wrong" MDFs reflects the geographic layout of the telephone access areas. At a time when distances did not affect the quality of telephone services, organizational considerations of the state-owned monopolistic operator of the telephone network (*Deutsche Bundespost*) determined the choice of an MDF. And if it was a better fit with the regional structure of the telephone areas, a more distant MDF was chosen. Now that distance does play a role for Internet transmission quality, it is often cheaper for the telecommunication carrier to provide DSL to a municipality via the closer MDF than the "wrong" MDF that actually serves the municipality. This leaves us with an exogenous explanation why some of the municipalities across the threshold are more likely to have DSL access.

Beyond these distance-related instruments, we employ one additional instrument that exploits the exogenous variation from a technological mistake that affects the provision of broadband Internet till today. After the German reunification in 1990, there was a lack of telephone access lines in many parts of East Germany. The new infrastructure that closed this gap was built on the basis of a special type of fiber wires instead of copper wires. This new OPAL technology was expected to dominate the ICT future as it was suitable for voice-telephony services, ISDN services, and for a limited amount of data transmission. However, the ongoing request for higher bandwidths soon overextended the OPAL capacities and DSL became the leading access technology for broadband Internet in Germany instead. This development was the misfortune of roughly 11% of the East German households because the fiber wires were

not compatible with the copper cable based DSL technology. Large investments were necessary to reverse this mistake and as a result, many of these areas cannot access DSL until today. This leaves us with an additional source of exogenous variation in DSL availability that is not based on geographical distance.

These sources of exogenous variation turn out to be highly relevant in our instrumental variable estimations and they all show the expected signs. The results of our voting behavior estimations suggest that an increase in DSL availability from 0 to 100 percent decreases voter turnout by 1.3 to 1.8 percentage points. The magnitude of this effect is comparable to the effect of TV on voter turnout reported in Gentzkow (2006). He estimates that the introduction of television in the 1940s and 1950s reduced voter turnout in congressional races by 2 percentage points. The direction of our effect supports the hypothesis that the Internet carries less political information than the media that it crowds out. Recent research suggests that the Internet does only slightly crowd out TV viewing (Liebowitz and Zentner, 2012). Thus, our effect may rather point to a crowding out of newspapers.

Our findings further suggest that small parties cannot benefit from the Internet as platform to increase their publicity. In fact, evidence goes to the opposite direction. Increasing DSL availability from 0 to 100 percent translates into a 2.1 to 3.3 percentage points higher vote share for established parties at the expense of small and especially extreme right-wing parties. The latter experience a decrease in their vote shares by 0.4 to 0.5 percentage points. On the extreme left wing of the political spectrum we do not find significant effects on the vote share. Overall, these results suggest that established parties make better use of the Internet in the post-roll-out phase between the years 2004 and 2008.

Several robustness tests confirm the validity of our results. First, we consider the existence of time-persistent effects which explain systematic differences between the complier municipalities and the control municipalities that are not related to the introduction of DSL. To test for this competing explanation, we exploit the panel structure of our data and shift the window of our analyses to elections before the emergence of the Internet, i.e. before 2000. In line with our arguments, we do not find any indication of differing voting behaviors between complier municipalities and control municipalities. In a second set of robustness checks, we consider an alternative explanation for the observed effect of the Internet on voting behavior. Imagine that the Internet improved the economic conditions of the complier municipalities systematically. If better economic conditions influenced voting behavior this would provide an alternative

explanation for the observed differences in voting behavior. To test this competing explanation, we perform comparable instrumental variable regressions with a municipality's unemployment rate as outcome variable. We find no significant effect of DSL availability on the unemployment rate suggesting that we indeed identify an information effect of the Internet on election outcomes. In a third set of robustness checks we analyze the heterogeneity of the observed effects in more detail and present subsample estimations for East- and West Germany and elections at the national level, state level and municipality level. One interesting finding is that the effect of the Internet on voter turnout seems to be driven by supra-regional elections at the state level and the national level. These effects contrast Gentzkow's (2006) finding that the negative effect of the introduction of TV was especially pronounced in local elections.

The remainder of the chapter is organized as follows. Section 6.2 reviews the existing literature on the political economy of mass media and discusses the expected effect of the Internet on voting behavior. Section 6.3 introduces the data and shows the association between Internet availability and voting behavior in a multivariate framework. Section 6.4 advances our empirical strategy to a causal analysis and introduces our instrumental variable strategy. In this section, we also present our baseline results and provide a number of robustness tests to support the validity of our findings. Section 6.5 concludes.

6.2 The Political Economy of Mass Media

Media are the main source of information for voters about government policies and ideological positions of parties and politicians. Theoretical models that formally express this relationship suggest that more information is generally good for voters because it helps them monitor politicians more efficiently (cf. Besley and Prat, 2006; Strömberg, 2004b). This simple insight is reflected in freedom of information legislations that guarantee access to government information. However, the quality of information provided by the media may vary across political issues and across regions thus giving rise to different kinds of media bias. One obvious bias would arise from a situation where the broad range of mass media was strategically employed to manipulate the public opinion (cf. McMillan and Zoido, 2004). We usually observe this in rather totalitarian regimes. However, even in the absence of strategic manipulation, media can still exert a tendentious influence on the public opinion as they might strengthen voters' predispositions by pervasive selection and filtering (cf. Prat and Strömberg, 2011). The intense Media coverage of an issue can make people believe that this issue is important (*agenda setting*); people may evaluate politicians' decisions based on the issues covered in the media

(*priming*); and the way an issue is characterized in news reports can have an influence on how it is understood by audiences (*framing*).

These different sources of biases seem especially feasible in the context of traditional mass media like newspapers, the radio or TV, where editorial boards determine which topics are covered. For instance, DellaVigna and Kaplan (2007) analyze the impact of the introduction of Fox News in the United States on voting behavior between 1996 and 2000 and find that the market entry of Fox News had a significant effect on the Presidential elections in 2000 with the Republican vote share increasing by 0.4 to 0.7 percentage points. Similarly, Enikolopov, Petrova, and Zhuravskaya (2009) analyze the expansion of the first private Russian TV channel (NTV) which supported the opposition in the 1999 parliamentary elections in Russia. Their estimations suggest that the presence of the independent TV channel decreased the aggregate vote for the government party by 2.5 percentage points while the combined vote for major opposition parties increased by 2.1 percentage points. Moreover, Prat and Strömberg (2006) analyze the introduction of a new commercial TV channel in Sweden as additional source of political information. Using survey data from the same respondents in two consecutive general elections before and after the entry of the commercial channel in 1990, they find significant effects on voters' political knowledge and voter turnout.

For the case of information provided by newspapers, Snyder and Strömberg (2010) find that a poor fit between newspaper markets and political districts reduces press coverage significantly. Increasing the congruence of newspaper markets and political districts from 0 to 1 is associated with 170 more articles written about the district's congressman. The authors then employ this variation in press coverage to infer on voter information and its effect on politicians' actions and policies. They find that voters living in areas with less coverage of their U.S. House representative are less likely to recall their representative's name and they are less able to describe and rate her. This lack of information (and accountability) leads to significantly lower amounts of federal funds flowing into less congruent districts.[45] Newspaper coverage does also influence voting behavior. Gentzkow *et al.* (2011) analyze the effect of increased newspaper coverage in a panel of all U.S. newspapers published in English language that existed between 1869 and 2004. They estimate that one extra newspaper is associated with a 0.3 percent increase in voter turnout. These effects appear to be stronger in the period before 1929, i.e. before the rise of radio and TV.

[45] A similar relationship between newspaper penetration and government spending is also reported by Besley and Burgess (2002) for the case of India.

Studies on the effect of the introduction of radio and television on political participation again suggest an effect of mass media on voting behavior. Strömberg (2004a) analyses the introduction of the radio in the United States in the period from 1920 to 1940 in the context of an unemployment relief program that was implemented during the diffusion period of the radio between 1933 and 1935. He estimates that an increase in the share of households owning a radio from 0 to 1 increases the voter turnout by 7 percentage points in this period. Regions with higher radio reception furthermore received higher funds from the unemployment relief program. This supports the idea that voters' access to mass media influences voter turnout and government policies.

Gentzkow (2006) studies the effect of the introduction of television in the U.S. on voter turnout in an attempt to explain the observed decrease of voter participation in the period from 1940 to 1970. Using variation across regions in the timing of the introduction of this mass medium, he shows that the introduction of television had a negative effect on voter participation. The estimations suggest that the introduction of television in the 1940s and 1950s reduced the turnout in congressional races (without simultaneous presidential elections) by two percent. Gentzkow argues that the effect is caused by TV crowding out media with more extensive coverage on political issues thus reducing the electorates' knowledgeability of political issues. In line with this, the introduction of television in a region was accompanied by a strong decrease of the diffusion of newspapers and radio in this region. By contrast, Oberholzer-Gee and Waldfogel (2009) estimate that the introduction of local Spanish-language television increases voter turnout among Hispanics in a metro area by 5 to 10 percentage points.

This chapter focuses on the new mass medium of the 21st century, the Internet, and the effect of its introduction on political preferences as they are expressed by voting behavior. Previous research on the effect of mass media on voting behavior suggests that the Internet may similarly crowd out traditional media thus affecting voter turnout and election outcomes. In providing direct and cheap access to the consumption and production of information, the Internet offers a way to get around editorial filtering. However, the absence of editorial filtering may also come at some costs as people now filter news by themselves. When they only consume the information and topics they want to hear and read about anyhow this might cause ideological lock-ins (Sunstein, 2001). While the consumption of traditional media such as newspapers, radio or even TV still urges people to encounter diverse viewpoints and exposes

them to new topics and ideas, self-selected news consumption according to prior beliefs bears the risk of segregating thus leading to ideological polarization.[46] Accordingly, the introduction and diffusion of the Internet may increase or decrease the range of news and opinions people are exposed to. Consequently, we hypothesize that the Internet like other mass media does affect voting behavior, but we do not have *a priori* assumptions about the direction of its effects.

In an attempt to get a better understanding of the potential ideological bias caused by a selective use of the Internet, Gentzkow and Shapiro (2010) analyze the ideological segregation of individuals' online news consumption. Their data for the U.S. suggest that segregation on the Internet is low, however higher than in most traditional media, and significantly lower than segregation in face-to-face interactions. Online news consumption is mostly concentrated on a small number of relatively centrist outlets whereas ideologically extreme outlets such as political blogs or activist sites account for a very small share of online news consumption. This chapter takes the initial studies on the effect of the Internet on political participation and political opinions one step further: It analyzes how the introduction of the Internet and the possibility to consume online news affects actual voting behavior, and assesses the causality of this relationship.

6.3 High-Speed Internet Availability and Voting Behavior

6.3.1 High-Speed Internet Availability in German Municipalities

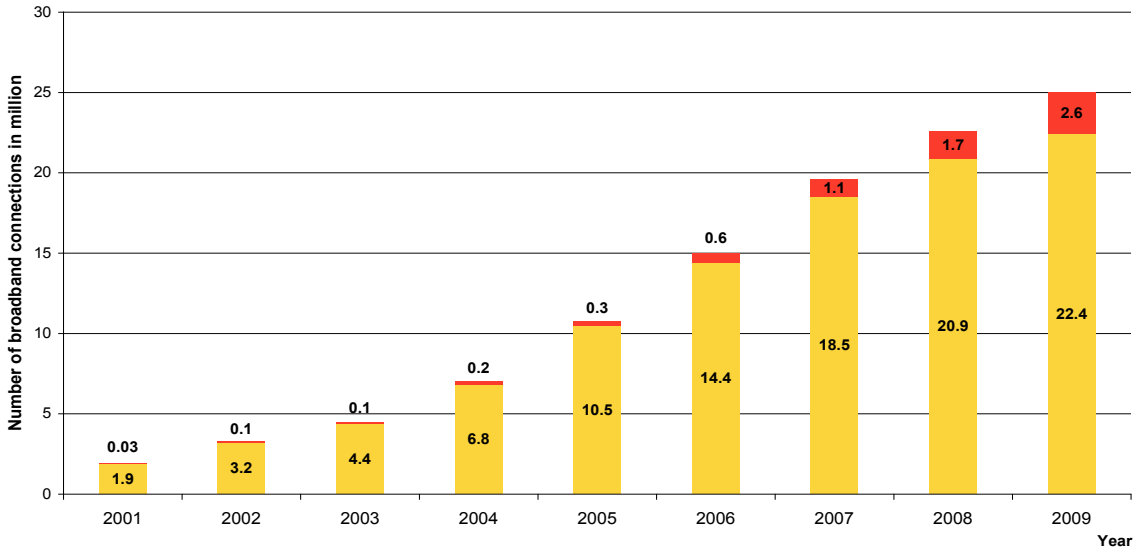
Data on high-speed Internet availability are taken from the German broadband atlas (*Breitbandatlas Deutschland*), an annual survey on broadband Internet availability conducted by the German Ministry of Economics and Technology since the year 2005. Network providers self-report the geographic areas they cover with their networks. This information is combined in a comprehensive dataset documenting the percentage of households that can access DSL across more than 12,000 German municipalities.[47] DSL is the dominant high-speed Internet access technology in Germany which provides a bandwidth of at least 1 Mbit/s. This bandwidth is

[46] Campante and Hojman (2010) find that the introduction of radio and TV contributed to a reduction in the ideological polarization of the United States in the mid-20th century.

[47] For the interpretation of the subsequent results, one has to keep in mind that in our data the DSL rate on the municipality-level is measured as DSL availability, i.e. the percentage of households in a municipality for which a DSL connection is available. However, it is not the pure availability of DSL but its use that will affect the outcome variables on voting behavior. We thus estimate the effect of DSL availability on the outcome variable and not the effect of DSL use. Technically, we thus estimate the intention to treat effect and not the treatment effect, a procedure that does overcome the endogeneity problems related to assessing the effect of DSL use.

the minimum requirement to use the Internet to access news online properly. For example, the webpage *Spiegel Online*, one of the most retrieved news sites in Germany, loads within 15 seconds at a connection of 1Mbit/s. With a dial-up Internet connection of 56k, loading the same site takes more than one minute.

Figure 1: Development of Broadband Connections in Germany by Technology



Notes: Bundesnetzagentur (2010, 75). The figure shows the development of broadband connections in Germany. The lower, lighter bars show the number of DSL connections that are realized via DSL. The upper, darker bars represent the number of broadband connections that are realized via other technologies, mainly via the cable TV network.

Figure 1 shows the development of broadband connections in Germany from 2001 to 2009. Broadband connections via DSL technology were introduced to the market for private households in July 1999 by the incumbent network provider Deutsche Telekom. By the end of the year, 100,000 connections existed (Bundesnetzagentur, 2000). The increasing importance of the Internet pushed the success of DSL and led Deutsche Telekom and its competitors to invest into the further development of the broadband infrastructure. DSL networks where set up in larger cities and as a result, 8% of the population could access DSL in 2001 (Bundesnetzagentur, 2001). Out of 1.9 million broadband connections registered in the year 2001, only 30,000 relayed on another technology than DSL. This underlines the role of DSL as dominant technology for broadband Internet connections which persisted over time. Only in 2007, broadband connections via other technologies (mainly via the cable TV network) reached more than 5% market share. While this share is increasing since then, DSL is by far the most commonly used technology to access the Internet in Germany. We disregard the initial years

of DSL technology and begin our analysis in 2004 when an adequate number of households were connected to broadband Internet.

We now turn to the question for what purposes individuals use the Internet. We are interested in the information function of the Internet thus implicitly assuming that individuals use the Internet to some extent to access news. To assess this, we employ a study by *Arbeitsgemeinschaft Media-Analyse* that asked nearly 19,000 individuals for which purpose they use the Internet (cf. Table 1). The survey was conducted in 2007 and allowed multiple answers. The most frequent answer was "Information Search" (94.6 %) closely followed by "Email" (89.4%) and "News" (71.7%). By contrast, "Entertainment" has been chosen by only 48.8% of the interviewees. These figures suggest that the Internet does have an information function and with its various news sites and information channels, the Internet has become an important player in the mass media market.

Table 1: Internet Usage

	Yes	%	No	%	No answer	Total
News	13,594	71.7%	5,312	28.0%	48	18,954
Information search	17,939	94.6%	984	5.2%	31	18,954
Entertainment	9,258	48.8%	9,581	50.5%	115	18,954
Services	10,400	54.9%	8,481	44.7%	73	18,954
Shopping	10,475	55.3%	8,418	44.4%	61	18,954
Banking	8,326	43.9%	10,550	55.7%	78	18,954
Discussion forums	6,153	32.5%	12,727	67.1%	74	18,954
E-Mail	16,937	89.4%	1,984	10.5%	33	18,954

Notes: Survey by *Arbeitsgemeinschaft Media Anaylse* in 2007 among 18,954 Internet users. Interviewees were asked for which purpose they use the Internet. Multiple answers were allowed.

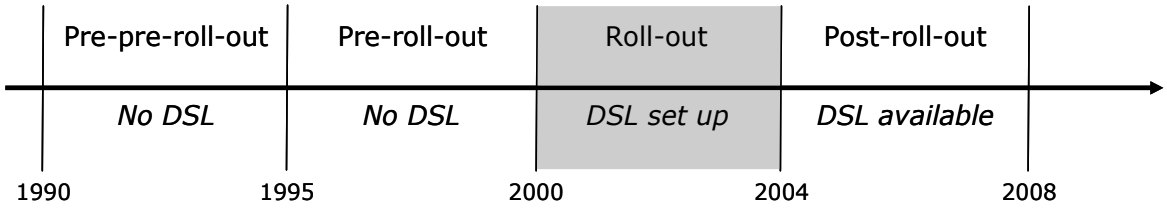
6.3.2 Election data

We measure the effect of the Internet on three aspects of voting behavior: (i) voter turnout, (ii) the vote share of established parties, and (iii) the vote share of radical parties. We observe these outcome variables at the municipality-level for elections at the three main levels of governance in Germany, i.e. elections for the Federal Parliament (*Bundestagswahlen*), elections for the State Parliaments (*Landtagswahlen*), and elections for the municipal- or city councils (*Gemeinderatswahlen* or *Stadtratswahlen*).[48] The data are obtained from the statistical offices

[48] Note that many German cities do not belong to a county (*kreisfreie Staedte*). Those municipalities elect their own city council, but they do not participate in elections for a county council. Hence we discard elections for the county councils that always take place simultaneously to the elections for the municipality councils from our analysis.

of the 16 German states.[49] For each election type, we consider three elections - two elections from the time before the year 2000, i.e., before the DSL infrastructure roll-out, and one election after the year 2003, i.e., a time when DSL diffusion has surpassed a critical mass of users. The resulting time structure of our data is summarized in Figure 2.

Figure 2: Time Structure of the Data



Notes: Roll-out period is discarded from analysis. Effects are measured for post-roll-out-period. Pre-roll-out and pre-pre-roll-out periods are used to control for time trends and for placebo estimations.

We collapse data from different municipalities if municipalities merged during the period of our analysis to fully exploit the panel structure of our election data. We include data on all elections mentioned above to exploit as many data points in time as possible. Our final dataset is a balanced panel of election data that draws a precise picture of political preferences and their changes across roughly 12,000 German municipalities over the last 20 years. Table 2 summarizes the timing of the three types of elections selected for our analysis.

In the absence of early elections, Federal elections take place every four years. The legislative periods of state parliaments vary between 4 and 5 years. Federal parliaments and state parliaments are both legislative bodies that elect and control the respective government. For all German parliaments, the electoral system mainly rests on the principle of proportionality, i.e. a party's vote share translates into its share of seats in the elected parliament. Voters deliberately choose their preferred parties and this decision expresses their preference for a party's political profile. Accordingly, the proportional vote is an appropriate approximation of the policy-orientation within a specific region.[50]

[49] Namely these are the *Statistisches Amt fuer Hamburg und Schleswig-Holstein* (Hamburg and Schleswig-Holstein), Statistisches Landesamt Sachsen-Anhalt (Saxony-Anhalt), Amt fuer Statistik Berlin-Brandenburg (Berlin and Brandenburg), Bayerisches Landesamt fuer Statistik und Datenverarbeitung (Bavaria), Statistisches Landesamt Baden-Wuerttemberg (Baden-Wuerttemberg), Hessisches Statistisches Landesamt (Hesse), Statistisches Landesamt Rheinland-Pfalz (Rhineland-Palatinate), Statistisches Amt Saarland (Saarland), Landesbetrieb fuer Statistik und Kommunikationstechnologie Niedersachsen (Lower Saxony), Landesbetrieb Information und Technik Nordrhein-Westfalen (North Rhine-Westphalia), Statistisches Landesamt Bremen (Bremen), Statistisches Landesamt des Freistaates Sachsen (Saxony), Statistisches Amt Mecklenburg-Vorpommern (Mecklenburg-Western Pomerania) and Thueringer Landesamt fuer Statistik (Thuringia).

[50] Note that federal elections and many state elections also contain an element of majority vote as voters can use a second ballot to elect their districts representative. With this ballot, voters decide on individual nominees who

Elections for the municipal- or city councils are held every 4 to 6 years. Those councils do not have legislative authority but control and advice authorities at the corresponding regional level. Nevertheless, councils influence local policy outcomes, since their resolutions are binding for the local authorities, thus determining the overall goals and measures of political action on the local level. The actual election systems for the municipal- or city councils vary significantly between states, mainly with regard to the way mandates are distributed. But nearly all municipalities still distribute the seats in the respective councils by proportional rule. The few remaining municipalities who apply majority rule as major principle to their council elections are discarded from our analysis. We further exclude the three city-states (i.e. Hamburg, Bremen and Berlin) from our analysis. Elections on the sub-national level are subject to the special institutional setup in these small city states and a comparison with sub-national elections in the other 13 states would likely be biased.

Table 2: The Timing of Elections

	pre-pre-period (1990-1994)	pre-period (1995-1999)	post-period (2004-2008)	election type
Schleswig-Holstein	1994	1998	2005	federal
	-	1996	2005	state
	-	1998	2008	local
Lower Saxony	1994	1998	2005	federal
	1990	1998	2008	state
	1991	1996	2006	local
North Rhine-Westphalia	1994	1998	2005	federal
	1990	1995	2005	state
	1994	1999	2004	local
Hesse	1994	1998	2005	federal
	1991	1995	2008	state
	1993	1997	2006	local
Rhineland-Palatinate	1994	1998	2005	federal
	1991	1996	2006	state
	1994	1999	2004	local
Baden-Wuerttemberg	1994	1998	2005	federal
	1992	1996	2006	state
	1994	1999	2004	local
Bavaria	1994	1998	2005	federal
	1994	1998	2008	state
	1990	1996	2008	local

...

are mostly party delegates. If they win a majority of votes in their election district, they are elected for parliament. As the election of individual candidates does not affect the distribution of seats in parliaments, the proportional vote is the decisive vote in all German federal and state elections. Therefore, we restrict our outcome to the proportional vote ballots.

Saarland	1994	1998	2005	federal
	1990	1999	2004	state
	1994	1999	2004	local
Brandenburg	1994	1998	2005	federal
	1990	1999	2004	state
	1993	1998	2008	local
Mecklenburg-Western Pomerania	1994	1998	2005	federal
	1990	1998	2006	state
	1994	1999	2004	local
Saxony	1994	1998	2005	federal
	1990	1999	2004	state
	1994	1999	2004	local
Saxony-Anhalt	1994	1998	2005	federal
	1990	1998	2006	state
	1994	1999	2004	local
Thuringia	1994	1998	2005	federal
	1990	1999	2004	state
	1994	1999	2004	local

Notes: The Table plots the elections years employed in the paper by state, period (relative to DSL rollout), and election type (level of governance).

The vote shares for established parties, extreme right-wing parties, and extreme left-wing parties are calculated as share of the overall votes in an election and municipality. "Established Parties' vote share" is the combined election results of the conservative parties CDU and CSU[51], the social democratic party SPD, the liberal party FDP and the ecologist green party GRUENE. These parties are active on all levels of governance, have sub-organizations in all German states, always participate in all German elections, regularly gain seats in the German parliaments, and usually provide the federal government and state governments respectively. All five parties have been active for at least 30 years and arguably dominate the political life in Germany during the time window of our analysis.

We refer to all other parties that are not established parties as small parties. This group consists of numerous organizations of different sizes and ideological backgrounds that only occasionally gain seats in state parliaments or the federal parliament[52]. Within the group of small parties, we are especially interested in the election outcomes of parties from the extreme right-wing and the extreme left-wing of the political spectrum. The most prominent among the "extreme right wing parties" include the radical nationalist parties NPD, DVU and REP.[53] At the

[51] With the CSU being the Bavarian branch of the CDU.
[52] Nevertheless they might play some role when it comes to city or municipality councils.
[53] We did separate estimations for this pretty selective group of radical nationalist and anti-democratic parties with very similar results. These are available from the authors upon request

other end of the political spectrum, we look at the combined election results of various Marxist and Leninist parties, first and foremost the socialist party LINKE and its predecessors PDS and WASG, and summarize them as "extreme left wing parties' vote share."[54]

Table 3: Summary Statistics on Election Outcomes, 2004-2008

	Observations	Mean	Std. Dev.	Min	Max
National Elections					
Turnout	12205	0.728	0.070	0.396	0.957
Vote share established parties	12205	0.851	0.109	0.478	1
Vote share ext. right-wing parties	12205	0.028	0.022	0.000	0.207
Vote share ext. left-wing parties	12205	0.105	0.099	0.000	0.449
State Elections					
Turnout	12205	0.591	0.098	0.280	1
Vote share established parties	12205	0.817	0.123	0.345	1
Vote share ext. right-wing parties	12205	0.034	0.034	0.000	0.382
Vote share ext. left-wing parties	12205	0.085	0.093	0.000	0.482
Municipality Elections					
Turnout	10783	0.609	0.105	0.271	1
Vote share established parties	10783	0.548	0.336	0.000	1
Vote share ext. right-wing parties	10783	0.001	0.008	0.000	0.252
Vote share ext. left-wing parties	10783	0.030	0.070	0.000	0.988

Notes: The Table presents descriptive statistics for our four outcome variables by election type in the Internet era, i.e. the post-rollout period from 2004 to 2008.

Table 3 shows summary statistics on different election outcomes. From the year 2004 on, voter turnout varied between about 60 percent and 73 percent depending on the type of elections. The vote share of established parties reached more than 80 percent in supra-regional elections. In local elections, established parties only reached a vote share of about 55 percent. The vote share of extreme right wing parties was about 3 percent in supra-regional elections and close to zero in local elections. Note that, in general, a single party must reach a vote share of 5 percent in supra-regional elections to get a seat in the respective parliament. Extreme left

[54] However one might think of accounting for the socialist party LINKE as sixth "established" German party as well. LINKE is a merger of the PDS, i.e. the successor of the socialist unity party formerly ruling the German Democratic Republic and thus mostly active in East Germany, and some leftist parties and factions rooted in West Germany. While LINKE nowadays manages to gain a fair amount of votes all across Germany, during our period of analysis it was mainly an East German party. Anyhow, we do not find significantly different results (available from the authors upon request) for the East German subsample when we include LINKE votes to calculate the established parties' vote share. But it was also at that time of analysis when the merger of the PDS and other leftist parties took place, a process provoking some noise in our data on votes related to nowadays' LINKE especially in the West German subsample. Hence we decided to account for the socialist LINKE and its predecessors as extreme leftwing parties and stick to the five parties being active all across Germany for so many years only to assess established parties' election outcomes.

wing parties reached vote shares of up to 10 percent which is mainly driven by the socialist party LINKE and its predecessors PDS and WASG.

6.3.3 The Association between High-Speed Internet Availability and Voting Behavior

Columns 1, 3, 5, and 7 of Table 3 show the results of simple multivariate regressions of the DSL rate, i.e. the share of households having access to broadband Internet by municipality, on our voting outcomes of interest conditional on a set of municipality-level control variables including surface, population, female population share, age structure of the population, and unemployment rate. For this purpose we concentrate on elections after the DSL infrastructure roll-out, i.e., elections from 2004 on. We pool the three types of elections and add election type dummies as controls. We further add year of election dummies. In order to only compare municipalities that are close to each other and thus arguably similar in many respects with the exception of DSL availability, we add a full set of county dummies. The average German county contains about 27 municipalities and represents a quite homogenous regional entity. We cluster our standard errors on the municipality level in order to account for the fact that voting outcomes in the three types of election might be correlated within a municipality.

Conditional on our municipality-level control variables, election type dummies, year of election dummies, and county dummies, we find a significantly negative association between the DSL share in a municipality and voter turnout; a significantly positive association between DSL share and the vote share of establishes parties; and a significantly positive association between DSL share and the vote share of extreme left-wing parties. We find no significant association between DSL share in a municipality and the vote share of right wing parties.

Table 3: The Association between High-Speed Internet Availability and Voting Outcomes

	Turnout		Vote share Established Parties		Vote share Ex. right-wing parties		Vote share Ex. left-wing parties	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
DSL share	-0.022***	-0.012***	0.027***	0.011***	0.000	0.002***	0.004**	-0.006***
	(0.002)	(0.002)	(0.004)	(0.003)	(0.001)	(0.001)	(0.002)	(0.001)
Pre-broadband election outcome	No	Yes	No	Yes	No	Yes	No	Yes
Time trend	No	Yes	No	Yes	No	Yes	No	Yes
No. of obs.	34,840	32,536	34,840	32,536	34,840	32,536	34,840	32,536
R^2	0.594	0.784	0.589	0.881	0.537	0.660	0.714	0.888

Notes: Municipality-level pooled regressions for elections after 2004 at three main levels of governance in Germany, i.e. elections for the Federal Parliament (*Bundestagswahlen*), elections for the State Parliaments (*Landtagswahlen*), and elections for the municipal- or city councils (*Gemeinderatswahlen* or *Stadtratswahlen*). All regressions include municipality characteristics (surface, population, female population share, age structure of the population, and unemployment rate), election type dummies, county dummies, and year dummies. Clustered standard errors on the municipality-level are reported in parentheses. *** 1% significance level; ** 5% significance level; * 10% significance level.

We do not interpret these results as a causal effect of the DSL availability on voting outcomes since there might be unobserved municipality characteristics that are correlated with both the DSL share and voting outcomes. Such a bias might arise from the endogenous regional distribution of individuals with different traits, for example, if open-minded and highly educated individuals who are also interested in politics preferred to move to dense areas rich of amenities and job opportunities. At the same time, dense areas face cost advantages in the provision of a broadband infrastructure because of scale effects in the roll-out process. Combined with a large number of broadband Internet subscriptions in dense areas —presumably from young and highly-educated individuals — profit-oriented telecommunication carriers most likely started rolling out broadband infrastructure in dense areas. As result our OLS estimates should be upward biased. Of course, one can think of many other stories why OLS estimates might tell us little about the true underlying causal relationship between broadband Internet access and voting behavior.

To overcome these various sources of estimation bias, we exploit the panel structure of our data and include the respective voting outcomes as well as the trend in voting outcomes from the years before the introduction of DSL in 2000. This procedure should capture all time invariant factors that might bias our results. The results of this next step are shown in Columns 2, 4, 6, and 8 of Table 3. We still find a significant negative association between DSL share and voter turnout and a positive association between DSL availability and the vote share of established parties. The association between DSL share and the vote share of extreme left-wing parties becomes negative and the association between DSL share and the vote share for extreme right-wing parties becomes significantly positive.

While this second step should control for all time invariant factors that might bias our results, we still worry about biases from time varying factors that simultaneously came up with the DSL technology and that are correlated with voting outcomes. To overcome this, we turn to instrumental variable estimations where we exploit path dependencies in the roll-out of DSL infrastructure.

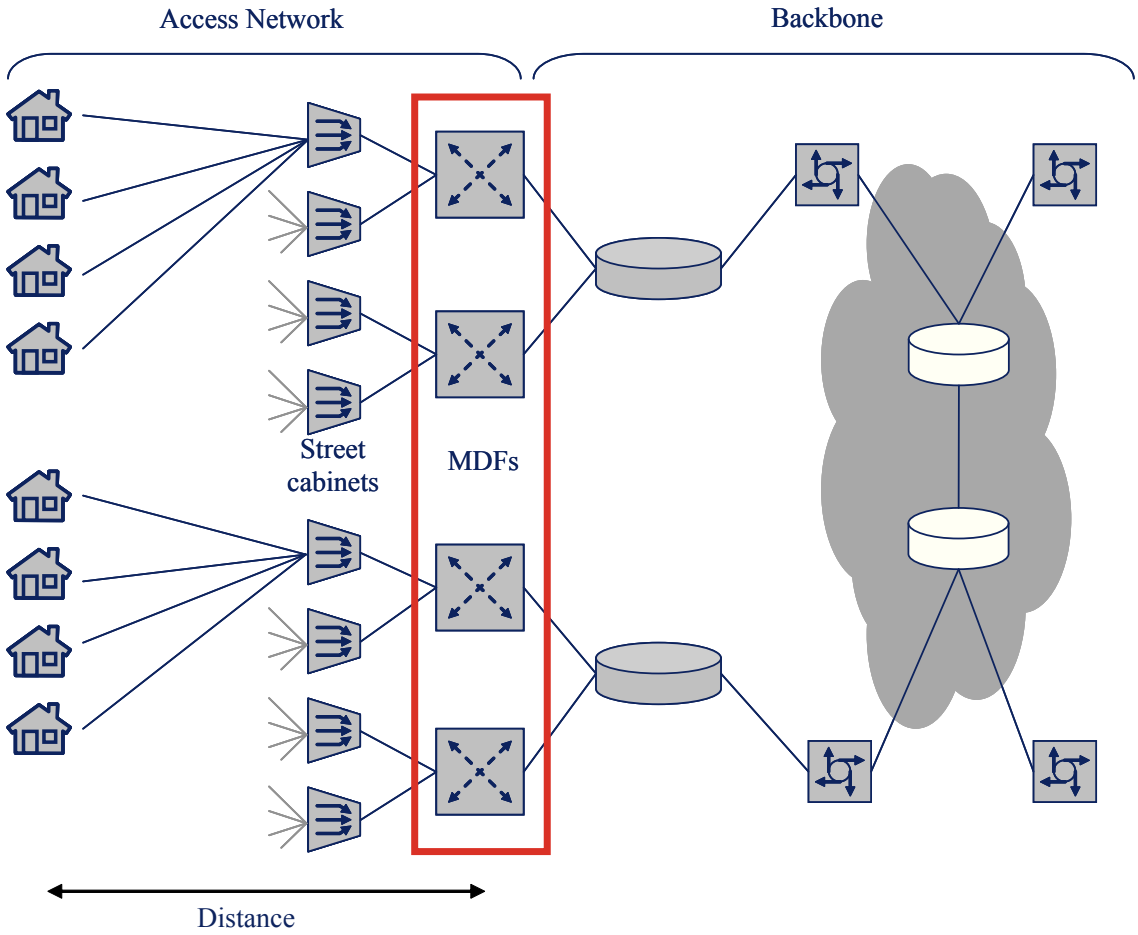
6.4 Assessing Causality: Path-Dependencies in the Telephone Infrastructure

6.4.1 Technical Foundations of DSL Infrastructure

We develop our instrumental variables from technological peculiarities of the traditional public switched telephone network in Germany which affect certain municipalities' possibilities to access broadband Internet. The voice network was rolled out at a time when considerations of its suitability for DSL technology were not a concern. As early as 1936, we observe 6,647 local telephone networks with about 3.4 million connections and the network was further developed to its current layout from the 1950s on. This allows us to identify a treatment group of municipalities that got worse initial conditions to access DLS technology at a time when DSL was not yet thought of. In the following, we will explain the technological peculiarities underlying our instrumental variable estimations in more detail.

The early generations of DSL technology in Germany completely rely on the copper wires between the household and the main distribution frame (MDF) – the so called 'last mile' – of the traditional public switched telephone network. Employing the existing wires is a significant cost advantage because all wires are rolled out subsurface in Germany. Further note that the public switched telephone network was rolled out at a time when the provision of telephone services was a state monopoly and the declared goal was to provide universal telephone service to all German households. While dense municipalities would always have had an own MDF, more rural municipalities typically share an MDF. The length of the copper wires was irrelevant for the quality of the telephone services and accordingly, the choice of MDF locations in more rural areas was determined by restrictions like the availability of buildings to host a MDF. However, in a DSL access network distance does play a crucial role because the maximum bandwidth attainable depends on the length of the copper wire between the household and the MDF. When surpassing a threshold of about 4.2 kilometers, DSL technology is no more feasible and one has to bypass parts of the copper wire by fiber wire which involves costly earthworks that further increase with the length of the bypass. Figure 3 schematically summarizes the structure of a DSL network. Figure 4 depicts the distribution of MDFs across Germany.

Figure 3: The Structure of a DSL Network



Notes: Anell et al. (2007). The access network is based on the traditional copper wires of the public switched telephone network (PSTN). The early generations of DSL technology connect the copper wires of the access network to the backbone network at the main distribution frame by means of a DSLAM (Digital Subscriber Line Access Multiplexer). This structure allows bandwidth of up to 16 Mbit/s. For the newer VDSL technology which allows bandwidths of up to 50 Mbit/s and for areas where the distance between households and MDFs are too long to make DSL feasible the copper wire between the MDF and a node which is nearer to the household, e.g., a street cabinet is bypassed by fiber wire and an (Outdoor-) DSLAM is installed at this node (street cabinet).

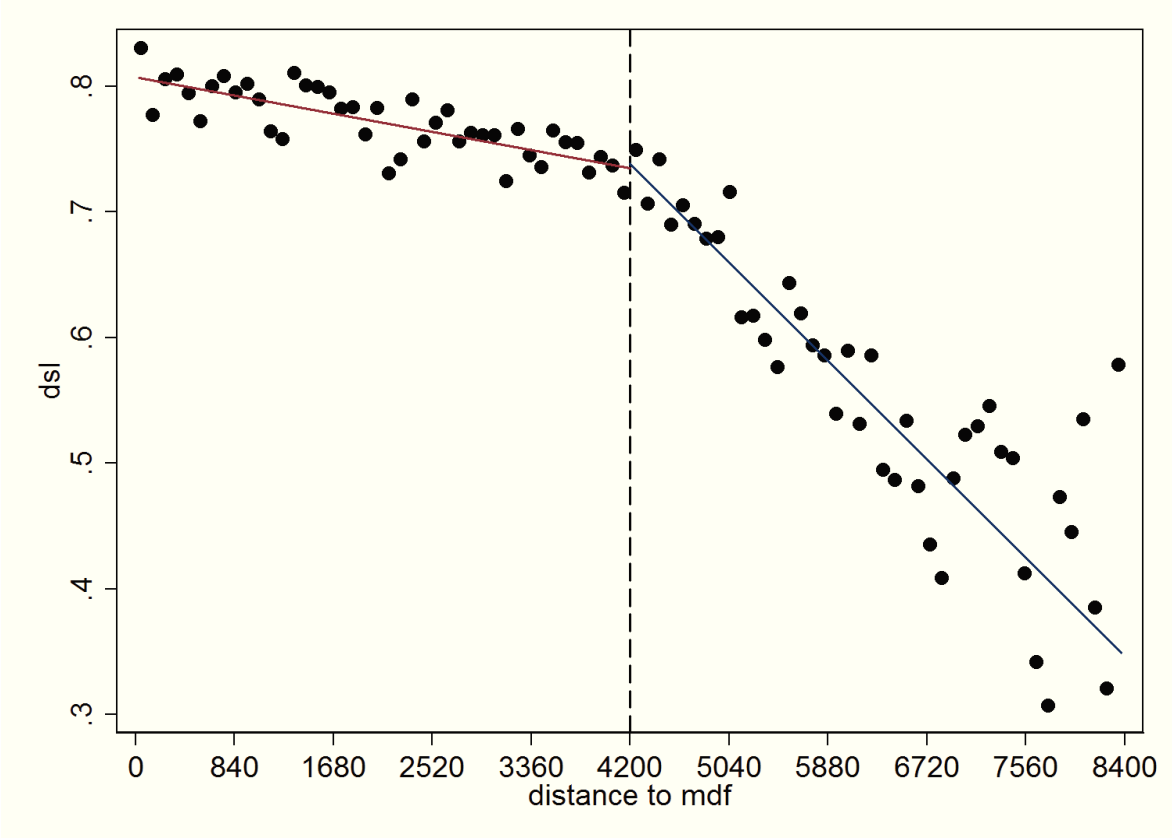
Figure 4: The Spatial Distribution of Main Distribution Frames (MDF) in Germany

Notes: The map shows the spatial distribution of the over 8,000 main distribution frames (MDF) in Germany.

Using GIS, we calculate the geographic distance from the geographic centroids of all municipalities to the MDF that serves the municipality. There are more than 8,000 MDFs in Germany which underlines the 'micro-geographic' structure of our data (cf. Figure 4). Figure 5 plots the DSL rate of a municipality against its distance to the actual MDF. The plot shows all municipalities around the critical threshold of 4,200 meters (2.6 miles). For clarity, the figure plots the average DSL availability of municipalities in bins of 100 meters (0.06 miles) as dots

while the fitted lines depicting the DSL share (conditional on distance to the MDF) are calculated on the basis of all single observations. The figure shows the kink in the DSL share at the threshold of 4,200 meters (2.6 miles). Municipalities with distances below 4,200 meters all have DSL shares between 70 to 80 % (red line). At distances above the critical threshold DSL availably begins to decrease sharply (blue line).

Figure 5: DSL Rate of Municipalities Conditional on Distance to MDF



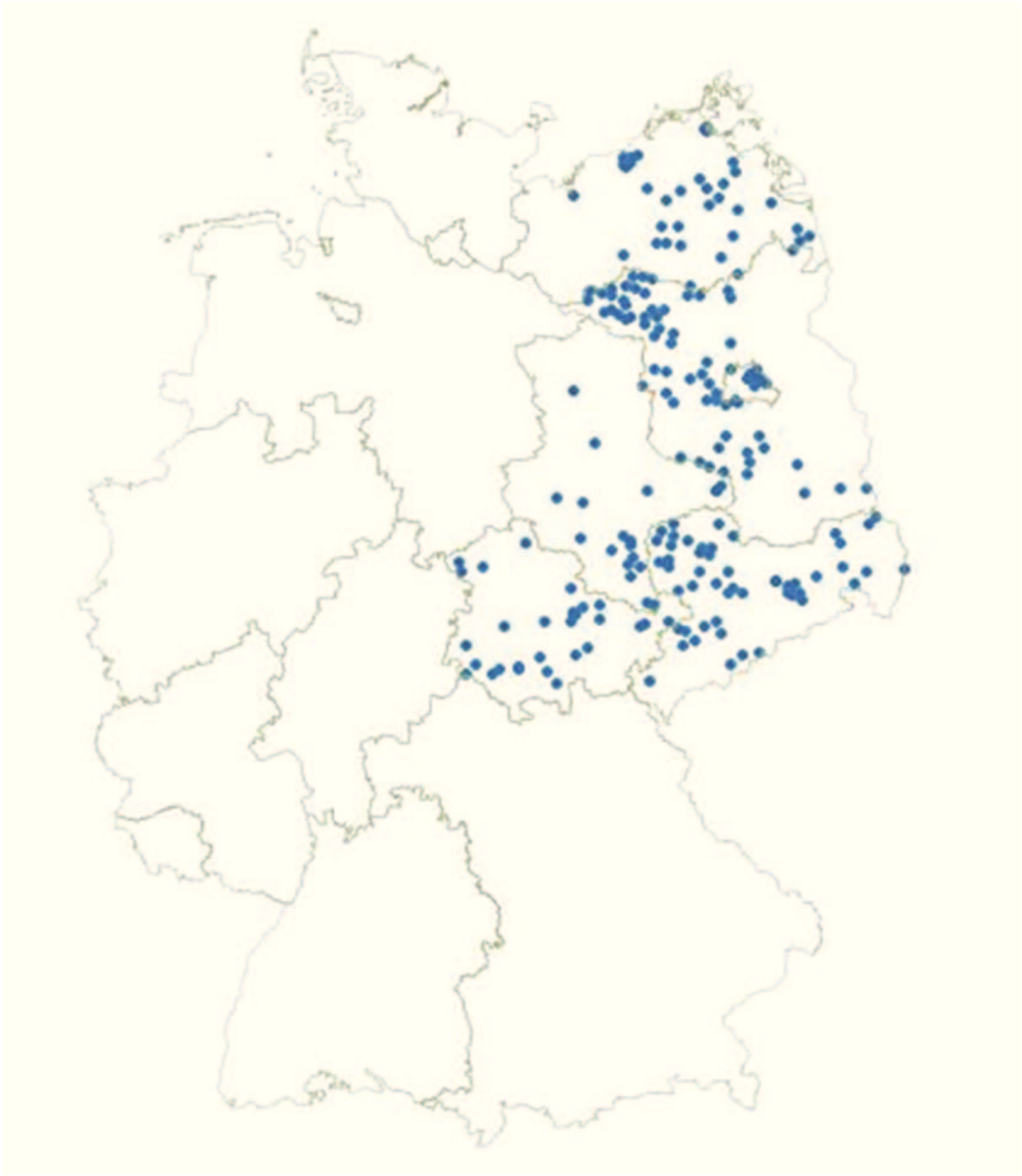
Notes: The Figure plots the share of households with DSL access in a municipality (municipalities are averaged across bins of 100 meter) against the distance from the geographic centroid of the municipality to the actual main distribution frame (MDF). The red line to the left of the technological threshold and the blue line to the right of the threshold are both fitted lines on the basis of individual observations.

A second source of exogenous variation comes from some 6% of the municipalities with a distance to their actual MDF that is greater than 4,200 meters where a closer MDF exists at a distance below the threshold of 4,200 meters. This peculiarity is the result of the geographic layout of the telephone access areas that were designed when distance was irrelevant. At that time, organizational considerations determined the allocation of municipalities' to certain telephone access areas. The assignment to a certain telephone access area tied the municipality to a particular MDF which, in some cases, was further away than a neighboring telephone access area's MDF. In such a situation it is now often cheaper for the telecommunication carrier to provide DSL to a municipality via the closer MDF than the "wrong" MDF the munici-

pality is actually connected to. We construct a dummy variable that equals unity for municipalities that are actually connected to a "wrong" MDF at a distance of more than 4,200 meters which could be connected to another MDF at a distance below 4,200 meters. We expect this dummy variable to have a significant positive impact on DSL availability in the municipality.

The third source of exogenous variation is independent of distance. After the German reunification in 1990, there was a huge lack of telephone access lines in many parts of East Germany. To close gap, telephony infrastructure was rolled out which was built on the basis of a special type of fiber wires, the so called OPAL technology, instead of the traditionally used copper wires. In the early 1990s, this technology was regarded to be the state-of-the-art technology that would dominate the ICT future. It is suited for voice-telephony services, ISDN services, and for a limited amount of data transmission. OPAL technology was eventually rolled out in 213 East German areas (c.f. Figure 6). But then things changed dramatically: The world saw the Internet revolution taking over with the Internet becoming a mass phenomenon and services on the Internet demanding higher and higher bandwidths; for reasons described above, DSL technologies became the leading access technologies for broadband Internet in Germany. This was, however, misfortune for the thought-to-be-high-tech OPAL areas. The reason for this is that OPAL technology is simply not compatible with DSL technologies. In order to still provide broadband Internet to OPAL areas, one was confronted with two very costly alternatives. One could either replace the OPAL wires of the access network by copper wires or, what is even more expensive; install new hardware and software at the network's nodes. We construct a dummy that equals unity for municipalities being situated in a (former) East German OPAL access area. We expect this dummy to have a significant negative impact on DSL availability.

Figure 6: OPAL Access Nodes in East Germany



Notes: The map shows the Opal access nodes in East German that provided about 11 percent of the East German population with OPAL technology.

Table 4 show the results of a multivariate regression where we regress the DSL share in a municipality on the variables that are technically derived from the characteristics of the pre-existing voice-telephony network. These variables are the distance to the actual MDF, a threshold dummy for distances above 4,200 meters, the interaction between distance and the threshold dummy, a dummy for municipalities which are actually connected to a "wrong"

MDF, a dummy for municipalities that are actually connected to a "wrong" MDF with another MDF at a distance below 4,200 meters, and an OPAL dummy.

Table 4: DSL Share in Municipalities and Characteristics of the Pre-Existing Voice-Telephony Network

	DSL share
Distance (in km)	-0.001
(minus 4.2km)	(0.002)
Threshold (4.2 km)	-0.039***
	(0.008)
Distance * threshold	-0.055***
	(0.005)
"Wrong" MDF dummy	-0.012*
	(0.007)
Actual MDF > 4.2 km &	0.101***
closer MDF <4.2 km	(0.010)
OPAL dummy	-0.076***
	(0.017)
R^2	0.394

Notes: Municipality-level regression of technical characteristics of the pre-existing voice telephony network on the share of households for which DSL is technically feasible in a municipality. Clustered standard errors on the municipality-level are reported in parentheses. *** 1 % significance level; ** 5% significance level; * 10% significance level.

The results clearly confirm our technical predictions. Distance turns out to be irrelevant for DSL availability in a municipality below the critical threshold of 4,200 meters. At the threshold, the DSL share drops by 3.9 percentage points. Above this threshold the DSL share decreases by 5.5 percentages points with every kilometer the municipality is farer away from the MDF. Not being connected to the closest MDF only shows a small negative effect. However, for municipalities that are actually connected to a MDF farer away than 4.2 kilometers but for which another MDF is closer by the DSL share increases by 10.1 percentage points due to the potential to redirect DSL access to the closer MDF. Finally, the DSL share of municipalities lying in OPAL areas is 7.6 percentage points lower. In a next step, we exploit these technical features of the pre-existing voice telephony network in an instrumental variables approach to identify an arguably causal effect of DSL availability on voting behavior.

6.4.2 The Causal Effect of High-Speed Internet Availability on Voting Behavior

We use the instruments for the DSL share in a municipality derived in Section 6.4.1 in a 2SLS procedure to estimate the causal effect of high-speed Internet availability on voting behavior. Column 1 of Table 5 shows the results for our full sample where we consider the outcomes of elections after 2004 at the three main levels of governance in Germany, i.e. elections for the Federal Parliament (*Bundestagswahlen*), elections for the State Parliaments (*Landtagswahlen*), and elections for the municipal- or city councils (*Gemeinderats*- or *Stadtratswahlen*). Each cell shows the DSL share coefficient from a separate regression. All regressions include contemporaneous municipality characteristics (surface, population, female population share, age structure of the population, and unemployment rate), pre-DSL-infrastructure-roll-out election outcomes and time trends in election outcomes, election type dummies, county dummies, and year dummies. We cluster our standard errors at the municipality level.

Table 5: Instrumental Variable Results

	Full sample	>3000m	No own mdf	No own mdf Placebo
	(1)	(2)	(3)	(4)
Turnout	-0.037***	-0.013*	-0.018**	0.001
	(0.007)	(0.008)	(0.007)	(0.006)
Vote share Incumbents	0.041***	0.033***	0.021*	0.014
	(0.011)	(0.012)	(0.011)	(0.012)
Vote share Ex. right-wing parties	-0.006***	-0.004*	-0.005*	0.001
	(0.002)	(0.002)	(0.002)	(0.002)
Vote share Ex. left-wing parties	0.002	0.002	0.003	0.001
	(0.005)	(0.005)	(0.005)	(0.005)
Unemployment rate	0.007*	0.004	0.006	-0.001
	(0.004)	(0.005)	(0.005)	(0.004)
Number of observations	31,930	15,392	17,857	17,842
F test of ex. Instruments	59.74	55.43	61.17	60.76

Notes: Municipality-level pooled 2SLS regressions for elections after 2004 at three main levels of governance in Germany, i.e. elections for the Federal Parliament (Bundestagswahlen), elections for the State Parliaments (Landtagswahlen), and elections for the municipal- or city councils (Gemeinderatswahlen or Stadtratswahlen). Each cell shows the DSL share coefficient from a separate regression. All regressions include contemporaneous municipality characteristics (surface, population, female population share, age structure of the population, and unemployment rate), pre-DSL-infrastructure roll-out election outcomes and trends in election outcomes, election type dummies, county dummies, and year dummies. Clustered standard errors on the municipality-level are reported in parentheses. *** 1% significance level; ** 5% significance level; * 10% significance level

The F-test of excluded instruments underlines the high relevance of our instruments. The DSL share coefficients in Column 1 are – except for vote shares of the extreme left- and right-wing parties – similar to those observed in the comparable multivariate regressions of Table 3, but they tend to be somewhat bigger. This might either signify that our OLS estimates were downward biased or a violation of the exclusion restriction that our instruments only affect voting outcomes through the DSL share. As argued in section 6.4.1, we do not believe that the location choice of the MDF is as-good-as random in densely populated areas. However, we believe that the MDF location is truly random for more rural areas where several municipalities share a MDF and the choice of the location of the MDF was determined by other restrictions, such as the availability of buildings to host the MDF. We thus restrict our sample to more rural areas by either restricting our sample to municipalities with a distance of at least 3000 meters to the MDF they are connected to (Column 2) or by restricting our sample to municipalities without own MDF (Column 3), i.e. municipalities that are connected to an MDF of a neighboring municipality.[55] The latter subsample is our preferred sample because it only contains municipalities that were not lucky to get an own MDF and some of them had the additional misfortune that the next MDF is relatively far away. Hence for this subsample, the location of the MDF can most certainly be considered to be truly orthogonal to our outcomes of interest.

Our results clearly show a negative effect of DSL availability on voter turnout. An increase in DSL availability from 0 to 100 percent is estimated to have decreased voter turnout by 1.3 (Column 2) to 1.8 (Column 3) percent. The magnitude of this effect is comparable to the negative effect of TV on voter turnout found by Gentzkow (2006). He estimates that the introduction of television in the 1940s and 1950s reduced the turnout in congressional races by 2 percentage points. Our results are in line with the hypothesis that the Internet carries less political information than the media that it crowds out. Recent research suggests that the Internet does only slightly crowd out TV viewing. Thus, our effect might especially point to a crowding out of newspapers.

We further find that DSL availability increases the vote share of established parties at the expense of small parties and especially extreme right-wing parties. The vote share of established parties increases by 2.1 to 3.3 percentage points when DSL availability increases from 0 to 100 percent. By contrast, the vote share of extreme right-wing parties decreases by 0.4 to 0.5

[55] We ran estimations for a variety of subsamples with different distances to the MDF and ranges around the threshold which yielded similar results. Overall, our selected subsamples provide conservative estimates.

percentage points. We find no significant effect on the vote share of extreme left-wing parties. These results suggest that despite the low cost of news production in the Internet, the established parties are more successful to make use of the Internet for their purposes.

One might argue that our complier municipalities already differed from the other municipalities in terms of voting outcomes before the introduction of DSL. Although we already control for pre-DSL-infrastructure-roll-out election outcomes and trends in election outcomes, we additionally run placebo regressions. In the placebo regressions, we regress pre-DSL-infrastructure voting outcomes from the years 1995 to 1999 on instrumented DSL availability. In fact, (instrumented) DSL availability cannot affect voting behavior in these years, since the technology did just not exist. Hence measuring significant placebo coefficients would be an indication for an omitted variables bias in our IV regressions. Again, these placebo regressions include contemporaneous municipality characteristics from the pre-roll-out period (surface, population, female population share, age structure of the population, and unemployment rate), pre-DSL-infrastructure-roll-out election outcomes, election type dummies, county dummies, and year dummies. We also cluster our standard errors at the municipality level. The results are shown in Column 4 of Table 5. All coefficients are not significant different from zero and the point estimate of most of them is also close to zero. This provides confidence that we indeed identify a causal effect of high-speed Internet availability on voting behavior which does not simply reflect persistent differences between municipalities.

Another argument might be that we indeed identify a causal effect of the Internet on voting behavior but that the channel is an economic one rather than an information channel. The idea behind is that broadband availability may foster economic growth in a municipality and that people vote differently in prospering municipalities. Indeed, Kolko (2012) finds evidence for the US that local broadband fosters economic growth whereby the effect is especially strong in more rural areas. Czernich et al. (2011) show important economic growth effects of broadband infrastructure in a cross-country analysis. To account for that, we ran comparable instrumental variable regressions with a municipality's unemployment rate as outcome. The results are presented in Line 5 of Table 5. This setup considers the unemployment rate to be an indicator for a municipality's overall economic situation. Apart from the likely biased estimate for the full sample, we find no significant effect of DSL availability on the unemployment rate which is in contrast to Kolko's results. The difference in the results might be explained by two facts: First, broadband appeared in the US several years earlier than in Germa-

ny and local broadband affects economic growth only in the long run. Second, economic activities were initially more evenly distributed across space in Germany than in the US such that local broadband is more important for rural areas in the US to bridge distances than in Germany. This result confirms that we indeed identify an information effect of the Internet on voting behavior.

Finally, we turn to the heterogeneity of the effect of DSL availability on voting outcomes (1) across election types, i.e., federal - , state -, and municipality elections, and (2) between East and West Germany.[56] Table 6 shows the effects of DSL availability on our voting outcomes of interest across the three election types. These subsample analyzes suggest that the effect of the Internet on voter turnout is driven by supra-regional elections at the federal and state level while the effect of the Internet on the vote share of established parties is mainly driven by municipality elections. Interestingly, the effects on voter turnout contrast Gentzkow's (2006) finding that the negative effect of the introduction of TV was especially pronounced in local elections with the TV crowding out newspapers. A possible explanation for this puzzle could be that the Internet indeed crowds out national newspapers but not local newspapers.[57]

[56] Remember that we account for this heterogeneity by (i) including election type dummies and (ii) including county fixed effects in all previous regressions.

[57] This would be line with findings on crowding out of social capital by TV and the Internet. Local newspapers are often seen as a measure for local social capital or the "civicness" of the local population (Putnam 1993). Olken (2009) shows that TV crowds out local social capital while the Internet does not seem to crowd out social capital measured over several dimensions (Bauernschuster et al. 2011).

Table 6: IV Regressions by Election Type

	Turnout	Vote share Incumbents	Vote share Ex. right-wing parties	Vote share Ex. left-wing parties
Federal elections (Municipalities without own MDF)				
DSL availability	-0.019***	0.001	-0.005*	0.004
	(0.007)	(0.007)	(0.003)	(0.006)
Number of observations	6,897	6,897	6,897	6,897
R^2	0.684	0.908	0.630	0.920
F test of ex. Instruments	53.98	54.41	54.15	54.58
State elections (Municipalities without own MDF)				
DSL availability	-0.021***	-0.001	-0.005*	0.005
	(0.008)	(0.007)	(0.003)	(0.005)
Number of observations	6,190	6,190	6,190	6,190
R^2	0.715	0.872	0.743	0.905
F test of ex. Instruments	74,02	73.98	74.20	74.20
Municipality elections (Municipalities without own MDF)				
DSL availability	-0.005	0.116***	0.002	-0.009
	(0.020)	(0.057)	(0.001)	(0.015)
Number of observations	4,783	4,783	4,783	4,783
R^2	0.698	0.777	0.092	0.664
F test of ex. Instruments	17.68	17.60	17.94	18.01

Notes: Municipality-level IV regressions for elections after 2004. All regressions include municipality characteristics (surface, population, female population share, age structure of the population, and unemployment rate), pre-DSL-infrastructure roll-out election outcomes and trends in election outcomes, election type dummies, county dummies, year dummies. Clustered standard errors on the municipality-level are reported in parentheses. *** 1% significance level; ** 5% significance level; * 10% significance level.

Table 7 shows effect differences between West and East Germany. These subsample analyzes suggest that the effect of the Internet on voter turnout is driven by West German municipalities while the effect on the vote share of incumbents is driven by East Germany. The zero effect on voter turnout in East Germany suggests that the Internet did not crowd out other media in this part of Germany. In fact, TV was regarded to be ideologically biased and did not enjoy a good reputation in East Germany. Furthermore, after reunification only local newspapers emerged while important supra-regional newspapers do not exist in East Germany. The strong effect of the Internet on the vote share of established parties might also reflect a lacking experience with democracy among East Germans. After decades of socialist rule, East Germans had to initially build up political preferences from scratch. Against this background, information provided by an entirely new and thus "unbiased" medium like the Internet might contribute to a harmonization of voting patterns between East and West Germans.

Table 7: IV Regressions for West and East Germany

	Turnout	Vote share Incumbents	Vote share Ex. right-wing parties	Vote share Ex. left-wing parties
West Germany (Municipalities without own MDF)				
DSL availability	-0.017**	0.009	-0.005***	0.001
	(0.007)	(0.010)	(0.002)	(0.003)
Number of observations	11,171	11,171	11,171	11,171
R^2	0.725	0.892	0.632	0.607
F test of ex. Instruments	76.80	76.66	76.73	76.68
East Germany (Municipalities without own MDF)				
DSL availability	-0.006	0.041*	-0.005	0.000
	(0.014)	(0.024)	(0.004)	(0.011)
Number of observations	6,686	6,686	6,686	6,686
R^2	0.727	0.816	0.637	0.808
F test of ex. Instruments	16.01	16.21	16.10	16.29

Notes: Municipality-level pooled IV regressions for elections after 2004 at three main levels of governance in Germany, i.e. elections for the Federal Parliament (*Bundestagswahlen*), elections for the State Parliaments (*Landtagswahlen*), and elections for the municipal- or city councils (*Gemeinderatswahlen* or *Stadtratswahlen*). All regressions include municipality characteristics (surface, population, female population share, age structure of the population, and unemployment rate), pre-DSL-infrastructure roll-out election outcomes and trends in election outcomes, election type dummies, county dummies, year dummies. Clustered standard errors on the municipality-level are reported in parentheses. *** 1% significance level; ** 5% significance level; * 10% significance level.

6.5 Conclusions

This chapter analyses the effect of the Internet on voting behavior. Research on the introduction of the equally influential mass media radio and TV shows that increased media coverage provides more information for voters. However, while more information is generally good for voters because it promotes accountability of politicians, research on the political economy of mass media also suggests that editorial filtering and the selection of certain topics can lead to adverse effects. If the media disseminate biased information, more information does not necessarily imply more transparency. In the Internet, editorial filtering is per se not a problem. Everyone can consume and produce information without any restriction and at reasonable costs. At the same time, the almost unlimited possibility to supply information bears the risk of an information overflow. As a result, people may concentrate on a limited number of topics and areas they want to hear and read about which may foster segregation and ideological polarization. An alternative reaction to an overflow of information would be that people demand aggregated sources of information. In this case, existing media outlets could simply use their

infrastructure to provide their news and information through an additional channel, the Internet.

Our analysis tests the effect of the Internet on three different aspects of voting behavior. First, we look at voter participation and find small negative effects of Internet access on voter turnout. One possible explanation could be that the Internet crowds out other media that contain more or "better" information. Such effects have been found for the introduction of TV which led to a crowding out of newspapers. Another possible interpretation of this finding could be that the Internet promotes other ways of political participation than elections. This might especially be the case for people who are interested in topics off the main policy issues. Before the Internet era, voting for small parties without a chance to win a significant vote share was one way to make a political statement. In the Internet era, blogging may be a more effective way to express political opinions on specific topics. In line with this, analyzing vote-shares of established parties as second outcome variable shows positive effects on incumbent parties' vote shares. This goes in line with a decrease in votes for small parties which might reflect established parties' better presence on the web. Finally, analyzing the vote shares for radical parties at the ideological fringes as third outcome variable does not provides evidence for ideological polarization.

We believe that our instrumental variable strategy enables us to report plausibly causal effects of the Internet on three different aspects of voting behavior, i.e. (i) turnout; (ii) established parties' vote shares; and (iii) radical parties' vote shares. The effect sizes are in the range of what other studies found for the introduction of the radio and TV. However, the direction of the effects also suggests that the Internet is a different medium than traditional mass media. While Gentzkow (2006) argues that TV crowds out local newspapers with negative effects on voter turnout in local elections, we find no Internet effect on local elections' voter turnout. The negative effect of the Internet on voter turnout in state elections and federal elections could nevertheless be an indication of a crowding out of national newspapers. But we believe that it requires more research on the joint effect of the Internet and traditional mass media on voting behavior to establish these mechanisms. Regarding the positive effect on established parties' vote share, we should stress that our analysis only suggests that incumbent parties benefit from the *introduction* of the Internet. Further research is needed to assess whether this advantage persists, or whether small parties are able to catch up in mobilizing voters via this new medium.

7. Epilogue

This thesis' goal is to explore the interrelation between institutions and entrepreneurship. The mere existence of this correlation does certainly not come as a big surprise. Anyhow, disentangling the effects of explicit and implicit institutions, this thesis tracks down the effects of implicit institutions and provides evidence that cultural values and traditional norms exert a significant influence on entrepreneurship to a degree that was not necessarily expected ex ante. Those informal rules and codes of conduct affect individuals' preferences, and consequently influence the occupational choice people make. Since implicit institutions are regionally sticky, they restrict the entrepreneurial potential of regions to a fair degree. Accordingly, part of the variation Audretsch and Fritsch (2002) find in the levels of entrepreneurship between growth-regimes could relate to differences in the implicit institutions of these regimes.

Anyway, the effects of implicit institutions are a policy issue – at the latest when it comes to entrepreneurship policies. In the best case, cultural norms and values are supportive of entrepreneurship and can act as complements to policy measures taken to enhance entrepreneurship in some regions. In the worst case, implicit institutions represent obstacles to entrepreneurship in other regions that cannot be overcome by policy either. Overall, policies designed to support entrepreneurship must take regional differences in the implicit institutions into account. Measures that are highly effective in one region might have adverse effects in other regions if cultural norms and traditional values are neglected. Particularly, policies designed to raise people's interest in entrepreneurship must account for regional heterogeneity in order to be successful.

This is particularly true for differences in the implicit institutions between East and West Germany. This thesis confirms that implicit institutions change rather slowly, so that the socialist experience in the Eastern part of Germany has its prolonged aftermath in entrepreneurship-skeptical norms and values. Anyhow, this thesis fails to account for the within variance in East Germany with respect to institutions and entrepreneurship. Already under the socialist regime in the GDR, there were regions with a fair amount of entrepreneurial activity in East Germany (Wyrwich, 2010), what might hint at differences in the implicit institutions as well. The origins of the regional differences in entrepreneurial activity in the GDR and the question in how far these differences translate into differences in the performance of East German regions in reunified Germany leave much room for further research. If other former socialist

countries show similar effects of implicit institutions on entrepreneurship is another question for future work. However, this thesis shows that the transition of East Germany could probably be fastened if the implicit institutions changed. This is possibly true for other regions and countries as well.

One measure to support the adaptation of institutions is education. This thesis clearly shows that the socialist regime in the GDR shaped entrepreneurship-adverse institutions by education from childhood on. This thesis also provides some hints for the adversative effect of schooling in a libertarian regime that partly reverses the negative effects of a previous socialist treatment. Consequently, an individual's attitude towards entrepreneurship is affected by education, whereby already pre-university schooling influences the formation of individual preferences. Of course, in a liberal market economy nobody would honestly propose that school education would be a good way to manipulate students' preferences in favor of entrepreneurship. But one might discuss the picture drawn from the role of the entrepreneur within society in the classroom. Apparently, the GDR managed to indoctrinate their citizens by drawing a negative picture of the exploitative capitalist. Integrating entrepreneurship into secondary schools' curricula and discussing entrepreneurial achievements in class might perhaps elicit students' interest in entrepreneurship – at least it would raise their awareness of this issue. But whatever measures of entrepreneurship education could be taken, this thesis suggests that entrepreneurship education effectively starts at secondary school, the latest.

Anyhow, the formation of entrepreneurial preferences continues after graduation from secondary school, as this thesis illustrates. Indeed, measures of entrepreneurship education still affect the attitude towards entrepreneurship of university students. But this thesis also shows that entrepreneurship education needs a strategic concept to be effective. Only if entrepreneurship education comprises broad information combined with consultancy services students can form an opinion on whether they would like to become an entrepreneur. Additionally, entrepreneurship education requires a comprehensive approach to actually raise students' interest in an occupation as entrepreneur. Consequently, policies designed to improve entrepreneurship education and attract people to a self-employed occupation cannot be implemented en passant, but need a prospective focus and an organizational commitment so succeed. Admittedly, the formation of occupational preferences, particularly the time dimension of the development of attitudes towards entrepreneurship, needs more thorough investigation in order to give concrete policy advice.

Nevertheless, this thesis suggests that it is information that contributes to the effects of entrepreneurship education. Indeed, it is information that matters most for an individual facing an occupational choice. Against the information asymmetries necessarily associated with a decision that should maximize income over one's own life-cycle, the decision in favor of or against self-employment is undeniably a difficult one, even more if labor market rigidities induce path-dependencies. This dilemma is described by Smith (1759/1982, 157), where the "man of today" has to deal with the decisions of the "man of yesterday". And Blanchflower and Oswald (1998) show that many men of today working as employees wish that the man of yesterday had decided to become an entrepreneur. Against the veil of uncertainty under which occupational choices have to be made, information is probably the only means to achieve superior results. Of course, policy cannot entirely overcome the information asymmetries related to an individual's decision to become an entrepreneur. But the provision of information on entrepreneurship as well as offering supplementary services like coaching and consultancy must certainly be part of a holistic concept of entrepreneurship education, that aims at improving the mechanisms of self-selection into entrepreneurship.

In the end, it is individuals' decisions that account for the levels of entrepreneurship realized in a region – and for regional differences with respect to entrepreneurship. This thesis suggests that these decisions are made according to individual preferences that are affected by implicit institutions. Another influences factor on preferences is information, as this thesis confirms. Accordingly, information may lead to an adjustment in the implicit institutions, if preference structures change sustainably. In order to predict these processes more precisely, more research is needed on the interplay between institutions and entrepreneurship. This thesis anyhow suggests that new technologies like the Internet might help to fasten institutional change. Accordingly, it is not only the content of information, but also the channel of its dissemination that matters – even though these are most likely two sides of the same coin. Anyhow this thesis demonstrates that new technologies for information dissemination provide opportunities for those how know how to make use of it, i.e. that understand how to utilize new communication channels to bring their message across. Thus, the Internet could prove to be a medium that helps to raise individual's awareness of entrepreneurship as occupational alternative, if it is employed appropriately. Providing information on entrepreneurship via the Internet and offering support to wannabe-entrepreneurs could increase people's interest in this issue and also to fasten the convergence of implicit institutions within Germany. At least, it is

apparently an attractive channel to advertise the respective policies, thus potentially advancing the interplay between institutions and entrepreneurship.

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Appendix

Table A1: Detailed variable description of the data used in chapter 4

Category	Variable	Description
Dependent Variable	Entrepreneurial intention	Question: *In which area do you want to be permanently employed in the future?* Option self-employed (entrepreneur or freelancer). Answers on a 4-point-scale. Variable is unity if respondent chooses "yes, certainly" and zero otherwise.
Explanatory Variable	Raised in the GDR	Variable is unity if respondent graduated from school in East Germany (former GDR), zero otherwise.
Control: Education	Final degree aspired	Six categories indicating which degree the respondent finally wants to reach (Diploma, Magister Artium, state examination, etc.).
	High school certificate	Demeaned variable indicating the grade reached in high school certificate.
	Immediate start	Variable is unity if respondent started studies immediately after school, zero otherwise.
	Intermediate examination	For categories indicating that intermediate examinations exist, whether the respondent has taken this examination and whether it was passed.
Control: Socialization	School education father / School education mother	Categorical variable indicating the level of school education for the respondent's father and mother separately. Discriminates secondary school (8^{th} grade), middle school (10^{th} grade), high school (12^{th}/13^{th} grade), and no graduation (less than 8^{th} grade).
	Occupation father / Occupation mother	Categorical variable indicating the actual occupation of the respondent's mother, respectively, father. Discriminates public officials, white-collar workers in the public sector, white-collar workers in the private sector, blue-collar workers in the public sector, blue-collar workers in the private sector, self-employed, and others.
Control: Job experience and perspectives	Job experience	Binary variable indicating whether respondent has been working before starting studies
	Student job	Binary variable indicating whether respondent has a student job
	Decided on job	Binary variable indicating whether respondent has yet decided on future occupation
	Job perspectives	Categorical variable indicating the student's self-assessed job perspective

Control: Individual characteristics	Field of study	Thirteen categories indicating the respondent's major: linguistic and cultural studies; psychology; pedagogics; sport; law; social sciences; economic sciences; mathematics & natural science; medicine; agronomy, forestry, nutrition science; engineering; arts; other.
	Wave	Wave 5: winter term 1992/93; Wave 6: winter term 1994/95, Wave 7: winter term 1997/98.
	Kind of studies	Four categories indicating whether respondent is obtaining first degree, second degree, doctoral degree, or doing other postgraduate courses.
	Term	Number of terms the respondent has already been studying his/her major.
	Marital status	Four categories: married, not married but living with permanent partner, single without permanent partner, widowed/divorced.
	Children	Number of children.
	Age	Continuous variable
	Sex	Dummy variable
	University	Dummies for 23 German universities (universities, technical universities, and universities of applied sciences).

Table A2: Detailed variable description of the data used in chapter 5

Variable	*Survey Question*	Sub-question	Relevant answer category	Type
Outcomes				
entrepreneurship_opinion	*In which area do you want to be permanently employed in the future?*	as entrepreneur (own firm, trade, services)	not "I do not know"	binary
entrepreneurship_interest	*-ditto-*	-ditto-	"yes, perhaps", "yes, certainly"	binary
entrepreneurship_intention	*-ditto-*	-ditto-	"yes, certainly"	binary
Baseline Controls				
survey wave			5-10	categorical
university	*At which site do you study at?*		1-27	categorical
Age	*How old are you?*			continuous
Gender	*Your gender?*		male, female	binary
Children	*Do you have children?*		yes (any children)	binary
marital status	*Your marital status?*		"married", "single, with permanent partner", "single, without permanent partner", "widowed/divorced"	categorical
field of studies	*Which subjects do you currently study?*	Major subject	aggregated categories 1-12	categorical
Terms	*How many terms have you studied at university yet?*			continuous
Undergraduate	*Specify your type of studies*		no graduation yet	binary
occupation_father	*Which occupation does your father have*		aggregated categories: public officials, white-collar, blue-collar, self-employed, misc./do not know.	categorical
occupation_mother	*Which occupation does your mother have*			categorical

anyparent_entrepreneur	*Which occupation does your father/mother have*		any "small self-employed (e.g. retailer, craftsman)", "medium self-employed (e.g. big retailer, chief agent)", "big self-employed (e.g. factory owner)"	binary
aspired degree	*Name your aspired degree*		"diploma", "magister artium" state exam (no teacher)", "state exam teacher", "BA", "MA", "other" "do not know yet"	categorical
education_father	*Name the highest degree your father has reached*		"secondary school (8th grade)", "middle school (10th grade)", "high school (12th/13th grade)", "no graduation (less than 8th grade)", "misc/do not know"	categorical
education_mother	*Name the highest degree your mother has reached*			categorical
Study related Controls				
wish to study [1 2 3]	*What does characterize you situation before starting your studies best?*		"I did not want to study at all", "I was uncertain for a long time", "I was quite sure that I wanted to study", "I had been certain that I wanted to study early"	categorical
changed major [2 3]	*Have you, in the course of your studies,…*	changed your major subject?	"yes"	binary
changed university [3]	*-ditto-*	changed the university you study at?	"yes"	binary
any subject science	Which subjects do you currently study?	Major subject, second subject, third subject	aggregated: any subject from the field of science	binary
any subject engineering	*-ditto-*	*-ditto-*	aggregated: any subject from the field of engineering	binary
any subject economics [1 2 3]	*-ditto-*	*-ditto-*	aggregated: any subject from the field of economic sciences	binary
study motive: interest in field [2 3]	In how far do you think studies at a university are useful to you with respect to…	learning more about the chosen field of studies	top 2 positive values	binary

study motive: income [2]	*-ditto-*	receiving a good income	top 2 positive values	binary
study motive: interesting job [2 3]	*-ditto-*	getting an interesting job later on	top 2 positive values	binary
study motive: social position [2]	*-ditto-*	receiving a high position in society	top 2 positive values	binary
study motive: realize ideas [2 3]	*-ditto-*	realizing my own ideas	top 2 positive values	binary
study motive: general knowledge	*-ditto-*	developing a comprehensively educated personality	top 2 positive values	binary
study motive: no work	*-ditto-*	delaying working life as long as possible	top 2 positive values	binary
study motive: help people	*-ditto-*	helping other people later on	top 2 positive values	binary
study motive: improve society	*-ditto-*	contributing to the improvement of the society	top 2 positive values	binary
study reason: talent [1]	*How important where the following reasons for deciding on your field of studies?*	own talent and skills	top 2 positive values	binary
study reason: future job [2 3]	*-ditto-*	clear job aspirations	top 2 positive values	binary
study reason: various opportunities [1 2]	*-ditto-*	variety of career opportunities with this studies	top 2 positive values	binary
study reason: job security [2 3]	*-ditto-*	good prospects for secure job	top 2 positive values	binary
study reason: leadership [2 3]	*-ditto-*	good prospects for getting a leading position	top 2 positive values	binary
plans abandoning [2]	*Do you currently seriously think about abandoning studies?*		top 2 positive values	binary
dislikes studying	*All things considered, do you like being a student?*		top 2 negative values	binary
school grade [2 3]	*What is the average grade of your final examination at school that qualifies you for studying?*		above average (sample mean by survey wave)	binary
studied directly [2]	*What have you done after you graduated from school?*	I directly started studying at a university	"yes"	Binary

Job related Controls				
info labor market	*How well do you feel informed about the following issues?*	labor market situation in aspired occupational field	top 2 positive values	Binary
student job [1 2]	*How do you finance your education?*	By own work during the semester / By own work in semester breaks	>0 h/week in either answer	Binary
important at job: work with people	*What is important for you with regard to a job?*	To work with people, not only with products	top 2 positive values	Binary
important at job: security [1 2 3]	*-ditto*	Job security	top 2 positive values	Binary
important at job: ideas [2 3]	*-ditto*	to have the opportunity to realize one's own ideas	top 2 positive values	Binary
important at job: income [2 3]	*-ditto-*	high income	top 2 positive values	binary
important at job: self-reliance [1 2 3]	*-ditto-*	to be able to take decisions independently	top 2 positive values	binary
important at job: leadership [2 3]	*-ditto-*	possibility to lead other people	top 2 positive values	binary
important at job: tasks [2 3]	*-ditto-*	to be given new tasks again and again	top 2 positive values	binary
important at job: academia [2 3]	*-ditto-*	possibility to work at academic tasks	top 2 positive values	binary
important at job: responsibility [2 3]	*-ditto-*	tasks that require a sense of responsibility	top 2 positive values	binary
important at job: help [1 2]	*-ditto-*	possibility to help others	top 2 positive values	binary
important at job: advancement [1 2]	*-ditto-*	advancement possibilities	top 2 positive values	binary
important at job: investigation	*-ditto-*	possibility to investigate unknown things	top 2 positive values	binary
unimportant at job: balance [2]	*-ditto-*	work-life balance	top 2 negative values	binary
unimportant at job: society	*-ditto-*	a job where you do things that are useful to society	top 2 negative values	binary
unimportant at job: relaxation [3]	*-ditto-*	a job where you do not have to strain yourself	top 2 negative values	binary

unimportant at job: free time [3]	*-ditto-*	much leisure	top 2 negative values	binary
no job difficulties [2 3]	*What describes your job perspectives after graduation best?*		hardly any difficulties to find a job	binary
job alternative: study [2]	*If you could not realize your job aspirations due to the labor market conditions after graduation, what would you do?*	I would continue studying (post graduate studies) to improve my job prospects	top 2 positive values	binary
job alternative: burden [3]	*-ditto-*	I would be willing to accept greater burdens (e.g. move, commute longer distances)	top 2 positive values	binary
job alternative: different job [2]	*-ditto-*	I would look for a job with similar qualification requirements and remuneration	top 2 positive values	binary
job alternative: financial loss [2 3]	*-ditto-*	I would accept financial loss if the job matches my qualification / skills	top 2 positive values	binary
job alternative: under qualification [2]	*-ditto-*	I would work in a job below my qualification	top 2 negative values	binary
Controls for individual characteristics				
type: skeptical [3]	*In how far do the following statements apply to you personally?*	I doubt whether I will graduate at all	top 2 positive values	binary
type: hardworking [1 3]	*-ditto-*	I work intensely and much for my studies	top 2 negative values	binary
type: good learner	*-ditto-*	It is easy to me to learn and remember	top 2 positive values	binary
type: nervous	*-ditto-*	During exams I am often so exited that I forget things that I actually know	top 2 positive values	binary
type: fast	*-ditto-*	I want to finish my studies as fast as possible	top 2 positive values	binary
problem: peer contact [2]	*What causes difficulties for you?*	To get into contact to other students	top 2 positive values	binary
problem: teachers	*-ditto-*	Dealings with lecturers	top 2 positive values	binary

problem: competition [3]	*-ditto-*	Competition amongst students	top 2 positive values	binary
problem: preparation [2]	*-ditto-*	To prepare exams efficiently	top 2 positive values	binary
problem: discussion	*-ditto-*	To participate in discussions during seminars	top 2 positive values	binary
problem: planning [1]	*-ditto-*	Planning studies one or two years in advance	top 2 positive values	binary
burden: performance	*In how far do you perceive the following issues to be a burden?*	Performance requirements of studies	top 2 positive values	binary
burden: orientation	*-ditto-*	Problems to keep orientation	top 2 positive values	binary
burden: anonymity	*-ditto-*	anonymity at university	top 2 positive values	binary
burden: exams [3]	*-ditto-*	examinations	top 2 positive values	binary
burden: financial situation	*-ditto-*	current financial situation	top 2 positive values	binary
burden: personal problems [3]	*-ditto-*	personal problems (e.g. fears, depression)	top 2 positive values	binary
burden: job perspectives [2 3]	*-ditto-*	uncertain job perspectives	top 2 positive values	binary
important: politics [1]	*How important are the following areas of life to you?*	politics and public life	top 2 positive values	binary
important: culture	*-ditto-*	arts and culture	top 2 positive values	binary
important: studies [2 3]	*-ditto-*	university and studies	top 2 positive values	binary
important: science	*-ditto-*	science and research	top 2 positive values	binary
important: job [1 2 3]	*-ditto-*	job and work	top 2 positive values	binary
important: kinship [1]	*-ditto-*	parents and siblings	top 2 positive values	binary
important: partner	*-ditto-*	partner/own family	top 2 positive values	binary
important: friends	*-ditto-*	sociability and friends	top 2 positive values	binary
important: belief [2]	*-ditto-*	religion and belief	top 2 positive values	binary
important: nature [1]	*-ditto-*	nature and environment	top 2 positive values	binary
important: technology [1 2 3]	*-ditto-*	technics and technology	top 2 positive values	binary

unimportant: leisure	*-ditto-*	leisure and hobby	top 2 negative values	binary
attitude towards competition [2]	*How much do you agree on the following statements?*	Mutual competition destroys people's solidarity	top 2 positive values	binary
attitude towards incentives [2 3]	*-ditto-*	People do not exert themselves without competition	top 2 positive values	binary
Controls for social network				
participation: anything [2]	*How often to you participate in the activities of the following groups and organizations?*	students association, student council, senate, political groups, fraternities, informal action groups, sports, religious groups, cultural activities, miscellaneous	any top 2 positive value	binary
participation: culture	*-ditto-*	cultural activities (e.g. theater or music groups)	top 2 positive values	binary
contact: friends [2]	*How often do you have contact to the following people?*	friends and acquaintances from outside the university	top 2 positive values	binary
contact: family [2]	*-ditto-*	parents and siblings	top 2 positive values	binary
contact: peers [2 3]	*-ditto-*	students from own field of studies	top 2 positive values	binary
contact: students	*-ditto-*	students from other fields	top 2 positive values	binary
contact: lecturers	*-ditto-*	teachers and lecturers of own field of studies	top 2 positive values	binary
contact: professors	*-ditto-*	professors of own field of studies	top 2 positive values	binary
contact: job [3]	*-ditto-*	people working in the aspired occupational field	top 2 positive values	binary
contact: foreigners [2 3]	*-ditto-*	foreign students	top 2 positive values	binary

Notes: Superscript [1] indicates variables that are significant as controls in the regressions on "opinion on entrepreneurship". These variables are included in the regression on "opinion on entrepreneurship" in Columns (1) and (2) of Table 5. Superscript [2] indicates variables that are significant as controls in the regressions on "interest in entrepreneurship". These variables are included in the regression on "interest in entrepreneurship" in Columns (3) and (4) of Table 5. Superscript [3] indicates variables that are significant as controls in the regressions on "entrepreneurial intentions". These variables are included in the regression on "entrepreneurial intentions" in Columns (5) and (6) of Table 5.

Zusammenfassung

Die vorliegende Dissertationsschrift „Institutions and Entrepreneurship“ beschäftigt sich mit institutionellen Einflussfaktoren auf Entrepreneurship, d.h. (innovatives) Unternehmertum im Sinne Schumpeters. Die fünf Kapitel des Hauptteils der Arbeit basieren auf fünf Forschungspapieren, welche den Zusammenhang von institutionellen Rahmenbedingungen und Entrepreneurship aus verschiedenen Blickwinkeln beleuchten. Den Kern der Arbeit bildet die empirische Analyse der Einflüsse institutionellen Wandels auf die individuelle Entscheidung, den Beruf des Unternehmers zu ergreifen. Dabei wird nach den Effekten expliziter Institutionen, d.h. des formellen Regelrahmens für Marktaustauschprozesse, wie er sich aus kodifizierten Regeln, Gesetzen und Verträgen ergibt, und den Effekten impliziter Institutionen, d.h. informeller Normen, Werte und Verfahrensweisen, die aus Kultur und Tradition resultieren, differenziert.

Die Dissertation zeigt auf, dass gerade jene impliziten Institutionen einen nachhaltigen Einfluss auf die berufliche Selbstselektion von Individuen in die Tätigkeit als Unternehmer haben. In diesem Zusammenhang wird die Bedeutung von Erziehung für die Ausbildung Entrepreneurship-affiner Präferenzen analysiert. Die Dissertation legt anhand von Untersuchungen zu den beruflichen Absichten von Hochschulstudenten dar, dass sowohl die voruniversitäre Erziehung als auch Maßnahmen zur Entrepreneurship-Ausbildung an Hochschulen das Interesse am Beruf des Unternehmers signifikant beeinflussen. Schließlich wendet sich die Arbeit dem institutionellen Wandel an sich zu und analysiert den Einfluss von Information und Informationsvermittlung auf institutionelle Wandlungsprozesse, v.a. auf die Ausbildung impliziter Institutionen. Dabei werden Effekte des Internets als Informationsmedium auf das Wahlverhalten als Indikator für Norm- und Wertorientierungen identifiziert.

Nach einleitenden Erörterungen zu den Wechselbeziehungen von Institutionen und Entrepreneurship in Kapitel 1 beschäftigt sich Kapitel 2 zunächst mit der Unterscheidung von expliziten und impliziten Institutionen und ihren Einflüssen auf die Selbstselektion in das Berufsfeld Unternehmertum. Unter Ausnutzung der deutschen Geschichte von Teilung und Wiedervereinigung als quasi-natürlichem Experiment wird der Effekt impliziter Institutionen, wie sie sich im Osten Deutschlands durch die kollektive Erfahrung des sozialistischen Regimes ausgebildet haben, herausgearbeitet. Während sich der explizite Institutionenrahmen seit der Wiedervereinigung in allen Landesteilen einheitlich darstellt, unterscheiden sich die impliziten Institutionen in den Neuen Bundesländern signifikant von denen der Alten Bundeländer. In den Werten und

Normen, denen die ostdeutschen Individuen anhängen, finden sich auch Jahre nach der Wiedervereinigung noch die Einflüsse sozialistischer Prägung. Diese Werte und Normen sind negativ mit der Wahrscheinlichkeit, den Beruf des Unternehmers auszuüben, korreliert. Entsprechend haben Individuen in Ostdeutschland c.p. eine geringere Wahrscheinlichkeit Unternehmer zu werden als Individuen der westdeutschen Kontrollgruppe. Nichtsdestotrotz zeigt eine vergleichende Untersuchung auf Landkreisebene, dass die Gründungsrate in ostdeutschen Regionen signifikant höher ist als in vergleichbaren westdeutschen Regionen. Dies verweist darauf, dass die speziellen Marktbedingungen in den Neuen Bundesländern, die sich aus der wiedervereinigungsbedingten Sonderkonjunktur ergeben, die negativen Effekte der impliziten Institutionen dominieren.

Kapitel 3 greift diese Ergebnisse auf und beschäftigt sich detailliert mit den Einflüssen des sozialistischen Regimes der DDR auf die Ausbildung Entrepreneurship-relevanter Präferenzen in den Neuen Bundesländern. In einer multivariaten Analyse zeigen sich ostdeutsche Individuen relativ skeptisch gegenüber marktwirtschaftlichen Mechanismen und Leistungsanreizen, während westdeutsche Individuen stärkere Präferenzen für eigenverantwortliches Handeln offenbaren und Staatseingriffen vergleichsweise ablehnend gegenüber stehen. Diese Präferenzen sind wiederum mit der Wahrscheinlichkeit, Unternehmer zu sein, korreliert. Tatsächlich zeigt die empirische Untersuchung, dass ostdeutsche Individuen ceteris paribus sogar eine höhere Neigung zu Entrepreneurship hätten als westdeutsche Individuen, d.h. wenn die Präferenzen in ganz Deutschland gleichverteilt wären. Diese Unterschiede in der Präferenzordnung werden auf die Einflüsse des sozialistischen Regimes zurückgeführt. Dabei unterscheidet Kapitel 3 zwei Wirkungskanäle dieses institutionellen Einflusses: Einerseits hat die staatlich organisierte Indoktrination mit der sozialistischen Lehre die im Osten Deutschlands vorherrschenden impliziten Institutionen nachhaltig geprägt, was sich in den individuellen Präferenzen niederschlägt. Andererseits findet Kapitel 3 deutliche Hinweise darauf, dass auch selektive Migration eine Rolle gespielt haben könnte, da vor dem Bau der innerdeutschen Mauer vor allem Individuen mit hoher Präferenz für Eigenverantwortung und liberale Werte die DDR gen Westen verlassen haben.

Kapitel 4 verlagert den Untersuchungsschwerpunkt hin zu den Einflüssen expliziter Institutionen auf Entrepreneurship. Methodisch knüpft das Kapitel dabei an die vorangegangen Analysen an. Die Ergebnisse der Kapitel 2 und 3 verweisen darauf, dass die impliziten Institutionen im Osten Deutschlands eine Eintrittsbarriere für Entrepreneurship darstellen. Daraus ergibt sich die Frage, durch welche Mechanismen sich diese Institutionen unter dem sozialistischen Regime ausgebil-

det haben. In der Konsequenz ist weiterhin fraglich, ob sich die kulturell vermittelten Normen und Werte im Zeitverlauf zwischen beiden Landesteilen angleichen werden, und durch welche Mechanismen dies geschehen könnte. Vor diesem Hintergrund analysiert Kapitel 4 den Einfluss von (voruniversitärer) Erziehung auf die beruflichen Pläne deutscher Hochschulstudenten, insbesondere auf deren Absicht, Unternehmer zu werden. Hochschulstudenten sind für die übergeordnete Fragestellung der Dissertation eine relevante Gruppe, da sie ein vielversprechendes Potential für innovatives Entrepreneurship im Sinne Schumpeters darstellen. Um den Einfluss von Erziehung zu bestimmen werden diejenigen Studenten identifiziert, die zumindest für einige Jahre in der DDR zur Schule gegangen sind. Die Studenten, die stets in der Bundesrepublik Deutschland zur Schule gegangen sind, bilden die Kontrollgruppe. Es zeigt sich, dass Erziehung in der DDR einen signifikant negativen und robusten Einfluss auf die Absicht, Unternehmer zu werden, hat. Im Vergleich der Studenten, die permanent in der DDR die Schule besucht haben mit den Studenten, die zwar noch in der DDR eingeschult wurden, aber schon im wiedervereinigten Deutschland ihre Schullaufbahn abgeschlossen haben, offenbart sich, dass einige Jahre Schulbesuch im marktwirtschaftlichen System das Interesse an Entrepreneurship erhöhen. Daraus lässt sich schlussfolgern, dass Erziehung ein effektives Mittel zur Beeinflussung von Präferenzen gegenüber Entrepreneurship ist.

Basierend auf demselben Datensatz analysiert Kapitel 5 die Effekte zweier konkreter Maßnahmen zur Entrepreneurship-Ausbildung an Hochschulen, nämlich der Einrichtung von Entrepreneurship-Lehrstühlen und der Teilnahme am staatlich geförderten EXIST (Existenzgründungen aus der Wissenschaft) Programm, auf die Einstellung von Studenten gegenüber Unternehmertum als beruflicher Alternative. Die empirische Analyse verwendet die Basiseffekte der Lehrstühle und der EXIST-Teilnahme sowie den Interaktionseffekt der gleichzeitigen Anwendung beider Maßnahmen als erklärende Variablen. In aufeinander folgenden Analyseschritten werden deren Einflüsse auf die zu erklärenden Variablen i) Meinung zu Entrepreneurship, d.h. jedwede positive oder negative Einstellung, ii) Interesse an Entrepreneurship, d.h. jede positive Einstellung gegenüber dem Beruf des Unternehmers, iii) sichere Absicht, Unternehmer zu werden, analysiert. Dabei stellt sich heraus, dass die verschiedenen Maßnahmen recht unterschiedlich wirken. Lehrstühle haben für dich genommen die geringste Auswirkung auf die Einstellung gegenüber Entrepreneurship. Nur wenn Universitäten sowohl am EXIST Programm teilnehmen als auch über einen Lehrstuhl für Entrepreneurship verfügen hilft dies den Studenten, sich überhaupt eine Meinung darüber zu bilden, ob sie als Unternehmer tätig werden wollen. Außerdem erhöht nur die gleichzeitige Anwendung beider Maßnahmen das Interesse am Beruf

des Unternehmers. Allerdings ist die Wahrscheinlichkeit, dass Studenten an solchen Universitäten mit starkem Fokus auf der Entrepreneurship-Ausbildung die konkrete Absicht, Unternehmer zu werden äußern, signifikant geringer als an allen anderen Universitäten. Das EXIST-Programm für sich genommen erhöht hingegen die Wahrscheinlichkeit, dass Studenten konkrete Absichten im Bezug auf Entrepreneurship haben. Allerdings zeigt sich auch, dass die verschiedenen Maßnahmen selektiv verschiedene Typen von Studenten ansprechen. Entsprechend finden sich Hinweise, dass an Universitäten, die beide Maßnahmen zur Entrepreneurship-Ausbildung anwenden, diejenigen Studenten mit unternehmerischen Absichten besonders geeignet für innovatives Unternehmertum sein könnten. Insgesamt bestätigt Kapitel 5 jedenfalls die Effektivität erzieherischer Maßnahmen bei der Beeinflussung von Präferenzen gegenüber Entrepreneurship.

Vor dem Hintergrund der zuvor erzielten Resultate entfernt sich Kapitel 6 inhaltlich vom Themenkomplex Entrepreneurship und wendet sich dem institutionellen Wandel aus allgemeinerer Perspektive zu. Aus den Ergebnissen der ersten beiden Kapitel lässt sich ableiten, dass Entrepreneurship durch eine Anpassung der impliziten Institutionen im Osten Deutschlands gestärkt werden könnte. Allerdings bleibt offen, durch welche Mechanismen sich ein solcher Prozess vollziehen könnte, und wie lange er gegebenenfalls dauern würde. Kapitel 4 und 5 stellen die Rolle von Erziehung für die Veränderung von Präferenzen und damit langfristig auch die Entwicklung impliziter Institutionen heraus. Eine zentrale Rolle kommt dabei der Informationsvermittlung zu, wie sie z.B. im Zuge der in Kapitel 5 untersuchten Maßnahmen zur Entrepreneurship-Ausbildung erfolgt. Dieser Wirkungszusammenhang von Informationsvermittlung und Präferenzänderung, der die Grundlage des Wandels vor allem impliziter Institutionen bildet, ist Gegenstand des sechsten Kapitels. Hierin werden Effekte des Internets auf das Wahlverhalten analysiert. Die Einführung des Internets wirkte wie ein technologischer Schock auf den Markt für Informationsmedien ein und hat die Mechanismen von Informationsangebot und Informationsnachfrage nachhaltig verändert. Vor dem Hintergrund der in den Kapiteln 2 bis 5 erzielten Resultate ist davon auszugehen, dass dies auch Einfluss auf individuelle Präferenzen hat. Wenn die in den vorangegangenen Kapiteln angestellten Vermutungen über die Rolle von Information für die Ausbildung von Präferenzen korrekt sind müsste die die Einführung des Internet einen messbaren Wandel der Präferenzordnung und damit längerfristig auch der impliziten Institutionen bewirken. Kapitel 6 findet entsprechend signifikante Einflüsse des Internet auf politische Präferenzen, wie sie sich in den Wahlergebnissen wiederspiegeln. Dabei fällt auf, dass gerade die etablierten Parteien von der Einführung des Internet profitieren und ihre Stimmanteile ausbauen können. Kleine Parteien und insbesondere Parteien vom rechten Rand des politischen

Spektrums verlieren hingegen durch die Einführung des Internet. Darüber hinaus wirkt sich die Einführung des Internet signifikant negativ auf die Wahlbeteiligung aus. Dies ist konsistent mit Ergebnissen aus Kapitel 5 die aufzeigen, dass ein mehr an Information (über Entrepreneurship) unter Umständen zu einem mehr an Indifferenz (gegenüber Entrepreneurship) führt. Damit unterstreicht Kapitel 6 die Bedeutung von Information für die Präferenzbildung und legt nahe, dass die Ausbildung impliziter Institutionen durch die Vermittlung von Informationen beeinflusst wird. Kapitel 7 diskutiert zusammenfassend die Implikationen der zuvor erzielten Forschungsergebnisse und schließt mit einem Ausblick.

Erklärung gemäß $4 Abs.1 S.3 PromO

Hiermit erkläre ich,

1. dass mir die geltende Promotionsordnung bekannt ist;

2. dass ich die Dissertation selbst angefertigt, keine Textabschnitte eines Dritten oder eigener Prüfungsarbeiten ohne Kennzeichnung übernommen und alle von mir benutzten Hilfsmittel, persönlichen Mitteilungen und Quellen in meiner Arbeit angegeben habe;

3. dass ich bei der Auswahl und Auswertung des Materials sowie bei der Herstellung des Manuskriptes keine unzulässige Hilfe in Anspruch genommen habe;

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5. dass ich die Dissertation noch nicht als Prüfungsarbeit für eine staatliche oder andere wissenschaftliche Prüfung eingereicht habe;

6. dass ich nicht die gleiche, eine in wesentlichen Teilen ähnliche oder eine andere Abhandlung bei einer anderen Hochschule bzw. anderen Fakultät als Dissertation eingereicht habe.

Frankfurt, den 27. Juli 2012

Robert Gold