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July 2019

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CESifo

**Impressum:**

CESifo Working Papers
ISSN 2364-1428 (electronic version)
Publisher and distributor: Munich Society for the Promotion of Economic Research - CESifo GmbH
The international platform of Ludwigs-Maximilians University's Center for Economic Studies and the ifo Institute
Poschingerstr. 5, 81679 Munich, Germany
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Editor: Clemens Fuest
www.cesifo-group.org/wp

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CESifo *Working Paper No. 7765*
*Category 4: Labour Markets*

# Are Business Start-Ups Liquidity Constrained? Evidence from a Quasi-Experimental Allocation of Housing Wealth in East Germany

## Abstract

Are entrepreneurs liquidity constraint? Using quasi-random housing wealth variation resulting from communist era decisions, we argue yes, as we find that wealthier East Germans are more likely to become self-employed after reunification. In the literature, no such strong relationship was found using regional house price changes the US and UK. In these economies, our results suggest, the effects of liquidity constraints are masked by anticipatory savings of the would be self-employed, which was impossible for the East Germans in our sample due to communism.

JEL-Codes: J230, L260, G320.

Keywords: self-employment, financial constraints, wealthy households, starting capital.

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July 2019
Financial support by Deutsche Forschungsgemeinschaft through grant GE 1250/2-1 is gratefully acknowledged.

# 1 Introduction

To understand borrowing constraints for entrepreneurs, we investigate the relationship between wealth and self-employment. We study how Germans who lived in the former German Democratic Republic (GDR) decide on self-employment after reunification, comparing labour market outcomes of communist era homeowners with renters. Under communism property rights were so diluted that home ownership hardly mattered and was acquired as a by-product of dwelling choice. Yet, after reunification, GDR homeowners turned out to be much wealthier. This wealth, we find, has a large positive impact of at least six percentage points per €100,000 on the probability to become self-employed. We argue that this large effect compared to previous research (Hurst and Lusardi 2004, Disney and Gathergood 2009) obtains because our households had little opportunity and incentive to save for a future self-employment, thereby, giving us a clear view on the underlying borrowing constraints.

Does an entrepreneur have to provide capital and bear risk, as Knight (1921) argued, or was Schumpeter (1934) right that financial markets supply sufficient funds? Financial markets may not be able to do so if they are constrained by asymmetric information (Stiglitz and Weiss 1981) or contractual incompleteness (Hart and Grossman 1986). These market imperfections are theoretically plausible, but are they empirically relevant? This is a question also of policy relevance: Financial markets' ability to supply credit in particular to small and medium enterprises (SME) is of concern for financial market and banking regulation, monetary policy and decisions on direct subsidies for SME.

To address this questions, Evans and Jovanovic (1989) study the relationship between wealth and self-employment, as financial market imperfections should impact wealthy founders less than those without funds. They document a positive relationship between wealth and self-employment. This relationship is confirmed by others (e.g. Hurst and Lusardi 2004), but may not be causal. Reverse causality may obtain if people save to become self-employed (Xu 1998) or if wealthy people consume the independence self-employment brings as a luxury good (Hurst and

Lusardi 2004). Human capital could be an omitted variable in the relationship between wealth and self-employment (Cressy 1996, Astbro and Bernhardt 2005), as well as risk-aversion (Cressy 2000).

To reduce the selection effect, a number of researchers (Holtz-Eakin, Joulfaian, and Rosen 1994a, Holtz-Eakin, Joulfaian, and Rosen 1994b, Lindh and Ohlsson 1996, Blanchflower and Oswald 1998, Hurst and Lusardi 2004) study the effect of wealth changes by way of inheritances on subsequent entry into self-employment- They typically find a positive relationship. Alas, wealthy families may differ from poor ones in many dimensions and Disney and Gathergood (2009) and Hurst and Lusardi (2004) find that future inheritances also increase entry into self-employment, which suggests a selection effect.

When Hurst and Lusardi (2004) and Disney and Gathergood (2009) use regional house price changes as instrument for wealth, they find no or only a small positive relationship with entry into self-employment. With this instrument, they avoid a selection effect, but they also estimate a specific LATE from their compliers. Compliers, in this case, are people whose wealth goes up when house prices go up, that is, homeowners. Becoming a homeowner requires at least some capital. Therefore, Hurst and Lusardi (2004) and Disney and Gathergood (2009) study the decisions of people who, in the past, had at least some capital, but decided not to become self-employed because the already self-employed are not in their sample. Hurst and Lusardi (2004) are careful to note that this result is not only consistent with little financial frictions but also with a situation in which self-employment requires so little capital that most people that wanted to become self-employed by the time of the study had managed to do so by saving. They present accompanying evidence that little capital is needed in most areas of self-employment.

For several reasons, it would be interesting to confirm their suggestion that their result is due to small capital requirements rather than functioning capital markets: Firstly, we would like to know whether the theories of financial markets are empirically relevant. Secondly, whether people who have very little ability to save, have access to self-employment is relevant out of concerns for equal oppor-

tunities, even if their numbers are relatively small. Thirdly, even if most people who want to be self-employed manage to become so after a delay by saving, their businesses may still be smaller than optimal due to lack of financing.

In this paper we consider a particular situation which allows us to fill these gaps, by investigating whether financial markets (in Germany) are able to finance self-employment. We consider East German households in the years after reunification. These households found themselves in a situation that makes them particularly amenable to our analysis: (1) There was very little self selection into employment or strategic saving for self-employment as the communist regime, distrustful of any form of entrepreneurship and private ownership of capital, severely restricted the opportunities for self-employment. (2) Households had little wealth mainly because the communist regime wanted to prevent capital accumulation in private hands. (3) The only ex-post (after reunification) successful form of capital accumulation was home ownership, which was acquired quasi-randomly as a by-product of dwelling choice, as the property rights of homeowners were so diluted in the GDR that home ownership became practically irrelevant (Gebhardt 2013). (4) Within months these households were transferred to a capitalist economy with all possibilities of self-employment and, in particular, an exact replica of the West Germany banking system.[1]

In this set-up, we find a significant and large effect of GDR acquired housing wealth on the probability of self-employment. Each €100,000 increase the probability of self-employment by around 6 percentage points. This effect appears immediately in 1991 and stays until 2002, albeit against the backdrop of an increasing number of self-employed heads of household that increase from 1.8 percent in 1991 to 4.5 percent in 2002. We interpret this as evidence in favor of the hypothesis that the West German banking system is not able to finance self-employed that do not have any capital and that had no opportunity to save strategically. In terms of policy, this implies that people without capital are severely

[1] Using the natural experiment of the German reunification is by now a well established practice in economics; see e.g., Fuchs-Schündeln and Schündeln (2005) or Redding and Sturm (2008) .

held back if they want to become self-employed. In addition, we look at the size of firms and find that each €100,000 in household wealth increases the probability of owning an above median firm increases by around 6 percentage points, as well. This is consistent with the hypothesis, that liquidity constraints do not only operate on the extensive margin, but also on the intensive margin. Even if people manage to found firms, they are less likely to grow them large if they have to rely on capital markets for financing.

# 2 Institutional Setting and Data

## 2.1 Self-employment before and after reunification

Starting with the Soviet occupation, the communist regime aimed to end private ownership of means of production. That included, at least theoretically, all forms of self-employment. To that end, it did not allow new private businesses to form in most sectors. Already in 1946, the Soviet occupiers[2] turned 200 large firms into first Soviet and then GDR owned *Sovietische Aktiengesellschaften (SAG)* and nationalized another 4000 firms whose owners were considered close to the preceding Nazi regime. In the following years many entrepreneurs fled the country and left their firms to the state.

To small firm owners, the state offered different semi-public forms of ownership. The state pressured entrepreneurs to accept limited partnerships with the state as a minority owner, craftsmen and retail traders to join cooperatives, called *Produktionsgenossenschaften des Handwerks (PGH)* and *Konsumgenossenschaften*, respectively (see chapter 4.6 of Cornelsen 1977). Retailers could also accept rigid commission contracts. Until the early 1970s, the government turned all limited partnerships and the larger *PGH*s into *Volkseigene Betriebe (VEB*s*)* and private ownership was limited to firms with a maximum of ten employees. At this time, it decided that it would tolerate and even support private ownership of small

[2]This account follows chapter 1.1.2 of Cornelsen (1977)

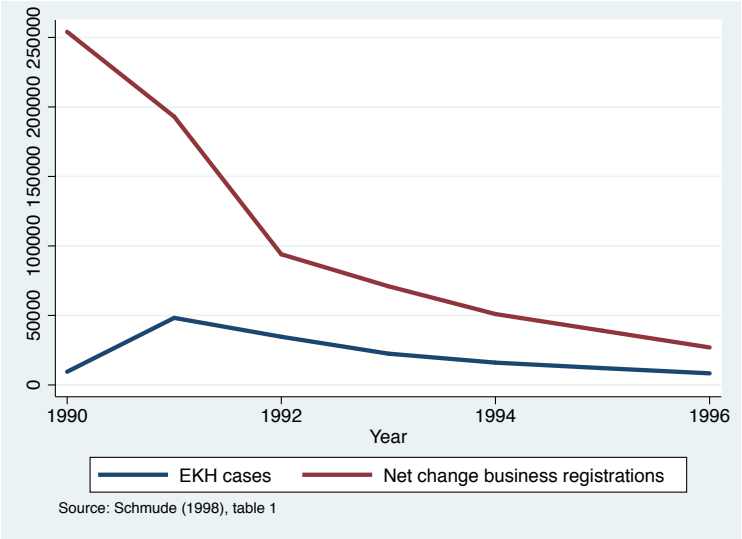
crafts catering to consumers. It handed out more permits, and provided relatively generous financing to people who wanted to become craftsmen.

All in all, in 1988 only 182,000 people or 2.1 percent of the labor force were self-employed in the GDR compared to 12.5 percent in the West German Federal Republic of Germany (FRG) (Wahse 1990, table 26). Of these, 82,234 were private craftsmen who employed 265,675 persons (Werner 1990, p. 89). In 1975, 86 percent of retail turnover was public, 7 percent operated under commission contracts. The state tolerated 7 percent of retail turnover in private ownership, as these businesses, typically bakeries and butchers, were considered crafts. This suggests that craftsmen together with bakers and butchers were the bulk of the self-employed in the GDR.

Even before the reunification, in March 1990, the *Gewerbegesetz der Deutschen Demokratischen Republik* established freedom of trade and removed many of the communist restrictions on private business ownership. After the reunification, West German law was applied, which guaranteed freedom of trade. These changes lead to a wave of business start-ups. In figure 1, we find an early peak of net business registrations in the years 1990 and 1991 that slowly peters out. Lehmann (1994) reports that in 1991 30 percent of new businesses are founded in the area of consumer services, 27 percent in wholesale and retail trade, 11.5 percent in business services, and 9.5 percent in construction.

The West German state considered new business formation as so essential to the East German transformation process that it started offering financing at preferential terms through its *Deutsche Ausgleichsbank (DtA)*, even before the currency union. The most important program to support new businesses was the *Eigenkapitalhilfeprogramm (EKH)* to bolster equity of business start-ups. They could apply for it in the first years of their existence through any commercial, cooperative or savings bank. After a successful evaluation of the business plan, the *DtA* would provide up to 700,000 DM in financing without collateral or equity requirements. This form of financing is akin to preferred equity. It has a fixed interest rate, but is junior to any other debt. The funds are channeled through

Figure 1: Net business registrations and EKH subsidy cases




the bank, but the bank is not liable for the amount. In addition, founders could apply to a subsidized loan from *European Recovery Program (ERP)*. Such a loan provides subsidized refinancing for the commercial bank and the *DtA* takes on up to 40 percent of the risk. Of the subsidized firms, 80 percent participated in both programs and obtained subsidized equity and debt (Deutsche Ausgleichsbank 1991).

In the years 1990 to 1994 alone, the *EKH* program provided 12.8 billion DM of financing (Hummel 1997, table 5). The investment per firm was quite large, almost 110,000 DM on average in the years 1990 to 1996 (Schmude 1998, table 1). During those years, more than 151,000 firms where supported, that is, more than 20 percent of the net business registrations over the same time. This is a very large share, as a business registration is cheap and straightforward to obtain, but mandatory even for minor part-time freelancing. At the time of the currency union (July 1, 1990), more than 13,000 application to the *EKH* program had already been submitted (Schmude 1998, p. 114). This early start enabled the EKH approvals to closely track the peak in new business registration with almost 10,000 loans approved in 1990 and a peak in 1991 (see figure 1).

## 2.2 The financial sector in East Germany before and after reunification

After nationalizing privately owned businesses, the communist regime in the GDR had to prevent its citizens from acquiring business assets by saving and investing. Therefore, it kept a share of the marginal product of labor (the wage share was roughly 6 percentage points lower than in the FRG (Cornelsen 1977, p. 114)), to finance investment according to the central plan.[3] The resulting free cash-flow on firm level was recycled into investments according to the central plan by a system of payments called *Fonds*, either directly through the national budget or through intermediate holdings (the *Vereinigungen Volkseigener Betriebe (VVE)* or *Kombinate*).

A mono banking system provided additional financing according to the central plan (loans with fixed interest rate, typically 5 percent) and supervised the implementation of the plan, as it handled all payments. The mono banking system nominally consisted of four different banks.[4] These banks harked back to four pre-communist banking groups, but were now simply the facades of the mono banking system towards different sectors of the communist economy. The *Staatsbank* (former private commercial banks and the *Reichsbank*) served as central bank and doubled as commercial bank to all major state enterprises. The *Bank für Landwirtschaft und Nahrungsgüterwirtschaft* (former *Raiffeisenbanken*) catered to the agricultural and food production sector. The *Genossenschaftskassen für Handwerk und Gewerbe* (former *Volksbanken*) served the craftsmen and other small businesses. The *Sparkassen*, heir to the eponymous municipality owned savings banks, offered ordinary citizens checking and savings accounts.

The savings accounts offered by the *Sparkassen* with an interest rate fixed at 3.25 percent were the only possible financial investments for private citizens. In exchange, the state would provide for retirement, unemployment and other circumstances for which people would save in a market economy. Hence, East

[3] This overview is based on chapter 2 of Cornelsen (1977).

[4] The following account follows closely Mann (1996).

Germans saved at a rate of only 6 percent (see Siebert 1990, table 1), half of what West Germans saved. The difference of the savings rate between the two Germanys was almost exactly the difference in the wage shares.[5] They saved, mainly because they could not find attractive goods to spend money on. They did not, however, acquire ownership of business assets in that process. As a result at the end of the GDR, they owned on average financial wealth of only around 27,500 Marks (Münnich 2001, p. 124), mostly (over 90 percent) held their savings in cash and savings accounts (see Werner 1990, table 6.38),

After 1989, the transformation to a capitalist banking system was swift. Most West German private banks as well as the savings and cooperative banks (re-) connected to their twin institutions almost immediately after the fall of the wall. On April 1, 1990, the *Staatsbank-Gesetz* split the central banking part of the *Staatsbank* from the commercial banking part and allowed new banks to be founded.[6] The commercial banking business of the former *Staatsbank* was then merged into two joint ventures with two of the biggest West German banks: *Deutsche Bank* and *Dresdner Bank*. With the currency union (July 1, 1990), West German banks could operate in the east and the *Sparkassen Gesetz* replicated the West German (and pre-war Imperial German) savings bank structure based on the municipalities' guarantee of the liabilities of their local *Sparkasse*. At the same time, the major West German cooperative banks scooped up the commercial banking business of the *Genossenschaftskassen für Handwerk und Gewerbe* and the *Bank für Landwirtschaft und Nahrungsgüterwirtschaft*, while splitting off retail banking to newly founded local cooperative banks, replicating the structure of the FRG. All of this was implemented with a massive transfer of employees from West to East. As a result, an exact replica of the West German banking system was up and running at the end of 1990.

Because East Germans held only cash, there was an aggregate monetary over-

[5] See Sachverständigenrat zur Begutachtung der Gesamtwirtschaftlichen Entwicklung (1981), figure 6 and Sachverständigenrat zur Begutachtung der Gesamtwirtschaftlichen Entwicklung (1991), figure 11.

[6] This follows chapter 6.1 of Mann (1996).

hang compared to the FRG that Sinn and Dornbusch (1992) estimate at 53 percent relative to income. Fearing inflation, the *Bundesbank* designed the currency union to eliminate this overhang. Savers could change only up to 2000 to 6000 Marks (depending on age) into DM at an exchange rate of 1:1. For the rest, they obtained a rate of 2:1. On average the exchange rate of savings accounts was 1.44:1 (Mann 1996, p. 34), which implies that GDR households started with roughly 19,100 DM after the currency union. All suggestions to let East Germans exchange monetary savings for equity in the nationalized firms or to redistribute equity came to naught. Instead, the public *Treuhandgesellschaft* sold the *VEB* off to private investors.[7] As a result, in 1993[8] East German households had on average financial assets of 22,830 DM compared to 63,150 DM in West Germany (Münnich 2001, p. 124).

## 2.3 Housing in the GDR

In contrast to private ownership of the capital stock, the communist regime of the GDR tolerated private ownership of consumption goods. This included owner occupied housing (Bundesministerium für innerdeutsche Beziehungen 2000, entry "Eigentum"). Home owners always owned the whole building because there were no condominiums in the German Empire or the GDR. They could pass on ownership via inheritance.

After the war, the GDR allowed the construction of owner occupied single family homes, but over time, the state virtually ended this possibility (Buck 2004, p. 245). In the mid 1970s, however, the housing shortage became so pressing that the communist regime started again to allow private construction of single family homes. To make new construction competitive with the heavily subsidized other

[7]The sale resulted in a net loss. Whether that was due to the low quality of the GDR capital stock, a botched selling strategy, or mistakes during the transition, remains an open question. See Sinn and Dornbusch (1992) for a discussion.

[8]These numbers are based on the *Einkommens- und Verbrauchstudie (EVS)*, a survey that includes among other questions, questions about wealth. In 1993, it was conducted in East and West Germany for the first time.

housing options, the state even subsidized construction and provided loans, whenever it granted permission. Relatively few permits were granted (Häußermann, Glock, and Keller 2000, p. 7, Buck, however. 2004, p. 331), mostly in the countryside, where the state could not apply its preferred method of industrial scale housing construction.

While new construction of rental property was always forbidden in the GDR, households could keep and even bequeath apartment buildings they owned before communism. Being a (private) landlord, however, was not attractive in the GDR. Landlords could not decide who lived in their apartments, they were not allowed to charge rents above the level of 1936, but they were required to maintain the apartments. Hence, owners of apartment buildings often gave the buildings to the state (Buck 2004, p. 245). At some point the burden to maintain these buildings became too much for the state, which began to require a permit to be allowed to give houses to the state (Hoffmann 1972, p. 349 and pp. 352–353).

The GDR law granted all rights typically associated with ownership to the state and the tenants such that ownership became irrelevant for all practical purposes. East German tenants were almost completely protected against interference by the landlord, but owners and tenants alike needed a government permit for every action related to housing. To evict a tenant a landlord required a court order, which was essentially never granted (Buck 2004, p. 363). East Germans needed a permit to conclude a (standardized) rental contract (Buck 2004, p. 363), to move into an empty dwelling even if they were the owners (Hoffmann 1972, p. 319), and to build a home (Buck 2004, p. 160). In principle, the state could evict renters and owner occupiers if they used up to much space (Hoffmann 1972, p. 323). In reality, in the 1980s renters often kept on paying rents for apartments that they no longer occupied just to have them available for future use. The state did little to nothing to prevent this from happening (Herbst, Ranke, and Winkler 1994, entry "Wohnraumlenkung").

This system of permits had to replace a price mechanism that did not work because rents and real estate prices were fixed at the values of the year 1936

(Häußermann, Glock, and Keller 2000, p. 7). There were also regulations in place for prices for new construction and building materials. The latter were heavily subsidized and there were by cheap credit and tax reductions if you could obtain a permit to construct owner occupied housing (Buck 2004, pp. 159–164). All in all prices were low: In 1989, East Germans paid only 3 percent of their net income for housing (Buck 2004, p. 372). In fact, they were too low so that 778,352 households were waiting for a home in 1989 (Buck 2004, p. 361). In the face of this undersupply of houses, it is extremely unlikely that East Germans could choose between two equivalent housing options, one being for rent, the other one owner occupied.

The GDR government used the permit system to control its citizens (Herbst, Ranke, and Winkler 1994, entry "Wohnraumlenkung") and rewarded loyalty to the communist regime (Buck 2004, pp. 367–369). Some households, therefore, obtained better housing than others. Housing quality, however, was most likely unrelated to ownership. East Germans were looking for suburban single family homes, often owner occupied, but also for newly built high rise apartments, always rented.

Immediately with reunification homeowners obtained the full range of property rights of the West German legal system. They could sell their property to whom they wanted and at any price they seemed fit. Prices quickly converged to West German levels for comparable locations. After reunification, homeowners ended up as the only ones in the GDR with considerable wealth. Schüssler, Lang, and Buslei (2000) who investigate the 1993 data from the *EVS* Survey find that only 27.4 percent of East German households owned real estate, but average net real estate wealth was 184,233, about nine times the average financial wealth (Schüssler, Lang, and Buslei 2000, table 3.3-3).[9]

[9]This compares to 50.7 percent of West German households that owned real estate with an average net value of 362,341, in 1993 (Schüssler, Lang, and Buslei 2000, table 3.3-3)

## 2.4 The German Socioeconomic Panel

We use the data of the German Socioeconomic Panel (GSOEP).[10] The GSOEP is a representative longitudinal study of private households in Germany. It started in 1984 in the FRG and was extended to the GDR in June 1990.[11] That is, the interviews for the first wave of the survey took place seven months after the fall of the wall, immediately before the currency union, and four months before the reunification with West Germany. In each of the following years the fieldwork organization *TNS Infratest Sozialforschung* surveyed the same households.

We choose the head of household and the associated household as the unit of observation for our analysis. Of these households we need information on wealth[12], which becomes available in 2002. In this year, we still observe 1,420 households out of the 2,179 households that were randomly selected for the "SOEP East" sample in 1990. Unless otherwise noted, we restrict our sample to heads of households that were not self-employed at the time of the 1990 survey, as we are interested in the transition to self-employment. Thereby, we exclude everybody who was self-employed in the GDR, but also have to exclude the early founders that registered their start-ups between March and June 1990. We calculate that 25 percent of the 1990 SOEP self-employed are new entrepreneurs who were not self-employed in the GDR, as the share of self-employed is 1.96 percent in the SOEP of 1990 while in 1989, according to official statistics (Statistisches Bundesamt 1990, p. 15 and p. 33), only 1.12 percent were self-employed in the GDR.

[10] See Wagner, Frick, and Schupp (2007) for a description.

[11] More than 95 percent of the interviews took place in June 1990.

[12] We include households with imputed wealth if some or all wealth components were imputed by the survey. We use the first imputation provided by the SOEP. The main results are essentially unaffected if we drop households with imputed net value of the residency, which is by far the largest component. We report all our main results for the reduced sample in the appendix in tables A-3 to A-7.

# 3 Comparison owners and renters in the GDR

In table 1, we compare (heads of) households who own a home in 1990 with those who rent one. We split owners into households that bought an existing home, build or bought a new home, or inherited their primary residence. We consider a number of different variables on the level of household or head of household as of 1990. For each of the different types of owners, we report the p-value of the difference of the means to the mean of renters. We do not adjust the p-values for multiple testing.

As the only significant difference between renters and owners of all types we find that home owners rarely live in urban areas. In these areas, Germans have always lived predominantly in apartment buildings, even before communism. Few of the units of these buildings were owner occupied, as condominiums did not exist in the German empire and were never introduced under communism. In addition, many privately owned pre-war apartment buildings were given to the state, for the reasons detailed above. To sum up, there were few single family homes, more likely to be owner occupied, to begin with. Under communism, new construction was rarely allowed, as the density of urban settlement allowed the industrial scale construction of apartment buildings preferred by the GDR state.

Homeowners that did not inherit their home differ little from renters. Buyers or builders of new houses are almost 13 percentage points less likely to be female than renters (p-value 0.02). Buyers of an existing house are almost 3 years older than renters (p-value 0.03). They are also 0.4 years less educated, but this difference is only marginally significant (p-value 0.10).

Households that inherited their home, however, differ significantly from renters in a number of dimensions. Heads of households are older and less likely to be female. They are less educated and less likely to work full time. In particular they are less likely to work for the government and indicate more often that they are satisfied with democracy, that is, the regime change away from communism. All the p-values are below 0.02, often considerably so.

These results are in line with the observation from other countries and other

Table 1: Comparison owners and renters as of 1990

| | Rented | New | P-value | Bought | P-value | Inherited | P-value |
|---|---|---|---|---|---|---|---|
| *Household* | | | | | | | |
| Monthly net income (Mark) eq. Sc. | 1058.9 | 1083.1 | 0.51 | 1055.6 | 0.95 | 1059.8 | 0.98 |
| Urban (%) | 48.1 | 2.0 | $< 0.01$ | 6.2 | $< 0.01$ | 4.1 | $< 0.01$ |
| *Head of household* | | | | | | | |
| Female (%) | 53.5 | 40.8 | 0.02 | 51.9 | 0.74 | 38.8 | $< 0.01$ |
| Age (Years) | 42.5 | 41.5 | 0.44 | 45.4 | 0.05 | 46.2 | $< 0.01$ |
| Education (Years) | 12.4 | 12.3 | 0.50 | 12.0 | 0.10 | 11.8 | $< 0.01$ |
| Monthly gross wage (Mark) | 1207.9 | 1181.6 | 0.48 | 1183.7 | 0.71 | 1148.8 | 0.21 |
| Hours worked | 42.7 | 43.4 | 0.37 | 41.8 | 0.46 | 43.0 | 0.79 |
| Full time 1990 (%) | 75.4 | 81.6 | 0.14 | 70.4 | 0.35 | 64.5 | 0.02 |
| Not working (%) | 12.2 | 9.2 | 0.31 | 13.6 | 0.77 | 18.2 | 0.11 |
| Government employee (%) | 39.9 | 34.9 | 0.34 | 31.8 | 0.17 | 26.1 | 0.01 |
| Satisfied with democracy (%) | 38.1 | 43.9 | 0.25 | 45.7 | 0.18 | 55.4 | $< 0.01$ |

political systems that households that inherit wealth are different from those who do not. While in other data we tend to find that households with inherited wealth are in many dimensions more successful, our results here point to more mixed outcomes. This need not be a contradiction. Those households may well belong to the same historically successful and probably more entrepreneurial upper classes as households with inherited wealth do in capitalist societies. This, however, may have been a disadvantage in the communist GDR. Most likely, these households had trouble to gain access to higher education and plum jobs, in particular in the government sector, as they were either considered unreliable or were less willing to make the political compromises (such as serving in the army or joining the socialist party) required for success. It it no surprise, then, that they welcomed the fall of the communist regime more than others. This is supported by the fact that the differences become more pronounced for inheritors of pre 1948 built houses, who are likely to hail from families of pre-communist home owners.

# 4 Evidence from Regressions

## 4.1 Specifications

We investigate the relationship between home ownership at the end of the GDR (1990) and subsequent wealth (2002) and self-employment (1991 to 2002). We argue that home ownership impacts on self-employment only through wealth (exclusion restriction). Therefore, we interpret the coefficients of IV regressions of self-employment on wealth, instrumented by GDR home ownership, as a (local) average treatment effect.

We employ the following specifications: One observation indexed by $i$ is one head of household that was not self-employed in 1990. In our second stage regression (2), we regress a dummy variable that is one if the head of household is self-employed in year $t$ ($self_{it}$) on her or his 2002 net total wealth (in €100,000) ($\widehat{wealth}_i$) predicted by the first stage. In the first stage (1), we instrument for

wealth ($wealth_i$) with dummy variables $bought_i, new_i$ and $inherited_i$ that are one if household $i$ acquired its 1990 primary residence in the respective way. All standard errors are robust.

$$wealth_i = \delta_0 + \delta_1\, bought_i, + \delta_2\, new_i + \delta_3\, inherited_i + \Gamma'_{\mathrm{B}} C_{i,B} + u_i \tag{1}$$

$$self_{i,t} = \beta_0 + \beta_1\, \widehat{wealth}_i + Z'_{\mathrm{B}} C_{i,B} + v_i \tag{2}$$

We consider three sets $B \in \{1,2,3\}$ of control variables $C_{i,B}$ containing (head of) household characteristics from the 1990 questionnaire. The first specification has no control variables. The second specification contains control variables for the differences we observed for households that bought or build a home: urban location, sex and age (squared). The third specification adds dummies for all possible secondary and post secondary educational outcomes and labor market status in 1990 (full-time, part time, not employed) to control for differences that we observed for households that inherited their primary residence. Moreover, we add dummies for all East German states of residence in 1990, and dummies for two digit NACE industry classification of employment in 1990. The latter should pick up the different opportunities for post 1990 self-employment resulting from different regulations during the GDR. As these regulations were rolled out administratively along sector and occupation lines such dummies should be effective in capturing their implications.

## 4.2 Impact of GDR home ownership on wealth in 2002

Table 2: First stage estimates of net overall wealth in 2002 € / 100,000

| | IV1 | IV2 | IV3 |
|---|---|---|---|
| Bought | 0.61*** | 0.60** | 0.59*** |
| | (0.17) | (0.19) | (0.16) |
| New | 0.71*** | 0.65*** | 0.63*** |
| | (0.084) | (0.093) | (0.092) |
| Inherited | 0.50*** | 0.47*** | 0.49*** |
| | (0.071) | (0.080) | (0.084) |
| Constant | 0.26*** | 0.092 | 0.58 |
| | (0.021) | (0.26) | (0.49) |
| Personal controls | | ✓ | ✓ |
| Urban | | ✓ | ✓ |
| German states | | | ✓ |
| Education | | | ✓ |
| Industry & employment dummies | | | ✓ |
| Kleibergen-Paap F-test | 40.6 | 22.7 | 22.2 |
| Observations | 1095 | 1095 | 1095 |

Notes: An observation in the regression is one head of household and its associated household. The dependent variable is net overall wealth in 2002 € / 100,000. Robust standard errors in parenthesis.
+ significant at 10%; * significant at 5%; ** significant at 1%; *** significant at 0.1%;

Table 2 presents the results of the first stage regression. Note that the first stage regressions remain the same for all years $t$ of the dependent variable $self_{it}$, as all the variables stay constant for different years of self-employment $t$. The first regression, without controls, tells us that home ownership in the GDR still largely determines the wealth distribution in 2002. Home ownership adds between €50,000 (inherited home) and €71,000 (new home) over the wealth of heads of households that rented (€26,000). Additional control variables make little difference to these results, only the value of the new homes converges to the lower

values for bought and inherited homes. The instruments are highly significant. The Kleibergen-Paap F-test of their joint significance is at least 22 indicating that small sample bias is likely to be small.

The 2002 results from the SOEP are broadly consistent with the previously reported information from a different survey, the *EVS* in the year 1993. As the *EVS* values are on the level of households, while we observe the wealth of the head of household, they are not directly comparable. We can, however, construct household level data from the SOEP: In 2002, 1990 home owner households are €88,505 wealthier than renters or 150,633 DM inflation adjusted to the year 1993. This compares to the 184,233 DM real estate wealth per 1993 home owning household in 1993 in the *EVS*.

## 4.3 Impact of wealth on self-employment in 1991

We start by considering the impact of wealth on business start-ups in the SOEP wave of 1991. I.e., we consider heads of households that did not report that they are self-employed in the 1990 questionnaire (June 1990) and investigate whether they report to be self-employed in the 1991 questionnaire (March/April 1991). This time window allows us to catch most of the wave in new business registrations that we observe in figure 1. Of course, some of these new registrations may already have been founded before June 1990 and are not in our sample. Out of our sample (not self-employed in 1990), 20 heads of household (1.8 percent) report in the 1991 questionnaire that they now are self-employed. Table A-1 in the appendix details the industries.[13] Retail trade dominates the list.

In table 3 we report a strong impact of GDR home ownership generated wealth on new business start-ups in 1991. We find coefficients between 0.062 and 0.077, i.e. each €100,000 of wealth increases the probability of self-employment by slightly above 6 percentage points. If we take the average wealth increase from the first stage of about 60,000 Euros, we can see that owning a house in the GDR

[13]For the cases where the entry of the precise industry is missing we show the occupational orientation in appendix table A-2.

increases the probability of self-employment by at least 3.7 percentage points, compared to a sample average of 1.8 percent. The different sets of control variables have little impact on the size of the coefficient. The standard errors of the coefficient estimate increase slightly, as we add up to 75 control variables in the third specification, but remain significant (p-value 2.4 percent).

If we compare these estimates to the literature, we find that they are higher than the effects of house price shocks. Hurst and Lusardi (2004) find for the US that an additional $100,000 (1988), derived from a shock to house prices, decrease (albeit not significantly) the probability of self-employment by 1.9 percentage points. Noting that $100,000 in 1988 are inflation and purchasing power adjusted roughly €136,000 in 2002, we can adjust this effect to minus 1.4 percentage points for €100,000 in 2002. Disney and Gathergood (2009) find for the UK that an additional £100,000 (1995), derived from a shock to housing prices, increase (significantly) the probability for self-employment by two percentage points. We can again adjust the £100,000 in 1995 to roughly €196,000 in 2002 and get an effect of one percentage point per €100,000 in the year 2002.

This difference most likely results from different LATEs being estimated. The average treatment effects of Hurst and Lusardi (2004) and Disney and Gathergood (2009) are estimated from the respective compliers, i.e. households whose wealth changes due to a house price shock. These households must be home owners. Home owners are households that managed to built up at least some equity in the past. Moreover, the sample consists of people who self selected into not being self-employed, over many years. Therefore, the compliers are people who had some capital, but decided not to use it to become self-employed. Changing their wealth now, does not induce them to become self-employed. In contrast to that, people in our sample had little opportunity to become self-employed for most of their lives. Only during the three months from March to June 1990 they could self select into self-employment. Moreover, the amounts necessary to start a business are small, as Hurst and Lusardi (2004) demonstrated. Most US and UK home owners most likely could have saved enough to start a business. East

German households without a house, however, plausibly were below even this low threshold, in particular, because they had little chance to save strategically for self-employment in a future capitalist East Germany they could not anticipate. Thus they had to rely on external financing as the only way to get started. Our results suggest that they faced difficulties obtaining the necessary funds.

Table 3: Estimates of the probability of self-employment in 1991

| | IV1 | IV2 | IV3 |
|---|---|---|---|
| Net wealth in 2002 € / 100,000 | 0.066** | 0.077** | 0.062* |
| | (0.022) | (0.029) | (0.027) |
| Constant | -0.0100 | -0.015 | -0.069 |
| | (0.0075) | (0.050) | (0.087) |
| Personal controls | | ✓ | ✓ |
| Urban | | ✓ | ✓ |
| German states | | | ✓ |
| Education | | | ✓ |
| Industry & employment dummies | | | ✓ |
| Mean of dependent variable | 0.018 | 0.018 | 0.018 |
| Kleibergen-Paap F-test | 40.6 | 22.7 | 22.2 |
| P-value Hansen J-statistic | 0.45 | 0.42 | 0.70 |
| P-value C-statistic (Inherited) | 0.96 | 0.77 | 0.87 |
| Observations | 1095 | 1095 | 1095 |

Notes: An observation in the regression is one head of household with the associated household. The dependent variable is a binary variable that is 1 if the person reported that it is self-employed in 1991. Robust standard errors in parenthesis. + significant at 10%; * significant at 5%; ** significant at 1%; *** significant at 0.1%;

Given that we have more instruments than endogenous regressors we can test the orthogonality restriction. The p-values above 0.4 do not give us any reason to reject the null hypothesis that the instruments are valid. As we are particularly suspicious of the independence of inherited houses, we can also calculate the p-value of the C-statistic regarding them. Again we are far from being able to reject the null hypothesis that inherited houses are a valid instrument. Still in table A-8

in the appendix, we report the results of the regression with only two instruments, i.e. without inherited houses. We lose some efficiency through a weaker first stage, but the size of the coefficient remains largely unaffected.

Given that there is a strong imbalance in the sense that urban households are underrepresented, we may be afraid that including a dummy for an urban location is not really enough. Instead we could consider dropping these households completely. We report the results for only non-urban households in table 4. The coefficients are essentially the same, the standard errors go down.

Table 4: Estimates of the probability of self-employment in 1991 – Excluding urban households

| | IV1 | IV2 | IV3 |
|---|---|---|---|
| Net wealth in 2002 € / 100,000 | 0.084** | 0.082** | 0.060** |
| | (0.027) | (0.026) | (0.022) |
| Constant | -0.022* | -0.039 | -0.18 |
| | (0.011) | (0.071) | (0.14) |
| Personal controls | | ✓ | ✓ |
| German states | | | ✓ |
| Education | | | ✓ |
| Industry & employment dummies | | | ✓ |
| Mean of dependent variable | 0.021 | 0.021 | 0.021 |
| Kleibergen-Paap F-test | 29.1 | 32.7 | 29.4 |
| P-value Hansen J-statistic | 0.62 | 0.65 | 0.62 |
| P-value C-statistic (Inherited) | 0.53 | 0.57 | 0.36 |
| Observations | 708 | 708 | 708 |

Notes: An observation in the regression is one head of household with the associated household. The dependent variable is a binary variable that is 1 if the person reported that it is self-employed in 1991. Robust standard errors in parenthesis. + significant at 10%; * significant at 5%; ** significant at 1%; *** significant at 0.1%;

## 4.4 Impact of wealth on self-employment in later years

We may be worried about the external validity of the results of the year 1991. As laid out above, we have some reason to believe that the East German banking system converged quickly to West German standards. Still, we may suspect that the existing employees of East German banks were not yet able to evaluate business plans or that the West German transplants were unsure about qualifications of East German applicants or future prospects of start-ups during the transition period. Hence, East German banks may extend overall less credit to start-ups or prefer loans secured by real property. In this case, we would still estimate an internally valid treatment effect, but this treatment effect would reflect the peculiar properties of an economy in transition and we would learn little about the financial system in a more general sense.

To address this concern, we extend the time period for the take-up of self-employment. We consider self-employment in the year 2002. The year 2002, i.e. 12 years after the German reunification, is a natural end point. It allows us to estimate long term effects of wealth on the same sample that we used for the year 1991, as we always included only households that remained in the SOEP until 2002 such that we could observe the wealth information. Besides, 12 years should give the banking system plenty of time to learn. Even if banks initially are loth to extend credit to promising but ill-secured start-ups, they should do so over the next decade. Thus, the effect of wealth on self-employment should disappear, if it is driven by a banking system in transition. If we still find it in 2002, it is most likely a feature of the banking system not of the transition period.

In table 5, we report essentially the same absolut impact of GDR home ownership generated wealth on new business start-ups in 2002 as in 1991. However, note that 4.5 percent of households started a business in the first 12 years after reunification. Thus, in relative terms, we find a smaller effect which, however, is still large. As argued before, the effect of GDR home ownership is about 3.6 percentage points, even in relative terms on the order of magnitude of the mean rate of self-employment (4.5 percent). Again, the different sets of control variables

have essentially no impact on either the size or the standard error of the coefficient estimate. All the p-values are below 4.6 percent.[14] Table A-10 and A-11 in the appendix detail the industries. We can see that there is nothing unusual here – retail still dominates the list.

Table 5: Estimates of the probability of self-employment in 2002

| | IV1 | IV2 | IV3 |
|---|---|---|---|
| Net wealth in 2002 € / 100,000 | 0.056* | 0.079* | 0.066* |
| | (0.027) | (0.035) | (0.033) |
| Constant | 0.021+ | 0.12+ | 0.045 |
| | (0.012) | (0.069) | (0.10) |
| Personal controls | | ✓ | ✓ |
| Urban | | ✓ | ✓ |
| German states | | | ✓ |
| Education | | | ✓ |
| Industry & employment dummies | | | ✓ |
| Mean of dependent variable | 0.045 | 0.045 | 0.045 |
| Kleibergen-Paap F-test | 40.1 | 21.5 | 21.7 |
| P-value Hansen J-statistic | 0.083 | 0.15 | 0.17 |
| P-value C-statistic (Inherited) | 0.050 | 0.083 | 0.072 |
| Observations | 1133 | 1133 | 1133 |

Notes: An observation in the regression is one head of household with the associated household. The dependent variable is a binary variable that is 1 if the person reported that it is self-employed in 2002. Robust standard errors in parenthesis. + significant at 10%; * significant at 5%; ** significant at 1%; *** significant at 0.1%;

If we drop inherited houses for the 2002 results, the effect of wealth on self-employment becomes even larger. For the 2002 regressions, we can reject the null hypothesis that inherited (housing) wealth is exogenous in all three specifications at the 10 percent level. This casts some doubt on the independence of inherited

[14]There are a few additional observations, for which the information on self-employment was missing in 1991, but available in 2002. Therefore in table A-9 in the appendix we report the first stage with the slightly changed sample. It is essentially unaffected.

wealth when it comes to the long term effect of wealth on self-employment. In table 6, we therefore drop inherited houses as an instrument and keep only bought or new houses. We find a further increase in the effect of wealth on self-employment. This suggests a negative omitted variable bias associated with inherited wealth. These omitted variables are likely related to the reduced educational attainment and lower labor force attachment we report in section 3. Such characteristics of households that inherited wealth plausibly lead to less successful entrepreneurial careers in the long term and early withdrawal from self-employment. In sum, the result that there is a large effect of wealth on self-employment in our sample is not driven by omitted variable bias due to inherited wealth. Quite the contrary, it is mitigated by it.

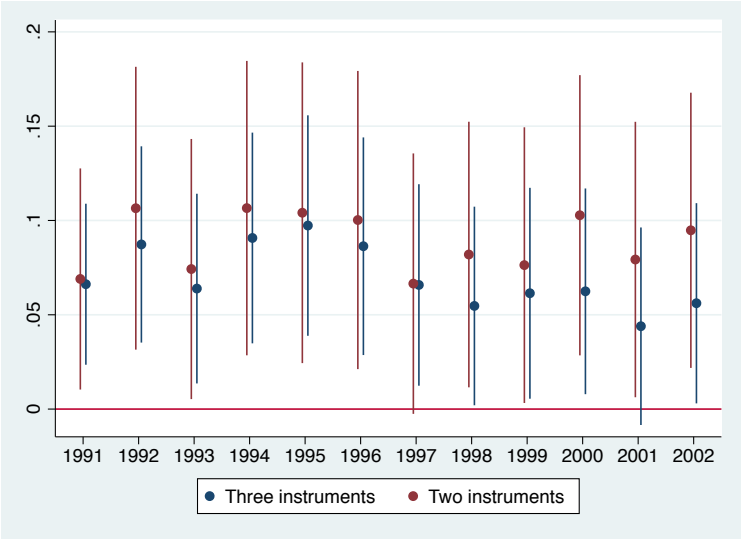
Table 6: Estimates of the probability of self-employment in 2002 no inheritance

| | IV1 | IV2 | IV3 |
|---|---|---|---|
| Net wealth in 2002 € / 100,000 | 0.095* | 0.13** | 0.12* |
| | (0.037) | (0.049) | (0.050) |
| Constant | 0.0051 | 0.12+ | 0.022 |
| | (0.015) | (0.069) | (0.11) |
| Personal controls | | ✓ | ✓ |
| Urban | | ✓ | ✓ |
| German states | | | ✓ |
| Education | | | ✓ |
| Industry & employment dummies | | | ✓ |
| Mean of dependent variable | 0.045 | 0.045 | 0.045 |
| Kleibergen-Paap F-test | 32.6 | 14.2 | 14.4 |
| P-value Hansen J-statistic | 0.28 | 0.40 | 0.59 |
| Observations | 1133 | 1133 | 1133 |

Notes: An observation in the regression is one head of household with the associated household. The dependent variable is a binary variable that is 1 if the person reported that it is self-employed in 2002. Robust standard errors in parenthesis. + significant at 10%; * significant at 5%; ** significant at 1%; *** significant at 0.1%;

The development over time demonstrates that our results for the years 1991

Figure 2: Coefficient on wealth over time (IV1) with 95 % confidence interval




and 2002 are no outliers, but rather typical for the development over the years. In figure 2, we plot the development of the coefficients in specification IV1 over time. The estimates for three instruments tend to have smaller standard errors. The estimates without inheritance as an instrument are similar in the first years, but diverge over time to become considerably larger.

# 5 Impact of wealth on firm growth (business assets)

In the 2002 wealth survey, all persons report business assets as a wealth component. These data allow us to investigate whether businesses are smaller than their optimum scale because entrepreneurs cannot borrow enough, a question that has so far not been addressed and has been suggested by Hurst and Lusardi (2004). In this sample, we can include all firms, independent of when they were founded. To avoid the selection effect of a conditional on positive estimate, we adopt the strategy suggested by Angrist (2001) and construct a new dummy that is one, if a head of household has business assets of above €25,000, the median amount of

business assets (conditional on them being positive).[15]

In table 7, we report that the effect on this dummy for a large firm is statistically significant in all specifications (p-values 0.1, 5.0 and 6.9 percent respectively). The effect of an additional €100,000 is between six and seven percentage points, which is considerable relative to the mean of the dependent variable of 2.2 percent. This result is consistent with the hypothesis that people with little wealth, even if they manage to become self-employed, are still financially constrained and their ventures grow slower.

[15] We can also simply run our regression on a continuous variable business assets, rather than a dummy that is one for positive business assets. We report the result in table A-12 in the appendix. We find that an extra €100,000 yields between €22,000 and €33,000 extra business assets.

Table 7: Estimates of the probability of business assets above €25,000 in 2002 (two instruments)

| | IV1 | IV2 | IV3 |
|---|---|---|---|
| Net wealth in 2002 € / 100,000 | 0.067* | 0.067+ | 0.060+ |
| | (0.027) | (0.034) | (0.033) |
| Constant | -0.0076 | 0.071 | 0.100 |
| | (0.011) | (0.046) | (0.069) |
| Personal controls | | ✓ | ✓ |
| Urban | | ✓ | ✓ |
| German states | | | ✓ |
| Education | | | ✓ |
| Industry & employment dummies | | | ✓ |
| Mean of dependent variable | 0.022 | 0.022 | 0.022 |
| Kleibergen-Paap F-test | 27.2 | 10.9 | 11.4 |
| P-value Hansen J-statistic | 0.29 | 0.39 | 0.65 |
| Observations | 1159 | 1159 | 1159 |

Notes: An observation in the regression is one head of household with the associated household. The dependent variable is a binary variable that is 1 if the person reported that it has business assets above €25,000 in 2002. Robust standard errors in parenthesis.
+ significant at 10%; * significant at 5%; ** significant at 1%; *** significant at 0.1%;

# 6 Direct evidence for liquidity constraints

One way in which home ownership can relax liquidity constraints is by relaxing borrowing constraints if it is posted as collateral. Of course, other more direct ways are possible, too. Houses can be sold, to directly provide capital or they can be used as the location of the business, eliminating the need to finance rent. In this section, we look at the direct impact of home ownership on debt. As part of the wealth survey, we have information on debt (see Deutsches Institut für Wirtschaftsforschung 2012, p. 24–25). We cannot be sure that the self-employed

report all debt taken on to finance their business. But we can construct a lower bound of debt taken on and provide some (not statistically significant) evidence consistent with the hypothesis that home owning entrepreneurs take on more debt.

In the survey, everybody answers two question regarding debt: The first question concerns mortgages, i.e., "loans taken out on your property". The second question concerns all other personal debt excluding mortgages. The English translation of the second question is: "Leaving aside any mortgages on house or property or house-building loan: Do you at the present time have any debts relating to credit that you as a private individual have taken on at a bank or a similar institution or a another individual, for which you are accountable?" Some people may not report business debt in these two questions because for business owners there is a third question: "How high do you estimate the current value of your enterprise or of your share to be? This is the price before tax, which you would receive at the sale of your enterprise or your share, taking into account any remaining financial burdens." Hence, business owners may report a net business value and subtract business debts.

We can add the answers to the first two questions to derive a lower bound on the amount of debt a self-employed has taken on. This measure equals total debt if we assume that the self-employed report all debt in the first two questions (depending on whether it is secured by real property or not) and report the gross asset value of their business in the third question. This is implausible if an individual owns the business in the form of a limited company. In this case, the individual is not liable for any debt, but the firm. If the owner sells the firm, he or she will sell equity shares. In this case, the survey participant will probably not report any business debts in the first two questions, as he or she is not liable for it. Besides he or she will probably report the value of his or her share in equity (equal to a net asset value) in the third question. Thus, we would underestimate total debt taken on if we use only the sum of the first two questions. However, as this form of incorporation was very expensive in the 1990s and the businesses we consider are really small, we expect the vast majority of businesses to be so called *Einzelun-*

*ternehmen* (sole proprietorships). In this legal form, the owner is fully liable for all business debts and he or she would reasonably report them in one of the two debt questions. Moreover, these businesses are typically not sold including debt, as the debt is attached to the owner. Rather, the owner sells the assets and pays back his or her debts, while the new owner has to secure new credit. Hence, there are no remaining financial burdens at the time of sale and owners will plausibly report the gross asset value in the third question. In addition, the subsidized loans of the *ERP* are always personal loans to the owner of the firm and can never be made to a limited company.

In table A-13 in the appendix, we compare reported debt means by way of a simple regression and find some tentative (not statistically significant) evidence that the self-employed who owned a home in 1990 take on more debt. Persons that neither owned a home in the GDR nor were self-employed either in 1991 or 2002 have around €10,000 overall debt in 2002. GDR home owners are little different. They borrow between €900 and €2,600 less (not significant). The self-employed borrow significantly more, roughly an additional €35,000 for the cohort of 2002 entrepreneurs and around €30,000 more for the cohort of 1991 entrepreneurs, indicating that self-employed indeed report their business debts in the survey as suggested above. The self-employed that owned a home in the GDR on average have even more debt. They borrowed between €12,000 and €53,000 extra. These differences are not statistically significant, however, as they are estimated from only 20 people who were self-employed in 1991 (7 GDR homeowners) or 50 self-employed in 2002 (31 GDR homeowners).

# 7 Government subsidies

The large effect of wealth on self-employment obtains, even in the presence of subsidized financing. Thus, the subsidies do not seem to be able to remedy financial market imperfections. We show that the government subsidies were pervasive in the sense that on average more than half of the more persistently self-employed,

i.e. people who remained self-employed for at least three years, received government funding. If this funding was not able to close the gap between wealthy and less wealthy entrepreneurs, it cannot have been successful at reaching all liquidity constrained would be self-employed with viable projects. Instead, most likely it went to some degree to independently wealthy entrepreneurs and improved their probability of self-employment, as well.

A back of the envelope calculation suggests that many of the newly self-employed in our sample received government subsidies under the *EKH* program. We do not have data on the subsidies the self-employed in our sample receive, but we can do a back of the envelope calculation to compare the number of newly self-employed in our sample to the number of subsidy cases. We know from Schmude (1998) that 141,905 business start-ups received government subsidies under the *EKH* program from 1990 until 1996. Using our complete sample (not only heads of households) of 4,453 people, we find that 122 were self-employed in 1996 but not in 1990. Scaling that up to the East German population of 15.5 million, we obtain 424,658 newly self-employed. To translate this number of self-employed persons into firms, we use information from the 2002 wealth survey, which tells us that roughly 80 percent of self-employed have no partners. Assuming conservatively that the remaining 20 percent have one partner, we get 382,192 businesses, indicating a participation rate of 37 percent for the government subsidies under the *EKH* program.

If we consider only the more permanently self-employed, as typical for the *EKH* program, we get an even higher subsidy rate. The firms subsidized under the *EKH* program are remarkably durable. At the end of 1992 only 0.6 percent of the self-employed have given up their business (Deutsche Ausgleichsbank 1993). If we use a comparable time span of three years for our back of the envelope calculation, i.e. new businesses that existed in 1996 and continued to exist until 1998, we get 83 self-employed in our sample, equivalent to a subsidy rate of 55 percent. Extending that period to the end of our sample in 2002, we get 44 self-employed scaling up to 137,840 firms, almost exactly the number of subsidized firms under

the *EKH* program. This exercise suggests that the self-employed in East Germany can be grouped into short-lived self-employment and more permanent start-ups, the latter typically being recipients of government subsidies. The former are made up of a considerable number of people drifting in and out of self-employment.

If the government programs are so large, how can it be that they do not eliminate the need for personal wealth to start a business? The so called *Hausbankprinzip*, i.e. the fact that you can only apply to subsidized loans through a commercial, savings or cooperative bank, empowers these banks as a gate keeper to screen the loan applicants. Data suggests that only safe bets pass this screening, as only 5 percent of applications that go through the banks are rejected by the *Deutsche Ausgleichsbank* (Deutsche Ausgleichsbank 1993) and there are almost no defaults, as reported above. This may happen because banks are exposed to considerable risk, as most firms get an *ERP* loan in addition to the preferred equity under the *EKH* program and for these loans the banks have to shoulder at least 60 percent of the default risk. Moreover, banks probably need to provide additional loans to recover the cost of screening the applications, exposing them to even more default risk. Therefore, banks are likely to prefer relatively safe investments, ideally secured by real estate. This is also the conclusion of Prantl (2002) in her analysis of an internal data set of the *Deutsche Ausgleichsbank*. She goes on to argue that it is in the interest of the *Deutsche Ausgleichsbank* that, for political reasons, wants to avoid defaults.

There is probably little a government can do. Banks fail to finance positive net present value projects because contracting problems make them unprofitable. Unless the government has a better contracting technology available, following the lead of the banks is probably the most efficient course of action. This strategy of subsidizing all bank financed start-ups, however, helps both constrained and unconstrained entrepreneurs and has, therefore, an ambiguous impact on the relationship of wealth and self-employment. It helps entrepreneurs without collateral to obtain financing, as a higher net present value gives banks and entrepreneurs more room to find incentive compatible contracts. But the subsidy also turns neg-

ative net present value projects of unconstrained entrepreneurs into positive net present value projects.

# 8 Conclusion and Discussion

In our main result, we find that an additional €100,000 of wealth resulting from GDR home ownership increases the probability of an East German becoming self-employed in the year after the currency union by about 6 percentage points, compared to a mean probability of 1.8 percent. This effect is considerably larger than the small (Disney and Gathergood 2009) to zero (Hurst and Lusardi 2004) effects reported in the literature for wealth changes resulting from house price shocks in the UK and US. The quasi experiment of the German reunification allows us to interpret this result in a way that addresses the main question left open by the literature: Is the small effect of housing wealth changes on self-employment evidence that business start-ups do not face borrowing constraints or that the self-employed need so little capital that they can acquire the necessary capital by saving. Our results suggest it is the latter.

Previous studies always observed a sample of people who had a lifetime to prepare for self-employment by saving. Therefore, they cannot disentangle the effect of strategic saving from the ability to borrow. In contrast, we have the unique opportunity to observe people that had little to no opportunity for either self-employment or saving, and who had to assume that was not going to change in their lifetime. Still, they should have been able to finance their future self-employment by borrowing if only the West German banking system they suddenly faced had little frictions. The lack of savings, strategic or not, should not have held them back and whether they happened to own a home or not should have been irrelevant. Alas that is not what we find. Wealth acquired by GDR home ownership matters a lot for self-employment, consistent with the hypothesis that there were borrowing constraints.

The distinction between the two hypotheses, is of theoretical interest of its

own, but also adds nuance to questions regarding public policy. From a public policy perspective the insights from the previous literature remain largely intact. In the US and the UK many households are able to save enough to buy a home. For this large proportion of the population, self-employment requires little enough capital to be in reach. The inefficiency probably consists only of some delay and maybe distorted consumption. But for people that have genuinely little or no capital, self-employment is out of reach, a fact that matters at least from an equal opportunity perspective.

Relevant from an efficiency perspective is the evidence we present on the effect of wealth on firm growth. Homeowners are more likely to have a large firm. This is consistent with a world, in which people can save enough to become self-employed but due to borrowing constraints lack the funds to grow the firm to the optimal scale. This suggests that small effects on the probability of self-employment in the US and UK could mask larger efficiency losses in terms of firm size.

Unfortunately from a policy perspective, our results obtain even though there was a large effort by the state to subsidize self-employment, indicating that there is no easy fix for the inefficiency. If the state does not have a better contracting or monitoring technology than private banks, it cannot target explicitly borrowing constraint firms without wasting money due to asymmetric information problems that where the reason private banks were not financing these firms to begin with. Subsidizing every firm that banks are willing to finance, reduces these losses (to almost zero) and will lift some borrowing constraint positive net present value projects over the financing threshold, but, at the same time, produces a welfare loss from negative net present value projects of unconstrained founders that due to the subsidy become profitable.

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# Appendix

Table A-1: Industries of business start-ups in 1991

| Industry | Number |
|---|---|
| Retail, Ex. Motor vehicles, Motorcycles; Repair | 7 |
| Does not apply | 4 |
| Construction | 3 |
| Manuf Other Non-metallic Mineral Products | 1 |
| Manuf Machinery And Equipment NEC | 1 |
| Manuf Electrical Machinery And Apparatus NEC | 1 |
| Manuf Radio, Television And Communication Equipment | 1 |
| Activities Auxiliary To Financial Intermediation | 1 |
| Other Business Activities | 1 |

Table A-2: Occupation if industry is "Does not apply" in 1991

| Occupation | Number |
|---|---|
| Managers of Small Enterprises in Wholesale and Retail Trade | 1 |
| Business Professionals Not Elsewhere Classified | 1 |
| Library and Filing Clerks | 1 |
| Building, Related Electrician | 1 |

Table A-3: First stage estimates of net overall wealth in 2002 € / 100,000 – Excluding households with imputed residence values

| | IV1 | IV2 | IV3 |
|---|---|---|---|
| Bought | 0.72** | 0.69** | 0.68** |
| | (0.24) | (0.26) | (0.21) |
| New | 0.78*** | 0.71*** | 0.67*** |
| | (0.100) | (0.11) | (0.11) |
| Inherited | 0.47*** | 0.42*** | 0.42*** |
| | (0.075) | (0.085) | (0.087) |
| Constant | 0.22*** | -0.15 | 0.24 |
| | (0.016) | (0.21) | (0.44) |
| Personal controls | | ✓ | ✓ |
| Urban | | ✓ | ✓ |
| German states | | | ✓ |
| Education | | | ✓ |
| Industry & employment dummies | | | ✓ |
| Kleibergen-Paap F-test | 35.5 | 19.0 | 18.7 |
| Observations | 949 | 949 | 949 |

Notes: An observation in the regression is one head of household and its associated household. The dependent variable is net overall wealth in 2002 € / 100,000. Robust standard errors in parenthesis.
+ significant at 10%; * significant at 5%; ** significant at 1%; *** significant at 0.1%;

Table A-4: Estimates of the probability of self-employment in 1991 – Excluding households with imputed residence values

| | IV1 | IV2 | IV3 |
|---|---|---|---|
| Net wealth in 2002 € / 100,000 | 0.069** | 0.076* | 0.071* |
| | (0.025) | (0.033) | (0.033) |
| Constant | -0.0068 | 0.030 | 0.028 |
| | (0.0073) | (0.052) | (0.089) |
| Personal controls | | ✓ | ✓ |
| Urban | | ✓ | ✓ |
| German states | | | ✓ |
| Education | | | ✓ |
| Industry & employment dummies | | | ✓ |
| Mean of dependent variable | 0.019 | 0.019 | 0.019 |
| Kleibergen-Paap F-test | 35.5 | 19.0 | 18.7 |
| P-value Hansen J-statistic | 0.66 | 0.63 | 0.78 |
| P-value C-statistic (Inherited) | 0.96 | 0.82 | 0.83 |
| Observations | 949 | 949 | 949 |

Notes: An observation in the regression is one head of household with the associated household. The dependent variable is a binary variable that is 1 if the person reported that it is self-employed in 1991. Robust standard errors in parenthesis. + significant at 10%; * significant at 5%; ** significant at 1%; *** significant at 0.1%;

Table A-5: Estimates of the probability of self-employment in 1991 – Excluding urban households and households with imputed residence values

| | IV1 | IV2 | IV3 |
|---|---|---|---|
| Net wealth in 2002 € / 100,000 | 0.089** | 0.089** | 0.073** |
| | (0.029) | (0.029) | (0.026) |
| Constant | -0.016+ | 0.028 | -0.042 |
| | (0.0098) | (0.079) | (0.14) |
| Personal controls | | ✓ | ✓ |
| German states | | | ✓ |
| Education | | | ✓ |
| Industry & employment dummies | | | ✓ |
| Mean of dependent variable | 0.024 | 0.024 | 0.024 |
| Kleibergen-Paap F-test | 35.5 | 34.2 | 28.0 |
| P-value Hansen J-statistic | 0.88 | 0.91 | 0.81 |
| P-value C-statistic (Inherited) | 0.76 | 0.80 | 0.53 |
| Observations | 593 | 593 | 593 |

Notes: An observation in the regression is one head of household with the associated household. The dependent variable is a binary variable that is 1 if the person reported that it is self-employed in 1991. Robust standard errors in parenthesis. + significant at 10%; * significant at 5%; ** significant at 1%; *** significant at 0.1%;

Table A-6: Estimates of the probability of self-employment in 2002 – Excluding households with imputed residence values

| | IV1 | IV2 | IV3 |
|---|---|---|---|
| Net wealth in 2002 € / 100,000 | 0.059* | 0.076* | 0.065+ |
| | (0.029) | (0.037) | (0.038) |
| Constant | 0.023* | 0.11 | 0.051 |
| | (0.011) | (0.070) | (0.10) |
| Personal controls | | ✓ | ✓ |
| Urban | | ✓ | ✓ |
| German states | | | ✓ |
| Education | | | ✓ |
| Industry & employment dummies | | | ✓ |
| Mean of dependent variable | 0.045 | 0.045 | 0.045 |
| Kleibergen-Paap F-test | 35.0 | 17.8 | 18.0 |
| P-value Hansen J-statistic | 0.14 | 0.19 | 0.13 |
| P-value C-statistic (Inherited) | 0.047 | 0.070 | 0.044 |
| Observations | 982 | 982 | 982 |

Notes: An observation in the regression is one head of household with the associated household. The dependent variable is a binary variable that is 1 if the person reported that it is self-employed in 2002. Robust standard errors in parenthesis. + significant at 10%; * significant at 5%; ** significant at 1%; *** significant at 0.1%;

Table A-7: Estimates of the probability of self-employment in 2002 no inheritance – Excluding urban households and households with imputed residence values

| | IV1 | IV2 | IV3 |
|---|---|---|---|
| Net wealth in 2002 € / 100,000 | 0.088* | 0.11* | 0.11* |
| | (0.036) | (0.047) | (0.049) |
| Constant | 0.012 | 0.12+ | 0.051 |
| | (0.013) | (0.071) | (0.11) |
| Personal controls | | ✓ | ✓ |
| Urban | | ✓ | ✓ |
| German states | | | ✓ |
| Education | | | ✓ |
| Industry & employment dummies | | | ✓ |
| Mean of dependent variable | 0.045 | 0.045 | 0.045 |
| Kleibergen-Paap F-test | 29.4 | 14.0 | 13.4 |
| P-value Hansen J-statistic | 0.86 | 0.95 | 0.77 |
| Observations | 982 | 982 | 982 |

Notes: An observation in the regression is one head of household with the associated household. The dependent variable is a binary variable that is 1 if the person reported that it is self-employed in 2002. Robust standard errors in parenthesis. + significant at 10%; * significant at 5%; ** significant at 1%; *** significant at 0.1%;

Table A-8: Estimates of the probability of self-employment in 1991 - no inherited houses

| | IV1 | IV2 | IV3 |
|---|---|---|---|
| Net wealth in 2002 € / 100,000 | 0.069* | 0.076+ | 0.071+ |
| | (0.030) | (0.040) | (0.041) |
| Constant | -0.011 | -0.015 | -0.073 |
| | (0.011) | (0.051) | (0.092) |
| Personal controls | | ✓ | ✓ |
| Urban | | ✓ | ✓ |
| German states | | | ✓ |
| Education | | | ✓ |
| Industry & employment dummies | | | ✓ |
| Mean of dependent variable | 0.018 | 0.018 | 0.018 |
| Kleibergen-Paap F-test | 33.1 | 15.1 | 14.8 |
| P-value Hansen J-statistic | 0.21 | 0.20 | 0.42 |
| Observations | 1095 | 1095 | 1095 |

Notes: An observation in the regression is one head of household with the associated household. The dependent variable is a binary variable that is 1 if the person reported that it is self-employed in 1991. Robust standard errors in parenthesis. + significant at 10%; * significant at 5%; ** significant at 1%; *** significant at 0.1%;

Table A-9: First Stage Estimates of Net Overall Wealth 2002 sample

| | IV1 | IV2 | IV3 |
|---|---|---|---|
| Bought | 0.59*** | 0.57** | 0.57*** |
| | (0.17) | (0.19) | (0.16) |
| New | 0.70*** | 0.63*** | 0.62*** |
| | (0.083) | (0.093) | (0.092) |
| Inherited | 0.50*** | 0.46*** | 0.49*** |
| | (0.071) | (0.081) | (0.083) |
| Constant | 0.26*** | 0.069 | 0.53 |
| | (0.021) | (0.24) | (0.46) |
| Personal controls | | ✓ | ✓ |
| Urban | | ✓ | ✓ |
| German states | | | ✓ |
| Education | | | ✓ |
| Industry & employment dummies | | | ✓ |
| Kleibergen-Paap F-test | 40.1 | 21.5 | 21.7 |
| Observations | 1133 | 1133 | 1133 |

Notes: An observation in the regression is one head of household and its associated household. The dependent variable is net overall wealth in 2002 € / 100,000. Robust standard errors in parenthesis.
+ significant at 10%; * significant at 5%; ** significant at 1%; *** significant at 0.1%;

Table A-10: Industries of business start-ups in 2002

| Industry | Number |
|---|---|
| Does not apply | 8 |
| Retail, Ex. Motor vehicles, Motorcycles; Repair | 7 |
| Construction | 5 |
| Other Business Activities | 5 |
| Health And Social Work | 5 |
| Agriculture, Hunting, Related Service Activities | 2 |
| Publishing, Printing And Reproduction Of Recorded Media | 2 |
| Sale, Maint, Repair Motor Vehicles; Retail Car Gas | 2 |
| Wholesale Trade, Commission Trade, Ex. Motor Vehicles | 2 |
| Supporting, Aux. Transport Activities; Travel agencies | 2 |
| No Answer | 1 |
| Manuf Wearing Apparel; Dressing And Dyeing Of Fur | 1 |
| Manuf Wood Products, Except Furniture | 1 |
| Manuf Machinery And Equipment NEC | 1 |
| Electricity, Gas, Steam And Hot Water Supply | 1 |
| Hotels And Restaurants | 1 |
| Activities Auxiliary To Financial Intermediation | 1 |
| Computer And Related Activities | 1 |
| Public Administration And Defense; Compulsory SocSec | 1 |
| Education | 1 |
| Other Service Activities | 1 |

Table A-11: Occupation if industry is "Does not apply" in 2002

| Occupation | Number |
|---|---|
| Managers of Small Enterprises Not Elsewhere Classifie | 2 |
| Estate Agent | 2 |
| Managers of Small Enterprises | 1 |
| Managers of Small Enterprises in Wholesale and Retail Trade | 1 |
| Authors, Journalists and Other Writers | 1 |
| Plumber, Pipe Fitter | 1 |

Table A-12: Estimates of business assets in 2002 (two instruments)

| | IV1 | IV2 | IV3 |
|---|---|---|---|
| Net wealth in 2002 € / 100,000 | 0.15* | 0.24* | 0.22* |
| | (0.073) | (0.093) | (0.086) |
| Constant | -0.025 | 0.14 | 0.17 |
| | (0.029) | (0.12) | (0.23) |
| Personal controls | | ✓ | ✓ |
| Urban | | ✓ | ✓ |
| German states | | | ✓ |
| Education | | | ✓ |
| Industry & employment dummies | | | ✓ |
| Mean of dependent variable | 0.041 | 0.041 | 0.041 |
| Kleibergen-Paap F-test | 27.2 | 10.9 | 11.4 |
| P-value Hansen J-statistic | 0.64 | 0.71 | 0.76 |
| Observations | 1159 | 1159 | 1159 |

Notes: An observation in the regression is one head of household with the associated household. The dependent variable is business assets in 2002 € / 100,000. Robust standard errors in parenthesis.
+ significant at 10%; * significant at 5%; ** significant at 1%; *** significant at 0.1%;

Table A-13: Overall Debt

| | OLS1 | OLS2 | OLS3 | OLS4 |
|---|---|---|---|---|
| Bought, New or Inherited 90 | -0.011 | -0.026 | | |
| | (0.017) | (0.017) | | |
| Bought or New 90 | | | -0.0090 | -0.018 |
| | | | (0.020) | (0.021) |
| Self Employed 02 | 0.37** | | 0.35** | |
| | (0.13) | | (0.12) | |
| Self Employed 91 | | 0.29* | | 0.30** |
| | | (0.13) | | (0.10) |
| (Bought, New or Inherited 90) * (Self Employed 02) | 0.12 | | | |
| | (0.29) | | | |
| (Bought, New or Inherited 90) * (Self Employed 91) | | 0.36 | | |
| | | (0.36) | | |
| (Bought or New 90) * (Self Employed 02) | | | 0.22 | |
| | | | (0.34) | |
| (Bought or New) * (Self Employed 91) | | | | 0.53 |
| | | | | (0.52) |
| Constant | 0.099*** | 0.11*** | 0.097*** | 0.11*** |
| | (0.0098) | (0.011) | (0.0089) | (0.010) |

Notes: An observation in the regression is one head of household with the associated household. The dependent variable is overall debt in 2002 € / 100,000. Robust standard errors in parenthesis.
+ significant at 10%; * significant at 5%; ** significant at 1%; *** significant at 0.1%;