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Calling Baumol: What Telephones Can Tell Us about the Allocation of Entrepreneurial Talent in the Face of Radical Institutional Changes

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ABSTRACT

Calling Baumol: What Telephones Can Tell Us about the Allocation of Entrepreneurial Talent in the Face of Radical Institutional Changes*

The aim of this paper is to test a key aspect of Baumol's theory that the allocation of entrepreneurial efforts toward its productive (e.g., start-up activity) or unproductive (e.g., rent-seeking) use depends on institutional conditions. In contrast to previous research, we study a context where a radical and exogenous institutional change took place that dramatically changed the rewards and opportunities of running a firm. We analyze at the individual level who decides to start a venture in East Germany after the fall of the Berlin Wall. We find that a significant number of people that demonstrated a strong commitment to the anti-entrepreneurial socialist regime were active in launching new ventures soon after the fall of the Berlin Wall. This pattern cannot be explained by having elite status during the socialist regime. We argue that this commitment to socialism reflects rent-seeking, a type of unproductive entrepreneurship. Once institutions change radically, their entrepreneurial efforts are redirected towards productive entrepreneurship (start-up activity). Regime commitment is captured by information from the 1990 wave of the German Socioeconomic Panel (GSOEP) that includes information on whether East German respondents had a telephone during the socialist era, a typical reward for pronounced efforts for the socialist regime. We find that this group of people were more likely to have an entrepreneurship- prone personality profile, had a higher propensity of becoming selfemployed, and were more successful entrepreneurs. Our results confirm Baumol's theory in a setting that resembles the historical examples Baumol used to make his general argument.

JEL Classification: L26, P20, P31

Keywords: entrepreneurship, transition, institutional conditions

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1 Introduction

In this paper, we provide a novel test of one of the key aspects of Baumol's (1990) theory on the allocation of entrepreneurship. In his seminal contribution, Baumol argues that the allocation of entrepreneurial efforts into productive and other types of entrepreneurship is strongly determined by the institutional framework. As Sobel (2008) put it, 'institutional structure determines the relative reward of investing entrepreneurial energies into productive market activities versus unproductive political and legal activities' (p. 641). Baumol (1990) uses different historical contexts to illustrate his main argument. For example, in ancient Rome entrepreneurial effort in the economic sphere was of low prestige, even though it was rewarding with respect to personal wealth. He suggests that warfare is an example of unproductive, even destructive, entrepreneurship that was common in early medieval Europe, and was more rewarding than being involved in commercial activities given that historical environment.

In this paper, our analysis of how institutions and institutional change affect the productive or unproductive allocation of entrepreneurship is contextualized by the rise of socialism in Eastern Europe after World War II, and the subsequent transition to a market economy after 1990. We focus on Eastern Germany because it provides us with several appealing institutional features for credibly testing the entrepreneurial response of people facing drastic institutional change. For example, immediately after the socialist system collapsed there was a sharp rise in start-up activity that was led by people who had been committed to the socialist regime (Rona-Tas, 1994; Stoica, 2004). This pattern is puzzling, because institutions established by the Soviet socialist regime were extremely anti-entrepreneurial (e.g., Earle & Sakova, 2000). In fact, the Soviet elite considered entrepreneurship to be a 'bourgeois anachronism'.

We believe that using Baumol's (1990) theory in this context will help us solve this puzzle. If the institutional framework found in Eastern Germany during the socialist regime did not reward entrepreneurial activities (for details, see, for example, Aslund, 1985; Pickel, 1992), people with an entrepreneurial mindset may have decided to engage in unproductive activities like lobbying and rent-seeking. These are two classical examples of unproductive entrepreneurial activity Baumol discusses (1990). These individuals may have even participated in the shadow economy (Aidis & van Praag, 2007), an example of destructive entrepreneurship. In the context of a socialist regime, rent-seeking behavior could be expressed, for example, by enthusiastic involvement in socialist organizations (e.g., party councils, youth organizations, state-owned enterprises) to gain material rewards. During the transition to a market economy, the institutional framework conditions for starting a venture improved significantly, thus, making it more rewarding for this group of people to re-allocate their entrepreneurial efforts to productive entrepreneurship, e.g., starting their own commercial ventures.

Germany provides an interesting test bed for this aspect of Baumol's theory, because post-socialist institutions did not evolve endogenously. This is in sharp contrast to most other Eastern European countries (Ivlevs et al. 2020), as well as other countries transitioning from socialism to a market economy (Zhou 2013, 2017). East Germany adopted the ready-made institutional framework of West Germany, literally overnight. Therefore, Eastern Germany's institutional change was not only radical, but also exogenous (for details, see Brezinski & Fritsch, 1995). This radical and rapid transition excluded individuals from using political networks, connections and other privileges developed during the socialist era to shape institutions in their favor.

The exogenous nature of institutional change in Eastern Germany also gives us the opportunity to explore a weak point in not only Baumol's theory, but any number of empirical studies that do not consider how entrepreneurship might impact institutional development (Kalantaridis, 2014; Douhan & Henrekson, 2010; Henrekson & Sanandaji, 2011). This weakness is most apparent when entrepreneurs have the ability to influence institutional change, for instance, in rapidly changing environments (e.g., Ahlstrom & Bruton 2010). Our analysis is based on a natural experiment in a context where individuals living under the Soviet socialist regime who had an entrepreneurial mindset could not influence the development of institutions after reunification with West Germany. Thus, we are able to investigate this missing aspect of Baumol's theory.

The goal of our analysis is to determine if individuals whose material possessions suggest a strong commitment to the socialist regime were more likely on average to start successful firms after German reunification in 1990. Our main empirical identification relies on a method developed by Bird et al. (1998), also in the context of post-socialist East Germany. The authors use survey responses to a question about the ownership of a telephone before the fall of the Berlin Wall to identify people strongly committed to the socialist regime, and explain why this information is superior to actual socialist party membership.[1]

Our findings reveal that individuals in the German Democratic Republic (GDR) households with a telephone connection had a more pronounced entrepreneurial personality profile. These individuals were also more likely to be involved in free-time activities that indicated a commitment to the socialist regime, were more likely to start new firms after German reunification and were more

[1] The authors refer to this group as socialist upper class, which may be too narrow a definition, because not every person having a strong commitment to the socialist regime was a member of the upper class or elite.

successful as entrepreneurs. All of these characteristics are positively associated with having access to a telephone in the GDR. We can rule out that this effect is driven by upper class and/or elite status, and other individual characteristics (e.g., human capital, specific occupations, and general wealth level).

Our study springs from and contributes to the stream of literature that was built on Baumol's work and focuses on how specific institutional arrangements and developments impact the level of start-up activity (Sobel, 2008; Stenholm et al., 2013; Elert & Henrekson, 2017; Chowdhury et al., 2019). We also contribute to the literature on entrepreneurship in a transition context (Smallbone & Welter, 2001; Kshetri, 2009; Ivlevs et al., 2020).

In Section 2, we discuss Baumol's contribution, and present a detailed description of our conceptual framework. Our empirical strategy, data collection and the structure of our models are all presented in Section 3. In Section 4 we discuss the results of our empirical models. Section 5 offers a brief summary and some concluding remarks.

2 Baumol's theory in the context of drastic institutional change

2.1 Baumol in the entrepreneurship literature

In his seminal contribution, Baumol (1990) develops the hypothesis that the productive (i.e., start-up activity) or unproductive (i.e., rent-seeking) use of entrepreneurship depends on the relative pay-off of such activities, and that the payoff depends on the institutional environment.[2] In this respect, institutions are understood as the 'rules of the game'. This understanding is based on North (1990)'s theory of institutions. According to North, institutions can be either formal (e.g., laws and constitutions) or informal (e.g., conventions, codes of conduct), and both types of

[2] In our assessment, we only differentiate between productive and unproductive entrepreneurship. Discussing destructive entrepreneurship is beyond the scope of the paper.

institutions structure and incentivize economic and social interactions. Understanding how the institutional environment influences the nature of entrepreneurial activities is crucial, especially when one considers that productive entrepreneurship encourages economic growth and unproductive entrepreneurship can undermine growth (Wennekers & Thurik, 1999; Bjørnskov & Foss, 2016).

The empirical literature inspired by Baumol's work mostly analyzes how variations in the structure of today's institutional arrangements (specifically the regulatory, cognitive, and normative dimensions of institutions) affect the allocation and the quality of entrepreneurial activities across countries (Busenitz et al. 2000, Sobel, 2008; Stenholm et al. 2013; Chowdhury et al., 2019). Another stream of literature that was influenced by Baumol focuses explicitly on how institutional quality impacts start-up activity (e.g., Sobel, 2008; Bosma et al., 2018). Some institutional features that are discussed include: the regulation of entry (e.g., Djankov et al. 2002), bankruptcy law (Peng, Yamakawa & Lee, 2009), the degree of economic freedom (e.g., Bjørnskov & Foss, 2008; Bradley & Klein, 2016; Gohmann, Hobbs, & McCrickard, 2008; Boudreaux, Nikolaev & Klein, 2019), credit constraints (Bianchi, 2010), the level of corruption (Collins, McMullen, & Reutzel, 2016; Berdiev & Saunoris, 2018), the size of the informal economy (Fredström, Peltonen & Wincent 2020), and the rule of law in general (Mickiewicz et al. 2021). A common finding is that the design and the quality of institutional structures are key drivers of productive entrepreneurship. Some scholars suggest that institutional structures moderate the link between the individual characteristics of entrepreneurs and their intention (e.g., Schmutzler, Andonova & Diaz-Serrano, 2019) as well as their actual decision to start a venture (e.g., Boudreaux, Nikolaev & Holcombe 2018).

The research on institutional quality and entrepreneurship has also inspired a growing literature on entrepreneurial ecosystems (Spigel, 2017; Stam & Van de Ven, 2019) and systems of entrepreneurship (e.g., Qian et al., 2013; Acs et al., 2014), and on the varieties of capitalism and entrepreneurship (e.g., Hall & Soskice, 2001; Dilli et al., 2018) that is focused on the design and quality of specific entrepreneurship-facilitating institutional support.

All of this literature is rooted in Baumol's original writing, both with respect to his theory and his empirical design. A common feature of most studies is that they focus on an environment where institutional arrangements are relatively stable or path-dependent, or where a short-term institutional change is imposed by an endogenous trigger. Although these studies deepen our understanding about how people respond to minor and endogenous changes in governance and regulation (e.g., number of entry procedures), we still do not understand how people allocate entrepreneurial effort when institutions are drastically different and institutional changes are radical. The lack of research for such settings is puzzling because Baumol (1990) derives his argument from historical examples with drastically varying institutional contexts.

Baumol (1990) uses historical contexts to prove his theory that specific institutional arrangements influence the direction entrepreneurial effort will take, either toward productive or unproductive activities. For example, he argues that the institutions in ancient Rome made involvement in productive economic activity less attractive, and that landholding, usury, and 'political payments' (all unproductive activities) were more attractive. Roman society was not against accumulating wealth, but this accumulation should not rely on economic activity. Thus, unproductive entrepreneurship (i.e., rent-seeking) was favored over productive entrepreneurship

(i.e., running a profitable business). Similarly, Baumol discusses the institutional environment of the Middle Ages in Europe. This environment encouraged engaging in small scale military skirmishes as a way to gain wealth and power. Baumol calls this destructive entrepreneurship (i.e., warfare), completing his catalog of productive, unproductive and destructive entrepreneurial activity. The historical examples Baumol uses to substantiate his theory are not limited to the two outlined above, but all describe institutional environments that are quite unlike those found in a modern market-based economy. Baumol uses a modern market-based economy as an example of an institutional environment that favors productive entrepreneurial activities.

Baumol's use of historical contexts to develop his argument is in stark contrast with other studies that rely on empirical evidence drawn from mainly stable institutional environments or on non-disruptive short-term institutional change (e.g., Mickiewicz et al. 2021). The fact that most of the literature does not analyze how radical institutional change impacts the allocation of entrepreneurial efforts, means that an interesting aspect of Baumol's theory remains untested.[3]

2.2 Baumol and the entrepreneurial response to drastic institutional change: What could be a real-world test bed?

One of the key aspects of Baumol (1990)'s theory is that entrepreneurial talent is bound to certain people, but institutions determine how these people use their talent and channel their entrepreneurial efforts. Specifically, Baumol (1990, p. 898) writes, 'if the rules are such as to impede the earning of much wealth via activity A, or are such as to impose social disgrace on those who engage in it, then, other things being equal, entrepreneurs' efforts will tend to be channeled to other activities, call them B'.

[3] We restrict our analysis to this aspect of the design of institutional arrangements because Baumol's original argument was specific with respect to institutional design, but not quality. Actually, in Baumol's paper, the word 'quality' appears only once in relation to the quality of a product, not in the context of institutional arrangements.

If this is true, we should be able to observe entrepreneurs switching between different types of entrepreneurship (productive/unproductive/destructive) when a drastic change of institutional arrangements alters the relative pay-off of different types of entrepreneurial activities.

This aspect of Baumol's theory can only be tested at the individual level. While previous studies primarily investigate variations in the aggregated level of entrepreneurial activities, within-country micro-level studies at the level of individuals are still rare. To our knowledge, no studies explicitly focus on this aspect of Baumol's theory, namely: how the same person might change the application of their entrepreneurial talent if the institutional environment changes.

It is challenging to find a context that allows for the exploration of the reallocation of entrepreneurial efforts in the face of drastic institutional change. Such an exploration requires information on individual behavior before and after the regime change. An almost ideal case is the transition from socialism toward a market economy that occurred in Eastern Europe at the end of the 20th century. There is hardly any economic system and/or institutional framework that is more hostile toward entrepreneurship than socialism. The level of self-employment was extremely low, if not completely prohibited, across socialist countries (for details, see Aslund, 1985; Pickel, 1992). There were hardly any opportunities to expand a business, much less start up an own business. High taxes, rigid wage and price controls, centralized allocation schemes for crucial means of production, and other bureaucratic obstacles and legal barriers created an environment that made it extremely difficult to be self-employed. These circumstances massively reduced the pay-offs of productive entrepreneurship, namely, running an own venture (e.g., Ageev and Kuzin 1990; Earle & Sakova, 2000).

This is in stark contrast to the pay-offs of productive entrepreneurship in a market economy, the model institutional framework for countries transitioning from a socialist regime. Not surprisingly, there was a sharp rise in start-up activity immediately after the transition to a market economy (e.g., Smallbone & Welter, 2001; Cieslik & van Stel, 2014). This post-socialist development suggests that the population had entrepreneurial potential that was not eradicated by several decades of socialist indoctrination. It also indicates that the pay-off of productive entrepreneurship and the opportunities to get involved in start-up activity changed tremendously.

Baumol's framework offers an explanation for the rise of start-up activity after the drastic change of the institutional environment. If entrepreneurial effort is bound to certain people, as Baumol argues, then the new post-socialist (productive) entrepreneurs were already engaged in other less productive types of entrepreneurship under socialist framework conditions, such as rent-seeking. Following Baumol (1990), rent-seeking is defined as unproductive entrepreneurship, but entrepreneurs, who Baumol considers to be 'ingenious and creative in finding ways that add to their own wealth, power, and prestige' (p. 897), may have had no other options. Because it is beneficial for authoritarian regimes to provide privileges for loyal supporters (for details, see Anderson & Boettke 1997), one strategy for increasing personal wealth and prestige in these regimes is to actively commit to the apparatus of the ruling administration. Accordingly, a viable strategy for entrepreneurs working in socialist economies is to become loyal supporters of the socialist party, and to seek rents in the form of material rewards and wealth. Once a market economy is introduced, redirecting these efforts toward start-up activity becomes a superior strategy, given the higher pay-offs of productive entrepreneurship.

One issue with this narrative is that many of the newly founded companies reflect 'nomenclatura' entrepreneurship. In other words, firms that were founded by the former socialist elite could still be considered as a form of unproductive entrepreneurship (Smallbone & Welter, 2001). The former elite used political influence for private gain by protecting market niches and using them to mobilize resources. Smallbone and Welter (2001) state that, based on Baumol's classification, this type of start-up activity can be classified as unproductive entrepreneurship in terms of its impact on societal welfare. The authors argue that 'nomenclatura' entrepreneurship is especially prevalent in transformation economies where the state and its institutions are still in the formative stages. In this type of environment, the former elite are able to disproportionately benefit from privatization (e.g., by securing monopolies and state subsidies), and unproductive entrepreneurship still pays off (see also Aidis et al. 2008; Kshetri 2009; Du & Mickiewicz 2016). The endogenous and gradual transition experienced in Eastern European countries is in sharp contrast with the “clean” radical exogenous transition of the socialist GDR in the course of reunification with the Federal Republic of Germany (FRG) in 1990. Hence, the type of “nomenclatura” entrepreneurship found in many Eastern European countries is almost completely absent in the context of East Germany.

Compared to other socialist bloc countries, the transformation process in East Germany was much faster and much more radical (Brezinski & Fritsch 1995). Rapid unification with West Germany introduced the institutional framework of a Western-style market economy almost overnight. Hence, the former socialist elite was not in a position to redesign or create new institutions that would give them disproportionate advantages. The unique characteristics of the East German setting allows us to test Baumol’s (1990) proposition that entrepreneurial effort that is bound to certain people changes direction in a manner that corresponds to the variations in the rules

of the game. More precisely, people in East Germany saw a rapid and exogenously imposed change in the institutional framework conditions. If Baumol's argument that entrepreneurial effort is bound to certain people holds, then we should observe that individuals who engaged in unproductive entrepreneurship, i.e., commitment to the socialist regime in the GDR as a form of rent-seeking primarily motivated by the prospect of material rewards, should be overrepresented among the group of firm founders after 1989.

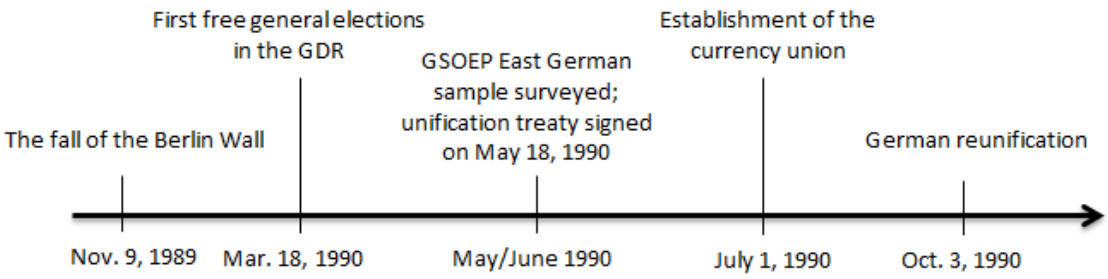
3 Empirical strategy

3.1 Setting the scene

Our empirical analysis relies on the German Socioeconomic Panel (GSOEP). The GSOEP is a national representative household panel of individuals aged 18 and older that has been available since 1984, with East Germany added in June 1990 (Goebel et al., 2019). Because German reunification officially took place in October 1990, the East German sample of the GSOEP as of 1990 offers a unique glimpse into life during and before the transition from socialism to market economy. Respondents in the East German sample have since been polled every year, even if they moved to other parts of Germany. The East German sample of the GSOEP has been widely used in the literature, typically in papers exploiting the existence and eventual destruction of the Berlin Wall as a natural experiment (e.g., Alesina & Fuchs-Schündeln, 2007).

In this section, we provide an overview of important events that shaped the radical institutional change that took place in East Germany (Figure **1**). The purpose of this overview is twofold. First, to give a sense of the changes the survey participants experienced between the fall of the Berlin Wall on November 9, 1989, and May/June 1990, when they were interviewed. Second, to give a sense of the degree to which they were able to anticipate other institutional change at the time of the interview.

Figure 1: Timeline of events surrounding the survey of East German respondents



Just a few weeks before the fall of the Berlin Wall, the GDR was a fully-fledged centrally planned economy with very few active business owners (185,000, ca. 1.8 % of the workforce). Most private sector activities were only tolerated in crafts and small-scale manufacturing (for details on self-employment in the GDR, see Pickel 1992). In the days before the fall of the Berlin Wall on November 9, 1989, no one could reasonably anticipate German reunification and the introduction of a fully-fledged market economy within less than 12 months. For example, the street protests against the regime before November 9th, revolved around reforming socialism, not reunifying Germany. While there was a new (non-elected) socialist government installed in mid-November, the economic policies of these party officials were focused on reforming central planning principles and allowing for cooperation with West German companies (i.e., joint ventures). The reform process, however, was sluggish because the socialist elite remained in power.

The West German government was also restrained, although Chancellor Helmut Kohl did present a 'confederative structures' agenda on November 28, 1989, this idea was rejected not only by the GDR government, but also by the Soviet Union and West German politicians. However, the continued economic malaise of the GDR,

and an increasing level of migration of people to West Germany made the idea of having two separate Germanys more and more unrealistic. In early February 1990, the Soviet Union agreed to a process of reunification advocated by Kohl. This unexpected turn of events was a huge surprise for many West German decision makers,[4] and gave a new dynamic to the first free elections in the GDR on March 18, 1990. The newly formed party 'Alliance for Germany', which was backed by Kohl's Christian Democrats and was clearly in support of an immediate reunification, obtained a landslide victory. Again, this victory shocked many political observers, since before World War II East Germany was a stronghold of the Social Democrats (Becker et al., 2020), a party that favored a much slower reunification process.

Reunification negotiations proceeded quickly after the elections. On May 18, 1990, the unification treaty was signed that presented a roadmap for reunification. On July 1, 1990, a currency union was established to establish a common economic landscape in preparation for full political and legal integration on October 3, 1990 (German unification day).

The finalization of the unification treaty in May 1990 coincides with the time when the participants of the survey were interviewed. Hence, every respondent clearly anticipated German reunification and the currency union a few weeks later. It was obvious that the 'rules of the game' were changing, and more opportunities for productive entrepreneurship were emerging. For example, there was an enormous backlog of demand for private consumer services that were in short supply under the socialist planned economy (Fritsch, 2004), while massive public investments in

[4] The day before Kohl started reunification negotiations with Mikhail Gorbachev, the president of the Central Bank (*Bundesbank*) categorically stated that reunification and currency union is not realistic any time soon.

infrastructure development induced a significant expansion of the construction industry (e.g., Bellmann et al. 2003).

During these early days, there were high expectations about East Germany's economic recovery and growth. Many political and economic experts expected a second German economic miracle (*Wirtschaftswunder*) that would lead to a prospering East German economy, or 'flourishing landscapes,' as Helmut Kohl put it. In hindsight we know that the transition of the East German economy induced the largest peaceful economic dislocation in the 20th century. The numbers speak for themselves: industrial production dropped by more than 60 percent between 1989 and 1993, GDP declined by 30 percent during the same period, unemployment rates rose to 40 percent in some regions (Brezinski & Fritsch, 1995; Burda and Hunt, 2001). This pattern was hardly foreseeable for most respondents when they participated in the GSOEP survey in May/June 1990.

3.2 Credibly identifying commitment to the socialist regime: Telephone ownership

To identify strong commitment to the socialist regime, we rely on longitudinal information from the GSOEP, version 34. It is difficult to determine retrospectively who was committed to the socialist regime. Survey respondents may be hesitant to provide this sensitive information in the historical moment of change when the personal consequences of their responses are not yet foreseeable. Whether or not an individual was willing to disclose their party membership is somewhat immaterial. Party membership is not considered to be an accurate indicator of engagement in socialist party work, since many people were ordinary members without much involvement (Bird et al. 1998). There is retrospective data from the 2018 survey on socialist party membership for a very small sub-set of individuals, and as expected there is no link between pure membership and telephone access (see Appendix A1).

Therefore, we follow Bird et al. (1998) who argue that telephone ownership is a plausible way of identifying people that were seriously committed to the socialist regime.

While the authors argue that telephone owners represent the socialist upper class, we cautiously interpret telephone ownership as indicating the outcome of a pronounced commitment to the socialist regime more generally, for example, via volunteer free-time activities. Telephone access could have been a reward for promoting socialist ideology (e.g., committee work) without necessarily suggesting being a member of the ruling elite. While the GDR elites may have enjoyed telephone access, elite status does not accurately capture an individual's commitment to the regime. Elite status was typically dependent on formal requirements (e.g., general human capital, specific occupational qualifications, and family background) rather than mere commitment to the regime. We will show that our results are not driven by elite status.

Telephone ownership is a superior indicator for determining active commitment to the socialist regime for several reasons. According to Economides (1997), the decision to issue a telephone line in the GDR was an ideological and not a technical matter. In addition, phone surveillance was omnipresent, in order to spot the 'unreliable social elements' and 'class enemies.' Leister (1996, 58) reports that at the time when the Berlin Wall came down in 1989, the range of telecommunications services available in the FRG and those available in the GDR were worlds apart. Whereas there was a ratio of about 470 telephones to 1,000 inhabitants in the West, the ratio in East Germany was 110 telephones to 1,000 inhabitants, at best. In 1989, there were approximately 1.8 million telephone lines in the GDR compared with 30 million in the FRG. While it was possible for a household to apply for a telephone

connection, waiting times could be decades long, and for many East Germans nothing was done until after reunification. A telephone line not only gave people superior access to institutional actors (e.g., authorities, shops, companies), it could also have been a symbol of success.[5]

3.3 Model

We use a logit regression to estimate the marginal effect of having a telephone in a GDR household in 1989 on the likelihood of being self-employed after the regime switch. Our main analysis draws on the 1990 wave of the GSOEP, the first time East German households were asked to provide information about their socio-economic status. In robustness checks, we include subsequent years. As a dependent variable, we measure success in self-employment by the length of time spent in self-employment and the income yielded in self-employment.

In our analysis, we have to rule out factors that might have affected both a GDR household's access to a telephone line and the probability of self-employment after the regime switch. To that end, we excluded individuals that were already self-employed in the GDR (see Section 2.3, for details on the limited scope of self-employment in the GDR). Although these individuals were not committed to the socialist regime by definition, they were likely to have access to a telephone.[6] Human capital might also affect the likelihood of assuming an important role in the GDR labor market and the likelihood of having access to a telephone. At the same time, human capital is a determinant of entrepreneurial choice in market economies. General wealth holdings capture significant material possessions beyond the telephone. Wealth holdings reflect high resource access that may be helpful for

[5] Telephone access could also indirectly facilitate rent-seeking, for instance, through better connections. Thus, the telephone itself became a means to further act out entrepreneurial talent in an unproductive way, beyond indicating active commitment to the socialist regime.
[6] Most of the remaining businesses in the GDR were pre-socialist in origin. Thus, they may have maintained telephone access since pre-socialist times.

starting a venture after 1989. If the effect of having telephone access is significant despite controlling for general wealth holdings, then we can rule out that the telephone variable captures general resource access. People working in specific industries may have also had access to a telephone in their household, e.g., doctors, postal workers, etc. Finally, in some regions of the former GDR the run-down telephone network may have been in a better shape than in other regions. We control for these factors in our empirical analysis by means of region- and industry-specific fixed effects.

In addition, we control for an array of socio-demographic characteristics that have been found to determine entrepreneurial choice, i.e., age, gender, household size, children, and marital status. We also control for the level of education and measures for the availability of financial resources other than wealth holdings (i.e., household income, size of living space, etc.). Tables B1, B2 and B3 in the appendix present the definition of variables, summary statistics, and a correlation matrix. Many of the aforementioned controls also capture elite status. We run additional sensitivity analyses to rule out that the telephone measure is capturing an elite effect.

4 Results

4.1 Baseline estimates

Table 1 shows our main estimations for the telephone variable. Full results are in the Appendix (Table B4). For all years between 1991 and 1995 telephone access has a positive and significant effect on the probability of self-employment. The marginal effect size shows that access to a telephone in 1989 increases the likelihood for a start-up after German reunification on average by 5 percent. The effect size is relatively stable over the years. This suggests that people with access to a telephone in the GDR started their venture as soon as this option became available.

Despite including a wide set of control variables, the analysis might suffer from an omitted variable bias. To assuage this concern, we also use a methodology developed by Altonji et al. (2005) that was fine-tuned by Oster (2017). The approach relies on comparing the coefficients of interest and the R-squared between regressions with and without control variables to understand whether the analysis suffers from an omitted variable bias. It is crucial to calculate the ratio of the impact of unobservable factors to the impact of observable control variables that would drive the coefficient of telephone access to insignificance.

For our models in Table 1 the ratio δ varies between 5 and 9. This implies that selection based on unobserved factors would need to be about 5 to 9 times as large as the selection based on observed control variables to explain away the effect of telephone access on the decision to become self-employed. Oster (2017) suggests that effects can be considered robust if the ratio is above the value of 1. Therefore, we conclude from the Oster check that omitted variable bias is not an issue in our setting.

Table 1: Access to a telephone and self-employment: Baseline regressions

	(1)	(2)	(3)	(4)	(5)
Dep Var: Self-employment in the year …	1991	1992	1993	1994	1995
Telephone in 1989	0.039***	0.028***	0.031***	0.029***	0.030***
	(0.009)	(0.009)	(0.009)	(0.010)	(0.010)
Controls	Yes	Yes	Yes	Yes	Yes
δ (OLS)	6.05	8.48	8.37	5.76	5.09
Pseudo R^2	0.1647	0.1441	0.1349	0.1376	0.1353
Observations	3,941	3,713	3,488	3,376	3,212

Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The table presents marginal effects. Full results on controls are presented in Table B4 in the Appendix. The Oster check only works for an OLS regression. Therefore, the results on the ratio δ are based on an OLS regression. The coefficients in an OLS regression are presented in Table B6 in the Appendix. For the calculation of BETA, we use the STATA command –pscalc- and set *Rmax* to 1.3 times the R^2 in the respective models (for details, see Oster 2017).

We can also show that the results remain robust after introducing a reduced set of control variables to rule out that the results are driven by overspecification, given the high number of controls and the sample size. The results are similar to our main specification when we only control for industry and regional fixed effects, but do not consider individual characteristics (Table B5, in the Appendix).

4.2 Robustness checks

The baseline models show that there is a link between having telephone access in 1989 and self-employment after 1991. We argued that telephone access reflects commitment to the socialist regime as a way to act out rent-seeking, which is a type of unproductive entrepreneurship (we provide a corresponding validation test in Section 4.3). Given these considerations, people owning a telephone most likely deliberately chose to switch to productive entrepreneurship over the course of transition, rather than becoming self-employed out of necessity.

One could argue that people who were strongly committed to the socialist regime were pushed into self-employment as a result of blocked mobility they might have faced immediately after transition. In fact, their engagement in socialist organizations could be a negative signal in a market economy context, and self-employment driven by necessity would not necessarily be in line with Baumol's hypothesis. Apart from that, a lot of start-ups were motivated by deteriorating economic conditions experienced in East Germany during the early 1990s (e.g., Lechner and Pfeiffer, 1993). Therefore, we run additional analyses to rule out necessity-based determinants (Table 2, Model 1). To this end, we use a question asked in the 1990 wave of the GSOEP survey about intentions to start a venture soon. The survey was conducted in May and early June 1990 before the currency union and the subsequent economic turmoil in East Germany (for details, see Section 3.1). Hence, the reported intention to set up a business is probably not driven by necessity.

Based on this question, we construct a dependent variable for necessity start-ups that assumes the value of 1 if people are self-employed in 1991, but did not self-report an intention of becoming self-employed in 1990. Our conjecture is that unplanned self-employment may be the result of an unforeseen economic necessity that emerged over the course of the year 1990. The results show that telephone access is not related to necessity self-employment defined in this way. We interpret this finding as evidence that our main effects are not driven by necessity entrepreneurship. It is important to note that being unemployed in early 1990, when the survey was carried out, is not a reasonable variable to consider, since unemployment did not officially exist in socialist economies.

There is a group of individuals who were already self-employed when the 1990 survey was conducted, but did not hold that status in 1989. This group began entrepreneurial activities promptly after the fall of the Berlin Wall in late 1989, when there was a window of opportunity and a first-mover advantage in the newly opened markets (Fritsch, 2004). This group is different from other early opportunity entrepreneurs in that they had already completed the start-up process at the time of the survey in May 1990. Model 2 of Table 2 takes this distinction into account, and still shows a positive effect of having a telephone in the GDR on starting a business promptly after transition.

We are also interested in determining the effect of GDR telephone access on start-ups that were established after the 1990 survey to avoid the possibility that the results of our analysis for 1991 to 1995 only reflect the persistence of self-employment among those who started in 1990. Therefore, we introduce self-employment status in 1990 as another control variable to predict self-employment in 1991 (Table 2, Model 3). While the persistence effect is strong, telephone access in the GDR still has an

effect. Hence, the effect on start-up propensity continues beyond the year 1990. Interestingly, the effect vanishes for the years 1992 to 1995, when including the lagged value for self-employment status (Table B7 in the Appendix). This finding suggests that the effect of owning a telephone on start-up activity occurs primarily in 1990 and 1991, immediately after the window of opportunity to engage in productive entrepreneurship opened. We interpret this pattern as supportive of our argumentation since it implies that entrepreneurs are flexible and agile economic actors who are able to quickly respond to changing environments. It is also possible that start-ups taking place after 1991 might be due to necessity, and that the telephone effect should vanish. Our argument is based on the conjecture that engagement in necessity entrepreneurship after transition is not associated with above-average entrepreneurial efforts before transition.

We also check if access to a telephone line was related to black market activities and/or involvement in barter trade in the GDR, rather than commitment to the socialist regime. We need to rule out this competing explanation of people striving for material rewards from rent-seeking in black market activities as a form of entrepreneurial effort. The GSOEP includes a question that allows us to make an inference about moonlighting (for details, see Runst, 2013). Controlling for moonlighting does not affect the significance of our telephone variable. Furthermore, moonlighting in the GDR as such is unrelated to self-employment after reunification (Table 2, Model 4). Telephone access is also not related to moonlighting behavior in the GDR (Table 2, Model 5).

Finally, we test whether working in certain occupations impacts our results. Table B8 in the Appendix reveals that there are differences in pre-transition telephone access and post-transition entrepreneurial propensity across occupational

groups. Therefore, we also run a specification where we control for a respondent's reported occupation in 1990, instead of the industry. We include occupation fixed effects at the 2-digit level of the official classification of occupations by the Federal German Statistical Office (KldB, 1992). Given the higher number of control variables, this exercise implies several perfect predictions that cannot be considered in the regression. Nevertheless, the result for telephone access is robust in this specification (Table 2, Model 6). This specification captures elite status relatively precisely, since leading positions in management and the party apparatus form two occupational groups that are controlled for.

Table 2: Telephone access and entrepreneurship: Ruling out alternative explanations

	(1)	(2)	(3)	(4)	(5)	(6)
Dep Var:	Necessity start-up 1991	Start-up 1990 (window of opportunity)	Start-up 1991	Self-employment 1991	Moonlighting in GDR 1989	Self-employment 1991
Telephone in 1989	0.003	0.029***	0.024***	0.033***	-0.001	0.032***
	(0.005)	(0.009)	(0.007)	(0.012)	(0.017)	(0.009)
Self-employed in 1990	-	-	0.541***	-	-	-
			(0.068)			
Moonlighting in GDR 1989	-	-	-	0.004	-	-
				(0.010)		
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Control for occupation						Yes
Pseudo R^2	0.2287	0.1992	0.3599	0.2206	0.0848	0.3448
Observations	2,560	3,071	3,941	2,109	3,091	2,798

Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

We argued earlier that a telephone was a scarce amenity. To validate this supposition, Table B9 in the Appendix shows the percentage of respondents who had access to a range of material assets. While, for example, 65 percent reported access to a car, only 23 percent reported access to a telephone. The only other material asset with similar low shares is access to a summer house (*Datsche*, 17 percent). In Table 3, we test whether access to other scarce material assets other than the telephone

explains differences in self-employment. First, we integrate access to a telephone into our calculation of the wealth index (Table 3, Model 1). In our baseline model we only use possessions other than a telephone to calculate the wealth index that we use as a control variable (for details, see Table B1 in the Appendix). In Model 2, along with the telephone variable, we include a measure indicating ownership of a summer house. Both are significantly related to self-employment in 1991. A non-significant effect of the interaction term between both wealth indicators reveals, however, that there is no stand-alone effect of possessing a summer house (Table 3, Model 4). In other words, respondents owning a summer house, but not a telephone are not more likely to become self-employed after 1990. This indicates that access to a telephone line is not a mere symptom of general wealth, but that it is crucial for explaining self-employment after transition.

Table 3: Other material rewards and entrepreneurship

	(1)	(2)	(3)	(4)
	Dep Var: Self-employment in the year 1991			
Telephone in 1989	0.037***	0.037***		0.030***
	(0.009)	(0.009)		(0.007)
Summer House in 1989		0.018**	0.016*	0.015
		(0.008)	(0.008)	(0.010)
Telephone X Summer House				0.002
				(0.012)
Tel89=0 & House89=0				*Ref*
Controls	Yes	Yes	Yes	Yes
Pseudo R2	0.1578	0.1633	0.1389	0.1633
Observations	3,941	3,891	3,891	3,891

Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. In contrast to the baseline models, the set of control variables includes a wealth index measure that also considers telephone access.

4.3 The determinants of telephone access: The role of entrepreneurial personality traits and commitment to the socialist regime

In a series of additional analyses, we identify the determinants of telephone access to provide an empirical underpinning to our argument that owning a telephone in the

GDR is the result of unproductive entrepreneurial efforts acted out through demonstrating commitment to the socialist regime. We have to acknowledge that there is no direct measure for entrepreneurial effort that we can link to telephone ownership, but we can rely on insights from psychology to make inferences about whether the propensity to own a telephone is based on personality traits that can be regarded as entrepreneurship-prone (for a review of the empirical evidence, see Obschonka & Stuetzer, 2017). This is our direct measure to determine the likelihood that a person will engage in entrepreneurial activities.[7]

We calculate the entrepreneurship-prone personality index in accordance with Obschonka et al. (2013). Following this approach, the individual entrepreneurial personality structure is calculated as a deviation measure to a fixed reference profile. This reference profile refers to the Big Five personality traits and has the highest possible value for openness to experience, extraversion and conscientiousness, and the lowest possible value for neuroticism and agreeableness. For the overall indicator of the individual entrepreneurial personality structure, all deviations of a person's Big Five from this reference profile are then squared (to exclude negative values) and added up. This positive sum captures the deviation from an ideal entrepreneur. The sum is multiplied with the factor of minus one, such that greater values of the index that are closer to zero indicate a more entrepreneurship-prone personality profile.

The Big Five dimensions of personality were measured for the first time in the 2005 wave of the GSOEP. Given the panel structure of the data set, we are able to link this information to a subsample of respondents from the 1990 wave who also

[7] The indicator captures only the likelihood of conducting entrepreneurial efforts, since personality traits are a distal factor. We cannot measure how traits are related to attitudes, subjective norms, perceived behavior control, and intention about conducting entrepreneurial efforts. Theories dealing with these aspects, like the Theory of Planned Behavior (Ajzen 1991), were not developed to investigate unproductive entrepreneurial efforts, such as committing to a regime to obtain material privileges. Based on the literature, it is reasonable that there is a link between personality traits and entrepreneurial efforts (Obschonka and Stuetzer 2017), although we are not able to observe the intermediate steps.

participated in the survey in 2005, about 50 percent of our observations. The results in Table 4 (Panel A, Model 1) reveal that people whose personality is closer to the ideal entrepreneurial reference profile are more likely to have possessed a telephone in the GDR before 1990 (Table 4, Panel A, Model 1). This supports our argument that individuals who are likely to select into productive entrepreneurship in a market economy, are also the ones that possessed a telephone in the GDR.

We need to determine if there is, in fact, a relationship between active commitment to the socialist regime and telephone access. There are several items in the 1990 survey about leisure activities that we think capture an individual's commitment to the socialist regime. One item refers to participation in citizens' initiatives and political parties or local politics, and in our analysis we call this activity "public committee work".[8] Another item measures the frequency of participation in volunteer activities in clubs, associations or social services. Since all of these organizations have to be aligned with the principles of the socialist regime, a high frequency of participation is likely to reflect commitment to the socialist regime as well.[9]

Our analysis reveals that the likelihood of having telephone access can be explained by responses to these two survey items. Frequent committee work and volunteer activities are both positively related to telephone access (Table 4, Panel A, Model 2 and 3). One may argue that involvement in committees and volunteer activities reflects altruism rather than rent-seeking behavior. To rule out this explanation, we run a placebo test and exploit information from a question on the

[8] In principle, the measure for committee work also captures activities in the opposition movement emerging in fall 1989. However, dissidents were unlikely to have telephone access for reasons outlined in Section 3.1. Therefore, our estimates are downward biased. The effect of socialist committee work on telephone access is likely to be even stronger than indicated by our estimates.

[9] Such activities are just one channel to demonstrate commitment to the regime. There are likely other ways of demonstrating loyalty. Another channel could be active engagement at work, for example, by suggesting and implementing new working methods (*Neuererwesen*). Another way of showing loyalty could be active participation in paramilitary combat forces (*Kampfgruppen der Arbeiterklasse*).

frequency of providing support to friends, relatives or neighbors. This type of community commitment is less likely to be recognized by the socialist regime. Hence, it should be less related to material rewards, like an access to a telephone. The results of Model 4 (Panel A) show that there is no significant link between frequent friends and family support and telephone access. The results of Model 5 clearly show that the coefficient estimate for committee work is twice as large as for volunteer activities, while supporting friends and family remains insignificant.

The results are also informative about the channels behind telephone access and start-up activity after 1989. The findings demonstrate that weak social ties (associational activity) were more important than strong social ties (friends and family) in determining access to a telephone. Hence, developing social capital through weak ties might be a possible channel through which rent-seeking behavior was eventually rewarded. Thus, telephone access reflects the ability to form and the prevalence of weak social ties. Social capital formation is also an important factor for successfully establishing a venture (Kim and Aldrich 2005), and may be an important channel behind the link of GDR telephone access and start-up activity after 1989.

Table 4: Determinants of telephone access[10]

Panel A	Dep Var: Telephone access in 1990				
	(1)	(2)	(3)	(4)	(5)
Entrepreneurial personality fit	0.002**				
	(0.001)				
Frequent public committee work		0.149***			0.123***
		(0.045)			(0.045)
Frequent public volunteer activities			0.064***		0.056***
			(0.017)		(0.017)

[10] Please note that the number of observations in this analysis is larger than in our main estimates, because we can use information from both the 1990 and 1991 survey waves. In our main estimates, we are only able to use information from the 1990 survey wave. For Model 1, Panel A, and Model 5, Panel B, we can only use retrospective information because questions on personality traits were only asked in the year 2005 and later. This means that many respondents from the 1990 wave are not included.

Frequent support for family & friends				0.011	0.003
				(0.016)	(0.016)
Individual-level controls	Yes	Yes	Yes	Yes	Yes
Region & Industry fixed effects	Yes	Yes	Yes	Yes	Yes
Pseudo R2	0.1599	0.1442	0.1474	0.1467	0.1492
Observations	2,026	4,420	4,420	4,420	4,420

Panel B:	Dep Var: Telephone access in 1990				Dep Var: Involvement in public activities
	(1)	(2)	(3)	(4)	(5)
Entrepreneurial personality fit					0.002***
					(0.001)
Frequent public committee work	0.108**				
	(0.047)				
Frequent public volunteer activities		0.047***			
		(0.018)			
Leading position	0.070*	0.068*	0.074*	0.213***	
(State-owned enterprise)	(0.041)	(0.040)	(0.041)	(0.050)	
Leading position	0.008	0.036	0.038	0.165*	
(State or party apparatus)	(0.071)	(0.074)	(0.074)	(0.087)	
Individual-level controls	Yes	Yes	Yes	No	Yes
Region & Industry fixed effects	Yes	Yes	Yes	Yes	Yes
Pseudo R^2	0.1545	0.1549	0.153	0.0609	0.0798
Observations	3,346	3,346	3,346	3,358	1,995

Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Leisure activities are regarded as frequent if they are carried out on a weekly basis. For volunteer activities, monthly activities are also regarded as frequent, since we did not find a difference between weekly and monthly activities with respect to having access to a telephone (see Table B10).

In Panel B, Table 4, we go a step further and control for the effect of elite status by determining whether respondents worked in leading positions in state-owned enterprises, or within the socialist party apparatus. The effect of volunteer activities and committee work remains robust in this specification. There is only a weakly significant link between being in a leading position and having telephone access (Panel B, Model 1-3). These results support our conjecture that telephone access does not primarily reflect a person's elite status, but whether he or she is actively engaged in activities revealing commitment to the socialist regime. Interestingly, the positive effect of elite status on telephone access is much stronger when not including individual-level control variables (Panel B, Model 4). This means that there is no specific elite status effect, or only a rather weak one, once considering socio-

demographic characteristics (wealth and human capital) that are potentially related to this elite status.

Finally, we create an outcome variable indicating whether a person is either involved in public committee work or volunteer activities, and link this information to entrepreneurial personality traits. We find that an entrepreneurship-prone personality profile is positively related to these activities (Panel B, Model 5). Hence, people with an entrepreneurial personality would be more likely to show a commitment to the socialist regime. In addition, this indicates that the ability to build social capital is related to entrepreneurial traits. What is more, people with entrepreneurial personality traits supported one of the most anti-entrepreneurial regimes in human history (Earle and Sakova 2000). This enigma is solved if we view their efforts, not as support for socialism, but as a strategy of directing their entrepreneurial energies towards gaining material rewards.

4.4 Telephone access and entrepreneurial success

Next, we investigate the effect of telephone ownership on success as an entrepreneur. We use two measures of entrepreneurial success, the length of time spent in self-employment from 1992 to 1995, and the income earned from self-employment. Table 5 presents the results of the analysis for the length of time (number of years) spent in self-employment for the years 1992 to 1995 (Models 1-4). We also run a random effects panel regression where we pool these years (Model 5). The results reveal that telephone access during the GDR era is positively linked to the length of time spent in self-employment. Table 6 presents the results of the analysis for income earned from self-employment. We find that telephone access in the GDR has a positive impact on the level of income earned in self-employment. Thus, telephone access is related to successful entrepreneurship after transition.

Table 5: Telephone access and duration in entrepreneurship

	(1)	(2)	(3)	(4)	(5)
Dep Var: Duration in self-employment in the year …	1992	1993	1994	1995	1992-1995 GLS Random effects
Telephone in 1989	0.197**	0.293***	0.290***	0.259**	0.246***
	(0.083)	(0.103)	(0.110)	(0.121)	(0.090)
Controls	Yes	Yes	Yes	Yes	Yes
R^2	0.028	0.032	0.034	0.034	0.0301
Observations	3,789	3,560	3,395	3,230	13,974

Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 6: Telephone access and income from self-employment

	(1)	(2)	(3)	(4)	(5)
Dep Var: Income in self-employment in the year …	1992	1993	1994	1995	1992-1995 GLS Random effects
Telephone in 1989	0.267***	0.260***	0.306***	0.297***	0.270***
	(0.080)	(0.089)	(0.095)	(0.097)	(0.076)
Controls	Yes	Yes	Yes	Yes	Yes
R^2	0.039	0.042	0.047	0.046	0.0394
Observations	3,741	3,512	3,359	3,200	13,812

Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Question on income from self-employment was not asked in 1991.

5 Concluding discussion

In his seminal work, Baumol (1990) proposes that an entrepreneurial spirit is bonded to only certain people. He goes on to theorize that the type of entrepreneurial activity these people engage in depends on the institutional environment in which they find themselves. Based on these hypotheses, Baumol (1990) states that there are three

types of entrepreneurial activities: productive, unproductive and destructive. We study entrepreneurial behavior at the individual level in the unique context of a region that recently experienced a radical shift in institutional arrangements. After enduring a Soviet socialist system for over four decades in the former GDR, individuals living in what is now the Eastern part of Germany suddenly found themselves reunited with West Germany and living in a fully-formed capitalist market economy as citizens of the Federal Republic of Germany.

Our study is a novel contribution. Our analyses follow Baumol's framework, and show that when institutional incentives for productive entrepreneurship are weak, entrepreneurial efforts are directed towards rent-seeking (unproductive entrepreneurship). Our analyses also show that the same people switch to productive entrepreneurial activities (e.g., they set up new business ventures), once institutional incentives for this type of entrepreneurship are introduced. This empirical regularity confirms an important aspect of Baumol's theory that is often brushed aside. More precisely, our findings support Baumol's idea that the institutional framework conditions determine the type of entrepreneurial activity to which people devote their efforts. This implies that entrepreneurs are flexible and agile economic agents who are able to promptly adapt themselves to even radical changes in their environment, such as the shock transition from socialism to a market economy that occurred in our case study of the former GDR.

We make the case that a strong commitment to the socialist regime in the former GDR reflects rent-seeking behavior to obtain material rewards. We argue that, following Baumol, this behavior can be defined as unproductive entrepreneurial activity being carried out in one of the most anti-entrepreneurial regimes in human history, as Earle and Sakova (2000) labeled the socialist regime. We use access to a

household telephone to determine an individual's commitment to the socialist regime, and empirically demonstrate that this measure is superior to considering socialist party membership and/or elite status. We show that using one's leisure time to engage in activities that show commitment to the regime is positively related to telephone access. We also show that people with above average entrepreneurial personality traits were more likely to possess a telephone and to engage in free-time activities facilitating the socialist regime. While this may appear puzzling, the enigma is solved if we look at it through the lens of Baumol's theory. To this end, the commitment has to be regarded not as support of socialist ideology, but as an entrepreneurial strategy to obtain material rewards by engaging social capital formation via committee work and volunteer activities facilitating the socialist regime.

Having laid the empirical groundwork, we show that people committed to the socialist regime became active in productive entrepreneurship immediately after the introduction of a market economy. We argue that this pattern cannot be explained by elite status, and holds when we control for alternative individual characteristics determining start-up propensity. Nevertheless, taking advantage of social capital developed in the GDR through active commitment to the regime could have played a key role in the successful launching of a venture after the regime switch (Kim and Aldrich, 2005). Other channels that may have enabled start-up efforts, such as formal education and/or entrepreneurship-relevant work experience either did not exist in the socialist GDR, or did not transmit entrepreneurship-relevant human capital (e.g., Fritsch and Rusakova 2012; Wyrwich 2013). Because individuals were unlikely to have specific entrepreneurial skills, our findings suggest that entrepreneurs were able to quickly adjust the direction of their efforts despite a lack of specific skills which they had to acquire after transition.

Although our research is linked to literature on entrepreneurship in transition economies (e.g., Smallbone & Welter, 2001; Ivlevs et al. 2020), a comparison of the East German case with Eastern European transition countries is possible only to a limited extent. Given the endogenous involvement of weak institutions in Eastern European countries, it may have been still attractive to act out entrepreneurial efforts via rent-seeking since institutional incentives for this behavior (unproductive entrepreneurship) were and are still high. Furthermore, weak institutions paired with a rudimentary social security system may explain the negative self-selection of former socialist party members into entrepreneurship found by Ivlevs et al. (2020). We believe that our findings are not in conflict with the results for other Eastern European countries, but they differ significantly because of the specific circumstances of German reunification (see Section 3, for details).

Future research could analyze similar dramatic shifts in institutional environments that may have occurred in other countries. One approach would be to study individual entrepreneurial behavior before, during and after catastrophic events like civil wars that brought about an exogenous change to the environment (e.g., Parachuri and Ingram, 2012; Bullough et al., 2014; Miller and Le Breton-Miller, 2017; Dimitriadis, 2021).

One limitation of our research is the possibility of alternative explanations. It is possible that individuals who were heavily committed to the socialist regime encountered anti-socialist prejudice and blocked mobility in the labor market that emerged immediately after transition. Entrepreneurship might have been a way out of such a precarious situation. Results by Deter (2020) show that socialist party members fared worse after German reunification in terms of income and an array of other socio-economic outcomes. However, it should be noted that we are not

capturing average socialist party members, but people who showcased a strong commitment to the system. The effects discussed by Deter (2020) might be driven by party members that joined for ideological and other reasons unrelated to rent-seeking. Furthermore, we empirically show that our focal group of entrepreneurs who were actively committed to the socialism was more successful in productive entrepreneurship after transition. This is at odds with a necessity-based explanation for their engagement in entrepreneurial activity. Finally, given that East Germans had immediate access to the social security system of the Federal Republic Germany, necessity-based entrepreneurship should play a much lower role in our setting as compared to Eastern European transition countries.

An interesting pattern that we observe is that engaging in bartering and black-market activity during the socialist regime is not related to entrepreneurship after transition. This may have to do with the fact that these activities were necessity-based due to material shortages inherent in a centrally planned economy, rather than a channel for acting out entrepreneurial effort. Moreover, participation in the shadow economy might have been dependent on a different skillset. Hence, only a small fraction of potential post-unification entrepreneurs (e.g., craftsmen) may have been involved implying an insignificant effect on average.

Our research highlights some aspects of institutional arrangements and design that have not yet been deeply investigated, but are essential to understand how institutions relate to the allocation of entrepreneurship. For example: How do institutional arrangements affect the type of entrepreneurial activity people choose? We analyze entrepreneurial activities in general, future research could apply more narrow definitions of productive entrepreneurship, for instance, related to innovation. One could also explore whether the link between institutions

(institutional quality) and entrepreneurship is stable beyond standard market economy settings. Is the observed link an artifact of specific general framework conditions, or is it universally valid? Does it, for example, also hold true in the digital era when nation-specific institutional boundaries are becoming less important?

There is also a need for more studies at the individual level to observe how people adjust their entrepreneurial behavior once institutional incentives for entrepreneurship change. In this respect, the useful insights of our study could be supplemented by further evidence. For instance, we were not able to investigate destructive entrepreneurship due to the lack of data. An investigation of the role of institutional environments in other contexts where there are drastic changes and/or catastrophic events might deepen our understanding of the link between institutions and the allocation of entrepreneurial effort, and determine if our results are robust across diverse contexts and historical periods as Baumol (1990) suggested.

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Appendix

A1. Socialist party membership (retrospective data) and telephone access

A limitation of our analysis is that the 1990 wave of the GSOEP provides no information about socialist party membership. While membership is not a good indicator of commitment to the socialist regime (Bird et al., 1998), it would be interesting to see how the 'telephone effect' behaves if we include membership in our models. If we had this information, we would also be able to determine if party membership is indeed unrelated to start-up behavior, as we expected.

While the 1990 wave of the GSOEP does not contain information about membership in the socialist party (SED), this information was collected in the 2018 wave of the GSOEP. However, only about 18 percent of the 1990 wave respondents included in the estimation of our baseline model (Table 1, Model 1) provided responses to this question. While this low rate is partly explained by panel attrition, it also shows that this question remains quite sensitive (Bird et al., 1998), even almost 30 years after reunification. Accordingly, the question cannot be integrated into our main analysis, as this would result in a substantially reduced number of observations.

We do, however, use this variable for a robustness check. The results presented in Table A1 reveal that the effect of having a telephone on entrepreneurship after reunification remains statistically significant and positive after including SED membership in our model and running it for the severely reduced subset of observations. Moreover, SED membership is not related to self-employment in this subsample. This suggests that self-employment is not explained by party membership, as we expected, since it does not adequately capture strong commitment to the socialist regime and is therefore not a good proxy for acting out unproductive entrepreneurship.

Table A1: Telephone access, socialist party membership, and entrepreneurship

	(1)	(2)	(3)	(4)	(5)	(6)
Dep Var: Self-employment in the year ...	1993	1993	1993	1995	1995	1995
Telephone in 1989		0.040**	0.043**		0.046**	0.043**
		(0.019)	(0.020)		(0.022)	(0.020)
SED Membership 1989	-0.005		-0.012	0.005		-0.012
	(0.018)		(0.017)	(0.022)		(0.017)
Region Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo R2	0.0512	0.1369	0.0757	0.0237	0.042	0.0757
Observations	731	731	731	733	733	731

Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Table A1 presents marginal effects. We used only a limited set of control variables due to the low case numbers. Because of the low observation numbers and the low numbers of observations indicating SED membership, there are too few start-ups by former SED members before 1993 for reasonable estimates. Results for the year 1994 are similar and not reported for the sake of brevity only. The results are available upon request.

B. Tables

Table B1: Definition of variables

Name	Definition
Self-employed in *t*	Dummy variable indicating whether respondent was self-employed in *t*.
Telephone in 1989	Dummy variable indicating whether respondent had access to telephone in her household in the GDR in 1989 (before the transition)
Age	Age of respondents in 1990, in categories (1: 18-35 years; 2: 36-45 years; 3: 45-60 years; >60 years)
Male	Gender of respondent in 1990
Household size	Number of people living in the household in 1990, in categories (1: 1 person; 2: 2; 3: 3; 4: 4; 5: 5 or larger)
Children	Children living in the household in 1990 (Yes=1; No=0)
Marital status	Marital status in 1990 in categories (1: Married; 2: Single; 3: divorced/separated/widowed; 4: Missing)
Education	Highest level of formal education in 1990, in categories (1: No high school diploma; 2: High school diploma; 3: Post-high school education l; 4: Missing)
Income	Income (log) in 1990, in categories (1: 1.Quartile; 2: 2.Quartile; 3: 3.Quartile; 4: 4.Quartile; 5: Missing)
Wealth index	Index about general wealth holdings other than income in 1990, in categories (1: below or equal to median (3); 2: 1=above median>3; 3: Missing). The wealth index is based on information about whether individuals (1) own a car, (2) a summer house, (3) a motorcycle, (4) color TV receiver, (5) automatic washing machine, and a (6) freezer. The index is the sum of all items, where each item has the value of 1. Hence, the maximum value is 6. In some specifications, the telephone is considered as well for the index calculation (the corresponding maximum value is 7).
Living space area	Size of living space area in categories (1: 1. Quartile; 2: 2. Quartile; 3: 3. Quartile; 4: 4. Quartile)
Region	Federal State in which respondent is residing in 1990 in categories (11: Berlin; 12: Brandenburg; 13: Mecklenburg-Western Pomerania; 14: Saxony; 15: Saxony-Anhalt; 16: Thuringia)
Industry	Industry in which respondent is working in 1990 (1: Agriculture; 2: Energy; 3: Mining; 4: Manufacturing; 5: Construction; 6: Trade; 7: Transport; 8 Services incl. public sector; 9: Missing)

Notes: Source is the German Socioeconomic Panel (GSOEP), Missing values are introduced to avoid a severe drop in observations. In the analyses, the categories for missing cases are insignificant.

Table B2: Summary Statistics (main variables)

	Mean	S.D.	Min	Max
Self-employed in 1991 (Yes=1)	0.03	0.16	0	1
Telephone in 1989 (Yes=1)	0.24	0.43	0	1
Age (categories, 1-4)	2.14	1.1	1	4
Male (Yes=1)	0.48	0.5	0	1
Household size (categories, 1-5)	3.09	1.08	1	5
Kids (Yes=1)	0.48	0.5	0	1
Marital status	1.46	0.79	1	4
Education (categories, 1-4)	2.16	0.63	1	4
Log income (categories)	3.08	1.44	1	5
Wealth index (categories, 1-3)	1.3	0.5	1	3
Living space areas (categories, 1-4)	2.47	1.09	1	4
Federal State (categories, 11-16)	13.9	1.48	11	16
Industries (categories, 1-10)	7.14	3.09	1	10

Sources: The information and underlying sample is from 1990, if not stated otherwise.

Table B3: Correlation Matrix

		1	2	3	4	5	6	7	8	9	10	11	12	13
1	Self-employed in 1991 (Yes=1)	1												
2	Telephone in 1989 (Yes=1)	0.11***	1											
3	Age (categories, 1-4)	-0.024	0.094***	1										
4	Male (Yes=1)	0.069***	0.008	-0.059***	1									
5	Household size (categories, 1-5)	0.063***	0.014	-0.502***	0.081***	1								
6	Kids (Yes=1)	0.056***	-0.076***	-0.534***	0.002	0.627***	1							
7	Marital status	-0.041**	-0.028*	0.065***	-0.077***	-0.227***	-0.206***	1						
8	Education (categories, 1-4)	0.04**	0.162***	-0.095***	0.088***	0.099***	0.165***	-0.006	1					
9	Log income (categories)	0.002	0.056***	0.313***	0.124***	-0.165***	-0.116***	0.175***	0.174***	1				
10	Wealth index (categories, 1-3)	0.063***	0.107***	-0.074***	0.046***	0.144***	-0.001	-0.035**	0.059***	-0.026	1			
11	Living space areas (categories, 1-4)	0.075***	0.129***	-0.15***	0.053***	0.412***	0.192***	-0.099***	0.096***	-0.068***	0.14***	1		
12	Federal State (categories, 11-16)	-0.011	-0.136***	0.019	-0.008	0.009	-0.012	-0.01	-0.062***	-0.046***	-0.037**	-0.008	1	
13	Industries (categories, 1-10)	-0.018	0.088***	0.198***	-0.218***	-0.174***	-0.117***	0.153***	0.066***	0.409***	-0.033**	-0.091***	-0.108***	1

Notes: *** p<0.01, ** p<0.05, * p<0.1

Table B4: Full results Table 1 in main text

	(1)	(2)	(3)	(4)	(5)
Dep Var: Self-employment in the year ...	1991	1992	1993	1994	1995
Telephone in 1989	0.039***	0.028***	0.031***	0.029***	0.030***
	(0.009)	(0.009)	(0.009)	(0.010)	(0.010)
Age: 18-35 years	Ref	Ref	Ref	Ref	Ref
Age: 36-45 years	0.008	-0.002	-0.010	-0.003	-0.001
	(0.008)	(0.008)	(0.009)	(0.011)	(0.011)
Age: 45-60 years	-0.005	-0.016*	-0.024**	-0.029***	-0.031***
	(0.008)	(0.009)	(0.010)	(0.010)	(0.012)
Age: >60 years	-0.006	-0.003	-0.037***	-0.050***	-0.055***
	(0.016)	(0.024)	(0.014)	(0.009)	(0.010)
Male	0.023***	0.021***	0.026***	0.032***	0.032***
	(0.007)	(0.008)	(0.008)	(0.008)	(0.009)
Household size: 1	Ref	Ref	Ref	Ref	Ref
Household size: 2	0.005	-0.000	-0.034	-0.029	-0.003
	(0.026)	(0.030)	(0.047)	(0.039)	(0.033)
Household size: 3	0.006	0.010	-0.022	-0.026	-0.001
	(0.025)	(0.030)	(0.048)	(0.039)	(0.032)
Household size: 4	-0.001	-0.005	-0.036	-0.031	-0.008
	(0.025)	(0.031)	(0.048)	(0.040)	(0.033)
Household size: 5 or larger	0.007	-0.001	-0.037	-0.031	0.012
	(0.026)	(0.032)	(0.049)	(0.041)	(0.036)
Children (Yes=1)	0.015**	0.013	0.018*	0.014	0.007
	(0.007)	(0.008)	(0.009)	(0.010)	(0.011)
Marital status: Married	Ref	Ref	Ref	Ref	Ref
Marital status: Single	-0.013*	-0.025***	-0.024***	-0.006	-0.004
	(0.008)	(0.007)	(0.009)	(0.012)	(0.013)
Marital status: divorced/separated/widowed	-0.009	-0.006	-0.012	-0.012	-0.019
	(0.009)	(0.012)	(0.013)	(0.012)	(0.012)
Marital status: Missing	0.092	-0.014	0.004	0.146	0.151
	(0.100)	(0.015)	(0.023)	(0.143)	(0.155)
Education: Less than graduating from high school	Ref	Ref	Ref	Ref	Ref
Education: Graduating from high school	0.030***	0.017	0.022**	0.011	0.003
	(0.008)	(0.011)	(0.011)	(0.016)	(0.018)
Education: More than graduating from high school	0.018**	0.017	0.030**	0.022	0.012
	(0.009)	(0.012)	(0.013)	(0.018)	(0.020)
Education: Missing	-0.000	0.022	0.034	-0.022	-0.034
	(0.010)	(0.028)	(0.029)	(0.019)	(0.021)
Log income: 1.Quartile	Ref	Ref	Ref	Ref	Ref
Log income: 2.Quartile	-0.008	0.003	-0.003	0.017*	0.005
	(0.010)	(0.011)	(0.011)	(0.009)	(0.011)
Log income: 3.Quartile	-0.010	-0.002	0.010	0.027**	0.017
	(0.010)	(0.011)	(0.013)	(0.011)	(0.012)
Log income: 4.Quartile	0.012	0.013	0.008	0.028**	0.032**
	(0.013)	(0.015)	(0.014)	(0.012)	(0.014)
Log income: Missing	-0.017	-0.025**	-0.020	0.026	0.016

	(0.013)	(0.011)	(0.012)	(0.017)	(0.016)
Wealth index: 0=below or equal to median (3 items)	Ref	Ref	Ref	Ref	Ref
Wealth index: 1=above median>3	0.015**	0.008	0.008	0.012	0.007
	(0.006)	(0.006)	(0.007)	(0.009)	(0.009)
Wealth index: Missing	0.048	0.022	0.037	0.003	-0.004
	(0.036)	(0.026)	(0.025)	(0.016)	(0.014)
Living space area: 1.Quartile	Ref	Ref	Ref	Ref	Ref
Living space area: 2.Quartile	0.005	0.019***	0.010	0.003	0.002
	(0.007)	(0.007)	(0.009)	(0.009)	(0.010)
Living space area: 3.Quartile	0.003	0.009	0.002	-0.001	0.005
	(0.007)	(0.006)	(0.009)	(0.010)	(0.010)
Living space area: 4.Quartile	0.023***	0.041***	0.028***	0.022*	0.027**
	(0.008)	(0.009)	(0.011)	(0.011)	(0.012)
Federal State: Berlin (East)	Ref	Ref	Ref	Ref	Ref
Federal State: Brandenburg	0.031***	0.028***	0.011	-0.010	-0.007
	(0.009)	(0.010)	(0.014)	(0.016)	(0.017)
Federal State: Mecklenburg-Western Pomerania	0.026**	0.022**	0.005	-0.004	-0.013
	(0.010)	(0.011)	(0.015)	(0.019)	(0.018)
Federal State: Saxony	0.017**	0.021***	0.006	-0.000	0.006
	(0.007)	(0.007)	(0.011)	(0.015)	(0.016)
Federal State: Saxony-Anhalt	0.020**	0.028***	0.019	0.000	-0.001
	(0.008)	(0.009)	(0.014)	(0.017)	(0.018)
Federal State: Thuringia	0.019**	0.023**	0.009	-0.003	0.005
	(0.008)	(0.009)	(0.014)	(0.017)	(0.018)
Industry: Agriculture	Ref	Ref	Ref	Ref	Ref
Industry: Mining	-0.013	-0.018	-0.008	-0.020	-0.029
	(0.012)	(0.015)	(0.021)	(0.024)	(0.024)
Industry: Manufacturing	-0.008	-0.011	-0.025**	-0.035**	-0.036**
	(0.009)	(0.011)	(0.012)	(0.014)	(0.016)
Industry: Construction	-0.010	-0.015	-0.019	-0.035**	-0.035**
	(0.009)	(0.010)	(0.013)	(0.015)	(0.016)
Industry: Trade	0.046***	0.021	0.051**	0.031	0.014
	(0.017)	(0.017)	(0.022)	(0.024)	(0.025)
Industry: Transport	0.012	-0.012	-0.011	-0.023	-0.038**
	(0.014)	(0.013)	(0.016)	(0.018)	(0.018)
Industry: Services	-0.000	-0.004	-0.001	-0.001	0.002
	(0.009)	(0.011)	(0.013)	(0.016)	(0.018)
Industry: Missing	0.010	0.011	0.006	-0.013	-0.011
	(0.011)	(0.014)	(0.015)	(0.017)	(0.019)
Industry: Energy				-0.038**	-0.041**
				(0.019)	(0.021)
δ (OLS)	6.05	8.48	8.37	5.76	5.09
Pseudo R2	0.1647	0.1441	0.1349	0.1376	0.1353
Observations	3,941	3,713	3,488	3,376	3,212

Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Table B4 presents marginal effects. The Oster-check only works for an OLS regression. Therefore, the results on the ratio δ are based on an OLS regression. The coefficients in an OLS regression are presented in Table B6 in the Appendix.

Table B5: Telephone access and entrepreneurship: reduced set of controls

	(1)	(2)	(3)	(4)	(5)
Dep Var: Self-employment in the year …	1991	1992	1993	1994	1995
Telephone in 1989	0.046***	0.034***	0.032***	0.031***	0.037***
	(0.009)	(0.008)	(0.009)	(0.009)	(0.010)
Region Fixed Effects	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes
Pseudo R2	0.0698	0.0392	0.0459	0.041	0.0397
Observations	3,941	3,713	3,488	3,376	3,212

Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Table B5 presents marginal effects.

Table B6: Baseline OLS regressions (Table 1 from main text)

	(1)	(2)	(3)	(4)	(5)
Dep Var: Self-employment in the year …	1991	1992	1993	1994	1995
Telephone in 1989	0.041***	0.028***	0.032***	0.030***	0.032***
	(0.008)	(0.008)	(0.009)	(0.009)	(0.010)
Controls	Yes	Yes	Yes	Yes	Yes
δ	6.05	8.48	8.37	5.76	5.09
R^2	0.045	0.040	0.043	0.044	0.047
Observations	3,941	3,713	3,488	3,376	3,212

Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. For the calculation of δ, we use the STATA command –pscalc- and set Rmax to 1.3 times the R^2 in the respective models (for details, see Oster 2017).

Table B7: Telephone access and start-up activity after 1991

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dep Var: Self-employment in the year ...	1992	1993	1994	1995	1992	1993	1994	1995
Telephone in 1989	0.017**	0.023***	0.023**	0.025***	0.007	0.007	0.004	0.009
	(0.008)	(0.009)	(0.009)	(0.010)	(0.006)	(0.005)	(0.005)	(0.006)
Self-employed in 1990	0.371***	0.334***	0.355***	0.365***	-	-	-	-
	(0.061)	(0.065)	(0.072)	(0.074)				
Self-employed in t-1	-	-	-	-	0.087***	0.093***	0.083***	0.092***
					(0.007)	(0.008)	(0.008)	(0.009)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo R2	0.2649	0.2072	0.2032	0.1897	0.4397	0.5557	0.6833	0.6292
Observations	3,713	3,488	3,376	3,212	3,581	3,415	3,315	3,172

Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table B8: Telephone access and post-1989 self-employment (experience) across occupational groups

	% telephone holders	N (Year 1990)	% post-1989 self-employment experience	N (Year 1995)
Professions in agriculture	15.7	172	5.36	36
Manufacturing occupations	14.44	1129	3.9	667
Technical professions	33.68	285	3.27	153
Service professions (consumer-oriented) & other workers	24.23	549	11.6	500
Service professions (public services)	32.22	1223	6.44	19.32
Professions in management	44.66	103	19.74	76
Members of parliament, administratively decisive professionals	48.57	35	0	32

Table B9: Material possessions among survey respondents

	% owners in 1990
Telephone	23.44
Car	64.66
Summer House	16.63
Motorcycle	43.01
Color TV receiver	77.76
Automatic washing machine	42.92
Freezer	67.65
N=4420	

Table B10: Free-time activities and telephone access

	(1)	(2)	(3)
	Dep Var: Telephone access in 1990		
Support for family & friends			
weekly	Ref		
monthly	-0.005		
	(0.018)		
less often than monthly	-0.019		
	(0.017)		
never	0.005		
	(0.027)		
Public volunteer activities			
weekly	Ref		
monthly		-0.055*	
		(0.031)	
less often than monthly		-0.076**	
		(0.031)	
never		-0.102***	
		(0.027)	
Public committee work	Ref		
weekly			
monthly			-0.116**
			(0.052)
less often than monthly			-0.114**
			(0.048)
never			-0.165***
			(0.045)
Controls	Yes	Yes	Yes
Pseudo R2	0.1451	0.1503	0.1503
Observations	4,286	4,218	4,197

Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1