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# On the Persistence of Norms and Values: The Case of Corporate Cash Holdings in reunified Germany\*

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**Abstract** Informal institutions are known to be rather persistent. We examine the impact of persistence on corporate policy. To be specific, we analyse – given the persistence of norms and values – whether cash holdings of firms located in the former German Democratic Republic (GDR) differ from their West German counterparts. In our empirical analysis – consisting of about 15,000 German firms – we find that the level of cash holding is significantly higher in East German firms than in West German firms. This effect is particularly relevant for small and medium-sized firms (SMEs). We extend our analysis by studying the dynamics of cash holdings and find that cash holdings' speed of adjustment (to a target cash ratio) significantly differs between East and West German firms as well. Our results are robust to alternative firm-specific and institutional explanations. We interpret that the persistence of norms and values has an impact on the precautionary motive to hold cash which consequently leads to the observed differences in cash holdings between East and West German firms.

**JEL classification** G30; G32; M14

**Keywords** Cash holdings · Persistence · Norms and values · Germany · SME · Speed of adjustment · Precautionary motive

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## 1 Introduction

Firms' cash policies differ widely across firms. While existing research identified different motives – based on, e.g., transaction costs or precaution – for firms to hold cash, more recent research additionally points on exogenous factors that influence cash policies. These factors include, among others, institutional, religious or cultural aspects. In the cultural context, existing research has shown that informal values and norms are very persistent and do not adjust quickly even if formal institutions have already changed (see, e.g., Schwartz and Bardi, 1997). In this paper, we revisit the persistence of norms and values (of a bygone political system) by analysing the effect of persistence on corporate cash holdings. For this purpose, we use Germany's history as a quasi-natural experiment since Germany experienced over 40 years of opposing political systems. The reunification in 1990, however, caused an unexpected and quick change in East Germany's formal institutions while, according to existing literature, informal norms and values persisted even over generations (see, e.g., Wyrwich, 2015 or Necker and Voskort, 2014). Given this persistence, we would expect that the exposure to socialistic values and norms still affects current corporate cash holdings. Based on the exposure to and persistence of socialistic values and norms, we motivate our hypotheses using Chen et al.'s (2015) propositions: Chen et al. (2015) argues that individualism can be related to overoptimism and overconfidence and thus, managers in more individualistic cultures are tending to overestimate firm performance and therefore setting the level of cash holdings too low. For our East/West German sample, we would consequently expect that firms in West Germany hold less cash than firms in East Germany and vice versa.<sup>1</sup>

Based on proprietary accounting data ranging from 2004 to 2016 and containing 99,464 firm year observations on 14,823 firms located in East and West Germany, we observe statistically significant differences in cash holdings between East and West German firms. East German firms hold significantly more cash than their West German counterparts do – being economically relevant as well, as their cash ratio tends to be at least 10% higher than the one of West German firms. The effect is particularly strong among small and medium-sized firms (SMEs) but practically non-existent for large-sized firms. Since persistence of norms and values refers to individuals and their decisions, a stronger effect in SMEs is in line with our expectations: Decision-making processes in SMEs include fewer persons than in large-sized firms, which typically base their corporate policy on board decisions. We extend our main analysis by a matching approach to exclude the possibility of sample biases and by predicting cash levels for East German firms as if they were West German firms to account for the potential differences in the determinants of cash holdings.

We additionally draw on the dynamic aspects of cash holdings and examine how East and West German firms differ by means of their speed of adjustment to their target level of cash (see, e.g., Ozkan and Ozkan, 2004). We find that East German firms' speed of adjustment is generally lower than the adjustment speed of West German firms. When we differentiate between excess cash (i.e., cash above the target) and cash shortage (i.e., cash below the target), however, we only find a statistically significant difference between

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<sup>1</sup> Note that for the sake of readability, we refer throughout the paper to states of the former German Democratic Republic (GDR) as East Germany and to the 'old' states of the Federal Republic of Germany as West Germany.

East and West German firms in the case of excess cash but not in the case of cash shortage. Thus, while East German firms reduce excess cash more slowly than their West German counterparts, firms' speed of adjustment is not different from each other in the case of cash shortfall. We interpret that the persistence of norms and values has an impact on the precautionary motive to hold cash which consequently leads to the observed differences in the static (i.e., level) as well as dynamic (i.e., speed of adjustment) aspects of corporate cash holdings.

To exclude the possibility that our findings are driven by another factor, we test a battery of alternative explanations: We control for both firm-specific and institutional factors that may drive our results. While firm- and industry-specific explanations mainly focus on financial constraints (i.e., the level of profitability, the amount of bank debt and trade credit and external finance dependence), institutional factors capture differences in local tax uncertainty as well as regional and historical aspects, respectively. Still, there remains a statistically significant difference between East and West German firms that cannot be explained by these additional tests. Similarly, our results are robust regarding different variable and model specifications as well as regarding the impact of the financial crisis. By showing that all these alternative factors cannot explain the observed differences between East and West German corporate cash holdings, we may conclude that the persistence of norms and values is still affecting corporate policies of East German firms.

Our study contributes to existing literature by being the first that investigates differences in cash holdings of East and West German firms. Germany's history allows us to extend the emerging strand of literature that links exogenous factors with corporate policy. While corporate governance in general has extensively been analysed with respect to institutional differences, the focus on explicit corporate policies (e.g., the level of cash holdings) is much less studied. In this light, our findings suggest that norms and values of a past (and bygone) political system still affect current corporate cash holdings. The persistence of norms and values and the consequential effects on corporate policies has not only implications for Germany but also for economies all over the world that were and are exposed to changes in their values and norms due to, e.g., a shift in their political system. We further contribute to existing research by explicitly differentiating between large-sized firms and SMEs. Our results suggest that firm size differentiation is important as – based on our sample – only SMEs are affected by the persistence of norms and values of the former GDR. Lastly, extant research that studies cash holdings from a cultural perspective concentrates on the level of corporate cash. The analysis of cash holdings' speed of adjustment contributes to current research that links cash holdings with culture on the one hand and broadens the emerging stream of research on speed of adjustment by highlighting that cultural aspects on the other hand also have an impact on the dynamics of corporate cash holdings.

This study finally adds to a long-established stream of research that uses Germany's reunification as quasi-natural experiment to analyse the differences between East and West Germany. With regard to economic questions, topics range, among others, from labour market examinations (e.g., Fuchs-Schündeln and Izem, 2012, Uhlig, 2006 or Snower and Merkl, 2006), to differences in self-employment activity (e.g., Runst, 2013 or Fritsch et al., 2014), to household consumption and savings (e.g., Bursztyn and Cantoni, 2016,

Friehe and Mechtel, 2014 or Fuchs-Schündeln, 2008) as well as studies that analyse preferences towards state interventions (e.g., Alesina and Fuchs-Schündeln, 2007) or solidarity (e.g., Brosig-Koch et al., 2011) and differences in trust and values (e.g., Necker and Voskort (2014), Heineck and Süßmuth, 2013 or Rainer and Siedler, 2009). All of these studies highlight that the exposure to a socialistic political system still affects East Germany. Our study extends this list by analysing the effect of persistence of norms and values on managers' decision-making (i.e., cash management policy).

The remainder of the paper is structured as follows: In Section 2, we review existing literature and outline our research environment. Section 3 describes the data together with descriptive statistics and the model specification. Section 4 shows our main results including the matching approach and the examination of excess cash. In Section 5, we analyse firms' speed of adjustment to their target cash level. Section 6 includes tests for potentially alternative explanation of our results, and Section 7 provides further robustness checks. Finally, Section 8 concludes our findings.

## 2 Related literature

Corporate cash holdings represent a well-studied area in corporate finance and existing research has developed several theories why firms hold a specific amount of cash. These include, among others, the transaction costs aspects and precautionary motives (see Bates et al., 2009, for an excellent overview). The transaction costs theory claims that firms facing a preliminary liquidity shortage can remedy the squeeze by either liquidating assets, increasing debt or equity, or decreasing dividends. Nevertheless, these actions are not free of charge, as transaction costs may arise when selling assets, raising debt etc. (Baumol, 1952). Thus, firms with higher transaction costs might keep more cash to avoid this kind of costs. In contrast, the precautionary motive stresses the negative costs from missing valuable investment projects. Consequently, especially firms with highly volatile cash flows and poor access to external capital markets hoard cash to meet unexpected incidentals and to hedge against the risk of sudden future cash shortfalls in order to not forego valuable investment opportunities (Opler et al., 1999). Almeida et al. (2004), e.g., show that while financially constrained firms use their cash flow to increase cash holdings, financially unconstrained firms do not exhibit such a behaviour. Nevertheless, also firms with more valuable investment projects may save cash to cope with potential negative shocks and liquidity shortfalls (Bates et al., 2009).

Additionally to these theories, existing research expands the analysis to exogenous – mainly country-specific – characteristics like investor protection, shareholder rights or corporate governance in general (see, e.g., Dittmar et al., 2003, Pinkowitz et al., 2006 or Kalcheva and Lins, 2007). Among this stream, the relevance of national culture is considered as an important determinant of corporate finance decisions in general (see, e.g., Li et al., 2013 for an analysis of corporate risk taking or Aggarwal et al., 2016 for a recent general overview) as well as of corporate cash holdings in particular. In this context, Chen et al. (2015) analyse the impact of culture on corporate cash holdings and argue that specific cultural features have an effect on managers and their decisions. More specifically, the authors develop their hypotheses regarding

corporate cash holdings based on a society's current level of individualism and uncertainty-avoidance. A high level of individualism, for instance, is related to self-centred persons. Such a characteristic is often linked to overconfidence bias which results in overestimating (own) abilities and being too optimistic. In combination with corporate cash holdings, this would imply that firms located in countries with an individualistic culture are expected to hold less cash than firms located in countries with a collectivistic culture. For the second cultural feature – the degree of uncertainty-avoidance – a similar reasoning is applied by Chen et al. (2015): The more relevant uncertainty avoidance is, the higher the level of cash holdings. The authors test and confirm their hypotheses on an international sample as well as on a sample of US firms only. They show that individualism has a significantly negative effect on the firms' cash balance and uncertainty-avoidance has a significantly positive effect. Similarly, Chang and Noorbakhsh (2009) further investigate the effect of culture on corporate cash holdings in 45 countries and expand cultural features by long-term orientation and cultural masculinity. Their results indicate that firms' cash holdings are positively correlated with uncertainty-avoidance, masculinity and long-term orientation – being robust to differences in corporate governance and financial market developments in the individual countries. Finally, Orlova et al. (2017) test the relation between national culture and cash holdings but focus more on the valuation of cash holdings than on the actual level. Somewhat related, Hu et al. (2019) analyse the impact of religious values on cash holdings of large-sized firms. The authors differentiate between Catholic and Protestant values and find that cash holdings are lower in regions with a higher level of Protestants. Hu et al. (2019) relate their finding to Protestants' work ethics and values which tend to reduce the free cash flow agency problem and induce a reallocation of cash to shareholders.

All these studies have a focus on current norms and values in common. We differ to these studies by analysing the impact of informal institutions (i.e., norms and values) of a bygone political system on corporate cash holdings. The emphasis on norms and values of a past political system allows to draw implications for transition economies worldwide which experience a change in their institutions and norms.<sup>2</sup> Further, all studies discussed above analyse samples consisting of listed firms, which are likely to include more than one person in decision-making processes and usually act in the global market. This implies that the impact of individuals' norms and values is potentially more diversified than in small firms and thus the effects might be diluted. We therefore focus not only on large-sized firms but specifically on SMEs.

We use Germany's history as research environment since its reunification serves as a quasi-natural experiment to analyse the effect of norms and values of a bygone political system on a firm's cash management policy. Given the wide variety of dissimilarities in norms and values between capitalist West Germany and former socialistic East Germany as political systems, we focus on the distinction between collectivism and individualism which is in line with, e.g., Chen et al.'s (2015) argumentation: While East Germany's political system was more related to a collectivistic culture, West Germany's political system, on the other hand, is

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<sup>2</sup> There exists a considerable amount of literature that takes into account the relevance of transition economies against the background of different aspects like entrepreneurship, financial deepening, or consumption behaviour (see, e.g., Smallbone and Welter, 2001, McMillan and Woodruff, 2002, Wu et al., 2012, Bursztyn and Cantoni, 2016).

more related to an individualistic culture (see, e.g., Schwartz and Bardi, 1997).<sup>3</sup> Chen et al. (2015) argues that firms located in countries with a high level of individualism are characterized by managers who are more self-centred and more overconfident (compared to their counterparts in regions with a lower level of individualism) and who might tend to overestimate firm performance and therefore set the level of cash too low. For firms located in regions with lower levels of individualism (i.e., more collectivism), cash levels are expected to be higher due to less overconfidence and less overestimation of firm performance. Given the persistence of norms and values of a past political system (i.e., East Germany's socialism), we would therefore expect differences in corporate cash holdings between East and West Germany and, more specifically, would expect that firms in West Germany hold less cash than firms in East Germany. Note that we presume the precautionary motive to hold cash as the underlying mechanism behind the relation between the effect of persistence of norms and values and the differences in corporate cash holdings.<sup>4</sup>

Several studies claim that motives to hold cash differ across firm size and that the precautionary motive is especially relevant for small and medium-sized firms due to their limited access to capital markets (see, e.g., Martínez-Sola et al., 2018). We would consequently expect that cash holdings are generally higher among SMEs. Furthermore, since smaller firms typically include fewer persons in decision-making processes, we would additionally expect that norms and values are more prevailing in small and medium-sized firms than in large-sized firms. Put differently, while large-sized firms typically base their corporate policy on group decisions (and are thus more diversified), smaller firms might include fewer persons in decision-making processes. Therefore, we would expect that if differences between East and West German firms in the level of corporate cash holdings exist, they should be more substantial among SMEs.

### 3 Data and empirical strategy

#### 3.1 Data

Our unique dataset is obtained from Creditreform AG, which provides a comprehensive coverage and representative sample of active companies registered in Germany.<sup>5</sup> Our sample covers the period from 2004 to 2016. To receive an appropriate dataset, some data cleansing is necessary: First of all, we drop companies with consolidated financial statements and only keep firms with individual financial statements to ensure that firms' management is located in East Germany. Furthermore, we delete incorporations, as the board of directors often might be composed of international managers. Next, we drop firms that were founded before 1950. To classify firms as East or West German company and to conduct additional regional analyses

<sup>3</sup> Note that the existing studies by Chen et al. (2015) and Chang and Noorbakhsh (2009) focus additionally on uncertainty-avoidance, masculinity and long-term orientation as relevant cultural aspects based on Hofstede's (2001) cultural dimensions. While the relevant data would be available for both East and West Germany as well, the differences in the level of, e.g., uncertainty-avoidance are too small to be statistically significant. Further, the use of such value surveys has recently been criticized as it has shown to deliver ambiguous findings (see, e.g., Maseland and Van Hoorn, 2009).

<sup>4</sup> Note that precautionary savings of German households have been analysed by Fuchs-Schündeln (2008). However, while Fuchs-Schündeln's (2008) focus is quite different (i.e., households versus firms), it also shows that the savings rate of East German households was significantly higher than the savings rate of West German households after Germany's reunification.

<sup>5</sup> Creditreform AG is a holding company with core services like business intelligence and receivables management.

in the following sections, we require firms to have a valid postal code. It is further common use to delete firms located in Berlin. Lastly, companies in the banking, finance, insurance and real estate sector as well as utilities, public administration and defence companies are excluded due to differences in their balance sheets and income statements.

To mitigate misspecification, we delete observations with negative values of cash holdings, total assets, total sales and tangible assets. Furthermore, we conduct several plausibility checks and delete, for instance, observations if cash holdings are larger than total assets. Finally, we only keep firms where at least four years of consequent observations are available.<sup>6</sup> To mitigate a potential impact of outliers, we trim variables at the 2.5 percentile in both tails. After all, we end up with a dataset containing 14,823 firms with 99,464 firm year observations of which about 26% are included in the East German sample. Table 1 provides summary statistics for the full sample.

**Table 1** Summary statistics

	Mean	Median	25 <sup>th</sup> Pct.	75 <sup>th</sup> Pct.	Std.Dev.	N
<i>Cash<sub>t</sub></i>	0.119	0.058	0.012	0.174	0.145	99,464
<i>Operating cash flow<sub>t-1</sub></i>	0.111	0.098	0.049	0.164	0.105	99,464
<i>Inventory<sub>t-1</sub></i>	0.231	0.193	0.063	0.362	0.189	99,464
<i>Net working capital<sub>t-1</sub></i>	0.005	0.012	-0.151	0.176	0.258	99,464
<i>Sales growth<sub>t-1</sub></i>	0.071	0.037	-0.045	0.140	0.250	99,464
<i>Tangible assets<sub>t-1</sub></i>	0.251	0.184	0.069	0.389	0.219	99,464
<i>Debt<sub>t-1</sub></i>	0.673	0.713	0.502	0.870	0.238	99,464
<i>Short-term bank debt<sub>t-1</sub></i>	0.139	0.087	0.026	0.206	0.146	60,904
<i>Total assets<sub>t-1</sub> (in Mio. €)</i>	15.891	4.284	1.166	14.316	28.206	99,464
<i>Age<sub>t</sub> (in years)</i>	21.021	18.000	11.000	27.000	13.036	99,464

Notes: This table reports summary statistics for the full sample. All variables except *Sales growth*, *Age* and *Total assets* are defined as ratios. The lower number of observations in *Short-term bank debt* is due to missing data. We refer to Table A1 in the Appendix for details on the variable construction. Subscript *t-1* means that the variable is lagged one period.

As outlined in the section before, we expect the effects of persistence of norms and values to be more pronounced in SMEs and therefore classify companies into the following size categories: micro, small, medium and large firms, with SMEs consisting of micro, small and medium-sized firms. This classification is based on §267 of the German Commercial Code taking into account the number of employees, total assets and total sales (see Table A2 in the Appendix for further details). While we allow for switching within the SME sample (i.e., micro, small and medium firms), we drop firms that have switched from SME to large firms or vice versa to avoid misclassification. Table 2 gives information for West and East Germany separately, is divided in all firms (Panel A) and SMEs only (Panel B) and tests for differences in means between both regions. The first row of both tables illustrates the amount of cash holdings. The *t*-statistics in Table 2 (Panel A and Panel B) already indicate a difference between East and West German firms in their cash holdings which is both, economically and statistically significant. We further observe that East firms are smaller in size, have higher tangible fixed assets, and tend to be younger. These differences are statistically significant based on the *t*-statistic for differences in means. According to Imbens and Wooldridge (2009) and

<sup>6</sup> Note that this procedure does not yield a survivorship bias. We re-run all estimations with at least two years of consequent observations available and all results remain unchanged (not tabulated).

Garcia-Appendini (2018), however, the normalised difference tends to be more realistic than the  $t$ -statistic for our sample as  $t$ -statistics rise with increasing sample size. The critical level of normalised differences is, as a rule of thumb, 0.25 in absolute terms. Normalised differences below this level imply that linear regression models would not be sensitive to the specification.<sup>7</sup> Note that we address normalised differences for size, tangible fixed assets and age that are larger than 0.25 in Section 4.2 by matching nearly each firm located in the East to a firm located in the West that is closest in propensity score and re-estimate the baseline model. Overall, the differences stress the necessity of multivariate regression analyses to exclude the possibility of interdependencies with other firm characteristics and to control for the different sources of heterogeneity.

Since we assign firms as East or West German firm simply by its postal code, we might include a potential bias due to migration (i.e., East Germans going to West Germany and running a business and vice versa). However, our focus on SMEs might mitigate this bias and the foreign ownership of East German firms is generally negligible since, according to Wyrwich (2010), only a low percentage of West Germans started to run a business in East Germany (i.e., more than 85% of East German firms are owned by East Germans). Lastly, and especially for SMEs, the term managers is synonymously used for firms owners.

### 3.2 Model specification

Our main dependent variable is firms' cash holdings divided by total assets (labelled as  $Cash_{i,t}$ ). The focus of our research agenda is on the identification of differences in corporate cash holdings due to the persistence of norms and values. As a first step, we analyse the overall differences in cash holdings between firms located in either East or West Germany. The corresponding empirical specification is:

$$Cash_{i,t} = \alpha + \beta East_i + \gamma X_{i,t} + D_t + D_j + \epsilon_{i,t}, \quad (1)$$

where  $Cash_{i,t}$  is the dependent variable, i.e. firm  $i$ 's cash holdings in year  $t$  divided by firm  $i$ 's total assets in year  $t$ . Our main (explanatory) variable of interest is  $East$ , which is a dummy variable and is defined as being one if the company is located in East Germany and zero otherwise (i.e., West Germany). If cash holdings are higher in East German firms, we expect  $\beta$  in Equation (1) to be significantly positive. We apply a random effects GLS-model with industry ( $D_j$ ) and year fixed effects ( $D_t$ ), which allows us to control for heterogeneity across industries and for business cycle fluctuations and other life-cycle effects.  $X_{i,t}$  represents a vector of independent control variables being in line with existing research on corporate cash holdings. To be specific,  $X_{i,t}$  comprises operating cash flow, inventory, working capital net cash, sales growth, fixed assets labelled as tangible assets, total liabilities, the natural logarithm of total assets and age. We also control for

<sup>7</sup> The normalised difference is calculated as follows:  $\Delta_x = \frac{\bar{X}_1 - \bar{X}_0}{\sqrt{S_1^2 + S_0^2}}$ , where  $\bar{X}_1$  and  $\bar{X}_0$  are the sample averages and  $S_1^2$  and  $S_0^2$  are the sample variances of variable  $X$  in the East and the West sample, respectively (see, e.g., Imbens and Wooldridge, 2009 or Garcia-Appendini, 2018).



**Table 2** Summary statistics for West and East German firms

Panel A: Full sample									
	East			West			Test for equality in means		
	Mean	Median	N	Mean	Median	N	$\Delta$	<i>t</i> -stat	Norm. diff.
<i>Cash<sub>t</sub></i>	0.127	0.070	25,826	0.116	0.054	73,638	0.011***	10.392	0.053
<i>Operating cash flow<sub>t-1</sub></i>	0.113	0.101	25,826	0.111	0.096	73,638	0.002**	3.205	0.017
<i>Inventory<sub>t-1</sub></i>	0.211	0.167	25,826	0.238	0.205	73,638	-0.027***	-19.968	-0.104
<i>Net working capital<sub>t-1</sub></i>	-0.022	-0.012	25,826	0.014	0.022	73,638	-0.036***	-19.347	-0.101
<i>Sales growth<sub>t-1</sub></i>	0.080	0.038	25,826	0.068	0.037	73,638	0.012***	6.745	0.033
<i>Tangible assets<sub>t-1</sub></i>	0.317	0.274	25,826	0.228	0.157	73,638	0.089***	57.232	0.288
<i>Debt<sub>t-1</sub></i>	0.656	0.693	25,826	0.679	0.720	73,638	-0.023***	-13.260	-0.068
<i>Short-term bank debt<sub>t-1</sub></i>	0.133	0.084	17,851	0.142	0.089	43,053	-0.009***	-7.063	-0.045
<i>Total assets<sub>t-1</sub> (in Mio. €)</i>	8.994	2.440	25,826	18.310	5.357	73,638	-9.316***	-46.158	-0.258
<i>Age<sub>t</sub> (in years)</i>	16.129	16.000	25,826	22.737	19.000	73,638	-6.608***	-71.895	-0.417

Panel B: SME									
	East			West			Test for equality in means		
	Mean	Median	N	Mean	Median	N	$\Delta$	<i>t</i> -stat	Norm. diff.
<i>Cash<sub>t</sub></i>	0.131	0.074	23,477	0.122	0.057	55,859	0.009***	7.835	0.043
<i>Operating cash flow<sub>t-1</sub></i>	0.113	0.101	23,477	0.113	0.099	55,859	0.001	0.678	0.004
<i>Inventory<sub>t-1</sub></i>	0.214	0.171	23,477	0.250	0.218	55,859	-0.036***	-24.080	-0.135
<i>Net working capital<sub>t-1</sub></i>	-0.023	-0.013	23,477	0.012	0.021	55,859	-0.035***	-17.369	-0.097
<i>Sales growth<sub>t-1</sub></i>	0.082	0.037	23,477	0.072	0.037	55,859	0.010***	4.711	0.025
<i>Tangible assets<sub>t-1</sub></i>	0.306	0.261	23,477	0.212	0.143	55,859	0.094***	58.401	0.314
<i>Debt<sub>t-1</sub></i>	0.669	0.705	23,477	0.695	0.742	55,859	-0.026***	-14.013	-0.077
<i>Short-term bank debt<sub>t-1</sub></i>	0.136	0.087	16,429	0.154	0.105	33,853	-0.018***	-12.885	-0.088
<i>Total assets<sub>t-1</sub> (in Mio. €)</i>	4.091	2.014	23,477	5.147	2.887	55,859	-1.056***	-20.103	-0.113
<i>Age<sub>t</sub> (in years)</i>	16.076	16.000	23,477	21.866	19.000	55,859	-5.790***	-61.335	-0.375

Notes: This table reports summary statistics for East and West German firms. All variables except *Sales growth*, *Age* and *Total assets* are defined as ratios. The lower number of observations in *Short-term bank debt* is due to missing data. Panel A includes the full sample of firms and Panel B includes only SMEs. The sizing of SME and large firms is classified according to §261 of the German Commercial Code. Firms are classified either as SME or Large if two of the following three criteria apply, respectively: employees smaller or equal to 250, total assets smaller or equal to € 19.25 Mio. and total sales smaller or equal to € 38.5 Mio. Subscript *t-1* means that the variable is lagged one period. \*, \*\* and \*\*\* indicate statistical significance at the 10%, 5% and 1% level, respectively.

regional specific economic developments by including the aggregated GDP growth rate of the federal state the firm is located in.<sup>8</sup> To avoid a simultaneity bias, we lag all control variables except age by one period. Furthermore, we scale – analogous to our dependent variable – all control variables by total assets except sales growth, total assets and age. We take into account that observations of the same firm over time are not independent, and thus, cluster standard errors at the firm level.

To test for firm size effects, on the other hand, we employ an interaction term between the *East* dummy and our main size dummy *SME*. This allows us to analyse whether the influence of the former GDR and its informal institutions is – as we would expect – more relevant for smaller companies. We define the *SME* dummy according to §267 of the German Commercial Code, which is based on the number of employees, total assets and total sales (see Table A2 in the Appendix for details). The equation for size effects is given by:

$$Cash_{i,t} = \alpha + \beta_1 East_i + \beta_2 SME_i + \beta_3 (East_i \times SME_i) + \gamma X_{i,t} + D_t + D_j + \epsilon_{i,t}. \quad (2)$$

<sup>8</sup> In robustness checks, we add further macroeconomic variables that vary across federal states (i.e., the growth rate of gross capital investments, the growth rate in household savings and the growth rate of employment). Qualitatively, our results remain the same and are available upon request. The data on the macroeconomic variables is available on <https://www.statistik-bw.de/VGRdL/tbls/> (11/09/2017).

If there is a firm size effect, we expect  $\beta_1$  to be insignificant and  $\beta_3$  to be significantly positive. To examine size effects in-depth, we additionally implement the following alternative measures for firm size: First, we sort our sample on total assets, estimate the yearly sample median and divide the sample in firms with total assets that lie below the median (dummy  $TA$  equals one) and in firms with total assets that lie above the median (dummy  $TA$  equals zero). Second, we use the number of employees (*Employees*) as alternative measure for firm size and construct it in the similar way as before. Third, we apply a categorical size variable (based on §267 of the German Commercial Code) as interaction term, which includes micro, small, medium and large-sized firms as respective categories (with large firms as base level). Lastly, we separately run the baseline estimation for each size class.

## 4 Main results

### 4.1 Baseline estimation

Table 3 includes the estimation results for Equations (1) and (2) and additional firm size estimations. Column (1) corresponds to Equation (1) and tests for differences in cash holdings between East and West German firms for the full sample. There is a statistically significant difference in cash holdings between East and West German firms (i.e., *East*). The level of cash is significantly higher in East German firms which is in line with our hypothesis on the persistence of norms and values of the bygone political system in East Germany. The observed difference in cash holdings might be due to a different level of individualism/collectivism: In line with Chen et al. (2015), we find that the region with an higher individualistic culture (i.e., West Germany) exhibits lower cash levels, which might be attributed to the overestimation of managers' own abilities and managers' overoptimism.

The next columns of Table 3 focus on our hypothesis regarding firm size. Column (2) shows similar results as above for the SME sample, while the coefficient even slightly increases. When adding the interaction terms to test differences between large-sized firms and SMEs (i.e., Columns (3)-(5)), we observe positive and significant coefficients for the respective interaction terms (i.e.,  $East \times SME$ ,  $East \times TA$ ). This result supports our hypothesis regarding firm size: The differences in cash holdings between firms located in East and West Germany are more pronounced among smaller firms. While we do not find a significant effect for *East* in Column (3), we find a significantly positive effect in Columns (4) and (5). This outcome might be caused by the fact that in Column (3) the base level represents are large-sized firms according to §267 of the German Commercial Code, while in Columns (4) and (5) our base firms are the ones whose total assets and number of employees are above the yearly cross-sectional sample median of total assets and amount of employees, respectively. Overall, this confirms our hypothesis that the effect is more pronounced among smaller firms. This finding is also indicated by Column (6), where we use a categorical size variable considering large, medium, small and micro firms, respectively.<sup>9</sup> While we do not observe a significant

<sup>9</sup> For simplicity we do not report the coefficients on the individual size classes.

difference between large firms in West and East Germany (i.e., *East* is not significant), we find that micro, small and medium-sized firms in East Germany exhibit significantly higher levels of cash holdings – between 1 to 3 percentage points – than their West German counterparts. Finally, Columns (7) to (10) in Table 3 show the baseline estimation for each firm size separately and confirm previous results. Micro, small and medium-sized firms in East Germany keep more cash than micro, small and medium-sized firms in West Germany, while this effect diminishes among large-sized firms. These results support our hypotheses implying that (i) cash holdings are higher in East Germany and (ii) the effect is more relevant for smaller firms than for large-sized firms. In fact, while the respective size dummies are significantly positive, there is no statistical significance for large-sized firms. Since the cash ratio of East German firms tends to be at least 10% higher than the one of West German firms considering an average cash ratio of 11% (see Column (1)), our results imply also economic relevance. This is even higher for SMEs resulting in a difference of more than 15% (see Column (2)). Besides, the control variables exhibit coefficients in line with existing literature: Large firms and firms with more debt hold less cash, while older firms and firms with higher cash flows hold more cash. Further, the covariates tangible assets, net working capital and inventory are all negatively related to corporate cash holdings.

In our baseline estimations above, we put all emphasis on the dummy variable in *East* to analyse the persistence of past norms and values and its effect on corporate cash holdings. While the results indicate that cash holdings among East and West German firms are significantly different, it is not clear whether this finding holds for all regions in East Germany. To test the consistency of our analysis, we re-estimate the baseline regression with federal state-specific dummy variables. We account for further differences in regional economic growth by adding aggregated federal state specific growth rates in household savings and growth rates in gross capital investment and employment as controls. The results of this exercise suggest that cash holdings are significantly higher across all East German federal states. More specifically, coefficients are significantly positive for all East German federal states, while the West German states cannot be distinguished from the reference state Baden-Württemberg for the full sample and for SMEs only (see Table A3 in the Appendix).<sup>10</sup> To visualize the consistency of our results, Figure 1 presents a heat map of Germany using the single coefficients of the individual federal states as underlying data after estimating Equation (1) for the full sample with Baden-Württemberg as reference state. The map clearly shows that East German federal states tend to hold between one to three percentage points more cash than their Western counterparts.

## 4.2 Matched sample

While our findings seem rather promising so far, it is important to highlight existing literature’s arguments that cash holdings highly depend on a firm’s industry and that larger firms usually hold less cash due

<sup>10</sup> Note that we apply a firm matching approach in the next section and re-run these federal state-specific regressions. For completeness, we also report results for the matched sample. Estimation outcomes do not change when using the matched sample (see Columns (3)-(4) of Table A3).

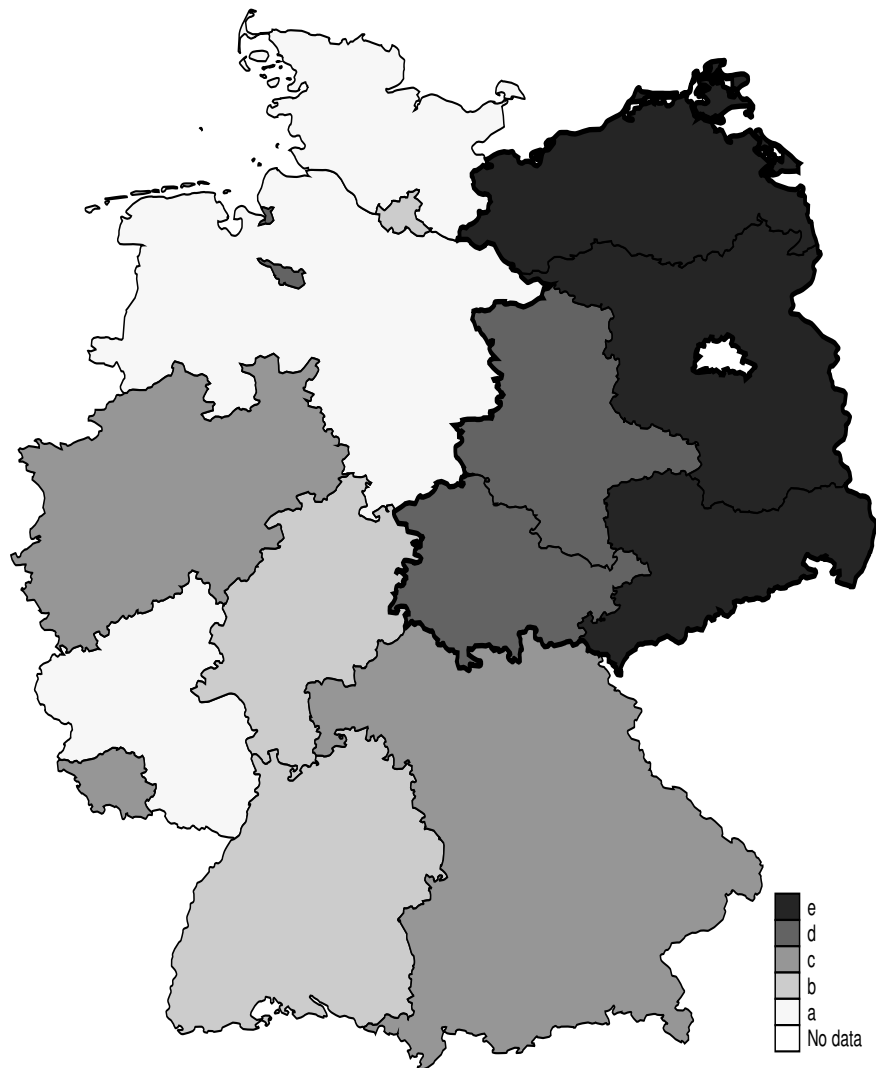
**Table 3** Cash holdings in East and West Germany

	Baseline sample		Size-interactions				Size-subsamples			
	(1) All	(2) SME	(3) SME	(4) TA	(5) Employees	(6) Size	(7) Micro	(8) Small	(9) Medium	(10) Large
<i>East</i>	0.017*** (0.002)	0.020*** (0.002)	-0.006 (0.005)	0.015*** (0.003)	0.021*** (0.003)	-0.006 (0.005)	0.029*** (0.007)	0.021*** (0.003)	0.011*** (0.004)	-0.006 (0.006)
<i>SME</i>			0.028*** (0.003)							
<i>East</i> × <i>SME</i>			0.027*** (0.006)							
<i>TA</i>				0.008*** (0.002)						
<i>East</i> × <i>TA</i>				0.009*** (0.003)						
<i>Employees</i>					0.016*** (0.002)					
<i>East</i> × <i>Employees</i>					-0.001 (0.003)					
<i>East</i> × <i>Micro</i>						0.032*** (0.008)				
<i>East</i> × <i>Small</i>						0.027*** (0.006)				
<i>East</i> × <i>Medium</i>						0.026*** (0.006)				
<i>Operating cash flow</i> <sub><i>t-1</i></sub>	0.090*** (0.005)	0.099*** (0.005)	0.094*** (0.005)	0.094*** (0.005)	0.095*** (0.005)	0.094*** (0.005)	0.084*** (0.015)	0.116*** (0.007)	0.078*** (0.008)	0.043*** (0.009)
<i>Inventory</i> <sub><i>t-1</i></sub>	-0.060*** (0.004)	-0.058*** (0.004)	-0.061*** (0.004)	-0.060*** (0.004)	-0.060*** (0.004)	-0.061*** (0.004)	-0.069*** (0.014)	-0.056*** (0.005)	-0.063*** (0.008)	-0.068*** (0.011)
<i>Net working capital</i> <sub><i>t-1</i></sub>	-0.072*** (0.003)	-0.071*** (0.003)	-0.070*** (0.003)	-0.071*** (0.003)	-0.071*** (0.003)	-0.071*** (0.003)	-0.064*** (0.010)	-0.071*** (0.004)	-0.077*** (0.005)	-0.074*** (0.008)
<i>Sales growth</i> <sub><i>t-1</i></sub>	-0.002 (0.001)	-0.002 (0.001)	-0.002** (0.001)	-0.002* (0.001)	-0.003** (0.001)	-0.002* (0.001)	-0.004 (0.005)	-0.003* (0.002)	-0.000 (0.002)	0.000 (0.003)
<i>Tangible assets</i> <sub><i>t-1</i></sub>	-0.176*** (0.004)	-0.180*** (0.005)	-0.179*** (0.004)	-0.178*** (0.004)	-0.179*** (0.004)	-0.179*** (0.004)	-0.159*** (0.014)	-0.189*** (0.006)	-0.178*** (0.009)	-0.157*** (0.011)
<i>Debt</i> <sub><i>t-1</i></sub>	-0.123*** (0.004)	-0.134*** (0.004)	-0.121*** (0.004)	-0.122*** (0.004)	-0.121*** (0.004)	-0.122*** (0.004)	-0.214*** (0.014)	-0.138*** (0.006)	-0.121*** (0.007)	-0.077*** (0.009)
<i>Total assets</i> <sub><i>t-1</i></sub>	-0.010*** (0.001)	-0.009*** (0.001)					-0.013*** (0.004)	-0.008*** (0.001)	-0.007*** (0.002)	-0.005* (0.003)
<i>Age</i> <sub><i>t</i></sub>	0.004*** (0.001)	0.004*** (0.001)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	-0.001 (0.004)	0.003 (0.002)	0.007*** (0.002)	-0.002 (0.002)
<i>GDP growth</i> <sub><i>t-1</i></sub>	-0.044* (0.024)	-0.046 (0.028)	-0.047** (0.024)	-0.047** (0.024)	-0.047** (0.024)	-0.045* (0.024)	0.053 (0.129)	-0.035 (0.039)	-0.026 (0.043)	-0.027 (0.040)
<i>Industry FE</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Year FE</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>R</i> <sup>2</sup>	0.259	0.274	0.253	0.254	0.257	0.256	0.300	0.290	0.256	0.175
<i>N</i>	99,464	79,336	99,464	99,377	98,717	99,464	6,274	43,911	29,151	20,128

Notes: This table reports random effects panel regression results with robust standard errors clustered at the firm level in parentheses. The baseline regression model is given by:  $Cash_{i,t} = \alpha + \beta East_i + \gamma X_{i,t} + D_t + D_j + \epsilon_{i,t}$ . The first row indicates the sample/specification used. The second row indicates either the sample used (Cols. (1)-(2), (7)-(10)) or the interaction term (Cols. (3)-(6)). In Column (1) we use the full sample. In Column (2) we use the sample of SMEs only. In Column (3) we use the full sample and *SME* as interaction term, which is defined according to §267 of the German Commercial Code. In Column (4) we use the full sample and the *TA* dummy as interaction term being one if the firm's total assets are below the yearly sample median and zero otherwise. In Column (5) we use the full sample and the *Employees* dummy as interaction term, being one if the firm's number of employees is below the yearly sample median and zero otherwise. In Column (6) we use the full sample and *Size classes* as interaction term, which are defined according to §267 of the German Commercial Code. In Columns (7)-(10) we use the different *Size classes* as sample. All specifications include year and industry fixed effects. We refer to Table A1 and Table A2 in the Appendix for details on the respective variables and the various firm size definitions, respectively. Subscript *t-1* means that the variable is lagged one period. \*, \*\* and \*\*\* indicate statistical significance at the 10%, 5% and 1% level, respectively.

to economies of scale (see, e.g., Opler et al., 1999 or Dittmar et al., 2003). In our sample, as shown in Table 2 above, firms located in East Germany significantly differ in size, age and tangible fixed assets from firms located in West Germany. To address this aspect, we now apply a matching approach to exclude the possibility that our results are confounded and display different cash policies simply caused by firm size and industry. For this purpose, we apply a nearest neighbour matching based on propensity score and re-estimate Equation (1) with the matched sample. We link the cash ratio of East German firms to their closest counterfactual West German firms by matching nearly each East German firm in our sample with a West German firm in the same industry class (two digit NACE2 code), closest in average total assets, average number of employees, average total sales, average tangible fixed assets, age and years of observations. To enhance the accuracy of the match, we allow for matching with replacement as applied by, e.g., Garcia-Appendini (2018). This matching exercise eliminates potential unobserved confounding factors that differ between East and West German firms.

Table A5 in the Appendix presents summary statistics for the matched sample. The sample differs from

**Fig. 1** Cash holdings - Federal states

Notes: This figure shows the coefficients of German federal states for a random effects panel regression with robust standard errors clustered at the firm level in parentheses. The regression model is given by:  $Cash_{i,t} = \alpha + \beta Federal\ state_f + \gamma X_{i,t} + D_t + D_j + \epsilon_{i,t}$ , while the reference state is Baden-Württemberg. Covariates are the same as those mentioned in Section 3.2. To account for potential differences in economic growth among the various federal states we add further macroeconomic variables like the lagged growth rate of gross capital investment, the lagged growth rate of household savings and the lagged growth rate of employment. The values in the legend indicate the size range of the coefficients for the respective colour class. The black bold line displays the border of the former GDR.

the full sample as that all normalised differences between East and West German firms are now considerably below the critical level of 0.25 and the  $t$ -statistics decreased substantially. The re-estimation of Equation (1) by using the matched sample is tabulated in Table 4 for both the full and SME sample. The estimates in Table 4 are quite similar to our baseline estimation (i.e., Table 3 Columns (1)-(2)) suggesting that results above are not caused by a selection of East German firms into certain size classes or industries where the amount of cash holdings may vary per se.

**Table 4** Matched sample

	(1)	(2)
	All	SME
<i>East</i>	0.018*** (0.002)	0.020*** (0.003)
<i>Operating cash flow<sub>t-1</sub></i>	0.099*** (0.007)	0.104*** (0.007)
<i>Inventory<sub>t-1</sub></i>	-0.060*** (0.006)	-0.057*** (0.006)
<i>Net working capital<sub>t-1</sub></i>	-0.062*** (0.004)	-0.064*** (0.004)
<i>Sales growth<sub>t-1</sub></i>	-0.002 (0.002)	-0.002 (0.002)
<i>Tangible assets<sub>t-1</sub></i>	-0.172*** (0.005)	-0.174*** (0.006)
<i>Debt<sub>t-1</sub></i>	-0.129*** (0.005)	-0.138*** (0.005)
<i>Total assets<sub>t-1</sub></i>	-0.011*** (0.001)	-0.010*** (0.001)
<i>Age<sub>t</sub></i>	0.003 (0.002)	0.003* (0.002)
<i>GDP growth<sub>t-1</sub></i>	0.013 (0.034)	0.009 (0.037)
<i>Industry FE</i>	Yes	Yes
<i>Year FE</i>	Yes	Yes
<i>R<sup>2</sup></i>	0.282	0.289
<i>N</i>	51,159	46,140

Notes: This table reports random effects panel regression results for the matched sample with robust standard errors clustered at the firm level in parentheses. The regression model is given by:  $Cash_{i,t} = \alpha + \beta East_i + \gamma X_{i,t} + D_t + D_j + \epsilon_{i,t}$ . The first row indicates the sample used. All specifications include year and industry fixed effects. We refer to Table A1 in the Appendix for details on the respective variables. Subscript  $t-1$  means that the variable is lagged one period. \*, \*\* and \*\*\* indicate statistical significance at the 10%, 5% and 1% level, respectively.

### 4.3 Excess cash holdings

So far, we estimate all regressions in a way that coefficients on firm characteristics of East and West German firms are forced to be the same. This might – in the case that firm characteristics have a different impact on cash holdings for East and West German firms – bias our results. To address this issue, we follow Gao et al.’s (2013) procedure to examine whether East German firms hold excess cash compared to their West German counterparts. More specifically, we re-estimate Equation (1) by using only West German firms.<sup>11</sup> We then take the regression model to predict the cash ratio for East German firms to estimate excess cash holdings maintaining individual firm characteristics. Excess cash is the difference between an East German firm’s actual cash ratio and its predicted cash ratio (based on West German firms’ coefficients). This allows assessing how much excess cash East German firms should keep were they a West German firm. Column (1) of Table 5 shows that the mean of the excess cash ratio of East German firms is 1.9% and significantly different from zero, indicating that East German firms would keep a lower amount of excess cash if they were the same firm but located in West Germany. In line with our previous findings regarding firm size, the results are very similar for SMEs (Column (2)). Overall, our results are in line with our hypothesis that especially East German SMEs exhibit higher cash reserves relative to total assets than their West German

<sup>11</sup> Note that since firm characteristics might considerably determine excess cash and speed of adjustment, we solely use the matched sample for this analysis.

counterparts.

For the sake of completeness, we also interact all control variables with the *East* dummy similarly allowing for different coefficients for East and West German firms. Results are shown in Table A4 in the Appendix and remain stable with this specification: There are no significant differences regarding the control variables between firms located in East Germany and firms located in West Germany except size. However, the negative sign of the interaction  $East \times Total\ assets_{i,t-1}$  confirms our expectations as the difference in cash holdings disappears with increasing firm size.

**Table 5 Excess cash holdings of firms in East Germany**

Excess cash for East German firms			
	(1) All	(2) SME	(3) Large
<i>Mean</i>	0.019***	0.021***	-0.009***
<i>S.E.</i>	0.001	0.001	0.002
<i>N</i>	25,771	23,427	2,344

Notes: This table reports average excess cash holdings of matched firms in East Germany. Excess cash is the difference between a firm's actual cash ratio and its predicted cash ratio. The regression model is given by:  $Cash_{i,t} = \alpha + \gamma X_{i,t} + D_t + D_j + \epsilon_{i,t}$ , which we estimate for West German firms in the matched sample. Based on this estimation, we obtain the predicted cash ratio for each East German firm in the matched sample. The first row indicates the sample used. \*, \*\* and \*\*\* indicate statistical significance at the 10%, 5% and 1% level, respectively.

## 5 Speed of adjustment

Our analysis using both the full sample as well as the matched sample indicates statistically significant differences in the level of cash holdings between East and West German firms. While we further show that East German firms would keep a lower amount of excess cash if they were the same firm but located in West Germany, both exercises only capture the static aspects of corporate cash holdings. In this section, we therefore focus on the dynamic aspects of cash management by analysing firms' target cash level and their adjustment process in the case of deviations from the target. Thereby, the speed of adjustment to the target cash level is of particular interest for current research and, due to the novelty of this topic, SME-related research is rather scarce (Martínez-Sola et al., 2018). Nonetheless, analysing firms' speed of adjustment gives some intuition on how firms dynamically maintain their cash holdings being relevant for large but also for SMEs, respectively.<sup>12</sup> In addition, – to the best of our knowledge – the effect of informal norms and values on the speed of adjustment is as well largely unexplored since speed of adjustment's determinants analysed so far draw mainly on firm characteristics (e.g., Jiang and Lie, 2016 or Orlova and Rao, 2018) or on institutional factors (e.g., Gao et al., 2013 or Orlova and Sun, 2018).

The rationale behind a target cash level and its dynamic adjustment is that firm managers trade off the costs of running out of cash and costs of keeping non-interest bearing liquid assets (Opler et al., 1999). If a firm deviates from its target cash level, however, managers have to re-adjust cash holdings and the speed of adjustment (back to the target) depends, according to Jiang and Lie (2016), on three different aspects: the costs of deviating from the target level, the costs of adjustments, and the willingness of managers to make

<sup>12</sup> The concept of speed of adjustment should not be associated with a sophisticated treasury department in a firm but rather how firms manage with their cash levels over time.

cash adjustment. For this study's purpose, we draw on managers' willingness as explanation since Opler et al. (1999), among others, document that risk averse and less overconfident managers are stockpiling excess cash to be independent from the capital markets (i.e., they keep a cash buffer in excess of the level that maximises firm values). Consequently, we expect – based on Opler et al.'s (1999) findings – that the persistence of norms and values is relevant for the speed of adjustment as well meaning that we should observe differences in adjustment speeds between East and West German firms in the case of excess cash.

As a first step of this analysis, we therefore estimate the following partial adjustment model as applied by, e.g., Gao et al. (2013):<sup>13</sup>

$$\Delta Cash_{i,t} = \alpha + \beta_1 East \times (Cash^*_{i,t} - Cash_{i,t-1}) + \beta_2 (Cash^*_{i,t} - Cash_{i,t-1}) + \beta_3 East + \epsilon_{i,t}, \quad (3)$$

where  $\Delta Cash_{i,t}$  is the variation in cash from  $t - 1$  to  $t$ .  $Cash^*_{i,t}$  is the firm's target cash ratio estimated by Equation (1) using only the West German firms of the matched sample.  $Cash^*_{i,t} - Cash_{i,t-1}$  represents the firm's deviation from its target cash level and  $\beta_2$  measures how quickly firms adjust their cash holdings to their target level, i.e. the speed of adjustment. Thus,  $\beta_1$  measures whether the speed of adjustment is different between East and West German firms. Panel A of Table 6 presents the results: Column (1) shows that both East and West German firms adjust their cash holdings to their target level (i.e.,  $Cash^*_{i,t} - Cash_{i,t-1}$ ), while the coefficient for the speed of adjustment is significantly smaller for East German firms (i.e.,  $East \times (Cash^*_{i,t} - Cash_{i,t-1})$ ). This implies that East German firms are slower in their adjustment process if they deviate from their target level than their West German counterparts. Again, the effect is only evident for SMEs (Column (2)) but not for large firms (Column (3)).

Our main interest focuses, however, not on the general speed of adjustment but on the speed of adjustment in the case of excess cash. For this purpose, we follow Gao et al. (2013) and split the sample into two subsamples, while one consists of firms with  $Cash^*_{i,t} - Cash_{i,t-1}$  lying within the bottom two quintiles ( $\leq 40^{th}$  Pct.), i.e., excess cash and the other one of firms with  $Cash^*_{i,t} - Cash_{i,t-1}$  lying within the top two quintiles ( $\geq 60^{th}$  Pct.), i.e., cash shortage. Panel B of Table 6 illustrates the results for excess cash holdings. The negative and statistically significant sign of the interaction term suggests that East German firms adapt more slowly their cash holdings to the target level in the case of excess cash. Put differently, they tend to reduce excess cash more slowly than West German firms. Again, this effect is even stronger among SMEs and not evident among large sized firms. In contrast, when firms exhibit a cash shortage (Panel C of Table 6), East German firms do not behave differently compared to their West German counterparts. Besides, the separation into excess cash and cash shortage displays that the results in Panel A are mainly driven by the lower speed of adjustment when there exists excess cash.

Summing up, these findings illustrate that East German firms not only differ by their level but also

<sup>13</sup> Note that since firm characteristics might considerably determine excess cash and speed of adjustment, we solely use the matched sample for the remainder of this section.



by their dynamic adjustment of cash holdings. The lower speed of adjustment in the case of excess cash highlights East German firms' preferences for an excess liquidity buffer. This additional finding fits again well to our hypothesis on the persistence of norms and values: We may attribute differences in the dynamic adjustment of cash holdings to the lower overconfidence and less overestimation in East German firms leading to a preference towards excess cash reserves.

**Table 6 Speed of adjustment**

Panel A: Full sample

	(1) All	(2) SME	(3) Large
$East \times (Cash^*_{i,t} - Cash_{i,t-1})$	-0.028** (0.011)	-0.029** (0.011)	-0.005 (0.036)
$Cash^*_{i,t} - Cash_{i,t-1}$	0.246*** (0.008)	0.253*** (0.008)	0.157*** (0.022)
$East$	0.005*** (0.001)	0.006*** (0.001)	0.000 (0.002)
$R^2$	0.098	0.101	0.067
$N$	50,810	45,858	4,952

Panel B: Excess cash:  $Cash^*_{i,t} - Cash_{i,t-1} \leq 40^{th}$  Pct.

	(1) All	(2) SME	(3) Large
$East \times (Cash^*_{i,t} - Cash_{i,t-1})$	-0.051** (0.022)	-0.057** (0.023)	0.024 (0.074)
$Cash^*_{i,t} - Cash_{i,t-1}$	0.300*** (0.017)	0.311*** (0.018)	0.177*** (0.046)
$East$	0.002 (0.002)	0.002 (0.003)	0.004 (0.005)
$R^2$	0.074	0.075	0.055
$N$	20,324	18,343	1,980

Panel C: Cash shortage:  $Cash^*_{i,t} - Cash_{i,t-1} \geq 60^{th}$  Pct.

	(1) All	(2) SME	(3) Large
$East \times (Cash^*_{i,t} - Cash_{i,t-1})$	0.008 (0.032)	0.016 (0.034)	0.044 (0.055)
$Cash^*_{i,t} - Cash_{i,t-1}$	0.112*** (0.021)	0.107*** (0.022)	0.014 (0.037)
$East$	0.002 (0.003)	0.002 (0.003)	-0.004 (0.005)
$R^2$	0.004	0.004	-0.000
$N$	20,324	18,344	1,980

Notes: This table reports the differences in speed of adjustment between East German firms and West German firms for the matched sample. The regression model is given by:  $\Delta Cash_{i,t} = \alpha + \beta_1 East \times (Cash^*_{i,t} - Cash_{i,t-1}) + \beta_2 (Cash^*_{i,t} - Cash_{i,t-1}) + \beta_3 East + \epsilon_{i,t}$ .  $Cash^*_{i,t}$  is the predicted cash ratio, when we estimate the baseline model from Equation (1) for West German firms in the matched samples. The first row of each panel indicates the sample used. Panel A reports the speed of adjustment for the full sample. In Panel B and Panel C, we sort the sample according to  $Cash^*_{i,t} - Cash_{i,t-1}$ . If a firm  $i$ 's  $Cash^*_{i,t} - Cash_{i,t-1}$  lies within the bottom two quintiles ( $\leq 40^{th}$  Pct.), we include it in Panel B, the sample of excess cash, and if it lies within the top two quintiles ( $\geq 60^{th}$  Pct.) in Panel C, the sample of cash shortage. \*, \*\* and \*\*\* indicate statistical significance at the 10%, 5% and 1% level, respectively.

## 6 Discussion of alternative explanations and channels

The analysis so far highlights significant differences in cash holdings between East and West German firms that we ascribe to the persistence of norms and values of the former GDR. In this section, we provide several tests to address potential endogeneity concerns or omitted variable biases and discuss alternative explanations for our findings. Note that in this section, we estimate all tests for the full sample as well as for the SME sample.

### 6.1 Firm and industry-specific financial constraints

This section includes alternative motives of cash holdings that are based on firm or industry-specific factors of financing, meaning that the reason to hold more cash may rather be caused by internal and industry-specific, yet unobserved, financial constraints.

We start with firm profitability as a potential driver for differences in cash holdings: Since we observe differences in profitability on the microeconomic level in our data, we test whether this has an impact on cash holdings. Burda and Hunt (2001), for instance, observe an East-West productivity gap, which is constant across various levels of skills. Similarly, Fuchs-Schündeln and Izem (2012) find that labour productivity in East Germany is still significantly lower than in West Germany, which can be attributed to factors caused by individual firms, as well as to factors caused by public policy. Consequently, the higher cash ratio of East German firms could rather be induced by the fact that East German firms are forced to keep more precautionary cash, since they are less profitable and thus, incapable to save an appropriate amount of cash out of cash flows, and not by the persistence of norms and values of the former GDR. We measure profitability by the firm's value added in Mio. € per employee  $\frac{Sales_{i,t-1} - COGS_{i,t-1}}{Employees_{i,t-1}}$ , where *COGS* represents the costs of goods sold. We include both the profitability measure itself as well as the interaction with the *East* dummy to account for different coefficients between East and West German firms. Columns (1)-(2) of Table 7 illustrate the results. Column (1) provides some evidence that higher profitability is related with higher cash holdings suggesting that more profitable firms are better able to generate internal funds. There is, however, no support that differences in profitability between East and West German firms cause the difference in cash holdings.

Second, we ensure that cash holdings are not driven by financial constraints in bank debt or access to external financing sources – being a common motive for precautionary cash holdings. Existing research argues that West German firms have better access to bank debt or at least can borrow money at lower costs (Lehmann et al., 2004). Cash holdings are often used as substitute for non-disposable short-term bank debt and, thus, the observed higher cash holdings in East German firms could simply be the consequence of worse access to short-term bank debt. Therefore, we control for the firm's level of short-term bank debt. More specifically, we add the control variable *Short-term bank debt*<sub>*t-1*</sub> and the interaction term *East* × *Short-term bank debt*<sub>*t-1*</sub> to additionally allow for different coefficients between East and West German firms. Results are shown in Table 7 Columns (3)-(4). While the negative and significant coefficient

in *Short-term bank debt*<sub>*t-1*</sub> indicates that short-term bank debt is in fact a substitute to cash holdings, the insignificant interaction term  $East \times Short\text{-term bank debt}_{t-1}$ , however, implies that there is no difference between East and West German firms. Moreover, the positive effect of *East* remains robust implying that East German firms do not hold significantly more cash than West German firms because of worse or more expensive access to short-term bank debt.<sup>14</sup>

In a similar vein, we analyse another alternative type of liabilities – namely trade credit: The operational motive of trade credit states that firms are squeezed to hold cash when there is no or only little trade credit available (see, e.g., Ferris, 1981; Emery, 1987), which might be costly for firms and leads to lower flexibility. Trade credit helps to reduce uncertainty between trading partners and thus, the requirement of preventive cash holdings becomes obsolete (Ferris, 1981). Consequently, a worse access to trade credit among East German firms could cause them to keep higher levels of cash. To account for this possibility, we use the ratio of accounts payable to costs of goods sold as control variable and additionally interact it with the *East* dummy. Columns (5)-(6) of Table 7 document that access to trade credit acts as a substitute for cash, i.e. higher accounts payable lead to lower cash holdings. However, since there is no significantly different impact for East German firms, we can reject the hypothesis that access to trade credit drives the differences in cash holdings.

Fourth, and to some extent related to the points raised above, we test whether dependence on external finance explains differences in cash holdings. For this purpose, we use industry-level measures of external finance dependence, as they are generally claimed to be more exogenous than an individual firm measure (Duchin et al., 2010; Garcia-Appendini and Montoriol-Garriga, 2013). As Lehmann et al. (2004) state that access to external finance is either worse or more expensive for East German firms, we should observe that firms acting in industries with higher external finance dependence are forced to save more cash in order to not lose valuable investment opportunities. Consequently, the higher (preventive) cash holdings would not be driven by the persistence of norms and values of the former GDR but rather by external finance dependent industries. We follow Rajan and Zingales (1998) and calculate an industry-level measure of external finance dependence *EFD*. More specifically, we calculate  $\frac{CAPEX_{i,t} - Operating\ cash\ flow_{i,t}}{CAPEX_{i,t}}$  for each firm-year observation, where *CAPEX* is capital expenditure. We then take the sample median and the industry (two digit NACE2) median to determine whether a firm belongs to an industry of high external finance dependence (i.e., its industry median lies above the sample median). We would again expect different coefficients between East and West German firms and therefore include, as above, an interaction term (i.e.,  $East \times EFD_j$ ). Columns (7)-(8) of Table 7 indicate that external finance dependence has a negative effect on corporate cash holdings, which is in line with existing literature as external finance dependent firms depend more on external funds and thus save less cash out of cash flow. However, we find no support for the hypothesis that East German firms acting in industries with high external finance dependence preventively save higher amounts of cash

<sup>14</sup> We also use a more exogenous measure of bank debt to account for access to bank financing, i.e. the yearly growth rate of the aggregated granted bank loan volume for each federal state. We find similar results as above, leading to the conclusion that the aggregate growth in federal bank debt is not related to respective (i.e., federal state-specific) firms' cash holdings (results not tabulated). The data on the aggregated bank loan volume is available on <https://www.bundesbank.de/de/statistiken/banken-und-andere-finanzielle-institute/banken> (01/20/2019).

as they are more constrained in bank debt than West German firms. Since the dummy variable *East* is still statistically significant, we conclude that dependence on external finance neither explains the differences in cash holdings between East and West German firms.

**Table 7 Alternative specifications – Firm and industry-specific financial constraints**

	Profitability		Bank debt		Trade credit		EFD	
	(1) All	(2) SME	(3) All	(4) SME	(5) All	(6) SME	(7) All	(8) SME
<i>East</i>	0.018*** (0.002)	0.020*** (0.002)	0.026*** (0.003)	0.028*** (0.003)	0.025*** (0.003)	0.027*** (0.003)	0.016*** (0.003)	0.018*** (0.003)
<i>Profitability<sub>t-1</sub></i>	0.011** (0.005)	0.008 (0.005)						
<i>East</i> × <i>Profitability<sub>t-1</sub></i>	-0.008 (0.013)	-0.003 (0.015)						
<i>Short-term bank debt<sub>t-1</sub></i>			-0.077*** (0.004)	-0.081*** (0.005)				
<i>East</i> × <i>Short-term bank debt<sub>t-1</sub></i>			-0.011 (0.007)	-0.012 (0.008)				
<i>Accounts payable<sub>t-1</sub></i>					-0.159*** (0.010)	-0.171*** (0.011)		
<i>East</i> × <i>Accounts payable<sub>t-1</sub></i>					-0.023 (0.017)	-0.016 (0.018)		
<i>EFD<sub>j</sub></i>							-0.010*** (0.002)	-0.008*** (0.003)
<i>East</i> × <i>EFD<sub>j</sub></i>							0.004 (0.004)	0.004 (0.005)
<i>Covariates</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Industry FE</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Year FE</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>R</i> <sup>2</sup>	0.260	0.277	0.159	0.163	0.182	0.194	0.257	0.273
<i>N</i>	96,555	77,052	60,904	50,282	94,824	75,298	94,599	75,637

Notes: This table reports random effects panel regression results with robust standard errors clustered at the firm level in parentheses. The baseline regression model is given by:  $Cash_{i,t} = \alpha + \beta East_i + \gamma X_{i,t} + D_t + D_j + \epsilon_{i,t}$ . The first row indicates the additional variable used. The second row indicates the sample used. In Columns (1)-(2), we interact the *East* dummy with *Profitability<sub>t-1</sub>*, which is measured by  $\frac{Sales_{i,t-1} - COGS_{i,t-1}}{Employees_{i,t-1}}$ , where *COGS* is costs of goods sold. In Columns (3)-(4), we interact the *East* dummy with short-term bank debt. In Columns (5)-(6), we interact the *East* dummy with accounts payable over costs of goods sold. In Columns (7)-(8), we interact the *East* dummy with *EFD<sub>j</sub>*, which is a dummy variable that is one if a firm acts in an industry (two digit NACE2) with high dependence on external finance as explained in Section 6. Covariates are the same as those mentioned in Section 3.2, in Columns (3)-(6) we exclude the debt ratio. All specifications include year and industry fixed effects. We refer to Table A1 in the Appendix for details on the respective variables. Subscript *t-1* means that the variable is lagged one period. \*, \*\* and \*\*\* indicate statistical significance at the 10%, 5% and 1% level, respectively.

## 6.2 Institutional and other external factors

In this section, we move from internal financing factors as potential confounders to external and institutional factors as alternative explanations and start with controlling for regional differences in taxes: While corporate taxes equally affect all firms in Germany, local business taxes (i.e., Gewerbesteuer) vary on the municipal level and can be adjusted frequently. A recent paper by Hanlon et al. (2017) shows that higher tax uncertainty leads to higher corporate cash holdings, i.e. the variation in cash holdings across firms is triggered by differences in tax uncertainty. With respect to our study, it could be the case that firms perceive it as a kind of uncertainty if municipalities change their local business taxes frequently – resulting in higher cash holdings. For this purpose, we calculate for all German municipalities the standard deviation of their local business tax between 2004 and 2016 as a proxy for local business tax uncertainty. Since this (ex post) measure is based on data between 2004 and 2016, we can only estimate a cross-sectional version of Equation (1) for the year 2016.<sup>15</sup> We include the proxy for tax uncertainty (*Tax uncertainty*) to examine whether cash holdings are driven by tax uncertainty. Columns (1)-(2) of Table 8 show that local tax uncertainty is unrelated to corporate cash holdings and that the difference in cash holdings between East and West German firms remains statistically significant.

<sup>15</sup> We obtain data on German local business taxes from the Federal Statistical Office of Germany. Data is available on [https://www.destatis.de/GPStatistik/receive/NWSerie\\_serie\\_00000585](https://www.destatis.de/GPStatistik/receive/NWSerie_serie_00000585) (01/15/2019).

Second, we analyse whether the level of regional bank concentration has an impact on corporate cash holdings. Agarwal and Hauswald (2010), for instance, argue that the distance between a lender and a bank is negatively related to the loan rate due to asymmetric information.<sup>16</sup> Put differently, the closer a bank is located to a firm, the less relevant is asymmetric information and *ceteris paribus* the lower will be the demanded interest rate. Thus, it could be the case that regional bank concentration as an institutional factor might affect the financing structure of a firm and consequently its cash holdings as well (see the discussion above on access to bank debt). We proxy yearly federal bank concentration by dividing the number of all branches of German savings banks and credit unions (i.e., Sparkassen- und Genossenschaftsbanken) by the federal state area (in square kilometre).<sup>17</sup> While there exist substantial differences in (our proxy for) bank concentration across German federal states and over time, Columns (3)-(4) of Table 8 suggest that bank concentration is unrelated to corporate cash holdings.

Likewise, we want to examine whether urbanisation as a general regional-specific factor drives our results. Arena and Dewally (2012), among others, find that rural firms face higher interest expense on their outstanding debt and allure smaller and less prestigious bank syndicates compared to urban firms that are located closer to banks facilitating their borrowing due to lower information asymmetries. Therefore, rural firms might keep more cash to substitute costly bank debt leading to the same conclusion as before with banking concentration. However, an opposing argument could be that rural firms hold significantly less cash than urban firms since Clark et al. (2009), for instance, show that rural firms are keeping less cash than urban firms. Though, the marginal value of cash is higher for the former ones, they are constrained in the amount of cash they can raise. Rural firms do not have unrestricted access to external capital markets and thus highly depend on their own operating cash flow. To examine whether our results are driven by a firm's location, we control for the type of town or municipality a firm is headquartered in by including a dummy variable which is one if the firm's domicile is based at least in a medium-sized town or larger and zero otherwise.<sup>18</sup> As shown in Columns (5)-(6) of Table 8, the dummy variable *Urban area* is positively statistically significant, i.e. urban firms have significantly higher cash levels. Nonetheless, it does not change our main finding that corporate cash holdings are higher in East Germany.

Finally, Fritsch and Wyrwich (2014) highlight the impact of German historical roots on entrepreneurship. Historical entrepreneurial roots consider Germany's entrepreneurial spirit during the 1920s as they display the distribution of self-employed persons in non-agricultural sectors across German regions in 1925. Fritsch and Wyrwich (2014) show that the correlation between the self-employment rate in 1925 and self-employment as well as start-up rates for the 1984-2005 period is highly significantly positive implying a long-term persistency of these roots. Thus, there exists the possibility that differences in cash holdings could rather be caused by the still existing historical roots of German entrepreneurship than by persistence

<sup>16</sup> See Degryse and Ongena (2005) for an overview of alternative models on lender distance and loan rates.

<sup>17</sup> The current number of bank branches is provided by the Deutsche Bundesbank and available on (<https://www.bundesbank.de/en/statistics/banks-and-other-financial-institutions/banks/publications>) (12/20/2018). The authors greatly acknowledge support of the Deutsche Bundesbank for providing historical data on the number of bank branches.

<sup>18</sup> The data on the type of a town or municipality is available on [https://www.bbsr.bund.de/BBSR/DE/Raumb Beobachtung/Downloads/downloads\\_node.html](https://www.bbsr.bund.de/BBSR/DE/Raumb Beobachtung/Downloads/downloads_node.html) (08/31/2017).

of norms and values of former GDR. To test this alternative explanation, we use – similarly as Fritsch and Wyrwich (2014) – the distribution of self-employed persons in non-agricultural sectors across German regions in 1925 and create a dummy variable that equals one if self-employment was above a specific level and zero otherwise.<sup>19</sup> We extend our baseline regression in Equation (1) by this dummy (i.e., *Hist. roots*) and Columns (7)-(8) of Table 8 show that the dummy *East* remains statistically significant after controlling for historical entrepreneurial roots. Additionally, the insignificant coefficient of *Hist. roots* indicates that corporate cash holdings are not related to these historical roots on entrepreneurship.<sup>20</sup>

Since all these additional tests – focusing on both internal financing constraints as well as external factors – suggest that the higher cash level of East German firms is unrelated to alternative factors, we may argue in favor of the persistence of values and norms of the bygone political system as relevant factor that drives the differences.

**Table 8 Alternative specifications – Institutional and other external factors**

	Tax uncertainty		Bank concentration		Urban		Hist. roots	
	(1) All	(2) SME	(3) All	(4) SME	(5) All	(6) SME	(7) All	(8) SME
<i>East</i>	0.011*** (0.004)	0.013*** (0.004)	0.018*** (0.002)	0.021*** (0.002)	0.018*** (0.002)	0.020*** (0.002)	0.018*** (0.002)	0.020*** (0.002)
<i>Tax uncertainty<sub>it</sub></i>	0.011 (0.017)	0.015 (0.019)						
<i>Bank concentration<sub>it</sub></i>			0.001 (0.002)	0.002 (0.002)				
<i>Urban area<sub>it</sub></i>					0.004** (0.002)	0.004** (0.002)		
<i>Hist. roots<sub>r</sub></i>							0.001 (0.002)	0.002 (0.002)
<i>Covariates</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Industry FE</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Year FE</i>	No	No	Yes	Yes	Yes	Yes	Yes	Yes
<i>R<sup>2</sup></i>	0.301	0.310	0.254	0.270	0.259	0.274	0.259	0.274
<i>N</i>	5,332	4,340	78,082	63,073	99,455	79,327	98,695	78,578

Notes: This table reports OLS and random effects panel regression results with robust standard errors clustered at the firm level in parentheses. The baseline regression model is given by:  $Cash_{i,t} = \alpha + \beta East_i + \gamma X_{i,t} + D_t + D_j + \epsilon_{i,t}$ . The first row indicates the additional variable used. The second row indicates the sample used. In Columns (1)-(2), we interact the *East* dummy with tax uncertainty, which is measured by the standard deviation of the municipal rate fixed by the municipality over the time period from 2004 to 2016. We use the year 2016 and OLS to measure the effect. In Columns (3)-(4), we control for bank concentration in the various federal states, i.e. *Bank concentration<sub>it</sub>* is calculated by the number of banks in the federal state *f* in year *t* divided by the surface area of the federal state *f* per square kilometre. In Columns (5)-(6), we control for the fact, whether a firm is located in an urban area. In Columns (7)-(8), we control for historical roots in a German region *r*. All specifications include year (except Columns (1)-(2)) and industry fixed effects and covariates are the same as those mentioned in Section 3.2. We refer to Table A1 in the Appendix for details on the respective variables. Subscript *t-1* means that the variable is lagged one period. \*, \*\* and \*\*\* indicate statistical significance at the 10%, 5% and 1% level, respectively.

## 7 Robustness

This section comprises alternative (estimation) specifications to emphasise the robustness of our results. We start by controlling whether the recent financial crisis is an economic driver behind our findings. A potential confounding effect might arise by a different impact of the financial crisis on firms located in either East or West Germany. If, due to any latent causes like e.g. liquidity shortfalls or distress of banks, firms were more restrained in attaining loans throughout the crisis, then cash holdings would just be higher as they might serve as substitute for the absent institutional credit during the credit crunch (see, e.g. Bedendo et al., 2018). Consequently, our results might capture distortions during the financial crisis rather than differences

<sup>19</sup> More specifically, we use Figure 6 in Fritsch and Wyrwich (2014) and create a dummy variable that is one if the share of self-employed persons was higher than 9,810 in a German region in 1925 and zero otherwise.

<sup>20</sup> For completeness, we also controlled for a potential interaction between the *East* dummy and *Bank concentration* as well as the *Urban area* and the *Hist. roots* dummy, respectively. Qualitatively, our results remain the same.

due to the persistence of socialistic norms and values: If East German firms are more financially constrained and thus forced to stockpile more cash and to use it as alternative funding source, we would likewise observe a difference in cash holdings. To test whether this is the case, we re-estimate our baseline specification of Equation (1) as follows: We include a dummy variable *Crisis*, which takes the value of one for the crisis years from 2008 to 2012 and zero otherwise as well as an interaction term  $East \times Crisis$ . The interaction term allows us to disentangle differences in cash holdings of firms located in East Germany compared to firms located in West Germany during the crisis. We present the results in Columns (1)-(4) of Table 9. In Columns (1) and (2) we apply a random effects model and include year and industry fixed effect. In Columns (3) and (4) we further control for firm fixed effects to account for time invariant unobserved heterogeneity. As our *East* dummy is time invariant it diminishes when using firm fixed effects. It becomes apparent that the financial crisis has no impact on our *East* dummy. East German firms hold more cash independent of the financial crisis, suggesting that the supply shock of the recent financial crisis did not cause our results. Besides, we find that firms hold significantly more cash during the financial crisis, suggesting cash holdings to be a substitute for non-disposable bank debt during the crisis.

While the matching approach in Section 4.2 aims to minimise differences in firm characteristics including, among other, firm age, we may explicitly focus on firms that have been founded after 1990. Since Fritsch et al. (2014), for instance, highlight the existence of anti-entrepreneurship strategies of the former GDR and the resulting low rates of self-employment, it could be the case that East German firms founded before Germany's reunification might be different to firms founded after 1990. Furthermore, most of the East German firms were founded after 1990 and thus tend to be much smaller in size than the average firm in West Germany. Thus, to exclude the possibility of an adverse selection, we re-estimate our baseline regression and include only firms that have been founded after 1990. Columns (5)-(6) of Table 9 show that the *East* dummy does not change when using this subsample.

From an econometrical perspective, one could raise the argument that statistical significance in the baseline model is mainly driven by our large sample size. Further, as we have a fairly long time period of 13 years our estimates may be subject to serial correlation (Bertrand et al., 2004). Due to the fact that our variable of interest – the *East* dummy – does not vary over time, the standard error for  $\hat{\beta}$  in Equation (1) could underestimate the standard deviation of  $\hat{\beta}$ . To assure that our results are not caused by serial correlation, we subsample our dataset and only use the last available year of each firm and re-estimate Equation (1). Results are tabulated in Columns (7)-(8) of Table 9 and show that the coefficients and standard errors are quite similar to our baseline results in Table 3. Thus, we conclude that our results are not driven by serial correlation or sample size.

Lastly, we replace our dependent variable with alternative definitions of cash holdings by using the natural logarithm of company's cash holdings to total assets and the natural logarithm of cash holdings to net total assets to account for extreme outliers (see, e.g., Opler et al., 1999, Foley et al., 2007 or Bates et al., 2009). Using these alternative specifications yields results very similar to those presented in Table 3 and we consequently conclude that using the simple cash to assets ratio is appropriate (results not tabulated).

**Table 9 Robustness tests**

	Crisis RE		Crisis FE		Founded after 1990		Latest available year	
	(1) All	(2) SME	(3) All	(4) SME	(5) All	(6) SME	(7) All	(8) SME
<i>East</i>	0.017*** (0.002)	0.019*** (0.002)			0.018*** (0.003)	0.020*** (0.003)	0.014*** (0.003)	0.017*** (0.003)
<i>Crisis</i>	0.008*** (0.003)	0.009*** (0.003)	0.019*** (0.003)	0.023*** (0.004)				
<i>East × Crisis</i>	0.001 (0.001)	0.001 (0.002)	0.000 (0.001)	0.000 (0.002)				
<i>Covariates</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Industry FE</i>	Yes	Yes	No	No	Yes	Yes	Yes	Yes
<i>Firm FE</i>	No	No	Yes	Yes	No	No	No	No
<i>Year FE</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>R<sup>2</sup></i>	0.259	0.274	0.183	0.187	0.270	0.284	0.299	0.307
<i>N</i>	99,464	79,336	99,464	79,336	59,796	50,000	14,823	12,301

Notes: This table reports OLS, random effects and fixed effects panel regression results with robust standard errors clustered at the firm level in parentheses. The baseline regression model is given by:  $Cash_{i,t} = \alpha + \beta East_{i,t} + \gamma X_{i,t} + D_t + D_j + \epsilon_{i,t}$ . The first row indicates the interaction term or time variable used. The second row indicates the sample used. In Columns (1)-(2), we interact the *East* dummy with the *Crisis* dummy, which is one for the years from 2008 to 2012. In Columns (3)-(4), we interact the *East* dummy with the *Crisis* dummy and include firm fixed effects. In Columns (5)-(6), we only include firms that were founded after 1990. In Columns (7)-(8), we report OLS estimates using the latest available year. All specifications include year and industry fixed effects (except Columns (3)-(4)) and covariates are the same as those mentioned in Section 3.2. We refer to Table A1 in the Appendix for details on the respective variables. Subscript *t-1* means that the variable is lagged one period. \*, \*\* and \*\*\* indicate statistical significance at the 10%, 5% and 1% level, respectively.

## 8 Conclusion

We revisit the persistence of socialistic norms and values of the former GDR in the light of corporate policy. Germany's history as a quasi-natural experiment allows analysing the impact of informal institutions' persistence. Norms and values of former GDR differed considerable to West Germany's informal institutions, and we argue that the persistence of norms and values might has an impact on corporate cash holdings. East Germany was shaped by a socialistic political system and West Germany, on the other hand, was characterised by a capitalistic culture during Germany's separation. We use the notion of individualism and collectivism as one obvious aspect of differentiation between both political systems to motivate our hypothesis: Existing literature relates individualism with overoptimism and overconfidence and, as a consequence, managers in more individualistic cultures should tend to overestimate firm performance and to set the level of cash holdings too low. Collectivism, on the other hand, is typically related to less overoptimism and less overconfidence and managers are expected to be less prone to overestimate firm performance and they accordingly should rather tend to hold a higher levels of cash. We presume the precautionary motive to hold cash as the underlying mechanism behind the relation between the effect of persistence of norms and values and the differences in corporate cash holdings.

In the empirical analysis we show that the level of cash holdings is significantly different between East and West German firms. More specifically, we find a difference in the cash ratio of more than 10%, i.e. East German firms hold 10% more assets in cash than their West German counterparts do. In this context, we contribute to existing literature (i) on differences between East and West Germany due to East Germany's socialist legacy and (ii) on exogenous factors that determine both the level and the dynamics of corporate cash holdings. Regarding our first contribution, we explicitly study firm's decision (i.e., setting the level of cash) and show that socialist legacy not only influences self-employment activity (e.g., Runst, 2013 or Fritsch et al., 2014), solidarity, values and trust (e.g., Brosig-Koch et al., 2011, Necker and Voskort, 2014 or Rainer and Siedler, 2009) or household consumption and savings (e.g., Bursztyn and Cantoni, 2016 or Fuchs-Schündeln, 2008) but also managers' decision-making process. For the second contribution, our study dissociates from existing literature since we examine cash holdings with respect to persistence of norms



and values of a bygone political system rather than current informal institutions. In the same vein, our unique and comprehensive sample includes a large share of SMEs which are in this context, to the best of our knowledge, much less studied than large-sized, listed firms. We further examine firms' behaviour if they hold cash below (i.e., cash shortage) or above (i.e., excess cash) their target level. In line with our hypothesis, we document that East German SMEs reduce excess cash more slowly than their West German counterparts do but do not differ from West German firms in the case of cash shortage.

The persistence of informal institutions is not a novel finding per se (see, e.g., Wyrwich, 2015 or Necker and Voskort, 2014); our study, however, suggests that socialistic norms and values of the former GDR is still affecting corporate policy. The effects of persistence are increasingly analysed in academia and there exists a differentiation between long-term persistence and persistence over shorter periods: Long-run persistence comprises, for instance, historical entrepreneurial roots (i.e., Fritsch and Wyrwich, 2014) or self-government of cities (i.e., Guiso et al., 2016). Contrary to these (very) long-run effects, Giuliano (2007) or Fisman and Miguel (2007), for instance, study cultural persistence over the short-run. Studies that use Germany's history as research object focus, to our opinion, on 'mid-term' persistence since the socialistic leadership took about forty years and lies in between short and long-term effects. Comparing the impact of long-, mid- and short-run effects and analysing their economic relevance is an important issue for future research. For instance, historical entrepreneurial roots (representing long-term persistence) do not have an impact on cash holdings in our study (see Table 8 Columns (11)-(12)).

While we avoid potential biases due to migration (from East to West and vice versa) or due to international boards in our sample by focusing on SMEs, a potential avenue for future research might comprise manager-specific analyses: While existing studies use managers' names as an indicator for their cultural background (e.g., Bedendo et al., 2018), this procedure is, however, not possible for our research environment as we do not have manager-specific data. Alternatively, lab experiments or surveys could, on the one hand, represent a possibility to in-depth study the persistence of norms and values.<sup>21</sup> On the other hand, however, it is difficult to extract actual decision making (i.e., setting the level of corporate cash) within a lab or survey setting. Ideally, linking firms' balance sheet data with qualitative, manager-specific data would provide further insights but is left for future research.

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<sup>21</sup> In the context of lab experiments, it would also be possible to account for differences in financial literacy as, e.g., Bucher-Koenen and Lusardi (2011) or Bucher-Koenen and Lamla (2014) highlight a still existing gap of financial literacy between East and West Germany. Since Stix (2013) documents that financially literate respondents have a lower preference for cash (in line with the transaction cost theory of cash), differences in financial literacy of firm managers might cause differences in cash holdings. To exclude this possibility (and as we do not have manager-specific financial literacy data), we draw on the German SAVE study to account for financial education. The German SAVE study is a representative household survey on financial behaviour and includes questions on financial literacy in SAVE 2007, 2008, and 2009 (for details on the study design, see Börsch-Supan et al., 2009). We follow Bucher-Koenen and Lusardi (2011) regarding the preparation of the panel and the usage of the questions on financial literacy. For our purpose, we compare self-employed persons (i.e., freelancers, self-employed persons, and collaborating family members of self-employed persons) living in East Germany with the ones living in West Germany. In all three studies, we do not find any significant differences in financial literacy between self-employed East and West Germans. We therefore conclude that differences in financial literacy among managers are negligible and do not have an effect on firms' cash holdings.

## Appendix

Table A1 Variable definition

Variable	Formula	Description
<b>Dependent variables</b>		
$Cash_{i,t}$	$\frac{Cash_{i,t}}{Total\ assets_{i,t}}$	Cash to total assets
$\Delta Cash_{i,t}$	$Cash_{i,t} - Cash_{i,t-1}$	Change in cash holdings (used in Section 5)
<b>Main variable of interest</b>		
$East_i$		Dummy that is 1 if the firm is located in East Germany and 0 otherwise
<b>Size dummy variables (being 1 for small firms and 0 otherwise) / categorical variables</b>		
$SME_i$		Dummy that measures a firm's size according to §267 of the German Commercial Code (small and medium-sized enterprises)
$TA_{i,t}$		Dummy that measures a firm's size according to total assets
$Employees_{i,t}$		Dummy that measures a firm's size according to the number of employees
$Size_i$		Categorical variable that measures a firm's size according to §267 of the German Commercial Code (micro, small, medium and large-sized enterprises)
<b>Speed of adjustment</b>		
$Cash^*_{i,t}$		Predicted cash ratio
$Speed\ of\ adjustment_{i,t}$	$Cash^*_{i,t} - Cash_{i,t-1}$	Speed of adjustment to target cash
<b>Alternative specifications</b>		
<b>Firm- and industry-specific financial constraint measures</b>		
$Profitability_{i,t-1}$	$\frac{Sales_{i,t-1} - COGS_{i,t-1}}{Employees_{i,t-1}}$	Sales net costs of goods sold in Mio. € per employee
$Trade\ credit_{i,t-1}$	$\frac{Accounts\ payable_{i,t-1}}{COGS_{i,t-1}}$	Accounts payable to costs of goods sold
$EFD_j$		Dummy that is 1 if the firm acts in an industry $j$ with high external finance dependence and 0 otherwise
<b>Institutional and other external factors</b>		
$Tax\ uncertainty_k$		Standard deviation of the municipal tax rate for municipality $k$ for the years 2004 to 2016
$Bank\ concentration_{f,t}$	$\frac{Number\ of\ banks_{f,t}}{Surface\ area_f}$	Aggregate number of bank branches in federal state $f$ to its surface area in km <sup>2</sup>
$Urban_k$		Dummy that is 1 if the firm is located in a municipality that is at least a medium-sized town and 0 otherwise
$Hist.\ roots_r$		Dummy that is 1 if the firm is headquartered in a German region $r$ with high historical self-employment rates and 0 otherwise (see Fritsch and Wyrwich, 2014)
<b>Robustness</b>		
$Crisis$		Dummy that is 1 during the crisis years 2008 to 2012 and 0 otherwise
<b>Control variables/covariates</b>		
$Operating\ cash\ flow_{i,t-1}$	$\frac{Operating\ cash\ flow_{i,t-1}}{Total\ assets_{i,t-1}}$	Operating cash flow to total assets
$Inventory_{i,t-1}$	$\frac{Inventory_{i,t-1}}{Total\ assets_{i,t-1}}$	Inventory to total assets
$Net\ working\ capital_{i,t-1}$	$\frac{(Working\ capital - Cash)_{i,t-1}}{Total\ assets_{i,t-1}}$	Working capital net cash to total assets
$Sales\ growth_{i,t-1}$	$\frac{Sales_{i,t-1} - Sales_{i,t-2}}{Sales_{i,t-2}}$	Sales growth
$Tangible\ assets_{i,t-1}$	$\frac{Tangible\ assets_{i,t-1}}{Total\ assets_{i,t-1}}$	Fixed assets to total assets labeled as tangible assets
$Debt_{i,t-1}$	$\frac{Debt_{i,t-1}}{Total\ assets_{i,t-1}}$	Total liabilities to total assets
$Short-term\ bank\ debt_{i,t-1}$	$\frac{Short-term\ bank\ debt_{i,t-1}}{Total\ assets_{i,t-1}}$	Short-term bank debt to total assets
$Total\ assets_{i,t-1}$	$\log(Total\ assets_{i,t-1})$	Natural logarithm of total assets
$Age_{i,t}$	$\log(Age_{i,t})$	Natural logarithm of age
$GDP\ growth_{f,t-1}$	$\frac{GDP_{f,t-1} - GDP_{f,t-2}}{GDP_{f,t-2}}$	Aggregate GDP growth at the federal state level

Notes: This table summarises variable definitions and outlines the respective description.

**Table A2 Firm size definition**

Size	Employees	Total assets (in €)	Total sales (in €)
<i>Micro</i>	x≤10	x≤350,000	x≤700,000
<i>Small</i>	10<x≤50	350,000<x≤484,000	700,000<x≤968,000
<i>Medium</i>	50<x≤250	484,000<x≤19.25 Mio.	968,000<x≤38.5 Mio.
<i>Large</i>	>250	>19.25 Mio.	>38.5 Mio.

Notes: This table outlines the specification of firm size categories: micro, small, medium and large-sized firms. At least two of the respective criteria have to be fulfilled to be assigned to one of the categories. Regarding the classification of *SME*, a firm is classified as *SME* if it either belongs to the micro, small, or medium-sized category.

**Table A3 Cash holdings – Federal states**

	Full sample		Matched sample	
	(1) All	(2) SME	(3) All	(4) SME
<i>Brandenburg</i>	0.019*** (0.005)	0.021*** (0.006)	0.019*** (0.006)	0.021*** (0.007)
<i>Mecklenburg-Vorpommern</i>	0.022*** (0.007)	0.021*** (0.007)	0.021*** (0.007)	0.021*** (0.008)
<i>Sachsen</i>	0.024*** (0.004)	0.024*** (0.004)	0.023*** (0.005)	0.023*** (0.006)
<i>Sachsen-Anhalt</i>	0.013*** (0.005)	0.012** (0.005)	0.013** (0.006)	0.012* (0.006)
<i>Thüringen</i>	0.011** (0.005)	0.011** (0.005)	0.011* (0.006)	0.011* (0.006)
<i>Bayern</i>	0.007* (0.004)	0.005 (0.004)	0.005 (0.006)	0.002 (0.006)
<i>Bremen</i>	0.014 (0.014)	0.023 (0.020)	0.008 (0.025)	0.019 (0.031)
<i>Hamburg</i>	0.003 (0.008)	0.003 (0.009)	0.006 (0.014)	0.004 (0.014)
<i>Hessen</i>	0.002 (0.004)	-0.000 (0.005)	-0.001 (0.007)	0.000 (0.008)
<i>Niedersachsen</i>	-0.006 (0.004)	-0.010** (0.005)	-0.003 (0.006)	-0.005 (0.006)
<i>Nordrhein-Westfalen</i>	0.005 (0.003)	0.002 (0.004)	0.003 (0.005)	0.001 (0.006)
<i>Rheinland-Pfalz</i>	-0.005 (0.005)	-0.007 (0.006)	-0.012 (0.008)	-0.012 (0.008)
<i>Saarland</i>	0.010 (0.008)	0.002 (0.008)	-0.004 (0.010)	-0.003 (0.011)
<i>Schleswig-Holstein</i>	-0.005 (0.006)	-0.005 (0.007)	0.000 (0.009)	-0.001 (0.009)
<i>Covariates</i>	Yes	Yes	Yes	Yes
<i>Industry FE</i>	Yes	Yes	Yes	Yes
<i>Year FE</i>	Yes	Yes	Yes	Yes
<i>R<sup>2</sup></i>	0.259	0.274	0.283	0.289
<i>N</i>	99,464	79,336	51,159	46,140

Notes: This table reports random effects panel regression results with robust standard errors clustered at the firm level in parentheses. The regression model is given by:  $Cash_{i,t} = \alpha + \beta Federal\ state_j + \gamma X_{i,t} + D_t + D_j + \epsilon_{i,t}$ , while the reference state is Baden-Württemberg. East German federal states are: Brandenburg, Mecklenburg-Vorpommern, Sachsen, Sachsen-Anhalt and Thüringen. In Columns (1)-(2), we use the full sample and SMEs only. For completeness, in Columns (4)-(5), we use a matched sample as outlined in 5. Covariates are the same as those mentioned in Section 3.2. To account for potential differences in economic growth among the various federal states we add further macroeconomic variables like the lagged growth rate of gross capital investment, the lagged growth rate of household savings and the lagged growth rate of employment. All specifications include year and industry fixed effects. \*, \*\* and \*\*\* indicate statistical significance at the 10%, 5% and 1% level, respectively.

Table A4 Cash holdings in East and West Germany - Interaction effects

	(1) All	(2) SME	(3) Large
<i>East</i>	0.084*** (0.022)	0.081*** (0.026)	0.123 (0.141)
<i>East</i> × <i>Operating cash flow</i> <sub><i>t-1</i></sub>	0.020* (0.010)	0.014 (0.011)	0.005 (0.032)
<i>East</i> × <i>Inventory</i> <sub><i>t-1</i></sub>	-0.000 (0.009)	-0.002 (0.009)	0.015 (0.027)
<i>East</i> × <i>Working capital-Cash</i> <sub><i>t-1</i></sub>	0.008 (0.006)	0.002 (0.007)	0.045** (0.019)
<i>East</i> × <i>Sales growth</i> <sub><i>t-1</i></sub>	0.003 (0.003)	0.003 (0.003)	0.009 (0.008)
<i>East</i> × <i>Tangible assets</i> <sub><i>t-1</i></sub>	-0.008 (0.009)	-0.012 (0.010)	0.020 (0.030)
<i>East</i> × <i>Debt</i> <sub><i>t-1</i></sub>	0.008 (0.008)	0.013 (0.009)	0.031 (0.021)
<i>East</i> × <i>Total assets</i> <sub><i>t-1</i></sub>	-0.005*** (0.001)	-0.005*** (0.002)	-0.007 (0.008)
<i>East</i> × <i>Age</i> <sub><i>t</i></sub>	0.003 (0.003)	0.004 (0.003)	-0.011* (0.006)
<i>East</i> × <i>GDP growth</i> <sub><i>t-1</i></sub>	0.039* (0.022)	0.031 (0.024)	0.032 (0.046)
<i>Operating cash flow</i> <sub><i>t-1</i></sub>	0.085*** (0.005)	0.095*** (0.006)	0.043*** (0.010)
<i>Inventory</i> <sub><i>t-1</i></sub>	-0.059*** (0.005)	-0.057*** (0.005)	-0.068*** (0.012)
<i>Net working capital</i> <sub><i>t-1</i></sub>	-0.074*** (0.003)	-0.072*** (0.004)	-0.079*** (0.009)
<i>Sales growth</i> <sub><i>t-1</i></sub>	-0.003* (0.001)	-0.003* (0.002)	-0.001 (0.003)
<i>Tangible assets</i> <sub><i>t-1</i></sub>	-0.173*** (0.005)	-0.175*** (0.006)	-0.160*** (0.012)
<i>Debt</i> <sub><i>t-1</i></sub>	-0.126*** (0.005)	-0.138*** (0.005)	-0.082*** (0.010)
<i>Total assets</i> <sub><i>t-1</i></sub>	-0.008*** (0.001)	-0.007*** (0.001)	-0.005* (0.003)
<i>Age</i> <sub><i>t</i></sub>	0.003** (0.001)	0.004** (0.002)	-0.000 (0.003)
<i>GDP growth</i> <sub><i>t-1</i></sub>	-0.047** (0.024)	-0.048* (0.029)	-0.024 (0.041)
<i>Industry FE</i>	Yes	Yes	Yes
<i>Year FE</i>	Yes	Yes	Yes
<i>R</i> <sup>2</sup>	0.260	0.274	0.178
<i>N</i>	99,464	79,336	20,128

Notes: This table reports random effects panel regression results with robust standard errors clustered at the firm level in parentheses. The regression model is given by:  $\frac{Cash_{i,t}}{TA_{i,t}} = \alpha + \beta_1 East_i + \beta_2 (East_i \times X_{i,t}) + \gamma X_{i,t} + D_t + D_j + \epsilon_{i,t}$ . The first row indicates the sample used. All specifications include year and industry fixed effects. We refer to Table A1 in the Appendix for details on the respective variables. Subscript *t-1* means that the variable is lagged one period. \*, \*\* and \*\*\* indicate statistical significance at the 10%, 5% and 1% level, respectively.

Table A5 Matched sample – Summary statistics

	East			West			Test for equality in means		
	Mean	Median	N	Mean	Median	N	$\Delta$	<i>t</i> -stat	Norm. diff.
<i>Cash</i> <sub><i>t</i></sub>	0.126	0.070	25,771	0.110	0.050	25,388	0.017***	13.246	0.083
<i>Operating cash flow</i> <sub><i>t-1</i></sub>	0.113	0.101	25,771	0.118	0.104	25,388	-0.005***	-5.264	-0.033
<i>Inventory</i> <sub><i>t-1</i></sub>	0.211	0.167	25,771	0.222	0.181	25,388	-0.011***	-6.562	-0.041
<i>Net working capital</i> <sub><i>t-1</i></sub>	-0.022	-0.012	25,771	-0.020	-0.012	25,388	-0.003	-1.198	-0.007
<i>Sales growth</i> <sub><i>t-1</i></sub>	0.080	0.038	25,771	0.079	0.041	25,388	0.001	0.608	0.004
<i>Tangible assets</i> <sub><i>t-1</i></sub>	0.317	0.275	25,771	0.304	0.246	25,388	0.013***	6.377	0.040
<i>Debt</i> <sub><i>t-1</i></sub>	0.656	0.693	25,771	0.682	0.721	25,388	-0.026***	-12.411	-0.078
<i>Short-term bank debt</i> <sub><i>t-1</i></sub>	0.133	0.084	17,835	0.144	0.095	16,551	-0.011***	-7.344	-0.056
<i>Total assets</i> <sub><i>t-1</i></sub> (in Mio. €)	8.998	2.444	25,771	9.909	2.304	25,388	-0.911***	-5.165	-0.032
<i>Age</i> <sub><i>t</i></sub> (in years)	16.131	16.000	25,771	15.362	13.000	25,388	0.768***	10.267	0.064

Notes: This table reports summary statistics for the matched sample. We refer to Table A1 in the Appendix for details on the respective variables. Subscript *t-1* means that the variable is lagged one period. \*, \*\* and \*\*\* indicate statistical significance at the 10%, 5% and 1% level, respectively.

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