# Employment protection and investment opportunities

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# Abstract

We examine the impact of employment protection legislation (EPL) on individual firms' growth opportunities, as measured by Tobin's q. On the one hand, by increasing job security, EPL spurs innovation effort. Yet that boost only occurs in firms with little comparative advantage at original innovation. On the other hand, EPL induces conservatism by preventing firms from adjusting their labor force when the economic environment changes. This conservatism effect reduces growth opportunities. Both effects help explain the observed heterogeneity in the effects of EPL across industries and countries.



**Keywords:** Employment protection, innovation, investment opportunities, financial flexibility, operating flexibility

**JEL Classification:** G30, L20



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# Employment protection and investment opportunities

by

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We examine the impact of employment protection legislation (EPL) on individual firms' growth opportunities, as measured by Tobin's *q*. On the one hand, by increasing job security, EPL spurs innovation effort. Yet that boost only occurs in firms with little comparative advantage at original innovation. The impact on *q* is therefore negligible. On the other hand, EPL increases restructuring costs and thereby reduces the firms' operating and financial flexibility. EPL-induced loss of flexibility has a strong negative effect on *q*. The evidence shows that scaling down EPL has stimulated growth opportunities internationally.

Keywords: Employment protection, innovation, investment opportunities, financial flexibility, operating flexibility

JEL codes: G30, L20

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## 1. Introduction

The main purpose of employment protection legislation (EPL) is to limit the firms' ability to hire and fire employees. EPL, however, has also important side effects. A vast literature has examined a number of these side effects at the macro level, including the number of jobs in the economy, size of the labor force, unemployment, wages, investment, and economic growth.[1] At the micro level, as explained below, researchers have looked at capital structure, capital expenditures, growth, innovation, start-up activity, and takeovers. We are interested in the net impact of EPL on growth opportunities at the micro level, as measured by Tobin's *q* ratios. That effect is a priori unclear.

On the one hand, recent studies argue and document that EPL limits employers' ability to hold up employees and therefore fosters corporate innovation efforts (Acharya, Baghai, and Subramanian (2013); Acharya, Baghai, and Subramanian (2014); Griffith and Macartney (2014); Gao and Zhang (2016)). The prediction is therefore that, by spurring on innovation efforts, EPL expands the firms' investment opportunity set and thereby boosts Tobin's *q* (see, among many others, Lev and Sougiannis (1996); Hall (1999)). A similar prediction follows from theoretical arguments that tolerance for failure in employment contracts encourages innovation (Manso (2011); Ederer and Manso (2013)), and that job security motivates workers to invest in firm-specific human capital (Suedekum and Ruehmann (2003); Wasmer (2006)).

On the other hand, EPL also limits the ability of firms to restructure their organizations and therefore compromises the efficient allocation of resources (Griffith and Macartney (2014); Simintzi, Vig, and Volpin (2015); Fairhurst and Serfling (2015); Dessaint, Golubov, and Volpin (2016); Fairhurst (2016)). Moreover, EPL increases the fixed-claim component of labor contracts

[1] EPL lowers investment and economic growth (Besley and Burgess (2004)), reduces entry-level wages (Leonardi and Pica (2013)), leads to lower labor force participation and higher unemployment (Lazear (1990); Ljungqvist and Sargent (1998); Botero, Djankov, La Porta, Lopez-de-Silanes, and Shleifer (2004)).

and thereby crowds out external financing (Simintzi et al. (2015)). These considerations suggest that EPL limits the firms' financial and operating flexibility and therefore hurts growth opportunities.[2]

The purpose of this paper is to investigate the two competing aspects of EPL and their net effect. The question we pursue is not only relevant from an academic point of view. It is fairly critical also for policy makers and regulators. In 2015, for example, the European Commission commented on the tradeoff by stating that "*while it is widely recognised that job security can foster human capital investment in firm-specific knowledge with a positive impact on productivity, overly high employment protection legislation can negatively affect productivity and growth by reducing the efficiency of the allocation of labour resources and innovation*" (European Commission, 2015, p.5).

The empirical investigation is based on a large international sample of individual firms in 16 countries during 1985–2010. To measure changes in EPL, we follow Dessaint et al. (2016), among others, and rely on the EPL-indicator constructed by Simintzi et al. (2015) on the basis of data from the Organisation for Economic Co-Operation and Development (OECD) and a wide range of other sources. The focus of the index is on "laws that protect workers with regular contracts, laws that regulate fixed-term (temporary) contracts, and laws that apply to collective dismissals."

Using a difference-in-differences research design similar to that used by Simintzi et al. (2015) and Dessaint et al. (2016), we test the impact of EPL by exploiting its intertemporal and cross-sectional differences. We find that stricter EPL does indeed encourage innovation effort (R&D), consistent with what Acharya et al. (2013) report for a more limited sample of countries. When

[2] Note that, theoretically, job security provisions could contractually be undone (Lazear (1990)) and firms could move some of their activities to jurisdictions without such provisions (Griffith and Macartney (2014)).

we distinguish between reforms that increase and those that decrease the Simintzi et al. (2015) index, we find that it is only the latter cases that have an impact. Higher index levels leave innovation efforts unaffected, whereas lower index levels reduce innovation effort—a reduction in the EPL index results in a 24% drop in innovation effort, on average. A detailed inspection of the data provides an explanation for this non-linearity. All instances of EPL-increases in the sample impose additional restrictions on collective redundancies. The Acharya et al. (2013) model and related theoretical considerations have less to say about this type of legislation. In contrast, the cases of decreased employment protection in the sample almost exclusively involve protection against unjust dismissal and deregulation of the market for temporary work. These are all changes that are germane to the Acharya et al. (2013) model. According to the model, they should consequently have had an impact, and they did.

However, and contrary to the initial prediction, the positive relation between EPL and innovation effort does not translate into a positive relation between EPL and the value of the firms' growth opportunities. To the contrary, we find a strong negative relation between EPL and Tobin's *q*. Accordingly, a change in the EPL index brings about a 10% change in Tobin's *q* in the opposite direction. As in the case of R&D activities, when we distinguish between increases and decreases in EPL, we find that it is only decreases that have a statistically significant impact on *q*.[3]

The remainder of the paper is dedicated to understanding the apparent puzzle of a reduction in R&D efforts and a simultaneous increase in *q*. To this end, we examine the reduction in R&D more closely. Arguably, EPL is more likely to affect innovators in mature firms than in young firms. Mature firms have compensation schemes that reward employees for operational

[3] The possible reason why EPL increases have no effect is that additional protection in the case of collective redundancies affects mostly firms in distress. If the probability of distress is sufficiently low, these legal changes should have only a limited impact on *q*.

excellence rather than for innovative breakthroughs (Holmstrom (1989); Kaplan and Henderson (2005); Manso (2011)). The incentive schemes in these firms are therefore less likely to let innovators share the rents from their ideas. Leaving the firm does not significantly protect these individuals either because the ideas generated in mature firms are mostly of the incremental type (see Tushman and Anderson (1986) and the literature cited in Acemoglu and Cao (2015)) and therefore either firm-specific or not valuable enough to sustain a new firm. Hence, changes in EPL should have a bigger impact on the innovation efforts of mature firms.

These predictions are supported by the data. For the average mature firm, our estimates imply a drop in innovation efforts by 36% in reaction to weaker EPL. In contrast, the innovation efforts of the average young firm are statistically unrelated to the degree of employment protection. These findings can also explain why weaker EPL does not translate into a noticeable decline in *q*. As mentioned above, mature firms tend to engage in incremental R&D activities, and therefore activities with a more moderate impact on *q*. The evidence supports this contention. Weaker employment protection reduces the R&D effort in mature firms, but that reduction does not affect the strength of the negative relation between EPL and *q*. In conclusion, EPL does affect the innovation effort of firms, but mainly in firms with little comparative advantage at generating "original" innovation.

A potential omitted variables problem that could confound our findings is that EPL is highly correlated with product market regulation (Nicoletti, Haffner, Nickell, Scarpetta, and Zoega (2001)). We conduct extensive robustness tests and conclude that the negative relation between EPL and Tobin's *q* does not reflect product market regulation.

The paper then examines why the easing of EPL provides such a strong boost to *q*. Previous studies document that EPL affects the restructuring costs and thereby the operating flexibility of firms (Lazear (1990); Ljungqvist and Sargent (1998); Fairhurst and Serfling (2015); Dessaint et

al. (2016)). Under strict EPL, firms are reluctant to hire new employees, especially if these employees have skill sets with little use for current operations. Thereby, EPL discourages investments into new fields and strategic decisions that would be costly to subsequently fine-tune or undo. These constraints would seem to be particularly binding for single-product firms, as their skill sets are generally more narrowly defined than those of multi-product firms. The greater operating flexibility that reductions in EPL bring about should therefore be particularly beneficial for the investment opportunity set of single-product firms.

The evidence is in line with this prediction. Single-product firms that are treated with weaker EPL increase their labor force by more than six percent, scale up their capital expenditures by a factor larger than two, and are 1.6 times more likely to diversify into multiple product lines than untreated single-product firms. There are no corresponding treatment effects for multi-product firms. As a result, single-product firms should also experience an increase in Tobin's *q*. We find strong empirical support for this prediction as well. The *q* of the average single-product firm increases by 22% in reaction to a reduction in EPL. For the average multi-product firm, the corresponding effect is less than half of that amount (9%) and statistically only marginally different from zero. Taken together, the evidence therefore implies that the negative relation between EPL and Tobin's *q* can be explained to a large extent by the greater operating flexibility that weaker EPL brings about.

Simintzi et al. (2015) and Fairhurst (2016) show that employment protection affects also capital structure decisions. In particular, Simintzi et al. (2015) show that stricter EPL de facto increases the fixed-claim component of labor contracts and thereby crowds out financial leverage. EPL should therefore affect particularly the *q* of firms that are financially inflexible or constrained. We use dividend payout as a proxy for financing constraints (see, for example, Fazzari, Hubbard, and Petersen (1988)) and find consistent evidence. The Tobin's *q* of financially

constrained firms is considerably more sensitive to changes in EPL than that of less constrained firms. According to our estimates, the Tobin's *q* of the average financially constrained firm increases by more than 20% in reaction to a reduction in EPL. The corresponding effect in financially unconstrained firms is only about 10%, though statistically significant at conventional confidence levels. The results are robust to alternative definitions of financing constraints. Loss of financial flexibility can therefore also explain parts of the observed negative relation between EPL and Tobin's *q*.

The last step in the analysis is to combine financial and operating flexibility and show that the relation between EPL and Tobin's *q* is in fact the result of the EPL-induced changes in these flexibilities. If so, the direct relation between EPL and *q* should be confined to firms which originally lack these flexibilities. The data strongly support this prediction.

The paper makes four contributions to the literature. First, we show that there is a strong negative relation between EPL and Tobin's *q*. A softening of EPL induces greater growth opportunities. Second, we find that the strength of this relation is unaffected by EPL-induced changes in innovation effort. This result is somewhat puzzling given the previous literature that reports a positive relation between EPL and innovation efforts. The explanation we propose is that only firms with little comparative advantage at significant innovation adjust their innovation efforts in reaction to changes in EPL. Third, we show that the negative relation between EPL and Tobin's *q* can be explained by the changes in operating and financial flexibility that these laws bring about. Taken together, our results should contribute to a better understanding of how labor market regulation affects innovation and firm value. There is considerable evidence at the macro level that increased employment protection is generally bad for economic growth (see, among others, Hopenhayn and Rogerson (1993); Saint-Paul (2002a); Saint-Paul (2002b)). We extend these findings at the firm level.

The paper proceeds as follows. Section 2 discusses the data and provides summary statistics. Section 3 investigates the relation between EPL and innovation efforts. Section 4 tests whether EPL affects *q* and whether that effect is related to the EPL-induced increase in innovation efforts. Section 5 inquires into the type of firms that are encouraged by EPL to increase their innovation efforts. Section 6 performs robustness tests and inquires into whether the relation between EPL and *q* is spurious and masks a relation between product market regulation and *q*. Section 7 relates operational flexibility and Tobin's *q*. Section 8 does the same for the case of financial flexibility. Section 9 tests whether the changes in operational and financial flexibility that EPL brings about are responsible for the relation between EPL and Tobin's *q*. Finally, Section 10 concludes.

## 2. Data and summary statistics

### *2.1 Sample*

The sample covers the 16 countries with the largest stock market capitalizations in the world according to the World Federation of Exchanges (December 2010).[4] Because data about firm age, one of our main control variables, had to be hand-collected from various sources, we limited our sample to these 16 countries instead of the 21 ones originally covered by Simintzi et al. (2015).[5] As mentioned below we find identical coefficients when we estimate Simintzi et al.'s (2015) main regression with our sample of firms. Therefore, an important implication is that the validity of their tests about the ability of the difference-in-differences design to assess the causality of EPL changes on firms' policies would seem to apply to our study as well.

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[4] These countries are Australia, Belgium, Canada, Denmark, Finland, France, Germany, Italy, Japan, the Netherlands, Norway, Spain, Sweden, Switzerland, the United Kingdom, and the United States.

[5] The five additional countries in Simintzi et al. (2015) are Austria (1,239 firm-year observations, 105 treated firms according to Table 2 of Simintzi et al. (2015)), Greece (2,718 observations, 23 treated firms), Ireland (990 observations, 0 treated firms), New Zealand (838 observations, 0 treated firms), and Portugal (979 observations, 41 treated firms).

The sample period starts in 1985, the year when the OECD began its systematic coverage of employment regulation, and ends in 2010. We gather firm-specific data from *WorldScope*. To ensure comparable fiscal years, we ignore all firm-years that do not last between 361 and 371 days. Moreover, we disregard all financial firms (SIC 6), regulated utilities (SIC 49), as well as firm-years with negative assets, sales, and book values of equity. Finally, we drop all firms younger than 5 years after listing, since these firms might not be representative (Fama and French (2004); Loderer, Stulz, and Waelchli (2016)). This latter omission reduces the sample size substantially. However, it does not alter our conclusions.

Across all years, the sample contains 17,686 firms and 124,817 firm-years with sufficient data to estimate our main regression of Tobin's q on EPL and determining factors. During the sample period, the coverage increases from 3,675 firms in 1985 to 12,828 firms in 2010. The increase is not uniform. Prior to 1995, it equals an annual 9%, on average. Thereafter, it is only 3%. Dropping the years prior to 1995 yields consistent results. The following two subsections describe the main variables. Appendix A contains detailed definitions and Table 1 shows summary statistics.

*2.2 Innovation effort, investment opportunities, and firm-level controls*

Our measure of innovation effort is the ratio of R&D-expenditures to sales (*R&D*), as computed from data reported in *WorldScope*. We rely on an R&D proxy because we are not aware of any comprehensive database with global coverage of firm-specific patent filings and citations. Moreover, as pointed out by Lerner and Seru (2015), the analysis of patent data can be problematic. In any case, since we want to investigate the impact of EPL on innovation *effort*, *R&D* is arguably the more appropriate variable. Patent filings do not necessarily capture changes in innovation effort. Moreover, not all innovations are patented. In untabulated tests, we replicate

our innovation regressions at the country level using the number of patent applications as well as the number of patents per million population as the dependent variable. Patent data at the country level are from OECD. The results remain qualitatively the same.

In line with the extant literature (e.g., Adam and Goyal (2008); Loderer et al. (2016)), our proxy for the value of the firms' investment opportunity set is Tobin's *q*, defined as market value of the firm's assets divided by total assets. We control for a broad set of firm-level variables that could simultaneously correlate with our dependent variables (in most cases *R&D* and Tobin's *q*) and the changes in EPL. These variables include:

a) Firm age (number of years since the IPO) as a proxy for the firm's ability to come up with "original" innovations (Loderer et al. (2016)). Details about the collection of age data are in Appendix A. We also gathered data about incorporation age. The results are very similar across age definitions;
b) Profitability (the firm's return on assets), dividend payout (a binary variable that identifies dividend payers), and financial leverage (ratio of debt to total assets) as proxies for the availability of internal funds;
c) Capital expenditures (divided by total assets) as proxies for the firm's current investment activities;
d) Firm size (logarithm of the market value of assets in USD) and strategic focus (binary variable that identifies firms with operations in a single SIC-2digit industry) as proxies for the scope of the firm's operations; and
e) Volatility (standard deviation of the firm's stock return over the past 24 months) as a proxy for uncertainty.

To reduce the influence of outliers, we winsorize all continuous and unbounded firm-level variables at the 1$^{st}$ and the 99$^{th}$ percentile of their country-specific distribution.

*2.3 Employment protection and country-level controls*

To analyze the impact of EPL on innovation and firm value, we exploit the time-series, cross-country variation of changes in these laws, as summarized by the employment protection indicator of Simintzi et al. (2015); *EPL*). In all countries, as described in detail on p. 568 as well as in Appendix B of Simintzi et al. (2015), the indicator is set equal to zero in 1985. In subsequent country-years, the indicator increases (decreases) by 1 every time labor law reforms lead to a significant increase (decrease) in employment protection.

The literature proposes various alternative measures of employment protection. First, there is the original EPL index itself that the OECD compiles and which Pagano and Volpin (2005), Bassanini and Garnero (2013), and Bassanini, Nunziata, and Venn (2009), among others, have used. The OECD (2013) provides a detailed overview of the construction of this index and the data collection procedure. We use it in our robustness check and find consistent evidence. Second, there is the index compiled by Botero et al. (2004) that measures labor protection in 85 countries. This index, however, is available only for 1997. Third, there is the labor law index from Deakin, Lele, and Siems (2007), which reflects the evolution of EPL across countries from 1970 to 2005. When we replicate the analysis with this index, we find consistent evidence, too.

We also include a number of time-varying, country-level control variables that could simultaneously affect our dependent variables and the changes in EPL. First, as suggested by Acharya et al. (2013) and Saint-Paul (2002b), slow economic growth could correlate with low *q* values and at the same time increase the political support for employment protection. To control for this possibility, we include real *Per-capita GDP growth* in the analysis. Second, as suggested by Subramanian and Megginson (2012), trade liberalization may boost Tobin's *q* and at the same time induce governments to enact more stringent EPL to offset any job losses. To control for this effect, we include the country-level aggregate of imports and exports (*Trade openness*) as a proxy

for trade reforms. A third concern is that changes in EPL and growth opportunities could correlate with government changes. As documented by Botero et al. (2004), left-leaning governments tend to have more stringent labor laws. At the same time, the policies enacted by these governments could affect a given country's growth opportunities. We therefore include the *Government orientation* index from Armingeon, Weisstanner, Engler, Potolidis, and Gerber (2012), which captures the balance of power between left and right-leaning parties in a given country's parliament. Fourth, increases in unemployment insurance benefits could correlate with changes in EPL and at the same time affect the growth opportunities of firms in the economy. We control for this possible relation with the annual expenditures for *Labor market programs* in any given country. We also control for the degree of unionization. In more unionized countries, employees exert considerable political pressure to legislate employment protection. At the same time, poorly performing managers that create less value are more likely to retain their jobs when unions are strong (Atanassov and Kim (2009)). Our regressions therefore include the degree of unionization in a given country, as measured by the annual *Fraction of union members* among wage and salary earners. Finally, we control for bankruptcy codes (*Creditor rights)*, financial development (*Stock market in % of GDP*), and education (*Tertiary enrolment*).

## 3. Employment protection and innovation effort

We begin by studying the relation between employment protection and innovation efforts. As mentioned above, we follow a difference-in-differences approach and exploit intertemporal, cross-country variations in labor regulation to study that relation. We estimate the following baseline regression equation:

$$R\&D_{i,t} = \delta \cdot EPL_{k,t-1} + \beta \cdot X_{i,t-1} + \gamma \cdot K_{k,t-1} + \lambda_i + \alpha_j \cdot \gamma_t + \varepsilon_{i,t}. \quad (1)$$

Except for the addition of a vector of country-level control variables, $K_{k,t-1}$, this equation is formally identical to the one Simintzi et al. (2015) use to investigate the relation between EPL and leverage. In the equation, *i* identifies the firm, *t* the year, *j* the industry, and *k* the country. The dependent variable is the firm's R&D-to-sales ratio; EPL is the employment protection indicator; $X_{i,t-1}$ is a vector of firm-level control variables; $K_{k,t-1}$is the vector of country-level control variables; $\lambda_i$ is a firm fixed effect; $\alpha_j \cdot \gamma_t$ is an industry-year fixed effect; and $\varepsilon_{i,t}$ is the error term. The firm-level controls included in $X_{i,t-1}$ are the lagged values of *ln(Firm age)*, *ROA*, *Capital expenditures*, *Dividend dummy*, *Focus*, *Leverage*, *MTB-equity*, *Size*, and *Volatility*. The country-level controls include, as mentioned above, the lagged values of *GDP growth*, *ln(Trade openness)*, *Government orientation*, *Labor market programs*, *Union membership*, and *Tertiary education*. Standard errors are clustered at the country level. The impact of changes in EPL on R&D expenditures is measured by the coefficient δ. As in Simintzi et al. (2015), the implicit assumption is that the impact of an increase or decrease in EPL is similar across countries regardless of the original level of EPL in 1985.

Table 2 shows the results. Column 1 estimates equation (1) for the full sample. Column 2 omits the firm-level control variables $X_{i,t-1}$, and column 3 limits the sample to the four countries covered by Acharya et al. (2013). Finally, column 4 splits the *EPL*-indicator into the two components that identify increases ($EPL^{Up}$) and decreases ($EPL^{Down}$) in employment protection, respectively. $EPL^{Up}$ equals *EPL* if *EPL* is larger than zero, otherwise $EPL^{Up}$ is equal to zero. Similarly, $EPL^{Down}$ equals the *negative* of *EPL* if *EPL* is negative, otherwise $EPL^{Down}$ is equal to zero.

Across all specifications, we find a positive and significant relation between EPL and innovation effort.[6] The coefficient estimates in column 1 imply that a unit change in *EPL* is associated with a 1.5% change in *R&D* in the same direction. Given a sample average R&D-to-sales ratio of 10.5%, this corresponds to a 14% change in innovation effort. The coefficient of *EPL* is statistically the same when we drop the firm-level control variables in column 2. Therefore, EPL changes do not appear to be proxies for firm-level characteristics. Note that, when we limit our attention to the four countries covered by Acharya et al. (2013), namely United States, United Kingdom, Germany, and France, the coefficient of EPL becomes numerically smaller but remains statistically significant at the 10% level (column 3). Finally, column 4 reveals that increases and decreases in EPL do not have a symmetric effect on innovation effort. While the coefficient of $EPL^{Down}_{t=-1}$ is negative and significant with confidence 0.99, the coefficient of $EPL^{Up}_{t=-1}$ is statistically zero. The relation between EPL and innovation effort is therefore driven by reductions in EPL. Our estimates imply that firms decrease their innovation effort by approximately 24% in reaction to lower EPL. As argued in the introduction, the six cases of EPL-increases in the sample[7] target collective redundancies and do not offer better protection of individual employees against unjust dismissal, which is the main source of potential hold-up problems according to Acharya et al. (2013).[8]

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[6] Consistent with that, Griffith and Macartney (2014) find that EPL may spur on incremental patenting activity in multinational firms, but that these firms locate radical patenting activity disproportionately in low-EPL countries, where adjustment costs are lower.

[7] The increases in EPL occurred in Belgium (1998), France (1990 and 1993), Italy (1991), Switzerland (1994), and the United States (1989).

[8] The countries and the events of reductions in employment protection are as follows (Simintzi et al. (2015), 586-589): Australia (2005; significant reduction of the concept and applicability of unfair dismissal); Denmark (1990; deregulation of temporary work agencies; this expanded the use of temporary work contracts); Netherlands (1988; requirements for dismissals eased in the case of bankruptcy; 1999; proposals for dismissal on economic, technical, and organizational grounds shortened and simplified); Norway (1994; introduction of contracted labor and temporary employment, deregulation of temporary work agencies, and increase in the duration of temporary work contracts); Spain (1994; deregulation of temporary work agencies, reduction of the costs of individual dismissal, and relaxation of rules governing collective dismissal); Sweden (1993; deregulation of temporary work

The first part of the investigation therefore confirms the positive relation between employment protection and innovation effort documented by Acharya et al. (2013). We extend their findings in two ways. First, we show that the relation holds also when we expand the sample from 4 to 16 countries. Second, our estimates show that, at least in our sample, the effect is driven by *decreases* in EPL and that *increases* in EPL do not affect innovation effort. The reason is the nature of those EPL changes. The next step is to investigate how these dynamics affect the value of the firms' growth opportunities.

## 4. Employment protection, innovation, and Tobin's *q*

This section inquires into the relation between employment protection and Tobin's *q* and asks whether the observed relation between EPL and *R&D* plays a mediation role in that relation. The baseline specification to estimate the relation between EPL and *q* is as follows:

$$ln(q_{i,t}) = \delta \cdot EPL_{k,t-1} + \beta \cdot X_{i,t-1} + \gamma \cdot K_{k,t-1} + \lambda_i + \alpha_j \cdot \gamma_t + \varepsilon_{i,t}, \quad (2)$$

where all variables and identifiers are defined as in equation (1). The dependent variable is Tobin's *q*. To limit skewness, we use the log of *q*, *ln(q)*, even though this choice does not affect the conclusions. The control variables are the same as in equation (1), except that, for obvious reasons, we drop *MTB-equity* from the list of firm-level controls $X_{i,t-1}$.

Table 3 presents the results. Column 1 looks at the full sample of firms whereas column 2 estimates the regression equation for the subsample of firms with non-missing *R&D* information (in column 1, missing *R&D* observations are set equal to zero). That restriction reduces sample

contracts, more flexibility to retain workers of choice in case of redundancies; 1997; further relaxations with respect to rehiring obligations, fixed term contracts, and length of notice periods).

size by about half. Column 3 extends the specification with *R&D* as an additional control, and column 4 adds an interaction term between *R&D* and EPL. Regression 5 then estimates the regression specification in column 2 by replacing $EPL_{t=-1}$ with $EPL^{Up}_{t=-1}$ and $EPL^{Down}_{t=-1}$, and regressions 6 and 7 extend that regression with *R&D* as well as an interaction term between *R&D* and $EPL^{Down}_{t=-1}$.[9]

Across specifications, we find a strong *negative* relation between EPL and Tobin's *q*. In particular, the coefficient estimate *of* $EPL_{t=-1}$ in column 2 is –0.1. This estimate implies that Tobin's *q* drops by 9.5% [$=e^{-0.1}-1$] in reaction to an increase in employment protection by 1, and increases by 10.5% [$=e^{0.1}-1$] if employment protection goes down by 1. Note that the coefficient of *EPL* does not change when we extend the specification both with *R&D* and with its interaction with *R&D* (columns 3 and 4). We will come back to this finding further down. Moreover, *R&D* alone takes on a positive and significant coefficient, consistent with the extant literature. The interaction term, however, is statistically zero.

When we distinguish between EPL increases and decreases (columns 5–7), we find that the negative relation between EPL and Tobin's *q* is driven by EPL decreases rather than by increases. As pointed out in the introduction, the reason could be that EPL increases reflect increased employment protection in the low-probability event of financial distress. According to our estimates, Tobin's *q* goes up by roughly 16% [$=e^{0.15}-1$] in reaction to a decrease in EPL. In contrast, stricter EPL does not hurt Tobin's *q*. *R&D* maintains a positive and significant coefficient whereas its interaction term with $EPL^{Down}_{t=-1}$ still has a coefficient that is statistically zero.

The regression coefficients we estimate imply that the effect of EPL on Tobin's *q* via *R&D* is economically zero. We can see that from the fact that adding *R&D* expenses in columns 3 and 4

[9] In untabulated regressions, we exclude the firm-level controls $X_{i,t-1}$ and find almost identical coefficients for EPL.

leaves the coefficient of EPL unchanged. Hence, the relation between EPL and *q* is unrelated to R&D activities. To see this more formally, note that the indirect effect of EPL via R&D on *q* is the product of the coefficient of EPL in the R&D regression, namely 0.015 (Table 2, column 2), and the coefficient of R&D in the q regression, namely 0.040 (Table 3, column 3). That product equals 0.015×0.040=0.0006 and is therefore economically small, even though statistically significant with confidence 0.90 based on a Monte Carlo simulation (not shown). Consequently, the impact of EPL on *q* is not mediated by any EPL-induced changes in innovation effort. The same conclusion applies when we distinguish between increases and decreases in EPL. There is no evidence that the innovation effort that is sparked by the loosening of EPL contributes to higher *q*. What follows examines why that could be the case.

## 5. Innovative ability and the relation between EPL and Tobin's q

As argued in the introduction, innovators in mature firms are more exposed to an expropriation problem. The innovation efforts of mature firms should therefore be more sensitive to changes in EPL. This section tests this prediction. Subsequently, we look for evidence that these additional innovation efforts add to the firms' growth opportunities.

### *5.1 EPL and innovation: Young vs. mature firms*

Table 4 replicates the regressions 1 and 4 of Table 2 for the subsamples of young and mature firms, separately. We use the median listing age in any given country as the cutoff value between young and mature age. Alternative definitions, such as the median incorporation age and the median industry age, yield similar results.

Columns 1 and 2 of Panel A report the results for the subsample of young firms, whereas columns 3 and 4 do so for the subsample of mature firms. To save space, we report only the

coefficients of the EPL variables. All regressions include firm-level and country-level control variables as well as firm and industry-year fixed effects. The estimates show that innovation efforts are unrelated to EPL in the subsample of young firms. This result holds regardless of whether we use the indicator *EPL* (column 1) or distinguish between increases and decreases in EPL (column 2). For mature firms, in contrast, we observe the pattern reported in Table 2. The aggregate EPL index has a positive coefficient, and that effect is driven by the subindex of EPL declines. The coefficient estimates of the subindex $EPL^{Down}_{t=-1}$ imply that a reduction in EPL is associated with a 2 percentage point-decrease in *R&D*. Given a sample average R&D-to-sales ratio of 5.6% in mature firms, this corresponds to a hefty decline in innovation effort by 36%.

*5.2 Implications for Tobin's q*

Panel B of Table 4 studies the implications of these dynamics for Tobin's *q*. We distinguish again between young (columns 1 to 4) and mature firms (columns 5 to 8). The dependent variable is *ln(q)*. As in the preceding panel, we present only the coefficients of the EPL variables. The first regression in each age group investigates how innovation effort (*R&D*) translates into growth opportunities (Tobin's *q*). In the second regression, we add the two variables $EPL^{Up}$ and $EPL^{Down}_{t=-1}$. The third regression is the same except that it includes also an interaction term between *R&D* and $EPL^{Down}_{t=-1}$ to test for a moderation effect of *R&D*. Finally, the last regression drops all variables involving *R&D*.[10]

For young firms, the main effect of *R&D* on Tobin's *q* is positive and significant with confidence 0.99 across specifications. Hence, innovation efforts per se boost *q* in young firms. Columns 2-4 show that the overall effect of EPL on growth opportunities is negative, and that this effect is driven by the easing up of EPL restrictions. Weaker EPL contributes to higher

[10] Using $EPL_{t=-1}$ instead of $EPL^{Up}_{t=-1}$ and $EPL^{Down}_{t=-1}$ yields consistent evidence.

Tobin's *q*. In contrast, the tightening of EPL does not have any effect. The reason for this effect might be, as mentioned before, the nature of EPL index increases in our sample. According to our estimates, a reduction in EPL brings about a 26%-increase in Tobin's *q* [= $e^{0.23}$–1]. Note that the EPL coefficients are essentially identical whether or not we control for *R&D*. Hence, there is no evidence that the effect of EPL on *q* is mediated by *R&D*. The loosening of EPL restrictions must consequently boost *q* through other channels than R&D. We also fail to find a statistically significant interaction effect of EPL and *R&D*.

Turning to the subsample of mature firms, we find a positive but statistically much weaker relation between *R&D* and Tobin's *q* (column 5). This suggests that increases in R&D efforts are less value creating in these firms compared to what we observe in young firms. This is consistent with the findings in Loderer et al. (2016) that mature firms, as result of a number of operational and organizational adjustment costs, are unable to renew their growth opportunities.

As in the case of young firms, we find that EPL contributes to higher *q* but only in the case of index reductions. According to our estimates, a loosening of EPL restrictions increases the Tobin's *q* of a mature firm by 11% [= $e^{0.10}$ – 1]. This effect is less than half of what we observe in young firms (26%). More important, we find that the decline in R&D induced by EPL (Panel A) does not seem to penalize the *q* of mature firms. This follows from the fact that the coefficients of EPL in columns 7 and 8 are almost identical regardless of whether we control for *R&D*. More formally, the mediation effect of R&D on *q*, as measured by the product of the $EPL^{Down}_{t=-1}$ sensitivity of *R&D* on the one hand (–0.020 in column 4 of Panel A) and the *R&D* sensitivity of *q* on the other (0.060 in column 7 of Panel B) is numerically quite small, namely only –0.001.

Note also that the interaction of EPL and *R&D* has a negative and significant coefficient. This seems to contradict our conclusions and suggest that less severe EPL has indeed a negative effect on *q* in firms with higher R&D activities. However, this effect is economically small. Even at

R&D levels in the third quartile of the sample distribution (0.057, Table 1), the effect of a decrease of the EPL index by 1 (0.003=0.058×1×0.057) is only a fraction of the coefficient of $EPL^{Down}$ alone (0.108).

## 6. Robustness test: Employment protection as a proxy for product market regulation

EPL typically does not come alone. As it turns out, employment protection is highly correlated with product market regulation (PMR) across OECD countries (Nicoletti et al. (2001)). This positive correlation could come about because product market regulation might be used to offset the costs of employment protection (Koeniger and Vindigni (2003)).[11] Before proceeding with the analysis, we therefore test whether employment protection is a proxy for product market regulation (PMR).

We use data on indicators of PMR that the OECD has published in 34 OECD countries in four different years (1998, 2003, 2008, and 2013). These indicators measure the degree to which public policies promote or inhibit product market competition. These policies includes state controls (public ownership and public involvement in business operations, such as price controls); barriers to entrepreneurship (licenses and permits, and administrative burdens); and barriers to trade and investment (for example, tariffs). To increase sample size, we assume that PMR did not change other than in the four years for which we have data.

Table 5 re-estimates equation (2) with *PMR* as an additional control variable. The sample period starts in 1998, i.e., the first year for which we have data on *PMR*. None of our sample countries have experienced a significant increase in EPL since 1998. The regression is therefore estimated only for EPL-reductions. Moreover, we omit *R&D* from the list of control variables

[11] Another possibility that Koeniger and Vindigni (2003) offer is that product market regulation decreases employment and makes workers' outside options relatively worse, which could induce them to ask for employment protection.

since, as we pointed out, *R&D* data are available only for about half of the observations. As it turns out, all the results remain qualitatively and quantitatively the same when we include *R&D* (not tabulated).

The first regression estimates the baseline regression equation (2) for the subsample of firms with available data on PMR. The coefficient estimate of $EPL^{Down}_{t=-1}$ is 0.151. It is statistically the same as the one reported in Table 3 for the full sample period, which suggests that the subsample in Table 5 has similar characteristics as the full sample. More important, the magnitude and statistical significance of $EPL^{Down}_{t=-1}$ remains the same when we include *PMR* in the regression (column 2). Therefore, EPL does not seem to be a proxy for PMR. The coefficient of *PMR* itself is negative and significant with confidence 0.99. Stricter PMR therefore seems to hurt the average firm's *q*. Taken together, we conclude that the positive impact of EPL reductions on Tobin's *q* does not reflect product market regulation.

## 7. Employment protection, operating flexibility, and Tobin's *q*

Overall, the evidence so far indicates that there is a negative relation between EPL and the value of a firm's growth opportunities and that the strength of this relation is unaffected by EPL-induced changes in innovation efforts. In what follows, we investigate what drives the negative relation between EPL and *q*.

According to Chen, Kacperczyk, and Ortiz-Molina (2011) and Dessaint et al. (2016), among others, more severe EPL raises the costs of restructuring. Conversely, a loosening of EPL restrictions gives firms more operational flexibility, which should encourage them to explore and pursue strategies that would otherwise be costly to fine tune or later undo (see also Fairhurst (2016)). This section tests whether firms react to the increased operational flexibility that more moderate EPL grants them. This could be a reason why Tobin's *q* goes up in reaction to less

severe EPL. For a measure of strategic realignment, we examine the decision to enter additional lines of business. We therefore expect single-segment firms to take advantage of softer labor protection and expand in additional industry segments. We test this prediction in Table 6.

The *WorldScope* tapes contain information about up to ten product segments and the associated SIC codes. Reasonable coverage for most countries starts in 1990, which is why we limit the sample period for this part of the analysis to the years 1990 – 2010. We classify all firms that report positive sales for more than one product segment as multi-segment firms. All other firms are classified as single-segment firms.

The investigation takes the form of a conditional logistic regression with a binary variable that identifies firms that increase the number of segments they engage in as the dependent variable (*Multi-segment firm*):

$$Multi\text{-}segment\ firm_{t+1} = \delta \cdot EPL_{k,t-1} + \beta \cdot X_{i,t-1} + \gamma \cdot K_{k,t-1} + \alpha_j \cdot \gamma_t + \varepsilon_{i,t}. \qquad (3)$$

The sample is limited to firms that were single-segment firms in the previous year. The regression includes the same lagged firm-level and country-level controls as the specifications in Table 2 as well as industry-year fixed effects. Because of insufficient variation in the dependent variable, we do not include firm-fixed effects.

Panel A of Table 6 presents the results. The coefficient of $EPL^{Down}{}_{t=-1}$ is positive and significant with confidence 0.99. It implies that single-segment firms that are treated with lower EPL are 1.6 times more likely to diversify into new industries than untreated firms are. This is consistent with the hypothesis that firms take advantage of a relaxation of labor protection to reposition themselves strategically.

If this effect is more than simply a taxonomic change, we should see an actual increase in investment outlays in single-segment firms. To test this prediction, Columns 1 and 2 of Panel B of the table look at capital expenditures and estimate the following regression:

$$Capital\ expenditures_t = \delta \cdot EPL_{k,t-1} + \beta \cdot X_{i,t-1} + \gamma \cdot K_{k,t-1} + \lambda_i + \alpha_j \cdot \gamma_t + \varepsilon_{i,t}. \qquad (4)$$

Column 1 looks at single-segment firms whereas column 2 examines multi-segment firms. The lagged firm-level and country level controls are the same as in Panel A, except we drop the lagged *Capital expenditures* from the list of country-level controls. The regressions also include firm and industry-year fixed effects. As predicted, single-segment firms scale up their capital expenditures in reaction to weaker EPL significantly. The coefficient of $EPL^{Down}_{t=-1}$ is positive and significant with confidence 0.99 and its estimate implies that single-segment firms more than double their capital expenditures in reaction to weaker EPL. There is no corresponding effect in multi-segment firms.

Columns 3 and 4 of the panel test whether single-segment firms that are treated with weaker EPL experience a comparatively larger increase in their workforce. This is what we would expect if labor protection prevented them from hiring the necessary skills to expand into new fields. In line with our predictions, the coefficient of $EPL^{Down}$ is positive and significant for single-product firms (column 3). The estimates imply that these firms take advantage of more moderate EPL by increasing their labor force by 6.2%. There is no corresponding treatment effect in the workforce of multi-product firms (column 4).

In untabulated regressions we also tested whether weaker EPL encourages firms to increase their labor-to-capital ratio. The dependent variable was the firm's labor-to-capital ratio (defined as staff costs divided by book value of property, plant, and equipment). The firm-level and the

country-level control variables were the same as in equation (4). According to the results, decreases in EPL do indeed encourage firms to raise their labor-to-capital ratios in a significant way. As in the preceding analyses, this effect is confined to single-segment firms.

Overall, the results therefore indicate that a softening of EPL induces firms to increase their investments and enter new lines of business. The question is whether that can explain the EPL-sensitivity of Tobin's *q*. The results of these tests are shown in Table 7. We again split the sample into single-segment firms (column 1) and multi-segment firms (column 2). We expect the Tobin's *q* of single-segment firms to be more sensitive to changes in EPL. The data support this prediction. In column 1, the coefficient of $EPL^{Down}_{t=-1}$ is positive and significant with confidence 0.99, whereas in column 2, it is substantially smaller and only marginally different from zero (confidence 0.9). Our estimates imply that the *q* of the average single-segment firm increases by 22% in reaction to more moderate EPL; the corresponding effect in multi-segment firms is less than half of that amount (9%). Increased operational flexibility could consequently be the reason why weaker EPL brings about higher *q* ratios.

## 8. Employment protection, financial flexibility, and Tobin's q

The literature also suggests that weaker EPL could raise Tobin's *q* ratios via a financial channel. Simintzi et al. (2015) show that stricter EPL increases the fixed-claim component of labor contracts and thereby crowds out financial leverage (see also Fairhurst (2016)). We therefore investigate whether a loosening of EPL benefits firms that are financially constrained and induces higher Tobin's *q* ratios.

In untabulated regressions, we first replicate the baseline financial leverage regression of Simintzi et al. (2015) (p. 573). Even though our sample is slightly different from theirs with respect to the number of countries covered (16 vs. 21) and firms considered (we exclude all firms

younger than 5 years), our coefficient estimate of EPL (–0.0184) is almost identical to what they report in their second specification of Table 3 (–0.0187), and the confidence level of the significance test against zero is the same as well (0.95). The data show that more employment protection discourages financial leverage, and less protection encourages it. The question is whether this effect is reflected also in Tobin's *q*. Increased financial flexibility should benefit particularly firms that are financially constrained.

Table 8 has the results. It replicates the regression specification 6 of Table 3 for the subsamples of financially constrained and unconstrained firms, separately. We identify financially constrained firms by whether they pay dividends (see, for example, Fazzari et al. (1988)). As predicted, the *q*-sensitivity of EPL is significantly stronger for financially constrained firms. Specifically, the coefficient of the EPL indicator is negative and significant with confidence 0.99 for firms that do not pay dividends (column 1). In contrast, in the subsample of firms that do pay dividends (column 3), the coefficient is also negative but numerically much smaller (0.032 vs. 0.17) and statistically significant only in a one-sided test against zero. When we distinguish between EPL increases and decreases, the data show that the effect of a decrease in EPL is more than twice as strong in financially constrained firms (0.186; column 2) as in unconstrained firms (0.088; column 4). Both effects are significantly different from zero with confidence 0.99. Increases in EPL, in turn, leave the Tobin's *q* of financially constrained firms unaffected. For unconstrained firms, however, we find that *q* actually increases significantly in reaction to stricter EPL. Firms with sufficient initial financial flexibility seem to benefit from stricter EPL. This might reflect a competition effect, in the sense that increased EPL protection hurts financially constrained firms and therefore benefits the unconstrained ones. In untabulated tests, we also use size as a proxy for financial constraints (Hadlock and Pierce (2010)) and find consistent evidence.

Overall, the evidence therefore supports the hypothesis that less severe EPL provides financial flexibility to firms and induces higher *q* ratios.

## 9. Why does the loosening of EPL boost Tobin's q?

The last step of the analysis is to examine whether the increased operational and financial flexibility induced by weaker EPL are jointly responsible for the increased Tobin's *q* we observe. To find out, we replicate the estimation of the regression specification 6 of Table 3. We test whether adding a term that identifies firms that are both financially and operationally constrained, and interacting that term with the indicator variable $EPL^{Down}_{t=-1}$ reduces the size and significance of the coefficient of EPL in the regression. If it does, we have support for the claim that relaxations of EPL contribute to higher *q* because they increase the operational and financial flexibility of firms.

Table 9 shows the results. The first column simply replicates regression 6 in Table 3 and shows that EPL reductions are associated with higher Tobin's *q* ratios. In column 2, we add both a binary variable that identifies firms that are operationally and financially constrained and the interaction of that term with $EPL^{Down}_{t=-1}$. The term that identifies firms with operational and financial constraints is negative and significant, which indicates that, compared with other firms, constrained firms have lower *q* ratios. More important, the interaction term is positive and significant and, at the same time, the coefficients of the two EPL subindices fall substantially in value and lose their statistical significance. This is consistent with our predictions. Weaker EPL leads to higher *q* ratios by benefiting firms that are operationally and financially constrained.

## 10. Conclusions

This paper investigates how changes in EPL affect the value of growth opportunities. Previous studies offer contradicting effects in this respect. One the one hand, they suggest that EPL might benefit firms because it resolves potential hold-up problems and encourages innovation (Acharya et al. (2013); Acharya et al. (2014)). On the other hand, however, they imply that EPL could be detrimental to growth opportunities because it reduces operational and financial flexibility (Simintzi et al. (2015), Dessaint et al. (2016)). We show that the relation between Tobin's *q* and EPL is actually negative. The strength of this relation is unaffected by the innovation efforts that EPL induces. The reason is that EPL seems to affect the innovation incentives of firms with little comparative advantage at innovating, namely mature firms. The data indicate that the negative effect of EPL on Tobin's *q* derives from the loss of operational and financial flexibility that EPL brings about.

## Appendix A: Variable definitions

*Panel A: Employment protection variables*

| | |
|---|---|
| EPL | The employment protection indicator developed by Simintzi et al. (2015). See their p. 568 and Appendix B for a detailed description of the indicator construction; |
| $EPL^{Up}$ | A variable that captures increases in *EPL*. It takes on the value of *EPL* if *EPL* is positive. Otherwise, the value is set equal to 0; |
| $EPL^{Down}$ | A variable that captures decreases in *EPL*. It takes on the negative value of *EPL* if *EPL* is negative. Otherwise, the value is set equal to 0. |

*Panel B: Firm-level variables*

| | |
|---|---|
| Age | IPO age, computed as one plus the difference between the year under investigation and the firm's IPO year. The IPO year is computed as (a), for the US, the minimum value of: (1) the first year the firm appears on the CRSP tapes; (2) the first year the firm appears on the COMPUSTAT tapes; and (3) the first year for which we find a link between the CRSP and the COMPUSTAT tapes, (b) WorldScope item 00000; the footnote contains information about "the date when the company became publicly held", (c) Compustat, (d) Osiris from Bureau van Djik, (e) SDC Platinum, (f) Zephyr from Bureau van Djik, (f) CRSP, (g) official websites from stock exchanges, (h) personal email to Investor Relations Manager, (i) corporate websites, (j) Thomson Reuters, and (k) online encyclopedias, filled up in this order; |
| Capital expenditures | The firm's capital expenditures (WorldScope item 04601) net of depreciation and amortization (WorldScope item 01151), divided by the market value of the firm's assets (*Size*); |
| Dividend payer | Binary variable that identifies firms with positive cash payouts to shareholders (WorldScope item 04551); |
| Dividend non-payer | 1 – *Dividend payer*; |
| Focus | Borrowing from Mitton (2002), a binary variable equal to 1 if the number of two-digit SIC level industries in which a firm operates is less than the median in a given country and year, using the higher number of reported industries in WorldScope items 07021 to 07028 and 19506 to 19596, respectively, and 0 otherwise; |
| Labor-to-capital ratio | The firm's labor-to-capital ratio, calculated as the staff costs (WorldScope item 01084) divided by the book value of property, plant, and equipment net of depreciation (WorldScope item 02501); |
| Large firm | 1 – *Small firm*; |
| Leverage | The firm's book leverage, calculated as the book value of debt (WorldScope item 03255) divided by the book value of assets (WorldScope item 02999); |
| Mature firm | 1 – *Young firm*; |
| MTB-equity | The firm's market-to-book ratio, calculated as the market value of the firm's equity (WorldScope item 08001) divided by the book value of the firm's equity (WorldScope item 03501); |
| Multi-segment firm | Binary variable that identifies firm-years with positive sales for more than 1 product segment, according to Worldscope; |
| q | Tobin's *q*, computed as the market value of the firm's assets (*Size*) divided by the book value of the firm's assets (WorldScope item 02999); |
| R&D | The firm's R&D expenditures (WorldScope item 01201) divided by the firm's net sales (WorldScope item 01001); |
| ROA | The firm's return on assets, calculated as the ratio of the firm's earnings before interest and taxes (WorldScope item 18191) divided by the book value of the firm's assets (WorldScope item 02999); |
| Single-segment firm | 1 – *Multi-segment firm*; |
| Size | The logarithm of the firm's size is the market value of the firm's assets, calculated |

| | |
|---|---|
| | as the book value of the firm's assets (WorldScope item 02999) minus the book value of the firm's equity (WorldScope item 03501) plus the market value of the firm's equity (WorldScope item 08001) minus deferred taxes (WorldScope item 03263); |
| Small firm | Binary variable that identifies firm-years with *Size* lower than the median *Size* of all sample firms in the country where the firm is listed; |
| Tangibility | The firm's asset tangibility, calcuated as property, plant, and equipment net of depreciation (WorldScope item 02501) divided by the book value of assets (WorldScope item 02999); |
| Volatility | The volatility of the firm's monthly stock return, calculated over a two-year window and including all firm-years with at least 12 monthly returns. The returns are continuously compounded and all padded zero-return records at the end of each stock's time series are removed, as defined in Ince and Porter (2006); |
| Young firm | Binary variable that identifies firm with *Age* smaller than the median *Age* of all sample firms in the country where the firm is listed. |

*Panel C: Country-level variables*

| | |
|---|---|
| Creditor rights | Djankov, McLiesh, and Shleifer's (2007) index aggregating creditor rights. The index ranges from 0 (weak creditor rights) to 4 (strong creditor rights); |
| GDP growth | The country's change in gross domestic product (GDP) relative to the previous year. GDP is expressed in constant national currency per person. Data are derived by dividing constant price GDP by total population. The data is from World Economic Outlook database; |
| GDP per capita | The country's per-capita gross domestic product (GDP). GDP is expressed in constant national currency per person. Data are derived by dividing constant price GDP by total population. The data is from World Economic Outlook database; |
| Government orientation | Cabinet composition index ranging from 1 (hegemony of right-wing (and center) parties) to 5 (hegemony of social-democratic and other left parties). The data is from Comparative political data set I 1960-2010 (item govparty) from Armingeon et al. (2012); |
| LMP | Grubb and Puymoyen's (2008) annual public expenditure on labor market programs as a percentage of GDP; |
| PMR | The OECD indicator of product market, which is available in four different years (1998, 2003, 2008, and 2013). The indicator measure the degree to which public policies promote or inhibit product market competition. This regulation includes state controls (public ownership and public involvement in business operations, such as price controls); barriers to entrepreneurship (licenses and permits, and administrative burdens); and barriers to trade and investment (for example, tariffs); |
| Tertiary education | The log of the total number of students enrolled at public and private tertiary education institutions. Data is from the UNESCO Institute for Statistics; |
| Trade openness | Openness of the economy, measured as total trade (sum of import and export) as a percentage of GDP. The data is from Comparative political data set I 1960-2010 (item *openc*) from Armingeon et al. (2012); |
| Union membership | Net union membership as a proportion of wage and salary earners in employment. The data is from Comparative political data set we 1960-2010 (item *ud*) from Armingeon et al. (2012). |

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## Table 1: Summary statistics

| | Mean | Median | SD | 25th percentile | 75th percentile |
|---|---|---|---|---|---|
| *Panel A: Employment protection* | | | | | |
| EPL | 0.255 | 0.000 | 0.736 | 0.000 | 1.000 |
| $EPL^{Down}$ | 0.377 | 0.000 | 0.550 | 0.000 | 1.000 |
| $EPL^{Up}$ | 0.122 | 0.000 | 0.383 | 0.000 | 0.000 |
| *Panel B: Main firm-level variables* | | | | | |
| Age | 19.912 | 14.000 | 16.588 | 8.000 | 28.000 |
| Capital expenditures | 1.141 | 0.013 | 6.058 | -1.133 | 1.845 |
| Focus | 0.302 | – | – | – | – |
| Leverage | 0.212 | 0.185 | 0.184 | 0.040 | 0.336 |
| MTB-equity | 2.198 | 1.353 | 3.318 | 0.955 | 2.190 |
| q | 1.755 | 1.226 | 1.986 | 0.964 | 1.774 |
| R&D | 0.120 | 0.015 | 0.500 | 0.001 | 0.057 |
| ROA | 0.002 | 0.054 | 0.273 | 0.002 | 0.105 |
| Size | 12.161 | 12.154 | 2.168 | 10.788 | 13.547 |
| Tangibility | 0.305 | 0.263 | 0.227 | 0.123 | 0.435 |
| Volatility | 0.489 | 0.407 | 0.297 | 0.288 | 0.599 |
| *Panel C: Country-level variables* | | | | | |
| Creditor rights | 2.025 | 2.000 | 1.169 | 1.000 | 3.000 |
| GDP growth | 0.016 | 0.018 | 0.022 | 0.008 | 0.029 |
| GDP per capita | 0.023 | 0.025 | 0.023 | 0.014 | 0.037 |
| Government orientation | 1.677 | 1.000 | 1.314 | 1.000 | 2.000 |
| LMP | 1.103 | 0.720 | 0.957 | 0.520 | 1.180 |
| PMR | 1.577 | 1.501 | 0.339 | 1.312 | 1.707 |
| Tertiary education | 4337.695 | 4171.025 | 1387.934 | 3184.897 | 5550.842 |
| Trade openness | 3.546 | 3.369 | 0.521 | 3.148 | 3.986 |
| Union membership | 22.462 | 18.800 | 13.597 | 12.840 | 27.710 |

## Table 2: Employment protection and innovation effort

The table shows the results of regressions of *R&D* on EPL. Columns 1, 2, and 4 are estimated for the full sample, column 3 is restricted to the four countries covered by Acharya et al. (2013), namely the United States, United Kingdom, France, and Germany. Variables are defined in Appendix A. All controls are lagged by one year. The regressions include firm and industry-year fixed effects. Standard errors are clustered at the country level and reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% level, respectively. The sample covers firms listed in 16 countries over the years 1985 – 2010.

| | Dependent variable: *R&D* | | | |
|---|---|---|---|---|
| | Full sample | | ABS (2013) countries | Full sample |
| | (1) | (2) | (3) | (4) |
| $EPL_{t-1}$ | 0.015*** | 0.015** | 0.007* | |
| | (0.006) | (0.006) | (0.004) | |
| $EPL^{Up}_{t-1}$ | | | | –0.002 |
| | | | | (–0.004) |
| $EPL^{Down}_{t-1}$ | | | | –0.025*** |
| | | | | (–0.009) |
| $Ln(Age)_{t-1}$ | –0.036* | | –0.054*** | –0.036* |
| | (0.020) | | (0.010) | (0.021) |
| $ROA_{t-1}$ | –0.162*** | | –0.172*** | –0.162*** |
| | (0.019) | | (0.015) | (0.019) |
| Capital expenditures $_{t-1}$ | 0.001 | | 0.001*** | 0.001 |
| | (0.001) | | (0.000) | (0.001) |
| Dividend dummy $_{t-1}$ | 0.007*** | | 0.008*** | 0.007*** |
| | (0.001) | | (0.002) | (0.001) |
| Focus $_{t-1}$ | 0.006 | | 0.010 | 0.005 |
| | (0.004) | | (0.008) | (0.004) |
| Leverage $_{t-1}$ | –0.086*** | | –0.114*** | –0.086*** |
| | (0.024) | | (0.001) | (0.024) |
| MTB-equity $_{t-1}$ | –0.002** | | –0.002*** | –0.002** |
| | (0.001) | | (0.000) | (0.001) |
| Size $_{t-1}$ | 0.002 | | 0.005*** | 0.002 |
| | (0.003) | | (0.002) | (0.003) |
| Volatility $_{t-1}$ | 0.035*** | | 0.041*** | 0.035*** |
| | (0.009) | | (0.004) | (0.009) |
| GDP growth $_{t-1}$ | –0.030 | –0.088 | –0.049 | –0.015 |
| | (0.120) | (0.128) | (0.069) | (0.124) |
| Ln(Trade openness) $_{t-1}$ | 0.013 | 0.041** | 0.093*** | 0.012 |
| | (0.021) | (0.018) | (0.035) | (0.022) |
| Government orientation $_{t-1}$ | 0.003** | 0.003** | –0.004*** | 0.002** |
| | (0.001) | (0.001) | (0.000) | (0.001) |
| Labor market programs $_{t-1}$ | –0.007 | –0.001 | –0.033*** | –0.007 |
| | (0.007) | (0.005) | (0.005) | (0.007) |
| Union membership $_{t-1}$ | 0.002*** | 0.002*** | 0.001 | 0.002*** |
| | (0.000) | (0.001) | (0.001) | (0.000) |
| Tertiary education $_{t-1}$ | 0.000 | 0.000 | 0.000 | 0.000 |
| | (0.000) | (0.000) | (0.000) | (0.000) |
| Firm FE | YES | | YES | YES |
| Industry-year FE | YES | | YES | YES |
| Observations | 69,848 | 69,848 | 42,683 | 69,848 |
| $R^2$ | 0.810 | 0.808 | 0.818 | 0.810 |

## Table 3: Employment protection, innovation effort, and Tobin's q

The table shows the results of regressions of Tobin's *q* on EPL and innovation effort. Column 1 is estimated for the full sample; all other columns only include firm-year observations with non-missing data on *R&D*. Variables are defined in Appendix A. All controls are lagged by one year. The regressions include firm and industry-year fixed effects. Standard errors are clustered at the country level and reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% level, respectively. The sample covers firms listed in 16 countries during the years 1985 – 2010.

| | Dependent variable: *ln(q)* | | | | | | |
|---|---|---|---|---|---|---|---|
| | All firms | Firms with non-missing *R&D* | | | | | |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| $EPL_{t=-1}$ | –0.069** | –0.100** | –0.100** | –0.100** | | | |
| | (0.033) | (0.039) | (0.039) | (0.040) | | | |
| $EPL^{Up}_{t=-1}$ | | | | | 0.003 | 0.003 | 0.003 |
| | | | | | (0.032) | (0.032) | (0.032) |
| $EPL^{Down}_{t=-1}$ | | | | | 0.153*** | 0.154*** | 0.154*** |
| | | | | | (0.037) | (0.037) | (0.037) |
| R&D | | | 0.040*** | 0.040*** | | 0.040*** | 0.040*** |
| | | | (0.006) | (0.005) | | (0.006) | (0.008) |
| $EPL_{t=-1}$ × R&D | | | | 0.005 | | | |
| | | | | (0.011) | | | |
| $EPL^{Down}_{t=-1}$ × R&D | | | | | | | 0.006 |
| | | | | | | | (0.006) |
| Ln(Age) $_{t=-1}$ | –0.049*** | –0.087*** | –0.086*** | –0.086*** | –0.089*** | –0.087*** | –0.087*** |
| | (0.015) | (0.014) | (0.014) | (0.014) | (0.014) | (0.015) | (0.015) |
| ROA $_{t=-1}$ | 0.121* | 0.165*** | 0.172*** | 0.172*** | 0.165*** | 0.171*** | 0.171*** |
| | (0.066) | (0.021) | (0.022) | (0.022) | (0.021) | (0.022) | (0.022) |
| Capital expenditures $_{t=-1}$ | 0.002*** | 0.003*** | 0.003*** | 0.003*** | 0.003*** | 0.003*** | 0.003*** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Dividend dummy $_{t=-1}$ | 0.036** | 0.031** | 0.031** | 0.031** | 0.031** | 0.031** | 0.031** |
| | (0.014) | (0.015) | (0.015) | (0.015) | (0.015) | (0.015) | (0.015) |
| Focus $_{t=-1}$ | 0.002 | –0.008* | –0.009* | –0.009* | –0.007* | –0.008* | –0.008* |
| | (0.008) | (0.004) | (0.004) | (0.004) | (0.004) | (0.004) | (0.004) |
| Leverage $_{t=-1}$ | –0.053 | –0.075 | –0.072 | –0.072 | –0.074 | –0.071 | –0.071 |
| | (0.041) | (0.046) | (0.045) | (0.045) | (0.046) | (0.045) | (0.045) |
| Size $_{t=-1}$ | –0.161*** | –0.190*** | –0.190*** | –0.190*** | –0.190*** | –0.190*** | –0.190*** |
| | (0.015) | (0.016) | (0.016) | (0.016) | (0.016) | (0.016) | (0.016) |
| Volatility $_{t=-1}$ | 0.041 | 0.042 | 0.040 | 0.040 | 0.040 | 0.039 | 0.039 |
| | (0.032) | (0.037) | (0.038) | (0.038) | (0.037) | (0.037) | (0.037) |
| GDP growth $_{t=-1}$ | 0.801* | 0.793* | 0.794* | 0.795* | 0.705 | 0.706 | 0.706 |
| | (0.432) | (0.473) | (0.475) | (0.475) | (0.512) | (0.515) | (0.515) |
| Ln(Trade openness) $_{t=-1}$ | –0.317*** | –0.324*** | –0.324*** | –0.324*** | –0.314*** | –0.314*** | –0.314*** |
| | (0.101) | (0.066) | (0.066) | (0.066) | (0.063) | (0.063) | (0.063) |
| Gov. orientation $_{t=-1}$ | –0.015** | –0.026*** | –0.026*** | –0.026*** | –0.025*** | –0.025*** | –0.025*** |
| | (0.006) | (0.006) | (0.006) | (0.006) | (0.006) | (0.006) | (0.006) |
| LMP $_{t=-1}$ | –0.012 | –0.028 | –0.028 | –0.028 | –0.026 | –0.025 | –0.025 |
| | (0.028) | (0.032) | (0.032) | (0.032) | (0.031) | (0.031) | (0.031) |
| Union membership $_{t=-1}$ | 0.005 | 0.010*** | 0.009*** | 0.009*** | 0.008*** | 0.008*** | 0.008*** |
| | (0.005) | (0.004) | (0.004) | (0.004) | (0.003) | (0.003) | (0.003) |
| Tertiary education $_{t=-1}$ | –0.000 | –0.000 | –0.000 | –0.000 | 0.000 | 0.000 | 0.000 |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Firm FE | YES | YES | YES | YES | YES | YES | YES |
| Industry-year FE | YES | YES | YES | YES | YES | YES | YES |
| Observations | 124,817 | 69'838 | 69'838 | 69'838 | 69'838 | 69'838 | 69'838 |
| $R^2$ | 0.743 | 0.764 | 0.764 | 0.764 | 0.764 | 0.764 | 0.764 |

## Table 4: Young vs. mature firms

Panel A of the table reports the results of separate regressions of *R&D* on EPL for young and mature firms. A firm is classified as young if its listing age is smaller than the median listing age in the country where the firm is listed. Variables are defined in Appendix A. The lagged firm-level controls included in the regression but not reported in the Panel are the same as in Table 2, namely *ROA*, *Capital expenditures*, *Dividend dummy*, *Focus*, *Leverage*, *MTB-equity*, *Size*, and *Volatility*. The lagged (included but not reported) country level controls include *GDP growth*, *ln(Trade openness)*, *Government orientation*, *LMP*, *Union membership*, and *Tertiary education*. Similarly, Panel B reports the results of separate regressions of Tobin's *q* on EPL for young and mature firms. With the exception of *MTB-equity*, these regressions include (but do not tabulate) the same lagged firm-level and country-level controls as the regressions in Panel A. All regressions also include firm and industry-year fixed effects. Standard errors are clustered at the country level and reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% level, respectively. The sample covers firms listed in 16 countries during the years 1985 – 2010.

*Panel A: EPL and innovation effort in young and mature firms*

| | Dependent variable: *R&D* | | | |
|---|---|---|---|---|
| | Young firms | | Mature firms | |
| | (1) | (2) | (3) | (4) |
| $EPL_{t=-1}$ | 0.013 | | 0.010* | |
| | (0.009) | | (0.006) | |
| $EPL^{Up}_{t=-1}$ | | 0.017 | | –0.004 |
| | | (0.017) | | (0.005) |
| $EPL^{Down}_{t=-1}$ | | –0.013 | | –0.020*** |
| | | (0.009) | | (0.007) |
| Firm-level controls | YES | YES | YES | YES |
| Country-level controls | YES | YES | YES | YES |
| Firm fixed effects | YES | YES | YES | YES |
| Industry-year fixed effects | YES | YES | YES | YES |
| Observations | 36,123 | 36,123 | 33,725 | 33,725 |
| R2 | 0.841 | 0.841 | 0.783 | 0.783 |

*Panel B: EPL and Tobin's q in young and mature firms*

| | Dependent variable: *ln(q)* | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Young firms | | | | Mature firms | | | |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| R&D | 0.034*** | 0.034*** | 0.035*** | | 0.059 | 0.060 | 0.073** | |
| | (0.008) | (0.009) | (0.007) | | (0.041) | (0.041) | (0.031) | |
| $EPL^{Up}_{t=-1}$ | | –0.073 | –0.073 | –0.073 | | 0.020 | 0.021 | 0.020 |
| | | (0.064) | (0.064) | (0.064) | | (0.030) | (0.030) | (0.029) |
| $EPL^{Down}_{t=-1}$ | | 0.232*** | 0.234*** | 0.231*** | | 0.105*** | 0.108*** | 0.104*** |
| | | (0.034) | (0.030) | (0.039) | | (0.029) | (0.032) | (0.029) |
| $EPL^{Down}_{t=-1} \times$ R&D | | | –0.009 | | | | –0.058** | |
| | | | (0.032) | | | | (0.023) | |
| Firm-level controls | YES | YES | YES | YES | YES | YES | YES | YES |
| Country-level controls | YES | YES | YES | YES | YES | YES | YES | YES |
| Firm fixed effects | YES | YES | YES | YES | YES | YES | YES | YES |
| Industry-year fixed effects | YES | YES | YES | YES | YES | YES | YES | YES |
| Observations | 36,125 | 36,125 | 36,125 | 36,125 | 33,737 | 33,737 | 33,737 | 33,737 |
| $R^2$ | 0.803 | 0.804 | 0.804 | 0.804 | 0.772 | 0.773 | 0.783 | 0.772 |

## Table 5: EPL as a proxy for product market competition

The table reports the results of regressions that control for product market competition (*PMR*) in the relation between EPL and Tobin's *q*. Variable definitions are in Appendix A. The regressions include (but do not report) the same lagged firm-level and country-level controls as the regressions in Table 3. The regressions also include firm and industry-year fixed effects. Standard errors are clustered at the country level and reported in parentheses. *** indicates significance at the 1% level. The sample covers firms listed in 16 countries. Since data on PMR are only available starting in 1998, the sample period is 1998 – 2010.

| | Dependent variable: *ln(q)* | |
|---|---|---|
| | Full sample | |
| | (1) | (2) |
| $EPL^{Down}_{t=-1}$ | 0.151*** | 0.146*** |
| | (0.044) | (0.042) |
| $PMR_{t=-1}$ | | –0.143*** |
| | | (0.042) |
| Firm-level controls | YES | YES |
| Country-level controls | YES | YES |
| Firm fixed effects | YES | YES |
| Industry-year fixed effects | YES | YES |
| Observations | 93,316 | 93,316 |
| R2 | 0.776 | 0.777 |

## Table 6: EPL and operating flexibility

The table tests whether EPL affects the operating flexibility of firms. Variable definitions are in Appendix A. Panel A estimates a conditional logit regression with *Multi-segment firm* as the dependent variable. The sample is limited to firms that were single-segment firms in the previous year. The regression includes but does not report coefficient estimates for the same lagged firm-level and country-level controls as Table 2. The regression also includes industry-year fixed effects. Panel B reports the results of regressions of capital expenditures and employment growth on EPL. Whereas regressions 1 and 3 look at single-segment firms, regressions 2 and 4 look at multi-segment firms. The lagged firm-level and country level controls are the same as in Panel A, except we drop the lagged *Capital expenditures* from the list of country-level controls in regressions 1 and 2. The regressions also include firm and industry-year fixed effects. Standard errors are clustered at the country level and reported in parentheses in both panels. Robust standard errors are reported in parentheses. *** indicates significance at the 1% level. The sample covers firms listed in 16 countries during the years 1985 – 2010.

*Panel A: Propensity to diversify*

| | Dependent variable: *Multi-segment firm* |
|---|---|
| $EPL^{Up}_{t=-1}$ | 0.072 |
| | (0.082) |
| $EPL^{Down}_{t=-1}$ | 0.440*** |
| | (0.074) |
| Firm-level controls | YES |
| Country-level controls | YES |
| Firm fixed effects | NO |
| Industry-year fixed effects | YES |
| Observations | 22,957 |
| Pseudo R2 | 0.023 |

*Panel B: Capital expenditures*

| | Dependent variable: *Capital expenditures* | | Dependent variable: *Employment growth* | |
|---|---|---|---|---|
| | Single-product firms | Multi-product firms | Single-product firms | Multi-product firms |
| | (1) | (2) | (3) | (4) |
| $EPL^{Up}_{t=-1}$ | –0.002 | 0.003 | –0.002 | 0.003 |
| | (0.003) | (0.002) | (0.003) | (0.002) |
| $EPL^{Down}_{t=-1}$ | 0.011*** | 0.003 | 0.011*** | 0.003 |
| | (0.003) | (0.003) | (0.003) | (0.003) |
| Firm-level controls | YES | YES | YES | YES |
| Country-level controls | YES | YES | YES | YES |
| Firm fixed effects | YES | YES | YES | YES |
| Industry-year fixed effects | YES | YES | YES | YES |
| Observations | 25,651 | 51,827 | 25,651 | 51,827 |
| R2 | 0.614 | 0.563 | 0.614 | 0.563 |

## Table 7: EPL, operating flexibility, and Tobin's q

The table reports the results of regressions of Tobin's *q* on EPL. Variable definitions are in Appendix A. Regressions 1 and 2 of split the sample in single-segment and multi-segment firms. The lagged firm-level and country-level control variables are the same as in Table 3. The regressions include firm and industry-year fixed effects. Standard errors are clustered at the country level and reported in parentheses. * and *** indicate significance at the 10% and 1% level, respectively. The sample covers firms listed in 16 countries during the years 1985 – 2010.

| | Dependent variable: *ln(q)* | |
|---|---|---|
| | Single-segment firms | Multi-segment firms |
| | (1) | (2) |
| $EPL^{Up}_{t=-1}$ | –0.002 | 0.005 |
| | (0.032) | (0.021) |
| $EPL^{Down}_{t=-1}$ | 0.195*** | 0.086* |
| | (0.037) | (0.051) |
| Firm-level controls | YES | YES |
| Country-level controls | YES | YES |
| Firm fixed effects | YES | YES |
| Industry-year fixed effects | YES | YES |
| Observations | 25,689 | 51,870 |
| R2 | 0.791 | 0.817 |

## Table 8: EPL and financial flexibility

The table splits the sample firms in dividend payers and non-payers and replicates the regression specification (6) in Table 3 for the respective subsamples. All regressions include firm and industry-year fixed effects. Standard errors are clustered at the country level and reported in parentheses. ** and *** indicate significance at the 5% and the 1% level, respectively. The sample covers firms listed in 16 countries during the years 1985 – 2010.

| | Dependent variable: *ln(q)* | | | |
|---|---|---|---|---|
| | Dividend non-payers$_{t=-1}$ (financially constrained firms) | | Dividend payers$_{t=-1}$ (financially unconstrained firms) | |
| | (1) | (2) | (3) | (4) |
| $EPL_{t=-1}$ | –0.170*** | | –0.032 | |
| | (0.040) | | (0.020) | |
| $EPL^{Up}_{t=-1}$ | | –0.036 | | 0.042** |
| | | (0.085) | | (0.021) |
| $EPL^{Down}_{t=-1}$ | | 0.186*** | | 0.088*** |
| | | (0.042) | | (0.022) |
| Firm-level controls | YES | YES | YES | YES |
| Country-level controls | YES | YES | YES | YES |
| Firm fixed effects | YES | YES | YES | YES |
| Industry-year fixed effects | YES | YES | YES | YES |
| Observations | 53,912 | 53,912 | 70,905 | 70,905 |
| R2 | 0.731 | 0.731 | 0.818 | 0.818 |

## Table 9: Operating and financial flexibilities and Tobin's q

The table replicates the main regressions of Table 3 and examines whether operating and financial flexibilities can explain the impact of EPL on *q*. All regressions include firm and industry-year fixed effects. Operationally constrained firms are single-segment firms. Financially constrained firms are firms that do not pay dividends. Standard errors are clustered at the country level and reported in parentheses. ** and *** indicate significance at the 5% and the 1% level, respectively. The sample covers firms listed in 16 countries during the years 1985 – 2010.

| | Dependent variable: *ln(q)* | |
|---|---|---|
| $EPL^{Up}_{t=-1}$ | 0.020 | –0.008 |
| | (0.022) | (0.038) |
| $EPL^{Down}_{t=-1}$ | 0.119*** | 0.074 |
| | (0.034) | (0.052) |
| Operationally and financially constrained $_{t=-1}$ | | –0.080*** |
| | | (0.021) |
| $EPL^{Down}_{t=-1}$ × Operationally and financially constrained $_{t=-1}$ | | 0.054** |
| | | (0.025) |
| Firm-level controls | YES | YES |
| Country-level controls | YES | YES |
| Firm FE | YES | YES |
| Industry-year FE | YES | YES |
| Observations | 61,271 | 49,751 |
| $R^2$ | 0.764 | 0.820 |

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