Innovation and the Structure of Employment Contracts *

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Abstract

We exploit the appealing institutional setting of the Spanish labor market to show that the use of more flexible (shorter and cheaper-to-terminate) contracts with labor increases firm's innovation. We distinguish between different types of innovation (frontier vs adoptive, domestic vs imported technology) to shed light on the mechanism behind the effect. The evidence is consistent with both flexible labor contracts reducing financial constraints of the firm, but at the expense of lower human capital investment. We build the identification strategy on the exogenous inter-temporal and cross-regional variation in government programs, which aimed at an increase in worker job security, and discouraged firms from using the more flexible ("fixed-term") contracts. This setting, akin to a natural experiment, allows us to identify the effects of interest in the instrumental variables framework, also controlling for unobserved heterogeneity.

Keywords: Innovation, Fixed-term Contracts, Employment Protection, Financial Constraints

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1 Introduction

Innovation and technology adoption have a central role in driving productivity and economic growth (Romer, 1990; Aghion and Howitt, 1992). As innovation is ultimately driven by people, an important question is how the structure of labor contracts in a firm affects innovation. In this paper we examine this question empirically, by focusing on one major aspect of a labor contract: its length (and the associated firing cost).

On the one hand, the ability to hire workers on flexible (short and cheap-to-fire) contracts constitutes a significant part of a firm's operating flexibility (Kuzmina, 2014), thereby allowing firms to lay off the unproductive workforce when negative economic shocks occur. This is in line with Caggese and Cuñat (2008) who show how flexible labor can help overcome financial constraints of the firms. On the margin, this would imply that firms that offer flexible contracts innovate more, as a large literature has shown how lower financial constraints lead to more innovation and growth[1].

However, such flexibility on the firm side potentially comes with another effect that is especially relevant for innovation that is almost by definition a human capital intensive task. Specifically, as firm-specific human capital is not fully transferable across firms, it requires longer contracts and job security to invest in (Wasmer, 2006). Similarly, Manso (2011) shows how commitment to longer contracts and job security is required to motivate innovation. In this line of argument, firms offering flexible contracts may not induce sufficient investment in human capital and will thus innovate less. These two major mechanisms work in the opposite direction, making it ultimately an empirical question, and potentially explaining why the recent literature that has considered the effect of employment protection on innovation (e.g. Acharya, Baghai, and Subramanian, 2014, Griffith and Macartney, 2014) has reached differential conclusions.

Griffith and Macartney (2014) argue that the effect of employment protection likely depends on the nature of innovation: frontier (radical) vs adoptive (imitative), and most data do not allow to neatly separate these two types. Unlike previous work, we are able to measure a whole range of different innovation activities, both in terms of expenditures and outputs. Specifically, we can

[1] E.g. Aghion, Howitt and Mayer-Foulkes (2005), Herrera and Minetti (2007), Benfratello, Schiantarelli and Sembenelli (2008) for adoptive innovation.

separately look at not only frontier innovation (as measured by R&D expenditures and patenting activity), but also on adoptive innovation (import of technology, product innovation, process innovation, and assimilation of foreing technologies). Additionally, we can differentiate between R&D activities that are performed in-house and those that are outsourced (subcontracted R&D). To the best of our knowledge, we are the first to examine these important facets of innovation together and relate them to labor contracts. We do so in an attempt to illustrate various mechanisms behind the potenial effects of employment protection on innovation.

Another challenge that is often present in this type of work is endogeneity. Firms are likely to select their contracts in expectation of future projects, and both variables are likely to be driven by shocks to the economic environment unobserved to econometrician. Our identification strategy (adapted from Kuzmina, 2014) solves this problem by using many layers of variation in government programs in Spain that have incentivized firms to convert their employees to longer contracts. An additional important feature of our institutional setup is that the firing cost is the only difference across the two main types of employment contracts that exist in Spain, and our data allow us to directly observe the composition of employment contracts at the firm level. We thus relate the firm-specific share of workers on flexible contracts to measures of its innovation activity. Finally, the exogenous changes in this variable mostly correspond to changes in the terms of contract with the *same* employee, rather than of a change in the composition of employees. This is important, because it automatically ensures that other structural characteristics of the labor force that may relate to innovation (such as female composition or skill intensity) do not change in our experiment.

We find a positive effect of flexible contracts on total innovation effort of firms. We argue that it is important to disagregate these expenditures, and by doing so we observe that the share of flexible contracts does not affect the amount of the local R&D spending performed within the boundaries of the firm, which also reflects in no change in patenting activity (neither locally, no abroad). On the opposite, we find a large and signficant effect on subcontracted R&D spending and on import of technology As a result, the share of outsourced technological effort increases by about 3-4pp for every 10pp of the share of flexble contracts. In other words, when firms (for exogenous reasons) have to rely on longer employment contracts, they can do disproportionately more of R&D in house,

however less of total technological effort. This is consistent with firms having some optimal amount of in-house R&D, but varying how much of outsourced technology they subcontract and/or buy from abroad. This suggests that both the adjustment cost and the human capital channels are important.

Then we explore how adoptive innovation changes with the share of flexible contracts. We find large and significant positive effects on product innovation. By disagregating product innovations into various types, we observe that the effects are largest for product innovation that incorporates new functions and new design. These types of product innovation are most likely of all to be non-frontier, which is consistent with the general results on outsourced innovation highlighted above. They are also likely to be the types of "lighter" innovation that is not necessarily productivity-improving – an implication that we test further. At the same time, there are virtually no effects on process innovation, except for some evidence towards more process innovation that involves new organizational methods – those that deal primarily with people and the organization of work. Addtionally, firms are significantly more likely to have performed active efforts to assimilate foreign technologies. Taken together, these results are consistent with the interpretation that when firms hire workers on flexible contracts, they use their existing processes with the knowledge inputs that exist in the world outside of them to increase new product varieties.

Finally, we explore if these changes are productivity-improving. By looking at levels and growth rates of labor productivity and real sales, we conclude that there is no robust effect of flexible contracts on productivity and growth of firms. This is consistent with the importance of the human capital channel: while firms outsource their R&D and are able to adopt some of the foreign technologies, the absense of worker job security potentially prevents firms from pushing the technological frontier, but firms rather move from one point on the technological frontier to another. A complementary interpretation of these results is that those technologies that firms adopt in response to the labor flexibility shock, are not necessarily productivity-improving. Our analysis broadly indicates that it is important to disagregate the source of innovation when looking at the effects of employment protection.

The rest of the paper proceeds as follows: Section 2 outlines the details of the institutional

environment (currenlty follows Kuzmina, 2018); Section 3 builds the identification strategy and describes the data; Section 4 presents the empirical results of the effect of employment flexibility on different types of innovation and productivity; Section 5 concludes and discusses policy implications.

2 Institutional Environment [follows Kuzmina, 2014]

2.1 Dual Labor Market

A dual labor market consisting of workers who are characterized by different degrees of job security exists in virtually every country, either informally (with "under-the-table" payments) or formally (with different legal contractual arrangements with employees).[2] Spain provides an excellent laboratory to study the effects of the structure of labor contracts on innovation of firms for several reasons.

First of all, the labor market in Spain is a formal dual market, which enables one to accurately measure the composition of the labor force in terms of employment contracts. Second, temporary contracts are not an artifact and are commonly used in practice there. In fact, the level of temporary employment in Spain (currently at 26% of all salaried workers as of 2017) has been the highest among the European countries for a long time, followed by Poland and the Netherlands (OECD, 2017). It is still not too far from the European average of 14.2%, suggesting that temporary employment contracts are important building blocks of the labor market system in Europe.

Finally, and more importantly, these two types of contracts are very similar across most dimensions and differ only in the associated explicit and implicit firing cost, and thus employment flexibility on the side of the firm. Specifically, workers on temporary and permanent contracts often perform the same job within a firm, and they are all covered by collective bargaining agreements that preclude firms from discriminating based on the contract type, e.g. by paying them different

[2] Although there is a debate on whether the U.S. have a dual labor market (see Saint-Paul, 1996, for an overview), the original models of the two tiers within regular employment were developed in the context of this country. As for non-regular employment, at least 6% of the employed in the U.S. can be classified as "temporary" workers (see Farber, 1999, and Addison and Surfield, 2006). These include agency and direct-hire temporaries, on-call workers, day laborers, and contract employees, and are on top of regular and self-employed workers. Informal employment can be also thought of having even less (virtually absent) job security, but it is harder to estimate accurately, and it is characterized by even more confounding differences from regular employment besides job security.

wages or providing different employment conditions (Jimeno and Toharia, 1994). Furthermore, these agreements are arguably exogenous for firms, since they apply to all firms equally irrespective of whether they participated in the actual bargaining process or not, and for most firms (85% of firms in manufacturing, as reported by Izquierdo et al, 2003) they are made at levels higher than the firm, such as industry provincial or industry national.

On the other hand, the difference in firing costs between the two types of contracts is dramatic. In terms of explicit cost, when a temporary worker is dismissed (or not converted into a permanent employee after having already been employed for the maximum legal limit of three years), a firm pays up to 12 days of wages in severance payments, as opposed to 33 to 45 days of wages for permanent workers (Jimeno and Toharia, 1994). The absolute difference is even larger, since both figures are per year of seniority, and permanent workers are more likely to have worked in the firm for longer. Additionally, permanent workers if fired would often sue firms for "unfair dismissal", thereby imposing substantial administrative costs on them, while temporary workers do not have such a right. And in terms of implicit firing cost, a firm may simply choose not to renew the temporary contract upon expiration of its term. Anecdotal evidence suggests that temporary contracts with some employees get renewed *every week*, providing the firm with exceptional flexibility through the option to downsize almost immediately, thereby reducing the wage bill for the next period, and escaping distress at the margin.

So why do firms have a mix of employment contracts, given that one type of a contract should not in principle dominate another in an equilibrium? Spain's dual labor market originated in the 1984 reform which recognized the need for flexibility in the labor market by extending largely the applicability of temporary employment contracts. After the reform, almost *all* new hires were in fact on temporary contracts (Guell and Petrongolo, 2007), suggesting that on the margin firms may have considered one type of contract to dominate the other – at least at the moment of choosing which contract to offer to a new hire.[3] Together with the pre-1984 variation in hiring cycles across firms (e.g. due to retirement of existing workers), this defined the time-series history-dependent

[3]Eventually temporary workers have to be converted to permanent contracts (or dismissed), so temporary employment is also hypothesized to work as a "stepping stone" towards regular employment – not only in Spain, but also in the U.S. (Farber, 1999) and the U.K. (Booth et al, 2002).

evolution of the share of temporary workers that each firm achieved by mid-1990s, when the new reforms, reversing the employment liberalization policy, were introduced. In the long-run, however, the equilibrium share of temporary workers is likely to be determined by the trade-off between firing flexibility on the temporary contract side and higher productivity on the permanent contract side (Blanchard and Landier, 2002), with several corresponding correlates identified in the literature. In particular, firms that value firing flexibility more (e.g. those that are subject to more volatile product demand, as in Abraham and Taylor, 1996, or more competition as in Aparicio-Fenoll, 2015), firms that have less need for firm-specific human capital investment, which requires employment protection (as in Jaggia and Thakor, 1994, or Wasmer, 2006), are likely to have a higher proportion of fixed-term workers on average.

Ultimately, investigating the effects of the structure of labor contracts on innovation of firms is very appealing in the framework of the Spanish institutional setup for several reasons. First, the difference across firms in the composition of employment contracts can fully characterize the difference in the degree of employment flexibility on the side of the firm, keeping other labor market effects, such as union-level bargaining, constant. Second, the large difference in firing costs between the two types of contracts implies that firms operating with different contract compositions will be far apart in terms of their operating flexibility, giving more statistical power in identifying the effect. Finally, the Spanish government has implemented a number of reforms that will help in terms of causal identification.

2.2 Region-Specific Government Labor Policies in Spain

Spain's dual labor market originated in the 1984 reform which recognized the need for flexibility in the labor market by extending largely the applicability of temporary employment contracts. As a result, their use quickly rose to 35% (29% in manufacturing) by 1995. Empirical evidence for some of the European countries[4] suggests that such dualism in the labor market may have negative effects on the economy. And indeed in the late 1990s the Spanish government partially reversed the employment liberalization policy by introducing subsidies to firms for converting temporary

[4]Blanchard and Landier (2002) for France; a survey by Dolado, García-Serrano and Jimeno (2002) for Spain.

contracts with existing workers into permanent ones and for hiring new workers from the unemployed on permanent contracts.

The Spanish government has subsidized the creation of permanent contracts at both the national and regional levels. Since national reform affects all firms equally and at the same time, one would not be able to credibly attribute within-firm changes in employment composition to the effect of the reform, rather than, for example, to some country-level macroeconomic shocks. On the other hand, the reforms at the regional level show much more variation due to the different timing of their implementation, distinct worker eligibility criteria (such as gender), and different amounts to be paid to firms in case of a new permanent contract creation.[5]

These regional subsidies were paid to the firm once at the time of creating the new permanent contract, either as a direct transfer to the firm or as a reduction of payroll taxes, per each contract.[6] In most region-years the two types of subsidies were exactly identical; therefore we do not differentiate across the two in our empirical analysis, and record the maximum available subsidy value for each region-year-gender. Also, as Guell and Petrongolo (2007) mention, over 90% of the new permanent hires in 1994-2002 in Spain were from temporary contracts, rather than from the unemployed. This implies that the results of our paper mostly correspond to the pure experiment of the change in the terms of contract with the *same* employee, rather than of a change in the composition of employees. This is very important, because it automatically ensures that other structural characteristics of the labor force (such as female composition or skill intensity) do not change in this type of experiment.

We summarize these maximum statutory subsidy amounts that a given firm could receive per contract by region, year, and gender of the worker in Table I.[7] [8] As can be seen from this table, the

[5] In terms of the regional composition, Spain is one of the most decentralized countries in the OECD: there are 17 autonomous communities, each having its own executive, legislative, and judicial powers; with tax devolution in the country similar to the U.S. (OECD, 2016). The regions are quite diverse, with Catalonia, Madrid, and Andalusia being the largest in terms of both population (about 6-8 mln people each) and GRP (comparable to e.g. Greece), and Cantabria and La Rioja being the smallest (0.3-0.5 mln people each and GRP comparable to e.g. Paraguay).

[6] The scope for manipulation on the part of the firm aimed at obtaining the subsidy without any real changes in employment is limited: only workers who have held a temporary contract within the same firm (or were unemployed) for a certain period of time, usually at least a year, are eligible for subsidized permanent contract creations.

[7] More information on these regional policies may be found in García-Pérez and Rebollo-Sanz (2009) who have assembled these data from multiple public sources.

[8] Sometimes it was not clear what this maximum value in Euro could be (e.g. Valencia in 1998-2000 offered subsidies as percentages of payroll tax). For these region-years I recorded a missing value. In my empirical analysis I

time profile of the policies is diverse: some regions, such as Andalucia, implemented these subsidies every year from 1997 onwards, some – only in certain years, while Catalonia, for example, did not introduce any regional-level subsidies at all during the sample period considered. One can also note a considerable variation in subsidy amounts across regions, years, and workers' genders that range from just 1653 Euros in Baleares community to more than 15000 Euros in Madrid per contract.

3 Data and Empirical Strategy

3.1 Data Description and Variables Definition

The results in this paper are based on three sets of data. We combine firm-level data, region-level data on subsidies, and industry-level data on the gender composition of the workforce.

The firm-level data come from the *Encuesta sobre Estrategias Empresariales* (ESEE) and span the years from 1994 to 2006. This is a panel dataset of Spanish manufacturing firms collected by the Fundación SEPI (a non-government organization) and the Spanish Ministry of Industry. The ESEE is designed to be representative of the population of Spanish manufacturing firms and includes on average about 1700 firms per year. The response rate in the survey is 80% to 100% annually, and when firms disappear over time due to attrition, new firms are re-sampled to ensure that the panel remains representative. The dataset contains information on both private and public firms. 14% of firms that enter the data with more than 200 employees will at some point trade on an exchange. Among smaller firms this percentage is less than 1%. Firms in the sample represent all 17 regions (autonomous communities) and 2-digit NACE industries.[9]

Our innovation variables are based on the firm-level responses to the questions about whether the firm made specific types of innovation in that year, as well as various types of reported innovation spending, and patenting activity. Precise variable definitions are available in the Appendix Table 0 and summary statistics are presented in Table I.

also did a robustness check imputing values from total wage bill information and the results were similar. Given that such imputation has to rely on additional assumptions, I opted to exclude such region-years from the main analysis.

[9]Details on the survey characteristics and data access guidelines can be obtained at http://www.fundacionsepi.es/esee/sp/svariables/indice.asp.

Firms in our dataset report three different types of innovation spending: internal R&D performed within the boundaries of the firm, external R&D that is subcontracted to other firms, and import of technology in the form of payment for licenses and technological assistance from abroad. We define each of these spendings separately, as a share of sales, and also look at their sum which is the total technological effort performed by the firm. On average only 40% of firms in our sample have some innovation spending based on this measure. This is also consistent with low average values of technology spending across these firms: on average it represents about 0.8% of sales (or about 2% of sales conditional on spending any positive amount). Based on these variables we also define the share of outsourced technology effort that equals the sum of external R&D and imported technology over total technology effort. On average about 16% of firm's technology comes from outside of the boundaries of the firm.

In terms of innovation output, we first look at frontier innovation output – patents. This is one of the most popular measures of innovation output, and our data futher allow to disaggregate them by patents registered in Spain and those registered abroad. On average about 7% of firms haveany type of patents, with about half of them registering patents abroad.

Following Guadalupe et al (2012), we also look at various types of adoptive innovation, related to process and product innovation, as well as efforts to assimilate foreign technologies. Since, at any point in time, the firm's technology can be characterized as the sum of innovations made up to that point, similar to Guadalupe et al (2012), we use the yearly binary variables on firm-level innovation to measure the firm's technology at time t as: $I_{it} = \sum_{j=t_0}^{t} I_{ij}$, where t_0 is the year the firm entered the data. Any differences in original technology levels across firms in the year they enter the data will be captured by the firm fixed effects in my empirical specifications. As a result, all the variation in a firm's innovative activity—and the resulting technology level—that we will later relate to changes in the composition of employment contracts occurs within the sample.

We further disagregate these measures by different types. In particular, among product innovations we consider all different (non-mutually exclusive) categories that are reported in ESEE. They are product innovations that incorporate new materials, new components, new design, and new functions. For process innovation these categories include process innovation that uses new

machinery and process innovation that uses new methods of organizing production.

Finally, we construct several measured of productivity and growth. These are the logarithm of labor productivity (defined as value added per worker) and the logarithm of real sales, as well as their growth rates. Firms in our sample on average grow by 3% a year and have the logarithm of real sales, equal to 16, which corresponds to approximately 8.8 million in real 2006 Euros. Average profitability, measured by a firm's operating profit margin (defined as the ratio of sales net of purchases and labor expenses, to sales), equals 22%. Average debt-to-assets rato is equal to 57%, which is somewhat higher than the usual book leverage ratios reported for European firms due to trade credit financing also being included in this variable[10]. These latter variables will be used as firm control variables in some of the analysis.

ESEE is a unique dataset in that besides such an extensive set of innovation-related variables and basic balance sheet variables, it also contains information on the types of labor contracts that workers hold in the firm, which is my main variable of interest. In particular, we can directly measure the fraction of workers employed on temporary contracts at an annual basis. As shown in Table I, 268 employees work in an average firm, 24% of whom have temporary contracts in the year the firm enters the data.

All firms report the location of their industrial plants and we use the region of the largest plant in terms of employment to merge firm-level data with the data on regional subsidies. Given that 85% of firms have just one plant and additional 6% of firms have two plants with both in the same region, this constitutes the exact merge for the majority of firms. Following Kuzmina (2018), Appendix Table 1a also reports the average values of maximum statutory subsidy amounts per eligible worker (i.e. per each new permanent contract created), as well as expected subsidy per employee (the instrument, defined below in Section 3.4), which are equal to 3514 and 815, respectively, which given the average yearly wage of about 29 thousand Euros, corresponds to the one-time subsidy covering about 8 weeks of salary for the worker that was actually converted from temporary to permanent, roughly corresponding to the numbers reported in García-Pérez and

[10] This measure specifically excludes pensions, deferred taxes and other provisions. It does, however, include trade credit, consistent with the argument in Rajan and Zingales (1995) who suggest that for firms that actively use this type of financing leverage measures should explicitly account for it.

Rebollo-Sanz (2009).

Finally, we use the data on the proportion of women and men across all types of workers by industry, as provided by the Spanish Labor Force Survey. These gender intensities ware used to construct the instrument in Section 3.4. They are measured as of the 4th quarter of 1993 and are listed in Appendix Table 1b, showing a considerable cross-industry variation. For example, more than three quarters of all employees in the "Apparel" industry are female, while women constitute less than 5% of all workers in the "Other transport equipment" industry. These industry ratios are quite stable over time, but in order to mitigate endogeneity concerns, they are kept fixed at the pre-sample year in the analysis.

3.2 Panel Framework

To explore the effect of a more flexible composition of employment contracts on firm's innovation, we estimate the following equation:

$$Y_{it} = \alpha_{rt} + \alpha_{st} + \beta Temp_{it-1} + X'_{it-2}\gamma + \eta_i + \epsilon_{it}, \tag{1}$$

where Y_{it} is an innovation variable of firm i in year t, α_{rt} are the region-year fixed effects, α_{st} are the industry-year fixed effects, $Temp_{it-1}$ is the proportion of workers on temporary contracts in the prior year, X'_{it-2} are various firm-level control variables (lagged 2 years) included in some specifications to account for firm-specific shocks, and η_i are firm fixed effects. We cluster standard errors throughout the paper at the firm and region-year levels (two-way), so that all statistics are robust to heteroskedasticity and arbitrary within-firm and within-region-year correlation.

The panel structure of the dataset allows us to explore what drives within-firm changes in innovation by holding constant time-invariant heterogeneity across firms. Some examples include whether the firm in general does more innovation, whether it is a small financially constrained firm, or whether its tasks on average require more human capital specificity.

In addition, including region-year fixed effects makes sure that the differences in innovation are not explained by firms locating in regions with more clusters of innovative firms, or in more credit-

abundant regions, and various macroeconomic shocks in these locations. Also, if there is generally more pressure from the society against firing workers in regions with higher unemployment rates and less innovative and risky firms locate there, region-year fixed effects will also capture such differences. At the same time, having industry-year fixed effects in all specifications makes sure that the results cannot be explained by differential shocks to innovation and employment patters across different industries.

3.3 Endogenous Choice of the Structure of Labor Contracts

Although the specification in equation (1) accounts for many sources of confounding variation, there is still a possibility for the time-varying unobserved component of the error term being correlated with the firm's choice of employment composition. There are many reasons why firms may choose the composition of employment contracts endogenously. One of them is the firm's desire to stimulate human capital investment, which can be time-varying depending on the outside investment opportunities. Wasmer (2006) models the idea that that employment protection in the form of longer-term contracts stimulates investment in firm-specific human capital. If the reason for offering permanent employment contracts is such a need for firm-specific human capital investment in highly-innovative firms, we would observe a spuriously low correlation between flexible employment and innovation. A similar type of selection, yet on the worker side, can happen if workers that are willing to invest into human capital sort into permanent contracts more in firms with higher innovation activity. Finally, Caggese and Cuñat (2008) point out that financially constrained firms may hire more temporary workers, thereby generating a "demand for flexibility". If such firms are also less innovative, this would also show up as a spuriously low correlation between flexible labor contracts and innovation. All these reasons suggest that the true causal effect of flexible contracts on innovation is likely to be more positive than the one implied by the simple panel OLS estimate.

These and similar reasons illustrate the importance of using of the variation in the proportion of temporary employment that would be orthogonal to firm's financial constraints, demand for human capital investments, worker self-selection and other reasons. In our paper, it is provided by the regional government subsidies, discussed in Section 2.2. We now proceed with a brief description of

how we use them in the instrumental variable framework.

3.4 Implementation of the Identification Strategy [follows Kuzmina, 2014]

To establish the relationship between employment flexibility and innovation of a firm, we estimate β in equation (1) through IV-2SLS using government labor policies as the source of variation. Firms were affected by these policies differentially depending on both the statutory amount of the subsidy in their region and the number of eligible temporary workers these firms had according to that particular region's criteria.

To exemplify the source of identification, let's consider, for example, a firm located in Baleares autonomous region. In 2000, such a firm was eligible to receive a one-time 1653 Euro subsidy for every female worker it converted from a temporary employment contract to a permanent contract. But if the firm did not employ women on temporary contracts in the first place, this subsidy would not affect its proportion of temporary workers.

The intuition behind the identification strategy can be further illustrated by the similarity with a difference-in-differences approach. A given increase in the statutory subsidy amount brings a larger increase in incentives to substitute away flexible contracts to firms that employ more workers that are eligible for subsidization (women on temporary contracts in the above example). The effect of the reduction of flexible employment can then be estimated by comparing innovation across firms that have high and low eligibility to substitute flexible contracts. Inasmuch as the cross-sectional variation in the proportion of eligible workers is driven by predetermined firm characteristics, their potential direct effect on innovation can be controlled for with firm fixed effects. At the same time, region-year fixed effects capture all time-series variation in temporary employment within regions, which could be related to the relative size of regional budgets and corresponding governmental choices of subsidy amounts, as well as region unemployment rates and other macroeconomic conditions.

The identification assumption of such a test is that the remaining variation is not correlated

with things such as a firm's opportunity set, financial constraints, or other firm-specific shocks. Importantly, this also means that the actual amounts of subsidies received by firms would not constitute a valid instrument, since firms may endogenously self-select into participating in the regional subsidy program depending on their current unobservable characteristics. The expected amount of subsidy that a given firm in a given region was eligible to receive in a given year, on the other hand, is by construction unrelated to firm's current conditions.[11] In other words, one can use the following expected subsidy amount to predict the shift in a firm's use of temporary labor:

$$ExpectedSubsidy_{it} = \sum_{g} w_{i0}^{T,g} \cdot Subsidy_{grt} \ , \tag{2}$$

where $Subsidy_{grt}$ is the maximum statutory subsidy allowed by the government in region r in year t for a worker of gender $g \in \{\text{female; male}\}$ (as listed in Appendix Table 1a), and $w_{i0}^{T,g}$ is the firm-specific proportion of temporary workers by gender (which is held constant at the year the firm enters the data to avoid any endogenous gender substitution; that year is subsequently dropped from the estimation).[12] I also express the subsidy amount in real 2006 Euros by deflating it using the industry-level producer price index and use its lagged value in the analysis.[13]

This instrument calculates the expected total real Euro value of subsidies that a given firm would receive per employee if it converted all of its temporary contracts into permanent contracts. It can be further described as the expected wage bill reduction per employee.[14] As summarized in Table I under "Expected Subsidy per Employee" this expected per-employee wage reduction

[11] A similar dichotomy between expected and actual values is present in Paravisini (2008) who studies the effect of bank financial constraints on lending: although actual amounts of external bank financing are endogenous, the expected amounts can be used as a valid instrument for bank sources of capital.

[12] ESEE allows observing only the overall proportion of temporary workers (which is already an improvement upon other datasets). Therefore, in order to predict the firm-level proportion of female and male temporary workers, we assume that firm-level contract composition is independent of the industry-level gender composition, i.e. that $w_{i0}^{T,g} = w_{i0}^{T} \cdot w_{s0}^{g}$, where w_{i0}^{T} is the firm-specific proportion of temporary workers at the year it enters the data and w_{s0}^{g} is the industry-specific use of female and male employees as of pre-sample 1993 year. Even if there is a measurement error involved in this assumption, as long as it is uncorrelated with the error term of the main equation and the first stage is strong, the inference is consistent.

[13] The subsidy is either received in the year of the actual conversion, or it reduces the payroll tax to be paid next year. Thus, there is no presumption on whether the lagged or contemporaneous value should be used. The lagged value, however, turns out to be more significant in the reduced form estimation.

[14] One can argue that firms that are more labor-intensive (e.g. have a higher employment-to-assets ratio) are more likely to be affected in the aggregate, as they can receive a higher total value of the subsidy per dollar of assets. Our instrument captures this idea fully, as long as these firms convert proportionately more workers than the less labor-intensive firms, as a result of these higher incentives.

amounted, on average, to 815 Euro. Although this variable may appear to implicitly assume that all eligible workers are converted, this does not have to be the case for the instrument to work, since it can also be interpreted in the intention-to-treat framework. The expected subsidy constitutes arguably a valid instrument since it combines predetermined firm eligibility (defined by its pre-existing practices and the intrinsic characteristics of its industry; to be filtered out by firm fixed effects) with the variation in government interventions that is orthogonal to firms conditional on the region-year characteristics.[15]

4 The Effect of Flexible Employment Contracts on Innovation and Productivity

4.1 Frontier Innovation

First, we explore how spending on various types of frontier innovation is affected by the type of contracts that the firm offers to workers. Table II reports the results of estimating (1) for different dependent variables, with and without controls.[16]

In columns 1 and 2, we look how the probability of undertaking any type of technology effort – either by doing R&D internally, or externally by subcontracting to third parties, or by importing foreign technology – changes with the share of flexible contracts. Theoretically this effect is ambiguous due to (at least) two forces that act in different directions. Specifically, while the labor adjustment costs story suggests that flexible contracts should encourage firm's innovation, the human capital story implies the opposite. Empirically, we find some evidence towards the former story dominating the latter, since the coefficient is broadly positive, albeit not highly statistically significant (p-values in these specifications are 10% and 6% respectively). The economic magnitude of the coefficient in

[15] One may be concerned about the exclusion restriction of the instrument, since the policy does not only affect the composition of labor contracts, but it is also a small subsidy (or a tax credit) to the firm, which may be used directly to overcome financial constraints and finance innovation on the margin. If this is the case, our coefficients will have a downward bias and hence are a conservative estimate of the true effect of flexible employment on innovation, which is then only more positive.

[16] The relevant first-stage coefficients are -0.025 and -0.036, respectively, both highly statistically significant (as indicated by F-statistics in the last row of the table). They imply that an expected per-worker subsidy of 1000 Euro incentivizes a firm to reduce its proportion of temporary workers by 2.5pp (3.6pp).

column 2 (0.350) suggests that when a firm hires 10pp more of workers on flexible contracts (which is about one within-firm standard deviation in our data), the probablity of spending on any type of innovation increases by 3.5pp (which is about one-tenth of the unconditional probability).

Columns 3 and 4 support this result by looking at total spending on innovation as a percentage of sales (measured in percentage points for convenience). These coefficients are significant at 5% and 10% levels, respectively. The economic magnitude implies that a 10pp point increase in the share of flexible contracts increases a firm's spending on innovation by 0.09pp, which is about a tenth of what an average firm spends on innovation.

While this evidence is illustrative mainly on the net effect on innovation through various mechanisms, we do a more direct investigation in columns 5 to 10 by looking at individual components of total spending. A very interesting pattern arises here. In particular, we observe that there is no significant effect on R&D performed within the boundaries of the firm (columns 5 and 6) – neither statistically, nor economically. Its magnitude is nil, especially for a component which constitutes the largest share of total innovation spending.

At the same time, there is a large and significant increase in subcontracted R&D (columns 7 and 8): a 10pp increase if the share of flexible contracts makes firms increase their subcontracted R&D spending by 0.05pp, which is more than a quarter of the unconditional average. Additionally, firms also spend more on foreign technology (in the form of licences and technical assistance), as indicated by columns 9 and 10. As a result, the overall share of outsourced technological effort (spending on subcontracted R&D and imported technology over total spending on technology) increases by 3-4pp for every 10pp change in the share of flexible contracts.

Taken together this evidence indicates, that while hiring workers on flexible contracts may reduce adjustment costs to the extent of promoting innovation on the margin, it does so only for the technological effort performed outside of the boundaries of the firm. In other words this flexibility of labor contracts comes at the expense of having to perform the frontier innovative activities outside of the firm, which is direct evidence of the human capital story. Reiterating, our evidence is consistent with the interpretation that firms that (for exogenous reasons) offer longer contracts that provide job security to workers can do disproportionately more of in-house R&D –

for human capital reasons, but less of total innovation – for adjustment costs reasons.

So now we proceed by looking at whether these innovation expenditures are fruitful. In Table III we estimate (1) for measures of patenting activity. Specifically, we look at total patents of the firm (columns 1 and 2), as well as disagregate them by those registered locally in Spain (columns 3 and 4) and abroad (columns 5 and 6). Quite expectedly, firms don't do any better or worse in terms of these measures of frontier innovaton output when they hire more workers on flexible contracts.[17] This is consistent with virtually no change in local R&D expenditures, since the outputs of outsourced R&D and of the imported technologies are likely to be patented by other firms.

Since innovation output may take more than a year, for robustness we additionally explore one-year forward values of the same variables in columns 7 to 12. Although one coefficient is significant at 10% level, there is no robust evidence of any effect of the share of flexible contracts on patenting, even one year afterwards. If any, it is positive, rather than negative, which makes it consistent with Griffiths and Macartney (2014), who document a negative relation between employment protection and radical innovation.

4.2 Adoptive Innovation

Next we proceed by looking at various types of adoptive innovation, by looking at product innovation (Table IV) and process innovation and efforts to assimilate foreign technologies (Table V). While ex ante one may attribute some of the changes in product and process innovation to frontier technology, the disagregated results suggest that it is likely the adoptive part of this innovation that changes with the share of flexible employment contracts.

In Table IV we consider product innovation: any (columns 1 and 2) and disagregated by type (columns 3 to 10). The results robustly indicate that firms undertake more of product innovation when hiring workers on more flexible contracts. The magnitude of the coefficient in column 2 indicates that for each 10pp increase in the share of flexible contracts, a firm is 20pp more likely to have undertaken an additional product innovation of any type.

[17] Given that very few firms in sample ever register patents, we have also looked at the probability of patenting activity as the dependent variable, and the results are similiar.

Then we disagregate product innovations into those incorporating new materials (columns 3 and 4), new components (columns 5 and 6), new design (columns 7 and 8), and new functions (columns 9 and 10), all non-mutually exclusive. While there is evidence virtually for each component (except for product innovation that incorporates new components, for which the coefficients are positive, but not statistically significant), the most robust results are on product innovation that incorporates new functions and new design, both in terms of statistical significance and economic magnitude.

This is interesting, because these are the types of product innovation that are most likely of these four types to be non-frontier and more adoptive in nature, which is consistent with the results on outsourced innovation highlighted in the previous section. They are also likely to be the types of "lighter" innovation that is not necessariy productivity-improving – an implication that we test in the next subsection.

Additionally, as highlighted in Table V columns 1 and 2, firms are more likely to have performed active efforts to assimilate foreign technologies (which are adoptive by definition). Unlike the import of foreign technology reported in the previous section, which is a cost, this variable can be considered as the output of this type of adoptive innovation[18]. The results are again consistent with those of the previous section: When firms hire workers on flexible contracts, they use knowledge inputs that exist in the world outside of them.

In Table V we further consider process innovations of any type (columns 3 and 4), as well as those involving new machinery (columns 5 and 6) and new methods of organizing production (columns 7 and 8) separately. Again, an interesting pattern arises. While there is no effect of the share of flexible contracts on the overall process innovaton and on process innovation that uses new machinery, that likely relate to "hard capital", there is a significant and large in magnitude positive efffect on process innovation that involves new organizational methods ("knowledge" or "organizational capital"). As indicated by Guadalupe et al. (2012), these constitute organizational innovations that deal primarily with people and the organization of work, such as "practices to improve knowledge sharing", "education and training systems", and "new methods for distributing

[18]Because this variable is reported in the survey only every four years, rather than annually, its stock grows at a 4 times lower rate than other variables, so that the absolute magnitude of this coefficient and the unconditional mean of this variable are 4 times lower mechanically.

responsibilities and decision making". These disagregated results additionally suggest that skill considerations likely play no role in the results: if flexible contracts indeed implied lower skill of workers, we could expect firms to innovate especially in the hard capital dimension, rather than organizational.[19] [20]

4.3 Productivity

The findings so far indicate that firms when hiring more workers on flexible contracts (i.e. not constrained by labor adjustment costs) use their existing processes in combination with foreign technology, to produce new product varieties. At the same time, in terms of frontier innovation, there is a similar substitution towards outsourced (subcontracted and imported) technology, with no concurrent changes in local R&D and patents. But the main remaining question is whether firms *have to* refer to outsourced and foreign technology when hiring workers on flexible contracts, because they can't do it locally due to human capital considerations, or these contracts actually *allow* them to use these previously unavailable technologies that can now be efficiently accessed due to lower adjustment costs and financial constraints. While the evidence so far is consistent with both of these mechanisms to some extent, we attempt to shed light on this question by exploring the resulting effect on productivity and growth of firms. Intuitively, if flexible workers help firms to overcome adjustment costs and financial constraints and adopt previously unavailable technology, then we would expect to see a productivity boost.

In Table VI we estimate (1) for various measures of productivity and growth: labor productivity (value added per worker) – in logarithms (columns 1 and 2) and growth rate (columns 3 and 4), and real sales – also in logarithms (columns 5 and 6) and growth rate (columns 7 and 8). While there is some evidence on the negative effect on the logarithms of productivity (columns 1 and 5), these become zero once we control for pre-treatment values of covariates in columns 2 and 6. [21] A

[19] As also mentioned before, the skill component is mostly fixed by the construction of the instrument: most changes in the share of flexible workers induced by the instrument are contract conversions with the same employees, so skill and other characteristics of the labor force do not change discontinuously upon conversion.

[20] For all specifications in the paper we report their OLS counterparts in the Appendix. The coefficients in front of all innovation variables are smaller in magnitude (less positive), which is consistent with a downward bias in the OLS, coming from omitted variable bias, highlighted in Section 3.3, or measurement error.

[21] The results in column 6 of course have to be interpreted with caution due to a lagged dependent variable in the

similar situation arisies with growth variables (columns 3, 4, 7, and 8). Overall, there is no robust effect on productivity and growth of firms, which is consistent with the importance of the human capital channel.

An alternative interpretation of our findings is that the technologies that are adopted in response to the flexibility shock are not necessarily productivity-improving, but firms rather move from one optimal point on the technological frontier to another.

In the future we plan to look at various subsamples in the data that could help further disentangle these hypotheses.

5 Conclusion

Our analysis shows that there are differential effects of flexible contracts on various sources and types of innovation. In particular, when firms hire more workers on flexible contracts they increase their total innovation effort, but this happens solely due to subcontracted R&D spending and import of technology. There is no effect on in-house R&D. At the same time, firms also perform various types of adoptive innovation, such as product innovation that incorporates new design and functions, process innovation that involves new organizational methods, as well as make efforts to assimilate foreign technologies.

We argue that it is important to distinguish these various souces of innovation because they may have different implications for productivity and growth of firms. As we find no overall effect of flexible contracts on these variables, it suggests that the types of innovation that firms perform in response to employment flexibility shock are not necessarily productivity-improving, perhaps due to the importance of human capital investment that is likely to be complementary to innovation when pushing the technological frontier.

Our findings have implications for labor market reforms, especially in the light of the two opposing theoretical effects of flexible contracts.

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fixed-effects specification. We keep them for comparison with other similar specifications.

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Table I. Descriptive Statistics

Notes: The sample includes all firms in the ESEE (1994-2006). Variable definitions are provided in Appendix Table 0. All firm-level control variables are winsorized at 1% tails.

Variable	Mean	Std. deviation	N
Innovation Expenditures:			
Total Technology Effort, Dummy	0.402	0.490	18,931
Total Technology Effort, share of Sales, pp	0.816	1.926	18,750
Internal R&D, share of Sales, pp	0.439	1.199	18,804
External R&D, share of Sales, pp	0.191	0.648	18,871
Import of Technology, share of Sales, pp	0.138	0.563	18,851
Share of Outsourced Technology Effort	0.164	0.324	18,769
Frontier Innovation Output:			
ln (total Patents + 1)	0.087	0.364	18,885
ln (local Patents + 1)	0.061	0.272	18,888
ln (foreing Patents + 1)	0.040	0.221	18,898
Adoptive Innovation:			
Product Innovation	1.632	2.355	18,931
Incorporating new materials	0.829	1.650	18,931
Incorporating new components	0.817	1.685	18,931
Incorporating new design	1.284	2.079	18,931
Incorporating new functions	0.749	1.572	18,931
Process Innovation	2.182	2.455	18,931
Using new machinery	1.899	2.313	18,931
Using new methods of organization of production	1.241	1.886	18,931
Assimilation of Foreign Technologies	0.295	0.592	18,931
Productivity:			
ln Labor Productivity	10.561	0.660	18,764
Labor Productivity Growth	0.011	0.420	18,556
ln Sales	15.984	2.027	18,903
Sales Growth	0.030	0.201	18,883
Employment:			
Total Employment	268	781	18,931
Temp ($Temp_{it}$)	0.174	0.211	18,927
$Temp_0$	0.237	0.251	18,930
Subsidies:			
Maximum Statutory Subsidy per Eligible Worker ($Subsidy_{grt}$)	3 514	4 003	18,031
Expected Subsidy per Employee ($ExpectedSubsidy_{it}$)	815	1 541	18,031
Control and other Variables:			
Size (ln Sales)	15.984	2.027	18,903
Operating Profit Margin	0.221	0.136	18,897
Debt/Assets	0.571	0.230	18,365
Total Assets	62.4 mln	270 mln	18,365

Table II. Innovation Expenditures and Employment Flexibility

This table reports the results of estimating the following specification using the IV-2SLS framework:

$$Y_{it}=\alpha_{rt}+\alpha_{st}+\beta Temp_{it-1}+X_{it-2}'\gamma+\eta_i+\varepsilon_{it}\ ,$$

where Y_{it} is the relevant dependent variable of firm i in year t, $Temp_{it-1}$ is its proportion of workers on temporary contracts, lagged one year, α_{rt} are region-year fixed effects, α_{st} are industry-year fixed effects, η_i are firm fixed effects, and X_{it-2} are firm-level controls (lag2 of log of sales, operating profit margin, and debt-to-assets ratio); included in even-numbered specifications). Standard errors are two-way clustered at the region-year and firm level and are reported below the coefficients. The first year the firm appears in the sample is dropped from all regressions. The number of firms and observations excludes singletons. * indicates 10% significance; ** 5% significance; *** 1% significance.

	Total Technology Effort, Dummy		Total Technology Effort, share of Sales, pp		Internal R&D, share of Sales, pp		External R&D, share of Sales, pp		Import of Technology, share of Sales, pp		Share of Outsourced Technology Effort	
	1	2	3	4	5	6	7	8	9	10	11	12
Lagged Temp	0.191	0.350*	0.871**	0.915*	0.0727	0.108	0.466***	0.469**	0.268**	0.267	0.284***	0.377**
	(0.119)	(0.185)	(0.370)	(0.527)	(0.262)	(0.404)	(0.172)	(0.229)	(0.133)	(0.203)	(0.101)	(0.154)
Lagged2 ln Sales		0.0638***		0.0657		0.0361		0.0148		0.0111		0.0257***
		(0.0157)		(0.0510)		(0.0397)		(0.0193)		(0.0125)		(0.00986)
Lagged2 OPM		-0.0394		0.272*		0.0332		0.0600		0.109***		0.00401
		(0.0412)		(0.159)		(0.105)		(0.0624)		(0.0392)		(0.0270)
Lagged2 Debt/Assets		-0.00380		0.0673		-0.0118		0.0212		0.0257		-0.00406
		(0.0261)		(0.120)		(0.0786)		(0.0466)		(0.0381)		(0.0190)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region-year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of firms	2,266	2,038	2,256	2,030	2,262	2,035	2,263	2,038	2,262	2,033	2,257	2,030
Observations	17,434	14,494	17,252	14,364	17,308	14,399	17,376	14,457	17,357	14,435	17,268	14,372
1st stage F-statistic	39.05	24.83	39.56	25.18	39.59	25.20	38.97	24.82	38.94	24.80	39.61	25.17

Table III. Frontier Innovation Output and Employment Flexibility

This table reports the results of estimating the following specification using the IV-2SLS framework:

$$Y_{it}=\alpha_{rt}+\alpha_{st}+\beta Temp_{it-1}+X_{it-2}'\gamma+\eta_i+\varepsilon_{it},$$

where Y_{it} is the relevant dependent variable of firm i in year t, $Temp_{it-1}$ is its proportion of workers on temporary contracts, lagged one year, α_{rt} are region-year fixed effects, α_{st} are industry-year fixed effects, η_i are firm fixed effects, and X_{it-2} are firm-level controls (lag2 of log of sales, operating profit margin, and debt-to-assets ratio); included in even-numbered specifications). Standard errors are two-way clustered at the region-year and firm level and are reported below the coefficients. The first year the firm appears in the sample is dropped from all regressions. The number of firms and observations excludes singletons. * indicates 10% significance; ** 5% significance; *** 1% significance.

	Current						1 year Forward					
	ln (total Patents + 1)		ln (local Patents + 1)		ln (foreign Patents + 1)		ln (total Patents + 1)		ln (local Patents + 1)		ln (foreign Patents + 1)	
	1	2	3	4	5	6	7	8	9	10	11	12
Lagged Temp	0.0232	0.0838	0.0127	0.0564	0.00972	0.0142	0.0586	0.224*	0.0340	0.151	0.00956	0.0692
	(0.0873)	(0.137)	(0.0707)	(0.107)	(0.0474)	(0.0738)	(0.0888)	(0.134)	(0.0733)	(0.100)	(0.0426)	(0.0687)
Lagged2 ln Sales		0.0303***		0.0231***		0.0141**		0.0212*		0.0178**		0.00634
		(0.0107)		(0.00791)		(0.00665)		(0.0113)		(0.00873)		(0.00622)
Lagged2 OPM		0.00929		0.00790		0.00864		0.0127		0.0148		0.00443
		(0.0302)		(0.0232)		(0.0189)		(0.0320)		(0.0232)		(0.0189)
Lagged2 Debt/Assets		0.00576		-0.00723		0.0157		-0.00222		-0.0157		0.00922
		(0.0305)		(0.0229)		(0.0187)		(0.0295)		(0.0222)		(0.0172)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region-year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of firms	2,258	2,038	2,258	2,038	2,259	2,038	2,076	1,891	2,076	1,891	2,076	1,891
Observations	17,383	14,472	17,385	14,473	17,396	14,481	14,966	12,368	14,967	12,368	14,975	12,376
1st stage F-statistic	38.87	24.76	38.88	24.76	39.03	24.82	69.69	57.36	69.69	57.36	69.97	57.65

Table IV. Product Innovation and Employment Flexibility

This table reports the results of estimating the following specification using the IV-2SLS framework:

$$Y_{it}=\alpha_{rt}+\alpha_{st}+\beta Temp_{it-1}+X_{it-2}'\gamma+\eta_i+\varepsilon_{it},$$

where Y_{it} is the relevant dependent variable of firm *i* in year *t*, $Temp_{it-1}$ is its proportion of workers on temporary contracts, lagged one year, α_{rt} are region-year fixed effects, α_{st} are industry-year fixed effects, η_i are firm fixed effects, and X_{it-2} are firm-level controls (lag2 of log of sales, operating profit margin, and debt-to-assets ratio); included in even-numbered specifications). Standard errors are two-way clustered at the region-year and firm level and are reported below the coefficients. The first year the firm appears in the sample is dropped from all regressions. The number of firms and observations excludes singletons. * indicates 10% significance; ** 5% significance; *** 1% significance.

	Product Innovation		Incorporating new materials		Incorporating new components		Incorporating new design		Incorporating new functions	
	1	2	3	4	5	6	7	8	9	10
Lagged Temp	1.532**	2.007**	0.929**	1.266*	0.681	0.948	1.378***	1.845**	1.477***	1.985***
	(0.613)	(0.845)	(0.469)	(0.665)	(0.436)	(0.594)	(0.521)	(0.743)	(0.391)	(0.568)
Lagged2 ln Sales		0.215***		0.170***		0.164***		0.196***		0.0844*
		(0.0698)		(0.0476)		(0.0502)		(0.0635)		(0.0451)
Lagged2 OPM		-0.0649		-0.0831		-0.125		-0.0334		-0.0684
		(0.164)		(0.118)		(0.119)		(0.145)		(0.113)
Lagged2 Debt/Assets		0.237		0.115		0.0845		0.109		0.119
		(0.159)		(0.128)		(0.113)		(0.133)		(0.105)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region-year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of firms	2,266	2,038	2,266	2,038	2,266	2,038	2,266	2,038	2,266	2,038
Observations	17,434	14,494	17,434	14,494	17,434	14,494	17,434	14,494	17,434	14,494
1st stage F-statistic	39.05	24.83	39.05	24.83	39.05	24.83	39.05	24.83	39.05	24.83

Table V. Process Innovation and Adoption of Foreign Technology and Employment Flexibility

This table reports the results of estimating the following specification using the IV-2SLS framework:

$$Y_{it}=\alpha_{rt}+\alpha_{st}+\beta Temp_{it-1}+X_{it-2}'\gamma+\eta_i+\varepsilon_{it}\ ,$$

where Y_{it} is the relevant dependent variable of firm *i* in year *t*, $Temp_{it-1}$ is its proportion of workers on temporary contracts, lagged one year, α_{rt} are region-year fixed effects, α_{st} are industry-year fixed effects, η_i are firm fixed effects, and X_{it-2} are firm-level controls (lag2 of log of sales, operating profit margin, and debt-to-assets ratio); included in even-numbered specifications). Standard errors are two-way clustered at the region-year and firm level and are reported below the coefficients. The first year the firm appears in the sample is dropped from all regressions. The number of firms and observations excludes singletons. * indicates 10% significance; ** 5% significance; *** 1% significance.

	Assimilation of Foreign Technologies		Process Innovation		Using new machinery		Using new methods of organizing production	
	1	2	3	4	5	6	7	8
Lagged Temp	0.364***	0.512***	0.621	0.766	0.423	0.546	0.898*	1.099*
	(0.125)	(0.180)	(0.578)	(0.782)	(0.546)	(0.723)	(0.463)	(0.646)
Lagged2 ln Sales		0.0292*		0.445***		0.446***		0.205***
		(0.0153)		(0.0766)		(0.0725)		(0.0534)
Lagged2 OPM		-0.0349		-0.195		-0.253*		0.0418
		(0.0334)		(0.160)		(0.147)		(0.133)
Lagged2 Debt/Assets		0.0354		0.128		0.0435		0.163
		(0.0307)		(0.142)		(0.135)		(0.108)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region-year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of firms	2,266	2,038	2,266	2,038	2,266	2,038	2,266	2,038
Observations	17,434	14,494	17,434	14,494	17,434	14,494	17,434	14,494
1st stage F-statistic	39.05	24.83	39.05	24.83	39.05	24.83	39.05	24.83

Table VI. Productivity and Employment Flexibility

This table reports the results of estimating the following specification using the IV-2SLS framework:

$$Y_{it}=\alpha_{rt}+\alpha_{st}+\beta Temp_{it-1}+X_{it-2}'\gamma+\eta_i+\varepsilon_{it}\ ,$$

where Y_{it} is the relevant dependent variable of firm *i* in year *t*, $Temp_{it-1}$ is its proportion of workers on temporary contracts, lagged one year, α_{rt} are region-year fixed effects, α_{st} are industry-year fixed effects, η_i are firm fixed effects, and X_{it-2} are firm-level controls (lag2 of log of sales, operating profit margin, and debt-to-assets ratio); included in even-numbered specifications). Standard errors are two-way clustered at the region-year and firm level and are reported below the coefficients. The first year the firm appears in the sample is dropped from all regressions. The number of firms and observations excludes singletons. * indicates 10% significance; ** 5% significance; *** 1% significance.

	ln Labor Productivity		Labor Productivity Growth		ln Sales		Sales Growth	
	1	2	3	4	5	6	7	8
Lagged Temp	-0.229	-0.226	0.0391	-0.151	-0.310**	-0.0736	0.102**	0.0117
	(0.147)	(0.235)	(0.0579)	(0.140)	(0.154)	(0.152)	(0.0486)	(0.0653)
Lagged2 ln Sales		0.0558***		-0.0701***		0.431***		-0.152***
		(0.0181)		(0.0150)		(0.0385)		(0.0125)
Lagged2 OPM		-0.00359		-0.217***		-0.298***		0.0862***
		(0.0562)		(0.0622)		(0.0504)		(0.0325)
Lagged2 Debt/Assets		0.0425		0.000775		0.0702**		-0.0262*
		(0.0352)		(0.0304)		(0.0295)		(0.0151)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region-year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of firms	2,258	2,032	2,248	2,024	2,265	2,038	2,264	2,037
Observations	17,278	14,398	17,083	14,299	17,409	14,477	17,388	14,459
1st stage F-statistic	38.14	24.47	37.28	24.36	38.98	24.83	38.96	24.80

Appendix Table 0. Variable definitions

Innovation Expenditures:	
Total Technology Effort, Dummy	The firm spent a positive amount on internal or external R&D or import of technology, Dummy 0/1
Total Technology Effort, share of Sales, pp	The amount that the firm spent on internal + external R&D + import of technology, divided by total sales, *100
Internal R&D, share of Sales, pp	The amount that the firm spent on internal R&D, divided by total sales, *100
External R&D, share of Sales, pp	The amount that the firm spent on external (subcontracted) R&D, divided by total sales, *100
Import of Technology, share of Sales, pp	The amount that the firm spent on licenses and technical aid from abroad, divided by total sales, *100
Share of Outsourced Technology Effort	(External R&D + Import of Technology)/ Total Technology Effort; set to 0 if Total Technoogy Effort is 0.
Frontier Innovation Output:	
ln (total Patents + 1)	Logarithm of (1 + all patents that the firm registed in the current year)
ln (local Patents + 1)	Logarithm of (1 + patents that the firm registed in Spain I nthe current year)
ln (foreing Patents + 1)	Logarithm of (1 + patents that the firm registed abroad in the current year)
Adoptive Innovation:	The firm conducted:
Product Innovation	a product innovation (completely new products, or with such modifications that they are different from those produced earlier), accumulated stock of years
Incorporating new materials	a product innovation that incorporated new materials, accumulated stock of years
Incorporating new components	a product innovation that incorporated new components or intermediate products, accumulated stock of years
Incorporating new design	a product innovation that incorporated new design, accumulated stock of years
Incorporating new functions	a product innovation that incorporated new functions, accumulated stock of years
Process Innovation	a process innovation, accumulated stock of years
Using new machinery	a process innovation using new machinery, accumulated stock of years
Using new methods of organization of production	a process innovation using new methods of organizing production, accumulated stock of years
Assimilation of Foreign Technologies	efforts to assimilate imported technologies, with its own means or through a contract, accumulated stock of years
Productivity:	
ln Labor Productivity	Logarithm of firm's value added per worker, in 2006 Euros, deflated using the industry-level PPI
Labor Productivity Growth	One-year change in the logarithm of firm's value added per worker, in 2006 Euros, deflated using the industry-level PPI
ln Sales	Logarithm of firm's real sales, in 2006 Euros, deflated using the industry-level PPI
Sales Growth	One-year change in the logarithm of firm's real sales, in 2006 Euros, deflated using the industry-level PPI
Employment:	
Total Employment	Total employment at the end of the year
Temp ($Temp_{it}$)	Ratio of workers on temporary contracts relative to total employment
$Temp_0$	Ratio of workers on temporary contracts relative to total employment in the first year the firm is in the data

Appendix Table 0. Variable definitions (continued)

Subsidies:	
Maximum Statutory Subsidy per Eligible Worker ($Subsidy_{grt}$)	Maximum subsidy amount a firm is eligible to receive (defined in Section 2), in 2006 Euros, deflated using the industry-level PPI
Expected Subsidy per Employee ($ExpectedSubsidy_{it}$)	Expected subsidy amount a firm is eligible to receive (defined in Section 2), in 2006 Euros, deflated using the industry-level PPI
Control and other Variables:	
Size (ln Sales)	Logarithm of firm's real sales, in 2006 Euros, deflated using the industry-level PPI
Operating Profit Margin	Ratio of sales net of purchases and labor expenses to sales
Debt/Assets	Ratio of total debt (which is the sum of short-term and long-term debts) to total assets
Total Assets	Book value of total assets of the firm, in 2006 Euros, deflated using the industry-level PPI

Appendix Table 1a. Maximum Statutory Subsidies per Eligible Worker by Region, Year and Gender of the Worker

This table lists the maximum statutory amounts of region-specific subsidies for creating a permanent employment contract ($Subsidy_{grt}$) by region, year and gender of the worker, in current Euro amounts, excluding the special treatment provinces and disabled workers. The missing value indicates that the maximum amount is not available.

Year / Region	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Andalucia	0			4200					6012			4750	
Aragon	0				4200	5280			5500		3750 if male, 5280 if female	5280 if male, 4500 if female	4000 if male, 5280 if female
Asturias	0			4350	4500	0	4200				4500 if male, 5400 if female		
Baleares	0						0 if male, 1653 if female		0 if male, 1800 if female	0 if male, 4808 if female		0	3000
Canarias	0				3600		0						
Cantabria	0				3900	0	4507	4207 if male, 4808 if female					
Castilla-La Mancha	0				3000 if male, 3600 if female	0	3000 if male, 3600 if female				3000 if male, 4200 if female		
Castilla-Leon	0				5112	5115	4508				4000 if male, 4500 if female		
Catalonia	0												
Valencia	0				.			1875 if male, 2000 if female	1875 if male, 2250 if female	4400	2500 if male, 5000 if female	2000 if male, 4600 if female	4000 if male, 5000 if female
Extremadura	0			13402	14027	14028	4296 if male, 5217 if female	4455 if male, 5410 if female	6010	.	4500		
Galicia	0				4200	4207 if male, 4808 if female	4200 if male, 4808 if female	6000		3600 if male, 4200 if female	5400 if male, 6000 if female	3300 if male, 3900 if female	5000 if male, 7500 if female
Madrid	0				6000	7800	6600 if male, 9000 if female	12000	13824 if male, 15027 if female	12000	0 if male, 3000 if female	9100 if male, 10000 if female	7000 if male, 7800 if female
Murcia	0				6000		6000 if male, 9000 if female		4800 if male, 6000 if female	5400 if male, 6000 if female	5400		
Navarra	0				3000	4800						.	
Basque country	0				3600	7512 if male, 9014 if female					6000 if male, 7500 if female		
Rioja	0				4500	4491	6011					4508 if male, 5109 if female	

Appendix Table 1b. Gender Distribution of Employees in Manufacturing Industries

Notes: This table lists total number of employees, in thousands of people, in different manufacturing industries and the corresponding proportion of women, measured as of the 4th quarter of 1993. The data come from Encuesta de Población Activa. *Petroleum refinery firms are not included in ESEE, but reported here for completeness.

	Total	Men	Women	% Women
Total in manufacturing	2105.4	1638.4	466.9	**28.5%**
Food and beverages	331.1	242.7	88.4	**26.7%**
Tabacco	9.4	5.0	4.4	**46.8%**
Textiles	105.4	62.1	43.3	**41.1%**
Apparel	119.2	29.8	89.5	**75.1%**
Leather and Footwear	64.0	43.2	20.8	**32.5%**
Timber	59.0	54.1	4.9	**8.3%**
Paper	39.6	32.4	7.1	**17.9%**
Printing and publishing	113.4	82.7	30.7	**27.1%**
Petroleum refinery*	12.2	10.6	1.6	**13.1%**
Chemicals	128.4	93.9	34.5	**26.9%**
Plastic and rubber products	82.1	68.3	13.8	**16.8%**
Other nonmetal mineral products	140.6	124.5	16.1	**11.5%**
Basic metal products	99.4	92.1	7.3	**7.3%**
Fabricated metal products	169.8	156.2	13.6	**8.0%**
Industrial and agricultural equipment	130.8	120.2	10.6	**8.1%**
Office machinery	12.3	9.4	2.9	**23.6%**
Electric materials and equipment	59.7	44.6	15.1	**25.3%**
Radio and TV equipment	36.3	26.8	9.5	**26.2%**
Medical equipment and precision instruments	25.6	15.3	10.3	**40.2%**
Vehicles and accessories	178.1	162.0	16.2	**9.1%**
Other transport equipment	57.9	55.1	2.8	**4.8%**
Furniture and other manufacturing	126.3	102.7	23.6	**18.7%**
Recycling	4.8	4.6	0.2	**4.2%**

Appendix Table II. Innovation Expenditures and Employment Flexibility - OLS

This table reports the results of estimating the following specification using the OLS framework:

$$Y_{it}=\alpha_{rt}+\alpha_{st}+\beta Temp_{it-1}+X_{it-2}'\gamma+\eta_i+\varepsilon_{it},$$

where Y_{it} is the relevant dependent variable of firm i in year t, $Temp_{it-1}$ is its proportion of workers on temporary contracts, lagged one year, α_{rt} are region-year fixed effects, α_{st} are industry-year fixed effects, η_i are firm fixed effects, and X_{it-2} are firm-level controls (lag2 of log of sales, operating profit margin, and debt-to-assets ratio); included in even-numbered specifications). Standard errors are two-way clustered at the region-year and firm level and are reported below the coefficients. The first year the firm appears in the sample is dropped from all regressions. The number of firms and observations excludes singletons. * indicates 10% significance; ** 5% significance; *** 1% significance.

	Total Technology Effort, Dummy		Total Technology Effort, share of Sales		Internal R&D, share of Sales		External R&D, share of Sales		Import of Technology, share of Sales		Share of Outsourced Technology Cost	
	1	2	3	4	5	6	7	8	9	10	11	12
Lagged Temp	0.0371	0.0538**	0.175*	0.139	0.0271	0.0461	0.0579*	0.0413	0.0613*	0.0359	0.0347*	0.0223
	(0.0231)	(0.0264)	(0.0896)	(0.0981)	(0.0544)	(0.0609)	(0.0352)	(0.0412)	(0.0328)	(0.0391)	(0.0188)	(0.0226)
Lagged2 ln Sales		0.0648***		0.0596		0.0334		0.0110		0.0107		0.0225**
		(0.0149)		(0.0515)		(0.0381)		(0.0193)		(0.0138)		(0.00935)
Lagged2 OPM		-0.0345		0.227		0.0443		0.0523		0.113***		0.00642
		(0.0408)		(0.160)		(0.100)		(0.0610)		(0.0390)		(0.0261)
Lagged2 Debt/Assets		0.00639		0.0952		-0.0162		0.0392		0.0353		0.00593
		(0.0255)		(0.114)		(0.0730)		(0.0446)		(0.0369)		(0.0183)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region-year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of firms	2,279	2,053	2,270	2,046	2,276	2,051	2,276	2,053	2,275	2,048	2,271	2,046
Observations	18,231	15,239	18,047	15,107	18,105	15,144	18,173	15,202	18,152	15,178	18,065	15,117

Appendix Table III. Frontier Innovation Output and Employment Flexibility - OLS

This table reports the results of estimating the following specification using the OLS framework:

$$Y_{it}=\alpha_{rt}+\alpha_{st}+\beta Temp_{it-1}+X_{it-2}'\gamma+\eta_i+\varepsilon_{it},$$

where Y_{it} is the relevant dependent variable of firm i in year t, $Temp_{it-1}$ is its proportion of workers on temporary contracts, lagged one year, α_{rt} are region-year fixed effects, α_{st} are industry-year fixed effects, η_i are firm fixed effects, and X_{it-2} are firm-level controls (lag2 of log of sales, operating profit margin, and debt-to-assets ratio); included in even-numbered specifications). Standard errors are two-way clustered at the region-year and firm level and are reported below the coefficients. The first year the firm appears in the sample is dropped from all regressions. The number of firms and observations excludes singletons. * indicates 10% significance; ** 5% significance; *** 1% significance.

	Current						1 year Forward					
	ln (total Patents + 1)		ln (local Patents + 1)		ln (foreign Patents + 1)		ln (total Patents + 1)		ln (local Patents + 1)		ln (foreign Patents + 1)	
	1	2	3	4	5	6	7	8	9	10	11	12
Lagged Temp	0.0112	0.0299	0.00253	0.0163	0.00428	0.00915	0.00998	0.0281	-0.00288	0.00682	0.00283	0.0150
	(0.0183)	(0.0194)	(0.0148)	(0.0154)	(0.0102)	(0.0113)	(0.0201)	(0.0217)	(0.0165)	(0.0176)	(0.0112)	(0.0118)
Lagged2 ln Sales		0.0351***		0.0273***		0.0137**		0.0240**		0.0199**		0.00721
		(0.0109)		(0.00810)		(0.00627)		(0.0109)		(0.00830)		(0.00601)
Lagged2 OPM		0.000312		-0.00134		0.00989		-0.00177		0.00195		0.00117
		(0.0285)		(0.0219)		(0.0176)		(0.0325)		(0.0242)		(0.0181)
Lagged2 Debt/Assets		-0.00118		-0.0136		0.0146		-0.00461		-0.0178		0.00764
		(0.0295)		(0.0223)		(0.0174)		(0.0275)		(0.0206)		(0.0162)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region-year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of firms	2,271	2,053	2,271	2,053	2,272	2,053	2,084	1,898	2,084	1,898	2,084	1,898
Observations	18,182	15,219	18,184	15,220	18,195	15,228	15,676	13,033	15,677	13,033	15,685	13,041

Appendix Table IV. Product Innovation and Employment Flexibility - OLS

This table reports the results of estimating the following specification using the OLS framework:

$$Y_{it}=\alpha_{rt}+\alpha_{st}+\beta Temp_{it-1}+X_{it-2}'\gamma+\eta_i+\varepsilon_{it}\ ,$$

where Y_{it} is the relevant dependent variable of firm *i* in year *t*, $Temp_{it-1}$ is its proportion of workers on temporary contracts, lagged one year, α_{rt} are region-year fixed effects, α_{st} are industry-year fixed effects, η_i are firm fixed effects, and X_{it-2} are firm-level controls (lag2 of log of sales, operating profit margin, and debt-to-assets ratio); included in even-numbered specifications). Standard errors are two-way clustered at the region-year and firm level and are reported below the coefficients. The first year the firm appears in the sample is dropped from all regressions. The number of firms and observations excludes singletons. * indicates 10% significance; ** 5% significance; *** 1% significance.

	Product Innovation		Incorporating new materials		Incorporating new components		Incorporating new design		Incorporating new functions	
	1	2	3	4	5	6	7	8	9	10
Lagged Temp	0.0257	-0.0703	0.0502	0.00374	0.0974	0.0605	0.0218	-0.0745	0.110*	0.0875
	(0.114)	(0.127)	(0.0855)	(0.0933)	(0.0819)	(0.0887)	(0.102)	(0.110)	(0.0637)	(0.0671)
Lagged2 ln Sales		0.193***		0.155***		0.144***		0.177***		0.0624
		(0.0654)		(0.0451)		(0.0477)		(0.0595)		(0.0420)
Lagged2 OPM		-0.0133		-0.0597		-0.0755		0.00260		-0.00791
		(0.149)		(0.112)		(0.114)		(0.132)		(0.0997)
Lagged2 Debt/Assets		0.308**		0.155		0.125		0.181		0.189*
		(0.148)		(0.118)		(0.107)		(0.124)		(0.0994)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region-year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of firms	2,279	2,053	2,279	2,053	2,279	2,053	2,279	2,053	2,279	2,053
Observations	18,233	15,241	18,233	15,241	18,233	15,241	18,233	15,241	18,233	15,241

Appendix Table V. Process Innovation and Employment Flexibility - OLS

This table reports the results of estimating the following specification using the OLS framework:

$$Y_{it}=\alpha_{rt}+\alpha_{st}+\beta Temp_{it-1}+X_{it-2}'\gamma+\eta_i+\varepsilon_{it}\,,$$

where Y_{it} is the relevant dependent variable of firm *i* in year *t*, $Temp_{it-1}$ is its proportion of workers on temporary contracts, lagged one year, α_{rt} are region-year fixed effects, α_{st} are industry-year fixed effects, η_i are firm fixed effects, and X_{it-2} are firm-level controls (lag2 of log of sales, operating profit margin, and debt-to-assets ratio); included in even-numbered specifications). Standard errors are two-way clustered at the region-year and firm level and are reported below the coefficients. The first year the firm appears in the sample is dropped from all regressions. The number of firms and observations excludes singletons. * indicates 10% significance; ** 5% significance; *** 1% significance.

	Assimilation of Foreign Technologies		Process Innovation		Using new machinery		Using new methods of organizing organizing production	
	1	2	3	4	5	6	7	8
Lagged Temp	0.0450*	0.0315	0.0693	0.0333	0.0731	0.0302	0.169*	0.106
	(0.0242)	(0.0267)	(0.111)	(0.123)	(0.106)	(0.119)	(0.0872)	(0.0963)
Lagged2 ln Sales		0.0227		0.428***		0.429***		0.186***
		(0.0141)		(0.0735)		(0.0698)		(0.0513)
Lagged2 OPM		-0.0174		-0.168		-0.222		0.0684
		(0.0319)		(0.151)		(0.139)		(0.127)
Lagged2 Debt/Assets		0.0544*		0.179		0.0888		0.218**
		(0.0292)		(0.136)		(0.130)		(0.105)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region-year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of firms	2,279	2,053	2,279	2,053	2,279	2,053	2,279	2,053
Observations	18,233	15,241	18,233	15,241	18,233	15,241	18,233	15,241

Appendix Table VI. Productivity and Employment Flexibility - OLS

This table reports the results of estimating the following specification using the OLS framework:

$$Y_{it}=\alpha_{rt}+\alpha_{st}+\beta Temp_{it-1}+X_{it-2}'\gamma+\eta_i+\varepsilon_{it}\ ,$$

where Y_{it} is the relevant dependent variable of firm *i* in year *t*, $Temp_{it-1}$ is its proportion of workers on temporary contracts, lagged one year, α_{rt} are region-year fixed effects, α_{st} are industry-year fixed effects, η_i are firm fixed effects, and X_{it-2} are firm-level controls (lag2 of log of sales, operating profit margin, and debt-to-assets ratio); included in even-numbered specifications). Standard errors are two-way clustered at the region-year and firm level and are reported below the coefficients. The first year the firm appears in the sample is dropped from all regressions. The number of firms and observations excludes singletons. * indicates 10% significance; ** 5% significance; *** 1% significance.

	ln Labor Productivity		Labor Productivity Growth		ln Sales		Sales Growth	
	1	2	3	4	5	6	7	8
Lagged Temp	-0.0426	-0.0226	0.258***	0.273***	0.147***	0.181***	0.0180	0.00875
	(0.0356)	(0.0371)	(0.0373)	(0.0435)	(0.0361)	(0.0313)	(0.0161)	(0.0161)
Lagged2 ln Sales		0.0569***		-0.0680***		0.433***		-0.156***
		(0.0172)		(0.0149)		(0.0378)		(0.0124)
Lagged2 OPM		-0.00739		-0.207***		-0.286***		0.0914***
		(0.0529)		(0.0606)		(0.0479)		(0.0305)
Lagged2 Debt/Assets		0.0451		-0.00539		0.0602**		-0.0260*
		(0.0317)		(0.0283)		(0.0275)		(0.0146)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region-year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of firms	2,271	2,047	2,261	2,039	2,278	2,053	2,277	2,052
Observations	18,068	15,138	17,862	15,031	18,206	15,222	18,185	15,204