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Revisiting the Analysis of Innovation on Employment: An Analysis for Uruguay

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Abstract

Employment has been a major preoccupation in developing countries facing technical progress. Thus, understanding the impact of technological change on employment is at the center of the policy debate. The objective of this work is to analyze the effect of innovation on labor demand, and the skill composition of the labor force. The data for this study come from the Innovation Surveys for Uruguay over the 2000-2021 period. We analyze the whole sample and manufacturing and service sectors according to technological/knowledge intensity. Using quantile regressions, our results show that innovation has a positive effect on employment and skilled labor growth. Usually, the impact of innovation is higher for skilled labor and at lower levels of the distribution. The results are heterogeneous according to technological intensity, and economic sector. These findings contribute to deepen the analysis of the effects of innovation on employment in Uruguay, providing new evidence with respect to previous studies.

Keywords: Employment, Skilled Labor, Product Innovation, Process Innovation.

JEL Classification: D2, J23, L1, O31, O33

Resumen

El empleo ha sido una de las principales preocupaciones de los países en desarrollo. Por lo tanto, comprender el impacto del cambio tecnológico en el empleo es un tema central en el debate político. El objetivo de este trabajo es analizar el efecto de la innovación en la demanda de mano de obra y en la composición de calificaciones del empleo. Los datos para este estudio provienen de las Encuestas de Innovación de Uruguay durante el período 2000-2021. Analizamos la muestra completa y los sectores manufacturero y de servicios según la intensidad tecnológica/de conocimientos. Utilizando regresiones cuantílicas, nuestros resultados muestran que la innovación tiene un efecto positivo en el empleo y el crecimiento de la mano de obra calificada. Por lo general, el impacto de la innovación es mayor para la mano de obra calificada y en los niveles más bajos de la distribución. Los resultados son heterogéneos según la intensidad tecnológica y el sector económico.

Palabras clave: Empleo, trabajo calificado, innovación de producto, innovación de proceso

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1. Introduction

The fear of technological change conveyed by the spectrum of rising unemployment is a topic that can be easily traced to the first industrial revolution. Technological innovation is expected to boost economic growth and have a sizable impact on employment. However, the relationship between innovation and employment is not straightforward, both theoretically and empirically. Since employment has been a major preoccupation in developing countries, understanding the impact of technological change on employment is at the center of the policy debate to implement policies aimed to promote growth and welfare of the population.

From a theoretical perspective, the expected impact of innovation on employment has been expressed as the interplay between displacement and compensation effects, which are related to two different types of innovation: process innovation and product innovation.

In general, the introduction of new products is expected to increase employment due to an increase in the demand for new goods. Nevertheless, if the innovator has market power and increases prices, this may translate into a reduction of output and displacement of workers. Furthermore, new products can be designed to increase efficiency and decrease the need for labor.

Process innovation can also have an ambiguous effect on employment. Usually, higher productivity and reduction of employment are expected results of process innovation. Although increased efficiency may lead to contractions in the inputs used for a given level of output, a reduction in prices may lead to an increase in demand, with an expansion of the inputs necessary in production. Nonetheless, as Pianta (2006) argued, keeping process innovation aside, if increasing efficiency also increases quality or decreases prices, an increase in demand may be followed by an increase in employment.

Additionally, the creation or destruction of jobs due to innovation also depends on other factors, such as institutional setting and market structure (Acemoglu, 2003; Baensch et al., 2019).

From an empirical perspective, most of studies have found a positive link between innovation and employment, especially driven by greater effects of product innovations (Van Reenen, 1997; Harrison et al., 2014; Bogliacino and Pianta, 2010; Lachenmaier and Rottmann, 2011). Opposing the popular distress, the role of the compensating mechanisms triggered by technological change seems to be far more relevant than the displacement ones (Vivarelli, 2014).

Unlike what happens in developed countries, where vast empirical evidence exists, the literature on the effect of innovation on employment in Latin American countries is relatively scarce. However, some studies have found a positive impact of innovation on labor creation, considering different types of innovation, although using different econometric approaches (de Elejalde et al., 2015; Zuniga & Crespi, 2013; Baensch et al., 2019). In particular, examining the impact of process and product innovation on employment growth and composition in Argentina, Chile, Costa Rica, and Uruguay, Crespi et al. (2019) show that compensation effects are pervasive, and no evidence was found of displacement effects due to process innovation.

Moreover, the type of shifts in employment due to innovation is relevant to the inequality debate, since increased inequality in developing countries has been associated with an increase in the skill premium prompted by globalization (Goldberg and Pavcnik, 2007). In this regard, for developed countries, several studies have analyzed the level of employment and its composition (Autor, Katz and Krueger, 1998; Caroli and Van Reenen, 2001; Bresnahan et al., 2002; and Greenan, 2003).

However, the link between technical progress and trade liberalization is of particular relevancy in developing countries, as trade liberalization increases competition, forcing firms to incorporate technology to survive.

The objective of this paper is to analyze the effect of innovation on labor demand and the skill composition of the labor force, at the firm level for Uruguay. Uruguay provides an interesting framework to study the impact of innovation on employment and its composition in a small Latin American country. Moreover, trade liberalization during the 1990s was associated with increasing productivity, as firms responded to the reductions in trade barriers by incorporating capital-intensive technologies, and with significant job destruction and wage dispersion (Casacuberta et al., 2004).

Our contribution to the literature is to provide new evidence on a small emerging country over a relatively long period of time, considering both manufacturing and service firms, according to knowledge intensity of the manufacturing and service sector, and firm size.

For this purpose, we exploit a long time span of data with the first years marked by the 2002 crisis and the recession, followed by a period of economic growth (2005-2013) and some stability until the last year of the sample (2021). Several works have used the Harrison et al. (2014) methodology, which has some advantages though it is no free of drawbacks. One of these caveats are that assumes Cobb-Douglas production functions, that assumes constant returns to innovation. Nevertheless, we innovation is likely to present increasing returns. First, we estimate the models using Instrumental Variable estimation (IV-GMM). We performed endogeneity tests and find no endogeneity in the innovation variables.

Thus, we estimate the models using Ordinary Least Squares (OLS). Furthermore, the results of IV estimation and OLS are relatively similar and are available upon request from the authors. In this version we analyze quantile regressions in order to see the behavior of the variables over different points of the distribution and not only the mean as in OLS. In order to take into account that the relationship between labour demand and different types of innovations varies across the conditional quantile of the employment and skill distribution in this work we use quantile regressions and robust regression methods. It is likely the case that the relationship between labour demand and different types of innovation varies

We find, that innovation has a positive effect on total employment and skilled labor growth. However, the results are heterogeneous according to firm technological intensity, and economic sector. These findings contribute to deepen the analysis of the effects of innovation on employment in Uruguay, providing new evidence with respect to previous studies (Aboal et al., 2015; Laguna & Bianchi, 2020), using different econometric techniques.

Generally, the effects of innovation are stronger for growth of skilled labor and at the lower quantiles of the distribution. Splitting the sectors (manufactures and services) according to the technological intensity we find mixed effects of innovation variables in services firms though innovation shows positive effects on both high-tech and low-tech manufacturing firms.

2. Literature review

a. Theoretical aspects

Economic theory does not predict the employment effect of innovation because the net result depends on the type of innovation and the interplay between displacement and compensation effects, which at its time is mediated by market structure and institutional factors. Thus, the effect

of innovation on employment is determined not only by direct effects but also by various types of compensation mechanisms and the channels through which these mechanisms operate.

Pianta (2006) reviews the literature on the relationship between innovation and employment for advanced economies. This researcher finds that the key question is the rate at which technological innovation and diffusion destroy jobs, versus the pace at which new economic activities creates new jobs. Regarding this, Acemoglu and Restrepo (2019) present a task-based framework where production tasks and automation generate displacement of labor but also new tasks which may create new labor demand.

Consider firms that are observed through two or more consecutive periods. In the first period, firms can only produce one type of product (old products). Afterward, firms have the choice to implement product innovation and introduce a second type of product (new products). For a given level of outcome, the productivity trend and process innovations should reduce the demand for workers (displacement effect). In turn, the effect of product innovation on labor demand depends on the productivity difference between new and old products (Harrison et al, 2014).

But there is also a demand effect that could have the opposite impact. Both the reduction of costs derived from process innovation and the introduction of new products may increase demand because of lower prices and new products. Other things equal, higher output means a higher demand for labor (compensation effect).

In this sense, Simonetti et al. (2000) point out that the shocks created by the introduction of new technology are compensated by various mechanisms that tend to ensure the existence of full employment, though some compensation mechanisms may limit the existence of others. The main compensation mechanisms are: 1) decreases in prices, 2) decreases in wages, 3) new investments, 4) new products, 5) new machines, 6) additional income. The effect of each mechanism depends on institutions and the strength of the other mechanisms. However, Vivarelli (2007) critiques the compensation theory and after a detailed theoretical and empirical survey shows that a complete counter-balancing of dismissed workers cannot be assumed ex-ante.

Thus, the net impact of innovation depends on the relative strength of the displacement and compensation effects. Vivarelli (1995) develops a model to examine the extent to which worker displacement due to technical progress can be offset by compensatory market forces. The theoretical discussion and empirical results for Italy and US demonstrate that the employment impact of labor saving technologies can be only partially counter-balanced by market forces and so economic measures could be necessary.

In this context, Bogliacino and Pianta (2010) and Acemoglu, LeLarge and Restrepo (2020) argue that technical change is a differentiated process that may impact differently firms, industries and economies. Such an impact can differ also by type of innovation. Besides the traditional types of innovations (product and process) organizational innovation is closely linked to technical change and it is usually an important complement to the adoption of new technologies (Pianta, 2006).

Suppose now that, in addition to the two types of products (old and new), we can differentiate two types of labor: skilled and unskilled. The production of old and new products requires a combination of skilled and unskilled labor that can be a substitute for or complementary to technology.

Improving efficiency would still have a negative partial effect on overall labor demand for a given output, but it depends on the nature of the new technology and how this affects the demand for

skilled and unskilled workers. If process innovation introduces skilled-biased technology, the ratio of skilled to unskilled labor is expected to increase despite the impact on the absolute level of skilled labor used being ambiguous. For product innovation, the result may depend on the ratio of skill intensity required for old and new products. Thus, the composition of the labor force can be altered by innovation.

The relationship between skills and technology may run in both directions. Innovators decide the skill intensity of technological change. If skills are abundant, it makes sense to direct innovation toward the skilled. Hence, by design, new technologies would be complementary to skills (Acemoglu, 1998; and Dauth et al., 2021). In countries where skills are not relatively abundant, it would make sense to substitute technology for skills provided that new technologies are locally produced and not imported from countries with higher skills endowments.

In summary, innovations that improve efficiency in production are likely to reduce the demand for labor, thereby displacing workers. Additionally, the introduction of new products that expands demand is expected to increase the demand for labor. Nevertheless, the relationship remains unclear. The displacement effect of productivity-enhancing innovation can be offset by increasing demand (innovative firms obtain more sales and steal labor from their competitors). In addition, when newer products are produced more efficiently, the replacement of the old product may result in labor reduction.

Increasing productivity while holding output constant reduces the demand for labor; the opposite ensues when increasing sales for a given efficiency level. Productivity reduces employment per unit of output, but output expansion can overcome this effect by increasing employment. Thus, the impact of innovation and its various types on employment is an empirical matter.

b. Empirical studies

A strand of literature has investigated the links between innovation and employment. As mentioned earlier, innovation can create or destroy employment depending on the market structure, type of innovation, and institutional setting.

Most studies of developed countries have demonstrated, using different econometric techniques, a positive association between product innovation and employment, but no consensus on process innovation has been reached (Van Reenen, 1997; Lachenmaier and Rottmann, 2011; Pellegrino, Piva and Vivarelli, 2019). In addition, some studies demonstrated that only product innovation generates new jobs at the sectoral level, while process innovation generates jobs within the innovative firm at the expense of competitors (Greenan and Guellec, 2000; Acemoglu, LeLarge and Restrepo, 2020).

Considering the sectoral-level dimension, Harrison et al. (2014) found that product innovation (introduction of new products) have a positive impact on employment, due to growth of demand, while process innovations tend to reduce employment (due to increase in productivity for a given output), using firm-level data for manufacturing and services firms in France, Germany, Spain and the United Kingdom. However, since increase in productivity seems to enhance output expansion of old products (partly due to price reduction) a compensation mechanism is found, overcoming the reduction showed for a given output.

Moreover, also discriminating different types of innovation, Evangelista and Vezzani (2012) estimated the impact of product, process and organizational innovation on employment in six European countries, running a three-stage least squares model. Considering possible direct and

indirect impacts of all types of innovation, the authors interestingly found a positive, strong and significant indirect effect of all three on employment, both in manufacturing and service industries; new jobs are generated as a consequence of the growth of sales.

As Vivarelli (2014) argued, microeconomic literature has tended to support the existence of a positive relationship between innovation and employment, especially when R&D or product innovation is adopted as a proxy to innovative activity, but mostly when high-technology sectors are at the center of the analysis. Several studies have confirmed the positive role of innovation on employment growth particularly for high-growth firms in higher-tech sectors (Bogliacino et al., 2012; Coad and Rao, 2011; Van Roy et al., 2018). Nevertheless, these studies do not analyze the impact on employment by splitting between product and process innovation. Regarding this, in Pellegrino, Piva and Vivarelli (2019) a positive and significant employment impact of R&D investments -linked to product innovation- were found when limiting the sample to high-tech firms.

Additionally, taking also into account firm age, Pellegrino & Piva (2020), for the Italian case, estimated the heterogeneity among young and mature firms in terms of innovative strategies, splitting manufacturing and services into low/medium-tech; high-tech industries and less knowledge-intensive and knowledge-intensive industries, respectively. Considering investments in R&D and technological acquisitions (TAs) separately, the structural model estimation showed that young companies are technologically successful in translating R&D investments into product innovations in knowledge-intensive sectors, but there are not significant differences when manufacturing is considered.

According to the literature, not only the age but also the size of the firms are relevant dimensions to account for the impact of innovation. Expósito and Sanchis-Llopis (2019) focusing on the impact of various types of innovation (product, process and organizational) on the performance of multi-sectoral Spanish Small and Medium Enterprise firms (SMEs). These authors use alternative indicators to measure performance and discrete binary models. They find that innovation of any type, indeed improves performance of SMEs. In particular, organizational innovation leads to a reduction of production costs. The authors also find that younger entrepreneurs, exporting SMEs, and bigger SMEs show better performance results. However, a labor-saving effect of Embodied Technological Change (ETC) investments- –linked to process innovation- in small firms (defining small as firms with less than 200 employees) was found significant in Pellegrino, Piva and Vivarelli (2019).

Given the current discussion both in economics and at the public policy level regarding the possible future impacts of computerization on the labor market (Frey and Osborne, 2017), in order to fully assess the impact of innovation on employment it's also relevant to consider possible different effects between skilled and unskilled workers. In this regard, several studies have analyzed the level of employment and its composition (Autor, Katz and Krueger, 1998; Caroli and Van Reenen, 2001; Bresnahan et al., 2002; Greenan, 2003; Dauth et al., 2021).

Bartelsman et al. (2019) study the relationship between innovations and productivity, considering the information and communication technology (ICT) intensity of usage at firm-level in ten European countries, covering the years 2002-2010. Measuring the ICT intensity as the proportion of broadband internet connected employees, the study provide evidence in favor of a significant and positive relationship between firm productivity and product innovations, that is weakened when ICT intensity is included.

Although the evidence on Latin America has increased in recent years, developed countries have been more studied. Nevertheless, results from developed countries cannot be extrapolated to developing countries because innovation is mainly the acquisition of knowledge from abroad (de Elejalde et al., 2015). Furthermore, studies of Latin American countries have related to the recurrent crises affecting the region. In a context of increasing unemployment, innovative firms may be better equipped to manage the crises and preserve their workforce.

de Elejalde et al. (2015) demonstrated that innovation had a protective effect during the Argentinean crisis, and the same study also demonstrated that product innovation creates jobs and is skilled biased, whereas process innovation has no effect on skilled or unskilled jobs. For Chile, Crespi and Tacsir (2011) demonstrated that process and product innovations are important sources of employment growth at the firm level, whereas Benavente and Lauterbach (2008) showed that product innovation increases employment and process innovation does not affect it. For Uruguay, Zuniga and Crespi (2013) found that firms that innovate generate more employment than firms that do not. The make-only strategy has the largest impact, while the buy-only strategy has the lowest impact.

Considering a multi-country studies, Crespi and Tacsir (2019) analyzed the impact of process and product innovation on employment growth and its composition in Argentina, Chile, Costa Rica, and Uruguay. Using the model proposed by Harrison et al. (2014), the authors demonstrated that product innovation is associated with employment growth. Furthermore, there was evidence of a skill bias, although product innovation is more complementary to skilled than to unskilled labor.

Other studies have demonstrated that innovation does not lead to job losses and generates demand for a qualified labor force. Using a panel of Brazilian manufacturing firms over the period from 1997 to 2005, Araújo, Bogliacino & Vivarelli (2011) studied the relationship between trade openness and relative demand for skilled labor, in particular focusing in the impact of domestic technologies and technology transfer. The authors run dynamic estimations of both skilled and unskilled labor demand, and found that skilled workers are complementary to domestic technology and capital formation, and that imported capital goods act as a skill-enhancing component of trade. Also considering Brazilian manufacturing firms, Goedhuys and Veugelers (2012) found that a large share of workers with secondary education is important for process innovation, while product innovation is more skill intensive. In this context, product innovation appears as a more complex process, requiring more knowledge and absorptive capacity, than process innovation.

Aboal et al. (2011) analyze the Uruguayan case following a qualitative and quantitative methodology. On one hand, from interviews with companies they found that that process innovation is expected to affect negatively employment. On the other hand, considering and comparing the make or make-and-buy strategy -linked to product innovation- it is demonstrated that both strategies tend to have a more positive effect on employment quantity and quality. Product innovation is complementary to labor, but process innovation seems to displace it. Laguna & Bianchi (2020) also test the effects of three innovation strategies (make, buy, make&buy) on the firm's workforce growth, and found that firms that conducted any type of innovation strategy show a positive and significant employment growth; contrary to previous findings, the effect of the buy strategy seems to be positive as well.

Another strand of literature on developing countries has focused on skill-enhancing trade. Liberalization accelerates the flow of physical capital, encouraging adaptation to skill-intensive technologies. Firms exporting to high-income countries employ more skilled workers (Brambilla et al., 2012), and skills necessary to enter the exports market may differ from those required to succeed in it (Love and Roper, 2015).

This work focuses on the effect of innovation on labor demand. Our interest is in total employment and the level of skilled workers[1]. All variables are measured at the firm level. The explanatory variable tested is innovation, which is further discriminated into: process and product innovation. Process innovation includes organizational and commercialization innovation.

We expect the innovative strategies of Uruguayan firms to be dominated—though not exclusively—by the adoption of technologies produced in developed countries. Such technologies are likely more skill-biased than locally developed technologies (Acemoglu, 2003). Hence, the adoption of new technologies may increase the relative demand for skilled workers.

Thus, we aim to answer these questions: How does innovation affect employment? Does it affect skilled labor differently? We conduct the analysis for the whole sample of manufacturing and services firms and then split the sample and study the firms in each sector, while also considering its technological/knowledge intensity.

3. Empirical strategy

a. Data and variables

The data for this study is from the Innovation Activities Surveys (Encuestas de Actividades de Innovación en la Industria – EAII) and collected by the National Bureau of Research and Innovation (Agencia Nacional de Investigación e Innovación – ANII). Surveys were delivered in three-year intervals. Data were available for the last five waves, corresponding to the years 2000, 2003, 2006, 2009, 2012, 2015, 2018 and 2021. Missing information from the first wave—EAII 2000—is taken from the Industrial Economic Surveys (Encuestas de Actividad Economica, EAE) conducted by the Instituto Nacional de Estadistica, for instance, skilled workers and sales in 2000 and average wages from 2000 to 2012.

Information is collected through personal interviews that are compulsory for all sampled firms. The questionnaire follows the guidelines of the Bogota Manual (Jaramillo et al., 2001).

Surveys combine two inclusion criteria: (1) compulsory participation for big firms[2] until 60% of employment within the industry is covered—after such a quota is filled, some big firms may be exempt from the survey—and (2) representative random selection of small and medium firms stratified by industry. A public firm was excluded from the analysis because it was an outlier.[3]

b. Innovation Variables

The EAII surveys provide binary information on whether firms have introduced four different types of innovation: product, process, organizational, and commercialization innovation. Product innovation implies putting on the market a new product or service whose characteristics or intended uses are either completely novel or significantly improved from the prior version offered. Process innovation is the implementation of new methods of production and can be directed to produce new goods or to increase the efficiency in producing existing goods. Process innovation includes organizational and commercialization innovation. Organizational innovation includes changes in management and administration and may include changes that affect labor such as economic incentive systems, working groups, and new ways of decision making. Finally, innovation

[1] We also analyze wages but due to space reasons we do not present results in this work. Results are available upon request from the corresponding author.

[2] Participation in EAII surveys is mandatory for firms that either reported (A) more than 50 employees in 2000, 2003, and 2006 or 100 employees from 2009 onwards; or (B) annual sales higher than 13 million of Uruguayan pesos (EAII2000), 1 million of Uruguayan pesos (EAII2003), 25 million of Uruguayan pesos (EAII2006), and 120 million of Uruguayan pesos (EAII2009). Additionally, some activities are defined by mandatory inclusion regardless of size.

[3] We exclude the state-owned firms that are oil refineries (ANCAP) because they produce important changes in the composition of the sample, and they are by far the biggest firms worldwide.

in commercialization occurs when the firm introduces new means of selling, delivering, or packing products -it is measured with organizational innovation. Thus, innovation variables are dummies that have as limitation its binary nature, which does not allow us to quantify its impacts (the intensity of their effects) but only analyze the effect of whether or not the firm made an innovation and of what type. In addition, as the data are recorded every three years, this could mask some changes and reduce the variance of the variables.

To achieve the objectives of this study, we differentiate between product innovation and the other types process innovation. Any of those forms of innovation should allow firms to provide more with the same resources because the output requires less input, workers produce more, or the consumers have less hassle finding the product. Thus, we use different combinations of innovation activities, defined as dummy variables.

c. Labor and Firm Variables

We analyze total employment and skilled labor in rates of growth.[4] We define skilled labor as the sum of professionals and technicians, and unskilled labor as those workers in production. This data comes from the Surveys and we hope that there is no bias since our explanatory variables also are compute each three years.

Empirical models also include a set of control variables such as s age of the firm, exporting status of the firm, foreign ownership of capital, categories of size and industry, and time dummies. In some models, we also include the exporting status of the firm, although this variable is not included in the first wave.

Firm size is measured in terms of categories of sales, in particular, discriminating big firms, or medium and big firms according to the sales distribution in the sample.

Foreign ownership is included as a dummy variable, taking the value one whenever there is foreign capital participation in the firm, and zero otherwise. A stylized fact is that foreign-owned firms tend to be more intensive in knowledge and capital than domestic firms. Studies in Uruguay have demonstrated that foreign-owned firms employ more skilled labor both in absolute and relative terms, and the wage gap between skilled and unskilled workers tends to be higher than that for domestic firms (Peluffo, 2015).

d. Econometric model

We aim to analyze the growth of total employment and skilled workers. Our baseline equation takes the same form whether the dependent variable is the total employment and the level of skilled labor (Y_{it}). Thus, we estimate the following model using OLS:

$$Y_{it} = \beta_0 + \beta_1 IN_{it} + \beta_2 X_{it} + \varepsilon_{it} \qquad (1)$$

where i denotes firm, and t denotes time. *IN* is a dummy that indicates if the firm effectively innovated or not. Taking advantage of the vast amount of information coming from the EAII, we include dummies of innovation (i) innovation of any kind (whether product, process or organizational); (ii) product innovation; (iii) process innovation

The covariates included in X—size measured by the sales of the firm, or categories of size according to sales or employment, export status, foreign firms (those with ownership of foreign capital higher than 10 %), exporting status, age of the firm, year dummies to control for macroeconomic shocks,

[4] We analyze total employment and skilled labor in levels, the share of skilled labor in total employment and growth of this share, and wages. Due to space limitations, we do not include all variables. The long version can be found in Peluffo, A. (2020) "Does Innovation Affect the Demand for Employment and Skilled Labor?" Serie Documentos de Trabajo, DT 13/2020. Instituto de Economía, Facultad de Ciencias Económicas y Administración, Universidad de la República, Uruguay.

and industry dummies to control for industry-specific effects—differ by the various specifications of the models tested.

Since our innovation variables, and in particular product innovation, may be endogenous, we also estimate equation (1) using the IV-GMM, and test for endogeneity of the suspected endogenous variables. Endogeneity may be present because of omitted variables and measurement errors due to unobservable prices at the firm level and productivity shocks. The omitted variable problem may arise because of productivity shocks included in the error term. Thus, we estimate (1) using instrumental variables with fixed effects and standard errors clustered by firm, and standard errors robust to autocorrelation and heteroscedasticity.

We tried three different instruments: a dummy equal one if the firm received public support to innovate and zero otherwise, an increase in the range of products and services ranging from irrelevant=4, low=3, medium=2, high=1. The third instrument used is a categorical variable that captures if the firm enters into new foreign markets. This variable takes the following values: irrelevant=4, low=3, medium=2, high=1. These instruments have been used successfully in several applied works (see, for example, Crespi et al., 2019; Baensch et al., 2019). We assume that product innovation is endogenous and process innovation is exogenous. Since any type of innovation includes product innovation, we treat it as endogenous. In all the specifications of the various dependent variables, we test the exogeneity of the innovation variables.

The validity of the instrument relies in the correlation between the instruments and endogenous variables in the first stage regressions. Moreover, we always analyze the test of under-identification proposed by Kleibergen-Paap and of weak identification supports that our instrument is good.

We perform tests of exogeneity of the innovation variables for each innovation variable and specification. To this aim, we use the *endogtest* option that comes with the *ivxtreg2* routine and has the advantage that it is robust to violations of conditional homoscedasticity. Thus, it is safer than the commonly used Wu-Hausman F-test. We find that the innovation variables analyzed seem to be exogenous according to the exogeneity tests. In Table 17 we present the results of the exogeneity tests finding that only for the share of skilled labor and product innovation the variable is endogenous. Thus, we will rely on the results of robust quantile regressions for the 0.25, 0.50, 0.75 and 0.90 quantiles.

4. Results

a. Descriptive statistics

We report descriptive statistics in Tables 1.1 to 1.5. Table 1.1 presents the share of firms that undertake innovations and the share by different types of innovations. In the period 2000–2021, 36% of the firms undertake any type of innovation; 26%, process innovations; 31%, productivity-enhancing innovations; and 20%, product innovations. Moreover 24 % of firms undertake organizational innovations.

In Table 1.2, it is shown that innovators are bigger in employment and sales and tend to hire a higher proportion of skilled workers. As regards to skilled labor, innovators present a higher growth in both skilled labor and its share. In terms of sales, innovators also exhibit a higher rate of growth in total sales and sales of new products.

Regarding the growth in skilled workers and total employment, we observe that for the full sample, the average number of skilled workers per firm is 30, with a growth rate of 14%, and total employment grows at a rate of nearly 75% over the period. Moreover, for innovators, the number of skilled workers is higher (60 skilled workers per firm) than for non-innovators (14) with a higher growth rate (250%), which is also in line with the growth in total employment (217%).

Tables 1.3 to 1.5 present features of manufacturing and service firms. Manufacturing firms tend to undertake more innovation activities These differences are confirmed by the t-tests of differences in means.[5]

We also observe from Table 1.4 and Table 1.5, that firms in the manufacturing sector are smaller in terms of total employment, have fewer skilled workers and a lower share of skilled labor than firms in the service sector. However, firms in the service sector show higher rates of growth in employment, skilled workers, sales, and share of skilled labor than manufacturing firms, during the period under study. Nevertheless, in terms of total sales, both manufacturing and services firms present similar figures.

b. Econometric results

This section presents the results obtained using the different econometric specifications. First, the full sample of firms is considered. Then we split the sample in manufacturing and service firms. Then we analyze manufacturing and service firms according to the technological intensity for manufacturers and knowledge intensity for services.

i. Whole Sample

First, we present the results of estimating with quantile techniques. Regarding the rate of growth of total employment, for the pooled sample over the period, there was an important increase in total employment, as we mention in descriptive statistics. Our sample starts in the recession period and ends with higher levels of economic growth for the Uruguayan economy. Table 2.1 to 2.3 we present the results for growth in total employment and growth in skilled workers for quantiles 0.25, 0.5, 0.75 and 0.90. We find positive effects of innovation (that is, to have carried out any type of innovation), on employment growth.

In Table 2.2, we analyze the effect of process innovation on the growth of total employment and skilled employment. It is observed that process innovation has a positive effect on employment growth, with a greater magnitude in the lower quantiles, which decreases as the quantile increases—from a coefficient of 2.28 at the lowest quantile (0.25) to 0.71 at the highest quantile (0.90). Younger firms tend to grow more (showing a positive and significant effect with a larger coefficient), and this effect increases as the quantile rises. Firm size (medium and large companies) also shows a positive and significant effect, with greater magnitude in the lower quantile and decreasing as the quantiles increase. Multinational companies show a negative effect that varies across quantiles, while exporter status is not significant except at the 0.75 quantile, where it shows a negative effect.

Regarding skilled employment growth, the effect of innovation is similar to total employment growth, showing positive and significant effects that decrease with higher quantiles and become non-significant at the highest quantile (0.90). Firm age is negative and significant, with an increasing effect across quantiles, except at the 0.20 quantile.

Firm size, for both medium and large firms, is positive and significant. It decreases at the 0.50 quantile but increases again at higher quantiles. Exporter status does not show significant effects, except at the 0.75 quantile, where it has a negative and significant effect.

Table 2.3 reports the results for product innovation. Our findings indicate that product innovation exerts a positive effect on total employment at the firm level, with the highest impact observed at the lower quantile. The magnitude of this effect decreases at the 0.50 and 0.75 quantiles and becomes statistically insignificant at the upper quantile (0.90). Firm age exhibits a significant and increasingly negative effect as one moves up the quantile distribution. Exporter status is generally not significant, with the exception of the 0.75 quantile, where it shows a negative and statistically

[5] Results of t-tests are available upon request.

significant effect. Medium- and large-sized firms demonstrate a positive and significant effect on employment growth, which is stronger at the lower quantile and diminishes at higher quantiles. With regard to the effect of product innovation on skilled employment growth (Table 2.2), the results similarly indicate a positive impact, though with lower magnitude at the lower quantile and a non-significant effect at the upper quantile, mirroring the pattern observed for total employment. Firm age is negatively associated with skilled employment growth starting at the 0.75 quantile, with the magnitude of the effect increasing across higher quantiles. At the lowest quantile, the effect is not statistically significant. Exporter status is again generally non-significant, except at the 0.75 quantile, where it is negative and significant. For medium- and large-sized firms, product innovation has a positive and significant impact on skilled employment, with variation across quantiles. In contrast, multinational firms do not exhibit statistically significant effects on skilled employment growth.

Regarding sectoral effects, Tables 3.1 to 3.3 present the results for total employment growth, while Tables 4.1 to 4.3 focus specifically on service-sector firms. In Table 3.1, innovation is found to have positive and statistically significant effect on total employment growth, with the strongest impact observed at the 0.25 quantile. The magnitude of the effect diminishes across higher quantiles and becomes statistically insignificant at the 0.90 quantile. Firm age exhibits a negative relationship with employment growth. While the effect is not significant at the 0.25 quantile, it becomes increasingly negative and statistically significant at higher quantiles. Export status is associated with a negative and significant effect on employment growth, with the largest impact at the 0.25 quantile. The magnitude of the effect decreases across quantiles and becomes non-significant at the 0.90 quantile. Firm size—both medium and large—shows a positive and significant association with employment growth, although the magnitude of this effect varies across the distribution. Foreign-owned firms exhibit mixed results: a negative and significant effect is observed at the 0.25 and 0.50 quantiles, while the effect is not statistically significant at the 0.75 and 0.90 quantiles.

With respect to skilled labor growth, innovation does not exert a significant effect at the 0.25 quantile but becomes positive and statistically significant at higher quantiles, with the strongest impact observed at the 0.75 quantile. Firm age has a consistently negative and significant effect on skilled employment growth across quantiles, except at the 0.25 quantile, where it is not significant. The magnitude of the negative effect increases progressively, reaching its highest level at the 0.90 quantile. Export status demonstrates a mixed pattern: it is not significant at the 0.25 and 0.50 quantiles, but becomes negative and significant at the 0.75 and 0.90 quantiles, with the largest effect occurring at the 0.75 quantile. Firm size generally shows a positive effect on the growth of skilled employment, although medium-sized firms exhibit no significant effect at the 0.50 quantile. Finally, foreign ownership is not statistically significant for most quantiles, with the exception of the 0.90 quantile, where a significant effect is observed.

In Table 3.2 we present the results of process innovation. We find that process innovation generally exhibits a positive effect on employment growth, except at the 0.90 quantile, with the strongest impact observed at the lower end of the distribution (0.25 quantile). Firm age is negatively associated with employment growth, and the magnitude of this effect increases across the quantiles. Export status shows a mixed pattern: it has a negative and statistically significant effect at the median (0.50) and 0.75 quantiles, but is not significant at the 0.25 and 0.90 quantiles. Firm size has a positive and statistically significant impact on employment growth across the distribution, although the magnitude of the effect varies. Foreign ownership is associated with a negative and significant effect at the 0.25 and 0.50 quantiles—most notably at the 0.25 quantile—while no statistically significant effect is observed at the 0.75 and 0.90 quantiles.

Regarding the effect of process innovation on the growth of skilled labor, the results indicate no statistically significant impact across most quantiles, except at the 0.25 quantile, where a positive effect is observed. Firm age has a negative and significant effect at the 0.75 and 0.90 quantiles, but no significant association is found at lower quantiles. Export status does not show significant

effects on skilled employment growth. Firm size, both for medium and large firms, has a positive and significant effect, with varying magnitude across quantiles.

Finally, foreign ownership is generally not significant, with the exception of the 0.90 quantile, where it exerts a negative and statistically significant effect. In Table 3.3 we present the results of the effect of product innovation on employment growth. The analysis reveals a generally positive and statistically significant effect of product innovation across most quantiles, with the strongest effect observed at the lowest quantile (0.25). The effect diminishes across higher quantiles and becomes statistically insignificant at the 0.90 quantile. Firm age has a negative and significant association with employment growth throughout the distribution, with the magnitude of the effect increasing from lower to higher quantiles. Export status is also negatively associated with employment growth, showing the strongest effect at the 0.25 quantile. Although the magnitude of the effect increases across quantiles, it becomes statistically insignificant at the 0.90 quantile. Firm size, both for medium and large firms, has a consistently positive and significant effect across all quantiles, although the magnitude varies. Foreign ownership shows an inconclusive pattern: it is negatively and significantly associated with employment growth at the 0.25 and 0.50 quantiles, but the effect becomes statistically insignificant at the 0.75 and 0.90 quantiles.

In Table 4.1 we present the results for firms in the Services sector. Innovation has a positive and statistically significant effect on employment growth, with the strongest impact observed at the lowest quantile. The effect decreases across the distribution and becomes non-significant at the highest quantile (0.90). Firm age has a negative effect across the entire distribution, with increasing magnitude, reaching its highest impact at the 0.90 quantile. Export status is not significant, except at the highest quantile (0.90), where it is negative and statistically significant. Firm size shows a positive and significant effect across the distribution, except at the highest quantile. Foreign ownership yields mixed results: it is negative and significant at the 0.25 and 0.50 quantiles, not significant at the 0.75 quantile, and becomes positive and significant at the 0.90 quantile.

Table 4.2 shows the effect of process innovation in service sector firms. There is a positive and significant effect of process innovation at the two first quantiles, with a higher effect for skilled labor than for total employment growth.

Table 4.3 presents the results for the impact of product innovation on both total employment and skilled labor growth. Product innovation is found to have a positive effect on employment growth across the distribution, except at the 90th quantile, where the effect is not statistically significant. Firm age exhibits a negative and significant relationship with employment growth, with the magnitude of the effect increasing across quantiles. Export status does not show a significant effect. Firm size is positively and significantly associated with employment growth, while foreign ownership displays mixed results: negative and significant effects at the 25th and 50th quantiles, no significant effect at the 75th quantile, and a positive and significant effect at the 90th quantile.

In contrast, the effect of product innovation on skilled labor growth is not statistically significant across most of the distribution, with the exception of the 50th quantile. Firm age is generally not significant, although it becomes significant and negative at the 75th quantile. Export status is also largely insignificant, except at the 25th quantile, where it has a positive and significant effect. Regarding firm size, a positive and significant effect is observed for large firms across the distribution, while for medium-sized firms, the effect is only significant at the 90th quantile. Finally, foreign ownership does not appear to have a statistically significant effect on the growth of skilled labor.

ii. Splitting according to technology intensity and knowledge-intensive

Next, we split the sample for manufactures and services, according to the technological intensity for manufacturers and knowledge intensity for services.

For manufacturers, we classify the sectors into high and low technological intensity according to the expenditure in innovation as a share of turnover, as in Aboal et al. (2015).[6] Table A3 in the Appendix presents the classification. Some features of low- and high-tech-intensive firms in manufacturing industries are presented in Table 13. High-tech firms undertake all types of innovative activities more frequently than low-tech firms and the whole sample of manufacturing firms do; moreover, they are bigger in terms of sales and employment, tend to have a higher presence of exporting firms, and have a higher share of foreign firms. Finally, high-tech manufacturing firms also show a higher growth in skilled labor and a lower reduction in total employment.

On the other hand, we refer to the literature (Eurostat, Table 1, n.d.; Schnabl & Zenker, n.d.), and classify as knowledge-intensive firms (KIS; instead of high tech) those firms that are above the median in the share of professional and technicians in total employment. Low intensive are those firms below the median in the sample of service firms. We present the classification in Table A4 in the Appendix. First, we observe some features of high KIS-intensive firms in Table 14. Similar to high-tech firms in manufacturing sectors, high KIS firms undertake all types of innovative activities more frequently than low-tech firms and the whole sample of service firms do; moreover, they are bigger in terms of sales and employment, tend to have a higher presence of exporting firms and a higher share of foreign firms, and have higher growth in total employment and skilled labor.

In Table 5.1 to 5.3 we present the results for firms classified within High Knowledge-Intensive Manufacturing. Innovation is found to have a positive impact on both total employment and skilled labor growth across all quantiles, with the exception of the highest quantile (90th) for both dependent variables. The most substantial effect is observed for skilled labor growth at the 25th quantile, as can be seen in Table 5.1.

Product innovation (Table 5.2 shows a positive and statistically significant effect on total employment growth across the entire distribution. In the case of skilled labor growth, the effect of product innovation is positive and significant at the 25th and 50th quantiles, but becomes insignificant at the higher quantiles. The strongest impact is again observed at the 25th quantile for skilled labor.

Similarly, process innovation shows a positive and significant association with total employment growth at all quantiles except the 90th. For skilled labor growth, the effect of process innovation is significant only at the 25th and 50th quantiles, with the largest effect occurring at the 25th quantile (Table 5.3). On the contrary, we do not find any significant effect of innovation variables in services firms. We note that the number of observations is low hence results could be driven by this and not be accurate, so we do not rely on these results.

With regard to firms operating in low-technology manufacturing sectors, innovation is found to have a positive effect on both total employment and skilled labor growth, except at the 90th percentile of the distribution. The strongest effects are observed for skilled labor growth at the lower percentiles for both dependent variables.

Product innovation is positively associated with employment growth across the distribution. For skilled labor growth, product innovation also shows positive effects, although the relationship becomes insignificant at the 90th percentile. The largest impact is observed at the lowest percentile, particularly for skilled labor growth.

[6] Sectors below equal to or below the median are classified as low-technological sectors, and those above the median are classified as high-technological intensive sectors.

Process innovation exerts a positive and significant influence on employment growth at all quantiles except the 90th. In the case of skilled labor growth, process innovation has a positive and statistically significant effect at the 25th and 50th percentiles, but the effect is not significant in the upper part of the distribution. As with product innovation, the greatest effect is observed at the lowest percentile and is more pronounced for skilled labor growth.

5. Concluding remarks

Employment has been a major preoccupation in developing countries managing technical progress. Thus, understanding the impact of technological change on employment is at the center of the policy debate. In this study, we analyze the effect of innovation on labor demand and the skills level, at the firm level in Uruguay.

Our results provide new evidence for a small emerging country over a relatively long period of time, considering both manufacturing and service firms, according to knowledge intensity and firm size. In addition, differently from several works that have used the Harrison et al (2014) methodology, which has the drawback of assuming well-behaved production functions, we rely on quantile regressions while also analyzing the possible presence of endogeneity. Using different specifications, our results provide evidence that innovation has a positive effect on the level and the rate of growth of employment and skilled labor. Generally, the effects of innovation are stronger on the growth of skilled labor at lower the lower quantiles, and for manufacturing effects are stronger than for services. Moreover, for manufacturing firms the effects of innovation, and mainly product innovation seems higher. Moreover, effects seem to be higher for high technology intensive firms than for low tech intensive firms.

Moreover, results also evidence that undertaking process innovation, and any type of innovations are beneficial for the rate of growth in total employment and skilled labor. Notably, contrary to findings in the literature (Aboal et al., 2015), we find that innovation aimed to enhance productivity – process innovation- has a positive impact on employment.

Splitting by technological intensity, though any significant effect of innovation variables in services firms was found, innovation does have a positive impact on both high-tech and low-tech manufacturing firms.

We conclude that innovation is not detrimental to labor but the opposite. Nevertheless, the effect of innovation on inequality should be further analyzed because the results evidence that innovation seems to be associated with a higher demand for skilled workers. These findings suggest that policies aimed at training workers may help realize the advantages of innovation.

References

Aboal, D., Garda, P., Lanzilotta, B., & Perera, M. (2011). Innovation, Firm Size, Technology Intensity, and Employment Generation in Uruguay: The Microeconometric Evidence. Inter-American Development Bank. http://publications.iadb.org/handle/11319/5347

Acemoglu, D. (1998). Why Do New Technologies Complement Skills? Directed Technical Change and Wage Inequality. The Quarterly Journal of Economics, 113(4), 1055–1089.

Acemoglu, D. (2003). Patterns of Skill Premia. The Review of Economic Studies, 70(2), 199–230. https://doi.org/10.1111/1467-937X.00242

Autor, D. H., Katz, L. F., & Krueger, A. B. (1998). Computing Inequality: Have Computers Changed the Labor Market? The Quarterly Journal of Economics, 113(4), 1169–1213. https://doi.org/10.1162/003355398555874

Baensch, L., Lanzalot, M. L., Lotti, G., & Stucchi, R. (2019). Do Labor Market Regulations Affect the Link between Innovation and Employment? Evidence from Latin America. The B.E. Journal of Economic Analysis & Policy, 19(3), 20180163. https://doi.org/10.1515/bejeap-2018-0163

Benavente, J. M., & Lauterbach, R. (2008). Technological innovation and employment: Complements or substitutes? The European Journal of Development Research, 20(2), 318–329. https://doi.org/10.1080/09578810802060744

Bogliacino, F., & Pianta, M. (2010). Innovation and employment: A reinvestigation using revised Pavitt classes. Research Policy, 39(6), 799–809.

Bogliacino, F., Piva, M., & Vivarelli, M. (2012). R&D and employment: An application of the LSDVC estimator using European microdata. Economics Letters, 116(1), 56–59.

Brambilla, I., Lederman, D., & Porto, G. (2012). Exports, export destinations, and skills. The American Economic Review, 112(7), 3406–3438.

Bresnahan, T. F., Brynjolfsson, E., & Hitt, L. M. (2002). Information technology, workplace organization, and the demand for skilled labor: Firm-level evidence. The Quarterly Journal of Economics, 117(1), 339–376.

Bresnahan, T. F., & Malerba, F. (2002). The value of competitive innovation and US policy toward the computer industry. Technology and the New Economy, 49–93.

Caroli, E., & Van Reenen, J. (2001). Skill-biased organizational change? Evidence from a panel of British and French establishments. The Quarterly Journal of Economics, 116(4), 1449–1492.

Coad, A., & Rao, R. (2011). The firm-level employment effects of innovations in high-tech US manufacturing industries. Journal of Evolutionary Economics, 21(2), 255–283.

Crespi, G., Tacsir, E., & Pereira, M. (2019). Effects of innovation on employment in Latin America. Industrial and Corporate Change, 28(1), 139–159.

Elejalde, R. de, Giuliodori, D., & Stucchi, R. (2015). Employment and Innovation: Firm-Level Evidence from Argentina. Emerging Markets Finance and Trade, 51(1), 27–47. https://doi.org/10.1080/1540496X.2015.998088

Goedhuys, M., & Veugelers, R. (2012). Innovation strategies, process and product innovations and growth: Firm-level evidence from Brazil. Structural Change and Economic Dynamics, 23(4), 516–529. https://doi.org/10.1016/j.strueco.2011.01.004

Greenan, N. (2003). Organisational change, technology, employment and skills: An empirical study of French manufacturing. Cambridge Journal of Economics, 27(2), 287–316.

Greenan, N., & Guellec, D. (2000). Technological Innovation and Employment Reallocation. LABOUR, 14(4), 547–590. https://doi.org/10.1111/1467-9914.00146

Greenaway, D., & Kneller, R. (2007). Industry Differences in the Effect of Export Market Entry: Learning by Exporting? Review of World Economics, 143(3), 416–432. https://doi.org/10.1007/s10290-007-0115-y

Harrison, R., Jaumandreu, J., Mairesse, J., & Peters, B. (2014). Does innovation stimulate employment? A firm-level analysis using comparable micro-data from four European countries. International Journal of Industrial Organization, 35, 29–43.

Jaramillo, H., Lugones, G., & Salazar, M. (2001). Manual de Bogotá: Normalización de indicadores de innovación tecnológica en América Latina y el Caribe. RICYT.

Lachenmaier, S., & Rottmann, H. (2011). Effects of innovation on employment: A dynamic panel analysis. International Journal of Industrial Organization, 29(2), 210–220. https://doi.org/10.1016/j.ijindorg.2010.05.004

Love, J. H., & Roper, S. (2015). SME innovation, exporting and growth: A review of existing evidence. International Small Business Journal, 33(1), 28–48.

Peluffo, A. (2015). Foreign Direct Investment, Productivity, Demand for Skilled Labour and Wage Inequality: An Analysis of Uruguay. The World Economy, 38(6), 962–983. https://doi.org/10.1111/twec.12180

Pianta, M. (2006). Innovation and employment. https://academic.oup.com/edited-volume/38667/chapter/335807920

Van Reenen, J. (1997). Employment and Technological Innovation: Evidence from U.K. Manufacturing Firms. Journal of Labor Economics, 15(2), 255–284. https://doi.org/10.1086/209833

Vivarelli, M. (2014). Innovation, employment and skills in advanced and developing countries: A survey of economic literature. Journal of Economic Issues, 48(1), 123–154.

Zuniga, P., & Crespi, G. (2013). Innovation strategies and employment in Latin American firms. Structural Change and Economic Dynamics, 24, 1–17. https://doi.org/10.1016/j.strueco.2012.11.001

Anexo

Table 1.1: Share of firms undertaking innovation activities (2000–2021)

Variable	Mean	Std Dev	No Obs	Min	Max
Innovation (product, process and/ or organizational)	0,3589	0,4797	14971	0	1
Process Innovation	0,2579	0,4375	14971	0	1
Product Innovation	0,1955	0,3966	14971	0	1
Organizational Innovation	0,1521	0,3591	14971	0	1
Enhancing Productivity Innovation	0,3120	0,4633	14971	0	1
Process-Innovation Only	0,0916	0,2885	14971	0	1
Product-Innovation Only	0,0469	0,2114	14971	0	1

Notes: Own elaboration based on survey information provided by ANII.

Table 1.2: Some features by innovation status and type of innovation, whole sample (2000-2021)

	Total Emp	Skilled	Sales	Share Skilled	Growth in Emp	Growth SL	Growth Share SL
Non-Innovators							
Mean	74	14,08	101752	0,1381	69,29	149,03	16,80
Sd	219	113,18	609817	0,2315	767,71	2622,85	307,29
No. Obs	9243	9243	9240	9201	8045	4952	4903
Innovators							
Mean	213	60,90	501941	0,2246	89,01	132,02	33,75
Sd	654	330,11	3858926	0,2559	760,52	2049,86	459,66
No. Obs	4966	4966	4966	4964	3782	3162	3153
Total							
Mean	123	30,45	241646	0,1684	75,60	142,40	23,43
Sd	430	216,59	2341617	0,2438	765,44	2415,65	374,45
No. Obs	14209	14209	14206	14165	11827	8114	8056

Notes: Own elaboration based on surveys provided by the ANII; sd: standard deviation; No.Obs.: number of observations.

Table 1.3: Innovation status and type of innovation by manufacturing and services firm

Manufactures	Innovation	Process Innovation	Product Innovation	Organizational Innovation	Process-Only Innovation	Product-Only Innovation	Enhancing Productivity Innovation
Mean	0,4043	0,3086	0,2420	0,1786	0,0912	0,0486	0,3557
Sd	0,4908	0,4620	0,4283	0,3831	0,2880	0,2150	0,4788
N	7222	7222	7222	7222	7222	7222	7222

Services	Innovation	Process Innovation	Product Innovation	Organizational Innovation	Process-Only Innovation	Product-Only Innovation	Enhancing Productivity Innovation
Mean	0,3166	0,2106	0,1521	0,1274	0,0920	0,0453	0,3292
Sd	0,4652	0,4078	0,3592	0,3334	0,2891	0,2080	0,4700
N	7749	7749	7749	7749	7749	7749	4392

Total	Innovation	Process Innovation	Product Innovation	Organizational Innovation	Process-Only Innovation	Product-Only Innovation	Enhancing Productivity Innovation
Mean	0,3589	0,2579	0,1955	0,1521	0,0916	0,0469	0,3120
Sd	0,4797	0,4375	0,3966	0,3591	0,2885	0,2114	0,4633
N	14971	14971	14971	14971	14971	14971	14971

Notes: Own elaboration based on surveys provided by the ANII; sd: standard deviation; No.Obs: number of observations.

Table 1.4: Features by innovation status of manufacturing firms

Non-Innovators	Total Emp	Skilled	Sales	Share Skilled	Growth Emp	Growth Sales	Growth in SL	Growth Share SL
Mean	52,74	3,77	103591,60	0,09	58,05	352,97	203,05	8,51
Sd	100,47	11,48	505608,30	0,15	478,25	7021,50	2282,80	183,16
No. Obs	3.947	3.947	3.947	3.937	2.795	2.790	1.524	1517
Innovators	Total Emp	Skilled	Sales	Share Skilled	Growth Emp	Growth Sales	Growth in SL	Growth Share SL
Mean	135,61	14,79	474133,40	0,14	85,47	1535,52	119,01	21,00
Sd	272,96	43,62	3400738,00	0,16	486,26	16531,80	962,76	203,58
No. Obs	2.513	2.513	2.513	2.512	1.345	1.345	1.037	1.036
Total	Total Emp	Skilled	Sales	Share Skilled	Growth Emp	Growth Sales	Growth SL	Growth Share SL
Mean	84,98	8,06	247736	0,11	66,96	737,62	169,02	13,58
Sd	191,77	29,15	2164861	0,16	480,98	11064,38	1864,69	191,77
No. Obs	6.460	6.460	6.460	6.449	4.140	4.135	2.561	2.553

Notes: Own elaboration based on surveys provided by the ANII; sd: standard deviation; No.Obs: number of observations.

Table 1.5: Features by innovation status of Services firms

Non-Innovators	Total Emp	Skilled	Sales	Share Skilled	Growth Emp	Growth SL	Growth Sales	Growth Share SL
Mean	90,03	21,77	100379	0,18	75,28	125,01	309,63	20,51
Sd	275,30	148,73	677212	0,27	883,94	2760,58	5217,86	348,83
No. Obs	5.296	5.296	5293	5.264	5.250	3.428	5.211	3386
Innovators	Total Emp	Skilled	Sales	Share Skilled	Growth Emp	Growth SL	Growth Sales	Growth Share SL
Mean	292,27	108,14	530429	0,31	90,96	138,37	264,34	39,99
Sd	882,07	462,92	4278254	0,30	875,94	2408,57	2624,11	542,53
No. Obs	2.453	2.453	2453	2.452	2.437	2.125	2.431	2.117
Total	Total Emp	Skilled	Sales	Share Skilled	Growth Emp	Growth SL	Growth Sales	Growth Share SL
Mean	154,05	49,11	236567	0,22	80,25	130,12	295,22	28,00
Sd	553,96	290,77	2479537	0,29	881,39	2631,23	4555,70	433,76
No. Obs	7.749	7.749	7746	7.716	7.687	5.553	7.642	5.503

Notes: Own elaboration based on surveys provided by the ANII; sd: standard deviation; No.Obs: number of observations.

Table 2.1: Effects of Innovation on total employment and skilled workers' growth (whole sample)

VARIABLES	(1) Emp Growth	(2) Emp Growth	(3) Emp Growth	(4) Emp Growth	(1) SL Growth	(2) SL Growth	(3) SL Growth	(4) SL Growth
Quantile	0.25	0.5	0.75	0.9	0.25	0.5	0.75	0.9
Innovation	2.282***	1.562***	1.293***	0.706*	5.453***	2.494***	4.587***	1.829
	(0.275)	(0.228)	(0.290)	(0.417)	(1.011)	(0.521)	(1.080)	(1.198)
Age	-0.0130***	-0.0261***	-0.0559***	-0.100***	-0.0204	-0.0304**	-0.0584***	-0.0812***
	(0.00445)	(0.00332)	(0.00506)	(0.00875)	(0.0239)	(0.0126)	(0.0225)	(0.0173)
Export status dummy	-0.304	-0.344	-0.843**	-0.751	0.499	0.343	-2.110*	-1.997
	(0.334)	(0.256)	(0.330)	(0.548)	(1.186)	(0.595)	(1.183)	(1.545)
Medium Size firms dummy	4.990***	3.329***	2.557***	2.617***	3.320***	1.065*	3.953**	4.694***
	(0.411)	(0.335)	(0.395)	(0.540)	(1.203)	(0.566)	(1.598)	(1.746)
Big firms dummy	8.108***	4.843***	3.281***	3.350***	6.834***	3.154***	7.067***	7.427***
	(0.408)	(0.314)	(0.399)	(0.635)	(1.362)	(0.714)	(1.652)	(1.907)
Foreign capital dummy	-2.230***	-0.964***	-0.0921	2.549*	-0.802	0.557	0.905	-1.908
	(0.469)	(0.307)	(0.389)	(1.414)	(1.471)	(0.833)	(1.359)	(1.436)
Constant	-4.596***	3.781***	11.09***	20.46***	-11.66***	8.205***	24.47***	49.76***
	(0.676)	(0.478)	(0.649)	(1.469)	(2.183)	(1.980)	(2.937)	(3.106)
Observations	7,155	7,155	7,155	7,155	4,520	4,520	4,520	4,520
Time Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard errors in parenthesis, *** p<0.01, ** p<0.05, * p<0.10.

Table 2.2: Effects of process innovation on total employment and skilled workers' growth (whole sample)

VARIABLES	Emp Growth	Emp Growth	Emp Growth	Emp Growth	SL Growth	SL Growth	SL Growth	SL Growth
Quantile	0.25	0.5	0.75	0.9	0.25	0.5	0.75	0.9
Process innovation	1.913***	1.339***	0.822***	0.341	4.169***	0.675*	2.174**	-0.599
	(0.275)	(0.231)	(0.301)	(0.457)	(0.868)	(0.382)	(1.086)	(1.307)
Age	-0.0135***	-0.0286***	-0.0542***	-0.0999***	-0.0287	-0.0165**	-0.0608***	-0.0948***
	(0.00426)	(0.00332)	(0.00469)	(0.00755)	(0.0236)	(0.00807)	(0.0200)	(0.0160)
Export status dummy	-0.160	-0.409	-0.838**	-0.692	0.811	0.199	-2.004*	-1.786
	(0.341)	(0.262)	(0.349)	(0.499)	(1.025)	(0.419)	(1.199)	(1.434)
Medium Size firms dummy	5.175***	3.480***	2.646***	2.645***	3.977***	1.141***	4.167***	5.030***
	(0.426)	(0.328)	(0.407)	(0.525)	(1.355)	(0.376)	(1.540)	(1.606)
Big firms dummy	8.252***	5.110***	3.576***	3.562***	7.910***	3.754***	8.068***	8.192***
	(0.423)	(0.314)	(0.433)	(0.544)	(1.256)	(0.591)	(1.594)	(1.812)
Foreign capital dummy	-1.854***	-1.094***	-0.114	2.085	-0.784	0.282	1.253	-1.754
	(0.506)	(0.333)	(0.420)	(1.285)	(1.252)	(0.695)	(1.289)	(1.820)
Constant	-4.528***	4.063***	11.19***	20.13***	-11.30***	8.740***	26.98***	50.82***
	(0.705)	(0.478)	(0.626)	(1.245)	(2.069)	(1.901)	(3.121)	(2.759)
Observations	7,155	7,155	7,155	7,155	4,520	4,520	4,520	4,520
Time Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard errors in parenthesis, *** p<0.01, ** p<0.05, * p<0.10.

Table 2.3: Effects of product innovation on total employment and skilled workers' growth (whole sample)

VARIABLES	(1) Emp Growth	(2) Emp Growth	(3) Emp Growth	(4) Emp Growth	(1) SL Growth	(2) SL Growth	(3) SL Growth	(4) SL Growth
Quantile	0.25	0.5	0.75	0.9	0.25	0.5	0.75	0.9
Product innovation dummy	1.828***	1.300***	1.300***	0.859	3.770***	2.430***	2.803**	1.878
	(0.265)	(0.256)	(0.315)	(0.781)	(1.078)	(0.603)	(1.153)	(1.332)
Age	-0.0119***	-0.0264***	-0.0558***	-0.103***	-0.0187	-0.0161*	-0.0691***	-0.0864***
	(0.00366)	(0.00355)	(0.00507)	(0.0134)	(0.0231)	(0.00854)	(0.0189)	(0.0155)
Export status dummy	-0.223	-0.415	-0.826**	-0.897	1.537	0.202	-2.279*	-1.800
	(0.285)	(0.267)	(0.361)	(0.779)	(1.163)	(0.541)	(1.201)	(1.428)
Medium Size firms dummy	5.399***	3.435***	2.830***	2.736***	3.814**	0.943**	3.964***	4.505***
	(0.427)	(0.338)	(0.405)	(0.684)	(1.480)	(0.462)	(1.451)	(1.433)
Big firms dummy	8.670***	4.985***	3.661***	3.763***	8.039***	3.319***	8.088***	7.329***
	(0.397)	(0.323)	(0.439)	(0.826)	(1.402)	(0.594)	(1.458)	(1.723)
Foreign capital dummy	-1.961***	-0.747**	-0.127	2.362*	-1.057	0.404	1.353	-1.384
	(0.453)	(0.303)	(0.442)	(1.282)	(1.257)	(0.683)	(1.345)	(1.597)
Constant	-4.556***	4.142***	11.09***	20.47***	-11.77***	8.324***	27.30***	49.96***
	(0.672)	(0.485)	(0.641)	(1.415)	(2.202)	(1.946)	(2.876)	(2.516)
Observations	7,155	7,155	7,155	7,155	4,520	4,520	4,520	4,520
Time Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1.

Table 3.1: Effects of innovation on total employment and skilled workers' growth (manufacturing firms)

	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
VARIABLES	Emp Growth	Emp Growth	Emp Growth	Emp Growth	SL Growth	SL Growth	SL Growth	SL Growth
Quantile	0.25	0.5	0.75	0.9	0.25	0.5	0.75	0.9
Any type of innovation dummy	2.568***	1.563***	1.349***	0.402	7.448***	3.617***	6.159***	3.824**
	(0.437)	(0.312)	(0.383)	(0.636)	(1.379)	(0.838)	(1.454)	(1.566)
Age	-0.0120	-0.0293***	-0.0589***	-0.118***	-0.0441	-0.0325*	-0.0559*	-0.0794***
	(0.00868)	(0.00587)	(0.00587)	(0.00927)	(0.0322)	(0.0197)	(0.0301)	(0.0275)
Export status dummy	-0.817**	-1.130***	-1.160***	-0.700	-0.789	0.130	-3.119**	-1.954
	(0.391)	(0.336)	(0.411)	(0.706)	(1.498)	(0.899)	(1.521)	(1.772)
Medium Size firms dummy	5.121***	3.895***	2.935***	3.214***	3.882**	1.623	4.907**	4.781*
	(0.608)	(0.459)	(0.479)	(0.697)	(1.868)	(1.141)	(2.065)	(2.448)
Big firms dummy	8.345***	5.903***	4.169***	5.410***	6.108***	2.497*	7.911***	6.918**
	(0.633)	(0.424)	(0.574)	(1.077)	(1.857)	(1.320)	(2.110)	(2.796)
Foreign capital dummy	-2.295***	-0.817**	-0.587	2.401	0.988	0.352	-0.395	-3.735**
	(0.553)	(0.369)	(0.523)	(1.713)	(1.878)	(1.151)	(1.706)	(1.803)
Constant	-4.808***	3.469***	10.77***	19.88***	-11.44***	8.025***	24.22***	47.71***
	(0.828)	(0.526)	(0.724)	(1.400)	(2.348)	(2.016)	(3.222)	(3.201)
Observations	3,704	3,704	3,704	3,704	2,334	2,334	2,334	2,334
Time Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1.

Table 3.2: Effects of process innovation on total employment and skilled workers' growth (manufacturing firms)

VARIABLES	(1) Emp Growth	(2) Emp Growth	(3) Emp Growth	(4) Emp Growth	(1) SL Growth	(2) SL Growth	(3) SL Growth	(4) SL Growth
Quantile	0.25	0.5	0.75	0.9	0.25	0.5	0.75	0.9
Process innovation dummy	2.385***	1.387***	1.188***	0.311	3.683***	0.678	1.954	-1.599
	(0.365)	(0.325)	(0.377)	(0.676)	(1.241)	(0.607)	(1.477)	(1.564)
Age	-0.0164**	-0.0303***	-0.0563***	-0.118***	-0.0293	-0.0212	-0.0664**	-0.0720**
	(0.00821)	(0.00513)	(0.00620)	(0.0144)	(0.0318)	(0.0145)	(0.0306)	(0.0288)
Export status dummy	-0.569	-1.153***	-1.147***	-0.653	-0.117	0.734	-2.547	-2.447
	(0.379)	(0.351)	(0.412)	(0.729)	(1.351)	(0.673)	(1.566)	(1.610)
Medium Size firms dummy	5.271***	3.799***	3.102***	3.477***	5.713***	0.988	5.721**	6.066***
	(0.549)	(0.482)	(0.489)	(0.718)	(1.699)	(0.917)	(2.440)	(2.016)
Big firms dummy	8.241***	5.924***	4.424***	5.532***	9.070***	2.638**	8.688***	9.537***
	(0.593)	(0.439)	(0.564)	(1.131)	(1.535)	(1.102)	(2.496)	(2.420)
Foreign capital dummy	-1.739***	-0.948**	-0.678	2.281	-0.381	0.352	0.403	-4.341**
	(0.585)	(0.385)	(0.496)	(1.672)	(1.860)	(0.926)	(1.681)	(1.891)
Constant	-4.610***	3.897***	10.77***	19.83***	-11.44***	8.877***	27.22***	49.79***
	(0.764)	(0.580)	(0.702)	(1.453)	(2.119)	(1.874)	(3.491)	(3.202)
Observations	3,704	3,704	3,704	3,704	2,334	2,334	2,334	2,334
Time Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1.

Table 3.3 Effects of product innovation on total employment and skilled workers' growth (manufacturing firms)

VARIABLES	(1) Emp Growth	(2) Emp Growth	(3) Emp Growth	(4) Emp Growth	(1) SL Growth	(2) SL Growth	(3) SL Growth	(4) SL Growth
Quantile	0.25	0.5	0.75	0.9	0.25	0.5	0.75	0.9
Product Innovation dummy	1.829***	1.512***	1.407***	1.122	4.547***	2.473***	5.219***	4.072***
	(0.341)	(0.344)	(0.385)	(0.700)	(1.154)	(0.777)	(1.517)	(1.579)
Age	-0.0201***	-0.0293***	-0.0605***	-0.115***	-0.0342	-0.0322*	-0.0658**	-0.0717**
	(0.00768)	(0.00538)	(0.00658)	(0.0129)	(0.0307)	(0.0169)	(0.0298)	(0.0287)
Export status dummy	-0.632*	-1.007***	-1.291***	-1.056	0.500	0.786	-3.482**	-1.956
	(0.370)	(0.331)	(0.402)	(0.690)	(1.248)	(0.795)	(1.542)	(1.698)
Medium Size firms dummy	5.609***	3.916***	3.291***	3.342***	5.996***	1.362	4.486**	6.602***
	(0.575)	(0.442)	(0.472)	(0.721)	(1.727)	(1.027)	(2.274)	(2.284)
Big firms dummy	8.796***	5.819***	4.590***	5.763***	8.866***	2.586**	8.525***	8.758***
	(0.605)	(0.414)	(0.544)	(1.056)	(1.308)	(1.208)	(2.259)	(2.653)
Foreign capital dummy	-1.592***	-0.763**	-0.204	1.718	-0.475	0.547	0.0350	-4.451**
	(0.551)	(0.361)	(0.507)	(1.660)	(1.734)	(0.987)	(1.717)	(2.078)
Constant	-4.241***	3.923***	10.92***	19.41***	-11.72***	8.374***	27.02***	48.79***
	(0.769)	(0.513)	(0.700)	(1.519)	(2.116)	(1.945)	(3.223)	(3.477)
Observations	3,704	3,704	3,704	3,704	2,334	2,334	2,334	2,334
Time Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1.

Table 4.1: Effects of innovation on total employment and skilled workers' growth (service firms)

VARIABLES	(1) Emp Growth	(2) Emp Growth	(3) Emp Growth	(4) Emp Growth	(1) SL Growth	(2) SL Growth	(3) SL Growth	(4) SL Growth
Quantile	0.25	0.5	0.75	0.9	0.25	0.5	0.75	0.9
Any type of innovation dummy	2.063***	1.455***	1.220**	0.742	3.786**	2.030***	2.266	-0.676
	(0.413)	(0.346)	(0.538)	(0.757)	(1.563)	(0.731)	(1.779)	(1.665)
Age	-0.0115**	-0.0243***	-0.0508***	-0.0899***	-0.00291	-0.0209	-0.0766**	-0.0622*
	(0.00573)	(0.00569)	(0.00711)	(0.0170)	(0.0316)	(0.0183)	(0.0353)	(0.0333)
Export status dummy	-0.348	0.390	-0.276	-1.321*	3.591*	0.107	0.235	1.570
	(0.624)	(0.458)	(0.704)	(0.730)	(1.944)	(0.989)	(2.737)	(2.507)
Medium Size firms dummy	4.665***	2.848***	1.342**	1.289	0.495	0.851	2.070	3.977**
	(0.701)	(0.494)	(0.678)	(1.036)	(2.092)	(0.893)	(2.276)	(1.890)
Big firms dummy	8.110***	4.036***	2.434***	1.147	6.298***	4.304***	7.070***	8.057***
	(0.666)	(0.475)	(0.669)	(1.073)	(2.287)	(0.922)	(2.432)	(2.639)
Foreign capital dummy	-2.516***	-1.244***	0.389	4.085**	-4.067*	0.290	2.251	2.520
	(0.689)	(0.476)	(0.708)	(1.953)	(2.173)	(1.305)	(2.881)	(2.839)
Constant	-4.179*	10.19***	22.59***	21.59**	-8.135*	0.109	4.947	22.74***
	(2.438)	(3.947)	(5.385)	(8.745)	(4.561)	(2.222)	(5.776)	(6.640)
Observations	3,451	3,451	3,451	3,451	2,186	2,186	2,186	2,186
Time Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard errors in parenthesis, *** p<0.01, ** p<0.05, * p<0.10.

Table 4.2. process service sector Effects of process innovation on total employment and skilled workers' growth (service firms)

VARIABLES	(1) Emp Growth	(2) Emp Growth	(3) Emp Growth	(4) Emp Growth	(1) SL Growth	(2) SL Growth	(3) SL Growth	(4) SL Growth
Quantile	0.25	0.5	0.75	0.9	0.25	0.5	0.75	0.9
Process innovation dummy	1.459***	1.125***	0.250	-0.635	4.842***	1.334*	2.492	-0.0928
	(0.381)	(0.349)	(0.521)	(0.744)	(1.435)	(0.722)	(1.712)	(1.682)
Age	-0.0119***	-0.0261***	-0.0455***	-0.0821***	-0.0131	-0.0173	-0.0808**	-0.0649**
	(0.00445)	(0.00511)	(0.00617)	(0.00981)	(0.0291)	(0.0130)	(0.0350)	(0.0270)
Export status dummy	-0.147	0.572	-0.257	-1.534	3.854**	0.440	-0.239	1.147
	(0.643)	(0.458)	(0.741)	(1.063)	(1.780)	(0.880)	(2.652)	(2.149)
Medium Size firms dummy	5.199***	2.820***	1.470**	1.539	0.870	1.110	2.040	3.854**
	(0.652)	(0.488)	(0.742)	(1.146)	(1.821)	(0.864)	(2.318)	(1.865)
Big firms dummy	8.538***	4.152***	2.560***	1.313	7.008***	4.372***	7.140***	7.857***
	(0.602)	(0.470)	(0.674)	(1.139)	(1.809)	(0.776)	(2.401)	(2.384)
Foreign capital dummy	-2.168***	-1.140**	0.292	4.364**	-4.081**	0.173	2.502	2.614
	(0.725)	(0.533)	(0.790)	(1.814)	(1.962)	(1.127)	(2.840)	(2.326)
Constant	-4.609	9.732***	23.43**	23.23	-9.315**	0.156	5.528	22.93***
	(8.583)	(0.764)	(11.52)	(15.82)	(3.768)	(1.513)	(5.592)	(3.078)
Observations	3,451	3,451	3,451	3,451	2,186	2,186	2,186	2,186
Time Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard errors in parenthesis, *** p<0.01, ** p<0.05, * p<0.10.

Table 4.3 product innovation service sector Effects of process innovation on total employment and skilled workers' growth (service firms)

VARIABLES	(1) Emp Growth	(2) Emp Growth	(3) Emp Growth	(4) Emp Growth	(1) SL Growth	(2) SL Growth	(3) SL Growth	(4) SL Growth
Quantile	0.25	0.5	0.75	0.9	0.25	0.5	0.75	0.9
Product Innovation dummy	1.715***	1.136***	1.273**	-0.344	2.890	2.850***	1.222	-1.390
	(0.343)	(0.377)	(0.514)	(0.751)	(1.922)	(0.986)	(1.901)	(2.494)
Age	-0.00848**	-0.0301***	-0.0431***	-0.0861***	0.00740	-0.00318	-0.0630**	-0.0593
	(0.00343)	(0.00469)	(0.0101)	(0.0105)	(0.0342)	(0.0162)	(0.0319)	(0.0365)
Export status dummy	-0.00908	0.517	-0.205	-1.569	3.532*	0.0826	-0.112	1.381
	(0.549)	(0.477)	(0.607)	(0.992)	(1.902)	(0.888)	(2.815)	(2.570)
Medium Size firms dummy	5.121***	2.682***	1.531**	1.375	1.193	0.146	2.330	4.033***
	(0.649)	(0.508)	(0.738)	(1.089)	(2.121)	(0.864)	(2.464)	(1.521)
Big firms dummy	8.675***	4.175***	2.598***	1.383	6.685***	3.578***	7.626***	7.866***
	(0.589)	(0.483)	(0.647)	(0.959)	(2.334)	(0.770)	(2.449)	(2.788)
Foreign capital dummy	-2.358***	-1.022**	0.0370	3.734**	-3.020	0.111	2.387	2.816
	(0.608)	(0.502)	(0.543)	(1.755)	(2.138)	(1.108)	(2.745)	(2.892)
Constant	-4.384	9.488	24.18**	22.35	-6.729	0.238	5.677	22.30***
	(5.563)	(6.053)	(10.22)	(17.27)	(5.133)	(1.539)	(4.569)	(4.504)
Observations	3,451	3,451	3,451	3,451	2,186	2,186	2,186	2,186
Time Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard in parenthesis; *** p<0.01, ** p<0.05, * p<0.10.

Table 5.1: Manufactures High Tech firms

VARIABLES	(1) Emp Growth	(2) Emp Growth	(3) Emp Growth	(4) Emp Growth	(1) SL Growth	(2) SL Growth	(3) SL Growth	(4) SL Growth
Quantile	0,25	0,5	0,75	0,9	0,25	0,5	0,75	0,9
Any type of innovation dummy	2.834***	2.126***	1.391***	0.282	7.663***	3.667***	5.447***	1.279
	(0.543)	(0.384)	(0.484)	(0.833)	(1.633)	(0.993)	(2.031)	(2.026)
Age	-0.0189***	-0.0372***	-0.0580***	-0.114***	-0.0240	-0.0299	-0.0506	-0.0963**
	(0.00707)	(0.00460)	(0.00659)	(0.0126)	(0.0366)	(0.0221)	(0.0407)	(0.0389)
Export status dummy	-0.950**	-1.169***	-1.175**	-1.718*	-0.473	0.759	-2.544	-2.146
	(0.420)	(0.385)	(0.487)	(0.967)	(1.421)	(1.060)	(2.055)	(1.800)
Medium Size firms dummy	4.106***	2.257***	2.778***	2.017**	2.840	2.099	4.158	5.443
	(0.890)	(0.581)	(0.588)	(0.912)	(2.176)	(1.940)	(3.327)	(3.395)
Big firms dummy	7.448***	4.799***	3.782***	6.005***	4.202***	3.271	7.364**	7.359**
	(0.868)	(0.514)	(0.660)	(1.293)	(1.545)	(2.109)	(3.273)	(3.362)
Foreign capital dummy	-1.322**	-0.542	-0.734	0.400	1.011	-0.155	-0.304	-4.443**
	(0.521)	(0.421)	(0.520)	(2.005)	(1.981)	(1.220)	(2.210)	(2.027)
Constant	-5.665***	2.861***	9.605***	17.56***	-10.07***	8.216***	26.22***	50.74***
	(1.008)	(0.605)	(0.642)	(1.292)	(2.477)	(2.667)	(4.478)	(4.165)
Observations	2,188	2,188	2,188	2,188	1,548	1,548	1,548	1,548
Time Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard errors in parenthesis, *** p<0.01, ** p<0.05, * p<0.10.

Table 5.2: Manufactures High Tech firms

VARIABLES	(1) Emp Growth	(2) Emp Growth	(3) Emp Growth	(4) Emp Growth	(1) SL Growth	(2) SL Growth	(3) SL Growth	(4) SL Growth
Quantile	0,25	0,5	0,75	0,9	0,25	0,5	0,75	0,9
Process innovation dummy	2.184***	1.699***	1.168***	-1.060	4.655***	0.969**	0.890	-2.739
	(0.397)	(0.390)	(0.435)	(0.766)	(1.645)	(0.469)	(2.086)	(1.752)
Age	-0.0179**	-0.0364***	-0.0547***	-0.105***	-0.0163	-0.0202	-0.0589	-0.109***
	(0.00860)	(0.00658)	(0.00786)	(0.0158)	(0.0414)	(0.0148)	(0.0447)	(0.0293)
Export status dummy	-0.734*	-1.266***	-1.226***	-1.684*	0.194	0.844	-2.233	-2.911
	(0.413)	(0.407)	(0.468)	(0.984)	(1.775)	(0.582)	(2.165)	(2.006)
Medium Size firms dummy	4.582***	2.305***	2.700***	2.104**	3.684	1.209	4.505	5.501*
	(0.849)	(0.622)	(0.606)	(0.981)	(2.721)	(1.788)	(3.443)	(3.264)
Big firms dummy	7.711***	5.033***	3.854***	6.507***	5.766***	2.838	8.227**	9.945***
	(0.824)	(0.557)	(0.652)	(1.264)	(2.206)	(1.924)	(3.349)	(2.686)
Foreign capital dummy	-1.430**	-0.648	-0.670	-0.546	-0.180	0.385	0.800	-4.139*
	(0.724)	(0.525)	(0.514)	(1.797)	(1.948)	(0.639)	(2.436)	(2.123)
Constant	-5.518***	3.257***	9.625***	17.53***	-9.185***	9.791***	28.46***	51.31***
	(1.004)	(0.670)	(0.700)	(1.227)	(2.675)	(2.481)	(4.706)	(4.418)
Observations	2,188	2,188	2,188	2,188	1,548	1,548	1,548	1,548
Time Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard in parenthesis; *** p<0.01, ** p<0.05, * p<0.10.

Table 5.3: Manufactures High Tech firms

VARIABLES	(1) Emp Growth	(2) Emp Growth	(3) Emp Growth	(4) Emp Growth	(1) SL Growth	(2) SL Growth	(3) SL Growth	(4) SL Growth
Quantile	0,25	0,5	0,75	0,9	0,25	0,5	0,75	0,9
Product Innovation dummy	2.038***	1.479***	1.447***	1.878**	5.095***	4.161**	0.792	0.792
	(0.423)	(0.372)	(0.438)	(0.926)	(1.320)	(1.840)	(1.735)	(2.776)
Age	-0.0156	-0.0348***	-0.0632***	-0.126***	-0.00769	-0.0551	-0.0860**	-0.0860
	(0.00992)	(0.00613)	(0.00539)	(0.0106)	(0.0337)	(0.0391)	(0.0350)	(0.0673)
Export status dummy	-1.103**	-0.999***	-1.303***	-1.470	0.738	-2.970	-1.976	-1.976
	(0.430)	(0.361)	(0.485)	(0.944)	(1.397)	(1.976)	(1.611)	(2.182)
Medium Size firms dummy	4.788***	2.640***	2.809***	1.846*	3.951*	2.153	5.219	5.219
	(0.918)	(0.604)	(0.593)	(1.029)	(2.320)	(3.154)	(3.496)	(4.383)
Big firms dummy	7.863***	5.021***	4.139***	4.912***	5.608***	6.953**	7.650**	7.650*
	(0.822)	(0.500)	(0.639)	(1.354)	(1.430)	(3.061)	(3.396)	(4.307)
Foreign capital dummy	-0.436	-0.536	-0.369	-0.607	-0.266	0.449	-4.686**	-4.686
	(0.669)	(0.463)	(0.510)	(2.175)	(1.774)	(2.239)	(1.887)	(2.998)
Constant	-5.013***	3.409***	9.977***	17.80***	-8.931***	29.28***	50.25***	50.25***
	(1.021)	(0.673)	(0.629)	(1.439)	(1.963)	(4.360)	(4.450)	(5.792)
Observations	2,188	2,188	2,188	2,188	1,548	1,548	1,548	1,548
Time Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard in parenthesis; *** p<0.01, ** p<0.05, * p<0.10.

Table 6.1: Low Tech Manufactures firms

VARIABLES	(1) Emp Growth	(2) Emp Growth	(3) Emp Growth	(4) Emp Growth	(1) SL Growth	(2) SL Growth	(3) SL Growth	(4) SL Growth
Quantile	0,25	0,5	0,75	0,9	0,25	0,5	0,75	0,9
Any type of innovation dummy	2.834***	2.126***	1.391***	0.282	7.663***	3.667***	5.447***	1.279
	(0.543)	(0.384)	(0.484)	(0.833)	(1.633)	(0.993)	(2.031)	(2.026)
Age	-0.0189***	-0.0372***	-0.0580***	-0.114***	-0.0240	-0.0299	-0.0506	-0.0963**
	(0.00707)	(0.00460)	(0.00659)	(0.0126)	(0.0366)	(0.0221)	(0.0407)	(0.0389)
Export status dummy	-0.950**	-1.169***	-1.175**	-1.718*	-0.473	0.759	-2.544	-2.146
	(0.420)	(0.385)	(0.487)	(0.967)	(1.421)	(1.060)	(2.055)	(1.800)
Medium Size firms dummy	4.106***	2.257***	2.778***	2.017**	2.840	2.099	4.158	5.443
	(0.890)	(0.581)	(0.588)	(0.912)	(2.176)	(1.940)	(3.327)	(3.395)
Big firms dummy	7.448***	4.799***	3.782***	6.005***	4.202***	3.271	7.364**	7.359**
	(0.868)	(0.514)	(0.660)	(1.293)	(1.545)	(2.109)	(3.273)	(3.362)
Foreign capital dummy	-1.322**	-0.542	-0.734	0.400	1.011	-0.155	-0.304	-4.443**
	(0.521)	(0.421)	(0.520)	(2.005)	(1.981)	(1.220)	(2.210)	(2.027)
Constant	-5.665***	2.861***	9.605***	17.56***	-10.07***	8.216***	26.22***	50.74***
	(1.008)	(0.605)	(0.642)	(1.292)	(2.477)	(2.667)	(4.478)	(4.165)
Observations	2,188	2,188	2,188	2,188	1,548	1,548	1,548	1,548
Time Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard in parenthesis; *** p<0.01, ** p<0.05, * p<0.10.

Table 6.2: Low Tech Manufactures firms

VARIABLES	(1) Emp Growth	(2) Emp Growth	(3) Emp Growth	(4) Emp Growth	(1) SL Growth	(2) SL Growth	(3) SL Growth	(4) SL Growth
Quantile	0,25	0,5	0,75	0,9	0,25	0,5	0,75	0,9
Process innovation dummy	2.184***	1.699***	1.168***	-1.060	4.655***	0.969**	0.890	-2.739
	(0.397)	(0.390)	(0.435)	(0.766)	(1.645)	(0.469)	(2.086)	(1.752)
Age	-0.0179**	-0.0364***	-0.0547***	-0.105***	-0.0163	-0.0202	-0.0589	-0.109***
	(0.00860)	(0.00658)	(0.00786)	(0.0158)	(0.0414)	(0.0148)	(0.0447)	(0.0293)
Export status dummy	-0.734*	-1.266***	-1.226***	-1.684*	0.194	0.844	-2.233	-2.911
	(0.413)	(0.407)	(0.468)	(0.984)	(1.775)	(0.582)	(2.165)	(2.006)
Medium Size firms dummy	4.582***	2.305***	2.700***	2.104**	3.684	1.209	4.505	5.501*
	(0.849)	(0.622)	(0.606)	(0.981)	(2.721)	(1.788)	(3.443)	(3.264)
Big firms dummy	7.711***	5.033***	3.854***	6.507***	5.766***	2.838	8.227**	9.945***
	(0.824)	(0.557)	(0.652)	(1.264)	(2.206)	(1.924)	(3.349)	(2.686)
Foreign capital dummy	-1.430**	-0.648	-0.670	-0.546	-0.180	0.385	0.800	-4.139*
	(0.724)	(0.525)	(0.514)	(1.797)	(1.948)	(0.639)	(2.436)	(2.123)
Constant	-5.518***	3.257***	9.625***	17.53***	-9.185***	9.791***	28.46***	51.31***
	(1.004)	(0.670)	(0.700)	(1.227)	(2.675)	(2.481)	(4.706)	(4.418)
Observations	2,188	2,188	2,188	2,188	1,548	1,548	1,548	1,548
Time Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard in parenthesis; *** p<0.01, ** p<0.05, * p<0.10.

Table 6.3: Low Tech Manufactures firms

VARIABLES	(1) Emp Growth	(2) Emp Growth	(3) Emp Growth	(4) Emp Growth	(1) SL Growth	(2) SL Growth	(3) SL Growth	(4) SL Growth
Quantile	0,25	0,5	0,75	0,9	0,25	0,5	0,75	0,9
Product Innovation dummy	2.038***	1.479***	1.447***	1.878**	5.095***	3.410***	4.161**	0.792
	(0.423)	(0.372)	(0.438)	(0.926)	(1.320)	(1.084)	(1.840)	(1.735)
Age	-0.0156	-0.0348***	-0.0632***	-0.126***	-0.00769	-0.0154	-0.0551	-0.0860**
	(0.00992)	(0.00613)	(0.00539)	(0.0106)	(0.0337)	(0.0211)	(0.0391)	(0.0350)
Export status dummy	-1.103**	-0.999***	-1.303***	-1.470	0.738	0.126	-2.970	-1.976
	(0.430)	(0.361)	(0.485)	(0.944)	(1.397)	(1.118)	(1.976)	(1.611)
Medium Size firms dummy	4.788***	2.640***	2.809***	1.846*	3.951*	2.297	2.153	5.219
	(0.918)	(0.604)	(0.593)	(1.029)	(2.320)	(2.038)	(3.154)	(3.496)
Big firms dummy	7.863***	5.021***	4.139***	4.912***	5.608***	2.960	6.953**	7.650**
	(0.822)	(0.500)	(0.639)	(1.354)	(1.430)	(2.190)	(3.061)	(3.396)
Foreign capital dummy	-0.436	-0.536	-0.369	-0.607	-0.266	0.509	0.449	-4.686**
	(0.669)	(0.463)	(0.510)	(2.175)	(1.774)	(1.392)	(2.239)	(1.887)
Constant	-5.013***	3.409***	9.977***	17.80***	-8.931***	8.530***	29.28***	50.25***
	(1.021)	(0.673)	(0.629)	(1.439)	(1.963)	(2.810)	(4.360)	(4.450)
Observations	2,188	2,188	2,188	2,188	1,548	1,548	1,548	1,548
Time Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard in parenthesis; *** p<0.01, ** p<0.05, * p<0.10.

Table 7.1: Services High Tech

VARIABLES	(1) Emp Growth	(2) Emp Growth	(3) Emp Growth	(4) Emp Growth	(1) SL Growth	(2) SL Growth	(3) SL Growth	(4) SL Growth
Quantile	0,25	0,5	0,75	0,9	0,25	0,5	0,75	0,9
Any type of innovation dummy	1.842***	0.679	-0.681	-3.151**	4.968**	0.0469	-2.874	-3.491
	(0.703)	(0.690)	(0.948)	(1.461)	(2.085)	(1.318)	(2.560)	(3.442)
Age	-0.0168*	-0.0160	-0.0264	0.0120	-0.0488	-0.0156	-0.0264	-0.00774
	(0.00952)	(0.0124)	(0.0168)	(0.0413)	(0.0479)	(0.0260)	(0.0529)	(0.0985)
Export status dummy	0.947	2.773*	2.693	2.054	5.414	2.316	5.137	3.306
	(1.529)	(1.490)	(1.740)	(2.249)	(3.345)	(2.622)	(3.861)	(7.548)
Medium Size firms dummy	3.269***	1.841*	1.500	4.311**	5.836*	2.425	2.673	-0.901
	(1.150)	(1.030)	(1.463)	(1.788)	(3.292)	(1.638)	(3.153)	(5.597)
Big firms dummy	6.835***	4.103***	4.833***	3.304*	8.285***	4.263**	6.752**	-2.025
	(0.938)	(0.892)	(1.199)	(1.995)	(2.621)	(1.687)	(3.128)	(5.907)
Foreign capital dummy	-1.669	-1.201	0.00471	2.779	-0.313	2.316	7.598**	11.03**
	(1.447)	(1.062)	(1.322)	(3.094)	(2.998)	(2.582)	(3.786)	(4.914)
Constant	25.74***	25.20***	21.57***	17.24*	-13.83***	1.976	6.189	29.53**
	(8.898)	(1.561)	(2.552)	(9.278)	(4.878)	(3.946)	(7.386)	(12.66)
Observations	895	895	895	895	762	762	762	762
Time Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard in parenthesis; *** p<0.01, ** p<0.05, * p<0.10.

Table 7.2: Services High Tech

VARIABLES	(1) Emp Growth	(2) Emp Growth	(3) Emp Growth	(4) Emp Growth	(1) SL Growth	(2) SL Growth	(3) SL Growth	(4) SL Growth
Quantile	0,25	0,5	0,75	0,9	0,25	0,5	0,75	0,9
Process innovation dummy	1.042	0.864	-1.252	-3.570**	6.129***	2.149	2.696	0.488
	(0.642)	(0.632)	(0.897)	(1.788)	(1.836)	(1.373)	(2.551)	(2.873)
Age	-0.0106	-0.0171	-0.0235**	0.00387	-0.0362	-0.00666	-0.0625	0.0779**
	(0.00959)	(0.0116)	(0.0107)	(0.0432)	(0.0429)	(0.0247)	(0.0620)	(0.0377)
Export status dummy	1.688	2.676**	2.549	1.935	6.383*	3.457	5.550	2.989
	(1.721)	(1.279)	(1.758)	(3.158)	(3.730)	(2.695)	(4.368)	(7.336)
Medium Size firms dummy	3.818***	2.162**	1.722	1.419	7.097**	2.209	2.912	-2.990
	(1.131)	(0.985)	(1.352)	(2.242)	(2.923)	(1.639)	(3.598)	(5.206)
Big firms dummy	6.910***	4.218***	5.139***	2.082	8.520***	3.578**	4.825	-2.987
	(0.919)	(0.813)	(1.152)	(2.442)	(2.341)	(1.800)	(3.241)	(5.362)
Foreign capital dummy	-2.161	-1.550	-0.145	4.288	-1.142	1.831	8.323*	10.83**
	(1.395)	(1.052)	(1.237)	(3.484)	(3.106)	(2.546)	(4.326)	(4.833)
Constant	26.33***	24.84**	22.08***	17.83*	-16.46***	-1.700	5.506	26.71**
	(8.989)	(10.74)	(2.565)	(9.406)	(4.713)	(4.272)	(10.54)	(10.52)
Observations	895	895	895	895	762	762	762	762
Time Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard in parenthesis; *** p<0.01, ** p<0.05, * p<0.10.

Table 7.3: Services High Tech

VARIABLES	(1) Emp Growth	(2) Emp Growth	(3) Emp Growth	(4) Emp Growth	(1) SL Growth	(2) SL Growth	(3) SL Growth	(4) SL Growth
Quantile	0,25	0,5	0,75	0,9	0,25	0,5	0,75	0,9
Product Innovation dummy	0.715	-0.0415	-0.366	-3.117**	-3.429	-1.559	-4.346*	-4.733
	(0.664)	(0.639)	(1.282)	(1.458)	(2.240)	(1.582)	(2.294)	(3.730)
Age	-0.0101	-0.00962	-0.0282*	-0.0179	-0.0480	-0.00931	-0.0458	-0.0143
	(0.0102)	(0.0102)	(0.0147)	(0.0323)	(0.0432)	(0.0253)	(0.0615)	(0.0350)
Export status dummy	2.230	2.777***	2.511	3.329*	9.357***	2.612	3.113	3.292
	(1.744)	(1.039)	(1.760)	(1.730)	(3.200)	(2.480)	(3.617)	(5.784)
Medium Size firms dummy	4.143***	1.629*	1.172	4.029**	9.824***	2.914*	2.928	-0.0531
	(1.108)	(0.970)	(1.389)	(1.667)	(3.034)	(1.617)	(3.135)	(5.647)
Big firms dummy	7.612***	4.368***	4.569***	3.084	10.80***	4.875***	6.889**	-0.271
	(0.879)	(0.788)	(1.158)	(2.059)	(2.269)	(1.610)	(2.975)	(5.545)
Foreign capital dummy	-2.159	-1.115	0.183	1.946	-1.795	2.214	5.961*	9.082**
	(1.471)	(1.094)	(1.143)	(2.882)	(3.486)	(2.425)	(3.272)	(4.626)
Constant	27.11***	25.41***	21.36*	16.89*	-17.89***	-0.636	7.004	28.71***
	(9.160)	(1.564)	(11.86)	(10.17)	(6.224)	(3.784)	(7.284)	(8.322)
Observations	895	895	895	895	762	762	762	762
Time Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard in parenthesis; *** p<0.01, ** p<0.05, * p<0.10.

Table 8.1: Services Low Tech

VARIABLES	(1) Emp Growth	(2) Emp Growth	(3) Emp Growth	(4) Emp Growth	(1) SL Growth	(2) SL Growth	(3) SL Growth	(4) SL Growth
Quantile	0,25	0,5	0,75	0,9	0,25	0,5	0,75	0,9
Any type of innovation dummy	2.028***	1.624***	1.610**	2.183**	2.442	2.852***	7.021***	1.493
	(0.549)	(0.410)	(0.639)	(1.002)	(2.323)	(1.002)	(2.486)	(2.089)
Age	-0.0135	-0.0332***	-0.0656***	-0.113***	0.0404	-0.0334	-0.0468	-0.115***
	(0.0102)	(0.00741)	(0.0129)	(0.0277)	(0.0476)	(0.0309)	(0.0587)	(0.0371)
Export status dummy	-0.702	0.175	-1.184*	-2.653*	2.442	-0.0142	-1.394	-0.287
	(0.642)	(0.488)	(0.700)	(1.437)	(2.436)	(1.259)	(3.217)	(3.322)
Medium Size firms dummy	5.587***	3.013***	1.728**	1.142	-1.457	0.368	1.801	5.735**
	(0.808)	(0.557)	(0.837)	(1.481)	(2.774)	(1.172)	(3.244)	(2.654)
Big firms dummy	9.178***	4.271***	1.296**	0.279	5.384	4.171***	3.924	11.71***
	(0.764)	(0.581)	(0.656)	(1.367)	(3.289)	(1.226)	(3.602)	(3.576)
Foreign capital dummy	-2.618***	-1.452**	1.204	6.563***	-5.255*	-0.0527	2.225	0.180
	(1.002)	(0.601)	(1.230)	(2.187)	(3.039)	(1.894)	(3.335)	(3.170)
Constant	-3.661*	-1.059	10.77	6.721	-36.21	-4.633	-6.880	26.45**
	(2.151)	(37.65)	(9.795)	(8.924)	(31.59)	(7.131)	(6.786)	(10.75)
Observations	2,556	2,556	2,556	2,556	1,424	1,424	1,424	1,424
Time Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard in parenthesis; *** p<0.01, ** p<0.05, * p<0.10.

Table 8.2: Services Low Tech

VARIABLES	(1) Emp Growth	(2) Emp Growth	(3) Emp Growth	(4) Emp Growth	(1) SL Growth	(2) SL Growth	(3) SL Growth	(4) SL Growth
Quantile	0,25	0,5	0,75	0,9	0,25	0,5	0,75	0,9
Process innovation dummy	1.420**	1.162***	0.706	0.776	1.353	0.0982	3.635	0.0929
	(0.608)	(0.391)	(0.554)	(0.979)	(2.441)	(0.880)	(2.627)	(2.564)
Age	-0.00223	-0.0409***	-0.0663***	-0.107***	0.0466	-0.00364	-0.0377	-0.0975**
	(0.0108)	(0.00697)	(0.0121)	(0.0275)	(0.0494)	(0.0218)	(0.0641)	(0.0430)
Export status dummy	-0.777	0.220	-0.985	-2.724***	2.875	0.0291	-1.810	-0.493
	(0.570)	(0.520)	(0.603)	(1.036)	(2.548)	(1.186)	(3.276)	(3.296)
Medium Size firms dummy	5.874***	3.074***	1.738**	0.805	-1.314	0.0654	2.926	6.984***
	(0.798)	(0.550)	(0.817)	(1.430)	(2.743)	(1.093)	(3.338)	(2.633)
Big firms dummy	9.484***	4.509***	1.688**	0.408	5.493*	4.676***	6.855*	12.99***
	(0.750)	(0.571)	(0.716)	(1.179)	(3.225)	(1.102)	(3.839)	(3.645)
Foreign capital dummy	-2.662***	-1.058*	1.088	6.377***	-4.430	-0.0182	2.745	0.552
	(0.851)	(0.619)	(1.116)	(2.145)	(3.070)	(1.597)	(3.623)	(3.616)
Constant	-3.499*	-0.435	11.26	6.885	-35.33	-4.276	-5.434	24.00***
	(1.885)	(35.32)	(9.345)	(9.011)	(30.68)	(7.322)	(6.529)	(3.659)
Observations	2,556	2,556	2,556	2,556	1,424	1,424	1,424	1,424
Time Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard in parenthesis; *** p<0.01, ** p<0.05, * p<0.10.

Table 8.3: Services Low Tech

VARIABLES	(1) Emp Growth	(2) Emp Growth	(3) Emp Growth	(4) Emp Growth	(1) SL Growth	(2) SL Growth	(3) SL Growth	(4) SL Growth
Quantile	0,25	0,5	0,75	0,9	0,25	0,5	0,75	0,9
Product Innovation dummy	2.128***	1.457***	1.600*	1.533	7.703***	4.692***	3.750	-0.0465
	(0.543)	(0.444)	(0.826)	(1.002)	(2.337)	(1.369)	(2.481)	(2.581)
Age	0.00217	-0.0374***	-0.0660***	-0.106***	0.0518*	0.0001	-0.0372	-0.103**
	(0.0101)	(0.00531)	(0.0142)	(0.0304)	(0.0297)	(0.0215)	(0.0593)	(0.0481)
Export status dummy	-0.693	0.0558	-0.977	-2.527**	1.948	0.0001	-1.992	-0.476
	(0.586)	(0.549)	(0.658)	(1.058)	(2.271)	(1.294)	(3.300)	(3.004)
Medium Size firms dummy	5.687***	2.869***	1.957**	0.991	-1.228	-0.0001	1.991	6.861***
	(0.796)	(0.594)	(0.840)	(1.440)	(2.739)	(1.027)	(3.231)	(2.361)
Big firms dummy	9.484***	4.204***	1.794**	0.718	5.194*	3.839***	6.985*	12.67***
	(0.750)	(0.603)	(0.767)	(1.453)	(3.078)	(1.078)	(3.785)	(3.297)
Foreign capital dummy	-2.818***	-0.661	0.853	6.389***	-4.398	-0.0001	1.806	0.609
	(0.903)	(0.666)	(1.186)	(1.876)	(2.874)	(1.481)	(3.486)	(2.699)
Constant	-3.160	-0.687	10.92*	6.961*	-36.22*	-8.334	-0.569	24.18***
	(10.47)	(36.81)	(5.685)	(3.862)	(19.69)	(12.22)	(5.222)	(6.697)
Observations	2,556	2,556	2,556	2,556	1,424	1,424	1,424	1,424
Time Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard in parenthesis; *** p<0.01, ** p<0.05, * p<0.10.

Table 13: Features of manufacturing firms by technological intensity

	Low tech	High tech	Total
Any type of innovation	0.4503	0.3421	0.4042
Process innovation	0.3454	0.2585	0.3084
Product innovation	0.2753	0.1977	0.2422
Organizational innovation	0.2030	0.1457	0.1786
Process innovation only	0.0554	0.0397	0.0487
Product innovation only	0.0989	0.0803	0.0910
Enhancing Productivity innovation	0.3950	0.3024	0.3555
Age	31	29	30
Foreign capital	0.1559	0.0810	0.1240
Sales (thousands of constant pesos)	314,948	157,254	248,057
Export Status	0.4266	0.3818	0.4075
Total Employment	104.06	59.22	85.04
Growth in Employment (in Ln)	89.4176	39.1070	67.1115
Growth in Skilled Labor (in Ln)	162.7048	179.5927	169.3622
Number of Observations	4,137	3,075	7,212

Source: Own elaboration based on Innovation Surveys, waves 1998–2021.

Table 14: Features of Service firms by knowledge intensity

	Low Knowledge-Intensive Sectors	High Knowledge-Intensive Sectors	Total
Any type of innovation	0.4381	0.2734	0.3166
Process innovation	0.3024	0.1780	0.2106
Product innovation	0.2483	0.1180	0.1522
Organizational innovation	0.1588	0.1162	0.1274
Process innovation only	0.0733	0.0354	0.0453
Product innovation only	0.1131	0.0845	0.0920
Enhancing Productivity innovation	0.3648	0.2380	0.2713
Age	25	22	23
Foreign capital	0.1416	0.1090	0.1176
Sales (thousands of constant pesos)	362,252	191,812	236,567
Export Status	0.1677	0.1460	0.1517
Total Employment	280.22	109.15	154.06
Growth in Employment (in Ln)	116.5803	67.2954	80.2610
Growth in Skilled Labor (in Ln)	283.9278	55.8049	130.1205
Number of Observations	2,034	5,714	7,748

Source: Own elaboration based on Innovation Surveys, waves 2003–2021.

Table 15: Features of manufacturing firms by size

	Big Firms	Medium Firms	Small Firms	Total
Any type of innovation	0.5976	0.4637	0.2759	0.4043
Process innovation	0.4771	0.3441	0.1998	0.3086
Product innovation	0.3852	0.2487	0.1538	0.242
Organizational innovation	0.2994	0.1828	0.1045	0.1786
Process innovation only	0.0588	0.0565	0.0409	0.0486
Product innovation only	0.1152	0.1129	0.0727	0.0912
Enhancing Productivity innovation	0.5388	0.4073	0.2350	0.3557
Age	35	32	27	30.343
Foreign capital	0.2255	0.1452	0.0583	0.1239
Sales (thousands of constant pesos)	814,175	101,330	37,788	247736
Export Status	0.7684	0.4059	0.1898	0.4082
Total Employment	251.37	60.17	19.94	84.975
Growth in Employment (in Ln)	187.3652	61.7169	41.7906	66.955
Growth in Skilled Labor (in Ln)	164.4293	82.6582	185.7075	169.02
Number of Observations	2,448	744	4,030	7222

Source: Own elaboration based on Innovation Surveys, waves 1998–2015.

Table 16: Features of Services firms by size

Size	Big Firms	Medium Firms	Small Firms	Total
Any type of innovation	0.4600	0.4028	0.2299	0.459957
Process innovation	0.3173	0.2716	0.1466	0.317345
Product innovation	0.2210	0.2046	0.1087	0.220985
Organizational innovation	0.2060	0.1493	0.0841	0.205996
Process innovation only	0.0522	0.0592	0.0395	0.052248
Product innovation only	0.1233	0.1210	0.0714	0.123341
Enhancing Productivity innovation	0.4077	0.3436	0.1904	0.407709
Age	27	22	21	26.85543
Foreign capital	0.1533	0.1441	0.0951	0.153319
Sales (thousands of constant pesos)	622,189	81,420	68,392	622188.7
Export Status	0.1593	0.1866	0.1419	0.159315
Total Employment	452.60	60.53	19.39	452.5957
Growth in Employment (in Ln)	119.3911	58.1579	64.2497	119.3911
Growth in Skilled Labor (in Ln)	235.3900	84.9371	66.3454	235.39
Number of Observations	2,335	777	4,637	7749

Source: Own elaboration based on Innovation Surveys, waves 2003–2015.

Table 17: Endogeneity tests of likely endogenous regressors

	Ln growth EMP	Ln growth SL
Innovation (any type)	1,643	0,516
p-value	(0,2)	(0,4727)
Enhancing Productivity	1,283	0,418
p-value	(0,2573)	(0,5178)
Product Innovation	1,402	0,038
p-value	(0,2364)	(0,8453)
Product Only Innovation	0,521	0,035
p-value	(0,4705)	(0,8513)