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International Sourcing in Portuguese Companies Evidence from Portuguese Micro Data

Ana Martins | Guida Nogueira | Eva Pereira



Gabinete de Estratégia e Estudos

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Evidence from Portuguese Micro Data

Ana Martins ², Guida Nogueira ², Eva Pereira ²

Abstract

Outsourcing is one of the main drivers behind economic globalization, especially international outsourcing. In general terms it refers to the process of moving stages of production to external providers, either domestic (usually labelled as domestic outsourcing) or international (commonly labelled as offshoring or simply outsourcing). Over time, technological advances in transportation and ICT developments, led to a substantial rise in this phenomenon, growing in extent and nature, from simple to more complex tasks related to both manufactures and services supply. International outsourcing is usually expected to reduce production costs and to increase efficiency, however it has received substantial attention from policy makers for its potential negative consequences on the labour market. This paper combines Portuguese firm-level data from the International Sourcing surveys and longitudinal administrative business record data, to explore the impacts of the sourcing status on a variety of firms' performance measures specially focusing on employment, competitiveness and productivity. The results suggest that international sourcing has an ambiguous effect on firm level total employment, but a positive effect on both the subset of workers that receive a salary (a proxy to employees) and on R&D jobs, coupled with an increasing effect on firm level total labour costs. Alongside these results, our findings also show that offshoring has a positive causal effect on both firm-level export intensity and trade balance, however the efficiency gains hypothesis was not confirmed. In fact, the results show that newly offshoring firms experienced lower labour productivity growth with a negative effect on both capital stock and capital per person employed.

Keywords: Outsourcing, international sourcing, offshoring, internationalization, productivity, employment and firm productivity, Propensity score matching

JEL Classification: F23, L24, F61, D24, J24, F16

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² Gabinete de Estratégia e Estudos, Ministério da Economia e da Transição Digital.

1. Introduction

Outsourcing has become a major trend among firms worldwide setting a new production paradigm and fostering economic globalization.

Outsourcing is a business strategy through which firms transfer some business functions to external suppliers, either domestic or international. This set of practises stem directly from the economic and management principles of specialization, as firms expect to optimize their operations and enhance their competitiveness in the global economy through efficiency gains and cost savings. International outsourcing is often more appealing since it provides the opportunity to take full advantage of these benefits, exploring international wage gaps to reduce labour costs, diversifying suppliers to access higher quality inputs and entering new markets to achieve economies of scale.

The international fragmentation of the production process is not a recent phenomenon, Samuelson first theorized the concept in 1967 as vertical specialization, recognizing the importance of intra-industry trade. Nevertheless, technological advances in transportation and ICT developments allowed for the intensification of this production model. On the account of this technological breakthrough, the outsourcing phenomenon has grown both in scale and nature, from domestic to a global level, from simple to more complex tasks related to both manufactures and services supply.

The prevalence and expected growth of International Sourcing requires a comprehensive understanding of its consequences on the domestic economies and the labour markets. In the current context of the global productivity slowdown, it becomes particularly relevant to understand its impacts on productivity and identify the channels and characteristics of these adjustments. The aim of the research presented in this paper is to contribute to the body of empirical work on the effects of offshoring production, mainly on productivity, employment and firm-level indicators in a small open economy.

This investigation represents a contribution to the empirical literature due to two key features, related with the database and the methodology applied. Regarding the database, Portugal participates in a coordinated statistical project that surveys Global Value Chains practices across 15 European member states. This data is complemented with a micro-data dataset for Portuguese firms. Concerning methodology, this research applies matching techniques to capture the impacts of outsourcing (domestic or international).

The structure of our paper is as follows. Section 2 presents the framework and describes the data used for the analysis. Section 3 presents some descriptive statistics on both international sourcing and outsourcing. Section 4 outlines the state-of-the-art research in the field and describes the methodology used in our paper. Section 5 reports the empirical findings. Section 6 summarizes and concludes.

2. Framework and dataset description:

In 2006, the European Union launched a project on international sourcing to provide policy makers at a national and European level relevant statistical information on the reasons for, the extent of, and the consequences of, international sourcing. Within this project, an ad hoc firm-level survey was carried out in some European Union countries, to examine the magnitude and impact of international sourcing of existing functions/activities, either core business or support business functions.

International sourcing data is collected by the National Statistical Institutes in each country. At the present time, there were three data collection rounds. The first round took place in 2007, referring to observed international sourcing in the period 2001-2006, the second one took place in 2012, referring to observed international sourcing in the period 2009-2011 and finally, the third one took place in 2018, referring to observed international sourcing in the period 2015-2017.

Portugal participated in all three surveys.

Enterprises concerned (with more than 100 people employed in the first and second surveys and more than 50 in the third) cover NACE Rev.2 (Statistical Classification of Economic Activities in the European Community) sections B to N excluding K which, broadly speaking, covers non-financial market activities. According to Eurostat, **sourcing** refers to “the total or partial movement of business functions (core or support business functions) currently performed in-house of a resident enterprise to either non-affiliated (external suppliers) or affiliated enterprises located either domestically or abroad”.

Outsourcing is the particular case of sourcing in which business functions move to a non-affiliated enterprise. **In sourcing** is the alternative case in which business functions move to affiliated enterprises. Furthermore, in both cases, if the host enterprise is located domestically it is called domestic outsourcing/in sourcing, whereas if the host enterprise is located abroad it is called international outsourcing/in sourcing.

Thus, **international sourcing** refers to “the total or partial movement of business functions (core or support business functions) currently performed in-house or currently domestically sourced by the resident enterprise to either non-affiliated (external suppliers) or affiliated enterprises located abroad. Exemptions are (i) the movement of business functions (core or support business functions) abroad without reducing activity and / or jobs in the enterprise concerned (for example, setting up a new production line abroad without reductions, even if the line could also have been set up in the country, does not constitute international sourcing) and (ii) temporary subcontracting abroad (one-year limit)”. Sometimes, international sourcing is also referred to as offshoring, near-shoring, delocalization or simply outsourcing.

In this paper we combine data from the two first International Sourcing surveys³ with longitudinal administrative business record data, at the firm-level, obtained from “Integrated Business Accounts System (SCIE) – Statistics Portugal” (2004-2017), to size the impacts of sourcing in Portuguese firms, specially focusing on employment, competitiveness and productivity.

“Integrated Business Accounts System (SCIE) – Statistics Portugal” data covers the entire population of non-financial firms in Portugal, providing general firm accounting data such as total wages, employment, value added, output, turnover (divided into domestic and foreign sales - which can be used to proxy exports), purchases (also divided into domestic and foreign purchases - which can be used to proxy imports), capital stock (measured by tangible assets), industry and location codes, etc. Furthermore, using this information, we can compute a variety of firms’ performance derived measures such as labour productivity, defined as value added per person employed; total factor productivity (TFP), obtained as the residual generated by

³ The third survey was not used given the fact that the window of time available in the business record data is not long enough to allow to observe its effects.

estimating the production function using the Levinsohn and Petrin (2003) methodology; capital intensity, defined as fixed capital stock over employment; financial soundness, defined as the ratio of operational income to total net assets; leverage, defined as the ratio of total liabilities to total net assets; collateral, defined as the ratio of fixed capital stock to total net assets; and financial autonomy, defined as the ratio of equity to total net assets.

International Sourcing is captured by a dummy variable based on the self-reported information in the survey, about whether or not the respondent firm has offshored production activities in the reference period of each survey. This information can be linked to the SCIE dataset, using the firm identifier, to size the impacts associated to the offshoring status. However, it is worth noting that this is not a perfect measure, due to the scarcity of information associated. We know that a firm offshored at least once within the period of reference, but not when, how many times, for what purpose or the magnitude associated. As a consequence, impact evaluation is made more difficult.

The data on international sourcing provided by the survey can be complemented with information on subcontracting available in SCIE database.. According to Statistics Portugal, subcontracts refers to “all work, concerning to own production process, in which the cooperation of other (external) enterprises has been used, under formal commitments or simple agreements”. Subcontracting is often used interchangeably with outsourcing, both domestic and international, and is one of the variables self-reported by firms that is available in our business record database. This metric can be combined with the previous one, concerning the international sourcing status, to distinguish between international and domestic outsourcing, for example. Therefore, to enrich our analysis, we decided to rely on both metrics in order to build different scenarios, associated to different measures of sourcing, to better understand and evaluate its impacts on a variety of firms’ performance measures.

In the end, our approach uses three different scenarios, depending on the type of sourcing concept that is considered and three different timespans, in order to proxy short-term (2012-2013), medium-term (2012-2015) and long-term (2012-2017) effects for each scenario.

On the first scenario, we use only the sample of enterprises surveyed, to assess differences in the performance between firms that have sourced production across borders and firms that did not, irrespective of whether firms on the comparison group sourced domestically or haven’t sourced at all. On the second scenario, we assess differences in the performance between firms that have sourced production across borders and firms that outsourced production domestically. Basically, we start with the selection from the first scenario and restrict the control group to firms that have outsourced domestically, based on the information made available through the variable named subcontracts in the business record information. Finally, on the third scenario, for a more comprehensive analysis, we take full advantage of the entire population of enterprises in the dataset to assess differences in the performance between firms that have outsourced production, either across or inside borders, and firms that didn’t outsource any task.

3. Descriptive statistics

To what extent do Portuguese firms source across borders?

Table 1 provides some summary statistics on the number of firms (N) that reported to have performed international sourcing on each collection round, the number of persons employed by those firms (L), as well

as the corresponding representativeness on the universe of non-financial companies from “Integrated Business Accounts System (SCIE) – Statistics Portugal”. Recalling that only firms with 100 or more persons employed were surveyed.

In the first collection round of international sourcing survey, approximately 110 Portuguese firms confirmed having relocated abroad their production of goods or services somewhere during the period of 2001-2006 (approximately 15% of total answers – Table A1 in Appendix), covering 0.03% of total non-financial Portuguese companies and accounting for 2.2% of their total employment.

In the second collection round, 135 Portuguese firms confirmed having relocated abroad their production of goods or services somewhere during the period of 2009-2011 (approximately 15% of total answers – Table A2 in Appendix), covering 0.04% of total non-financial Portuguese companies and accounting for 1.6% of their total employment.

Between both data collection rounds the average size of offshoring firms, expressed as the number of persons employed per firm, decreased substantially. On the second survey, each firm has on average 2/3 of the size of the offshoring firm from the first round.

Table 1 – Offshoring Firms

Year	International Sourcing Survey #1 2001-2006						International Sourcing Survey #2 2009-2011					
	Total NFC		IS01_06 = 1				IS09_11 = 1					
	N	L	N		L		N		L		L/N	
			% Total		% Total	L/N	% Total		% Total			
2004	339 856	2 776 854	111	0.03 %	63 248	2.28 %	570	128	0.04 %	41 444	1.49 %	324
2005	343 978	2 811 321	111	0.03 %	63 070	2.24 %	568	128	0.04 %	40 543	1.44 %	317
2006	344 998	2 878 212	112	0.03 %	62 742	2.18 %	560	131	0.04 %	43 842	1.52 %	335
2007	359 325	2 990 894	112	0.03 %	63 704	2.13 %	569	132	0.04 %	45 437	1.52 %	344
2008	368 205	2 962 190	111	0.03 %	66 180	2.23 %	596	135	0.04 %	47 682	1.61 %	353
2009	366 915	2 872 688	111	0.03 %	63 634	2.22 %	573	135	0.04 %	47 177	1.64 %	349
2010	361 235	2 824 929	111	0.03 %	62 299	2.21 %	561	135	0.04 %	46 300	1.64 %	343
2011	361 851	2 760 265	110	0.03 %	62 071	2.25 %	564	135	0.04 %	46 663	1.69 %	346
2012	355 769	2 589 309	109	0.03 %	61 329	2.37 %	563	133	0.04 %	46 530	1.80 %	350
2013	356 577	2 542 739	108	0.03 %	59 360	2.33 %	550	132	0.04 %	44 770	1.76 %	339
2014	363 356	2 598 434	105	0.03 %	60 116	2.31 %	573	130	0.04 %	45 508	1.75 %	350
2015	372 201	2 702 027	102	0.03 %	60 153	2.23 %	590	129	0.03 %	45 484	1.68 %	353
2016	380 935	2 804 923	103	0.03 %	58 825	2.10 %	571	126	0.03 %	41 762	1.49 %	331
2017	394 967	2 955 992	102	0.03 %	59 128	2.00 %	580	124	0.03 %	42 123	1.43 %	340

Source: Own calculations based on micro-level data from both International Survey and SCIE - Statistics Portugal.

A closer look at the descriptive statistics will also provide useful information:

- From approximately 260 firms that participated in both surveys, only 16 have offshored in both periods.
- 27 firms that in 2006 said to have offshored in the 2001-2006 period, and participated in the second survey, didn't offshore during the 2009-2011 period.
- 69 firms that in 2006 said to have offshored during the 2001-2006 period ceased to exist or did not participate in the second survey.
- 27 firms that in 2011 said to have offshored in the 2009-2011 period, and participated in the first survey, didn't offshore during the 2001-2006 period.

- 92 firms that in 2011 said to have offshore during the 2009-2011 period didn't participate in the first survey or didn't exist at the time.
- Approximately 190 firms that participated in both surveys said to have never offshored during any of the considered periods.
- Approximately 50 firms that participated in both surveys have offshored at least in one of the two periods.

To what extent do Portuguese firms outsource?

Based on the assumption that positive values of the variable subcontracts (as a percentage of turnover – excluding units reporting zero values of turnover) are indicative of outsourcing (both to domestic and foreign suppliers), table 2 provides some summary statistics on the number of firms (N) that outsourced between 2004-2017, the number of persons employed by those firms (L), as well as the corresponding representativeness on the universe of non-financial companies from “Integrated Business Accounts System (SCIE) – Statistics Portugal”.

According to the data, approximately 30% of total non-financial Portuguese companies perform outsourcing, which accounts for 50% of total employment in non-financial Portuguese companies.

Combining this information with that from the international sourcing survey, we can isolate, among respondents in each collection round, firms that are sourcing across borders or just inside borders. Recalling that the survey covers only enterprises with more than 100 persons employed, we can conclude that more than 60% of International survey respondents perform only domestic outsourcing, whereas 4% perform only international outsourcing.

Table 2 – Outsourcing Firms

Year	Total NFC		Outsourcing		International Survey respondents	Domestic Outsourcing Only	International Sourcing Only
	N	L	N	L	N	N	N
			% Total	% Total		% Resp	% Resp
2004	339 856	2 776 854	299 142	2 612 652	710	554	5
2005	343 978	2 811 321	300 537	2 619 473	712	548	4
2006	344 998	2 878 212	105 445	1 567 898	713	398	25
2007	359 325	2 990 894	106 767	1 632 330			
2008	368 205	2 962 190	108 289	1 584 161			
2009	366 915	2 872 688	106 519	1 534 762	894	514	29
2010	361 235	2 824 929	116 918	1 566 810	894	521	34
2011	361 851	2 760 265	104 457	1 470 843	891	509	32
2012	355 769	2 589 309	96 050	1 348 818			
2013	356 577	2 542 739	95 808	1 338 290			
2014	363 356	2 598 434	98 770	1 369 694			
2015	372 201	2 702 027	101 956	1 440 463			
2016	380 935	2 804 923	104 571	1 476 240			
2017	394 967	2 955 992	109 204	1 565 344			

Source: Own calculations based on micro-level data from both International Survey and SCIE - Statistics Portugal.

4. Literature Review and Methodology

In order to size the impact of a given phenomenon, i.e. the difference between the individual's outcome with and without being exposed to the phenomenon (usually referred to as treatment), the most natural way would be to compare the average outcomes of treated and non-treated individuals, by using the so-called t-tests. This would be straightforward if treatment assignment was random. With observational data, this is almost never the case. This is because with observational data the subjects choose whether or not to get the treatment. In our case firms decide to source or not to source. Therefore, the subjects are said to have self-selected into the treated and untreated groups. As the firms' characteristics determining selection may also affect outcome, treatment assignment is therefore not independent of the outcome. This problem is known as selection bias. When a treatment cannot be randomized, the next best thing is to try to mimic randomization with matching methods.

One possible solution to selection bias is to use a matching approach to find and select, among the non-treated group, individuals that are similar to treated individuals in all relevant pre-treatment characteristics X . The selected control group represents the so-called counterfactual and allows us to determine what the outcome would be for the treated individuals if they had not received treatment. Once we find the adequate counterfactual, differences in outcomes can thus be attributed to the treatment. The key concerns are that of similarity and credibility. How can we find individuals who are similar on all observable characteristics in order to match treated and non-treated individuals?

Since conditioning on all relevant pre-treatment characteristics X (covariates) is difficult in case of a high dimensional set X (curse of dimensionality problem), Rosenbaum and Rubin (1983), suggest the use of balancing scores, $b(X)$, i.e., functions of the relevant observed covariates X , such that the conditional distribution of X given $b(X)$ is independent of assignment into treatment. The Propensity score is one possible balancing score. Basically, it summarizes the information of the observed covariates X into a single index normalized to the scale between 0 and 1, corresponding to the conditional probability of assignment to a particular treatment given a vector of observed covariates. According to the authors, adjustment for the scalar propensity score is sufficient to remove bias due to all observed covariates. This implies that the unbiased estimation of treatment effects is possible by conditioning on the propensity score alone rather than the entire covariate vector X . This dimension reduction property led to the subsequent development of various propensity score methods, including matching and weighting.

In the case of propensity score, the resulting matching variant is known as propensity score matching (PSM). The likelihood of being treated is thus computed based only on observable characteristics. In fact, if any of the relevant covariate is unobserved, PSM estimates will be biased. The control group is retrieved by matching treated and non-treated observations using their propensity scores.

The nearest-neighbour matching method matches the observations with the closest propensities scores. This can be done with or without replacement, in the sense that an untreated observation can be matched with more than one treated observation. All treated units find a match. The pitfall, however, is that some of these matches can be fairly poor, potentially providing a fragile counterfactual.

Another possible technique is the stratification method, which stratifies the sample into blocks according to intervals of propensity scores and computes the average outcome for each group within each interval. Then

a weighted average is used to assess the overall effect of the program. This method can discard some treated units if no control is available in the respective interval.

Finally, the Kernel matching method, uses a weighted average of the untreated observations, with the weight being the distance between the treated and untreated propensity scores.

4.1. Literature Review

Outsourcing, in general terms, refers to the process of moving stages of production to external suppliers, either domestic (usually labelled domestic outsourcing) or international (commonly labelled offshoring or simply outsourcing). Over time, the outsourcing phenomenon has experienced an intense growth, powered by technological advances in transportation and ICT developments, ranging from simple to more complex tasks related to both manufactures and services supply.

Firm's decision on whether to produce in-house or to outsource activities, either domestically or internationally, can be summarized in three motivational drivers: reduce labour costs, reduce workload volatility and achieve economies of scale (Abraham and Taylor, 1996). International outsourcing is often more appealing since it provides the opportunity to take full advantage of these benefits, exploring international wage gaps to reduce labour costs, diversifying suppliers to access higher quality inputs and entering new markets to achieve economies of scale.

Economic theory suggests that the impacts of offshoring on firm's performance extend beyond cost reduction effects as it allows to relocate the relatively inefficient stages of its production process to more specialized suppliers, focusing and expanding its output in the stages for which it has comparative advantage. Amiti and Wei (2004) mention that these compositional and structural changes can lead to an increase in firm's productivity.

Despite the importance of outsourcing for the reorganization of the global production process, empirical research is still scarce and mainly focused on the manufacturing sector. Difficulties in measuring outsourcing at the firm-level can explain this phenomenon (Möhlmann and Groot, 2013). Drawing on the existing literature, table 3 reproduces the results found in empirical literature for the casual effects of outsourcing on firm-level indicators, namely productivity.

Empirical research does suggest significant positive impacts from outsourcing practices on firm performance. For most of the detailed literature, positive impacts are demonstrated in different geographies, through diverse time frames and with different methodologies. Notably, in a study conducted with the U.S. manufacturing sector, Amiti and Wei (2005) find that offshoring practices in material inputs accounted for a 5% labour productivity growth and outsourcing of services accounted for an 11% productivity growth, throughout the 1992-2000 period. Moser (2010) applied a differences-in-differences matching technique to German establishments for the 1998-2004 period, finding that offshoring originated a highly significant and positive impact of around 3,6 percentage points. Additionally, when testing for sales and export intensity, the results also show positive and significant impacts.

Notwithstanding these positive effects, in general terms, table 3 presents some ambiguous results for different disaggregation exercises. An important takeaway from this literature review is that significance and,

in some cases, even the direction of the productivity effects are highly sensitive to industry and firm level characteristics, the types of tasks outsourced as well as on the market destination.

An interesting example on the role of firm's characteristics is presented by McCann (2009) in a study conducted on the effects of International outsourcing for a large panel of Irish manufacturing firms. The study finds that foreign firms experience the highest productivity gains from international sourcing, arguing that knowledge and integration in international production networks is fundamental. As for domestic firms, the gains are specific for firms in capital and technology-intensive industries. In what follows, McCann denotes that the two types of firms which benefit from outsourcing make up a relatively small proportion of the total manufacturing firms, hence positive side effects at the aggregate level may be limited. These results are in line with the evidence from Schwörer (2013) on the larger productivity gains for multinational in comparison to domestic firms.

In a more recent study, also focused on manufacturing firms, Bandick (2015) applies a differences-in-differences approach for the period 1995-2006 in Denmark, finding positive effects not only on productivity but also in export intensity for firms engaged in international outsourcing. However, the novelty of this research is the mixed results when disentangling offshoring activities by destination: only firms that mainly offshore to high-wage countries experience these positive effects

Mohlmann and Groot (2013) contribute to the literature on this topic by understanding the effects of outsourcing on different types of tasks (core or support) and channels (international or domestic). This study was conducted for Dutch firms based on an outsourcing survey covering the 2001 to 2006 period. They find that international outsourcing of core activities impacts negatively productivity. When comparing international and domestic channels, the study only finds evidence of productivity gains in domestic outsourcing, when international remains negative or insignificant. The authors suggest that the negative returns on international sourcing (especially significant for the case of core activities) can be explained by measurement or econometric problems or the fact that firms may have been faced with higher than expected inter-firm transaction costs.

In fact, these unexpected costs related with sourcing activities can be detrimental in explaining some of the confounding evidence. In a survey detailing international sourcing activities for firms in the Netherlands, Van Gorp (2010) finds that 17% of the firms engaged in international sourcing reported having relocated the activities back to the home country. Furthermore, when asked the reasons why some or all the objectives from offshoring were not met, the most mentioned factors were: governance, higher costs than expected, group of firms that reported that the objectives from offshoring were not met or difficulties in measuring the costs before implementation.

Table 3 – Literature review on firm's economic performance

Sector	Type of outsourcing/Activities	Outcome Measure	Effect
Mghlmann and Groot, 2013			
All sectors	International Outsourcing	Total Factor Productivity	-
	Domestic Outsourcing		+
	International outsourcing – core activities	Total Factor Productivity	-
	International outsourcing – support activities		n.e.
	Domestic outsourcing – core activities		-
	Domestic outsourcing – support activities		+
	International outsourcing – core activities	Labour Productivity	-
	International outsourcing – support activities		n.e.
	Domestic outsourcing – core activities		+
	Domestic outsourcing – support activities		n.e.
Schwörer, 2013			
Manufacturing	International sourcing – non-core activities and services	Total Factor Productivity	+
	International sourcing – core activities		n.e.
	Domestic sourcing – both functions		n.e.
Chidlow et al, 2012			
Manufacturing	International sourcing	Reduction of labour costs	+
		Improved quality/New products	n.e.
		Access to technology knowledge (know-how)	n.e.
		Profitability	+
Services	International sourcing	Reduction of labour costs	-
		Improved quality/New products	+
		Access to technology knowledge (know-how)	+
		Profitability	n.e.
Moser, 2010			
All sectors	International outsourcing of intermediate goods	Labour productivity	+
		Turnover	+
		Exports	+
McCann, 2009			
Manufacturing	Intermediate goods – foreign firms	Total Factor Productivity	+
	Intermediate goods – domestic firms		/
	Intermediate goods – domestic firms (capital intensive)		+
Amiti and Wei, 2005			
	Services	Total Factor Productivity	+
	Services	Labour Productivity	+
	Intermmediate Goods	Labour Productivity	+

Notes: (+): statistically significant positive effect; (-): statistically significant negative effect; (n.e.): statistically non-significant effect

The impacts of the growing international involvement and fragmentation of business activities on home country labour markets constitute another key concern for policy makers and economic research. At the heart of the debate lie opposing effects. On the one hand, unfavourable results may arise in employment and wage levels due to compositional effects at the firm level, the specialization in certain tasks leads to

lower labour demand in the outsourced tasks; on the other hand, the gains in firm performance, and particularly in export intensity, can yield positive impacts that arise from capacity growth. Empirical research can shed light on the significance, direction and magnitude of these effects.

Table 4 presents the empirical results on the domestic Labour Market as a result of different outsourcing practices (domestic or international), disaggregated by sector and tasks. Empirical results regarding labour market outcomes are more ambiguous than for firm-level indicators. However, it is still possible to infer common patterns in these results.

A striking conclusion observed in table 4, common in the existing literature, is the fact that outsourcing tends to impact negatively employment levels in the manufacturing sector, whilst in the service sector impacts are mixed or, depending on the disaggregation, even positive. Chidlow et al (2012) apply a matching methodology to understand the casual effects of international sourcing in the manufacturing sector versus the services sector to a panel data of Slovenian firms (relating to international outsourcing decisions for the 2001-2009 period). Their results show that for manufacturing firms, international sourcing strategies lead to larger labour cost reductions compared to manufacturing firms that didn't source internationally. On the contrary, for service sector firms, the causality effects of international outsourcing proved to increase labour costs. To complement these findings, Chidlow et al find statistically significant differences in employment growth: on average, service firms engaged in international outsourcing experienced a higher employment growth (more than double) as compared to firms that did not source internationally; whilst manufacturing firms with i.o. practices demonstrated higher employment declines, on average. In light of these results, the researcher points to the different outsourcing motivations as an explanation: cost-cutting strategies appear key for the competitiveness of manufacturing firms, whilst service firms' decisions to outsource appear to be motivated by innovation, technological knowhow and improved quality. These findings are supported by another study for a sample of Danish firms that estimates larger employment decreases for the manufacturing sector when compared to the services sector, due to offshoring activities.

Another common pattern arises when analysing wages. Literature points to positive impacts of high-skilled wages from outsourcing practices; whilst low skilled workers experience a decrease in real wages (Hummels et al, 2014). Hence, it appears that the fragmentation of business activities contributes to a widening in the low-skill/high-skill wage gap.

To what regards the remaining ambiguity in the results on Labour Market Outcomes, empirical studies suggest explanations and research avenues. Firstly, measurement issues can explain, in part, some of the ambiguity. For example, Moser (2010) finds a positive effect of offshoring on employment levels for German firms in the 1998-2004 period. It argues that the productivity, export intensity and turnover increases due to offshoring can explain capacity expansion, and thus, employment. But Moser also finds that for a large proportion of the dataset, offshoring, measured through the data on the imported inputs, consisted in substitution from local suppliers to foreign. Data on offshoring might capture changes in firms' outsourcing decision that don't imply reorganizational structures, and thus, changes in the workforce.

Secondly, a recent OECD study demonstrates that employment levels in the manufacturing sector are determined primarily on the length of the value chains, ICT maturity and economic regulation, with larger impacts than firms' offshoring decisions (Nordås, 2019). Finally, data on the type of functions that are outsourced can significantly alter results. According with Nordås (2019), and only focused on the

manufacturing sector data for the OECD, outsourcing of IT functions have no significant impact on home-country employment, whilst marketing and transport outsourcing have a significant negative impact on employment levels.

Table 4 – Literature review of labour market outcomes

Sector	Type of outsourcing/Activities	Outcome Measure	Effect
Nordås, 2019			
Manufacturing	Local outsourcing - IT functions	Employment	n.e.
	Local outsourcing - R&D, Marketing, Transport		-
	Offshoring - IT functions		n.e.
	Offshoring - Marketing		-
Hummels et al 2014			
	International sourcing	High skilled wage	+
	International sourcing	Low skilled wage	-
Chidlow et al, 2012			
Manufacturing	International sourcing	Labour costs	-
	International sourcing	Employment	-
Services	International sourcing	Labour costs	n.e.
	International sourcing	Employment	+
Geishecker, Holger Görg, 2008			
	Services functions	Low/medium skilled real wages	-
		High skilled real wages	+
Timmermans and Østergaard, 2011			
		High-skill employment	+
		Low-skill employment	-
Moser, 2010			
All sectors	International sourcing – intermediate inputs	Employment	+
Deschryvere and Kotiranta, 2008 –results for international outsourcing			
Manufacturing	Production (material inputs) - offshore outsourcing	Employment	-
	Production (material inputs) - offshore in-house (through FDI)		n.e.
	R&D - offshore outsourcing		+
	R&D - offshore in-house (through FDI)		-
	Service tasks (support tasks) - offshore outsourcing		+
	Service tasks (support tasks) - offshore in-house (through FDI)		n.e.
Services Sector	R&D - offshore outsourcing		+
	R&D - offshore in-house (through FDI)		n.e.
	Service tasks (support tasks) - offshore outsourcing		+
	Service tasks (support tasks) - offshore in-house (through FDI)		-

Notes: (+): statistically significant positive effect; (-): statistically significant negative effect; (n.e.): statistically non-significant effect

4.2. Methodology

To investigate the impacts of sourcing we will pursue the following strategy. First, we will ignore the selection bias and compute difference-in-means on the unmatched sample, between treated and control groups, using the so-called *t*-tests. Then, acknowledging the underlying problem, we will employ the Propensity Score Matching (PSM) method to estimate the causal effects of sourcing without random assignment, by computing difference-in-means between matched treated and matched controls. In the end, both results will be combined to refine the interpretation of the treatment effect.

Three different scenarios will be used to assess differences in the performance between treated and untreated firms, depending on the type of sourcing that is considered. The first scenario attempts to size the impact of performing international sourcing over not performing international sourcing. The second scenario attempts to size the impact of performing international sourcing over performing only domestic outsourcing. Finally, the third scenario attempts to size the impact of outsourcing (domestically or abroad) over not outsourcing any task.

When implementing matching methods to estimate causal effects, the following key steps are required: (1) choosing the covariates to be used in the PSM; (2) diagnosing covariate balance in the resulting matched samples and iterating 1-2 until achieved; (3) combining balanced covariates into one distance measure; (4) choosing the matching algorithm to form matched, conditioning on the distance measure; and finally, (5) estimating the effect of the treatment effect after matching.

We start by estimating the propensity score of each firm, using a standard logit model in which the treatment status (denoted T_i , where $T_i=1$ if the firm i has been treated and $T_i=0$ otherwise) is regressed on a number of observable firms' characteristics, that according to our assumptions, influence the probability to source. The units treated (the "treated" group) are then matched to units without treatment (the control group) according to the similarity of their predicted probabilities to source based on the defined pre-exposure control variables (X_i):

$$P(X_i) = \text{Prob} (T_i = 1 \mid X_i)$$

The causal effect of sourcing status on firm performance will thus be given by the differences in the outcomes between the two groups, after exposure. However, one crucial diagnostic of success in matching is balance. The degree of covariate balance achieved by the conditioning determines if the control group can be considered to represent a credible counterfactual (Wang-Sheng Lee, 2006). Achieving adequate balance in the covariates is thus critical for unbiased estimates of the treatment effect.

The set of control variables used in our matching process comprise a wide range of firm's characteristics. Treated and non-treated groups were required to produce a similar propensity score conditional on the following baseline characteristics: (i) size, based on both the number of persons employed and turnover, (ii) labour costs burden, measured by both average labour costs per person employed and the share of labour costs in gross value added; (iii) financial soundness; (iv) financial autonomy; and (v) industry sector code:

$$P (T_i = 1 \mid \ln L_{i,2006} , \ln \text{Turnover}_{i,2006} , \text{Wage}_{i,2006} , \ln \text{LabourCostBurden}_{i,2006} , \\ \ln \text{FinancialSoundness}_{i,2006} , \ln \text{FinancialAutonomy}_{i,2006} , A7_{i,2006})$$

The Propensity Score for Matching was estimated using Becker and Ichino (2002) routines in Stata, in the year 2006, assuming that this is the best pre-exposure to treatment year, available in our database. Furthermore, to guarantee consistency, we used the same specification and the same year to estimate the propensity score in all three scenarios.

To assess balance, we first perform the Dehejia and Wahba (1999, 2002) specification test (henceforth the DW test), which groups observations into strata defined on the estimated propensity score to check if the propensity score is balanced within each stratum. Then, we check if differences in the covariates in the two groups in matched samples have been eliminated after matching. Once balancing is achieved, we use three different matching techniques to derive the average treatment effect on the treated group, namely nearest-neighbour (NN), stratification (Strat.) and kernel matching. As said before, none of these matching techniques is a priori superior to the others, however, applying the DW test does not make much sense if any other matching algorithm other than stratification is to be used (Wang-Sheng Lee, 2006). In this context, we will first look at stratification matching results and use Kernel and NN results, as our second and third best option, respectively, either to assess the robustness of the stratification estimates, or as an alternative in case stratification does not provide any results due to not having enough observations.

Three different spans of time are used in order to proxy short (2012-2013), medium (2012-2015) and long-term (2012-2017) effects for each scenario. However, it is worth noting that the longer the distance in time from exposure to treatment, to assess the impacts of a certain programme, the higher the risk of contamination bias by capturing effects other than solely the effects attributable to the programme itself.

Additionally, and since the 2009-2011 period in which enterprises were surveyed, was quite struggling for Portuguese firms, as they were also adjusting to the economic and financial crisis, we opted to observe the post-treatment evolution of each variable expressed both in natural logarithms and using pre-treatment/pre-crisis indexes (whenever the variable is available), throughout the three spans of time referred.

5. Empirical Findings

In this section, we will present each scenario in detail and the corresponding empirical findings on a variety of firms' performance measures by using matching techniques.

5.1. Scenario 1

On the first scenario, we assess differences in the performance between firms that have outsourced production across borders and firms that did not, irrespective of whether firms on the comparison group outsourced domestically or haven't outsourced at all. On this scenario we focus on firms that answered to the second survey, referring to observed international sourcing in the period 2009-2011, discarding those that, according to their answer on the first survey, had already sourced internationally in the period 2001-2006. The purpose is to keep only firms that, according to the information that we have available, are apparently performing international sourcing for the first time in the period 2009-2011, to capture the "switching effect" of sourcing in the second period.

Based on the set of covariates presented above, the estimated PSM for this scenario, leads to a common support region comprising a balanced panel of 90 (out of 107) firms that reported to have outsourced across borders for the first time in the period 2009-2011 and 492 (out of 599) control firms (see Figure A1 in Appendix). According to the DW test, no statistically significant difference remains between the mean of the estimated propensity score in both treatment and control group within each stratum, so we accept the PSM specification. The number of blocks that ensures balance in each block is 5.

The tests for equality of means before and after matching in each of the covariates used to estimate the propensity score (see Table A4 in Appendix), show that after matching most of the significant covariate differences disappear (there are still a significant difference in the wage variable when using kernel matching), confirming that our model balances the covariates.

Table 5 summarizes all estimations with two alternative specifications of the outcome variables. We believe that the most interesting comparison refers to the second specification of each variable, where we calculate the change on that variable by indexing it to its level in the year that immediately precedes treatment. Whenever the variable is not available to create the referred index we will rely on the first specification only.

Table 5 – Difference-in-Means
Newly offshoring firms *versus* non-offshoring firms

Scenario #1		Short-Term Effects 2012-2013				Medium-Term Effects 2012-2015				Long-Term Effects 2012-2017			
		Unmatched Data		Matched Data		Unmatched Data		Matched Data		Unmatched Data		Matched Data	
		t-tests	NN	Strat.	Kernel	t-tests	NN	Strat.	Kernel	t-tests	NN	Strat.	Kernel
L	In	0.067	-0.130 *	0.035	0.031	0.034	-0.178 ***	0.031	0.020	0.027	-0.188 ***	0.039	0.026
	2008=100	3.166	23.282 *	29.890 *	30.897 **	1.047	18.607 *	28.769 ***	28.874 **	-3.217	14.330 *	25.499 ***	25.411 ***
Employees	In	0.071	-0.099	0.065	0.058	0.037	-0.133 **	0.067 *	0.050 *	0.020	-0.138 **	0.068 *	0.047
	2008=100	17.566	22.514	29.117 *	30.143 *	16.153	18.187 *	28.346 **	28.461 ***	12.536	13.987	25.158 ***	25.077 ***
R&D Personnel	In	0.258	0.246	0.413 ***	0.358 **	0.174	0.213	0.358 ***	0.280 **	0.162	0.201	0.383 ***	0.293 **
	-	-	-	-	-	-	-	-	-	-	-	-	-
LP	In	0.369 ***	-0.052	0.062	0.135 ***	0.370 ***	-0.043 *	0.040	0.114 ***	0.364 ***	-0.046 *	0.029	0.102 ***
	2008=100	-13.343 *	-15.546 **	-6.832 *	-7.107 *	-10.406	-13.690 **	-14.934 **	-13.541 **	-9.435	-14.026 ***	-14.738 *	-10.494
LP_adjusted	In	0.060	-0.121 **	-0.030	-0.029	0.052	-0.131 ***	-0.056 **	-0.055 *	0.053 *	-0.133 ***	-0.064 ***	-0.063 **
	2008=100	-3.944	-10.060 **	-4.795 *	-5.141 *	-4.038	-9.970 **	-7.474 ***	-7.555 ***	-4.269	-10.260 **	-8.880 **	-9.003 ***
TFP	In	-0.022	-0.160	-0.178	-0.161	-0.006	-0.138	-0.145	-0.132	-0.011	-0.135	-0.136	-0.121
	-	-	-	-	-	-	-	-	-	-	-	-	-
Wage	In	0.292 ***	0.058 *	0.088 ***	0.156 ***	0.292 ***	0.067 ***	0.081 ***	0.150 ***	0.291 ***	0.064 ***	0.078 ***	0.147 ***
	2008=100	-0.729	-1.975	0.978	0.751	-0.959	-1.284	-1.070	-0.816	-4.240	-1.272	-3.619 **	-3.080 *
Labour Costs	In	-0.071	0.099 *	0.020	0.020	-0.065 *	0.112 ***	0.045 *	0.044 *	-0.060 **	0.125 ***	0.060 ***	0.058 ***
	2008=100	7.031	-7.315	6.189	6.862	20.074	8.270	38.056 *	31.578	15.682	22.008 **	36.783 ***	31.867 ***
GVA	In	0.436 ***	-0.142 *	0.109	0.180 **	0.403 ***	-0.165 **	0.081	0.145 **	0.383 ***	-0.172 ***	0.067	0.126 **
	2008=100	0.261	-7.870	3.205	4.605	-5.626	-7.502	1.735	2.276	-10.154 *	-11.465 *	0.399	0.679
Turnover	In	0.672 ***	-0.095	0.220 **	0.269 ***	0.643 ***	-0.119 *	0.214 ***	0.254 ***	0.600 ***	-0.130 **	0.196 ***	0.233 ***
	2008=100	-5.361	-7.640	0.157	2.125	-10.898 **	-9.484 **	-1.568	-0.365	-15.142 ***	-11.836 ***	-2.396	-1.609
X Goods	In	0.961 ***	0.519 *	0.530 **	0.538 ***	0.902 ***	0.507 ***	0.562 ***	0.557 ***	0.868 ***	0.572 ***	0.539 ***	0.545 ***
	-	-	-	-	-	-	-	-	-	-	-	-	-
X G&S	In	1.231 ***	0.486 **	0.894 ***	0.872 ***	1.149 ***	0.407 ***	0.815 ***	0.824 ***	1.141 ***	0.423 ***	0.836 ***	0.851 ***
	-	-	-	-	-	-	-	-	-	-	-	-	-
Export Intensity	In	0.684 ***	0.397 *	0.629 ***	0.580 ***	0.658 ***	0.349 ***	0.586 ***	0.565 ***	0.673 ***	0.366 ***	0.605 ***	0.588 ***
	-	-	-	-	-	-	-	-	-	-	-	-	-
M Goods	In	0.934 ***	0.595 **	0.397 **	0.561 ***	0.929 ***	0.643 ***	0.358 ***	0.571 ***	0.984 ***	0.647 ***	0.416 ***	0.646 ***
	-	-	-	-	-	-	-	-	-	-	-	-	-
M G&S	In	1.230 ***	0.445 *	0.708 ***	0.761 ***	1.228 ***	0.487 **	0.689 ***	0.757 ***	1.210 ***	0.498 ***	0.699 ***	0.790 ***
	-	-	-	-	-	-	-	-	-	-	-	-	-
Trade Balance (G&S)	In	0.916 ***	0.273	0.646 ***	0.537 ***	0.819 ***	0.325 **	0.573 ***	0.467 ***	0.823 ***	0.365 **	0.647 ***	0.533 ***
	-	-	-	-	-	-	-	-	-	-	-	-	-
Capital	In	0.453 **	-0.170	-0.117	-0.136	0.459 ***	-0.204 *	-0.116	-0.147 *	0.411 ***	-0.288 ***	-0.160 *	-0.201 ***
	-	-	-	-	-	-	-	-	-	-	-	-	-
K/L	In	0.391 **	-0.034	-0.134	-0.161	0.441 ***	-0.019	-0.124 *	-0.155 *	0.401 ***	-0.102	-0.183 **	-0.222 ***
	-	-	-	-	-	-	-	-	-	-	-	-	-
GFCF	In	0.520 **	-0.127	-0.026	0.044	0.468 ***	-0.166	-0.057	-0.035	0.440 ***	-0.111	-0.041	-0.022
	2008=100	166.577	232.622	308.705 *	245.079	249.352	177.206 **	286.267 **	265.754 **	284.293	277.368	328.665	352.430
EBITDA	In	0.783 ***	0.039	0.171 *	0.244 **	0.697 ***	0.071	0.108 *	0.185 **	0.668 ***	-0.022	0.086	0.163 **
	-	-	-	-	-	-	-	-	-	-	-	-	-
Financial Soundness	In	0.032	-0.151 *	-0.097 *	-0.027	0.074	-0.064	-0.043	0.006	0.087	-0.064	-0.009	0.039
	2008=100	-173.388	-190.233	-224.628 *	-221.506 *	-155.516	-200.201 *	-199.214 **	-190.516 **	360.909	-247.477 ***	62.014	22.988
Leverage	In	-0.087 *	-0.010	-0.057 *	-0.063 *	-0.093 ***	0.001	-0.042	-0.051 **	-0.100 ***	0.005	-0.035 *	-0.041 **
	2008=100	-4.867	-4.114	-3.102	-3.747	-5.635 **	-3.327	-2.095	-3.056 *	-302.461	-2.494	-162.759	-138.255
Collateral	In	-0.146	-0.158	-0.186 *	-0.262 ***	-0.126	-0.192 **	-0.195 ***	-0.277 ***	-0.157 **	-0.254 ***	-0.239 ***	-0.325 ***
	-	-	-	-	-	-	-	-	-	-	-	-	-
Financial Autonomy	In	0.102	-0.086	-0.011	0.006	0.114 **	-0.027	-0.019	-0.001	0.120 ***	-0.003	-0.009	0.008
	2008=100	-94.508	-796.499 *	-125.279	-127.504	-64.271	-644.375 **	-98.950 **	-97.959 **	-35 816.358	-547.596 **	377.683	313.963

Source: Own calculations based on micro-level data from both International Survey and SCIE - Statistics Portugal.

Firm's labour force variables:

Offshoring is often perceived as a job-destroying strategy. Here we examine the link between offshoring and firm's labour force variables focusing on firm level total employment, employees and R&D workers.

According to the results reported in Table 5, t-tests performed on unmatched data point to a positive but non-statistically significant difference in total employment between newly offshoring firms and non-offshoring firms. After pairing each treated firm with a “similar” control, results are ambiguous. Stratification and Kernel matching methods, our first and second best estimators, point to a positive even though non-significant difference-in-means between both groups, while the nearest neighbour matching method, our third best estimator, point to a negative statistically significant difference between the two groups. Once we consider the total employment variable indexed to the pre-treatment/pre-crisis year of 2008 at the firm level of each group, it is clear that newly offshoring firms outperformed non-offshoring firms, throughout the three spans of time considered. Actually, a closer look at both groups mean shows that the mean observed in the distribution of matched controls is still below the pre-crisis level, while the mean observed in the distribution of matched treated is around 30% higher (see Table A4 in Appendix).

In what concerns the subset of workers that receives a salary, the results seem to point toward a favourable effect on the number of employees detected in both specifications of the variable. However, the statistical significance in the first specification is only attained in the medium and long-run.

These results are in line with the empirical findings from previous literature: international sourcing does not necessarily impact employment negatively, as it is commonly perceived, having mixed or even positive effects. Different empirical studies have found this positive effect, as reported in the Literature Review – Deschryvere and Kotiranta (2008), Moser (2010), Chidlow et al (2012). In particular, Chidlow et al (2012) attempt to explain this evidence and conclude that the strategies and motivations underpinning firms’ offshoring decisions play a fundamental role on the significance and direction of the effects on firm-level labour variables. In particular, the research finds increasing employment and labour costs levels for the service sector, which also presents significant evidence of positive impacts in access to know-how and improved quality. For the manufacturing sector, the authors find higher than average decrease in employment and labour costs in offshoring firms coupled with positive effects on profitability, however with no significant effects in variables such as technological improvement or new products). This study highlights the industry, firm characteristics and strategies conducted when offshoring as key factors to understand employment dynamics.

Finally, we detect a positive causal effect of offshoring on R&D jobs. This can be a sign of strategic commitment to innovation by off-shoring firms., Given that the dataset does not allow to explore skill composition of labour force in the firm, this result can also indicate that offshoring contributes to some extent to job creation for high skilled workers.

Despite the fact that the type of task/function offshored may have different employment effects, other empirical studies have reported a similar effect – re-composition of the workforce in favour of high skilled workers (Timmermans and Østergaard, 2011).

Firm’s efficiency variables:

As indicated earlier, offshoring can increase efficiency in the sense that firms can relocate relatively more inefficient stages of production and focus its economic resources on higher value added activities such as

innovation. Here we explore the link between offshoring and firm's efficiency by looking at firm level labour productivity, wage adjusted labour productivity and total factor productivity.

Regarding the effect of offshoring on labour productivity, defined as value added per person employed, the results are not straightforward. Using the first specification, the results seem to indicate that offshoring exerts a positive effect on labour productivity. The sign is positive with both Stratification and Kernel estimators but the statistical significance is only attained with the Kernel estimator. However, indexing labour productivity levels to the pre-treatment year of 2008 at the firm level in both groups reveals that, as compared to their counterparts, firms that started to reallocate some of their production process abroad experienced lower productivity growth. This is possibly related to the fact that the non-offshoring group display on average lower pre-crisis levels of both employment and GVA, with a greater reduction in employment, thus producing an upturn on their labour productivity.

The previous measure, however, does not take into account that employees are heterogeneous, and generate different amounts of value added according to their skills. As such, we also compute a wage adjusted labour productivity ratio. As, in theory, wage differentials are expected to reflect productivity differences of employees, this ratio allows taking labour heterogeneity into account. With the wage adjusted labour productivity ratio, the results point to a consistent negative causal effect with both specifications, suggesting that in newly offshoring firms the effect on average personnel costs more than offsets the effect on average value added generated per worker, as compared to the control group.

Furthermore, we detect a negative, but not statistically significant, effect on total factor productivity in the period investigated.

This negative relation can be explain by the fact that offshoring for the first time can be complex, and often associated with large risks, countless challenges and substantial hidden costs. Efficiency usually comes with experience, with the progress through learning curves and typically, after long periods of adjustment. Additionally, since many of these firms are part of an economic enterprise group, the sourcing decision can be exogenous, which means that probably the goal is not to make them more efficient individually, but as a group.

As mentioned in the literature review, depending on the specification, measures, firm characteristics or sector, productivity effects not only differ but can become statistically negative (Mohlmann and Groot (2012); McCann (2009). McCann finds mixed results for the impact of offshoring on TFP, namely results indicate that the TFP gains are not pervasive for all the firms, on average, but specific to foreign owned firms and, as for domestic firms, the gains are specific to technological and capital intensive firms. Thus, ownership and firm level characteristics play a fundamental role on the effects of sourcing. On another note, Mohlmann and Groot (2012) stress that firms' outsourcing strategies might have implied higher than expected inter-firm transaction costs to explain the negative and insignificant effect estimation for productivity. In a survey on offshoring decisions for a sample of firms (Netherlands), Van Gorp (2010) details that 17% of internationally outsourced activities were relocated back to the home country; the main reasons for not achieving their goals were: governance, higher than expected costs, more time needed, lack of market potential, and cultural differences.

Finally, our findings also show that offshoring has a negative causal effect on both capital stock and capital per person employed. As such, the dynamics of labour productivity presented above may be attributed more to lower capital deepening rather than to lack of labour efficiency per se.

Firm's labour cost variables:

Offshoring is often designed to allow significant cost reductions. Here we explore the link between offshoring and firm's labour cost variables focusing on firm level unit wages, labour cost burden, measured as a percentage of GVA.

According to the results reported in Table 5, international sourcing has a consistent positive causal effect on labour cost burden, using both specifications, possibly related to the increase in R&D jobs. This may also suggest a mode of international sourcing seeking access to new technologies, new knowledge and new markets, rather than labour cost reduction.

Firm's international trade variables:

Offshoring represents the most important dimension of GVCs involvement and is often designed to have access to new markets. Here we explore the link between offshoring and firm's international exposure, by looking at firm level exports and imports.

According to the results reported in Table 5, international sourcing has a positive causal effect on both exports and imports at the firm level, with a positive causal effect on both export intensity and trade balance.

The positive effect from offshoring on export intensity has been detailed in the literature. For example, Moser (2010) finds a positive and significant causal effect on export intensity originating from offshoring intermediate goods for a sample of German firms (period 1998-2004) both short and long-term (3 years). The author argues that international sourcing allows firms to benefit from price competitiveness, which leads to an increase in their foreign market share – this causality chain is denominated the productivity effect of offshoring and is derived from the Grossman and Rossi-Hansberg (2008) partial equilibrium model on production offshoring.

Firm's Profit and financial variables:

Offshoring can be a boost in firms' profits. Here we explore the link between offshoring and firm's financial variables, focusing on EBITDA, financial soundness, financial autonomy and collateral.

Our findings point to a positive causal effect of offshoring on firm's profits. However, the results also seem to indicate that offshoring exerts a negative impact on firm's collateral, probably linked to the negative effect on fixed capital stock, and on both financial soundness and financial autonomy of firms, specially on the short/medium-run.. These results are, however, not significant for most matching methods

Chidlow et al (2012) find a similar effect on Slovenian firms, however the positive effect on profitability is only significant for firms in the manufacturing sector.

5.2. Scenario 2

On the second scenario we assess differences in performance between firms that sourced production across borders and firms that outsourced domestically, to understand if the previous results hold between different types of outsourcing. To implement this, we combine the information from International Sourcing respondents with the variable *subcontracts* reported in our business record database.

Basically, we start with the selection from scenario 1 and restrict the control group to firms that have outsourced domestically, based on the assumption that positive values of the variable *subcontracts* (as a percentage of turnover) are indicative of outsourcing (both to domestic and foreign suppliers). This allows us to identify firms that are sourcing across borders or just inside borders.

Based on the set of covariates presented above, the estimated PSM for this scenario, leads to a common support region comprising a balanced panel of 90 (out of 107) firms that reported to have outsourced across borders for the first time in the period 2009-2011 and 366 (out of 431) control firms that reported not to have offshored production across-borders in the period 2009-2011, but display positive values of the variable *subcontracts* (as a percentage of turnover) at least one time throughout the period 2004-2011, indicating that the firm outsourced production domestically (see Figure A1 in Appendix). According to the DW test, no statistically significant difference remains between the mean of the estimated propensity score in both treatment and control group within each stratum, so we accept the PSM specification. The number of blocks that ensures balance in each block is 5.

The tests for equality of means before and after matching in each of the covariates used to estimate the propensity score (see Table A4 in Appendix), show that after matching most of the significant covariate differences disappear (there are still a significant difference in the wage variable when using kernel matching).

Table 6 summarizes all estimations with two alternative specifications of the outcome variables. As said before, we believe that the most interesting comparison refers to the second specification of each variable, which measures its variation from the pre-treatment period.

The results in this scenario are broadly similar to those from the previous scenario, meaning that, in general, previous conclusions are still valid even when restricting the control group to firms that also outsource their production but pursue purely domestic outsourcing strategies. This would suggest that only international outsourcing matters.

However, major differences are detected concerning the effects on R&D jobs and total factor productivity.

Table 6 – Difference-in-Means
Newly offshoring firms *versus* firms performing domestic outsourcing only

Scenario #2		Short-Term Effects 2012-2013				Medium-Term Effects 2012-2015				Long-Term Effects 2012-2017			
		Unmatched Data		Matched Data		Unmatched Data		Matched Data		Unmatched Data		Matched Data	
Variable		t-tests	NN	Strat.	Kernel	t-tests	NN	Strat.	Kernel	t-tests	NN	Strat.	Kernel
L	In	0.092	-0.142	-0.007	0.022	0.065	-0.125 *	0.007	0.017	0.068	-0.119 **	0.019	0.029
	2008=100	23.371	30.675 *	28.776 *	30.359 *	20.213	31.872 **	27.529 **	28.441 ***	16.621 *	30.638 ***	24.239 **	25.337 ***
Employees	In	0.100	-0.111	0.024	0.049	0.072	-0.080	0.035	0.046	0.064	-0.069	0.038	0.047
	2008=100	22.765	29.925 *	27.998 **	29.610 **	19.895	31.462 ***	27.105 **	28.032 ***	16.363 *	30.303 ***	23.897 ***	25.003 ***
R&D	In	0.163	-0.015	0.262	0.213	0.127	-0.119	0.211	0.151	0.125	-0.089	0.196 *	0.152
Personnel	-												
LP	In	0.402 ***	0.016	0.124 ***	0.127 **	0.404 ***	-0.004	0.098 ***	0.105 ***	0.393 ***	-0.007	0.085 ***	0.088 ***
	2008=100	-17.763 *	-0.310	-5.549	-5.915 *	-16.285	-0.746	-13.983 **	-13.491 **	-10.840	10.600	-13.583 *	-9.144
LP_adjusted	In	0.070	-0.060	-0.005	-0.019	0.063 *	-0.069 *	-0.028	-0.044 *	0.061 *	-0.058 **	-0.039 **	-0.057 **
	2008=100	-5.888	1.113	-5.586 *	-5.654	-6.074	0.546	-8.422 ***	-8.508 ***	-6.668	11.760	-9.661 ***	-10.521 ***
TFP	In	-0.405	-1.375 ***	-0.532 *	-0.632 **	-0.391 *	-1.361 ***	-0.507 **	-0.616 ***	-0.393 **	-1.372 ***	-0.504 ***	-0.612 ***
	-												
Wage	In	0.306 ***	0.030	0.114 ***	0.130 ***	0.308 ***	0.026	0.108 ***	0.125 ***	0.309 ***	0.020	0.105 ***	0.122 ***
	2008=100	0.051	1.009	3.317 *	2.428	-0.149	0.404	1.259	0.775	-0.577	0.078	0.108	-0.030
Labour Costs	In	-0.079 *	0.036	-0.004	0.010	-0.074 **	0.048	0.018	0.035	-0.065 **	0.057 **	0.037 **	0.056 **
Burden	2008=100	12.409	29.330	21.881	9.665	12.478	33.519 **	21.312 *	14.146	11.746	36.040 ***	25.609 **	20.384 **
GVA	In	0.505 ***	-0.158	0.125 *	0.160 **	0.476 ***	-0.169 ***	0.102 **	0.129 **	0.454 ***	-0.157 **	0.089 **	0.107 **
	2008=100	-0.194	7.927	3.208	5.305	-4.928	7.543 *	1.095	2.725	-8.889	8.795 **	-0.750	0.945
Turnover	In	0.735 ***	-0.062	0.234 ***	0.231 **	0.702 ***	-0.060	0.227 ***	0.215 ***	0.662 ***	-0.099	0.205 ***	0.193 ***
	2008=100	-6.414	-0.617	1.490	3.170	-11.250 **	-0.190	-0.915	0.391	-14.953 ***	-0.614	-2.748	-1.105
X Goods	In	0.928 ***	0.089	0.571 **	0.595 **	0.866 ***	0.229	0.563 ***	0.562 ***	0.823 ***	0.323 **	0.527 ***	0.513 ***
	-												
X G&S	In	1.089 ***	0.262	0.788 ***	0.847 ***	1.010 ***	0.354 **	0.731 ***	0.756 ***	0.989 ***	0.359 ***	0.731 ***	0.760 ***
	-												
Export Intensity	In	0.459 **	0.317	0.575 ***	0.589 ***	0.424 ***	0.405 **	0.526 ***	0.534 ***	0.425 ***	0.419 ***	0.520 ***	0.540 ***
	-												
M Goods	In	1.185 ***	0.262	0.548 **	0.577 ***	1.183 ***	0.599 **	0.502 ***	0.569 ***	1.238 ***	0.617 ***	0.551 ***	0.642 ***
	-												
M G&S	In	1.376 ***	0.537 **	0.843 ***	0.730 ***	1.363 ***	0.820 ***	0.784 ***	0.698 ***	1.337 ***	0.765 ***	0.777 ***	0.717 ***
	-												
Trade Balance (G&S)	In	0.818 ***	0.161	0.524 ***	0.283 *	0.752 ***	0.328 *	0.449 ***	0.237 *	0.791 ***	0.453 ***	0.546 ***	0.316 ***
	-												
Capital	In	0.479 **	-0.539 ***	-0.073	-0.124	0.487 ***	-0.536 ***	-0.068	-0.125	0.438 ***	-0.536 ***	-0.115 *	-0.182 **
	-												
K/L	In	0.392 **	-0.391 **	-0.058	-0.136	0.436 ***	-0.403 ***	-0.060	-0.126 *	0.381 ***	-0.428 ***	-0.128 *	-0.202 **
	-												
GFCF	In	0.624 ***	-0.151	0.087	0.081	0.534 ***	-0.265	0.008	-0.036	0.500 ***	-0.195 *	0.018	-0.042
	2008=100	117.350	268.815	297.521	356.696 *	222.397	230.129 **	290.087 **	314.148 **	238.987	298.345	367.105	358.222 *
EBITDA	In	0.839 ***	0.070	0.283 **	0.220 *	0.765 ***	0.070	0.205 ***	0.152 **	0.730 ***	-0.020	0.159 ***	0.119 *
	-												
Financial Soundness	In	0.069	0.072	-0.019	0.010	0.128 *	0.171 **	0.040	0.049	0.144 **	0.155 **	0.067	0.073 **
	2008=100	-162.019	-318.356 **	-232.204 **	-232.446 *	-132.612	-227.591 **	-174.707 *	-182.987 *	-165.931	-251.999 **	-207.138 ***	-219.585 **
Leverage	In	-0.075	-0.049	-0.054	-0.058 *	-0.081 **	-0.058 *	-0.042 **	-0.048 **	-0.087 ***	-0.062 ***	-0.042 **	-0.041 *
	2008=100	-4.125	3.294	-1.636	-5.704	-4.738 *	2.813	-0.992	-5.064	-7.355 *	2.055	-2.338	-6.165 **
Collateral	In	-0.122	-0.246	-0.164 *	-0.164 *	-0.101	-0.240 **	-0.162 **	-0.165 **	-0.138 *	-0.263 ***	-0.209 ***	-0.218 ***
	-												
Financial Autonomy	In	0.091	0.051	0.002	0.005	0.100 *	0.108 **	-0.001	0.006	0.106 **	0.095 **	0.013	0.016
	2008=100	-136.084	5.012	-311.826	-193.049	-92.901	3.464	-242.858 **	-148.145 *	-45.046	-0.437	-178.370 **	-94.859

Source: Own calculations based on micro-level data from both International Survey and SCIE - Statistics Portugal.

In this scenario, once the control group is narrowed down to firms that also perform outsourcing but opt for domestic hosts only, we failed to detect the positive causal effect of offshoring on R&D jobs throughout all

spans of time considered that we found in the previous scenario. This means that the favourable effect on R&D jobs doesn't depend on a specific type of outsourcing.

Finally, in what concerns total factor productivity, we detect a negative causal effect, throughout the three spans of time considered. This suggests that, in what concerns total factor productivity, international sourcing may be relatively less attractive than domestic outsourcing strategy, or that international sourcing may imply higher adjustment costs.

Despite the importance of analysing the effects derived from outsourcing from different types of channels, few studies have been able to conduct these estimations. Mohlmann and Groot (2013) find a similar effect, detailing positive impacts on TFP and labour productivity from domestic outsourcing against negative or insignificant causal effects for the same variables from international sourcing.

5.3. Scenario 3

On the third scenario, we assess differences in the performance between firms that have outsourced production, either across or inside borders, and firms that did not outsource any task. To implement this, we focus on the full panel dataset and use the variable *subcontracts* reported in our business record database, which is often used interchangeably with outsourcing.

The rationale is to take full advantage of the entire population of firms in our dataset and enrich the analysis by further exploring the overall impact of externalizing activities, regardless of the location of the host enterprise.

For this purpose, two groups are defined as follows. The first one, the treated group, considers enterprises that display positive values of the variable *subcontracts* (as a percentage of turnover) in the period 2009-2011, and zero during the period 2004-2008. The second group, the control one, considers enterprises that displays zero values of the variable *subcontracts* (as a percentage of turnover) during the entire period 2004-2011.

Based on the set of covariates presented above, the estimated PSM for this scenario, leads to a common support region comprising a balanced panel of 516 (out of 1285) firms that reported to have outsourced across borders for the first time in the period 2009-2011 and 1659 (out of 4774) control firms that didn't outsource any task in the period 2004-2011 (see Figure A1 in Appendix). According to the DW test, no statistically significant difference remains between the mean of the estimated propensity score in both treatment and control group within each stratum, so we accept the PSM specification. The number of blocks that ensures balance in each block is 4.

The tests for equality of means before and after matching in each of the covariates used to estimate the propensity score (see Table A4 in Appendix), show that after matching all of the significant covariate differences disappear.

Table 7 summarizes all estimations.

Table 7 – Difference-in-Means
Outsourcing firms versus non-outsourcing firms

Scenario #3		Short-Term Effects 2012-2013				Medium-Term Effects 2012-2015				Long-Term Effects 2012-2017			
		Unmatched Data		Matched Data		Unmatched Data		Matched Data		Unmatched Data		Matched Data	
		t-tests	NN	Strat.	Kernel	t-tests	NN	Strat.	Kernel	t-tests	NN	Strat.	Kernel
		Variable											
L	In	0.206 ***	0.207 ***	0.122 ***	0.118 **	0.209 ***	0.202 ***	0.124 ***	0.120 ***	0.209 ***	0.208 ***	0.122 ***	0.117 ***
	2008=100	43.251 **	31.485 **	34.776 ***	34.853 **	47.256 ***	37.177 ***	38.607 ***	38.661 ***	48.510 ***	43.175 ***	42.982 ***	42.944 ***
Employees	In	0.128 ***	0.198 ***	0.104 ***	0.102 **	0.134 ***	0.234 ***	0.114 ***	0.111 ***	0.130 ***	0.252 ***	0.113 ***	0.110 ***
	2008=100	22.528 ***	36.310 **	30.537 ***	30.716 **	25.915 ***	36.920 ***	32.491 ***	32.633 ***	29.784 ***	42.630 ***	37.256 ***	37.315 ***
R&D	In	-0.138	0.370		-0.183	-0.313	0.311		-0.561 **	-0.428 **	0.229		-0.561 ***
Personnel	-												
LP	In	0.120 ***	0.063	0.017	0.023	0.108 ***	0.086 **	0.005	0.010	0.112 ***	0.070 ***	0.003	0.008
	2008=100	636.544	13.621	0.453	-1.811	441.903	28.385 **	26.899	25.845	223.990	27.416 **	18.589 *	16.874
LP_adjusted	In	0.031	0.097 ***	0.056 ***	0.065 ***	0.030 *	0.090 ***	0.046 ***	0.056 ***	0.032 **	0.055 **	0.038 ***	0.046 ***
	2008=100	-37.147	29.818	-5.074	-7.479	5.211	42.312 *	22.795	21.715	2.863	42.321 **	12.955	11.992
TFP	In	0.225 ***	-0.063	-0.011	0.050	0.206 ***	-0.103 *	-0.002	0.051	0.200 ***	-0.117 ***	-0.002	0.048
	-												
Wage	In	0.034 *	-0.015	-0.034 *	-0.039 **	0.032 **	0.017	-0.019	-0.024 *	0.032 ***	0.027 *	-0.013	-0.019 *
	2008=100	4.291	-4.673 *	-3.896 **	-4.330 **	5.186 *	-1.285	-2.488 *	-2.769 *	7.250 ***	-0.170	-1.799	-1.839 *
Labour Costs	In	0.110 ***	-0.085 **	-0.046 *	-0.046 **	0.107 ***	-0.095 ***	-0.044 **	-0.045 **	0.107 ***	-0.057 **	-0.036 **	-0.039 ***
	Burden	123.910	-207.493	-100.924	-133.369	92.572	24.787	89.422	75.688	164.238	84.037	147.715 *	141.325 *
GVA	In	0.338 ***	0.291 ***	0.146 **	0.142 ***	0.325 ***	0.313 ***	0.119 ***	0.117 ***	0.328 ***	0.325 ***	0.121 ***	0.118 ***
	2008=100	780.525	44.891 ***	4.185	-0.600	511.626	62.146 ***	23.553	19.104	259.842	69.841 ***	12.118	5.397
Turnover	In	0.343 ***	0.321 ***	0.178 ***	0.149 **	0.346 ***	0.327 ***	0.185 ***	0.158 ***	0.347 ***	0.327 ***	0.171 ***	0.146 ***
	2008=100	-51.806	146.990	-595.463	-488.733	67.004	195.566 ***	-407.272 *	-320.350	167.600	442.797 ***	-240.730	-142.572
X Goods	In	-0.111	-0.093	-0.646 **	-0.301	-0.052	0.810 **	-0.511 **	-0.228	-0.073	0.847 ***	-0.539 ***	-0.262 *
	-												
X G&S	In	-0.009	0.237	-0.127	-0.171	0.037	0.603 ***	-0.050	-0.137	0.010	0.690 ***	-0.106	-0.157 *
	-												
Export Intensity	In	0.040	-0.024	0.092	0.162	0.044	0.229	0.124	0.136	-0.009	0.235 **	0.062	0.074
	-												
M Goods	In	-0.011	0.535		-0.127	-0.002	0.836 ***		-0.160	-0.093	1.043 ***	-0.418 ***	-0.262 **
	-												
M G&S	In	0.097	0.551 *	-0.240	-0.214	0.081	0.969 ***	-0.242 *	-0.173	0.019	1.099 ***	-0.274 **	-0.181 *
	-												
Trade Balance (G&S)	In	-0.069	0.490 *	0.063	0.004	-0.022	0.850 ***	0.075	-0.033	-0.018	0.825 ***	0.012	-0.054
	-												
Capital	In	0.191 ***	0.217 *	0.077	0.107	0.217 ***	0.357 ***	0.119 **	0.152 **	0.203 ***	0.420 ***	0.103 **	0.143 ***
	-												
K/L	In	0.035	0.020	-0.016	0.014	0.061	0.141 **	0.028	0.062	0.052	0.171 ***	0.021	0.060
	-												
GFCF	In	0.073	0.295 **	0.024	0.093	0.146 **	0.383 ***	0.021	0.074	0.112 **	0.405 ***	-0.006	0.050
	2008=100	484.432 *	1 598.320 *	901.190 **	846.045 *	276.651 *	1 165.075 **	616.969 **	556.084 **	301.411 *	1 188.669 **	758.330 ***	681.071 ***
EBITDA	In	0.227 ***	0.337 ***	0.148 **	0.158 ***	0.224 ***	0.489 ***	0.140 ***	0.152 ***	0.224 ***	0.521 ***	0.141 ***	0.155 ***
	-												
Financial Soundness	In	-0.079 *	-0.022	-0.081 **	-0.087 **	-0.051 *	0.014	-0.037	-0.049 *	-0.055 **	0.014	-0.020	-0.033
	2008=100	-135.279	-177.553	-1 255.840	-850.795	58.676	-131.351 *	-847.339 *	-560.563 **	69.669	1 635.193	-466.081	-193.924
Leverage	In	0.033	0.038	0.065 **	0.059 **	0.015	0.015	0.028	0.019	0.008	0.018	0.009	-0.001
	2008=100	-3.596	9.927	3.120	1.236	-41.881 *	-9.230	-48.180 *	-52.137 *	974.122	162.852	216.486	210.418
Collateral	In	-0.038	-0.086	-0.041	-0.047	-0.015	0.010	-0.022	-0.022	-0.018	0.040	-0.036	-0.029
	-												
Financial Autonomy	In	-0.057 *	-0.009	-0.028	-0.029	-0.052 **	0.006	-0.029	-0.031	-0.042 **	0.007	-0.024	-0.026
	2008=100	-2 813.120	-7 437.979 *	-7 540.517 *	-7 539.725	-2 691.180	-7 187.039 **	-7 280.036 **	-7 281.510 **	-7 855.385 *	-6 048.902 *	-7 675.188 ***	-7 628.420 ***

Source: Own calculations based on micro-level data from both International Survey and SCIE - Statistics Portugal.

Firm's labour force variables:

According to the results reported in table 7, outsourcing has a consistent positive causal effect on both total employment and the subset of workers that receive a salary, with both specifications of each variable. However, we detect a negative causal effect of outsourcing on R&D jobs.

Firm's efficiency variables:

Regarding the effect of outsourcing on productivity, the results seem to indicate that outsourcing has a positive effect on labour productivity, defined as value added per person employed, although statistical significance is only attained with the nearest neighbour matching method. Once we use wage adjusted labour productivity ratio, the results point to a positive causal effect detected with both specifications, suggesting that in firms performing outsourcing, the effect on average value added generated per person employed more than compensates the effect on average personnel costs, as compared to the control group.

Finally, in what concerns total factor productivity, the sign is negative with both stratification estimator and nearest neighbour, but the statistical significance is only attained with the nearest neighbour estimator.

The estimated average effects on productivity should be understood bearing in mind that, in this specification, the treatment group is comprised by two types of outsourcing (international and domestic). According with the main findings drawn from the literature review, empirical research indicates that the outsourcing channels – and specifically international vs domestic – can have different or even opposite effects. Mohlmann and Groot (2013) find evidence of productivity gains deriving from domestic outsourcing, contrasting with negative impacts from international sourcing activities. In another study, Schwörer (2013), focused only on manufacturing firms, find another pattern: with domestic outsourcing associated with no significant effects, whilst offshoring of non-core activities and services is found to yield positive effects on total factor productivity.

Our findings also show that outsourcing has a positive causal effect on capital stock on the observed period.

Firm's labour cost variables:

Regarding the effect of outsourcing on labour cost variables, the results point to a negative causal effect on both unit wages and labour cost burden.

On the basis of these findings, the fact that outsourcing allowed for labour cost savings, together with the observed positive effect on capital accumulation, may help to explain the positive dynamics on wage adjusted labour productivity ratio.

These results complement previous findings on the effects of outsourcing on labour cost variables, in particular, Chidlow et al (2012) find that manufacturing firms engaged in international outsourcing experience labour cost reductions (although this result does not hold for service firms).

Firm's international trade variables:

According to the results reported in table 7, outsourcing has a negative causal effect on both exports and imports at the firm level, especially of goods, with no significant effect on export intensity or trade balance.

Analysing these results in light of the previous scenarios, the estimations point to a specific causal relationship between sourcing and exporting performance: international sourcing in particular demonstrates positive effects on export intensity, whilst domestic sourcing is associated with insignificant effects for this outcome. These findings are relevant for our understanding of the causal relationships from international

trade participation, highlighting what can be understood as an *importer premia*. Previous research on trade and firm characteristics complements these findings. Notably, Bernard et al. (2007) in “*Firms in International Trade*” find that exporting and importing firms exhibit similar characteristics – larger in size, more productive, pay higher wages and are more skill and capital intensive than non-importers/exporters – and detect the presence of a significant correlation between importing and exporting. The authors suggest that these relationships can be caused by the participation of firms in global value chains, which entails a higher degree of both importing and exporting behaviour.

Firm's Profit and financial variables:

Finally, our findings confirm that outsourcing exerts a positive causal effect on firm's profits, and a negative impact on both financial soundness and financial autonomy of firms.

6. Conclusions

Offshoring has an ambiguous effect on firm level total employment. Nonetheless, it has a positive effect on both the subset of workers that receive a salary (a proxy to employees) and on R&D jobs, coupled with an increasing effect on firm level total labour costs. The favourable effect on R&D jobs can be a sign of innovation or an indication that offshoring contributes to some extent to job creation for more high skilled workers. Moreover, it can also help explain the effect on labour costs.

In what productivity is concerned, firms that outsourced experienced a lower labour productivity possibly related to the fact that international sourcing often involves high adjustments costs. Our findings also show that offshoring has a negative causal effect on both capital stock and capital per person employed. As such, the dynamics of productivity may be attributed to lower capital deepening rather than to lack of labour efficiency.

Additionally, international sourcing has a positive causal effect on both exports and imports at the firm level, with a positive causal effect on both export intensity and trade balance.

Finally, our findings confirm that offshoring exerts a positive causal effect on firm's profits, in the medium/long-run. On the other hand, we detected a negative causal impact on firm's collateral, probably linked to the negative effect on fixed capital stock, and on both financial soundness and financial autonomy of firms.

Differently from offshoring, **outsourcing** has a consistent positive causal effect on total employment and a negative causal effect on labour costs. Furthermore, results also point to a negative causal effect on R&D jobs. Together, these variables may reflect an increase in lower qualifications employment.

Also, differently from offshoring, regarding the effect of outsourcing on productivity the results point to a positive causal effect of outsourcing on wage adjusted labour productivity what suggests that in firms performing outsourcing, the effect on average value added generated per person employed more than compensates the effect on average personnel costs, as compared to the control group. Finally, in what

concerns total factor productivity, the results are not clear. Our findings also show that, differently from offshoring, outsourcing has a positive causal effect on capital stock. On the basis of these findings, the fact that outsourcing allowed for labour cost savings, together with the observed positive effect on capital accumulation, may help to explain the positive dynamics on wage adjusted labour productivity ratio.

Additionally, contrary to offshoring, outsourcing has a negative causal effect on both exports and imports of goods at the firm level, with no significant effect on export intensity or trade balance. Finally, our findings confirm that outsourcing exerts a positive causal effect on firm's profits but a negative impact on both financial soundness and financial autonomy of firms.

As a final remark, contrary to what intuition would tell us, outsourcing does not seem to harm employment at the firm level, but it can change the composition of firm's labour force. In the case of international sourcing, results point to a skill upgrading effect proxied by R&D jobs.

References

- Abraham, K.G. and S. Taylor (1996): 'Firms' Use of Outside Contractors: Theory and Evidence', *Journal of Labor Economics*, 14, pp. 394–424.
- Amiti, M. and Wei, S.-J. (2005). 'Service Offshoring, Productivity, and Employment: Evidence from the United States', IMF Working Paper, WP/05/238
- Antràs et al. (2005), "Global Sourcing", *Journal of Political Economy*
- Becker, S.O. and Ichino, A. (2002), "Estimation of Average Treatment Effects Based on Propensity Scores". *The Stata Journal*, 2, 358-377.
- Bernard, Andrew, B., J. Bradford Jensen, Stephen J. Redding, and Peter K. Schott. 2007. "Firms in International Trade." *Journal of Economic Perspectives*, 21 (3): 105-130.
- Chidlow, Jaklic and Cirjakovic (2012) "Exploring the effects of international sourcing on manufacturing versus service firms", *The Service Industries Journal*
- Dehejia, R. H., and Wahba, S. (1999), "Causal effects in nonexperimental studies: Reevaluation of the evaluation of training programs". *Journal of the American Statistical Association*, 94: 1043–1062.
- Dehejia, R. H., and Wahba, S. (2002), "Propensity score matching methods for Nonexperimental causal studies". *Review of Economics and Statistics*, 84(1): 151–161.
- Deschryvere, Matthias, and Kotiranta, Annu (2008) "Domestic Employment Effects of Offshoring: Empirical Evidence from Finland". Helsinki: ETLA, Elinkeinoelämän Tutkimuslaitos, The Research Institute of the Finnish Economy, Keskusteluaiheita, Discussion Papers, ISSN; No. 1166.
- Geishecker I., Görg H., Maioli S. (2008), "The Labour Market Impact of International Outsourcing." In: Greenaway D., Upward R., Wright P. (eds) *Globalisation and Labour Market Adjustment*. Palgrave Macmillan, London.
- Girma, S., Greenaway, D. and Kneller, R. (2004), "Does exporting increase productivity? A microeconomic analysis of matched firms", *Review of International Economics*, Vol. 12.
- Girma and Görg (2006), "Evaluating the foreign ownership wage premium using a difference-in-differences matching approach", *Journal of International Economics*
- Greenaway and Kneller (2004), "Exporting and Productivity in the United Kingdom" Research paper series, University of Nottingham
- Grossman, G. M. and E. Rossi-Hansberg (2008). *Trading Tasks: A Simple Theory of Offshoring*. *American Economic Review*, 98 (5), 1978–1997.
- Hummels, David, Jorgensen, Rasmus, Munch, Jakob and Xiang, Chong (2014), "The Wage Effects of Offshoring: Evidence from Danish Matched Worker-Firm Data". *American Economic Review* 104(6): 1597-1629.

Lee, Wang-Sheng (2006), “Propensity Score Matching and Variations on the Balancing Test”. Melbourne Institute of applied Economic and Social Research, University of Melbourne.

Levinsohn, J. and A. Petrin (2003), “Estimating production functions using inputs to control for unobservables,” *Review of Economic Studies*, 70 (2), 317–341

McCann, Fergal, (2009), “Outsourcing and Firm Productivity in Irish Manufacturing”, No 21, FIW Working Paper series, FIW

Möhlmann and Groot (2013), “The Effects of Outsourcing on Firm Productivity Evidence from Microdata in the Netherlands”, CPB Discussion Paper 250

Moser, Christoph, Urban, Dieter, and Weder di Mauro, Beatrice (2010), “Offshoring, Firm Performance and Establishment-level Employment – Identifying Productivity and Downsizing Effects”. VIII Annual Conference of the Euro-Latin Study Network On Integration and Trade (ELSNIT) CEPPII – Paris, France October 15-16.

Nordås, H. (2019-03-20), “Offshoring of services functions and labour market adjustments”, OECD Trade Policy Papers, No. 226, OECD Publishing, Paris.

Rosenbaum and Rubin (1983), “The Central Role of the Propensity Score in Observational Studies for Causal Effects” *Biometrika*

Schwörer, T. (2013), “Offshoring, domestic outsourcing and productivity: evidence for a number of European countries”, *Rev World Econ* 149, 131–149

Timmermans, B., & Østergaard, C. R. (2011), “Offshoring and Changes in Firms’ Domestic Employment: Evidence from the Danish Offshoring Survey”. In DRUID Summer Conference 2011 on Innovation, Strategy, and Structure

Appendix

1a - Variables Definitions

Variable	Definition	Availability
L	Total employment in the firm given by the number of persons employed	2004-2017
Employees	Number of employees proxied by the subset of total employment that receives a salary	2004-2017
R&D Personnel	Number of Employees engaged in R&D activities	2011-2017
LP	Labour productivity defined as the ratio of value-added (at factor cost) to total employment. The dataset does not report the yearly effective hours of work.	2004-2017
LP_adjusted	Wage-adjusted labour productivity ratio, defined as the ratio of value added (at factor cost) to total wage bill which is subsequently adjusted by the share of paid employees in the total number of persons employed.	2004-2017
TFP	TFP is estimated by implementing the Levinsohn and Petrin (2003) methodology. The routine uses the log of turnover as the dependent variable and labour and fixed capital stock as inputs of the firm production function.	2010-2017
Wage	Average wage in the firm computed as compensation per employee	2004-2017
Labour Costs Burden	Total Wage bill as a percentage of gross value-added at factor cost	2004-2017
GVA	The balance sheet gross value-added (current prices) reported at factor cost.	2004-2017
Turnover	Total sales of goods and services of the firm	2004-2017
X Goods	Total exports measured by the amount of goods and services sold abroad.	2010-2017
X G&S	Exports of goods measured by the amount of goods sold abroad.	2010-2017
Export Intensity	The ratio of total exports to total sales	2010-2017
M Goods	Total imports measured by the amount of goods and services purchased abroad.	2010-2017
M G&S	Imports of goods measured by the amount of goods purchased abroad.	2010-2017
Trade Balance (G&S)	Trade balance of goods and services	2010-2017
Capital	Fixed Capital Stock at the end of the period measured by the current value of total fixed assets as reported in the balance sheet	2010-2017
K/L	Capital Stock at the end of the period measured by the current value of tangible and intangible assets as reported in the balance sheet	2010-2017
GFCF	Gross Fixed Capital Formation (current prices) as reported in the balance sheet	2010-2017
EBITDA	Earnings Before Interest, Taxes, Depreciation and Amortization	2010-2017
Financial Soundness	The ratio of operational income to total net assets	2010-2017
Leverage	The ratio of total liabilities to total net assets	2004-2017
Colateral	The ratio of fixed capital stock to total net assets	2010-2017
Financial Autonomy	The ratio of equity to total net assets	2004-2017
NUTSII	X regional dummies corresponding to the portuguese regions (NUTSII)	2004-2017
A7	7 sector dummies corresponding to the following aggregation in NACE Rev. 2 classification: Sections A; B; C; D-F; G-I; J-N (excluding K) ; -	2004-2017
UNIV_GVC	Dummy variable identifying firms that belong to the universe of reference in the second round of the international sourcing survey "Inquérito às Cadeias de Valor Globais 2009-2011" (1 - Yes; 0 - No)	2009-2011
AMO_GVC	Dummy variable identifying firms that belong to the sample in the second round of the international sourcing survey "Inquérito às Cadeias de Valor Globais 2009-2011" (1 - Yes; 0 - No)	2009-2011
RESP_GVC	Dummy variable identifying respondent firms in the second round of the international sourcing survey "Inquérito às Cadeias de Valor Globais 2009-2011" (1 - Yes; 0 - No)	2009-2011
IS09_11	Dummy variable that assumes the value of one if the respondent firm has declared to have offshored production activities during the 2009-2011 period and zero otherwise	2009-2011
UNIV_IS	Dummy variable identifying firms that belong to the universe of reference in the first round of the international sourcing survey "Inquérito ao Sourcing Internacional 2001-2006" (1 - Yes; 0 - No)	2004-2006
AMO_IS	Dummy variable identifying firms that belong to the sample in the first round of the international sourcing survey "Inquérito ao Sourcing Internacional 2001-2006" (1 - Yes; 0 - No)	2004-2006
RESP_IS	Dummy variable identifying respondent firms in the first round of the international sourcing survey "Inquérito ao Sourcing Internacional" (1 - Yes; 0 - No)	2004-2006
IS01_06	Dummy variable that assumes the value of one if the respondent firm has declared to have offshored production activities during the 2001-2006 period and zero otherwise	2004-2006
Subcontracts	The amount spent in all work concerning to own production process in which the cooperation of other (external) enterprises has been used, under formal commitments or simple agreements	2004-2006

1b – Descriptive Statistics

Table A1 – Number of firms in each survey round

Year	International Sourcing Survey #1 2001-2006				International Sourcing Survey #2 2009-2011			
	UNIV_IS	AMO_IS	RESP_IS	ISO1_06 = 1	UNIV_GVC	AMO_GVC	RESP_GVC	ISO9_11 = 1
2004	1 745	754	710	111	2 273	898	834	128
2005	1 749	756	712	111	2 327	916	847	128
2006	1 751	757	713	112	2 387	940	869	131
2007	1 751	757	713	112	2 433	954	882	132
2008	1 740	752	708	111	2 468	964	890	135
2009	1 740	752	708	111	2 483	969	894	135
2010	1 736	750	706	111	2 472	969	894	135
2011	1 725	746	702	110	2 438	960	891	135
2012	1 677	727	684	109	2 359	930	874	133
2013	1 633	715	672	108	2 277	894	843	132
2014	1 594	698	656	105	2 203	869	820	130
2015	1 560	684	642	102	2 150	852	804	129
2016	1 535	676	635	103	2 103	826	780	126
2017	1 505	665	625	102	2 058	811	767	124

Source: Own calculations based on micro-level data from both International Survey and SCIE - Statistics Portugal.

Table A2 – Number of Enterprises

Year	N	ISO9_11=1 & ISO1_06=1	ISO9_11=0 & ISO1_06=1	ISO9_11=, & ISO1_06=1	ISO9_11=1 & ISO1_06=0	ISO9_11=0 & ISO1_06=0	ISO9_11=1 & ISO1_06=,	ISO9_11=0 & ISO1_06=,	ISO9_11=, & ISO1_06=0	ISO9_11=1 ou ISO1_06=1
2004	339 856	16 0.005 %	26 0.008 %	69 0.020 %	27 0.008 %	194 0.057 %	85 0.025 %	486 0.143 %	378 0.111 %	53 0.016 %
2005	343 978	16 0.005 %	27 0.008 %	68 0.020 %	27 0.008 %	194 0.056 %	85 0.025 %	498 0.145 %	380 0.110 %	54 0.016 %
2006	344 998	16 0.005 %	27 0.008 %	69 0.020 %	27 0.008 %	194 0.056 %	88 0.026 %	517 0.150 %	380 0.110 %	54 0.016 %
2007	359 325	16 0.004 %	27 0.008 %	69 0.019 %	27 0.008 %	194 0.054 %	89 0.025 %	529 0.147 %	380 0.106 %	54 0.015 %
2008	368 205	16 0.004 %	27 0.007 %	68 0.018 %	27 0.007 %	192 0.052 %	92 0.025 %	536 0.146 %	378 0.103 %	54 0.015 %
2009	366 915	16 0.004 %	27 0.007 %	68 0.019 %	27 0.007 %	192 0.052 %	92 0.025 %	540 0.147 %	378 0.103 %	54 0.015 %
2010	361 235	16 0.004 %	27 0.007 %	68 0.019 %	27 0.007 %	192 0.053 %	92 0.025 %	540 0.149 %	376 0.104 %	54 0.015 %
2011	361 851	16 0.004 %	26 0.007 %	68 0.019 %	27 0.007 %	192 0.053 %	92 0.025 %	538 0.149 %	373 0.103 %	53 0.015 %
2012	355 769	16 0.004 %	25 0.007 %	68 0.019 %	27 0.008 %	188 0.053 %	90 0.025 %	528 0.148 %	360 0.101 %	52 0.015 %
2013	356 577	16 0.004 %	25 0.007 %	67 0.019 %	27 0.008 %	183 0.051 %	89 0.025 %	503 0.141 %	354 0.099 %	52 0.015 %
2014	363 356	16 0.004 %	24 0.007 %	65 0.018 %	26 0.007 %	179 0.049 %	88 0.024 %	487 0.134 %	346 0.095 %	50 0.014 %
2015	372 201	15 0.004 %	22 0.006 %	65 0.017 %	26 0.007 %	175 0.047 %	88 0.024 %	478 0.128 %	339 0.091 %	48 0.013 %
2016	380 935	15 0.004 %	22 0.006 %	66 0.017 %	26 0.007 %	172 0.045 %	85 0.022 %	460 0.121 %	334 0.088 %	48 0.013 %
2017	394 967	15 0.004 %	22 0.006 %	65 0.016 %	26 0.007 %	166 0.042 %	83 0.021 %	455 0.115 %	331 0.084 %	48 0.012 %

Source: Own calculations based on micro-level data from both International Survey and SCIE - Statistics Portugal.

Table A3 – Number of Persons Employed

Year	N	ISO9_11=1 & ISO1_06=1	ISO9_11=0 & ISO1_06=1	ISO9_11=, & ISO1_06=1	ISO9_11=1 & ISO1_06=0	ISO9_11=0 & ISO1_06=0	ISO9_11=1 & ISO1_06=,	ISO9_11=0 & ISO1_06=,	ISO9_11=, & ISO1_06=0	ISO9_11=1 ou ISO1_06=1
2004	2 776 854	9 769 0.4 %	14 212 0.5 %	39 267 1.4 %	19 249 0.7 %	138 861 5.0 %	12 426 0.4 %	65 700 2.4 %	254 439 9.2 %	33 461 1.2 %
2005	2 811 321	9 329 0.3 %	15 539 0.6 %	38 202 1.4 %	18 856 0.7 %	143 978 5.1 %	12 358 0.4 %	68 570 2.4 %	263 240 9.4 %	34 395 1.2 %
2006	2 878 212	9 020 0.3 %	15 714 0.5 %	38 008 1.3 %	20 539 0.7 %	153 614 5.3 %	14 283 0.5 %	75 658 2.6 %	268 598 9.3 %	36 253 1.3 %
2007	2 990 894	8 977 0.3 %	15 440 0.5 %	39 287 1.3 %	21 419 0.7 %	165 047 5.5 %	15 041 0.5 %	83 883 2.8 %	275 810 9.2 %	36 859 1.2 %
2008	2 962 190	8 162 0.3 %	15 707 0.5 %	42 311 1.4 %	22 689 0.8 %	166 950 5.6 %	16 831 0.6 %	91 615 3.1 %	297 258 10.0 %	38 396 1.3 %
2009	2 872 688	7 253 0.3 %	15 150 0.5 %	41 231 1.4 %	22 435 0.8 %	163 962 5.7 %	17 489 0.6 %	95 776 3.3 %	305 517 10.6 %	37 585 1.3 %
2010	2 824 929	7 282 0.3 %	15 178 0.5 %	39 839 1.4 %	21 151 0.7 %	167 264 5.9 %	17 867 0.6 %	96 452 3.4 %	307 203 10.9 %	36 329 1.3 %
2011	2 760 265	7 523 0.3 %	14 599 0.5 %	39 949 1.4 %	20 360 0.7 %	167 547 6.1 %	18 780 0.7 %	96 404 3.5 %	293 460 10.6 %	34 959 1.3 %
2012	2 589 309	7 706 0.3 %	13 637 0.5 %	39 986 1.5 %	19 038 0.7 %	158 121 6.1 %	19 786 0.8 %	91 557 3.5 %	275 470 10.6 %	32 675 1.3 %
2013	2 542 739	7 284 0.3 %	13 668 0.5 %	38 408 1.5 %	18 625 0.7 %	152 304 6.0 %	18 861 0.7 %	88 423 3.5 %	263 788 10.4 %	32 293 1.3 %
2014	2 598 434	8 229 0.3 %	13 295 0.5 %	38 592 1.5 %	17 270 0.7 %	152 941 5.9 %	20 009 0.8 %	90 061 3.5 %	264 458 10.2 %	30 565 1.2 %
2015	2 702 027	8 047 0.3 %	13 087 0.5 %	39 019 1.4 %	16 358 0.6 %	153 094 5.7 %	21 079 0.8 %	90 836 3.4 %	269 320 10.0 %	29 445 1.1 %
2016	2 804 923	8 049 0.3 %	13 842 0.5 %	36 934 1.3 %	16 239 0.6 %	161 059 5.7 %	17 474 0.6 %	88 438 3.2 %	271 569 9.7 %	30 081 1.1 %
2017	2 955 992	7 700 0.3 %	14 302 0.5 %	37 126 1.3 %	16 441 0.6 %	167 354 5.7 %	17 982 0.6 %	90 881 3.1 %	279 585 9.5 %	30 743 1.0 %

Source: Own calculations based on micro-level data from both International Survey and SCIE - Statistics Portugal.

1c – Results

Figure A1 – Common Support

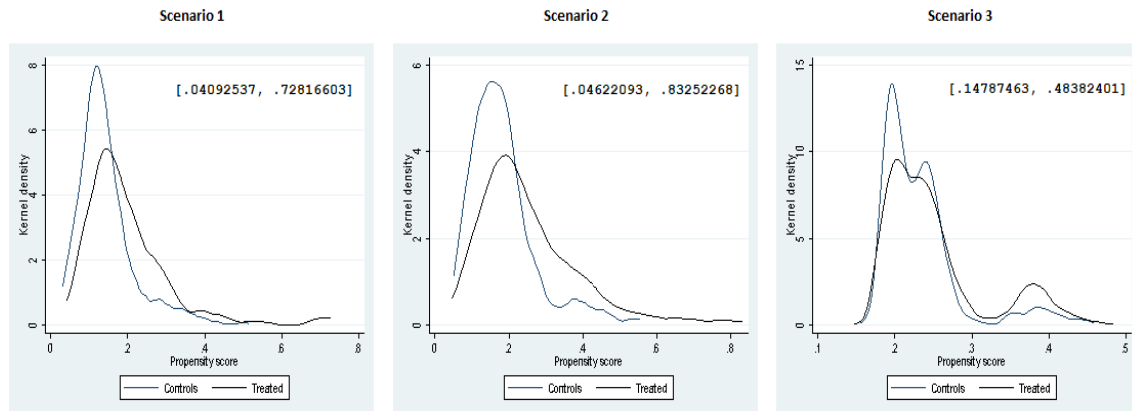


Table A4 – Test for Equality of Means Before and After Matching

		Scenario #1						Scenario #2						Scenario #3					
		Unmatched Data - Mean			Matched Data - Mean			Unmatched Data - Mean			Matched Data - Mean			Unmatched Data - Mean			Matched Data - Mean		
		T=1	T=0		T=1	T=0		T=1	T=0		T=1	T=0		T=1	T=0		T=1	T=0	
					[NN]	[Strat.]	[Kernel]				[NN]	[Strat.]	[Kernel]				[NN]	[Strat.]	[Kernel]
Number of Observations		107	599		90	88		107	431		90	87		1285	4774		516	516	
L	In	5.305	5.196		5.353	5.394		5.305	5.199		5.353	5.380		5.546	5.357		5.358		
	Difference in means		0.109		-0.075	0.037	0.003		0.106		-0.193	0.022	-0.004		0.089		0.089	0.024	0.029
Turnover	In	17.148	16.480		17.216	17.254		17.148	16.443		17.216	17.219		17.387	17.073		17.096		
	Difference in means		0.668 ***		-0.039	0.140	0.189		0.706 ***		-0.171	0.146	0.120		0.369		0.160	0.026	0.007
Wage	-	19.813	14.592		20.089	18.378		19.813	14.429		20.089	18.107		19.073	17.561		17.933		
	Difference in means		5.220 ***		1.590	263	2.955 ***		5.384 ***		1.017	546	2.157 **		53		586	183	171
Labour Cost Burden	In	-0.527	-0.421		-0.574	-0.585		-0.527	-0.406		-0.574	-0.574		-0.575	-0.540		-0.569		
	Difference in means		-0.105 *		0.049	-0.020	-0.012		-0.120 **		0.001	-0.094	-0.005		0.120 **		0.013	0.012	0.007
Fin. Soundness	In	-2.808	-2.945		-2.814	-2.828		-2.808	-2.997		-2.814	-2.836		-2.801	-2.888		-2.857		
	Difference in means		0.137		-0.187	0.014	0.050		0.189		-0.013	0.052	0.043		0.035		0.036	-0.015	-0.039
Financial Autonomy	In	-1.103	-1.184		-1.075	-1.073		-1.103	-1.160		-1.075	-1.080		-1.081	-1.129		-1.089		
	Difference in means		0.081		-0.090	0.022	0.011		0.057		0.006	0.049	0.014		0.000		0.007	0.028	0.034

Source: Own calculations based on micro-level data from both International Survey and SCIE - Statistics Portugal.

Table A5 – Group Means in Scenario 1
Newly offshoring firms *versus* non-offshoring firms

Scenario #1		Short-Term Effects 2012-2013							Medium-Term Effects 2012-2015							Long-Term Effects 2012-2017						
		Unmatched Data - Mean		Matched Data - Mean					Unmatched Data - Mean		Matched Data - Mean					Unmatched Data - Mean		Matched Data - Mean				
		T=1	T=0	T=1 [NN Kernel]	T=1 [Strat.]	T=0 [NN]	T=0 [Strat.]	T=0 [Kernel]	T=1	T=0	T=1 [NN Kernel]	T=1 [Strat.]	T=0 [NN]	T=0 [Strat.]	T=0 [Kernel]	T=1	T=0	T=1 [NN Kernel]	T=1 [Strat.]	T=0 [NN]	T=0 [Strat.]	T=0 [Kernel]
Variable																						
L	In	5.324	5.257	5.372	5.364	5.502	5.329	5.341	5.268	5.234	5.331	5.335	5.509	5.304	5.310	5.241	5.214	5.313	5.318	5.501	5.279	5.287
	2008=100	124.726	121.559	129.131	128.703	105.849	98.813	98.233	123.182	122.136	127.921	128.409	109.314	99.639	99.047	121.277	124.494	125.931	126.443	111.601	100.943	100.520
		5.350	5.279	5.403	5.396	5.502	5.331	5.345	5.305	5.269	5.376	5.382	5.509	5.315	5.326	5.282	5.262	5.362	5.369	5.500	5.302	5.316
Employees	In	124.092	106.526	128.360	127.906	105.846	98.789	98.217	122.840	106.686	127.497	127.970	109.310	99.624	99.036	120.995	108.459	125.580	126.079	111.593	100.921	100.503
	2008=100	2.193	1.936	2.263	2.263	2.017	1.850	1.905	2.108	1.934	2.169	2.169	1.956	1.811	1.890	2.136	1.975	2.199	2.199	1.998	1.816	1.906
R&D Personnel	In	10.499	10.130	10.522	10.485	10.574	10.422	10.387	10.528	10.157	10.525	10.484	10.568	10.444	10.412	10.550	10.186	10.542	10.503	10.588	10.474	10.435
	2008=100	96.226	109.569	93.630	93.577	109.176	100.409	100.738	107.475	117.881	96.434	95.888	110.124	110.820	109.975	109.749	119.183	98.928	98.692	112.954	113.430	109.422
		0.353	0.293	0.374	0.364	0.495	0.394	0.403	0.361	0.309	0.364	0.355	0.495	0.411	0.419	0.376	0.323	0.370	0.361	0.503	0.425	0.432
LP _{adjusted}	In	91.588	95.533	89.612	89.109	99.672	93.904	94.753	94.667	98.705	90.633	90.255	100.603	97.729	98.188	96.576	100.845	91.620	91.275	101.880	100.155	100.624
	2008=100	3.782	3.804	3.953	3.932	4.113	4.109	4.113	3.809	3.816	3.987	3.968	4.125	4.113	4.119	3.798	3.809	3.987	3.968	4.122	4.104	4.105
TFP	In	9.862	9.570	9.874	9.847	9.816	9.759	9.717	9.878	9.587	9.883	9.856	9.816	9.775	9.733	9.892	9.601	9.893	9.867	9.829	9.789	9.745
	2008=100	107.311	108.039	108.124	108.880	110.099	107.902	107.379	109.484	110.443	109.019	109.823	110.303	110.892	109.836	111.521	115.761	110.660	111.547	111.932	115.166	113.740
		-0.365	-0.294	-0.383	-0.373	-0.482	-0.394	-0.403	-0.377	-0.311	-0.378	-0.369	-0.490	-0.414	-0.422	-0.385	-0.325	-0.377	-0.369	-0.502	-0.429	-0.436
Labour Costs	In	115.259	108.228	109.548	109.958	116.863	103.769	102.686	118.782	98.708	119.711	120.377	111.441	82.321	88.133	118.520	102.838	126.363	127.234	104.355	90.451	94.496
	2008=100	15.856	15.420	15.934	15.890	16.076	15.781	15.754	15.845	15.443	15.914	15.879	16.079	15.798	15.768	15.851	15.468	15.918	15.886	16.090	15.820	15.792
		103.000	102.739	103.337	102.193	111.207	98.987	98.732	104.038	109.663	105.153	104.887	112.655	103.152	102.877	106.702	116.856	108.080	108.054	119.545	107.655	107.401
GVA	In	17.287	16.615	17.323	17.306	17.418	17.086	17.054	17.265	16.623	17.309	17.296	17.428	17.082	17.054	17.236	16.636	17.296	17.284	17.426	17.087	17.063
	2008=100	103.731	109.091	103.366	102.129	111.006	101.971	101.240	103.294	114.192	103.475	102.748	112.959	104.316	103.840	104.851	119.993	105.582	104.972	117.418	107.368	107.190
		15.722	14.761	15.595	15.650	15.076	15.121	15.057	15.743	14.840	15.668	15.697	15.161	15.134	15.111	15.720	14.851	15.662	15.688	15.090	15.149	15.117
X Goods	In	15.943	14.712	15.980	15.993	15.494	15.099	15.108	15.891	14.741	15.959	15.975	15.552	15.160	15.135	15.895	14.754	15.994	16.008	15.571	15.171	15.143
	2008=100	-1.396	-2.080	-1.412	-1.383	-1.809	-2.013	-1.992	-1.422	-2.080	-1.417	-1.390	-1.766	-1.976	-1.982	-1.411	-2.083	-1.394	-1.376	-1.760	-1.981	-1.982
		15.212	14.278	15.261	15.220	14.666	14.823	14.699	15.219	14.290	15.286	15.245	14.643	14.886	14.715	15.293	14.309	15.382	15.341	14.735	14.925	14.736
M Goods	In	15.525	14.295	15.569	15.619	15.124	14.911	14.807	15.523	14.295	15.575	15.632	15.088	14.942	14.818	15.511	14.302	15.601	15.657	15.103	14.958	14.811
	2008=100	15.821	14.905	15.879	15.852	15.606	15.206	15.342	15.698	14.878	15.788	15.765	15.463	15.192	15.320	15.791	14.908	15.856	15.837	15.491	15.189	15.324
		15.151	14.699	15.123	15.118	15.293	15.235	15.259	15.138	14.679	15.088	15.091	15.292	15.206	15.235	15.092	14.681	15.037	15.045	15.325	15.204	15.238
Capital	In	9.827	9.436	9.751	9.754	9.785	9.889	9.912	9.870	9.428	9.757	9.755	9.776	9.879	9.912	9.843	9.442	9.714	9.716	9.816	9.900	9.935
	2008=100	13.025	12.505	13.052	13.086	13.179	13.112	13.008	13.034	12.567	13.010	13.049	13.176	13.105	13.045	13.129	12.689	13.144	13.176	13.255	13.216	13.166
		354.392	187.816	386.834	397.563	154.212	88.858	141.756	341.522	92.170	324.278	330.469	147.072	44.202	58.525	402.065	117.772	408.145	418.452	130.777	89.787	55.715
EBITDA	In	14.765	13.983	14.819	14.774	14.780	14.603	14.575	14.747	14.050	14.812	14.778	14.741	14.670	14.627	14.763	14.095	14.825	14.806	14.847	14.721	14.663
	2008=100	-3.017	-3.049	-2.992	-3.055	-2.841	-2.959	-2.965	-2.949	-3.023	-2.941	-2.983	-2.877	-2.940	-2.947	-2.929	-3.016	-2.910	-2.938	-2.846	-2.930	-2.948
		-99.575	73.813	-139.974	-149.877	50.259	74.751	81.532	-101.999	53.517	-143.324	-151.866	56.877	47.349	47.192	-139.274	-500.183	-183.231	-192.600	64.246	-254.614	-206.219
Financial Soundness	In	-0.637	-0.550	-0.638	-0.626	-0.628	-0.569	-0.575	-0.654	-0.561	-0.641	-0.628	-0.642	-0.586	-0.590	-0.666	-0.567	-0.642	-0.635	-0.647	-0.599	-0.601
	2008=100	98.486	103.353	101.249	101.789	105.363	104.892	104.996	97.890	103.525	101.615	102.091	104.942	104.187	104.670	98.152	400.613	102.313	102.463	104.807	265.222	240.568
		-2.004	-1.858	-2.086	-2.090	-1.928	-1.904	-1.825	-2.018	-1.892	-2.130	-2.130	-1.938	-1.935	-1.853	-2.066	-1.909	-2.187	-2.186	-1.933	-1.946	-1.862
Collateral	In	-1.054	-1.156	-1.070	-1.090	-0.984	-1.079	-1.076	-1.025	-1.139	-1.055	-1.073	-1.028	-1.054	-1.054	-0.998	-1.118	-1.034	-1.048	-1.031	-1.039	-1.042
	2008=100	116.763	211.271	106.439	104.991	902.938	230.270	233.943	123.517	187.788	105.697	104.251	750.072	203.201	203.657	123.149	85.939.507	102.787	101.825	650.383	-275.858	-211.175

Source: Own calculations based on micro-level data from both International Survey and SCIE - Statistics Portugal.

Table A6 – Group Means in Scenario 2
Newly offshoring firms *versus* firms performing domestic outsourcing only

Scenario #2		Short-Term Effects 2012-2013							Medium-Term Effects 2012-2015							Long-Term Effects 2012-2017						
		Unmatched Data - Mean		Matched Data - Mean					Unmatched Data - Mean		Matched Data - Mean					Unmatched Data - Mean		Matched Data - Mean				
Variable		T-1	T=0	T-1 [NN Kernel]	T-1 [Strat.]	T=0 [NN]	T=0 [Strat.]	T=0 [Kernel]	T-1	T=0	T-1 [NN Kernel]	T-1 [Strat.]	T=0 [NN]	T=0 [Strat.]	T=0 [Kernel]	T-1	T=0	T-1 [NN Kernel]	T-1 [Strat.]	T=0 [NN]	T=0 [Strat.]	T=0 [Kernel]
L	In	5.324	5.232	5.372	5.376	5.514	5.382	5.350	5.268	5.203	5.331	5.333	5.456	5.327	5.314	5.241	5.173	5.313	5.315	5.432	5.296	5.284
	2008=100	124.726	101.354	129.131	129.000	98.456	100.223	98.772	123.182	102.969	127.921	127.732	96.049	100.203	99.480	121.277	104.656	125.931	125.627	95.293	101.388	100.595
Employees	In	5.350	5.250	5.403	5.407	5.514	5.383	5.354	5.305	5.233	5.376	5.379	5.456	5.344	5.330	5.282	5.217	5.362	5.365	5.431	5.326	5.315
	2008=100	124.092	101.327	128.360	128.220	98.435	100.222	98.750	122.840	102.945	127.497	127.303	96.035	100.199	99.465	120.995	104.632	125.580	125.271	95.277	101.375	100.577
R&D	In	2.193	2.030	2.263	2.263	2.278	2.001	2.050	2.108	1.981	2.169	2.169	2.288	1.959	2.019	2.136	2.011	2.199	2.199	2.288	2.003	2.047
Personnel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LP	In	10.499	10.097	10.522	10.509	10.506	10.385	10.395	10.528	10.123	10.525	10.513	10.529	10.415	10.420	10.550	10.157	10.542	10.530	10.549	10.444	10.454
	2008=100	96.226	113.989	93.630	93.301	93.940	98.850	99.545	107.475	123.760	96.434	96.186	97.180	110.169	109.925	109.749	120.588	98.928	98.756	88.328	112.339	108.072
LP _{adjusted}	In	0.353	0.283	0.374	0.376	0.434	0.380	0.393	0.361	0.298	0.364	0.367	0.433	0.394	0.408	0.376	0.315	0.370	0.373	0.428	0.411	0.427
	2008=100	91.588	97.476	89.612	89.431	88.499	95.017	95.266	94.667	100.741	90.633	90.530	90.087	98.951	99.141	96.576	103.244	91.620	91.558	79.860	101.219	102.141
TFP	In	3.782	4.187	3.953	3.947	5.328	4.479	4.585	3.809	4.201	3.987	3.982	5.348	4.489	4.602	3.798	4.191	3.987	3.982	5.359	4.486	4.599
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wage	In	9.862	9.557	9.874	9.860	9.844	9.746	9.744	9.878	9.570	9.883	9.869	9.857	9.761	9.758	9.892	9.583	9.893	9.880	9.873	9.775	9.771
	2008=100	107.311	107.260	108.124	108.158	107.115	104.841	105.695	109.484	109.632	109.019	109.094	108.615	107.834	108.244	111.521	112.098	110.660	110.769	110.582	110.661	110.690
Labour Costs	In	-0.365	-0.286	-0.383	-0.385	-0.419	-0.381	-0.393	-0.377	-0.303	-0.378	-0.381	-0.426	-0.399	-0.413	-0.385	-0.320	-0.377	-0.380	-0.434	-0.417	-0.433
Burden	In	115.259	102.850	109.548	109.694	80.218	87.813	99.883	118.782	106.304	119.711	119.905	86.192	98.592	105.565	118.520	106.774	126.363	126.601	90.323	100.992	105.979
GVA	In	15.856	15.351	15.934	15.925	16.082	15.800	15.774	15.845	15.369	15.914	15.905	16.083	15.803	15.785	15.851	15.398	15.918	15.908	16.075	15.820	15.811
	2008=100	103.000	103.193	103.337	102.556	95.410	99.348	98.032	104.038	108.966	105.153	104.410	97.610	103.316	102.428	106.702	115.591	108.080	107.339	99.285	108.089	107.135
Turnover	In	17.287	16.552	17.323	17.325	17.385	17.091	17.092	17.265	16.563	17.309	17.310	17.369	17.083	17.094	17.236	16.573	17.296	17.297	17.395	17.092	17.103
	2008=100	103.731	110.145	103.366	102.600	103.983	101.110	100.195	103.294	114.544	103.475	102.653	103.665	103.568	103.084	104.851	119.803	105.582	104.744	106.196	107.492	106.686
X Goods	In	15.722	14.794	15.595	15.595	15.506	15.024	15.000	15.743	14.876	15.668	15.668	15.439	15.106	15.107	15.720	14.897	15.662	15.662	15.339	15.135	15.149
X G&S	In	15.943	14.854	15.980	15.966	15.718	15.178	15.133	15.891	14.881	15.959	15.943	15.605	15.212	15.203	15.895	14.906	15.994	15.979	15.635	15.248	15.234
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Export Intensity	In	-1.396	-1.855	-1.412	-1.430	-1.729	-2.005	-2.000	-1.422	-1.846	-1.417	-1.435	-1.822	-1.961	-1.951	-1.411	-1.835	-1.394	-1.412	-1.813	-1.932	-1.934
M Goods	In	15.212	14.026	15.261	15.261	14.999	14.713	14.684	15.219	14.036	15.286	15.286	14.687	14.784	14.716	15.293	14.055	15.382	15.382	14.765	14.831	14.740
M G&S	In	15.525	14.150	15.569	15.597	15.032	14.754	14.838	15.523	14.160	15.575	15.604	14.755	14.820	14.877	15.511	14.174	15.601	15.639	14.836	14.862	14.885
Trade Balance (G&S)	In	15.821	15.003	15.879	15.858	15.718	15.334	15.595	15.698	14.946	15.788	15.765	15.460	15.316	15.551	15.751	14.940	15.856	15.835	15.403	15.289	15.540
Capital	In	15.151	14.672	15.123	15.129	15.662	15.202	15.247	15.138	14.651	15.088	15.096	15.624	15.164	15.212	15.092	14.654	15.037	15.051	15.573	15.166	15.218
K/L	In	9.827	9.435	9.751	9.753	10.142	9.811	9.887	9.870	9.434	9.757	9.763	10.160	9.823	9.883	9.843	9.462	9.714	9.726	10.142	9.854	9.916
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GFCF	In	13.025	12.401	13.052	13.064	13.203	12.977	12.971	13.034	12.500	13.010	13.029	13.275	13.021	13.046	13.129	12.630	13.144	13.166	13.339	13.148	13.186
	2008=100	354.392	237.042	386.834	391.219	118.019	93.698	30.139	341.522	119.125	324.278	327.962	94.149	37.875	10.130	402.065	163.077	408.145	412.799	109.800	45.694	49.923
EBITDA	In	14.765	13.927	14.819	14.818	14.749	14.535	14.599	14.747	13.982	14.812	14.814	14.742	14.609	14.659	14.763	14.034	14.825	14.830	14.845	14.672	14.707
Financial Soundness	In	-3.017	-3.086	-2.992	-3.004	-3.064	-2.985	-3.002	-2.949	-3.078	-2.941	-2.946	-3.112	-2.986	-2.990	-2.929	-3.073	-2.910	-2.913	-3.065	-2.981	-2.983
	2008=100	-99.575	62.444	-139.974	-142.481	178.382	89.724	92.472	-101.999	30.612	-143.324	-145.598	84.267	29.109	39.663	-139.274	26.657	-183.231	-185.912	68.768	21.226	36.354
Leverage	In	-0.637	-0.562	-0.638	-0.632	-0.589	-0.579	-0.580	-0.654	-0.573	-0.641	-0.635	-0.583	-0.593	-0.592	-0.666	-0.580	-0.642	-0.638	-0.580	-0.596	-0.601
	2008=100	98.486	102.611	101.249	101.513	97.955	103.149	106.953	97.890	102.628	101.615	101.940	98.802	102.932	106.679	98.152	105.507	102.313	102.465	100.258	104.803	108.478
Collateral	In	-2.004	-1.882	-2.086	-2.086	-1.840	-1.923	-1.923	-2.018	-1.917	-2.130	-2.126	-1.890	-1.964	-1.965	-2.066	-1.929	-2.187	-2.179	-1.924	-1.971	-1.969
Financial Autonomy	In	-1.054	-1.145	-1.070	-1.077	-1.121	-1.079	-1.075	-1.025	-1.125	-1.055	-1.062	-1.163	-1.062	-1.061	-0.998	-1.104	-1.034	-1.040	-1.129	-1.053	-1.050
	2008=100	116.763	252.847	106.439	106.317	101.427	418.143	299.489	123.517	216.418	105.697	105.523	102.233	348.381	253.843	123.149	168.194	102.787	102.721	103.224	281.091	197.646

Source: Own calculations based on micro-level data from both International Survey and SCIE - Statistics Portugal.

Table A7 – Group Means in Scenario 3
Outsourcing firms *versus* non-outsourcing firms

Variable		Short-Term Effects 2012-2013						Medium-Term Effects 2012-2015						Long-Term Effects 2012-2017					
		Unmatched Data - Mean		Matched Data - Mean				Unmatched Data - Mean		Matched Data - Mean				Unmatched Data - Mean		Matched Data - Mean			
		T-1	T=0	T-1 [NN]	T=0 [Strat.]	T=0 [Strat.]	T=0 [Kernel]	T-1	T=0	T-1 [NN]	T=0 [Strat.]	T=0 [Strat.]	T=0 [Kernel]	T-1	T=0	T-1 [NN]	T=0 [Strat.]	T=0 [Strat.]	T=0 [Kernel]
L	In	1.148	0.941	1.415	1.208	1.289	1.297	1.151	0.941	1.408	1.206	1.279	1.288	1.156	0.947	1.408	1.200	1.282	1.291
	2008=100	161.554	118.303	150.468	118.983	115.544	115.615	167.981	120.725	155.288	118.111	116.386	116.627	179.179	124.662	162.782	119.607	119.409	119.838
Employees	In	1.259	1.130	1.439	1.241	1.334	1.337	1.270	1.136	1.450	1.216	1.336	1.339	1.284	1.154	1.466	1.214	1.353	1.356
	2008=100	137.402	114.874	143.134	106.824	112.295	112.419	142.154	116.239	146.164	109.244	113.133	113.530	149.205	119.421	153.488	110.858	115.563	116.173
R&D Personnel	In	1.205	1.343	1.389	1.019		1.572	1.070	1.383	1.014	0.703		1.574	1.039	1.467	1.019	0.790		1.580
	-																		
LP	In	9.566	9.446	9.677	9.614	9.659	9.654	9.583	9.475	9.695	9.609	9.691	9.685	9.620	9.508	9.727	9.657	9.723	9.719
	2008=100	743.103	106.559	101.127	87.606	101.041	103.038	548.295	106.392	107.031	78.646	79.804	81.186	339.883	115.893	111.838	84.422	92.843	94.964
LP _{adjusted}	In	0.282	0.251	0.358	0.261	0.302	0.293	0.302	0.272	0.365	0.275	0.319	0.309	0.323	0.291	0.375	0.320	0.338	0.329
	2008=100	68.531	105.679	91.806	61.888	96.700	99.285	112.289	107.078	101.844	59.532	78.994	80.128	115.079	113.016	105.114	62.793	92.137	93.122
TFP	In	3.622	3.397	3.558	3.621	3.563	3.508	3.626	3.419	3.565	3.668	3.563	3.514	3.637	3.436	3.570	3.687	3.569	3.522
	-																		
Wage	In	9.079	9.045	9.112	9.127	9.145	9.152	9.085	9.053	9.134	9.117	9.152	9.158	9.106	9.074	9.159	9.132	9.173	9.178
	2008=100	123.934	119.643	110.757	115.430	114.719	115.087	126.293	121.107	114.128	115.413	116.656	116.897	131.155	123.906	117.882	118.052	119.744	119.721
Labour Costs Burden	In	-0.305	-0.416	-0.341	-0.256	-0.295	-0.296	-0.329	-0.436	-0.356	-0.261	-0.312	-0.311	-0.349	-0.456	-0.371	-0.314	-0.335	-0.332
	2008=100	245.153	121.243	-7.771	199.722	93.725	125.598	261.024	168.452	193.851	169.064	103.591	118.163	320.002	155.765	226.775	142.738	77.967	85.450
GVA	In	10.778	10.440	11.131	10.840	10.982	10.990	10.803	10.478	11.142	10.829	11.022	11.026	10.857	10.529	11.193	10.868	11.069	11.075
	2008=100	926.720	146.195	130.436	85.545	126.409	131.036	670.101	158.475	143.715	81.569	119.561	124.611	450.950	191.108	161.317	91.476	148.375	155.520
Turnover	In	11.901	11.558	12.341	12.020	12.156	12.192	11.918	11.571	12.355	12.028	12.159	12.196	11.940	11.593	12.365	12.038	12.183	12.219
	2008=100	271.536	323.342	254.344	107.254	849.179	742.977	361.475	294.471	310.257	114.691	716.421	630.607	486.059	318.460	562.527	119.730	800.530	705.098
X Goods	In	10.390	10.501	10.863	10.956	11.498	11.163	10.356	10.408	10.888	10.078	11.394	11.116	10.317	10.390	10.859	10.012	11.391	11.120
	-																		
X G&S	In	10.595	10.605	10.971	10.734	11.092	11.142	10.612	10.575	11.006	10.403	11.052	11.143	10.551	10.541	10.965	10.275	11.057	11.121
	-																		
Export Intensity	In	-2.326	-2.366	-2.205	-2.181	-2.295	-2.367	-2.367	-2.411	-2.234	-2.463	-2.357	-2.370	-2.484	-2.475	-2.357	-2.592	-2.420	-2.431
	-																		
M Goods	In	10.008	10.019	10.465	9.930		10.591	10.014	10.016	10.487	9.651		10.646	9.997	10.089	10.473	9.430	10.891	10.734
	-																		
M G&S	In	9.824	9.727	10.217	9.666	10.457	10.431	9.821	9.740	10.220	9.251	10.462	10.394	9.814	9.795	10.253	9.154	10.524	10.434
	-																		
Trade Balance (G&S)	In	10.681	10.750	11.123	10.633	11.049	11.119	10.707	10.729	11.125	10.275	11.045	11.158	10.681	10.699	11.094	10.269	11.075	11.148
	-																		
Capital	In	10.083	9.892	10.139	9.922	10.060	10.032	10.108	9.891	10.194	9.837	10.074	10.041	10.161	9.958	10.254	9.834	10.150	10.112
	-																		
K/L	In	8.874	8.838	8.671	8.651	8.685	8.657	8.883	8.822	8.715	8.574	8.687	8.653	8.818	8.866	8.757	8.586	8.737	8.697
	-																		
GFCF	In	8.670	8.597	8.938	8.643	8.919	8.845	8.825	8.680	9.011	8.628	8.992	8.937	8.920	8.808	9.111	8.706	9.115	9.061
	2008=100	726.589	242.157	1 013.131	-585.189	106.798	167.086	596.797	320.146	732.874	-432.201	112.184	176.791	701.212	399.801	855.906	-332.763	93.209	174.835
EBITDA	In	9.818	9.591	10.089	9.752	9.943	9.931	9.883	9.659	10.170	9.681	10.033	10.018	9.938	9.714	10.229	9.708	10.087	10.074
	-																		
Financial Soundness	In	-3.036	-2.958	-3.053	-3.031	-2.961	-2.966	-2.915	-2.864	-2.914	-2.928	-2.869	-2.865	-2.873	-2.818	-2.851	-2.865	-2.826	-2.818
	2008=100	-42.966	92.313	-159.491	18.062	1 090.243	691.303	47.542	-11.134	-100.098	31.253	741.326	460.465	-217.585	-287.254	-633.213	-2 188.406	-170.578	-439.289
Leverage	In	-0.474	-0.507	-0.661	-0.699	-0.726	-0.719	-0.506	-0.521	-0.702	-0.717	-0.732	-0.722	-0.529	-0.536	-0.738	-0.756	-0.747	-0.737
	2008=100	162.145	165.741	151.462	141.535	149.756	150.226	169.450	211.332	149.346	158.576	198.590	201.483	1 257.755	283.633	497.931	335.079	282.051	287.514
Collateral	In	-2.143	-2.106	-2.365	-2.279	-2.326	-2.318	-2.155	-2.140	-2.356	-2.366	-2.333	-2.334	-2.144	-2.126	-2.342	-2.382	-2.306	-2.313
	-																		
Financial Autonomy	In	-1.206	-1.149	-1.068	-1.059	-1.041	-1.039	-1.140	-1.087	-1.021	-1.027	-0.992	-0.990	-1.079	-1.037	-0.971	-0.978	-0.946	-0.945
	2008=100	-2 788.993	24.188	-7 445.158	-7.179	129.268	94.566	-2 788.109	-92.146	-7 474.078	-287.039	-157.896	-192.568	-1 208.789	4 646.596	-8 457.705	-2 488.803	-749.443	-829.285

Source: Own calculations based on micro-level data from both International Survey and SCIE - Statistics Portugal.

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