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Offshoring to high and low income countries and the labour demand. Evidence from Italian firms.

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Abstract

Making use of an original data set on a panel of Italian manufacturing firms we investigate the effects of imports of intermediates from high and low income countries on the demand for labour. We estimate a dynamic panel data model by means of System GMM allowing for the endogeneity of our right hand side regressors, especially our offshoring measures. Our results bear a negative offshoring effect on the firm conditional labour demand which is attributable exclusively to imports of intermediates from low income trading partners and mainly concerns firms operating in traditional sectors. No statistically significant effect is estimated for imports from high income countries. These findings are robust to the different measures of offshoring and to the inclusion of further controls.

JEL:_F14, F16, J23, L23_
Keywords: _Offshoring, Employment, dynamic panel data model_

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1 Introduction

The current economic downturn is giving new momentum to the policy debate on the future of manufacturing workers in advanced economies. Political worries have especially regarded the role of competition from low income countries which may turn into severe domestic job losses. Also, the sharp increase in the skill premium of educated workers in the U.S.A. has stimulated a lively academic debate on the relative weight of trade - namely offshoring in the form of imports of intermediates - and technological change on the relative demand for skilled workers. However, while the main idea is that both forces can involve a permanent shift of production technology in favour of the skilled, the IMF (IMF, 2007) shows a worrying picture: over the past two decades the labour share has declined especially in Europe and Japan and especially in unskilled sectors. Possibly, for an advanced economy the permanent shift of technology not only involves the relative position of skilled versus unskilled workers, but more generally concerns a permanent substitution of labour in favour of labour saving technologies and imported intermediates. This flavour of structural change regarding the advanced economies is also mirrored in the growing weight of the service sector in value added, employment and trade.

While there is more consensus on the role of technological advancements on the labour market, the most debated issue in literature has been the potential effect of offshoring on the skill composition of employment and on the wage differential between skilled and unskilled workers. Empirical studies, usually exploiting sectoral datasets, confirm an increase of the skill ratio following the firms' delocalisation process and, especially in anglo-saxon labour markets, also some effects on the increase of the wage differential. On the other hand, the overall employment effect of offshoring has received relatively less attention even though manufacturing sectors in advanced economies have been experiencing sharp reductions in employment levels. For Italy, in particular, the recent closure of the FIAT plant located in Sicily on behalf of production in foreign labour cost locations and the FIAT CEO's decision to keep the Panda production in the Campania plant only after the plant workers had renounced to some of their former contractual rights represent two major events. These are two cases related to one of the largest Italian firm which however are the symbol of the tensions existing between deepening international integration and the preservation of employment levels in advanced countries.

With this research, we then intend to add to the existing evidence on the offshoring consequences on the labour market in several directions.

Firstly, we mean to address the impact on the labour demand, at firm level. Most of the existing evidence on the issue has rather focused on the relative demand for the skilled workers and is mainly based on sector-level analysis. In particular, for the Italian case, Bertoli (2008) finds a negative effect of offshoring on the conditional labour demand which turns non-significant on the unconditional labour demand, while Falzoni and Tajoli (2010) find no effect at all. In this framework, a firm level perspective on the labour demand can shed more light on the issue: if the demand for labour ultimately comes from firms, it is fundamental to highlight how production techniques adjust to the increasing availability of cheap intermediates from low labour cost countries. In this respect, a firm-level analysis could properly answer the question on the role of labour in nowadays manufacturing production which could be not addressed in detail by aggregate studies.

Secondly, our offshoring measures are split according to the origin country of foreign inputs. This represents an important advantage of our contribution. Previous studies often do not take into account the existence of a heterogeneity of effects according to the partner country, but this is potentially misleading because the reasons behind the foreign input flows may differ across partner countries and also the effects on the offshoring firm's performance could differ (Harrison and McMillan, 2007). In this respect, micro level data allows us to examine the geographical origin of inputs while traditional sectoral indicators of offshoring from National IO Tables don't split foreign intermediate sourcing according to the origin country. Some sectoral studies deal with the foreign input origin combining IO Tables with national trade data, but this could not be a good proxy: it assumes that the breakdown by origin country of intermediate imports j is the same across all of the input purchasing sector (for example Falk and Wolfmayr, 2005; Geishecker, 2006; Cadarso et al., 2008; Ekholm and Hakkala, 2008).

Finally, we also investigate the existence of heterogeneous offshoring effects between traditional and non traditional sectors. The general belief is that employment in advanced countries may be negatively affected by imports of intermediates from low labour cost countries. However, it could be the case that this process does not involve all the sectors equally. In particular, for firms performing more traditional activities imports from low income/low technology countries might actually represent a viable opportunity to restructure their own production processes. On the contrary, these imports could not be suitable for firms performing more complex tasks.

As expected, our results show that the negative effect from offshoring on employment is attributable exclusively to imports of intermediates from low income partners. On the other hand, imports from high income partners do not affect employment at all. These results are confirmed by a set of robustness checks and convey some interesting implications. First of all, labour turns out to be less and less central in manufacturing production techniques. From this, in our opinion, the effort put by some advanced countries in fostering innovation and R&D activities goes in the right direction of fostering immaterial more than material production. In particular, the negative employment effect in traditional sectors is of particular interest for the target country of our analysis. These sectors have traditionally represented an important share of the Italian manufacturing output, employment and exports, but recent technological advances and, as supported by our results, the international re-organisation of production has led to their reduced domestic labour absorptive capacity. This calls for the immediate attention of policy makers who should tailor some policies to ease the transition of labour from these sectors towards other activities. The work has been structured as follows. Section 2 surveys the relevant literature on the topic, after presenting the data and some descriptive statistics on offshoring and employment in section 3, Section 4 discusses the empirical model and some estimation issues, section 5 shows the main results and the robustness checks and, Section 6 concludes the work.

2 Review of the related literature

Offshoring involves an international division of labour that may drive important effects on the domestic labour market and also on productivity and sector/firm performance. Motivated also by the heated debate in the public opinion, different theoretical contributions (to cite only a few, Feenstra and Hanson, 1996a, Deardorff, 2002, Kohler, 2004 and Grossman and, indirectly, Rossi-Hansberg, 2006) and the empirical literature have focused on the impact of offshoring on the skill composition of employment and on the wage gap between workers with different skills (Feenstra and Hanson, 1996 and 1999; Falk and Koebel, 2002; Egger and Egger, 2003 and 2005; Strauss-Kahn, 2004; Cadarso et al., 2008; Hijzen et al., 2005; Hijzen, 2007; Ekholm and Hakkala, 2008; Geishecker and Gorg 2008). Even if conclusions are not clear a review of the literature seems to suggest a small negative impact on unskilled ratio and wages of low-skilled workers [1].

However, part of the literature also has dealt with the consequences for the total employment level in manufacturing. Amiti and Wei (2005 and 2006) especially show no impact from service offshoring even if they convey a positive effect of material offshoring on employment in the U.S.A. at the sector level. The OECD study on offshoring and employment (2007) shows

[1] Part of the literature has focused instead on the job separation risk (Munch, 2005; Geishecker, 2008; Egger et al. 2007).

that offshoring reduces the conditional and unconditional demand for labour in OECD countries. On the same set of countries, Hijzen and Swaim (2007) analyse both technology and scale effects of offshoring using industry-level data and, according to their results, narrow offshoring - imports of material inputs from the same sector abroad - reduces the labour-intensity of production, but has no significant impact on the overall employment. Focusing instead on the broad indicator of offshoring - imports of material inputs from all the manufacturing sectors abroad- they show no changes in the labour-intensity and positive effects on overall employment. These papers, however, do not distinguish across the origin of the imported inputs. The literature, instead, has usually given great importance to the relocation of parts of the production process from high to low labour cost countries. As we will show in our analysis, most of the input imports to high-income countries comes from other advanced countries and it is likely that these inputs have different technological content and quality level compared to inputs from developing countries. For this reason they might convey different effects on the importing country[2]. In fact, when papers focus on the origin countries they usually find a significant effect only for offshoring to low income economies. Falk and Wolfmayr (2005) highlight the offshoring role for a group of seven EU countries in the period 1995-2000. Focusing on a narrow offshoring indicator from low-wage countries they find a reduction of 0.25 percentage points in sectoral employment per year driven by offshoring, and show that this negative impact is significant only for low skill intensive industries. Cadarso et al (2008) for Spain, estimating a dynamic labour demand, also display heterogeneous effects according to the technological level of sectors and the origin countries, but their results are slightly different: a significant and negative impact is disclosed only when narrow offshoring concerns medium and high-tech industries and inputs come from Central and Eastern European countries. No significant effect is found for low-tech industries and other origin economies. Anyway they don't deal with the endogeneity of offshoring. These two latter papers infer the share of input coming from different origins, merging the use matrix of IO Tables with national trade data[3]. However, we have argued above that this could prove a poor proxy for offshoring by origin of input imports and we believe that, in order to examine the importance of the ori-

[2]Focusing on the effect of overall trade on the conditional sector labour demand in the UK, Greenaway et al. find that the origin of imports matters.

[3]Also, for the demand of different skill groups, Geishecker (2006) shows a negative effect of international (broad) outsourcing to Central Eastern Europe and no role for input imports from EU15. Ekholm and Hakkala (2008), for Sweden, confirm no significance for offshoring to high-income countries and a reduction of the less educated workers driven by imports from low-wage economies.

gin countries, it is fundamental to use micro data with detailed firm-level information on offshoring practices by partner countries. As an example, in a partially similar framework Harrison and McMillan (2007) study the offshoring practices of U.S.A. multinationals and find that employment in low income countries affiliates substitutes for employment at home while employment in high income affiliates is complementary with U.S. employment. They interpret their results as the location of foreign affiliates determining the employment effects of offshoring. Despite the recent availability of micro level data, which allow for individual heterogeneity and help to capture the offshoring implications for micro units that may be hidden in the aggregate dynamics, very few studies concern the role of offshoring for the firm labour demand, none of them uses a firm-level offshoring intensity and none of them has allowed for heterogeneous effects according to the origin country. Görg and Hanley (2005) study a dynamic labour demand on a plant level database for the Irish Electronics sector. They find a reduction of the total employment level in the short-run and the effect of material offshoring is stronger than the one of service offshoring. Even if their analysis concerns the firm performance their firm-level offshoring measure is not split by destination. Moser et al. (2009), applying a difference-in-difference analysis for a matched sample, find an increase of employment level caused by offshoring in German manufacturing firms. This paper, as the OECD study and the paper by Hijzen and Swaim, presents a more comprehensive framework, trying to capture also scale effects that work through productivity gains[4] and competitiveness improvements.

Turning to the evidence on the Italian case, the studies on the labour market effects of offshoring are mainly at sectoral level and especially focus on the skilled/low skilled relative demand (Helg and Tajoli, 2004; Antonioli and Antonietti, 2007; Falzoni and Tajoli, 2009; Broccolini et al., 2010). For manufacturing employment, Falzoni and Tajoli (2009) show no significant reduction following the increase in offshoring. Bertoli (2008), instead, shows a negative and significant effect of material offshoring on the conditional labour demand, but this effect turns to be non significant when he allows for scale effects in the unconditional demand. In addition, in order to investigate the intra-sectoral effects of offshoring, he also builds a measure of offshoring of downstream sectors. The idea behind this analysis is that offshoring may affect employment because it can disrupt the domestic sub-contracting rela-

[4] In the last few years the issue of the offshoring impact on productivity is receiving great attention (for a review see Olsen, 2006). Firm level evidence suggests efficiency gains from offshoring, see for example Görg et al (2008) and Hijzen, Inui and Todo (2007). For Italy sector-level studies show a positive effect for offshoring of materials and, in some cases, negative for offshoring of services (Lo Turco, 2007; Daveri and Jona-lasinio, 2008).

tionships. A similar aim is followed in Costa and Ferri (2008) who present a firm-level study focusing both on direct effects of offshoring and on effects for subcontracting firms, comparing offshoring firms to non offshoring firms via propensity score matching. Both works find similar results: offshoring of the downstream sectors (or firm clusters in Costa and Ferri) lower employment of the subcontracting sectors (or firm clusters)[5]. In front of this limited firm level evidence, both for Italy and other advanced countries, our work means to provide some new insights on the topic.
First of all, our panel of firms covers a great part of the Italian manufacturing output and employment containing a direct measure of the offshoring intensity for each firm, more importantly our data allows us to distinguish the input origin countries between high and low income countries. In line with some of the previous works, we estimate a dynamic labour demand model at firm level where offshoring is modeled as a technology shock affecting the production technique and the demand for inputs. Differently from matching methods, where the offshoring status only is evaluated, our empirical approach focuses on the employment effect of the intensity of imported material inputs in production. Finally, we will show in our results that the distinction of import origin drives heterogeneous effects on the demand for labour. Also heterogeneous effects are investigated and found across sectors.

3 The Data

The main data source for this work is a panel of Italian limited companies covering a 5-year period from 2000 to 2004. It is a balanced panel gathered by the National Statistical Institute (Istat) for a descriptive analysis on offshoring practices by Italian firms published in the Istat Annual Report for 2006. The data is obtained as a merge between custom and balance sheet data. We consider our sample as quite representative of the whole manufacturing sector since it represents about 40% of total manufacturing employment and output and reproduces the sectoral distribution of employment[6]. The data set provides detailed information for 40479 firms[7] on output and inputs,

[5]Previous papers, Barba-Navaretti and Castellani (2004) and Castellani et al. (2009), deal with the employment consequences of FDI, but do not take into account the process of international outsourcing.

[6]See the Appendix for the details.

[7]The original number of firms was slightly higher, however, as standard we cleaned the sample removing firms in NACE sectors 16 and 23 and firms with some anomalous (zero or negative) or missing values for the main variables (output, materials, value added or capital). We also delete firms which are considered as outliers for at least one year in the sample period, we consider as outliers observations from the bottom and top 0.5 percent

labour costs, tangible and intangible fixed assets, exports, control participation, offshoring (imports of intermediates) and the firm activity sector at 3-digit NACE. Then, the firm capital stock is proxied by the tangible fixed assets and deflated with the capital price index (always retrieved from the Italian National Accounts) while the firm unit wage and output have been deflated using the 3-digit producer price index (Istat). The real variables all assume 2000 as base year.

Offshoring Measures and Practices - As in the literature (Feenstra and Hanson, 1996 and 1999), researchers at Istat have labeled as offshoring the firm import flows of non-energy material intermediates from all sectors and the imports of finished goods from the firm's sector. These latter flows are also part of the international fragmentation of production and it is important to take them into account: when firms decide to move some parts of their production process abroad they could decide to move the final stages too. This phenomenon is not captured by the sectoral indicators constructed with IO Tables that only record intermediate flows. Also, the offshoring indicators have been split according to the development stage of partner countries (developed and non-developed economies)[8]. The available measure of offshoring includes both international outsourcing, the firm purchases of inputs from independent foreign suppliers, and inhouse-offshoring, the relocation abroad of parts of production process that gives rise to good flows from foreign affiliates, so we are not able to distinguish between these two phenomena. Offshoring has mainly been defined as imported inputs on total non-energy intermediates (Feenstra and Hanson, 1996; Amiti and Wei, 2005 and 2006) or on output (see for example: Falk and Wolfmayr, 2005; Geishecker, 2008; Geishecker and Görg, 2005 and 2008; Ekholm and Hakkala, 2008; Egger and Egger, 2003; and Strauss-Kahn, 2004; Cadarso et al., 2008). Horgos (2009) argues that the index on the total intermediates slightly underestimates international outsourcing, instead, the best performance is verified for the output normalization.

Although both indicators are able to capture the substitution between domestic and imported material inputs, offshoring over total sales has the further advantage to better capture the ease of substitution between those activities previously performed within the boundaries of the firm and then outsourced abroad. In the latter case, the indicator over the total intermediate purchases may not fully catch the phenomenon since imports appear

of distribution of some main ratio (value added on labour and capital on labour).

[8]The classification between high and low income countries has been performed by the Italian National Statistical Office.

both at the numerator and the denominator of the formula. Thus, we calculate the offshoring intensity both as the total material imports on the firm total purchases and as the total material imports on the firm total sales and we use both measures alternatively in our estimates. In the Tables in this section, however, we will stick to the traditional measure of imported inputs on total non-energy intermediates for brevity, however the main insights do not change with the alternative indicator on production.

Turning to the firm-level evidence on offshoring practices in Italian manufacturing, Table 1 in the Appendix shows that about 37% of our 40479 firms shows a non zero value of offshoring. Over the sample period the number of offshorers has grown of about 600 units. The average percentage of offshorers importing from low income countries is about 55% in 2000 and becomes 64% in 2004. Across sectors, the percentage of offshorers to low income countries is quite high in the traditional sectors, nevertheless between 2000 and 2004 the share of importers of intermediates from the same origins increases across all of the activities of about 8 percentage points. Furthermore, the number of offshorers to low income countries especially grows in more advanced productions. The number of offshorers to high income countries represents the bulk of the offshorers within each two digit sector, however their share declines across all the economic activities implying a decline of about 3 percentage points on average between 2000 and 2004. The decline is sharper for more traditional activities. Only a smaller fraction of offshorers within each sector imports intermediates both from high and low income countries and these firms modestly grow in number between 2000 and 2004. Summing up the firms'involvement with low income countries as a source for imports of intermediates is a growing phenomenon which goes hand in hand with a reduced involvement with high-income exporters. This feature could be attributable to the fact that suppliers in high income countries might have, in turn, relocated their production abroad and might supply customers in other advanced countries from these new low labour cost locations.

Finally, Table 2 shows that the average share of imports of intermediates is about 7%, most of which is represented by offshoring to high income countries, OFF_{High}. This average share more than doubles when considering only offshoring firms and it is particularly high in Traditional sectors when offshoring to low income countries, OFF_{Low}, is considered.

Also, Table 3 shows the t-tests for the difference in means of labour, l, and labour growth, Δl, between non-offshorers and offshorers to low and high income countries. Offshorers are in general larger than non-offshorers, their employment growth is lower even if the difference is not always statistically significant especially when offshoring to low income countries is taken into account.

Table 1: Sample Composition and Offshoring Practices

	Number of:				Offshorers to (%):					
	Firms		Offshorers		Low Income Countries		High Income Countries		Low and High Income Countries	
NACE	2000	2004	2000	2004	2000	2004	2000	2004	2000	2004
15	2595	2596	831	870	39.95	48.51	88.93	88.28	28.88	36.78
17	2545	2583	1353	1355	69.55	78.15	81.15	76.97	50.70	55.13
18	1699	1629	727	791	78.95	87.61	70.56	61.19	49.52	48.80
19	1666	1688	810	833	83.83	87.88	61.11	56.42	44.94	44.30
20	1291	1247	586	592	69.11	68.75	76.79	76.35	45.90	45.10
21	845	861	354	360	53.11	60.28	93.22	90.83	46.33	51.11
22	2226	2211	366	361	23.77	33.24	93.44	91.41	17.21	24.65
24	1366	1371	902	908	53.66	62.78	93.79	92.51	47.45	55.29
25	2404	2383	1064	1088	46.15	54.78	87.97	85.39	34.12	40.17
26	2334	2324	524	573	59.35	63.18	78.24	77.49	37.60	40.66
27	940	907	431	450	58.93	69.33	85.15	83.56	44.08	52.89
28	7351	7531	1517	1627	44.17	53.10	83.92	81.68	28.08	34.79
29	5967	5822	2689	2778	54.93	64.00	85.98	82.54	40.91	46.54
30	151	144	67	72	56.72	56.94	100.00	93.06	56.72	50.00
31	1854	1854	714	798	56.02	66.04	86.83	83.58	42.86	49.62
32	494	515	251	287	54.18	70.03	94.02	88.85	48.21	58.89
33	1092	1096	601	630	48.92	60.00	95.01	89.52	43.93	49.52
34	471	471	243	258	53.50	68.99	88.07	87.98	41.56	56.98
35	416	405	160	164	50.63	62.80	87.50	87.20	38.13	50.00
36	2772	2841	1024	1100	54.59	63.36	83.01	77.00	37.60	40.36
Total	40479	40479	15214	15895	55.50	63.99	85.74	82.59	41.24	46.58

Source: Our elaborations on the Firm-level database from ISTAT Annual Report, 2006

Table 2: Average share of offshoring

Sectors	OFF	OFF_{Low}	OFF_{High}
Across All Firms			
All	0.07	0.02	0.05
Traditional	0.09	0.04	0.05
Non-Traditional	0.06	0.01	0.05
Across Offshorers only			
All	0.191	0.104	0.158
Traditional	0.217	0.144	0.159
Non-Traditional	0.170	0.067	0.156

Table 3: Differences in employment levels and growth between offshorers and non-offshorers

	OFF_{Low}		OFF_{High}	
NACE	l	Δl	l	Δl
	Non-Offshorers vs. $Offshorers_{Low}$		*Non-Offshorers* vs. $Offshorers_{High}$	
15	-54.00	-1.96	-69.46	-2.06
17	-43.41	-3.15	-52.85	-3.49
18	-28.61	-1.13	-36.21	-2.47
19	-40.87	-0.77	-49.22	-1.72
20	-36.38	-0.16	-38.86	0.84
21	-42.22	-1.54	-45.46	-1.88
22	-37.88	-1.82	-53.31	-2.65
24	-53.15	-0.53	-50.56	-0.22
25	-60.96	-0.17	-70.86	-2.46
26	-48.51	1.34	-57.12	0.24
27	-33.57	-2.02	-37.29	-3.54
28	-85.02	-0.45	-100.80	-1.03
29	-105.61	-0.44	-106.36	-1.86
30	-17.12	-0.60	-16.55	-0.41
31	-55.50	-1.32	-55.32	-2.16
32	-25.58	-0.45	-25.15	0.08
33	-42.25	-1.60	-36.70	-2.07
34	-33.06	0.41	-34.07	-0.32
35	-19.57	0.52	-22.14	-0.23
36	-46.21	0.89	-56.49	-0.52

Before moving to the estimation of the empirical model, we want to preliminary assess whether splitting the offshoring measure by origin actually gives some new insights at the sector level. Then, we aggregated our firm-level information on imports of intermediates at the sector level and comparing the total offshoring indicator from the National Input-Output Tables with our measure from the firm level dataset[9], the two indicators present a correlation of more than 71% (significant at 1%), and, as expected, it seems that the indicator from IO National Table especially captures the purchases from high income countries, in fact the correlation between this latter and the offshoring share to high income countries from our sample is 74.95%, while the correlation with the offshoring share to non developed economies is only 12.8%. This depends on the larger input flows originating from developed countries, even if intermediate imports from low-wage countries have substantially grown in recent years[10]. Now, we compare in Table 4 the 2-digit NACE sector evolution of employment and offshoring from National Input-Output Tables and National Accounts (columns 2 to 4) to the evolution of the offshoring to Low and High income countries obtained through the aggregation our firm level imports (columns 5 to 8).

Comparing the sector level indicators in the first half of the Table, there is no clear time evolution for offshoring in all sectors and no particular relationship can be observed between the two variables. A negative relation can be detected for some traditional sectors NACE 17 (*Textiles and textile products*) and 18 (*Wearing apparel, dressing and dyeing of fur*), but also for more advanced industries (NACE 24 *Chemicals* and 33 *Medical, precision and optical instruments*). In all these sectors (with the exception of sector 26 *Non-metallic mineral products* and 35 *Transport equipment*), an increase of offshoring happens in conjunction with a decrease in employment. In opposite, the great part of sectors presents an increase (for example the sectors NACE 15 *Food products, beverages and tobacco*) or a decrease (NACE 32 *Radio, television and communication equipment*) in both variables. From this descriptive evidence at sector level we cannot detect any clear pattern on the relation between the two phenomena.

[9]These two indicators are not exactly comparable because the firm based indicator also includes the purchases of the finished goods and it doesn't cover the whole firm population. Anyway we believe that it can give an idea about the importance of the different origin countries.

[10]Although the reason usually advanced to explain international outsourcing is the lower labour cost for unskilled work, previous studies show that offshoring from high-income countries represents the great part of foreign sourcing (Geishecker, 2006). Falk and Wolfmayr (2005) argue that for seven EU advanced members outsourcing to industrialised countries is dominant and cover 80% of their imported materials.

Table 4: Sectoral Offshoring and Employment Evolution

	Sectoral Indicators			**Sectoral Offshoring from Firm-Level Data**			
	Offshoring from IO Tables		Employment	to Low Income		to High Income	
NACE	2000	Δ%2000/2004	Δ%2000/2004	2004	Δ%2000/2004	2004	Δ%2000/2004
15 [a]	0.096	1	5.6	0.028	47.37	0.14	0.72
17	0.227	2.6	-15.9	0.134	41.05	0.152	-5
18	0.186	1.7	-11	0.364	36.33	0.085	-5.56
19	0.214	-0.3	-12.6	0.275	26.15	0.065	3.17
20	0.153	0.7	0.1	0.134	7.2	0.194	-3.96
21	0.302	-4.2	-0.5	0.064	-4.48	0.254	-2.31
22	0.159	-1.3	-5.8	0.008	100	0.192	7.87
24	0.437	3.3	-3.1	0.035	-2.78	0.534	7.23
25	0.318	-1.6	-1.3	0.04	33.33	0.2	-21.26
26	0.113	-1.6	2.3	0.024	71.43	0.063	6.78
27	0.336	4.4	-2.8	0.168	11.26	0.187	-5.08
28	0.182	2.8	3.5	0.042	50	0.108	-5.26
29	0.158	0.2	-1.8	0.037	60.87	0.111	-3.48
30	0.651	-12.6	-11	0.04	42.86	0.364	58.26
31	0.234	-3.8	-12.6	0.063	80	0.158	-4.82
32	0.527	-6.9	-13.1	0.056	27.27	0.388	-25.1
33	0.339	2.5	-0.3	0.068	78.95	0.225	-2.6
34	0.28	-3.1	-6.2	0.037	54.17	0.201	-15.9
35	0.299	-2	4.6	0.047	-37.33	0.294	23.01
36	0.217	0	3.7	0.039	34.48	0.056	-15.15

Source: National IO Tables, National Accounts and Firm Economic Accounts (Istat). The growth rates concern the 5-year period 2000/2004. [a] This is the sum of NACE 15 and 16 (sub-section DA), because in the Firm Economic Accounts (Istat) NACE sector 15 is missing.

As mentioned above, these unenlightening findings may be due to the high aggregation of the sectoral data the fact that the imported input origins are not recorded in the IO Tables. So, the sectoral offshoring measures to high and low income countries reconstructed from our firm-level sample in the last four columns of Table 4 show that, in every sector, with the exception of NACE 18 (*Manufacture of wearing apparel, dressing and dyeing of fur*) and NACE 19 (*Manufacture of leather and leather products*), the amount of foreign materials from advanced countries is higher than total inputs from low-wage ones, thus confirming the firm-level evidence above. However, role of foreign sourcing from less developed countries has increased dramatically in our sample period. In opposite the offshoring share to industrial economies results to be quite constant across sample time with some exception (sectors NACE 25, 30, 32 and 35). It is worth to notice that, once the offshoring measure is split by origin, for most of the sectors, an increase in offshoring to low income countries goes with a reduction in employment while it is less so for the relation between offshoring to high income countries and sectoral employment. To summarize this evidence we have calculated the correlation between the growth of two offshoring measures and employment growth and it turned out to be about -.20 for the first case and -.02 for the second one.

4 Modeling the effects of offshoring

The Model - We may assume different forms for the labour demand function according to the hypothesis we make for the technology, that is the form of the production function, the adjustment costs, the structure of product and factor markets, and the behaviour of the firm (Bond and Van Reenen, 2007). Transposing the usual skilled/unskilled labour analytical framework to the capital/labour dichotomy, offshoring is modeled as to affect the relative demand for labour exactly in the same way labour saving technological change does. Thus, following the suggestions from the theory and previous empirical work (Feenstra and Hanson, 1996, 1999; Feenstra, 2004), firm productivity, A, is a function of offshoring, OFF:

$$A_{ijt} = B_j e^{\delta OFF_{ijt} + \tau_t} \tag{1}$$

with B_j representing an industry specific scale factor and τ_t representing common yearly macro shocks affecting the level of A. Assuming a production technology with n factor inputs, we follow Hamermesh (1993)[11] and derive

[11]See page 30.

the log linear conditional demand for labour from a multi-factor CES cost function as follows

$$l_{ijt} = -\sigma w_{ijt} + y_{ijt} + \sigma a_{ijt}(OFF) \quad (2)$$

l is the log of the number of workers in firm i, industry j at time t, w measures the log of the average wage paid by the firm, y measures the log of the firm's real output as and $\sigma = \frac{1}{1-\rho}$ is the elasticity of substitution. Finally, a in equation 2 refers to the log of technical change A. From a preliminary investigation of the data the static specification of the labour demand poorly fits our data, so we preferred a dynamic panel data model in the form of a ARDL(1,1) [12]. This evidence is consistent with the presence of adjustment costs for inputs, especially this is true for employment because of the rigidities of the labour market[13]. Then, generalising the equation 2 with the inclusion of the first lag of the dependent and independent variables and adding an idiosyncratic disturbance term, ϵ_{ijt}, we get the following empirical model to estimate

$$\begin{aligned} l_{ijt} \;=\; & \alpha_0 + \beta_0 l_{ijt-1} + \alpha_1 w_{ijt} + \gamma_1 w_{ijt-1} + \alpha_2 k_{ijt} + \gamma_2 k_{ijt-1} + \\ & \alpha_3 y_{ijt} + \gamma_3 y_{ijt-1} + \delta OFF_{ijt} + \eta_i + \mu_j + \tau_t + \epsilon_{ijt} \end{aligned} \quad (3)$$

where capital, K, is treated as fixed in the short-run. According to the theoretical predictions and previous studies, we expect that offshoring has a negative impact on the firm level conditional demand for labour, especially if foreign inputs are bought from low-income countries. All regressions are run both for the total offshoring share and for the breakdown between offshoring to high and low income countries, OFF_{high} and OFF_{low} respectively. From the dynamic specification we can retrieve two distinct coefficients: in response to a change in a single regressor x, the coefficient on regressors at time t represents a *short-run* parameter and conveys information on the short-run adjustment of labour ; the *long-run* coefficient, instead, gives the equilibrium adjustment and is calculated as a non-linear combination of the estimated parameters obtained from the long run solution:

[12] The presence of a AR(1) in the disturbances led us to test the common factor restrictions which were rejected so we identified a dynamic specification with the inclusion of the regressor and right hand side variables lagged to one period. We have also tried to include only the lag of the dependent variable, and no lag for regressors, but both second order correlation test (AR2) and Hansen test reveal that the model is not well specified.

[13] Labour markets in European countries present high costs related to worker lay-offs and also the recruiting and hiring procedure may take some time.

$$l = \frac{\alpha + \gamma}{1 - \beta_0} x \tag{4}$$

For each specification we will then estimate model 3 as such and from the estimated coefficients we will also retrieve the the long run ones. Descriptive statistics and correlations for the variables used in the empirical model are respectively shown in Table 9 and Table 10 in the Appendix.

Estimation Issues - The introduction of the lag of the dependent variable (l_{it-1}) represents a source of endogeneity for our estimates. In order to solve this problem Arellano and Bond (1991) have proposed to use the General Method of Moments applied to the differenced equation and to use lagged levels of the variables as instruments (GMM-DIFF). Anyway it has been proved that GMM-DIFF is less informative and is characterized by weak instruments if the series has a near unit root behaviour, and if the cross-section variability dominates time variability. Blundell and Bond (1998) deal with the instrument weakness and suggest to combine the difference equation with the equation in levels in a system estimation[14]. Thanks to the availability of a 5-year panel and due to the high persistence of firm employment we apply a GMM-SYS estimation to our dynamic model. In order to verify the goodness of our estimates we report also the results for OLS and FE regressions. We know that in this framework FE leads to a downward biased estimation of the lagged dependent variable, while OLS leads to an upward bias, thus GMM results should lie in this range (Bond, 2002). GMM-SYS also allows us to deal with the problem of the endogeneity in our explanatory variables, especially our variable of interest, offshoring, and interpret our results as causal relationships. This estimator furthermore represents a useful tool to overcome the lack of information on the firm's location in our data: as a matter of fact, allowing for the correlation between the unobserved firm heterogeneity and our right hand side variables the estimator accommodates the unobserved firm location which, due to the short time span of our panel, can be considered, in fact, a firm-specific time invariant feature. In all regressions we use one-step GMM and heteroskedasticity-robust standard errors. Following Blundell and Bond (1998) the second (and deeper) lags of the variables in levels should be used as instruments in the differenced equation. Anyway in our case, the Hansen test of over-identifying restrictions does not fail to strongly reject the validity of lagged levels dated *(*t-2) for the whole

[14]In this case, the lagged levels of variables (second and deeper lags) are always used to instrument the differenced equation, instead lagged differences of variables (first lag) become instruments for the level equation.

sample and the sub-sample of Non-Traditional sectors. This is consistent with the presence of measurement errors as also shown in Bond (2002) and in these cases, instruments dated (t-3) and (t-4) are not rejected and we will use these instruments[15] while we will stick to instruments dated (t-2) and (t-3) for the sub-sample of Traditional sectors.

5 Results

In the following Tables we report the results from the estimates of the empirical model. Each specification includes time and 3-digit sector dummies together with a dummy for control participation. The Tables displaying the GMM estimates are organized as follows: the first half of each Table shows the results when offshoring is measured as total intermediate imports over total purchases and the second half shows the results when offshoring is measured as total intermediate imports over total sales; the upper panel presents the results from the estimations, the lower panel displays the long-run coefficients calculated from formula 4 and the final rows of each Table report the tests for first-order, *AR1*, and second-order, *AR2*, serial correlation in the differenced residuals and the Hansen test of over-identifying restrictions . In all of the specifications we reject the null of no first order serial correlation and we fail to reject the null of no second order serial correlation. Also, the Hansen test supports, in general, the validity of our instruments.

Now, from Table 5 we can notice that the coefficient of the lagged dependent variable always lies in the range between the FE and OLS estimates in Tables 11 and 12 in the Appendix, especially it seems to well capture the high persistence of the firm employment. Thus we are trustful about the goodness of our estimates. Output is positive and significant with a long run elasticity of about 0.9, while wage is significant and negative in the short-run, but not strongly significant in the long run. The short run wage elasticity of labour demand is about -0.6 in line with the reference confidence interval [0.15; 0.75] defined by Hamermesh (1993, p.92) and it is, however similar to values found by previous studies with firm or plant data. The capital stock is not significant either in the short or the long run. Concerning our variable of interest, the total offshoring intensity (columns 1 to 3 and 7 to 9) presents a negative and not significant coefficient in most cases, but it turns to be significant in column 3 where offshoring is measured over total purchases

[15] We have collapsed the instruments, as in Calderon, Chong, and Loayza (2002), Beck and Levine (2004) and Carkovic and Levine (2005), because this allows us to improve the validity of instruments and anyway preserves the information contained in original variables. For more details see Roodman (2009).

and is included at time t and $t-1$. In opposite, when we move to the specifications of columns 4 to 6 and 10 to 12, a negative and significant effect is detected for the firm material imports from low income countries, while a positive and no significant impact is shown for the offshoring to developed countries. Offshoring to high-income countries has no significant effect on the employment level, and this may be due to the fact that this type of input procurement is not related to a relocation abroad of the labour intensive activities in order to exploit the labour cost differentials, while, consistently with the literature, input flows from low wages economies seem to substitute domestic employment. These results hold both for the short run and long run coefficients and when we substitute the lagged intensity of offshoring for offshoring at time t. When we include the offshoring intensity to high and low income countries at time t and $t-1$ the short and long-run coefficients are not significant anymore. The negative sign on the short- and long-run offshoring coefficients is also confirmed from the OLS and FE estimates in Tables 11 and 12 in the Appendix. Here offshoring always bears a negative and significant coefficient regardless of the measure adopted, with the only exception of offshoring to high income countries in FE regressions.

From the previous Table we have learnt that the overall offshoring measure is likely to hide important information on the phenomenon dynamics so in the following Tables we will discard this measure in favour of the split between offshoring to high and low income countries. Table 6 presents some robustness checks: we respectively included the export intensity and the log of the stock of immaterial assets at time t, at time $t-1$, and at t and $t-1$ in the same specification[16]. The inclusion of these variables is meant to capture further firm heterogeneous features that might actually affect the firm labour demand. The export intensity is aimed at controlling for another very important firm international activity. A deeper involvement in export markets might force the firm to reduce the labour intensity of production due to higher competitive requirements. Also, the stock of immaterial assets is meant to proxy for the complexity and technological level of the activities performed within the firms. As a matter of fact we observe in our sample that the largest stock of these activities is recorded for firms in High Tech sectors while the lowest stock is for firms in Traditional sectors. The results mimic the previous ones even if the Hansen test shows low p-values for the regressions including exports. It is worth to notice that the inclusion of these controls improves the significance of the long-run coefficient estimates

[16]Further robustness checks concern the inclusion of sectoral controls, such as the ICT capital intensity, the sectoral material offshoring measure and the sectoral skill ratio. The main insights from Table 6 are unchanged. The results are not shown here for the sake of brevity and are available upon request.

Table 5: Labour Demand: System GMM

	Offshoring over total purchases						**Offshoring over total sales**					
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]
l_{t-1}	0.756***	0.768***	0.744***	0.729***	0.733***	0.724***	0.727***	0.725***	0.716***	0.728***	0.725***	0.723***
	[0.0326]	[0.0308]	[0.0374]	[0.0390]	[0.0386]	[0.0439]	[0.0402]	[0.0410]	[0.0456]	[0.0370]	[0.0379]	[0.0404]
k_t	-0.0509	-0.0491*	-0.0465	-0.0456	-0.0481	-0.046	-0.0516	-0.0511	-0.041	-0.0476	-0.0479	-0.04
	[0.0318]	[0.0294]	[0.0363]	[0.0369]	[0.0368]	[0.0409]	[0.0399]	[0.0405]	[0.0452]	[0.0359]	[0.0370]	[0.0415]
k_{t-1}	0.0511*	0.0492*	0.0488	0.0526	0.0558*	0.0533	0.0566	0.0566	0.0482	0.0528	0.0528	0.0476
	[0.0290]	[0.0273]	[0.0332]	[0.0333]	[0.0334]	[0.0372]	[0.0360]	[0.0366]	[0.0405]	[0.0323]	[0.0333]	[0.0365]
y_t	0.684***	0.675***	0.701***	0.712***	0.721***	0.735***	0.743***	0.747***	0.743***	0.732***	0.735***	0.743***
	[0.0840]	[0.0803]	[0.0952]	[0.0952]	[0.0965]	[0.105]	[0.107]	[0.109]	[0.116]	[0.0944]	[0.0977]	[0.106]
y_{t-1}	-0.450***	-0.449***	-0.466***	-0.468***	-0.478***	-0.489***	-0.496***	-0.500***	-0.493***	-0.491***	-0.491***	-0.502***
	[0.0793]	[0.0759]	[0.0898]	[0.0892]	[0.0906]	[0.101]	[0.0999]	[0.101]	[0.108]	[0.0891]	[0.0921]	[0.102]
w_t	-0.660***	-0.671***	-0.539**	-0.645***	-0.652***	-0.563**	-0.649***	-0.650***	-0.560**	-0.622***	-0.599***	-0.601***
	[0.181]	[0.162]	[0.211]	[0.213]	[0.202]	[0.251]	[0.222]	[0.225]	[0.253]	[0.200]	[0.207]	[0.226]
w_{t-1}	0.412***	0.434***	0.306*	0.441***	0.462***	0.368**	0.413**	0.416**	0.352**	0.396***	0.377**	0.393**
	[0.146]	[0.139]	[0.163]	[0.161]	[0.157]	[0.176]	[0.162]	[0.163]	[0.178]	[0.147]	[0.151]	[0.171]
OFF_t	-0.0664		-0.706**				0.0153		-0.898			
	[0.0529]		[0.295]				[0.117]		[0.891]			
OFF_{t-1}		-0.0469	0.509**					0.0229	0.749			
		[0.0383]	[0.240]					[0.0973]	[0.734]			
$OFF_{Low\ t}$				-0.136**		-0.985				-0.237***		-1.232
				[0.0630]		[1.191]				[0.0889]		[2.103]
$OFF_{Low\ t-1}$					-0.128**	0.778					-0.204***	0.892
					[0.0561]	[1.074]					[0.0782]	[1.872]
$OFF_{High\ t}$				0.125		-0.304				0.515		0.265
				[0.130]		[1.580]				[0.318]		[1.271]
$OFF_{High\ t-1}$					0.0995	0.278					0.361*	0.168
					[0.0777]	[0.984]					[0.195]	[0.811]
Observations	158186	158265	158060	158284	158348	158165	158932	158932	158932	158932	158932	158932
Number of id	39731	39753	39701	39745	39767	39720	39826	39826	39826	39826	39826	39826
	Long Run Coefficients											
K	0.000751	0.0000795	0.00904	0.0259	0.0288	0.0267	0.0183	0.0198	0.0252	0.0193	0.0181	0.0276
	[0.0409]	[0.0408]	[0.0447]	[0.0431]	[0.0435]	[0.0475]	[0.0434]	[0.0440]	[0.0463]	[0.0403]	[0.0411]	[0.0448]
Y	0.957***	0.974***	0.922***	0.902***	0.911***	0.890***	0.902***	0.900***	0.879***	0.886***	0.886***	0.871***
	[0.0762]	[0.0732]	[0.0818]	[0.0793]	[0.0767]	[0.112]	[0.0814]	[0.0826]	[0.0866]	[0.0745]	[0.0757]	[0.0795]
W	-1.015**	-1.018**	-0.910*	-0.75	-0.713	-0.707	-0.866	-0.852	-0.731	-0.831*	-0.805	-0.751
	[0.503]	[0.489]	[0.553]	[0.540]	[0.530]	[0.637]	[0.539]	[0.546]	[0.574]	[0.495]	[0.503]	[0.524]
OFF	-0.272	-0.202	-0.769**				0.0562	0.0833	-0.526			
	[0.223]	[0.169]	[0.319]				[0.428]	[0.353]	[0.693]			
OFF_{Low}				-0.502**	-0.480**	-0.75				-0.874***	-0.743***	-1.229
				[0.222]	[0.199]	[0.463]				[0.320]	[0.281]	[0.906]
OFF_{High}				0.463	0.373	-0.0917				1.897	1.313*	1.565
				[0.459]	[0.277]	[2.206]				[1.162]	[0.700]	[1.910]
AR1	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
AR2	0.98	0.49	0.68	0.35	0.41	0.35	0.29	0.27	0.28	0.53	0.46	0.42
HANSEN	0.05	0.01	0.37	0.70	0.67	0.86	0.78	0.79	0.88	0.91	0.93	0.9

*** $p<0.01$, ** $p<0.05$, * $p<0.1$. All regressions include a full set of three-digit sector, time dummies and a dummy for control participations. Robust standard errors are in brackets. GMM estimates are obtained using the 3^{rd} and 4^{th} lags of the dependent variable and regressors as instruments for the equation in differences and the 2^{nd} lag of the differenced variables for the equation in levels. AR1 and AR2 show the P-value for the tests of the null hypothesis of no first and second order serial correlation in the differences of residuals. Hansen shows the P-value of the test of the validity of the over-identifying restrictions.

Table 6: Labour Demand: System GMM - Firm-Level Controls

	Offshoring over total purchases						Offshoring over total sales					
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]
l_{t-1}	0.753***	0.750***	0.770***	0.749***	0.722***	0.756***	0.749***	0.748***	0.744***	0.737***	0.727***	0.753***
	[0.0318]	[0.0319]	[0.0573]	[0.0351]	[0.0422]	[0.0411]	[0.0304]	[0.0309]	[0.0370]	[0.0371]	[0.0386]	[0.0390]
k_t	-0.0328	-0.0327	-0.0396	-0.0269	-0.0303	-0.0338	-0.0301	-0.0346	-0.0299	-0.0279	-0.0231	-0.0306
	[0.0322]	[0.0316]	[0.0517]	[0.0313]	[0.0396]	[0.0372]	[0.0316]	[0.0312]	[0.0373]	[0.0335]	[0.0360]	[0.0371]
k_{t-1}	0.0338	0.0357	0.0357	0.0256	0.0389	0.026	0.0331	0.0364	0.0323	0.0293	0.0292	0.0242
	[0.0288]	[0.0289]	[0.0462]	[0.0290]	[0.0374]	[0.0354]	[0.0283]	[0.0283]	[0.0334]	[0.0309]	[0.0336]	[0.0351]
y_t	0.612***	0.613***	0.576***	0.617***	0.740***	0.531***	0.617***	0.625***	0.613***	0.655***	0.708***	0.557***
	[0.0791]	[0.0751]	[0.127]	[0.0903]	[0.113]	[0.119]	[0.0790]	[0.0748]	[0.0947]	[0.0981]	[0.102]	[0.115]
y_{t-1}	-0.380***	-0.384***	-0.327***	-0.387***	-0.485***	-0.308***	-0.387***	-0.396***	-0.378***	-0.416***	-0.461***	-0.334***
	[0.0750]	[0.0716]	[0.124]	[0.0751]	[0.0974]	[0.0965]	[0.0749]	[0.0716]	[0.0945]	[0.0818]	[0.0893]	[0.0941]
w_t	-0.610***	-0.613***	-0.756**	-0.479***	-0.661***	-0.577***	-0.582***	-0.585***	-0.537**	-0.508***	-0.612***	-0.563***
	[0.183]	[0.169]	[0.368]	[0.170]	[0.210]	[0.205]	[0.175]	[0.170]	[0.232]	[0.185]	[0.201]	[0.205]
w_{t-1}	0.313**	0.340***	0.307	0.205	0.436**	0.164	0.303**	0.306**	0.27	0.24	0.370**	0.175
	[0.130]	[0.127]	[0.232]	[0.146]	[0.180]	[0.181]	[0.127]	[0.127]	[0.171]	[0.157]	[0.168]	[0.179]
$OFF_{Low\ t}$	-0.0854		1.609	-0.106**		0.0004	-0.244**		-0.0388	-0.255***		-0.521
	[0.0624]		[2.508]	[0.053]		[0.880]	[0.105]		[1.794]	[0.0864]		[0.856]
$OFF_{Low\ t-1}$		-0.0948*	-1.531		-0.112**	-0.061		-0.191**	-0.144		-0.247***	0.239
		[0.0514]	[2.239]		[0.057]	[0.782]		[0.0927]	[1.579]		[0.0813]	[0.750]
$OFF_{High\ t}$	0.0469		-3.368	0.076		-0.151	0.354		-1.562	0.387		0.122
	[0.116]		[2.554]	[0.095]		[0.802]	[0.306]		[2.190]	[0.265]		[0.854]
$OFF_{High\ t-1}$		0.0881	2.097		0.089	0.149		0.286	1.261		0.303*	0.104
		[0.0674]	[1.567]		[0.077]	[0.535]		[0.185]	[1.413]		[0.183]	[0.586]
Exp_t	-0.100*		0.334				-0.0965		0.129			
	[0.0586]		[0.534]				[0.0597]		[0.342]			
Exp_{t-1}		-0.0726	-0.325					-0.0752	-0.17			
		[0.0590]	[0.468]					[0.0595]	[0.308]			
$Imm.Assets_t$				0.000448		0.0257**				-0.00115		0.0216**
				[0.00444]		[0.0118]				[0.00485]		[0.0109]
$Imm.Assets_{t-1}$					-0.00467	-0.0215**					-0.00336	-0.0186**
					[0.00558]	[0.00843]					[0.00505]	[0.00800]
Observations	157449	157514	157066	139299	140452	135542	157873	157902	157570	139895	140985	136227
Number of id	39648	39676	39580	37271	37399	36699	39706	39716	39648	37354	37459	36804
	Long Run Coefficients											
K	0.00408	0.0122	-0.017	-0.00505	0.0309	-0.032	0.0117	0.00722	0.00954	0.00552	0.0225	-0.0258
	[0.0417]	[0.0393]	[0.0878]	[0.0360]	[0.0396]	[0.0461]	[0.0383]	[0.0386]	[0.0460]	[0.0357]	[0.0375]	[0.0443]
Y	0.935***	0.920***	1.083***	0.916***	0.915***	0.910***	0.913***	0.910***	0.915***	0.906***	0.904***	0.901***
	[0.0780]	[0.0724]	[0.230]	[0.0764]	[0.0742]	[0.0875]	[0.0714]	[0.0703]	[0.0809]	[0.0773]	[0.0718]	[0.0824]
W	-1.204**	-1.092**	-1.956	-1.095***	-0.809*	-1.691***	-1.111**	-1.108**	-1.038*	-1.017**	-0.884**	-1.572***
	[0.551]	[0.493]	[1.399]	[0.410]	[0.459]	[0.636]	[0.495]	[0.482]	[0.569]	[0.409]	[0.433]	[0.577]
OFF_{Low}	-0.345	-0.380*	0.34	-0.423**	-0.403**	-0.246	-0.972**	-0.761**	-0.711	-0.967***	-0.904***	-1.141**
	[0.249]	[0.204]	[1.285]	[0.205]	[0.192]	[0.458]	[0.425]	[0.376]	[0.976]	[0.321]	[0.289]	[0.545]
OFF_{High}	0.19	0.353	-5.53	0.301	0.32	-0.00806	1.408	1.139	-1.174	1.471	1.108*	0.911
	[0.461]	[0.259]	[5.212]	[0.366]	[0.265]	[1.148]	[1.194]	[0.718]	[3.170]	[0.985]	[0.668]	[1.293]
E	-0.405*	-0.291	0.0406				-0.384*	-0.299	-0.157			
	[0.229]	[0.230]	[0.545]				[0.229]	[0.229]	[0.303]			
$IMM.ASS$				0.00178	-0.0168	0.0169				-0.00438	-0.0123	0.0122
				[0.0178]	[0.0189]	[0.0258]				[0.0181]	[0.0177]	[0.0234]
AR1	0.00	0.00	0.03	0.00	0.00	0.00	0	0	0	0	0	0
AR2	0.48	0.58	0.25	0.27	0.57	0.7	0.59	0.76	0.62	0.71	0.84	0.81
HANSEN	0.03	0.06	0.78	0.22	0.31	0.59	0.05	0.12	0.1	0.44	0.31	0.57

*** $p<0.01$, ** $p<0.05$, * $p<0.1$. Robust S.E. in brackets. All regressions include a full set of three-digit sector and time dummies. The 3^{rd} and 4^{th} lags and the 2^{nd} lag of the first differences of the variables have been used as instruments respectively for the equation in differences and for the one in levels. AR1 and AR2 show the P-value for the tests of the null hypothesis of no first and second order serial correlation in the differences of residuals.Hansen shows the P-value of the test of the validity of the over-identifying restrictions.

of the wage. In the most comprehensive specifications the long-run estimated elasticity of wage is above 1 and reaches the maximum of 1.6 in absolute value when immaterial assets are included. From our derivation of the labour demand, this should also be interpreted as an estimate of the elasticity of substitution σ between labour and the remaining inputs. Turning to the significance of offshoring, when we include the immaterial assets at time t and t-1 the long-run coefficient on offshoring from low income countries turns significant. It is worth noticing that the second measure of offshoring proves better and always conveys clear-cut indications on the significance and sign, while the other measure shows alternate significance levels even if the sign on the coefficient is always negative. Finally, building on the evidence of heterogeneous effects according to technological level of the activity performed in the sector (Cadarso et al., 2008), Table 7 shows the results for the two sub-samples of Traditional and Non Traditional sectors. For the sake of brevity, in this Table we focus only on the offshoring measure on total sales even if the main results are unchanged when the other measure is adopted[17]. When splitting the sample the long-run elasticity of the wage turns non-significant again, however the short-run one is higher for firms in Traditional sectors. Also, the output elasticity is higher for Traditional sectors in the long-run thus confirming a deeper labour intensity of these activities and the stock of immaterial assets seems to substitute for employment in traditional production processes and this result holds unambiguously regardless of the offshoring measure adopted. Considering sectors heterogeneity proves particularly important in our analysis since, as we can observe from the Table, offshoring to low income countries only proves detrimental for employment in the first group of sectors: considering offshoring over total sales in traditional sectors and taking the mean value of the offshoring measure, a doubling of offshoring to low income countries would mean a reduction of about 1%/3% in employment in the short-run/long-run, while considering the average value of offshoring among offshorers a doubling of offshoring to low income countries would mean a reduction of about 4%/12% in employment in the short-run/long-run. These percentages are not negligible. As we observe offshorers are larger than non-offshorers so, even in the case of a positive employment growth between 2000 and 2004, saying that employment could have been 12% higher than what is observed may imply many more labour units employed in the firm and in the sector. To conclude our analysis it would be worth to take the scale effect from offshoring into account. Usually, empirical papers estimating the unconditional labour demand simply remove output from the model and substitute it with the output price (OECD 2007,

[17]Results are available from the Authors upon request.

Hjzen and Swaim, 2007). In our case we do not have information on the output price at the firm level so we tried to remove output or to substitute firm-level output with the sector-level price. Unfortunately, this resulted in a serious mis-specification of our empirical model with the consequent poor performance of our preferred estimator. It is worth mentioning that studies estimating the offshoring effect on the unconditional labour demand are usually carried on at the sector level by means of OLS. So we did not proceed further on this direction and we stick to the conditional labour demand specification. Nevertheless, just for a check we ran a regression on the labour demand obtained by a translog profit function which confirmed a negative effect of offshoring to low income countries even when we allow for scale effects from offshoring. This line of research however should be further investigated.

6 Conclusion

This paper has analysed the effect of offshoring on the manufacturing firms labour demand. We have estimated a conditional labour demand at the firm level by means of System GMM. The availability of firm level indicators of offshoring split by origin intermediate inputs has allowed us to shed new light on the issue. In line with previous evidence on the topic, our results bear a negative effect of offshoring to low income countries on the conditional labour demand of Italian manufacturing firms. This outcome, however, is attributable to those firms involved in Traditional activities. For the remaining firms, in fact, the sign on the offshoring to low income countries coefficient is negative, although never significant. The ambiguous sector level evidence found for the Italian case is then reconciled by our analysis, thus confirming that firm-level studies are better suited to investigate technology relationship, even when involving labour market outcomes. Also, our study highlights that measures of international fragmentation of production should definitely take into account the heterogeneity of trading partners in order to dissect the different mechanisms underlying such a complex phenomenon. Turning to the implication of our study for society, our results confirm that the new international division of labour is putting under stress the advanced economies labour markets. Even if offshoring represents a renewed opportunity for competitiveness for many firms, it is worth to say that it poses a heavy burden on manufacturing sector workers in advanced countries. From our results the burden seems to be higher for workers in traditional sectors due to two features: on one hand, these sectors are the ones facing fiercer competition from low labour cost countries and are compelled to reduce labour costs to preserve the competitiveness; on the other hand, the employ-

Table 7: Labour Demand: Traditional and Non Traditional Sectors

	Traditional Sectors						Non Traditional Sectors					
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]
l_{t-1}	0.761***	0.765***	0.686***	0.778***	0.752***	0.713***	0.734***	0.733***	0.745***	0.718***	0.714***	0.751***
	[0.0355]	[0.0368]	[0.0430]	[0.0505]	[0.0457]	[0.0469]	[0.0391]	[0.0388]	[0.038]	[0.0502]	[0.0489]	[0.049]
k_t	-0.0406	-0.0563	-0.0768	-0.052	-0.0574	0.025	0.00328	-0.00051	0.008	-0.0151	-0.0158	-0.016
	[0.0368]	[0.0387]	[0.0503]	[0.0468]	[0.0466]	[0.0567]	[0.0603]	[0.0616]	[0.059]	[0.0595]	[0.0677]	[0.063]
k_{t-1}	0.0315	0.0449	0.0795*	0.0359	0.0342	-0.0202	0.0108	0.0133	0.004	0.0289	0.0317	0.023
	[0.0353]	[0.0372]	[0.0464]	[0.0473]	[0.0455]	[0.0544]	[0.0507]	[0.0514]	[0.051]	[0.0542]	[0.0605]	[0.058]
y_t	0.630***	0.658***	1.077***	0.833***	0.776***	1.188***	0.543***	0.566***	0.539***	0.627***	0.708***	0.523***
	[0.101]	[0.106]	[0.0984]	[0.188]	[0.170]	[0.121]	[0.123]	[0.126]	[0.114]	[0.162]	[0.157]	[0.147]
y_{t-1}	-0.377***	-0.406***	-0.717***	-0.531***	-0.464***	-0.829***	-0.329***	-0.345***	-0.326***	-0.391***	-0.474***	-0.326***
	[0.0992]	[0.104]	[0.0905]	[0.152]	[0.142]	[0.101]	[0.108]	[0.111]	[0.103]	[0.125]	[0.136]	[0.111]
w_t	-0.616***	-0.568***	-0.708**	-0.935***	-0.858***	-1.060***	-0.542*	-0.637**	-0.641*	-0.629*	-0.783**	-0.455
	[0.206]	[0.212]	[0.300]	[0.250]	[0.246]	[0.354]	[0.303]	[0.298]	[0.342]	[0.351]	[0.390]	[0.354]
w_{t-1}	0.292*	0.249	0.554***	0.661***	0.479**	0.710***	0.351*	0.428**	0.419*	0.384	0.539*	0.201
	[0.159]	[0.162]	[0.142]	[0.254]	[0.215]	[0.158]	[0.208]	[0.202]	[0.244]	[0.273]	[0.283]	[0.260]
$OFF_{Low\ t}$	-0.388***		-1.345*	-0.381***		-1.599**	-0.0674		-0.693	-0.172		-0.705
	[0.114]		[0.807]	[0.122]		[0.756]	[0.323]		[1.328]	[0.297]		[0.956]
$OFF_{Low\ t-1}$		-0.333***	0.479		-0.410***	0.72		0.0364	0.608		-0.158	0.527
		[0.0995]	[0.565]		[0.103]	[0.610]		[0.298]	[1.262]		[0.284]	[0.851]
$OFF_{High\ t}$	0.133		1.336	0.256		-0.328	0.702		-0.444	0.559		-0.299
	[0.172]		[0.968]	[0.260]		[0.836]	[0.731]		[0.801]	[0.506]		[0.739]
$OFF_{High\ t-1}$		0.125	-0.736		0.195	0.191		0.604*	0.738*		0.542	0.568
		[0.124]	[0.630]		[0.152]	[0.542]		[0.360]	[0.406]		[0.401]	[0.462]
Exp_t	-0.0251		0.568				-0.168		0.181			
	[0.0610]		[0.738]				[0.121]		[0.384]			
Exp_{t-1}		-0.0261	-0.376					-0.146	-0.239			
		[0.0529]	[0.515]					[0.0906]	[0.285]			
$Imm.Assets_t$				-0.0142		-0.0341*				-0.00389		0.023**
				[0.0103]		[0.0195]				[0.00730]		[0.011]
$Imm.Assets_{t-1}$					-0.00741	0.0201					-0.00579	-0.022*
					[0.00807]	[0.0157]					[0.00694]	[0.009]
Observations	61222	61243	61023	54060	54541	52634	94615	94626	94516	83955	84580	81767
Number of id	15940	15952	15899	14923	14979	14696	24282	24284	24266	22873	22934	22524
Long Run Coefficients												
K	-0.0383	-0.0485	0.00856	-0.0724	-0.0934	0.0169	0.0528	0.048	0.045	0.0488	0.0554	0.03
	[0.0486]	[0.0499]	[0.0327]	[0.0732]	[0.0662]	[0.0400]	[0.0546]	[0.0565]	[0.052]	[0.0403]	[0.0462]	[0.041]
Y	1.061***	1.070***	1.147***	1.360***	1.256***	1.249***	0.806***	0.825***	0.837***	0.834***	0.818***	0.787***
	[0.116]	[0.120]	[0.169]	[0.196]	[0.144]	[0.204]	[0.0907]	[0.0957]	[0.095]	[0.0978]	[0.107]	[0.106]
W	-1.356**	-1.355**	-0.491	-1.229*	-1.524**	-1.217	-0.72	-0.783	-0.87	-0.865*	-0.854	-1.020*
	[0.558]	[0.573]	[0.584]	[0.738]	[0.707]	[0.865]	[0.658]	[0.679]	[0.667]	[0.510]	[0.622]	[0.585]
OFF_{Low}	-1.625***	-1.418***	-2.760***	-1.714***	-1.652***	-3.056***	-0.254	0.136	-0.335	-0.61	-0.552	-0.715
	[0.495]	[0.445]	[1.066]	[0.539]	[0.393]	[0.840]	[1.219]	[1.115]	[1.114]	[1.042]	[0.980]	[1.072]
OFF_{High}	0.556	0.533	1.914	1.15	0.79	-0.478	2.641	2.258*	1.15	1.978	1.897	1.078
	[0.715]	[0.525]	[1.321]	[1.156]	[0.593]	[1.137]	[2.653]	[1.345]	[2.260]	[1.655]	[1.400]	[1.685]
E	-0.105	-0.111	0.611				-0.631	-0.548	-0.225			
	[0.255]	[0.226]	[0.767]				[0.452]	[0.345]	[0.595]			
$IMM.ASS.$				-0.0641	-0.0298	-0.0488**				-0.0138	-0.0202	0.006
				[0.0432]	[0.0305]	[0.0247]				[0.0247]	[0.0235]	[0.024]
AR1	0	0	0	0	0	0	0	0	0	0	0	0
AR2	0.74	0.96	0.44	0.68	0.39	0.8	0.32	0.4	0.682	0.62	0.6	0.479
HANSEN	0.04	0.07	0.43	0.45	0.35	0.22	0.46	0.75	0.337	0.6	0.94	0.923

*** p<0.01, ** p<0.05, * p<0.1. Robust S.E. in brackets. All regressions include a full set of three-digit sector and time dummies. The $3^{rd}$and 4^{th} (2^{nd} and 3^{rd}) lags and the 2^{nd} (1^{st}) lag of the first differences of the variables have been used as instruments in columns 1, 2,4, 5 and 7 to 12 (columns 3 and 6) sectors equation in differences and for the one in levels. AR1 and AR2 show the P-value for the tests of the null hypothesis of no first and second order serial correlation in the differences of residuals. Hansen shows the P-value of the test of the validity of the over-identifying restrictions.

ment composition in these sectors is more skewed towards low skill intensive activities which are more easily substituted with imports from low labour cost locations. In both cases it is evident that a structural change is at work and then policy makers should try to look ahead and ease the transition of production towards more advanced manufacturing and especially service sectors. These transition could ensure that the tasks performed by workers would be less and less substitutable with respect to imported materials.

7 Appendix

Representativeness - Table 8 describes our sample representativeness in terms of employment by sector and firm size[18]. The sample representativeness has been checked in two ways. Firstly, we have calculated the share of employment from our sample over total employment in each sector and size-class (**Sample/Universe**) ; secondly, we have compared the universe and sample distributions of employment by sector and size-class (**Sample and Universe Distributions**). We have repeated the comparison in the first and last year of our panel to be sure that the representativeness is preserved across time and that we are focusing on an important part of manufacturing both from a static and dynamic point of view. From the first two columns of the Table, then, our sample is shown to cover, on average, 39%(42%) of the total output in manufacturing in 2004 (2000). Unfortunately, in our sample the firms with less than 10 employees are under-represented, while the largest sample to universe output ratio is recorded for firms with 50 to 249 employees. The second set of columns confirms this feature from the comparison of the universe and sample distributions of firms by size. Small firms are particularly active in more traditional activities where they may represent from about 10% to more than 20% of total employment. The under-representation of these firms could then reproduce a sample skewed towards non traditional activities, however the estimation of the empirical model by sub-samples of traditional and non traditional activities should help in overcoming this problem. Also, being interested in the direct effect of offshoring, we think that this bias is not severe because mainly large firms import inputs from abroad. Finally, the universe and sample distributions of employment by sector, both in 2000 and 2004, are very similar. To compare the two distributions, we have also calculated a correlation coefficient which ranges around .99 in both years. Also, Table 8 shows the list of sectors included in our analysis and their description. Throughout the paper the definition of Traditional sectors is established at three digit levels according to the Pavitt's taxonomy [19] (Pavitt, 1984).

[18] We checked the representativeness in terms of output too and the statistics mimic those on employment so we decided not to include them in the paper, however they are available from the Authors upon request.

[19] The following sectors are classified as Traditional: 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 171, 172, 173, 174, 175, 176, 177, 181, 182. 183, 191, 192, 193, 201, 202, 203, 204, 205, 212, 245, 256, 251, 286, 287, 361, 362, 364, 365, 366. The remaining ones are classified as non-Traditional.

Table 8: Representativeness

		Sample/Universe		Sample and Universe distributions			
Representativeness By Sector							
Sectors	Description	**2000**	**2004**	**2000**		**2004**	
				Universe	**Sample**	**Universe**	**Sample**
15[ab]	Food, beverages and Tobacco	34.27%	33.56%	8.26%	7.05%	8.98%	7.32%
17[b]	Textiles	46.81%	39.83%	6.74%	6.83%	5.84%	6.50%
18[b]	Apparel	28.33%	25.48%	5.87%	3.81%	5.38%	3.63%
19[b]	Leather Products and Footwear	34.40%	29.36%	4.25%	3.17%	3.82%	3.13%
20[b]	Wood Products	29.83%	29.28%	2.80%	2.09%	2.89%	2.05%
21[b]	Paper and Paper Products	49.90%	46.38%	1.91%	2.26%	1.96%	2.32%
22	Printing and Editing	40.45%	38.16%	3.43%	3.33%	3.33%	3.20%
24[b]	Chemical Products	54.13%	49.06%	4.96%	6.19%	4.95%	6.37%
25[b]	Rubber and Plastics	52.70%	50.83%	4.84%	6.26%	4.92%	6.16%
26	Non Metallic mineral Products	45.01%	43.61%	5.16%	5.72%	5.44%	5.82%
27	Metals	52.83%	48.23%	3.35%	4.11%	3.35%	4.21%
28[b]	Metal Products	37.02%	36.62%	13.43%	12.51%	14.32%	12.60%
29	Mechanical Machineries	51.06%	47.89%	13.05%	15.89%	13.20%	16.02%
30	Office Machines and Equipment	27.43%	20.33%	0.36%	0.19%	0.33%	0.22%
31	Electrical Machines and Appliances	43.57%	40.16%	4.86%	4.96%	4.37%	4.53%
32	Radio, TV and Communication Appliances	39.05%	35.03%	2.26%	2.01%	2.02%	1.87%
33	Medical, Optical and Precision Appliances	43.13%	37.77%	2.39%	2.29%	2.45%	2.51%
34	Motor vehicles and Transport Equipment	37.70%	34.87%	4.41%	3.91%	4.26%	3.82%
35	Other Transport Equipment	39.52%	40.37%	2.15%	2.21%	2.32%	2.18%
36[b]	Furniture and Other manufacturing, nec.	39.86%	37.42%	5.50%	5.23%	5.88%	5.57%
	Total	42%	39%	100%	100%	100%	100%
				0.999		0.999	
Representativeness By Size-Class							
		2000	**2004**	2000		2004	
				Universe	**Sample**	**Universe**	**Sample**
1-9		12.45%	12.74%	14%	5%	15%	4%
10-19		25.54%	27.14%	16%	10%	16%	10%
20-49		44.60%	46.56%	18%	21%	18%	20%
50-249		53.48%	57.84%	24%	33%	25%	34%
more than 249		43.81%	48.13%	28%	31%	26%	31%
				100%	100%	100%	100%

Source: Firm Economic Accounts and firm-level database from ISTAT Annual Report, 2006. [a] Sum of sector 15 and 16. [b] Sectors containing Traditional three digit activities: 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 171, 172, 173, 174, 175, 176, 177, 181, 182. 183, 191, 192, 193, 201, 202, 203, 204, 205, 212, 245, 256, 251, 286, 287, 361, 362, 364, 365, 366.

Table 9: Descriptive Statistics

Variable		Mean	Std. Dev.	Observations
l	overall	2.89	1.06	N = 202395
	between		1.05	n = 40479
	within		0.17	T = 5
y	overall	14.64	1.38	N = 202395
	between		1.36	n = 40479
	within		0.22	T = 5
k	overall	12.55	1.82	N = 202254
	between		1.78	n = 40472
	within		0.41	T-bar = 4.99738
w	overall	10.06	0.37	N = 202387
	between		0.35	n = 40479
	within		0.13	T-bar = 4.9998
OFF^a	overall	0.07	0.17	N = 201435
	between		0.16	n = 40406
	within		0.06	T-bar = 4.98527
OFF^a_{Low}	overall	0.02	0.09	N = 201914
	between		0.09	n = 40449
	within		0.04	T-bar = 4.99182
OFF^a_{High}	overall	0.05	0.13	N = 202014
	between		0.13	n = 40446
	within		0.05	T-bar = 4.99466
OFF^b	overall	0.04	0.12	N = 202395
	between		0.11	n = 40479
	within		0.05	T = 5
OFF^b_{Low}	overall	0.01	0.07	N = 202395
	between		0.06	n = 40479
	within		0.02	T = 5
OFF^b_{high}	overall	0.03	0.10	N = 202395
	between		0.09	n = 40479
	within		0.05	T = 5
Exp	overall	0.16	0.25	N = 200964
	between		0.24	n = 40385
	within		0.06	T-bar = 4.9762
$Imm.Assets$	overall	9.77	2.16	N = 178499
	between		2.06	n = 38425
	within		0.85	T-bar = 4.64539

The Table shows real variables in logarithms, with the exception of the offshoring intensity and the export share

[a] Offshoring over total purchases.

[b] Offshoring over total sales.

Table 10: Pairwise Correlations

	y	k	l	w	Off_{Low}	Off_{High}	Off	Exp	$Imm.Assets$
y	1								
k	0.75	1							
l	0.85	0.74	1						
w	0.60	0.46	0.50	1					
Off_{Low}	0.18	0.10	0.12	0.01	1				
Off_{High}	0.34	0.25	0.27	0.23	0.08	1			
Off	0.37	0.25	0.28	0.19	0.61	0.83	1		
Exp	0.38	0.24	0.32	0.18	0.15	0.15	0.20	1	
$Imm.Assets$	0.53	0.45	0.52	0.37	0.06	0.18	0.18	0.21	1

All correlations significant at 1%

Table 11: Labour Demand: OLS and FE I

	OFFSHORING ON TOTAL PURCHASES											
	OLS						**FE**					
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]
l_{t-1}	0.920***	0.920***	0.920***	0.919***	0.919***	0.919***	0.289***	0.290***	0.289***	0.290***	0.290***	0.290***
	[0.00115]	[0.00114]	[0.00114]	[0.00115]	[0.00115]	[0.00115]	[0.00489]	[0.00489]	[0.00489]	[0.00489]	[0.00489]	[0.00490]
k_t	0.0434***	0.0433***	0.0433***	0.0434***	0.0434***	0.0433***	0.0323***	0.0323***	0.0321***	0.0323***	0.0324***	0.0322***
	[0.00139]	[0.00138]	[0.00138]	[0.00139]	[0.00138]	[0.00138]	[0.00157]	[0.00156]	[0.00156]	[0.00156]	[0.00156]	[0.00156]
k_{t-1}	-0.0335***	-0.0335***	-0.0334***	-0.0335***	-0.0335***	-0.0335***	0.00704***	0.00715***	0.00707***	0.00707***	0.00715***	0.00706***
	[0.00139]	[0.00138]	[0.00139]	[0.00139]	[0.00138]	[0.00139]	[0.00137]	[0.00137]	[0.00137]	[0.00137]	[0.00137]	[0.00137]
y_t	0.316***	0.316***	0.316***	0.316***	0.316***	0.316***	0.274***	0.274***	0.274***	0.274***	0.274***	0.274***
	[0.00514]	[0.00514]	[0.00515]	[0.00514]	[0.00514]	[0.00515]	[0.00608]	[0.00608]	[0.00608]	[0.00607]	[0.00608]	[0.00608]
y_{t-1}	-0.264***	-0.264***	-0.264***	-0.263***	-0.263***	-0.263***	0.0163***	0.0159***	0.0165***	0.0160***	0.0157***	0.0160***
	[0.00521]	[0.00521]	[0.00522]	[0.00521]	[0.00521]	[0.00521]	[0.00387]	[0.00388]	[0.00387]	[0.00387]	[0.00388]	[0.00387]
w_t	-0.435***	-0.435***	-0.435***	-0.435***	-0.435***	-0.436***	-0.395***	-0.395***	-0.395***	-0.395***	-0.395***	-0.395***
	[0.00676]	[0.00677]	[0.00676]	[0.00676]	[0.00676]	[0.00676]	[0.00935]	[0.00935]	[0.00936]	[0.00935]	[0.00935]	[0.00936]
w_{t-1}	0.406***	0.407***	0.407***	0.405***	0.406***	0.406***	0.218***	0.219***	0.219***	0.218***	0.219***	0.219***
	[0.00671]	[0.00672]	[0.00672]	[0.00671]	[0.00672]	[0.00672]	[0.00579]	[0.00581]	[0.00580]	[0.00579]	[0.00581]	[0.00581]
OFF_t	-0.0296***		-0.0120*				-0.0134		-0.0115			
	[0.00276]		[0.00698]				[0.00947]		[0.00948]			
OFF_{t-1}		-0.0319***	-0.0208***					-0.0172**	-0.0143*			
		[0.00266]	[0.00692]					[0.00806]	[0.00802]			
OFF_{hight}				-0.00889***		0.0114				0.00907		0.00632
				[0.00320]		[0.00777]				[0.0101]		[0.0101]
OFF_{Lowt}				-0.0677***		-0.0651***				-0.0597***		-0.0514***
				[0.00497]		[0.0137]				[0.0184]		[0.0185]
$OFF_{hight-1}$					-0.0144***	-0.0241***					0.001	0.0016
					[0.00306]	[0.00764]					[0.00866]	[0.00857]
OFF_{Lowt-1}					-0.0633***	-0.00353					-0.0459***	-0.0388**
					[0.00491]	[0.0140]					[0.0158]	[0.0159]
Observations	158186	158265	158060	158284	158348	158165	158186	158265	158060	158284	158348	158165
R-squared	0.976	0.976	0.977	0.977	0.977	0.977	0.381	0.38	0.38	0.381	0.38	0.38
	Long Run Coefficients											
K	0.123***	0.123***	0.122***	0.122***	0.122***	0.122***	0.0554***	0.0556***	0.0552***	0.0555***	0.0557***	0.0552***
	[0.00519]	[0.00519]	[0.00519]	[0.00516]	[0.00516]	[0.00516]	[0.00253]	[0.00254]	[0.00253]	[0.00253]	[0.00254]	[0.00253]
Y	0.651***	0.651***	0.652***	0.652***	0.651***	0.653***	0.409***	0.409***	0.409***	0.409***	0.408***	0.408***
	[0.00865]	[0.00863]	[0.00866]	[0.00860]	[0.00859]	[0.00861]	[0.00785]	[0.00785]	[0.00786]	[0.00785]	[0.00785]	[0.00785]
W	-0.358***	-0.355***	-0.356***	-0.369***	-0.364***	-0.368***	-0.249***	-0.248***	-0.248***	-0.249***	-0.248***	-0.248***
	[0.0278]	[0.0277]	[0.0277]	[0.0277]	[0.0277]	[0.0277]	[0.0131]	[0.0131]	[0.0131]	[0.0131]	[0.0131]	[0.0131]
O	-0.368***	-0.397***	-0.408***				-0.0188	-0.0242**	-0.0364**			
	[0.0340]	[0.0326]	[0.0336]				[0.0133]	[0.0113]	[0.0169]			
OP				-0.837***	-0.783***	-0.848***				-0.0840***	-0.0646***	-0.127***
				[0.0609]	[0.0600]	[0.0612]				[0.0259]	[0.0223]	[0.0326]
OR				-0.110***	-0.179***	-0.157***				0.0128	0.00141	0.0111
				[0.0394]	[0.0377]	[0.0389]				[0.0142]	[0.0122]	[0.0183]

*** p<0.01, ** p<0.05, * p<0.1. All regressions include a full set of three-digit sector and time dummies together with a dummy for control participation.
Robust standard errors are in brackets.

Table 12: Labour Demand: OLS and FE II

	OFFSHORING ON TOTAL SALES											
	OLS						FE					
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]
l_{t-1}	0.919***	0.919***	0.919***	0.919***	0.919***	0.918***	0.291***	0.291***	0.291***	0.291***	0.291***	0.291***
	[0.00115]	[0.00115]	[0.00115]	[0.00115]	[0.00115]	[0.00115]	[0.00494]	[0.00494]	[0.00494]	[0.00493]	[0.00494]	[0.00493]
k	0.0435***	0.0435***	0.0435***	0.0435***	0.0435***	0.0435***	0.0327***	0.0327***	0.0327***	0.0327***	0.0327***	0.0327***
	[0.00138]	[0.00138]	[0.00138]	[0.00138]	[0.00138]	[0.00138]	[0.00157]	[0.00157]	[0.00157]	[0.00157]	[0.00157]	[0.00157]
k_{t-1}	-0.0337***	-0.0337***	-0.0337***	-0.0337***	-0.0337***	-0.0337***	0.00697***	0.00702***	0.00700***	0.00697***	0.00701***	0.00699***
	[0.00138]	[0.00138]	[0.00138]	[0.00138]	[0.00138]	[0.00138]	[0.00137]	[0.00137]	[0.00137]	[0.00137]	[0.00137]	[0.00137]
y	0.317***	0.317***	0.317***	0.317***	0.317***	0.317***	0.275***	0.275***	0.275***	0.275***	0.275***	0.275***
	[0.00513]	[0.00512]	[0.00512]	[0.00513]	[0.00512]	[0.00512]	[0.00607]	[0.00607]	[0.00607]	[0.00607]	[0.00607]	[0.00607]
y_{t-1}	-0.264***	-0.264***	-0.264***	-0.263***	-0.263***	-0.263***	0.0155***	0.0155***	0.0156***	0.0156***	0.0156***	0.0157***
	[0.00519]	[0.00519]	[0.00519]	[0.00519]	[0.00519]	[0.00519]	[0.00392]	[0.00392]	[0.00392]	[0.00391]	[0.00392]	[0.00392]
w	-0.434***	-0.433***	-0.434***	-0.434***	-0.434***	-0.434***	-0.393***	-0.393***	-0.393***	-0.393***	-0.393***	-0.393***
	[0.00675]	[0.00676]	[0.00676]	[0.00675]	[0.00675]	[0.00675]	[0.00939]	[0.00939]	[0.00939]	[0.00938]	[0.00939]	[0.00938]
w_{t-1}	0.405***	0.405***	0.405***	0.404***	0.404***	0.404***	0.219***	0.218***	0.218***	0.218***	0.218***	0.218***
	[0.00671]	[0.00671]	[0.00671]	[0.00670]	[0.00671]	[0.00670]	[0.00585]	[0.00586]	[0.00586]	[0.00585]	[0.00586]	[0.00586]
OFF	-0.0572***		-0.0294**				-0.0357*		-0.0306*			
	[0.00492]		[0.0137]				[0.0187]		[0.0183]			
OFF_{t-1}		-0.0579***	-0.0318**					-0.0393***	-0.0349**			
		[0.00474]	[0.0137]					[0.0140]	[0.0139]			
OFF_{high}				-0.0292***		0.0107				-0.00255		-0.00044
				[0.00571]		[0.0157]				[0.0203]		[0.0198]
OFF_{Low}				-0.101***		-0.101***				-0.0999***		-0.0892***
				[0.00838]		[0.0222]				[0.0331]		[0.0328]
$OFF_{hight-1}$					-0.0375***	-0.0461***					-0.0247	-0.0236
					[0.00550]	[0.0156]					[0.0156]	[0.0159]
OFF_{Lowt-1}					-0.0919***	0.00101					-0.0655**	-0.0467*
					[0.00858]	[0.0227]					[0.0278]	[0.0267]
Observations	158932	158932	158932	158932	158932	158932	158932	158932	158932	158932	158932	158932
R-squared	0.976	0.976	0.976	0.977	0.977	0.977	0.38	0.38	0.38	0.38	0.38	0.38
	Long Run Coefficients											
K	0.121***	0.121***	0.121***	0.121***	0.121***	0.121***	0.0560***	0.0560***	0.0560***	0.0559***	0.0560***	0.0559***
	[0.00515]	[0.00515]	[0.00515]	[0.00513]	[0.00513]	[0.00512]	[0.00255]	[0.00255]	[0.00255]	[0.00255]	[0.00255]	[0.00254]
Y	0.654***	0.653***	0.655***	0.654***	0.653***	0.655***	410***	410***	410***	410***	410***	410***
	[0.00860]	[0.00858]	[0.00859]	[0.00854]	[0.00855]	[0.00854]	[0.00785]	[0.00786]	[0.00786]	[0.00784]	[0.00785]	[0.00785]
W	-0.356***	-0.356***	-0.356***	-0.365***	-0.365***	-0.365***	-0.245***	-0.246***	-0.246***	-0.246***	-0.246***	-0.246***
	[0.0275]	[0.0275]	[0.0275]	[0.0274]	[0.0274]	[0.0274]	[0.0132]	[0.0133]	[0.0133]	[0.0132]	[0.0133]	[0.0132]
O	-0.706***	-0.715***	-0.755***				-0.0504*	-0.0554***	-0.0924***			
	[0.0597]	[0.0574]	[0.0584]				[0.0265]	[0.0197]	[0.0317]			
OP				-1.240***	-1.130***	-1.228***				-0.141***	-0.0924***	-0.192***
				[0.102]	[0.104]	[0.104]				[0.0467]	[0.0392]	[0.0588]
OR				-0.358***	-0.461***	-0.434***				-0.0036	-0.0348	-0.03339
				[0.0696]	[0.0671]	[0.0669]				[0.0286]	[0.0220]	[0.0352]

*** p<0.01, ** p<0.05, * p<0.1. All regressions include a full set of three-digit sector and time dummies together with a dummy for control participation.
Robust standard errors are in brackets.

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