The impact of offshoring on employment: a meta-analysis

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Abstract

Over the last decades, the intensification of offshoring movements has generated important impacts on labour markets. The literature on this topic has, however, produced divergent results. We develop a meta-analysis of the empirical literature that estimates the effect of offshoring on employment in the origin country. We find that, although the overall effect is weak, there are important differences in the effects reported by the primary studies that are explained by the development level of the countries included in the sample, the type of goods/services that are analyzed, the structure of the data, the estimation technique, the way offshoring is measured, and the unit of analysis. We also find that on average the effect for high-skilled workers is not statistically different from the effect for low-skilled workers.

Keywords: offshoring; employment; meta-analysis.

JEL codes: E24; F16; F23; F66.

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1. Introduction

Over the past decades, globalization, cost pressure and technological advances have led firms to seek new ways of competing and organizing their activities. Several companies have relocated parts of their value chain activities abroad to maintain or improve their competitiveness (Coucke & Sleuwaegen, 2008). Empirical evidence shows that the companies that pioneered this activity were large multinational corporations. However, small and medium-sized enterprises have been following this offshoring trend, despite having limited human and financial resources, which restricts the company's strategic freedom in the internationalization process (Aspelund and Butsko, 2010).

In the context of the international economics literature, offshoring has been seen as a new form of internationalization in which companies unbundle their business tasks or functions abroad (Lewin et al., 2009). From an economic perspective, it is a consequence of the international division of labour and globalization, leading to the relocation of economic activities to places where investment can translate into a higher return (Jahns et al., 2006). During the 1990s, offshoring focused especially on the relocation of manufacturing activities to low-cost countries, but its complexity and scope have since expanded on a large scale (Manning, 2013).

Multinational enterprises are closely involved in all the transmission mechanisms through which globalization affects labour market outcomes. This may explain why labour market spillovers are one of the focuses of the public debate on globalization. However, this debate is far from being resolved, as empirical evidence on the employment effects in the countries of origin of delocalized production is mostly inconclusive (Neureiter & Nunnenkamp, 2010): while some studies report positive effects, others report negative or even insignificant impacts.

In face of this heterogeneity in the reported effects, in this paper, we develop a meta-analysis of the empirical literature that estimates the impacts of offshoring on employment in the origin countries (Grewal et al., 2018). With this methodology, we apply statistical tools to identify some patterns in the literature, synthesize and systematize the main reported effects and explain the sources of heterogeneity.

We find that, although the overall effect of offshoring on employment is weak, the divergence in the results reported by the primary studies is explained by differences in some methodological characteristics, such as the development level of the countries included in the sample, the types of goods/services that are analyzed, the structure of the data, the

estimation technique, the way offshoring is measured, and the unit of analysis. We also find that on average the effect for high-skilled workers is not statistically different from the effect for low-skilled workers.

The remaining of the paper is structured as follows. Section 2 presents the Literature Review on the effects of offshoring on employment. Section 3 describes the methodology adopted and presents the studies to be included in the meta-analysis. Section 4 reports and discusses the main results, and Section 5 concludes.

2. Literature review

A significant body of theoretical and empirical literature has focused on examining the effects of offshoring on the labour markets.

Within the neoclassical theoretical literature, the Stolper-Sanmuelson argues that changes in the relative prices of goods, due to trade openness, affect the relative prices of factors of production, whereby a relative increase in the price of a good results in an increase in the relative price of the factor in which the good is relatively more intensive. As such, the holders of the relatively more abundant factor in each country tend to gain with trade openness. In the case of developing countries, where labour is initially more abundant and wages are lower, the reallocation of international firms resulting from trade intensification makes labour relatively scarcer, which contributes to increasing the relative remuneration of labour. Conversely, in developed countries, labour becomes more abundant with the relocation of part of their company's activity to the abroad, and therefore relative wages are expected to fall. Thus, the Srolper-Samuelson theorem predicts that the expansion of offshoring resulting from trade liberalization is expected to bring winners and losers, with the overall welfare gain within a country depending on whether those agents who lose can be compensated by those who win (Bacchetta & Jansen, 2011).

According to Moser et al. (2015), the economic literature distinguishes two main channels through which offshoring can have an impact on the employment of the origin country. On the one hand, there is a positive effect on productivity due to cost savings and due to gains in competitiveness that allow firms to increase their market shares and employment. On the other hand, there may be a negative effect of offshoring on domestic employment due to a reduction in the size of firms as a result of the relocation of the production processes to another country. In addition, firms that opt for offshoring may substitute domestic suppliers for foreign ones.

In the same line, Görg (2011) emphasizes that the effect of offshoring on employment in the origin country results from the interaction of multiple transmission mechanisms. First, offshoring allows the expansion of the sales of the firm that relocates parts of its activity abroad, leading to it employing more people, which is referred to as the "scale effect" of offshoring. Second, due to offshoring, firms can provide their services at a lower cost, being able to expand their activity and employ more people. Third, if offshoring results in lower prices for final consumers, the real income of consumers increases, and a proportion of that real income will be spent on domestically produced goods, leading to increased employment in the domestic market.

Antràs et al. (2006) stress the role of the workers' skills in the impact of offshoring on employment. In particular, they highlight that the skills gap strongly conditions offshoring and the type of jobs created or encouraged in both the countries of origin and the destination. Feenstra & Hanson (1997) also emphasize the role of skills in a context in which the most developed and skilled-intensive countries (the Northern countries) interact with developing (Southern countries) - the North specializes in the production of goods that use intensively high-skilled labour, while the South specializes in the production of goods that use intensively low-skilled labour, and this pattern of specialization generates important offshoring movements between both types of countries.

In a different perspective, Neureiter & Nunnenkamp (2010) find that, while overall offshoring leads to job destruction, it tends to generate specific benefits to more skilled workers, as it may contribute to an increase in the demand for more skilled workers in the origin countries. The authors also highlight that globalization intensifies the pressure of lower-income economies in the global division of labour and tends to weaken the protection of domestic workers, who are relatively unskilled in terms of abundance, through traditional labour market regulations and institutions.

Wolszczak-Derlacz & Parteka (2015) also find that offshoring is negatively associated with employment, but the effect on high-skilled workers is not statistically significant. On the contrary, Foster-Mcgregor & Pöschl (2015) add that the negative effect of offshoring is more common in developed countries than in developing countries and for low and medium-technology sectors. In a further study, Foster-McGregor et al. (2016) report that the negative effect of offshoring on employment is more pronounced for low- and medium-skilled workers in developing countries and for high-skilled workers in developed countries.

Considering that offshoring may have different impacts in different time horizons, Görg (2011) finds that offshoring is likely to lead to employment restructuring and a higher

employment turnover in the short run. However, in the long run, there is no indication that offshoring leads to higher unemployment, although low-skilled workers may be at disadvantage, as high-skilled employment tends to expand. Görg & Strobl (2001) also argue that offshoring contributes to increasing unemployment in the short run.

Falk & Wolfmay (2008), Michel & Rycx (2012) and Bramucci et al. (2021) examine the offshoring effects across different sectors, finding a negative effect on employment in both services and manufacturing sectors. Kamal & Lovely (2017) show that when offshoring comes from low-income countries, there is a reduction in the employment of the manufacturing sector, but when Narrow Offshoring is considered such effect ceases to exist. Moreover, Hijzen & Swaim (2007) find that offshoring has an insignificant or slightly positive effect on sectoral employment. More specifically, although relocation of production within the same industry (intra-industry offshoring) reduces labour intensity, it does not affect overall industry employment; conversely, inter-industry offshoring does not affect labour intensity but may have a positive effect on overall industry employment. The authors conclude that the productivity gains from offshoring are large enough such that the jobs created by higher sales offset employment losses by shifting certain parts of production to more economically advantageous locations.

Focusing on the role of institutional issues, Ranjan (2013) argues that the jobs destruction in the home country resulting from offshoring is less pronounced in the presence of collective bargaining. For example, offshoring is more likely to increase unemployment in the US, where wages are generally negotiated individually, than in the case of Europe, where wages are set in a context of stronger collective bargaining. This empirical evidence is contrary to that of David (1998), who argues that globalization to countries with lower-skilled labour is likely to lead to higher unemployment in Europe than in the USA due to higher levels of labour market rigidity.

In sum, the results of the literature that examines the impact of offshoring on the employment of the origin country are mixed. On the one hand, the predictions of the theory are not always confirmed by empirical evidence. On the other hand, the results of empirical studies are far from being consensual. In light of these contradictory findings, we develop a meta-analysis of the literature on this topic.

3. Selection of studies to be included in the meta-analysis

A meta-analysis is a quantitative synthesis of the empirical evidence of a hypothesis, phenomenon, or effect. It makes use of statistical tools to compare the results of independent studies, identify elements of divergence/convergence, and find the sources of heterogeneity of the reported effects (Neves et al., 2016). It has gained increasing importance in economics in the last two decades, being used especially in topics in which the literature is not consensual (Forza & Di Nuzzo, 1998; Cook et al., 1992).

The first step in conducting a meta-analysis is the selection of studies to be analysed. We searched in Scopus and Web of Science for scientific papers that included the terms "*Offshoring*", "*Offshoring* and *employment", "Offshoring* and FDI", "*Offshoring* and *Outsourcing*", "*Offshoring* and *unemployment*" and "*Offshoring* and *labour market*". We also searched Google Scholar for papers that examined the offshoring-employment link.

Given that our focus is on collecting estimates of the impact of offshoring on employment in the home country (our effect size), theoretical articles were removed from the sample, as were articles that did not report the necessary information to conduct the meta-analysis (namely, coefficient's estimates, the respective standard errors / t-statistics, and the number of observations).

Applying all these criteria, we were left with a sample of 24 studies (listed in Table 1), from which we collected a total of 925 estimates of the effect size. These studies differ regarding: the estimation technique; the structure of the data (panel vs. cross-section); the development level of the countries included in the sample; the way of measuring offshoring (e.g., broad offshoring, narrow offshoring, outsourcing); the unit of analysis (e.g. industry, firm or individual); the workers' qualifications (high-skilled, medium-skilled or low-skilled); the sectors analyzed (e.g., manufacturing sector, service sector, high-tech sectors, low-tech sectors).

Considering that the 24 studies use different scales and metrics, it is necessary to convert them into a common. We resorted to a method commonly used for this purpose, which consists in calculating the partial correlation coefficient (r_i) and the respective standard deviation (se_i), as follows:

$$r_i = t_i / \sqrt{t_i^2 + df_i} \quad (1)$$

$$se_i = \sqrt{(1 - r_i^2)} / df_i \quad (2)$$

In these two equations, t_i represents the t-statistic associated with the coefficient of the effect size, and df_i the degrees of freedom.

A first screening of the 925 estimates of r_i reveals a high degree of variability. Table 1 shows that, of the 24 articles considered in this sample, 10 present a positive average for the reported values of r_i, while 15 have a negative average.

Table 1: Studies included in the meta-analysis

Study	Number of estimates	Mean of r_i
Wolszczark-Derlacz & Paterka (2015)	20	-0.03355
Michel & Rycx (2012)	64	0.0179
Gorg & Hanley (2005)	6	-0.0925
Falk & Wolfmayr (2008)	13	-1.4165
Hijzen & Swaim (2007)	12	0.0873
Cardaso et al. (2007)	15	-0.283
Amiti & Wei (2005)	62	-0.1055
Foster-Mcgregor et al. (2015)	84	-0.05186
Hertveldt & Michel (2012)	10	-0.9645
Foster-Mcgregor & Poeschl (2015)	64	-0.1105
Yoon (2016)	18	-0.1111
Wright (2014)	21	-0.007
Eppinger (2019)	11	0.06175
Ornaghi et al. (2021)	272	0.4698
Bramucci et al. (2021)	3	0.123
Kreutzer & Berger (2018)	4	-0.05725
Kim & Hwang (2016)	3	0.123
Fuster et al. (2019)	30	-0.00173
Winkler (2010)	92	0.01374
Kamal & Lovely (2017)	8	-0.0095
Egger & Egger (2003)	8	0.0775
Neureiter & Nunnenkamp (2009)	67	-0.00198
Goel (2017)	3	0.2357
Bachman & Braun (2011)	32	-0.0548

4. Results of the meta-analysis

In this section, we present and discuss the results of the meta-analysis. We first calculate the average effect and test for the presence of publication bias, and then we estimate a multivariate meta-regression to examine the sources of heterogeneity in the reported effects.

4.1 Estimation of the average effect and *publication bias*

The two most used methods to estimate the average size in meta-analyses are the fixed effects model and the random effects model. Both are weighted averages of the effects reported in primary studies but differ in their underlying assumptions. The fixed effects model assumes that all studies share a common effect and the differences in the observed effects result from sampling errors within each study (Borenstein et al., 2007). The random effects model considers that, in addition to sampling errors within each study, there is also heterogeneity in the true effects between studies (Borenstein et al., 2007).

Considering that J is the number of studies of the meta-analysis and Y_j the observed effect in the study, with j=1, 2,..., J, the fixed effects and random effects model are given respectively by:

$$Y_j = \theta_M + \varepsilon_j \quad (3)$$

$$Y_j = \theta_M + \zeta_j + \varepsilon_j \quad (4)$$

where ε_j is the error of study j, θ_M is the effect common to all studies, and ζ_j is the random component specific to each study (Rodrigues & Ziegelmann, 2010).

We have calculated both averages for our meta-analysis, having obtained values of 0.00478 and -0.01723 for the fixed and random effects estimators, respectively.

A common issue in empirical research is publication bias. In its most frequent form, publication bias arises when studies with statistically significant results or showing more impactful effects are given preference for publication over studies with non-significant results. This phenomenon may lead to a distortion in the empirical results, as the effects reported in the empirical studies tend to be higher than the real effects (Dominicis et al., 2008; Doucouliagos & Laroche, 2009; Bax & Moons, 2011).

Several statistical and graphical tools can be used to analyze the presence of publication bias, one of the most popular being the funnel plot. The funnel plot is a scatter diagram that displays the effect sizes (in the horizontal axis) against their precision (in the vertical axis), measured by the inverse of the standard error, $1/se_i$. If the plot takes the form

of an inverted funnel, with the estimates symmetrically distributed around the average, there is no evidence of publication bias. However, if the plot is asymmetric with the estimates biased in a certain direction, especially at the bottom, then publication bias is present (Sequeira & Neves, 2020). Figure 1 shows the funnel plot for our meta-sample. The point estimates seem to be dispersed symmetrically around the average, suggesting the absence of publication bias.

The conclusions of the visual inspection of the funnel plot can be formally tested by estimating a PET/FAT (Precision Effect Test / Funnel Asymmetry Test) equation. This involves regressing the effect sizes reported in the primary studies on (5) e standard errors, as follows:

$$r_i = \alpha_0 + \alpha_1 se_i + \mu_i$$

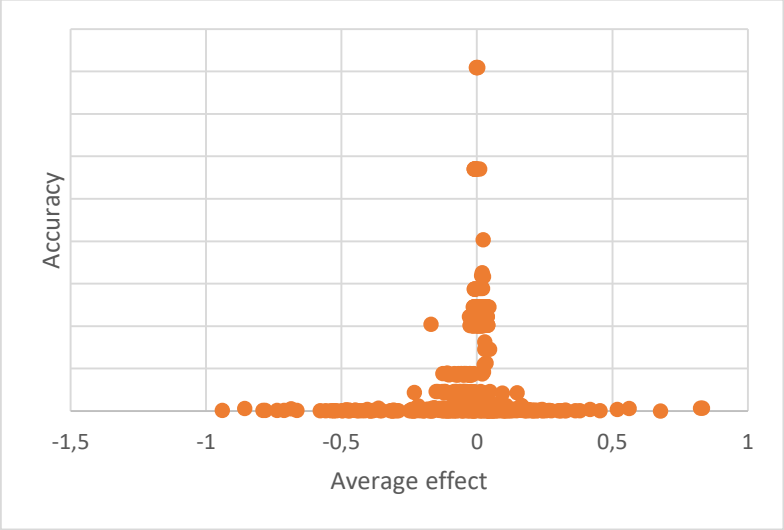

Figure 1: *Funnel Plot for the analysis of the impact of offshoring on employment*

In case of no publication bias, estimates are expected to vary randomly around the average effect, α_0, regardless of the standard error value. In this case, there will be no significant correlation between r_i e se_i and α_1 will be zero. On the contrary, if there is publication bias, studies with small samples and high standard errors will have higher estimates of the average effect to obtain statistically significant results, meaning that r_i and se_i will be correlated. Thus, a simple significance test to α_1 is a test to publication bias, while a test to α_0 is a test to the existence of a statistically significant average effect beyond publication bias (Stanley, 2005).

However, the estimation of equation (5) by OLS has two econometric problems, namely heteroscedasticity and autocorrelation. The first problem results from the fact that the standard errors are not constant across the sample, since each estimate reported in the primary studies has its standard error. The solution to this problem is to divide both sides of equation (5) by the standard error, se_i, which yields:

$$t_i = \alpha_0 precision_i + \alpha_1 + v_i \quad (6)$$

where t_i is the t-statistic associated with r_i. In comparison to (4), the coefficients are now reversed, as a test to the constant is now a test to the existence of publication bias, while the slope represents the average effect.

Regarding the problem of autocorrelation, it is usually present in meta-analyzes that include in their samples more than one estimate from each primary study. In this case, there is statistical dependence as estimates from the study share the same data, sample, or estimation techniques. This problem could be eliminated if only one estimate from each study was selected, but such a solution would lead to a significant reduction in the size of the meta-sample. Doucouliagos & Laroche (2009) consider alternative methods to circumvent the statistical dependence problem, such as the estimation of equation (6) by OLS with clustered standard errors or using hierarchical models. In both cases, observations are nested in groups (each group representing a study), which allows obtaining corrected standard errors. In addition, in hierarchical models, the regression coefficients are allowed to vary across groups (Sequeira & Neves, 2020).

In Table 2 we present the results of the estimation of equation (6) using OLS with clustered standard errors and hierarchical models.

Table 2: Results of the estimation of equation 6

	(1) OLS with *clustered standard errors*	**(2) Hierarchical Models**
Precision	0.00005** (0.00002)	-0.00002 (0.00009)
Constant	-0.706321 (0.44546)	-0.51889 (0.32019)
No. of observations (studies)	925 (24)	925 (24)

Notes: The dependent variable is *t*. Standard errors are in parentheses. Significance levels: *** for *p-value* < 0.01, ** for *p-value* < 0.05, * *p-value* < 0.1.

The results show that the constant is negative but not statistically different from zero, meaning that, as suggested by the funnel plot, there is no evidence of publication bias in the literature that estimates the impact of offshoring on employment. However, the results are not conclusive regarding the magnitude of the average effect: while the estimation by OLS with clustered standard errors shows a significant and positive effect, the estimation using hierarchical models suggests that such a significant effect does not exist.

4.2 Multivariate meta-regression

So far, the analysis does not consider the possible role of certain variables in explaining the differences in the reported effect sizes. In this subsection, we explore the sources of such differences by estimating a multivariate meta-regression.

As such, we include as moderating variables of the meta-regression dummies that take the value 1 if a specific methodological characteristic is present and 0 otherwise. The dummies capture some of the differences mentioned in Section 3, namely in the development level of the countries analyzed in the primary studies, the structure of the data, the level of the worker's qualifications, the measurement of offshoring, the estimation method, the unit of analysis, and the type of sectors analyzed. We also include as an additional regressor a quantitative variable measuring the number of citations obtained by the study. Table 3 lists and describes all the moderating variables included in the multivariate meta-regression.

Table 3: Moderating variables of the multivariate meta-regression

Characteristic	Variable name	Variable description
Countries' development level	Developed	1 if the sample is composed of developed countries only, 0 otherwise.
	Developing	1 if the sample is composed of developing countries only, 0 otherwise.
Data structure	Panel	1 if the primary study uses panel data, 0 otherwise.
Workers' qualification level	Low-skilled	1 if the analysis is performed for low-skilled workers only, 0 otherwise.
	High-skilled	1 if the analysis is performed for high-skilled workers only, 0 otherwise.
Offshoring Measure	Broad	1 if a broad measure of offshoring is used, 0 otherwise.
	Narrow	1 if a narrow measure of offshoring is used, 0 otherwise.
	Outsourcing	1 if offshoring is measured by outsourcing, 0 otherwise.
Estimation method	Fixed	1 if the estimation method is fixed effects; 0 otherwise.

Unit of analysis	Industry	1 if industry-level data are used, 0 otherwise.
	Firm	1 if firm-level data are used, 0 otherwise.
Sector	Services	1 if the primary study focuses only on firms from the services sector, 0 otherwise.
	High-tech	1 if the primary study focuses only on firms from high-technology sectors, 0 otherwise.
	Low-tech	1 if the primary study focuses only on firms from low-technology sectors, 0 otherwise.
Temporal effects	Contemporaneous	1 if the contemporaneous effect of offshoring on employment is estimated, 0 if it is a lagged effect.
Relevance	Citations	Number of citations (divided by 100) obtained by the study in Google Scholar as of 17 June 2022.

The results of the estimation of the multivariate meta-regression using OLS with clustered standard errors and hierarchical models are reported in Table 4.

Table 4: Results of the estimation of the multivariate meta-regression

Coefficients	(1) OLS with clustered standard errors	(2) Hierarchical Models
Precision	-0.00070*** (0.00004)	-0.00084*** (0.00009)
Developed	0.00005 (0.00009)	-0.00003 (0.00014)
Developing	-0.00029*** (0.00004)	-0.00036*** (0.00010)
Panel	0.00014*** (0.00002)	0.00016*** (0.00002)
Low-skilled	-0.00001 (0.00001)	-0.00001 (0.00001)
High-skilled	0.00001 (0.00001)	0.00001 (0.00001)
Broad	0.00002 (0.00005)	0.00005*** (0.00001)
Narrow	0.00004** (0.00002)	0.00004** (0.00002)
Outsourcing	0.00032* (0.00017)	0.00039 (0.00028)
Fixed	0.00056*** (0.00010)	0.00075*** (0.00023)

Industry	-0.00058*** (0.00019)	-0.00067** (0.00026)
Firm	0.00053*** (0.00013)	0.00062** (0.00025)
Services	-0.00002*** (0.000003)	-0.00002*** (0.000003)
High-tech	-0.00045 (0.00190)	-0.00132 (0.00131)
Low-tech	0.00306*** (0.00088)	-0.00082*** (0.00025
Contemporaneous	0.000004** (0.000002)	0.000004*** (0.000002)
Citations	0.00046** (0.00016)	0.000715*** (0.000152)
No. of observations (studies)	**925 (24)**	**925 (24)**

Notes: The dependent variable is *t*. Standard errors are in parentheses. Significance levels: *** for *p-value* < 0.01, ** for *p-value* < 0.05, * *p-value* < 0.1.

Table 4 shows that while the dummy *Developed* is not statistically significant, dummy *Developing* is significant at 1% in both regressions. The negative coefficient of the latter suggests that the effect of offshoring on employment tends to be more negative in developing countries than in developed ones.

However, we find no evidence of significant differences in the employment effect of offshoring according to the worker's skill level. Dummies *Low-skilled* and *High-skilled* are not significant in any regression, meaning that on average the effect of offshoring on the employment of high-skilled workers is not very different from the effect on the employment of low-skilled workers.

In their turn, dummies *Panel*, *Fixed* and *Narrow* are statistically significant (at 1% and 5%) in both regressions, suggesting that the reported effects are sensitive to the structure of the data used in the primary studies, the estimation technique, and the way of measuring offshoring.

The unit of analysis is also relevant in explaining the heterogeneity in the results reported by the primary studies, given that the effect of offshoring on employment tends to be positive and stronger in studies using firm-level data than in studies using industry-level data – dummies *Firm* and *Industry* are statistically significant at 1% in column (1) and 5% in column (2), the former having a negative coefficient and the latter a positive one.

Our meta-regression also indicates that offshoring of services has a lower impact on employment than other forms of offshoring, namely offshoring of manufactured goods, since *Services* has a negative coefficient and is statistically significant.

Finally, the statistical significance and positive coefficient of variables *Contemporaneous* and *Citations* suggest that the immediate effects of offshoring on employment tend to be stronger than the lagged effects and that studies reporting a stronger positive effect tend to be more cited in the literature.

5. Conclusion

Over the last decades, several studies have examined the impact of offshoring on the labour markets. However, the results have been mixed regarding both the magnitude and the direction of such impact.

In this paper, we have conducted a meta-analysis of the empirical literature that estimates the effect of offshoring on employment in the origin country. We first estimated a PET/FAT regression and found no traces of publication bias. We also found that the average effect is weak. However, this does not necessarily mean that offshoring has no impact on employment at all; in fact, due to the high heterogeneity of the results reported by the primary studies, offshoring exerts a positive impact on employment in some circumstances and a negative impact in other circumstances.

The results of the estimation of multivariate meta-regression reveal that differences in the structure of the data, the estimation techniques, the way of measuring offshoring, and the unit of analysis are important factors explaining the heterogeneity in the studies' findings. The meta-regression also shows that the employment effects of offshoring tend to be more negative in developing countries and in the services sectors and are felt more strongly in the immediate than with some temporal lag. We also find that on average the effect for high-skilled workers is not statistically different from the effect for low-skilled workers.

These findings highlight the complex and multidimensional nature of the relationship between offshoring and employment and reinforce the need for a thorough analysis of the transmission channels through which the two variables interact. A better understanding of these channels may provide important guidelines for policymakers.

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