The Determinants of International Outsourcing and its Impact on the Labor Market in the USA

Master Thesis – MSc Economics and Business, International Economics

Erasmus School of Economics, Rotterdam – Academic Year 2016-2017

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Abstract

This research investigates which factors affect the share of offshored activities in American industries and how this procedure influences the difference in wages between high and low skilled workers within the domestic market. This study is carried out through a panel data on 49 industries of the American economy throughout the time span going from 1997 to 2015. In order to take care of serial correlation issues and capture the dynamics of this process, I decide to perform an error correction model, thanks to which it is possible to assess which variables have an effect in the short and long run. The results suggest that when it comes to move production stages abroad, domestic high skilled wages appear to be the major motive in the short run, as the input which companies seek the most is cheaper qualified labor force. A further finding of this study is the widening effect of international outsourcing on the gap between the different kinds of salary only in the short term. However, this procedure does not appear to be the sole factor determining this difference.

1. Introduction

A common practice that companies have been using over the last fifty years to reduce their costs of production and increase corporate profitability is the so-called "Outsourcing". There are two types of outsourcing: the first one involves the movement of an activity outside the firm, but not necessarily outside the country in which it resides. More specifically, companies eliminate in-house activities and outsource them to third party companies, which either offer more convenient conditions or are placed in lower cost locations. However, this practice might have some drawbacks. Firstly, stipulating contracts with other firms may require time and extra effort from a company's legal team. In addition, if there is a lack of communication between the two companies, a delay in the achievement of goals may occur. Lastly, if another party gets access to a firm's confidential information, there could be a leak of data which may represent a risk for its security. The second type is more properly called "International outsourcing" or "Offshoring", which defines the relocation of a company's activity outside the country in which its headquarter is located, but not necessarily outside the firm. The latter practice can be pursued either by establishing subsidiaries abroad or by subcontracting to another firm. The main reason why companies adopt this process is the opportunity to produce goods or provide services at much lower costs due to more convenient economic conditions available in other countries, such as China, India or former Soviet states. In addition, companies can also take advantage of the different taxation and tariff relief in some countries, so as to minimize their effect and generate considerable savings. Finally, the sharp improvements in transportation and communication technologies have increased the benefits of producing abroad rather than domestically (Blinder, 2006). Through my research, I analyze which factors influence the share of offshored activities in 49 industries of the American economy during a time span going from 1997 to 2015. Given the outcome of my empirical analysis, the growth of high skilled workers' wages could be the main cause for which companies move stages of production abroad. Owing to the sharply increasing importance of highly qualified workers in the production process, firms try to search for this kind of labor force at more convenient prices in foreign countries.

However, there are also drawbacks born especially by home workers, as they see themselves substituted by their foreign counterparts. In fact, as this procedure has become more widespread, job losses and declines in wages within developed countries have stimulated opposition towards offshoring. The effect, though, may also depend on the industry in which the firm operates as well as on workers' education. In the manufacturing sector, for instance, moving the various non-skill-intensive stages of the production abroad has decreased the demand for unskilled workers, thereby reducing their salaries (Ebenstein et al., 2014). On the contrary, a rise in the domestic demand for well educated workers has occurred, leading to an increase in skilled workers' wages. This might also be explained by the reduction in marginal costs of production that firms bear due to their offshored activities. The lower costs in turn expand output but, at the same time, raise markups and profitability, which are then shared in the form of higher wages. Moreover, developing countries have experienced a large increase in the availability of skilled labor. Of course, companies planning to outsource labor to offshore facilities should take into account further costs that they might bear, such as training or communication. Alternative strategies may also be found as it occurs in the field of Information Technology (IT) and services, where the production often requires intensive use of skilled workers and, therefore, the stages of production relocated abroad are usually less skill intensive than those remaining within national boundaries (Cheung and Rossiter, 2008). Even in this case labor demand within the nation of origin will shift towards high-skilled workers, increasing their wages (Feenstra and Hanson, 1999). In my research, indeed, I try to verify if the ratio of high and low skilled wages is actually influenced by the offshoring procedure. Results confirm this hypothesis and, overall, we can speculate that international outsourcing could lead to a higher inequality in wages between skilled and unskilled workers. However, this effect is also due to other factors, such as technology diffusion.

In the aftermath of the financial crisis of 2008, firms have been tempted to relocate abroad some of their activities in order to achieve further cost-cuts expenditures in labor. Over the subsequent years from 2008, data indicate that there has been a robust increase in developed economies' FDIs outflows, implying that firms have continued to move abroad some of their activities. Hence, this data could possibly represent an approximate measure of the offshoring phenomenon (Radlo, 2016). Nevertheless, a more accurate measure of offshoring is the share of imports of intermediate goods and services in total inputs, which is based on international input-output tables (Feenstra and Hanson, 1999). This new indicator shows that since the mid-1990s there has been a steady increase in offshoring among developed countries both in manufacturing and service sectors. By contrast, in periods of recession, such as after 2007, this indicator revealed a reduction in offshoring (Radlo, 2016). Here below I report two graphs displaying the trend in offshoring in the US from 1997 to 2015. Specifically, they show the shares of offshored activities within the top ten industries, sorted by manufacturing and service, that exploit international outsourcing.

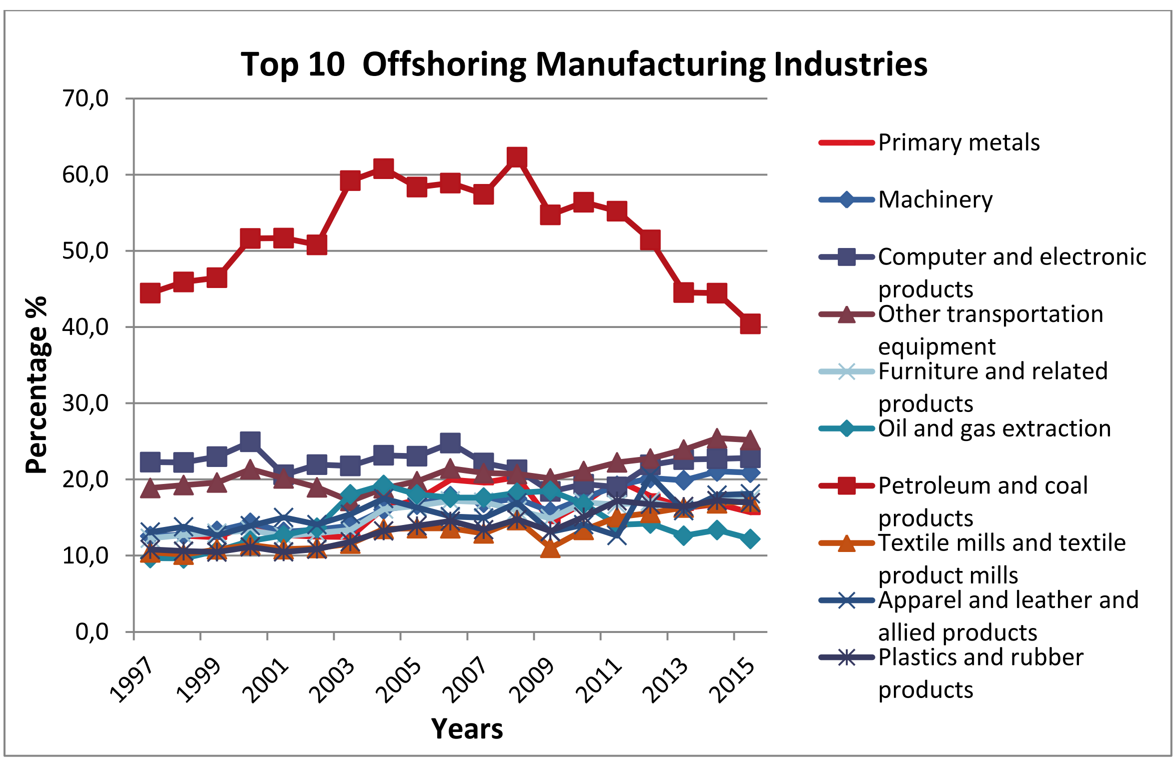

Figure 1. Shares of offshored activities in manufacturing industries (1997-2015).

In figure 1, we can see the ten manufacturing industries with the highest percentage of offshored activities. Almost all shares lie between 10 and 25 percent, whereas petroleum and coal products' share is definitely much higher compared to the previous ones, accounting for 40-60 percent. In addition, this percentage has increased during the years from the beginning of the time span until the period of the 2008 financial crisis' aftermath. Subsequently, as mentioned previously, over the years following the crisis the amount of offshored activities in all industries dropped. This can be seen from the graph at the point corresponding to 2009. Later on, the shares have started to rise again up to 2011, but then until the end of the analyzed time span it seems that all industries have experienced a rather constant decrease in the quantity of offshored activities. This might have been due to the new tendency of firms, as they may have started to move activities back within domestic boundaries or to adjoining countries.

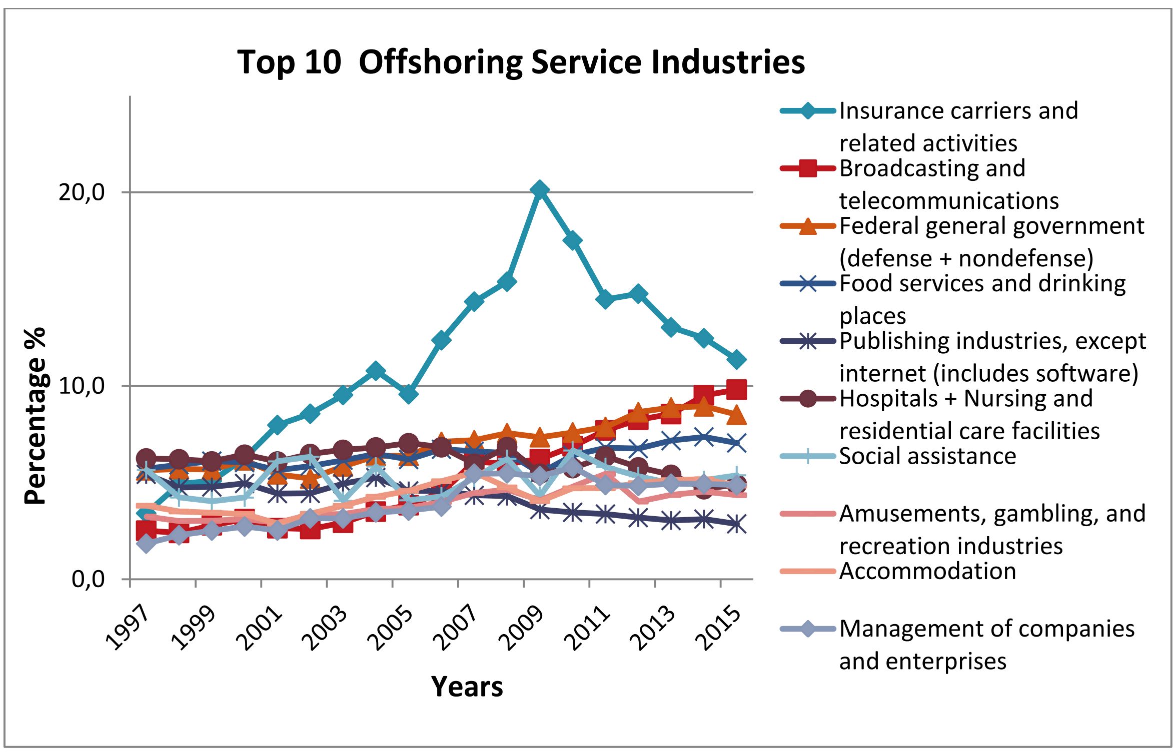

Figure 2. Shares of offshored activities in service industries (1997-2015).

In figure 2, the same trend is shown for service industries. The shares are much lower in percentage than those of manufacturing industries, as they lie between 1 and 10 percent. Focusing more on the details, the case of insurance carriers and related activities industry is particularly interesting, as it has experienced a higher growth peaking at 20 percent in 2009. Nevertheless, its starting and ending points are approximately the same as those of the other industries. Also for all service industries there has been a remarkable decrease in international outsourcing during the aftermath of the crisis. In addition, service sectors appear to have started to reduce the quantity of activities located abroad. Another explanation for this occurrence could be that a few companies are now reluctant to engage in production and services relocation, as citizens of countries in which they are based may face harsh living conditions and, therefore, develop hostile feelings towards offshoring.

The remainder of the thesis is structured as follows. In section 2 and 3 I provide a review of the existing literature and theories concerning this topic for a deeper insight into the causes and consequences of the offshoring procedure and the framework on which I based my research. Section 4 introduces the methodology used to carry out my analysis and section 5 provides a description of the gathered data. Section 6 presents the results obtained through the error correction model strategy, whereas section 7 shows the robustness checks to verify the outcome of the research. Finally, in section 8 I address possible policy implications and share some concluding remarks.

2. Literature Review

In the available literature specifically concerning the determinants of offshoring and its effects on domestic labor market there is some interesting papers that deserve to be mentioned, in order to provide a more comprehensive insight into this procedure. However, first I provide a short review on the methods used to compute the extent of this phenomenon.

As far as it concerns the measure of international outsourcing, there are a few schools of thought. The first measure of international relationships among firms can be represented by data on FDI flows and stock. Unfortunately, these kind of data are usually highly aggregated, providing information on FDI related to production fragmentation along with data on investments in new foreign markets and growth of sales network. Thus, this type of data is not very precise and should be analyzed carefully (Radlo, 2016). Another measure of offshoring is suggested by Grubel and Lloyd (1975), who assert that data on intermediate goods trade provide information on vertical intra-industry trade. These data allow to create rather simple indicators, but useful for analysis. For instance, they allow to compute the share of intermediate goods in imports and exports in different economies and industries. A quite useful and practical measure is the proportion of intra-firm trade in import and export of the economy. This information depicts in detail the intensity of captive offshoring, so the share of intra-corporate transactions in the trade of an economy or among its sectors. Therefore, it would allow to spot this phenomenon and evaluate intra-firm trade in single economies. Unfortunately, it is complicated to find databases with this kind of data, as the only economy that gathers it regularly is the US (Lanz and Miroudot, 2011). Further measures are constructed exploiting the Input-Output tables provided by authorities, such as the US Bureau of Economic Analysis or the European Commission. The first of these indicators is the share of inputs purchased from foreign related companies of American multinationals over the value of their entire production (Lawrence, 1994). A similar but more accurate measure of offshoring is the share of imported intermediate goods and services in total inputs, excluding energy inputs (Feenstra and Hanson, 1999). In order to obtain this index, databases on foreign trade are needed in addition to Inputs-Output tables. Thanks to this measure, it is possible to take into account type and the geographical origin of intermediate inputs. Moreover, it can help to compute the proportion of offshoring at the aggregate level for the entire economy or in particular industries, depending on the availability of data. For this reason it is the most broadly used measure in the literature on this topic (Amiti and Wei, 2005; Geishecker et al., 2012).

Moving on to the determinants of offshoring, there are papers discussing which ones play a major role. A noteworthy study conducted by Lewin and Couto (2007) points out cost reduction as the main reason of offshoring. They survey a group of more than 500 hundred European and American firms to see which factors push them to implement this procedure and find that companies seek especially cheaper high skilled labor force, as it represents most of the time the biggest expense they have to bear. For instance, many firms look at the difference in R&D personnel wages between the home and host country (Demirbag and Glaister, 2010). Furthermore, also productivity seems to provide a reliable picture of outsourcing, as it appears that most efficient firms tend to offshore activities to a higher extent. A possible explanation for this can be that they concentrate their efforts on production stages for which they own the necessary skill, whereas they cut off the inefficient ones. However, this interpretation should be handled carefully due to the possibility of reverse causality. In this sense, some studies allege that, since there are fixed costs for international outsourcing, only most efficient firms put it into practice (Capasso et al., 2011). Other factors that appear to influence the decision to relocate activities abroad are also those not strictly linked to costs, such as geographical proximity, political stability, cultural and linguistic compatibility. These features are taken into account mostly when it comes to choose where to establish subsidiaries.

Through the first studies, the main idea on international outsourcing is that it influences minimally workers wages (Berman, Bound and Griliches 1994). However, important works carried out by Feenstra and Hanson (1995, 1999) reverse this view. In fact, they find that offshoring does not affect directly wages, but rather stimulates technological changes, which seem to be the major cause for the increasing difference between high and low skilled wages in US. They argue that previously used methods to measure this phenomenon were too "narrow", in the sense that they took into account only trades of intermediate goods within the same industry. Therefore, they elaborate a new measure which includes the total intermediate or final goods, now coming also from different industries, used in the production of American firms. More recent studies expanded the knowledge on this topic, as they focused on the displacement of low-skilled workers and how international outsourcing affects absolute wages. Hummels et al. (2011) in their paper provide relevant insights into this issue. Thanks to data on Danish private sector firms and population, they find that offshoring has opposite effects on high-skilled and low-skilled wages. It increases the former, whereas it lowers the latter. In addition, they argue that low-skilled workers who have routine tasks are more likely to experience greater drops in their salaries. Another relevant study is that of Ebenstein et al. (2011) for which they use data on foreign affiliates of American multinational firms. As these firms operate in both manufacturing and service sectors, they investigate how wages change depending on the relocation of workers due to offshoring. Firstly, the effect of international outsourcing during the first half of 1990s is insignificant and modest in terms of magnitude. On the contrary, from the second half of the 90s onwards the impact becomes significant and economically relevant. In addition, those who stay within the manufacturing industry go through trivial changes in wages, whereas those who move to service sector experience relevant declines in their salaries: around 2-4% for workers switching industry and 8-15% for those who also change occupation. Geishecker and Gorg (2008) study the relationship between wages of high and low skilled workers and international outsourcing. They use industry-level data on German industries' outsourcing activities and their main result is that offshoring reduces salaries of low-skilled workers by 1.5%, whereas it increases those of high-skilled workers by 2.6%. Baumgarten et al. (2013) look at the link between offshoring, wages, and the occupational task profile in Germany. Their findings show that within-industry changes in offshored activities lead to a slight decrease in low-skilled workers wages. Sethupathy (2013) investigates how American wages are affected by the new offshoring opportunities in Mexico. The results suggest that domestic wages rise only for firms able to exploit these favorable circumstances, whereas those that are not able to do it experience a fall in their wages. Currently, what institutions worry about the most is how to cope with displaced workers: helping them finding a new job and avert harsh times while unemployed (Chang, 2012). Feenstra and Hanson (1999) study the impact of both technological change and offshoring on nonproduction workers, which are assumed to be high skilled labor force. They find that salaries rise mostly due to the former, explaining around 35% of the growth. On the other hand, offshoring seems to play a smaller role, since it explains up to 15%. Thus, their results support the widespread idea that the gap between the two kinds of workers in terms of salary increases mostly due to the greater use of computers and technology. Slaughter (1998) studies whether the transfer of production stages from US multinational enterprises to foreign affiliates shifts within industry labor demand towards more skilled workers. His regression model suggests that, as MNE transfer increases, there is no evidence of significant effects on labor demand composition.

3. Theoretical Background

As the offshoring procedure is a multidimensional phenomenon, there is not a univocal economic theory explaining its various aspects. Consequently, when it comes to provide a theoretical background for this process, it is necessary to present an overview of economic theories concerning international trade that try to explain causes and possible effects of this procedure.

A first insight into how the differences in labor costs lead countries to specialize in the production of certain goods is given by Adam Smith. Countries start to produce those goods for which they enjoy an absolute advantage in terms of costs with respect to other countries. He claims that, in a context of international trade, this can be considered as an advanced system of labor division. Later, Ricardo introduces the concept of comparative advantage, which indicates the ability of an economic agent to produce a good at a lower opportunity cost, hence more efficiently, than other agents do. Thanks to this concept, he alleges that countries move resources to places where the labor employed for a specific good is relatively more productive. Subsequently, Heckscher and Ohlin re-elaborate Ricardo's theory by including more production factors rather than the sole labor force. Therefore, they argue that international specialization in production and trade takes place depending on the factor endowments of a country and on the intensity of their use in the productive process.

Although these are avant-garde theories in their own times, they look only at trade of final goods and do not focus on production fragmentation. In order to overcome this limitation, the successive authors introduce intermediate goods in international trade flows in place of final ones. Grossman and Rossi-Hansberg (2006) explain reasons and consequences of offshoring through the Heckscher-Ohlin model. They assume that the production of each good needs both high and low skilled labor, with different intensities, and the task of low-skilled labor is the only one that can be moved abroad. In their model, the key factors affecting the choice to relocate activities to another country are the relative cost of labor abroad and the task's susceptibility to offshoring. The last factor takes into account features such as communication and transportation costs and technology. Therefore, if the combined effect of these factors assures more convenient conditions of production, companies eventually opt for relocating activities abroad. As a result, firms generate savings and experience an increase in their production efficiency. Thanks to these adjustments, the authors argue that now countries carry out certain tasks belonging to the global value chain of a particular final good, instead of specializing in its production and trade. A fact that corroborates their argument is that production fragmentation has caused a steep increase in trade in tasks over last thirty years. Ivarsson and Johnsson (2000) try to see if intra-firm trade between multinationals' subsidiaries is correlated to the driving factors for a specific location of their venues. This study can be relevant to the purpose of this research as intra-firm trade in intermediate goods gives a more accurate estimate of offshoring. They find that there is a positive relationship between intra-firm trade and efficiency enhancement purposes of FDIs. This result is confirmed by Manning et al. (2008), whose study is based on the annual Offshoring Research Network survey. They allege that the main reasons for offshoring are efficiency in terms of costs and the availability of resources, such as qualified employees and a superior service level. Lastly, another important theory is that of Molla (2010), who analyzes the role of exchange rates in defining the level of internationally outsourced activities. He argues that the effects of fluctuations in exchange rates are easily observable, as domestic cost to import intermediate goods is surely affected by movements in the currency's value. Focusing on Swedish industries during the years 1995 to 2005, the main findings of his model indicate that an appreciation of the local currency leads firms to raise their share of offshored activities.

In order to evaluate which factors contribute to the growth of offshoring, I take the cue from Grossman and Rossi-Hansberg (2006) supposing that production requires both high and low skilled labor and companies seek cost cutting opportunities. Moreover, as Molla (2010) suggests that variations in exchange rates are crucial for the share of offshored activities, in my model I check if these results can be confirmed for American industries as well.

Moving on to the possible consequences of offshoring, a relevant theory is the one developed by Markusen (2005) from the model of Heckscher-Ohlin. He elaborates a group of different models in which he tries to take into account many aspects affecting offshoring, in order to evaluate its effect distribution on wages of different kinds of workers and on international trade. He starts from an H-O model with two different factor endowments and two final goods, allowing for production fragmentation and subsequent trade between the two countries, a more advanced economy and a less developed one. By progressively adding more assumptions to his models, he concludes that benefits in terms of wages, production and trade flows are not equally distributed. He points out that those more negatively influenced are the unskilled workers of the developed country. However, he also suggests to evaluate cautiously the results of the model, as they may vary depending on the assumptions made, such as differences in factor endowments, comparative advantages and factor intensity of production.

A further theory on the ambiguity of offshoring's effects is provided by Grossman and Rossi-Hansberg (2008), who elaborate a model thanks to which they try to explain the consequences of offshoring on the domestic labor market with particular regard to differences in wages between high and low skilled workers. They claim that this procedure gives rise to three different effects on both kinds of salaries, depending also on which factor is more intensive in the production of a certain good. Firstly, through offshoring firms enhance efficiency and productivity of their workers, who experience an increase in their real wages. The second one is due to the amount of labor supply, which rises because of the higher number of dismissed workers within the economy. As a result, the temporary excess of labor supply drags real wages down. Lastly, the third consequence is the relative price effect in general equilibrium, which can be explained through the Stolper-Samuelson theorem. Final goods that exploit offshoring for their production experience a fall in their prices. This, in turn, negatively influences the price of factors, either high skilled or low skilled labor, used intensively during production, whereas at the same time it also increases those used less intensively. Therefore, the overall result of the three aforementioned effects might be hard to estimate through an empirical research, since it depends mainly on the relative magnitude of these effects and if offshored stages intensively use high or low skilled labor.

On the basis of the work of Grossman and Rossi-Hansberg (2008), through my research I try to see the overall effect of this procedure on the ratio of high and low skilled wages, since I do not have any information on factor intensities or jobs' susceptibility to offshoring. Furthermore, I also check whether the internet use can be pointed out as a determinant of the gap between the two kinds of salaries, as Feenstra and Hanson (1999) claim that technology improvements along with international outsourcing increase this difference.

Another consequence of international outsourcing procedure is the remarkable changes in the structure of international trade. As this strategy takes place, the different tasks involved in the productive process are carried out in various locations, depending on their factor intensities and the availability of necessary resources at more convenient prices. The implementation of production fragmentation leads to the production of intermediate goods and services, which in turn causes a sharp increase in international trade. In fact, Baldwin and Robert-Nicoud (2006) note that there has been a significant gap between global trade growth and that of world GDP. They allege that this is due to the positive contribution of trade in intermediate goods and services to international exchanges value, as the former does not replace the latter. In addition, as transportation and communication costs drop, production fragmentation becomes more sophisticated. This implies that international competition is now between sets of workers able to cope with various facets of the production, instead of being between firms producing final goods. Consequently, comparative advantages may change quickly and may be harder to estimate. As a result, it becomes more complicated to forecast the outcome of the competition in international trade. This undoubtedly represents an important change on one of the building blocks of international trade theory.

From this brief excursus, it is clear that all these economic theories contribute to illustrate this phenomenon and its numerous aspects, from the motives up to the possible consequences. In conclusion, there is no univocal theory capable to explain offshoring as a whole, but we need to rely on the related theories in order to have a deeper understanding of this procedure.

4. Model

My data is a panel data with yearly observation for 49 industries of United States over a time span of 19 years, namely from 1997 to 2015. At first, I perform two pooled OLS regressions which represent my benchmark models. Concerning the first stage of this analysis, the main purpose of the first regression model is to understand what the determinants of offshoring are. For this scope, I use as independent variables inputs for the production process, such as average high and low skilled wages, the value of total labor cost and of capital. In addition, I include also the total gross output in order to take into account the size of firms as well. Moving on to the next stage, the objective of the second model is to verify whether this phenomenon has an impact on wages in the American labor market. More specifically, I try to check if the delocalization of productive activities implemented by firms widens the difference in wages between high-skilled and low-skilled workers. For this purpose, the independent variable on which I focus is the offshoring share. Further regressors are the unemployment rate, the internet use so as to control for technology diffusion, and the minimum wage which accounts for implemented policies concerning this topic.

In order to determine what could influence the decision to offshore activities and by what magnitude, the first regression model is structured as follows:

$$lnOff_{i,t} = \beta_0 + \alpha lnHS_{i,t} + \beta lnLS_{i,t} + \gamma lnGrOut_{i,t} + \delta lnLab_{i,t} + \zeta lnK_{i,t} + \eta lnXR£_t + \varepsilon_{i,t}$$

Subscripts i and t refer to industry and year, respectively. $lnOff_{i,t}$ is calculated as the logarithm of offshoring index, which is constructed as the share of imported intermediate inputs over total production inputs except for energy inputs. The idea behind the exclusion of energy inputs from the data used to calculate the offshoring variable is trying to take into consideration only those tasks and services strictly related to the production and supply chain that can be carried out abroad, such as assembly or financial services.

$$Offshoring_{i,t} = \frac{\sum_{j=1}^{N} Imported\ intermediate\ inputs - imported\ energy\ inputs}{\sum_{j=1}^{N} Total\ intermediate\ inputs - energy\ inputs} \times 100$$

Here j indicates the N industries from which used intermediate inputs come. I use this indicator since it is one of the most broadly used in the literature (Amiti and Wei, 2005; Geishecker et al., 2012). $lnHS_{i,t}$ refers to the average wages of high-skilled, whereas $lnLS_{i,t}$ shows that of low-skilled workers in each industry. $lnGrOut_{i,t}$ is the logarithm of total gross output value of each industry. $lnLab_{i,t}$ indicates the logarithmic scale of labor total costs used in the production process. $lnK_{i,t}$ is computed as the logarithm of the value of capital employed in each industry. $lnXR£_{i,t}$ is the yearly exchange rate between the American dollar and the British pound and is converted into logarithms. Through these models I try to check whether high-skilled and low-skilled wages have a significant effect on the share of imported intermediate inputs. Consequently, the null hypotheses (H_0) are that the outcomes of $lnHS_{i,t}$ and $lnLS_{i,t}$ in the models are not significantly different from zero. These hypotheses are rejected at different levels of significance (i.e. 10%, 5% and 1%) and, thus, the alternative hypotheses (H_1) are verified: the coefficients of high-skilled and low-skilled wages are significantly different from zero.

By contrast, in order to see whether offshoring enlarges the difference between high-skilled and low-skilled wages, the regression model is built as follows:

$$lnRelW_{i,t} = \beta_0 + \alpha lnOff_{i,t} + \beta lnUnemp_{i,t} + \gamma lnInternet_{i,t} + \delta lnAdMinWage_{i,t} + \varepsilon_{i,t}$$

Subscripts i and t indicate industry and year, respectively, here as well. $lnRelW_{i,t}$ is the ratio of high-skilled wages over low-skilled wages. As far as it concerns $lnOff_{i,t}$, it is constructed in the same way as in the previous model. $lnUnemp_{i,t}$ refers to the unemployment rate characterizing each industry and is transformed into logarithms. $lnInternet_{i,t}$ measures the change in percentage of American population who has used the Internet from any location over the last 3 months through any kind of device, such computer or mobile phone. $lnAdMinWage_{i,t}$ shows the variation in the minimum wage in the US adjusted for the inflation rate, namely to 2015 dollars through the Consumer Price Index for All Urban Consumers (CPI-U).

As this model is meant to capture the effect of offshoring on wages, I expect $lnOff_{i,t}$ to reveal a positive and significant effect on $lnRelW_{i,t}$. Therefore, my null hypothesis (H_0) is that the consequences of offshoring in the model are not significantly different from zero. This hypothesis is rejected at different levels of significance (i.e. 10%, 5% and 1%) and, thus, the alternative hypothesis (H_1) is confirmed: the coefficient of the offshoring indicator is significantly different from zero.

Since my dataset is a dynamic panel, I decide to adopt an error correction model approach, so that I would be able to capture both short run and long run correlation between my dependent and independent variables. In addition, I include in both models fixed effects in order to account for time invariant features of each industry and common sector's characteristics that vary over time.

Therefore, the regressions look as follows:

$$\begin{aligned}\Delta lnOff_{i,t} = {} & \beta_0 + \beta_1 \Delta lnHS_{i,t} + \beta_2 \Delta lnLS_{i,t} + \beta_3 \Delta lnGrOut_{i,t} + \beta_4 \Delta lnLab_{i,t} + \beta_5 \Delta lnK_{i,t} + \beta_6 lnXR£_t \\ & + \beta_7 lnOff_{i,t-1} + \beta_8 lnHS_{i,t-1} + \beta_9 lnLS_{i,t-1} + \beta_{10} lnGrOut_{i,t-1} + \beta_{11} lnLab_{i,t-1} \\ & + \beta_{12} lnK_{i,t-1} + \beta_{13} lnXR£_{t-1} + \varepsilon_{i,t} + \alpha_i + \eta_t\end{aligned}$$

and

$$\begin{aligned}\Delta lnRelW_{i,t} = {} & \beta_0 + \beta_1 \Delta lnOff_{i,t} + \beta_2 \Delta lnUnemp_{i,t} + \beta_3 \Delta lnInternet_{i,t} + \beta_4 \Delta lnAdMinWage_{i,t} \\ & + \beta_5 lnRelW_{i,t-1} + \beta_6 lnOff_{i,t-1} + \beta_7 lnUnemp_{i,t-1} + \beta_8 lnInternet_{i,t-1} \\ & + \beta_9 lnAdMinWage_{i,t-1} + \varepsilon_{i,t} + \alpha_i + \eta_t\end{aligned}$$

As can be seen in the regressions, I used the first differences of the original variables, which are represented by the terms followed by the delta, and included also their lagged values. Thanks to this approach, I manage to correct for serial correlation, which both of my models present, as I verify through residual analysis. However, since residuals are still serially correlated in the second regression, I introduce the lagged first difference of the ratio between high and low skilled wages among the independent variables. Thanks to this approach, the issue of serial correlation should be overcome and, therefore, the model should provide consistent estimates.

5. Data

The main sources of data on US industries I use for this analysis are the Bureau of Economic Analysis and the Bureau of Labor statistics. From the former I collect the Use Input-Output tables and the Import Matrices, thanks to which I calculate the Offshoring share variable. Whereas from the latter, I obtain data on wages in each industry by type of profession on unemployment rates by industry and on minimum wage. Further involved databases are those on the values of produced gross output and used capital and labor in each industry provided by the World Klems website. In addition, I consult the World Bank database for data on internet use. Lastly, I retrieve yearly data on currencies exchange rates from the Oanda Corporation database. Overall, the gathered data refer to 49 industries of the American economy and the time span considered for this analysis goes from 1997 to 2015. Therefore, the total amount of observations is 931 for each variable, except for capital, labor and dollar/euro exchange rate due to lack of data for one year. When put into the regression model, all variables are converted into logarithms, in order to evaluate the changes in terms of growth rates.

Table 1. Descriptive Statistics

VARIABLES	(1) N	(2) mean	(3) sd	(4) min	(5) max
Industry	**49**	**N/A**	**N/A**	**N/A**	**N/A**
Offshoring Share (%)	**931**	**8.64**	**8.49**	**0.190**	**62.3**
Gross Output (mln)	**931**	**327,528**	**381,086**	**16,149**	**2,965,000**
Capital (mln)	**882**	**83,998**	**209,278**	**1,857**	**1,940,000**
Labor (mln)	**882**	**89,554**	**100,383**	**1,893**	**550,429**
Internet Use (%)	**931**	**68.891**	**16.250**	**21.616**	**75.00**
Adjusted Min Wage/Hour	**931**	**7.10**	**0.52**	**6.04**	**7.98**
Unemployment Rate (%)	**931**	**6.120**	**2.873**	**1.900**	**20.60**
High-Skilled Wage	**931**	**30.25**	**6.657**	**15.60**	**51.93**
Low-Skilled Wage	**931**	**15.34**	**3.045**	**8.439**	**25.66**
Ratio HS/LS	**931**	**1.972**	**0.194**	**1.308**	**2.670**
Exchange Rate $/€	**882**	**0.844**	**0.129**	**0.682**	**1.121**
Exchange Rate $/£	**931**	**0.611**	**0.050**	**0.499**	**0.693**
Exchange Rate $/¥	**931**	**108.42**	**14.291**	**78.645**	**126.801**

Thanks to the descriptive statistics, we can observe some interesting features of the examined variables. As far as it concerns offshored activities, the average share accounts for approximately 8.6%. In the sample, the amount of internationally outsourced activities varies noticeably, as some industries present values over 50%, whereas some others less than 1%. Firms adopting this procedure to a great extent belong mostly to manufacturing sectors. By contrast, those showing the lowest percentages of offshored activities usually operate in service industries. Moving on to the other inputs used for the production process, the average value of capital and cost of domestic labor input is 84,000 and 90,000 million dollars, respectively. Regarding the outcome of final production, on average the gross output is roughly 330,000 million dollars. However, it differs remarkably across industries since some show values of only 16,000 millions, while others reach almost 2,000 billion dollars. This is certainly caused by the rather elevated number of industries and their great diversity. Focusing now on the internet use rate, it can be noticed that over the last twenty years the percentage of people able to access to the internet has sharply risen. In 1997 this percentage accounted for only 22%, but in 2015, as the broadband and smartphones became widespread, it has more than tripled. Observing minimum wage statistics, the maximum value was reached in 2009 with roughly 8 dollars an hour, whereas the least value was 6 dollars in 2006. However, the hourly minimum wage has slightly changed if comparing the initial and final amount, since both are between 7.25 and 7.6 dollars. Regarding unemployment data, I extracted them from a database reporting the total and the percentage of unemployed persons by industry, class of worker and gender. The unemployment rate is on average 6%, but it reaches 20% at maximum most likely because of the inclusion of the crisis period. Analyzing wages, those of high-skilled workers average around 30 dollars per hour, whereas those of low-skilled workers are roughly 15 dollars. In addition, the former fluctuates more than the latter, as its standard deviation is more than twice that of low-skilled. Consequently, it can be observed that the mean ratio of high-skilled over low-skilled wages takes the value of almost two. This could lead to the conclusion that across the sectors and the years considered highly qualified workers earn on average twice as much as low qualified ones, although the formers' wages tend to vary more. Therefore, this gap demonstrates that a better education or higher qualifications are a long term investment, which eventually will pay off. As far as it concerns exchange rates, the dollar/euro rate presents less observations compared to the others since European currency rates were determined for the first time on December 31st 1998.

6. Results

Analyzing the tests' results on the residuals of the models, I confirm the concerns about the presence of serial correlation. Current residuals are, indeed, highly correlated with their lagged values. This outcome corroborates the implementation of an error correction model strategy in order to solve this issue.

Table 2.

[1]Dependent Variable	D.lnOff
Independent Variables	
D.lnHS	0.269**
	(0.108)
D.lnLS	-0.324**
	(0.139)
D.lnGOut	0.0587
	(0.0573)
D.lnK	0.00692
	(0.0261)
D.lnLab	0.000278
	(0.0437)
D.lnXR£	2.490**
	(1.196)
lagOff	-0.224***
	(0.0216)
lagHS	0.162
	(0.102)
lagLS	-0.228
	(0.139)
lagGOut	0.0862**
	(0.0375)
lagK	-0.0126
	(0.0231)
lagLab	-0.106***
	(0.0344)
lagXR£	3.574*
	(2.144)
Constant	1.359
	(1.407)
Observations	833
Number of ID	49
Industry FE	Yes
Time FE	Yes
R-squared	0.366

Long run coefficients interpretation	
lagGrossOutput :	$\frac{0.0862}{-(-0.224)} = 0.385$
lagLabor :	$\frac{0.106}{-(-0.224)} = 0.473$
lagXR$/£ :	$\frac{3.574}{-(-0.224)} = 15.95$

Table 2a. Long run estimates are calculated as the ratio between the coefficient of the variable of interest and minus the coefficient of *lagOff*.

[1] All variables are transformed in logarithmic scales. The model includes both industry and time fixed effects. Standard errors are reported in parentheses. *, **, *** indicates significance at the 10%, 5%, and 1% level, respectively.

The estimates of the error correction model are displayed in Table 2. Here these results are obtained by including both industry and time fixed effects. As far as it concerns the two salaries, it seems that high and low skilled wages affect offshoring in the short run, but they do not in the long run. Therefore, their effect does not persist and dies out after a short amount of time. The coefficients provide estimates for the dependent variable's elasticity to changes in the growth rates of the independent variables. More specifically, if high-skilled wages grow by 1%, the offshoring share goes up by 0.27%. Hence, firms have an incentive to internationally outsource activities when the average highly qualified labor becomes more expensive. This result is consistent with Demirbag and Glaister (2010) who look at the differences in R&D personnel wages between countries as a possible determinant of offshoring. On the contrary, as low-skilled salaries experience the same change, they lead to a drop in offshoring by 0.32%. Apparently, although the cost of less qualified workers augments, companies still prefer to employ domestic labor, which is an unexpected result. A possible explanation for this outcome might be that many low skilled professions either need to be performed in a particular workplace or require a face-to-face approach, such as receptionist or personal assistant. Therefore, although these wages rise, employers are still forced to hire domestic workers, as some jobs are poorly susceptible to international outsourcing. Accordingly, Blinder (2009) argues that high skilled jobs might be slightly more offshorable compared to low skilled ones. Nevertheless, this estimation strategy could be improved by sorting these jobs in an "offshorability" scale and analyzing their wages' impact on this procedure, in order to obtain a more accurate assessment. As the results show that the two types of salary affect offshoring only in the short run, it could mean that their variations cause a slight shock at the beginning, implying that firms react by either moving abroad more activities or reducing them. However, as both wages seem not to have any significant effect in the long run, firms' decisions on offshoring for the future do not depend on their variations. The variable which seems to play a role both in the short and long run is the exchange rate. From the outcome of the regression, it can be noted that, when the dollar appreciates by one percentage point with respect to the pound, offshoring goes up by 2.50% in the short run. At the same time, in the long run an equal variation causes an increment in this procedure of 15.95%. These results are consistent with the findings of Molla (2010) and confirm the conviction that exchange rates definitely play a remarkable role when it comes to offshoring. An appreciation of the domestic currency or a depreciation of the destination country's currency allows firms to experience purchasing power gains, as employing labor force in the chosen country becomes more convenient. Differently, the gross output and the domestic labor input contribute exclusively in the long run. In fact, as the former rises by 1%, offshoring grows by 0.38%, whereas a 1% increase in the latter makes it fall by 0.47%. From these results it can be inferred that companies start to offshore a higher amount of activities when they experience a growth in their production and, in turn, in their size. This could also imply that, once they reach certain dimensions, they can bear more easily the fixed costs entailed by offshoring procedure, such as transportation costs. By contrast, when they use more domestic labor input, they tend to reduce offshoring. These variables appear to play a major role when it comes to long term plans for firms' activities.

In order to provide some estimates of how offshoring affects the difference between high and low skilled wages, I focus on Table 3, which includes both time and cross sectional fixed effects. As a small remark, in this model I regress my dependent variable also on its lagged first difference. I adopt this strategy in order to solve the issue of persisting serial correlation, which is confirmed by the outcome of residuals analysis.

Table 3.

[2]Dependent Variable	D.lnRelW
Independent Variables	
D.lnOff	0.0314**
	(0.0136)
D.lnUnemp	0.00874
	(0.00856)
D.lnInternet	0.105
	(0.0763)
D.lnAdMinW	-0.521
	(0.693)
LD.lnRelW	-0.139***
	(0.0344)
lagRelW	-0.478***
	(0.0351)
lagOff	-0.00567
	(0.00855)
lagUnemp	0.0226***
	(0.00792)
lagInternet	0.0367*
	(0.0191)
lagAdMinW	-0.485
	(0.318)
Constant	1.089*
	(0.598)
Observations	833
Number of ID	49
Industry FE	Yes
Time FE	Yes
R-squared	0.403

Long run coefficients interpretation	
lagUnemployment :	$\frac{0.0226}{-(-0.478)} = 0.047$
lagInternet :	$\frac{0.0367}{-(-0.478)} = 0.077$

Table 3a. Long run estimates are calculated as the ratio between the coefficient of the variable of interest and minus the coefficient of *lagRelW*.

The main finding of this model is the short run effect caused by offshoring. It influences, indeed, positively the differential between wages, as a 1% rise leads to an increase of 0.03%. This result is consistent with Geishecker and Görg (2011) who study the impact of service offshoring on wages. Therefore, when companies decide to exploit offshoring to a greater extent, this produces a temporary shock, which widens the difference between the two kinds of salary. The effect has rather slight magnitude, but still significant, whereas in the long run it does not persist, turning irrelevant. This might be motivated by the fact that offshoring allows companies to cut their costs and reinvest those new resources to expand the

[2] All variables are transformed in logarithmic scales. The model includes both industry and time fixed effects. Standard errors are reported in parentheses. *, **, *** indicates significance at the 10%, 5%, and 1% level, respectively.

production. Consequently, dismissed employees could be hired back in newly created departments, without suffering drastic declines in their salary for a long period of time (Grossman and Rossi-Hansberg, 2008). It cannot be excluded, though, that implementation of policies on the minimum wage or successful negotiations on salaries between labor unions and employers may contribute to slow the decline in salaries. In addition, there are a few programs in the US aiming to guarantee subsidies and allowances to employees who have been laid off due to trade or outsourcing reasons. Among these there is the unemployment insurance, which provides involuntary dismissed workers with benefits accounting for 50% of their previous salary on average. Initially this program lasted for a maximum of six months, but it has been extended up to one year in 2009 to compensate the high unemployment rates experienced during the aftermath of the financial crisis (Chang, 2012). Once put into force, the joint effect of these interventions may balance the consequences of offshoring on the gap between wages, bringing those of low-skilled workers closer to those of high-skilled ones. As far as it concerns factors causing long run effects, the only variables that appears to play a relevant role are unemployment and internet use. In fact, a 1% change in the unemployment rate entails an enlargement in the gap of approximately 0.05%. The kind of labor which firms usually skimp on is the low skilled one, as it can be replaced more easily then highly qualified labor. Consequently, this procedure certainly increases the difference between the two wages, since the lower demand for low skilled workers reduces their salary. Regarding internet use, a 1% variation in the people having access to the internet leads to an increase in the difference of 0.08%. This result could imply that, as technology makes progress, those who really take advantage of it are, indeed, high skilled workers. This outcome could be due also to the fact that, since technology or more simply the use of computers has become crucial throughout the production process, companies now require their employees to be capable to carry out tasks for which strong computer skills are highly necessary. Therefore, high skilled labor force, which is likely characterized by higher computer skills, becomes more requested, experiencing an increase in its wage values. This result is quite consistent with Feenstra and Hanson (1999) who argue that the enlargement of the gap between the two kinds of wages is not only caused by the higher implementation of offshoring, but also by the rapid technological progress.

7. Robustness Checks

Herein I perform a few tests, in order to provide an assessment of the robustness of my results.

First of all, I present the outcome of the serial correlation tests for both the first and the second regression. I regress the residuals of each regression on their lagged values, so as to check whether they are significantly correlated.

Table 4.

(1) Offshoring Determinants		(2) Effects on Wages	
Dep. Variable	ResidOff	Dep. Variable	ResidWage
Indep. Variable		Indep. Variable	
LagResidOff	0.0245	LagResidWage	-0.0136
	(0.0364)		(0.0332)
Constant	0	Constant	5.61e-11
	(0.00338)		(0.00116)
Observations	784	Observations	784
Number of ID	49	Number of ID	49
R-squared	0.001	R-squared	0.000

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The results in the first column of the table refer to first regression aiming to analyze the determinants of offshoring. As it can be seen, the results are not significant, meaning that this model is not affected by serial correlation. I obtain the same outcome in the test checking for the presence of serial correlation in the second model, which looks at the effect of offshoring on wages. The results are not significant here as well, hence estimates are not upset by serial correlation.

Another test that I perform in order to check the goodness of my results is the normality test, through which I see if residuals follow a normal distribution. As far as it concerns the first regression model, which investigates how offshoring is affected by the level of high and low skilled wages, it can be seen in Figure 3 that residuals present a slight negative skewness. Overall, though, residuals appear to be quite normally distributed.

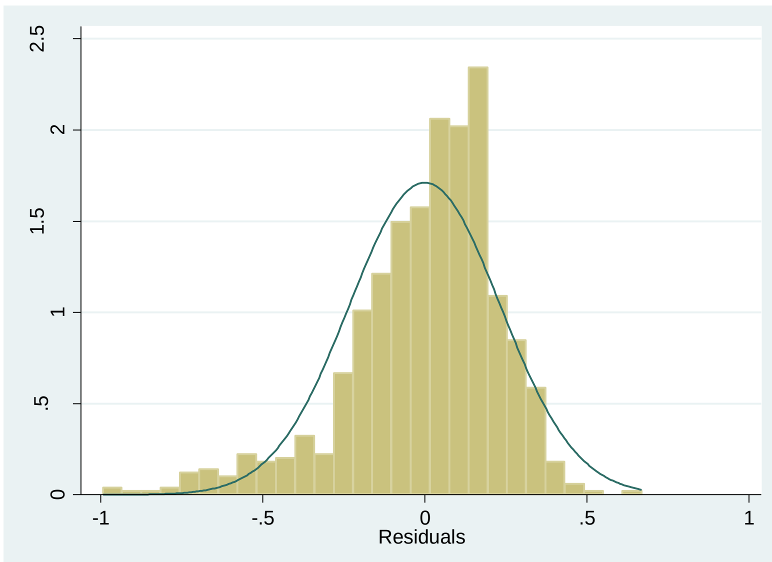

Figure 3. Normality test first equation.

Moving on to the second model, which evaluates how offshoring influences the gap between high and low skilled wages, the results show the residuals that seems to follow a rather normal distribution.

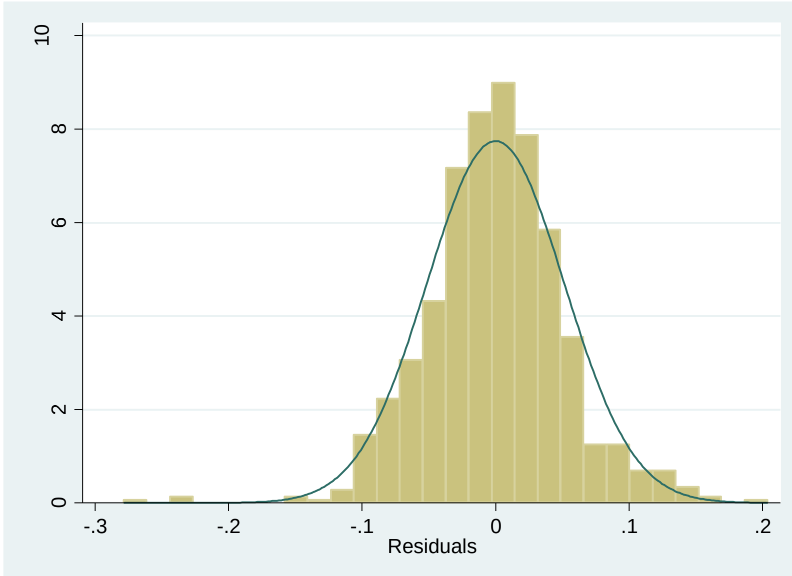

Figure 4. Normality test second equation.

In addition to these graphic tests, I also perform the Jarque-Bera normality test, which suggests, though, that both models' residuals are not normally distributed. However, it is well known that this kind of test easily fails to confirm the observance of a normal distribution, because it requires particularly strict assumptions to be satisfied. Therefore, the negative outcome of this test can also be neglected.

In order to verify the robustness of my results, I also try to take out the other independent variables one at a time.

Table 5.

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)
LaglnOff	-0.197***	-0.196***	-0.195***	-0.196***	-0.224***	-0.224***	-0.224***
	(0.0202)	(0.0202)	(0.0202)	(0.0204)	(0.0216)	(0.0216)	(0.0216)
D.lnHS		0.150	0.208**	0.213**	0.268**	0.269**	0.269**
		(0.101)	(0.104)	(0.104)	(0.107)	(0.108)	(0.108)
lagHS		-0.00620	0.0610	0.0593	0.155	0.162	0.162
		(0.0868)	(0.0951)	(0.0957)	(0.101)	(0.102)	(0.102)
D.lnLS			-0.282**	-0.261*	-0.319**	-0.324**	-0.324**
			(0.134)	(0.136)	(0.139)	(0.139)	(0.139)
lagLS			-0.223*	-0.197	-0.223	-0.228	-0.228
			(0.128)	(0.133)	(0.138)	(0.139)	(0.139)
D.lnGOut				0.0656	0.0649	0.0587	0.0587
				(0.0430)	(0.0502)	(0.0573)	(0.0573)
lagGOut				-0.00359	0.0744**	0.0862**	0.0862**
				(0.0186)	(0.0307)	(0.0375)	(0.0375)
D.lnLab					-0.00376	0.000278	0.000278
					(0.0432)	(0.0437)	(0.0437)
lagLab					-0.106***	-0.106***	-0.106***
					(0.0344)	(0.0344)	(0.0344)
D.lnK						0.00692	0.00692
						(0.0261)	(0.0261)
lagK						-0.0126	-0.0126
						(0.0231)	(0.0231)
D.lnXR£							2.490**
							(1.196)
lagXR£							3.574*
							(2.144)
Constant	-0.617***	-0.601**	-0.249	-0.268	-0.381	-0.414	1.359
	(0.0631)	(0.272)	(0.335)	(0.381)	(0.395)	(0.401)	(1.407)
Observations	882	882	882	882	833	833	833
Number of ID	49	49	49	49	49	49	49
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.334	0.336	0.340	0.342	0.365	0.366	0.366

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Focusing on the coefficients of high and low skilled wages, as we can see the results do not change remarkably from their values in the final regression. The variables of interest remain significant throughout the whole test. Therefore, I consider these estimates quite robust.

I implement the same approach also for assessing the quality of the results obtained through the second model.

Table 6.

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
laglnRelW	-0.496***	-0.469***	-0.464***	-0.478***	-0.478***	-0.478***
	(0.0296)	(0.0349)	(0.0348)	(0.0351)	(0.0351)	(0.0351)
lagD.lnRelW		-0.139***	-0.142***	-0.139***	-0.139***	-0.139***
		(0.0345)	(0.0344)	(0.0344)	(0.0344)	(0.0344)
D.lnOff			0.0316**	0.0314**	0.0314**	0.0314**
			(0.0137)	(0.0136)	(0.0136)	(0.0136)
lagOff			-0.00464	-0.00567	-0.00567	-0.00567
			(0.00858)	(0.00855)	(0.00855)	(0.00855)
D.lnUnemp				0.00874	0.00874	0.00874
				(0.00856)	(0.00856)	(0.00856)
lagUnemp				0.0226***	0.0226***	0.0226***
				(0.00792)	(0.00792)	(0.00792)
D.lnInternet					-0.376	0.105
					(2.694)	(0.0763)
lagInternet					-0.0441	0.0367*
					(0.472)	(0.0191)
D.lnAdMinW						-0.521
						(0.693)
lagAdMinW						-0.485
						(0.318)
Constant	0.296***	0.313***	0.294***	0.269***	0.484	1.089*
	(0.0180)	(0.0210)	(0.0340)	(0.0350)	(2.079)	(0.598)
Observations	882	833	833	833	833	833
Number of ID	49	49	49	49	49	49
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.352	0.391	0.396	0.403	0.403	0.403

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Here as well, the estimates of the offshoring effect on the gap between the different kinds of wages do not vary as the other control variables are taken out of the regression. In addition, the significance of the main variable of interest, namely *D.lnOff*, stays constant during all the steps of the test. As far as it concerns the other variables, *lagUnemp* maintains its coefficient and significance constant throughout the whole test. By contrast, *lagInternet* gains significance only when the adjusted minimum wage is included in the regression. Therefore, this last result may not be robust.

Table 7.

Dependent Variable D.lnOff			
Independent Variables	(1)	Independent Variables	(2)
L.lnOff	-0.224***	L.lnOff	-0.214***
	(0.0216)		(0.0233)
D.lnHS	0.269**	D.lnHS	0.230**
	(0.108)		(0.110)
L.lnHS	0.162	L.lnHS	0.116
	(0.102)		(0.108)
D.lnLS	-0.324**	D.lnLS	-0.331**
	(0.139)		(0.147)
L.lnLS	-0.228	L.lnLS	-0.235
	(0.139)		(0.150)
D.lnGOut	0.0587	D.lnGOut	0.0691
	(0.0573)		(0.0608)
L.lnGOut	0.0862**	L.lnGOut	0.0869**
	(0.0375)		(0.0401)
D.lnK	0.00692	D.lnK	0.0129
	(0.0261)		(0.0268)
L.lnK	-0.0126	L.lnK	-0.00887
	(0.0231)		(0.0245)
D.lnLab	0.000278	D.lnLab	-0.0136
	(0.0437)		(0.0445)
L.lnLab	-0.106***	L.lnLab	-0.122***
	(0.0344)		(0.0363)
D.lnXR¥	1.554**	D.lnXR€	0.146
	(0.643)		(0.125)
L.lnXR¥	0.470**	L.lnXR€	-0.380
	(0.193)		(0.292)
Constant	-2.662***	Constant	-0.0822
	(0.873)		(0.423)
Observations	833	Observations	784
Number of ID	49	Number of ID	49
R-squared	0.366	R-squared	0.366

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

In this table I use different measures of exchange rates, in order to see if main results on the reaction of offshoring to variations in domestic currency's value are confirmed. More specifically, in column 1 I substitute the previous one with the USD/JPY exchange rate, whereas in column 2 with the dollar/euro. Both outcomes corroborate the main results on the effects of other independent variables on offshoring, as coefficients and significance do not vary. In addition, when using the USD/JPY exchange rate, offshoring still reacts positively to an appreciation of the domestic currency. By contrast, when switching it with the USD/EUR exchange rate, the variable completely loses its significance. This might be due either to the smaller fluctuations in the USD/EUR rate compared to the other exchange rates in terms of magnitude or to the lower number of observations, as data on euro's values are available only from 1998 onwards.

As a final assessment on the obtained results, the lack of serial correlation, the normally distributed residuals and the consistent coefficients allow me to assert that the estimates are robust.

8. Conclusions

As the offshoring phenomenon has become a widespread procedure over the last thirty years among rather developed enterprises located in advanced economies, its effects and consequences have turned into a major concern not only for researchers but also for workers.

As far as it concerns the theoretical background, there is no univocal economic theory able to provide an exhaustive explanation of this phenomenon. We need to rely on the numerous formulated theories in order to gain a comprehensive overview of this topic. It is necessary to start from the early theories, such as the absolute and comparative advantage, providing reasons for countries' specialization in the production of a specific good, up to theories introducing intermediate goods in international trade explaining how countries carry out certain tasks of a global value chain. In a nutshell, economists, who elaborated models illustrating the offshoring procedure, have always built them upon previous theories by progressively adding more factors affecting the decision whether to relocate activities and in which countries. Thanks to this approach, they have tried to take into account as many elements as possible, for international outsourcing is a multidimensional phenomenon. Moreover, they have focused on the motives that lead firms to relocate some of their production and service processes abroad and how the labor market and the economic system as a whole may be affected.

As I reported previously in the literature and theoretical sections, the main factor encouraging firms to implement this procedure is cost reduction. They usually move activities to developing countries due to the more favorable economic conditions in terms of cost of labor force, but also to locations with an elevated availability of highly qualified workers. Thanks to this research, we have seen that the increase in the average wages of high-skilled employees raises the amount of offshored activities. Owing to the advent of the internet and subsequent business digitalization throughout the time span considered, namely 1997-2015, the tasks for which highly qualified workers are necessary have risen remarkably.

Therefore, this kind of workers has gained a relevant position in enterprises' payrolls leading them to look for cost cutting opportunities. Furthermore, the economic growth of developing countries has increased the supply of high-skilled labor, which is definitely cheaper to deploy than that in western markets.

However, this study presents some limitations, as it does not take into account further factors that may influence the decision to relocate activities. For instance, in every industry there are tasks that require a face-to-face approach in order to be carried out. Consequently, some jobs may be more prone to be offshored, whereas some others need to be kept in the same place of the company's venue. Therefore, knowing the susceptibility level to offshoring for each job would certainly contribute to provide more accurate estimates of the phenomenon. There are also features in potential destination countries that play a major role when it comes to pick a location, such as a country's quality of infrastructures and political stability. These characteristics should be considered as well, especially when analyzing bilateral relationships or destination countries where companies might offshore some activities.

Moving on to the effects of offshoring, it is an engaging subject for researchers, but also a great concern for workers. Amongst its consequences, those that have been studied the most are the possible job displacements and the widening of the gap between high and low skilled workers in terms of salaries. Regarding the former, numerous studies did not find any strong evidence of slower job growth rate in industries with increasing offshoring rates, which would have supported the worries of domestic workers. By contrast, many researchers (Amiti and Wei, 2005; Chang, 2012) argue that the potential savings generated through offshoring may lead to an expansion of the company and subsequent diversification in new products and services. This in turn would lead to the creation of new job places in which dismissed workers might be reemployed. Regarding the impact on the difference between high and low skilled wages, there is no univocal thread in the existing literature and it is also what I try to verify through this study. Some papers allege that this procedure has a widening effect on the gap between the two types of salary (Berman et al., 1994; Hummels, 2011), whereas others argue that it does not directly affect it, but by fostering technological changes (Feenstra and Hanson, 1995, 1999). The findings of my research suggest that it is possible to observe an increase in the wages gap due to offshoring only in the short run and of a rather tiny magnitude. This outcome may not be a straight answer able to put an end to the question, but it contributes to expand the knowledge on this controversial topic. Further factors that appear to affect this gap are unemployment and technology diffusion. The former increases this difference since, during periods of high unemployment, those who usually struggle the most with finding a new occupation are indeed low skilled workers, who in turn suffer declines in their salaries because of the higher labor supply. Regarding the spread of technology, it seems that, as the use of computers becomes indispensable especially for companies, those who benefit the most from it are high skilled workers. Companies seek employees with high computer skills, and these are usually high skilled ones. The higher demand, in turn, raises their salaries and enlarges the gap with low skilled ones.

Another matter that might affect the results of this research is the issue of endogeneity between wages and offshoring, more specifically the presence of reverse causality. This study does not solve this problem and it is still not clear whether the direction of causality goes from wages to offshoring or vice versa. This question could be addressed through an instrumental variable approach, thanks to which the endogenous part of regressors could be eliminated. However, it is quite difficult to find effective instruments for this specific purpose, as they ought to affect wages only through offshoring, but it is a drawback of this method. Nevertheless, this could represent a subject of interest for future studies in order to improve the existing literature on this topic.

From the results of this paper, it is possible to formulate some policy proposals aimed to offset the negative effects of offshoring on the domestic labor market. In order to assist dismissed workers, the government should provide them with a wage insurance program.

Thanks to this plan, losses in terms of salary due to temporary unemployment would be covered and workers would be able to seek a new job without any pressure. In addition, companies themselves should offer retraining programs, through which dismissed workers could gain new skills and qualifications necessary to be reemployed for a different job. This would also promote skill upgrades for low-skilled workers, which would develop the required expertise and know-how for moving to the high-skilled category.

As final remarks, I would like to provide some insights into the future evolution of the offshoring procedure. Nowadays countries where companies tend to offshore the majority of jobs are mostly located in Eastern and Southeastern Asia and in Central and Eastern Europe. These economies are the preferred locations since they boast very low labor costs. However, as these countries are currently experiencing a quick economic growth, they might lose rapidly this comparative advantage and develop more exclusive ones, such as particular skills and expertise of crews employed in R&D or IT. At the same time, areas currently suffering harsh conditions, such as some African countries, if supported by favorable circumstances, might become potential offshoring locations as well and join global value chains. This would definitely entail a radical change into the dynamics of the international outsourcing phenomenon.

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