When work moves off

Effect of outsourcing on firm level employment growth

Karen Geurts

August 2009

Abstract

This study empirically examines the effect of outsourcing on employment growth at the level of the individual firm. We take a dynamic view of outsourcing, measuring it as a shift of activities previously performed in-house to an external supplier. We study the effect of outsourcing of several business functions separately. Our measure includes both domestic and international outsourcing. The analysis is based on data of a representative set of Belgian firms covering all sectors of activity. An exploratory analysis is performed by using ordinary least squares regression. In a second step, we consider an instrumental variables approach. The main finding is that outsourcing does not have a negative effect on firm level employment growth. In the case of support activities, outsourcers even show significantly higher average growth rates than firms which did not outsource this kind of activities. Only in the case of R&D outsourcing, a negative relationship between outsourcing and employment growth is found.

This study is part of the research undertaken in the frame of the KEROSINE-project (Knowledge Economy and Regional Strategies for Organisational and Sustainable Innovation), a project in strategic basic research supported by the Institute for the Promotion of Innovation by Science and Technology in Flanders. The project is conducted by HIVA and CESO at KUL and by Vlerick UGent. Promotors are Geert Van Hootegem and Monique Ramioul.
This paper has been submitted as a master thesis in the Master Beleidseconomie at the Faculty of Economics and Applied Economics of the K.U. Leuven under the supervision of Prof. dr. Maarten Goos.
Employment data have been kindly provided by the Statistics Department of the Belgian National Social Security Office.

Executive summary

Outsourcing has grown rapidly in recent years. Driven by cost efficiency reasons or in search of external capabilities, firms increasingly decide to contract out activities to an outside supplier. At the micro level, this relocation of activities has to be understood as an element of the vertical disintegration firms. From an economy-wide perspective, it is considered as an element of the growing interdependence between firms and sectors. Our data strongly confirm the increasing trend towards outsourcing: between 2003 and 2008, 57% of the Belgian firms have outsourced at least one business activity which they previously produced in-house.

This paper contributes to a growing body of empirical literature on the effects of outsourcing on labour demand. The impact of outsourcing of activities to foreign locations has recently received much attention. A growing number of studies has investigated whether offshore outsourcing negatively affects labour demand and wages in western countries. Little research has been undertaken, however, into the way domestic outsourcing influences employment. Subcontracting to a domestic supplier is yet by far the most common type of outsourcing. This paper contributes towards filling this gap by looking at the issue from the perspective of the individual outsourcing firm.

Our main research question is whether outsourcing affects firm level employment growth, and in what direction. Does the transfer of work to an outside supplier merely leads to a reduction in the workforce of the outsourcer, or alternatively, are the job losses due to outsourcing offset by the creation of new jobs in other activities, resulting in zero or positive employment growth at the outsourcing firm? We empirically study this question by comparing employment growth in outsourcing and non-outsourcing firms. The strength of the analysis is that it covers all sectors of the economy, and that it takes into account outsourcing of all kinds of activities, both production of materials and delivering of services.

The firm-level perspective has urged us to redefine the common research approach to outsourcing in a number of ways. First, we take a dynamic view of outsourcing, measuring it as a shift of activities previously performed in-house to an external supplier. Second, we do not distinguish between domestic and foreign outsourcing, since this distinction is not an antecedent

of the firm level decision to outsource. Third, we do differentiate between outsourcing of various business functions, since these are expected to be related to different rationales for outsourcing and hence to result in different firm level outcomes. We use a classification of ten business functions which determines the functional structure of the firm.

The analysis is based on a customised data set which contains the results of an employer survey linked with administrative data on employment. The survey is conducted among a representative sample of employers in the Flemish region of Belgium. The employment data are derived from an administrative register maintained by the Belgian National Social Security Office. The period of analysis is 2003-2008. An exploratory analysis is performed by using ordinary least squares (OLS) regression. Next, an instrumental variables (IV) approach is considered to mitigate problems of endogeneity and simultaneous causality.

The overall results of the OLS regressions contradict the belief that outsourcing has a negative effect on firm level labour demand. When comparing firms of the same size and sector, outsourcers do not experience lower growth rates of employment than firms that did not outsource. In the case of six business functions - logistic and transport, financial and legal services, HRM, ICT services, facility management, and engineering services - outsourcers even show significantly higher average growth rates than firms which did not outsource these activities.

R&D outsourcing is an exception. Here, a negative relationship is found between outsourcing and employment growth. This might support the view that outsourcing of this strategic business function, which is a near-core activity closely related to the innovation capacities of the firm, leads to a decline of overall market performance and hence to a loss of jobs.

The results from the OLS regressions could not be confirmed by using an IV approach. The reason is that only in the case of one business function, marketing and sales, a strong instrument could be found. This leaves us with the open question whether the correlations we found are the result of a straightforward causal relation. Firms with high growth rates might be the ones that engage more in outsourcing. Alternatively, in the case of R&D, firms experiencing lower growth

rates might be the ones that decide to outsource activities in pursuit of gaining access to external knowledge.

The best way to proceed with this analysis would be to look for better instruments. We suggest that by including firm level employment in the years before the period of observation, and by applying generalised method of moments, a more robust estimation of the parameters of our model could be achieved.

1. Introduction

Motivated by efficiency seeking factors, such as production cost savings, or driven by strategic reasons, firms decide to contract out activities to an external supplier which can be located nearby or abroad. This relocation of activities, to which we will refer as 'outsourcing', is often part of restructuring processes aiming at productivity gains and comparative advantages. Facilitated by developments in information and communication technologies, the last two decades have witnessed a significant increase in outsourcing of service activities. Historically, firms have relied on external providers for a limited set of specialised activities, such as legal services, accounting or transport of goods. Today, nearly all steps in the production process qualify for outsourcing, from product development to customer services.

Not the nature of this phenomenon but its pace and scale are found to be without precedent. Today, outsourcing involves both manufacturing and service activities, and affects large multinational companies as well as domestic players all over the world (OECD, 2007; Gereffi & Korzeniewicz, 1994). The international dimension of outsourcing has attracted most attention. Supported by trade liberalisation and lower transportation costs, large companies are breaking down their production processes and redistributing separate segments to affiliated and non-affiliated parties around the globe (Huws & Ramioul, 2006). Not only low-skilled workers, but also high-skilled occupations are now potentially affected by offshore outsourcing (Van Welsum & Reif, 2006). The fear that subcontracting to foreign firms would affect the whole (domestic) economy, is reflected in the rise of empirical studies into the shift in labour demand and wages due to international outsourcing (overviews by Knabe & Koebel, 2006; Michel, 2009).

The international dimension of outsourcing seems to dominate the academic debate. Outsourcing, however, is as much a domestic phenomenon reflecting an increasing interdependence between firms and sectors. In particular, the growth of the service sector in western economies has been partially explained by outsourcing of business services, both by manufacturing firms, private service sector companies, and more recently also by public sector organisations (ten Raa & Wolff, 2001; Fixler & Siegel, 1999; Bosch & Wagner, 2005; Domberger & Jensen, 1997). Several service activities, such as facility management, catering or technical support, require physical proximity of the service provider and hence not qualify for foreign

outsourcing. Besides this, also language barriers, legislation, existing local networks, and advantages of face to face contacts imply that subcontracting to domestic suppliers is far more common than foreign outsourcing. In this paper we will see that up to 95% of the outsourcing firms purchase services or intermediate goods from domestics suppliers.

From the perspective of the firm, outsourcing is primarily regarded as the result of a strategic decision to shift an activity previously performed in-house to an outside supplier (Gilley & Rasheed, 2000; Knabe & Koebel, 2006). Whether this supplier is located nearby or abroad is of secondary importance. In principle, all activities necessary in the various stages of production can either be organised within the firm, or be conducted by market exchange with an external organisation. Reasons to outsource activities to external suppliers may be wage cost savings, focus on core competencies, or benefits from economies of scale (Abraham & Taylor, 1996; Deavers, 1997), while the main driving forces for in-house production may be to avoid transaction costs, and to invest in internal competences and innovation (Arnold, 2000; Williamson, 1989).

The relocation of activities to another firm or to another geographical location obviously implies a shift of labour. What the impact is and could be of international outsourcing on aggregate domestic labour demand has been the subject of research since the 1990s. After massive job losses due to the offshore relocation of production activities in manufacturing in the 1970s and 1980s, a second wave of job destruction was feared, this time caused by offshore relocation of service activities. A brief overview of empirical research into this area is presented in the next section.

Although subcontracting to a domestic supplier is by far the most common type of outsourcing, little research has been undertaken hitherto into the way domestic outsourcing influences employment. This paper contributes to filling this gap by looking at outsourcing from a firm level perspective. The aim is to empirically study the effect of outsourcing on net labour demand at the level of the individual firm. The main question is whether outsourcing affects firm level employment growth, and in what direction.

Two conflicting hypotheses can be proposed, which actually reflect opposite views of employers and employees. On the one hand, it seems reasonable to assume that outsourcing causes short

term job losses in the outsourcing firm. Dodsworth & Constable (2006, p. 120) reports that the majority of employees cite job security as their primary concern during an outsourcing process. Alternatively, managers may argue that job losses in the outsourced segments are counterbalanced by a strengthening of other activities in the short term, and by enhanced firm performance in the mid term, resulting in the creation of new jobs (Quinn, 1992; Görg & Hanley, 2005). Hence the question under consideration is whether the transfer of work to an outside supplier merely leads to a reduction in the workforce of the outsourcer, or alternatively, whether job loss due to outsourcing is offset by the creation of new jobs in other activities, resulting in zero or positive employment growth in the outsourcing firm.

In this paper, we empirically test the hypothesis that outsourcing of business activities has an impact on employment growth at firm level by comparing employment growth in outsourcing and non-outsourcing firms. An exploratory analysis is performed by using ordinary least squares (OLS) regression. In a second step, we adopt an instrumental variables (IV) approach to mitigate problems of endogeneity and simultaneous causality.

The approach in this paper is novel in two ways. First, we move away from the strict focus on the international dimension and study firm level employment effects of outsourcing taking into account both domestic and offshore outsourcing. Since we are interested in the impact of a firm level decision on firm level labour demand, no distinction according to the location of the supplier is made. This approach reflects the view that the outsourcing decision is primarily a choice between in-house production and external contracting. In other words, we consider offshoring as a form of outsourcing which just happens to be abroad.

We do, however, make a distinction between the type of functional activity that is outsourced. For example, moving IT activities to an external provider is distinguished from outsourcing facility management activities; the shift of transportation of goods to an outside supplier is separated from the decision to subcontract legal services. This is the second novelty of our approach. Instead of considering outsourcing as a uni-dimensional concept, we make a distinction between outsourcing of ten types of activities which can be considered as determining the functional structure of the firm. These types are referred to as business functions. This way, we explicitly conceptualise outsourcing as an element of the vertical disintegration of firms,

where different parts of the value chain are split-up and organised into separate firms (Gereffi, Korzeniewicz & Korzeniewicz, 1994; Knabe & Koebel, 2006). As much as the general notion of outsourcing described above, the focus on separate business functions reflects the way employers perceive their businesses and decide to externalise certain activities in order to increase efficiency.

The rest of the paper is organised as follows. Section 2 gives a brief overview of the literature this paper relates to. Section 3 explains the definitions and presents the data. Section 4 reports the summary statistics of the main variables of interest. Section 5 presents the model that is used and reports the results of the regression analyses. Section 6 outlines some points of discussion. Section 7 concludes.

2. Background

This paper relates to different streams of literature. First, It draws on industrial organisation theory to understand the concept of outsourcing. Second, it makes use of insights from management literature to specify the research question. Finally, it contributes to empirical research into the effects of outsourcing on labour demand.

2.1 Industrial organisation theory

2.2.1 Vertical disintegration of the firm

This paper regards outsourcing as an element of the vertical disintegration of the firm. In industrial organisation theory, outsourcing is understood as a split-up of two elements in the production chain which were formerly organised in one firm into two separate firms (Knabe & Koebel, 2006). Starting with Coase (1937), a theory of the firm has been developed where the costs of market transactions are considered as the driving force of vertical *in*tegration. Elaborating on the concept of transaction costs, Williamson (1975) has described what factors determine whether certain production activities are organised within the firm, and others conducted by market exchange. According to transaction cost theory, economic actors will make a choice between

these two governance structures based on which will yield minimum costs. Transaction cost theory helps to understand why firms decide to vertical disintegrate, that is, to shift from internal organisation to market – in other words, why they outsource. More recently, the transaction cost approach towards outsourcing has been complemented by other theoretical perspectives such as the resource-based view (Barney, 1991) or institutional theory (Ang & Cummings, 1997).

2.1.2 Global value chain restructuring

Taking a more global view on the division of labour, Gereffi *et al.* (1994) has developed the concept of global commodity chains. Here, the vertical disintegration of firms is described from the perspective of the increasing global inter-firm linkages and the development of transnational production systems. This approach has been extended by several authors into the study of global value chains (Gereffi, Humphrey & Sturgeon, 2005; Flecker, 2005; Huws, 2006, Huws & Ramioul, 2006). A value chain can be defined as the full range of activities that are required to bring a product from its conception to its end use. Separate units of the value chain may be within the same company or in different ones. Similarly, they may be on the same site, or in another location. The value chain approach provides a theoretical framework to understand how firms organise and restructure their production processes, and how an increasing number of business activities has become tradable and is traded between companies. In this view, outsourcing is but one of the business strategies accompanying the vertical disintegration of different parts of a value chain. Other such strategies are in-house relocation, delocalisation, spin-offs, split-ups, or downsizing. These are examples of 'value chain restructuring'.

2.1.3 Business functions

When empirically investigating the structure of value chains, and the relocation of parts of them, traditional concepts and units of observations, such as 'the enterprise' or 'products' are inadequate. This is where the concept of the business function comes in. The term business function is derived from the value chain theory as developed by Michael Porter in the 1980s (Porter, 1985). Porter's value chain divides a company's activities into those technologically and economically distinct activities it performs to do business, including core and support activities. These separate segments of the production process are defined as business functions. Business

functions are classified into primary activities (such as production, assembly, transport & distribution, sales, and customer services) and secondary activities, which are supportive to the primary process (such as finance and accountancy, HRM, and training). Porter's influential work on competitive advantage has encouraged managers to think of their businesses as value chains, and to articulate strategic decision making with respect to individual business functions. In subsequent management literature, such as on Business Process Reengineering, it is explained how firms can reorganise their businesses in order to maximise value added at each stage of the value chain whilst minimising costs (see e.g. Davenport, 1993).

In this paper, we use a classification of ten business functions which can be considered as determining the functional structure of the firm. By modelling the firm level effect of outsourcing of each individual function, we explicitly take into account that the outsourcing decision is a choice to vertically disintegrate the production process by externalising a specific functional activity.

2.2 Rationales for outsourcing: a management perspective

This paper investigates firm level effects of outsourcing whilst taking into account that different types of outsourcing may have different outcomes. Hence, it draws on insights from management literature to understand the different rationales of outsourcing.

2.2.1 Enhanced firm performance

There are several ways in which outsourcing is expected to enhance firm performance. The traditional view is that a firm should allocate its resources to core activities and outsource everything else (Quinn, 1992). Outsourcing of non-core activities is expected to reduce production costs because external suppliers benefit from economies of scale, smoother production schedules and higher specialisation (Alexander & Young, 1996; Abraham & Taylor, 1996). Transaction costs theory has pointed out that not only production costs, but also the specific costs of the market exchange have to be taken into consideration. High asset specificity, a highly uncertain environment, and a low frequency of the transaction may drive up the costs of

governing the outside relationship (Williamson, 1989). Studies into the main motives for outsourcing have shown that, when the optimal choice between inside and outside production is made, firms expect to face lower production & transactions costs, have access to external expertise, benefit from quality improvement and from increased flexibility, and a greater emphasis on core competencies (Quélin & Duhamel, 2003; Deavers, 1997). These outcomes can, in turn, enhance firm performance (see e.g. Kotabe, 1989; Gilley, Rasheed & Al-Shammari, 2006). Several authors have argued that outsourcing of core, or strategically relevant activities may have the reverse effect. 'Core outsourcing' may lead to reduced firm performance due to a loss of knowledge, competition form the service provider and declining innovation (Prahalad & Hamel, 1990; Kotabe, 1990).

2.2.2 Empirical evidence

Despite the growing theoretical interest in the subject, few studies have attempted to empirically examine the effects of outsourcing on firm level performance. The ones that exist mostly use data from manufacturing sectors only, and the results do not reveal a clear positive impact on firm performance measures. Some studies find no effect (Gilley & Rasheed, 2000), others find a positive effect in only a limited number of sectors (Girma & Görg (2004), or a contrasting effect between material and service outsourcing (Görzig & Stephan, 2002; Görg & Hanley, 2004). Recent overviews are provided by Olsen (2006) and Heshmati & Pietola (2006). A common feature of these empirical studies is that both domestic and international outsourcing are included in the outsourcing measure. In this paper, we adopt a similar approach: since our principal interest is in the firm level outcomes of a shift form internal to external production, no distinction is made between the (foreign or domestic) location of the supplier.

In management literature, it is generally accepted that different types of outsourcing lead to different outcomes. Globerman & Vining (2006), for example, show how various combinations of product complexity and asset specificity affect the outsourcing strategy and the potential benefits. In empirical studies, however, such differentiation is neglected. Apart from the distinction between material and service inputs, outsourcing is treated as a uni-dimensional concept and the effects are assumed to be unequivocal. Gilley & Rasheed (2000) has tried to challenge this approach by studying the effects on firm performance of two generic types of

outsourcing. The authors distinguish outsourcing of peripheral activities, which is expected to have a positive effect on firm performance, from outsourcing of core and near-core activities, which they expect to reduce firm performance. In this paper, we take this differentiated approach one step further by distinguishing between outsourcing of ten different functional activities. As explained above, we refer to them as business functions and we expect employment outcomes to differ across them. At the same time, we do not neglect the distinction between outsourcing of core and support/peripheral activities, and group the ten business functions into these two broad categories.

2.3 Effects on labour demand: empirical evidence

This paper contributes to a growing body of empirical literature investigating the effects of outsourcing on labour demand. Whereas firm-level studies are scarce, empirical research on international outsourcing has taken off strongly since the 1990s. The primary focus of this research is the impact of international outsourcing on aggregate labour demand in a country.

2.3.1 Effect on aggregate labour demand

An important strand in literature focuses on the question whether offshore outsourcing contributes to a shift in labour demand for different categories of workers. Following the pioneering work of Feenstra & Hanson (1996, 1999), a number of studies have investigated how international outsourcing affects the (relative) demand for high and low skilled workers, and how it can predict a change in the wage differential between them (e.g. Falk & Koebel, 2000; Egger & Egger, 2003; Geishecker & Görg, 2004; Hijzen, Görg & Hine, 2005; Crino, 2007). Most of these studies find that offshore outsourcing is skill-biased, producing a small negative impact on employment and wages of low-skilled workers.

A second strand of empirical literature, which is considerably less extensive, analyses the impact of international outsourcing on total domestic employment, without making a distinction between different skill groups. Since the 1980s, the effect of the offshore relocation of manufacturing activities on domestic employment has been studied. More recent research also

focuses on the impacts of outsourcing of service activities. Starting with the work of Kletzer (2000) on the impacts of increased import competition in manufacturing industries, a number of recent studies have investigated the impact of offshore outsourcing on total employment for the U.S. (Amiti & Wei, 2005a), the U.K. (Amiti & Wei, 2005b), European countries (Falk & Wolfmayr, 2005, 2008), and OECD countries (OECD, 2007a). Michel (2009), examining the situation for Belgium, provides a survey of the recent literature. Because the analysis in these studies focuses on specific types of activities (materials or service outsourcing) and specific industries (manufacturing or services), the results can not be easily compared. The overall conclusion, however, is that evidence-based estimates do not reveal a significant impact of offshore outsourcing on aggregate domestic labour demand. When a significant negative effect is found, it appears to be very small. These findings are in sharp contrast to calculations on the potential large-scale job losses that could occur as a result of increased tradability and offshorability of jobs (Jensen & Kletzer, 2007; Van Welsum & Reif, 2006). In a recent paper, Liu and Trefler (2008) has convincingly argued that the hype and fear surrounding offshore outsourcing is not supported by empirical evidence. By estimating not only the labour market impact of offshore outsourcing, but also taking into account the reverse flow, i.e. the effect of insourcing, the authors find remarkably small effects of both flows, and a net positive effect.

2.3.2 Micro-level analysis

While most studies have focused on aggregate effects of international outsourcing on domestic employment, micro level analyses on the subject have been scarce. A few examples exist. They all report a negative impact of offshore outsourcing on individual or firm level employment. Egger, Pfaffermayr & Weber (2007) has investigated the impact of international outsourcing on the transition probabilities of employment between sectors, based on a panel of male Austrian workers. They find that international outsourcing negatively affects the probability of staying in or changing into the manufacturing sector. Also Geishecker (2007), using a panel of German employees working in the manufacturing sector, finds a negative impact of international outsourcing on individual employment security. To the best of our knowledge, only one study has examined the impact of outsourcing on firm level labour demand. Görg & Hanley (2005) uses plant level data for the Irish electronics sector and concludes that outsourcing significantly decreases labour demand in the short run.

2.3.3 Domestic outsourcing & firm level effects

From the brief overview presented above, it can be seen that empirical research into the effect of outsourcing on employment is confined to the study of foreign relocation of activities. Foreign outsourcing is however rather limited in current outsourcing practises. Our data will show that subcontracting to foreign suppliers involves less than 5% of the outsourcers of activities such as *facility management*, *financial and legal services*, and *HR management*, and 20% to 25% of outsourcers of *main activity*, *R&D*, and *logistics and transport*. The reason why domestic outsourcing is has not been the subject of empirical reserach is because it is assumed to yield only a shift in employment between firms, not affecting aggregate levels. Since outsourcing creates jobs in the subcontracting firms, only delocalisation to foreign firms is expected to exert a significant (negative) impact on aggregate domestic labour demand. Hence, it is not clear from this literature whether the reallocation of resources due to outsourcing mainly results in a redistribution of work within the same firm, or in a shift of employment between firms. This paper provides a partial answer to this question by studying changes in net employment at the level of the outsourcing firm.

In summary, this paper contributes to the empirical research into the impact of outsourcing on labour demand. It departs from the existing research in the field by looking at it from the perspective of the individual firm. This unusual starting-point has urged us to redefine the common research approach, building on insights gained from industrial organisation theory and management literature. As a result, we do not distinguish domestic from foreign outsourcing, since this distinction is not an antecedent of the firm level decision to externalise certain activities. Second, we do differentiate between various functional types of the outsourced activity, since these are expected to be related to different rationales for outsourcing and hence to result in different firm level outcomes. The strength of our analysis, compared to other research in the field, is that it covers all sectors of the economy, and that it takes into account outsourcing of all kinds of activities, both production of materials and delivering of services.

The main result of this study is that we do not find evidence of a significant negative impact of outsourcing on firm level employment growth. Hence, our findings strongly endorse the view

that the actual employment impact of increased inter-firm trade in goods and services is very small.

3. Data & definitions

3.1 Outsourcing

Since research on outsourcing is still in its early stages, different theoretical perspectives and definitions exist. Gilley & Rasheed (2000, p. 764) note that, generally, the definitions used in management literature are so broad that "it includes virtually any good or service that an organization procures from outside firms". This is, to a certain extent, also the case in empirical studies of outsourcing on employment. Following the concepts proposed by Feenstra & Hanson (1996, 1999), most studies in the field define (offshore) outsourcing as imported intermediate inputs (see e.g. Egger & Egger, 2003; Falk & Wolfmayr, 2008; Geishecker, 2007; Liu & Trefler, 2008). Where outsourcing of materials is sometimes restricted to imported intermediate inputs from the same industry, service outsourcing is much the same as (internationally) purchased services.

In contrast to these static and broad definitions, we adopt a more narrow definition which reflects the dynamic and strategic nature of the outsourcing decision (see e.g. Fixler & Siegel, 1999). In following Gilley & Rasheed (2000, p. 764), outsourcing in this paper is used to reflect the "decision to reject the internalization of an activity". More specifically, it arises through the "substitution of external purchases for internal activities". This notion of outsourcing reflects the *dynamic* character of outsourcing, since it denotes a shift from internal production to external contracting, and it describes the *strategic* nature, because it indicates the decision to externalise what could have been done internally.

Hence, we define outsourcing as "the full or partial movement of activities previously performed in-house to another firm". The transfer of activities to another firm within the same enterprise group is considered as outsourcing, but relocation between national establishments of the same firm is not. We do not impose additional restrictions to this definition, neither with respect to the

type of activity, the location of the supplier, nor the kind of relationship between the outsourcer and the supplier. This means that contracting out of both material and service activities is taken into account. The destination firm can be located nearby or abroad. The relationship with the destination firm may vary form a highly codified market relationship to a partnership with dense interactions and knowledge sharing.

3.2 Business functions

Data on outsourcing are gathered according to a set of ten business functions. The list of business functions that has been adopted in this paper is a synthesis derived from classifications recently developed in Europe and the U.S. We have mainly relied on the following programmes and research: European Research Programme WORKS[1], EUROSTAT International Sourcing Survey[2], Mass Layoff Statistics program of the U.S. Bureau of Labor Statistics[3], and the Global Value Chains Initiative[4]. In order to cover a broad range of value chain activities on the one hand, and to dispose of a limited list of functions that is suitable for a survey questionnaire on the other hand, a list of ten generic business functions has been compiled, including *main activity; research and development (R&D); information and communication technologies (ICT); engineering services; facility management; logistics and transport; marketing and sales; customer service; financial, legal and administrative management; and human resources management (HRM)*. These functions can be considered as 'generic' in the sense that they apply across different industries. A brief description of these business functions is given Table A.1 in Annex.

As explained in section 1 & 2, the distinction between business functions is made because it implies different motives and types of the outsourcing transaction, which may lead to different employment outcomes. In line with strategic management literature about the distinction between core and peripheral outsourcing, we expect the main employment difference to be observed between outsourcing of core versus support activities. Following usual classifications (see e.g. Brown, 2008; Quélin & Duhamel, 2003), we adopt following grouping. Core activities are

[1] www.worksproject.be
[2] epp.eurostat.ec.europa.eu/portal/page/portal/european_business/special_topics/international_sourcing
[3] www.bls.gov/mls
[4] www.globalvaluechains.org

those that most directly relate to the basic business of the firm. Besides *main activity*, representing the key industry activity of the firm, *R&D*, *marketing and sales*, *customer services*, and *logistics and transport* are considered as core functions. Support functions are those that facilitate the core process. *Financial and legal services*, *HRM*, *ICT*, *facility management* and *engineering services*, are regarded as support functions.

3.3 Customised data set

A data set has been developed for the purpose of this study. It compiles information at firm level from different sources. Variables on outsourcing and firm characteristics are based on a survey, which has been conducted in the frame of the IWT project KEROSINE, and employment data are based on an administrative register, which is maintained by the Belgian National Social Security Office (NSSO).

The employer survey on outsourcing is conducted with a random stratified sample of 1646 employer firms with more than 5 employees, located in the Flemish region of Belgium. The sample covers all sectors of activity except agriculture. All legal forms are represented, both private firms, and public organisations. For confidentiality reasons sole proprietorships are excluded. Stratified sampling by size class and sector is used to produce an efficient sample distribution. Table A.2 in Annex reports the 3 size classes and 12 sectors that constitute the 36 strata of the sample. Within each stratum, a sample of employers has been randomly selected. The survey was conducted by telephone interview and achieved a 60,8% average response rate.

Recent comparative research into outsourcing has highlighted that outsourcing strategies vary widely across industries (Statistics Denmark *et al.*, 2008; OECD, 2007; Flecker et al., 2009). Because we want to control for this institutional influence, sectoral stratification of the sample is found necessary. Point of departure has been a list of nine sectors, selected on the basis of different criteria, one of which was a high indirect employment generation in other sectors (Avonds, 2005; author's analysis based on Belgian input-output tables). The selection of nine is complemented by three remaining sectoral categories. These allow to conduct the analyses at the level of the three

main sectors of activity, i.e. manufacturing, private services and public services, as well as for the economy as a whole.

In the survey, the respondents were presented with the list of ten business functions. With regard to each of them, a number of identical questions were asked. A first group of questions was related to the actual position of the business function in the firm's value chain: whether it was a core activity or a supporting one; whether it was carried out by the company's own workforce; and if not, where it was performed. A second group of questions was related to outsourcing. The main question here was whether, in the last five years, more, less or the same number of activities in the business function was supplied by external firms. When more activities were supplied from outside, the firm is considered as an outsourcer with respect to that business function. Since the survey has been conducted in June 2008, the questions on outsourcing refer to the period 2003-2008. Besides questions related to business functions, the survey included a number of general questions on the identification, background and structure of the firm.

In order to estimate firm level employment growth of the employers in the sample, the survey results have been linked to an administrative data set which is maintained by the Belgian National Social Security Office (NSSO). This employer-employee data set contains the annual number of employees of active employers, measured at June 30 from 2003 to 2008. The NSSO data do not include local and provincial public employers. A common problem with measures of firm level growth based on administrative registers is the occurrence of changes in firm identifiers and of restructurings involving multiple firms. The failure to properly link the identifiers of one and the same employer, and of predecessor and successor firms involved in a restructuring, results in an upward bias in statistics of firm and employment dynamics. In collaboration with the statistics department of NSSO, HIVA-K.U.Leuven has developed a method to address these problems. The method makes use of clustered employee flows between employers to reduce inaccuracies in firm level employment measures. In this paper, we use corrected measures of employment growth between 2003 and 2008. The correction method is described in extenso in Geurts, Ramioul & Vets (2009).

The unit of analysis in the linked data set is the employer. Employers are firms hiring at least one employee. The definition of an employer in the NSSO database corresponds to the statistical unit

recommended by Eurostat and OECD for business demography data collection.[5] In this paper, the terms 'employer' and 'firm' are treated as synonyms. The industry code of an employer is the code of its primary activity, which is assigned according to the NACE Rev.1 classification. Of the 1646 employers in the survey sample, 1581 could be linked to the NSSO data set. 1430 of them were active employers in 2003 and 2008. After removing extreme outliers - employment growth outside the interval [-200%, +200%] - 1415 firms were left. These have been selected to perform the analysis.

In brief, the regression analysis in section 5 is performed using a data set containing 1415 firms, which were active employers in year 2003 and 2008, and which were taken from a random stratified sample of employers located in the Flemish region. Not included in the research population are sole proprietorships, firms with main activity in agriculture, local and provincial public employers, and firms with less than 6 employees in 2008. The main variables of interest are binary variables on outsourcing of specific business functions which refer to outsourcing in the period 2003-2008. The dependent variable, employment growth, is calculated as the relative employment evolution between June 30 of 2003 and 2008. Table A.2 in Annex reports the number of observations in each stratum of the sample as well as the population sizes. Table A.3 lists a selection of the variables available in the data set.

4. Summary statistics

4.1 Outsourcing of ten business functions

A first glance at the empirical data confirm the assumption from theory that outsourcing has strongly increased in recent years. Weighted and extrapolated to the population, the results of the employer survey show that more than half of the Flemish firms (57%) have outsourced at least one business function between 2003 and 2008. This share does not differ significantly in

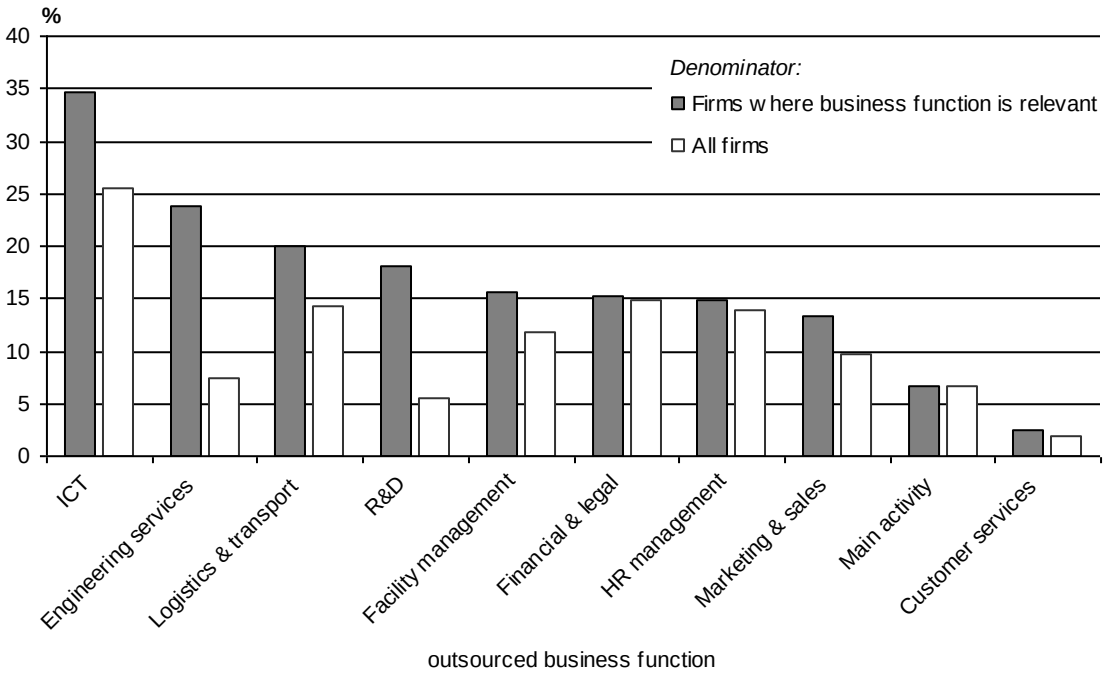
[5] "The enterprise is the smallest combination of legal units that is an organisational unit producing goods or services, which benefits from a certain degree of autonomy in decision-making, especially for the allocation of its current resources. An enterprise carries out one or more activities at one or more locations. An enterprise may be a sole legal unit." [Council Regulation (EEC) No 696/93 of 15 March 1993]

manufacturing and private services. There is, however, some dissimilarity between both sectors of activity in the type of business function that has been outsourced (Table A.4). The difference is most apparent for *ICT* activities, which is the business function that has been most frequently outsourced in private services, and for *logistics and transport*, which has been the preferred business function for outsourcing in manufacturing.

Figure 1 presents an overview of recent outsourcing practises in Flemish firms. The bars represent the share of employers which have been outsourcing part or all of a particular business function between 2003 and 2008. The dark bars give the share of outsourcers as a percentage of the relevant population of firms, i.e. firms where the specific business function is either carried out internally or purchased from an external supplier. This population differs across business functions since not all business functions are relevant activities for the production process of all firms. The light bars give the share of outsourcers in all firms. Consistent with our definition, outsourcers are firms which have shifted (part or all) activities of the business function to an external supplier in the period under consideration (2003-2008). In the dark bars of the graph, the complement of outsourcers is formed by the sum of firms performing the business function internally, and firms having decided to purchase the business function from outside already before 2003. In the case of strongly generic functions applying to most businesses, such as *financial and legal services* or *HRM*, the population of 'relevant firms' and 'all firms' are nearly the same. In the case of other business functions, the two populations differ. *R&D* and *engineering services*, for example, are not relevant to many firm's value chains, especially for companies in the service sector. Those firms are not included in the measures underlying the dark bars, and will also be excluded from the regression analysis. Table A.4 in Annex reports the numbers underlying Figure 1 and the standard errors. It also presents the shares of outsourcers in the manufacturing sector and in private services separately.

On average in all sectors of the economy, *ICT* has most often been outsourced. In the last five years, one in three employers have decided to contract out part or all of their *ICT* activities to an outside supplier (Figure 1). The *ICT* function has been outsourced by high shares of employers in all sectors of the economy and by both small and large companies. In private services, it by far the most frequently outsourced activity. In manufacturing, *ICT* outsourcing is only surpassed by outsourcing of *logistics and transport* (Table A.4).

Figure 1 Share of employers which have outsourced business functions in 2003-2008



Note: weighted shares according to population of Flemish firms with more than 5 employees

Source: NSSO and KEROSINE outsourcing survey (calculations by author)

For *engineering services* and *R&D* activities we find high outsourcing shares in the relevant population of firms and low overall outsourcing shares. The reason is that only 30% of the employers, mainly large firms, consider these activities as a relevant function for the goods they produce or the services they deliver. Within the latter population, however, the share of outsourcers of *engineering services* and *R&D* is 24% and 18% respectively, which is considerably higher than for most other business functions.

Logistic and transport activities have been moved to external suppliers especially by manufacturing firms: in some manufacturing sectors, one in three firms have outsourced part or all of these activities in recent years. *Facility management*, on the other hand, has been outsourced most often in public services, where one in five organisations has decided to transfer these activities to an outside supplier.

Financial and legal services and *HR management* are considered by nearly all firms as business functions which are relevant to their production processes. In the five-year period of our analysis, about 15% of the firms have decided to subcontract at least part of these functions which they previously performed in-house. In contrast with other business functions, outsourcing of *financial and legal services* has occurred especially frequently in small firms.

The three remaining business functions, *marketing and sales*, *customer services*, and the *main activity*, are considered by many companies as strategic activities that constitute sources of core competencies or competitive advantages (Quélin & Duhamel, 2003). These activities, which we classed as 'core' business functions, have been outsourced by the lowest shares of firms, which is in line with common strategic management view on the risks of outsourcing near-core activities (see e.g. Prahalad & Hamel, 1990; Gilley & Rasheed, 2000). For the two other core functions, however, *logistics* and *R&D*, we found high outsourcing shares. Hence, we cannot conclude from these descriptive statistics that there is a clear-cut difference in recent outsourcing practises of Flemish firms between core and support business functions.

The data also confirm that international outsourcing does not occur frequently and that activities are mainly outsourced to suppliers located nearby. Table A.6 in Annex reports the location of the external supplier(s) of the ten business functions. Note that firms may have contracts with both domestic and foreign suppliers, also for one and the same business function. Especially support functions, such as *financial and legal services*, *HRM*, *facility management* and *engineering services* are rarely subcontracted to a foreign firm. More than 95% of the outsourcers have domestic suppliers for these business functions. For ICT services, around 10% of the outsourcers subcontract to a foreign firm, while 92% have ICT activities performed by a service provider located in Belgium. For business functions we defined as core functions, contracts with foreign suppliers a bit more common and involve over 20% of the outsourcers. Yet still 85% to 95% of the outsourcers of core functions purchase services or intermediate inputs from another domestic firm.

4.2 Outsourcing and employment

Table 1 reports the summary statistics of the main variables of interest, i.e. outsourcing and employment growth. The average size of a firm or an organisation in the selected population is 45.3 employees (average number of employees in 2003 and 2008). Between 2003 and 2008 the number of jobs at firm level increased by +5.1 on average, which corresponds to a relative employment growth of 13.8%.

Table 1. Summary statistics of the main variables

	Number of firms	Weighted mean	Standard deviation
Average employment 2003-2008	1415	45.3	2.2
Absolute employment growth 2003-2008	1415	+5.1	0.9
Relative employment growth 2003-2008 - Δln(*empl*)	1415	0.138	0.02
Number of outsourced business functions 2003-2008	1415	1.12	0.05
Average employment 2003-2008 by number of outsourced business functions			
0	521	32.8	2.6
1	363	42.5	5.5
2	260	48.3	7.5
3	142	72.8	12.0
4 or more	129	98.0	20.7
Relative employment growth 2003-2008 by number of outsourced business functions			
0	521	+0.101	0.030
1	363	+0.132	0.039
2	260	+0.196	0.042
3	142	+0.183	0.079
4 or more	129	+0.208	0.081

Note: means are weighted according to population of Flemish firms with more than 5 employees
Source: NSSO and KEROSINE outsourcing survey (calculations by author)

The number of business functions that firms have outsourced between 2003 and 2008 ranges from 0 to 7 and has a weighted mean of 1.12. About 43% of the population has not outsourced any activity in the last five years (not in table); 27% of the firms has outsourced only one business function; 16% has outsourced two; 14% has outsourced activities in three or more business functions.

Table 1 reports the weighted means of average employment for 5 categories of firms, ranging from those that have not outsourced any business activity between 2003 and 2008, to those that have shifted activities in 4 or more business functions to external suppliers. Consistent with other research (Heshmati & Pietola, 2006) we find that outsourcing intensity increases with firm size. Firms which have not outsourced any activity are likely to be smaller and average firm size increases with increasing number of outsourced business functions. Finally, relative employment growth by number of outsourced business functions is reported. Relative growth also seems to increase by outsourcing intensity, but here, the relation is looser.

Figure A.1 in Annex compares relative employment evolutions of outsourcers and non-outsourcers for each of the ten business functions separately. This will be the starting point for the regression analysis. The graphs confirm that, on average, outsourcers are larger than firms that have not outsourced the business function considered. As noted above, this does not hold for outsourcers of financial and legal services, which have a smaller average firms size than non-outsourcers of this business function. The graphs further reveal that firms which have outsourced activities of a support function (i.e. *financial and legal services, HR management, ICT, facility management,* and *engineering services*), experienced stronger employment growth than companies that did not shift any of these activities to an external supplier. This is also true for outsourcers of *logistic and transport* activities, which has been classed as a core function. The core functions *marketing and sales* and *customer services* do not reveal differences in average employment growth between outsourcers and non-outsourcers. Firms that have outsourced *main activity* or *R&D* report a smaller average employment growth than firms that did not outsource these activities. This is particularly true for outsourcers of *R&D*, which is the only class of firms in the population that shows a negative average employment growth in the period considered.

4.3 Towards an analytical approach

In the next section, we move on from this descriptive analysis to a more analytical approach. We use OLS regression to investigate whether outsourcing has a significant effect on firm level employment growth and whether this effect is still valid when we control for other variables that might influence employment growth, such as firm size and sector.

A feature of the data that will hamper the analysis is that the main variables of interest, outsourcing and employment growth, refer to the same 5-year period 2003-2008. This makes it difficult to disentangle the direction of the causal effect: does outsourcing has an effect on firm growth or does firm growth influences the decision to outsource? Moreover, there might be other events taking place in that period which affect both outsourcing and employment, and which are not observed in the data set. Both problems - simultaneous causality and omitted variables - may lead to the assessment of spurious causal effects of outsourcing on employment and hence to unreliable results. Part of these problems could be addressed by including lagged values of the variables of interest. Unfortunately, information on the outsourcing decision is only available in one variable referring to the entire period 2003-2008. Lagged values of annual employment between 2003 and 2008 are available, but including only these would simply result in more variability in the outcome variable without adding explanatory power to the model. An effective solution to address problems of simultaneous causality and omitted variables is instrumental variables approach. In addition to the OLS regressions in the next section, we will turn to this method.

To conclude this section, we mention the results of a question in the survey, which could give an indication of the answer to our research question. The survey question is about the issue whether outsourcing results in *direct* job losses at firm level: firms which have outsourced a specific business function is asked whether any jobs had been cut "as a result". Table A.5 in Annex reports the share of outsourcers that have reported job losses caused by outsourcing. For most business functions, the share of firms reporting direct job losses is very low, with a lower limit of the 95% confidence interval close to zero. Only in the case of outsourcing of *main activities*, a substantial share (around 21%) of the outsourcers have reported that jobs have been cut as a result. These figures suggest that most outsourcing decisions might not lead to direct job losses at the level of the firm. The affected employees may shift to other functions or departments in the firm (Dodsworth & Constable, 2006). The reported results in table A.5, however, show large standard errors, which makes them difficult to interpret. In addition, we have to take into account that the number of missings for this variable is high, and that self-reported figures on job destruction do not tend to be the most reliable statistics.

5. Modelling employment growth at firm level

We try to understand the impact of outsourcing on employment. The aim is to consistently estimate the causal effect of outsourcing on changes in net labour demand at the firm level. We investigate the effect of outsourcing of ten business functions separately, because we expect employment outcomes to differ across them.

For each business function, we consider a firm level employment equation of the form

$$\Delta \ln(empl)_i = \alpha + \beta\, outbf_i + \gamma Z_i + \varepsilon_i \qquad \text{with } i = 1,\ldots,N$$

where the dependent variable $\Delta \ln(empl)_i$ denotes the rate of employment growth at firm i over the considered period, calculated as the difference between log employment in firm i in 2008 and log employment in firm i in 2003. The main explanatory variable of interest, $outbf_i$, is a binary variable which is equal to one if firm i has outsourced the business function to an external supplier between 2003 and 2008. The parameter β represents the difference in relative employment growth between outsourcing firms and firms which have not shifted the business function to an outside party in the period considered. Z_i is a set of additional controls which varies across specifications. ε_i represents an uncorrelated error term. As explained in the previous section, the number of observations, N, differs across business functions. Firms for which the business function is not a relevant activity, i.e. when the function is neither performed in-house nor purchased from an external supplier, are excluded from the analysis.

We start with a simple regression without control variables. Next we include three firm level characteristics which are found in literature to have an effect on firm growth and which are expected to correlate with outsourcing: firm size, sector, and type of governance (Delmar, Davidsson & Gartner, 2003). Many studies find that growth rates diminish with increasing size (Jovanovic, 1982; Dunne & Hughes, 1996). Sector is assumed to be related to a number of sector-specific and institutional characteristics which affect the growth process of firms (Delmar et al, 2003). Ownership is believed to have an impact on growth as well, be it not always clear in what direction. Age is a fourth control variable which is found to show a relationship with firm

growth. Due to lack of information in the data set, this control variable is not included in our model.

Our full model is of the form

$$\Delta \ln(empl)_i = \alpha + \beta\, outbf_i + \gamma_1 \ln(empl_0)_i + \sum_{j=1}^{11} \gamma_{2j} S_{ji} + \gamma_3 O_i + \varepsilon_i \quad \text{with } i = 1,...,N$$

where the additional covariate $\ln(empl_0)_i$ is the initial size of firm *i*, measured as log employment in firm *i* in 2003, $\sum_{j=1}^{11} S_{ji}$ are sector dummies corresponding to the 12 sectors of the survey stratification, and O_i is a binary variable which is equal to one if firm *i* is an independent firm or a head office of an enterprise group, and which is equal to zero if firm *i* is a subsidiary.

5.1 OLS regression

We first use ordinary least squares (OLS) regression analysis with heteroscedasticity-robust standard errors. We start by building up the model taking the business function *financial, legal, and administrative* services as an example. Table 2 reports the OLS results.

Table 2 Effect of outsourcing of financial, legal, and administrative services on firm level employment growth: results of OLS regression

Dependent variable: Δln(*empl*) over 5-year period (2003-2008)				
	(1)	(2)	(3)	(4)
Outsourcing of business function: $outbf_i$	0.108***	0.091***	0.072**	0.073**
	(0.034)	(0.033)	(0.033)	(0.033)
Initial size: ln ($empl_0$)$_i$		-0.060***	-0.064***	-0.066***
		(0.008)	(0.008)	(0.008)
Sector dummies			X	X
Ownership				-0.025
				(0.028)
Intercept	0.097***	0.301***	0.350***	0.376***
	(0.012)	(0.033)	(0.065)	(0.071)
SER	0.430	0.420	0.409	0.409
Adj. R^2	0.008	0.052	0.101	0.101
N	1367	1367	1367	1367

Note: heteroscedasticity-robust standard errors in parentheses; * significant at 10%, ** significant at 5%, *** significant at 1%

Source: NSSO and KEROSINE outsourcing survey (calculations by author)

In all specifications, we find evidence that outsourcing of *financial, legal, and administrative* services, $outbf_i$, is significantly positively related with employment growth. Model (3), including initial size and sector, gives the best fit of the data. Both initial size and sector explain a relatively important part of the variation in employment growth between firms, as can be concluded from an increasing R^2 and a decreasing standard error of the regression, *SER*, when adding these variables successively in model (2) and (3). Leaving these variables out causes substantial bias in the estimated effect of outsourcing. As we expected, initial size enters the model with a significant, negative effect on employment growth (model 2). Controlling for size considerably reduces the difference in the average growth rate of employment between outsourcing and non-outsourcing firms. Controlling for sector further reduces this difference, but it remains significant at the 5% level (model 3). Ownership, which is introduced in specification (4), has no significant effect and does not add explanatory power to the model.

In our preferred model (3), the estimated effect of outsourcing of *financial, legal, and administrative* services on firm level employment growth is 0.072: firms that have outsourced this business function between 2003 and 2008 show a relative employment growth in that period which is 7.2 percentage points higher than other firms of the same size and sector.

We continue using OLS regression to model the employment effect of outsourcing of other business functions. As before, we allow for heteroscedasticity of the error term. When estimating the effects of other business functions, the role and significance of the three control variables is found to be similar: initial size and sector have a large and significant effect, while the coefficient on ownership is not significant. We therefore restrict the discussion of the other nine business functions to the specifications in which initial size and sector are included as additional covariates (model 3). Table 3 reports the results of the OLS regressions. In the estimation of each specification, only those firms where the business function is a relevant activity in the production process are included. This results in strong differences in the number of observations, *N*. Business functions such as *financial services* or *HRM* apply to nearly all firms, whereas *engineering services* and *R&D* are only relevant for less than half of the population.

Table 3 Effect of outsourcing of business functions on firm level employment growth: results of OLS regression

Dependent variable: $\Delta \ln(empl)$ over 5-year period (2003-2008)										
	Support business functions					Core business functions				
	Finan., legal & admin. services	HRM	ICT services	Facility manage-ment	Enginee-ring services	Logistics & transport	R&D	Marketing & sales	Customer services	Main activity
Outsourcing of business function: $outbf_i$	0.072**	0.094***	0.043*	0.097***	0.076*	0.057**	-0.168***	0.013	-0.069	-0.074
	(0.033)	(0.030)	(0.025)	(0.035)	(0.039)	(0.029)	(0.048)	(0.042)	(0.092)	(0.048)
Initial size: ln $(empl_0)_i$	-0.064***	-0.067***	-0.059***	-0.068***	-0.054***	-0.052***	-0.078***	-0.072***	-0.075***	-0.065***
	(0.008)	(0.008)	(0.008)	(0.008)	(0.011)	(0.008)	(0.011)	(0.009)	(0.009)	(0.008)
Sector dummies	X	X	X	X	X	X	X	X	X	X
Intercept	0.350***	0.378***	0.319***	0.331***	0.281**	0.323***	0.515***	0.397***	0.435***	0.365***
	(0.065)	(0.068)	(0.068)	(0.077)	(0.124)	(0.098)	(0.074)	(0.078)	(0.069)	(0.065)
SER	0.409	0.414	0.407	0.419	0.386	0.390	0.428	0.429	0.403	0.414
Adj. R^2	0.101	0.101	0.097	0.089	0.086	0.079	0.133	0.106	0.119	0.093
N	1367	1359	1174	1159	574	1104	634	1067	1069	1410

Note: heteroscedasticity-robust standard errors in parentheses; * significant at 10%, ** significant at 5%, *** significant at 1%
Source: NSSO and KEROSINE outsourcing survey (calculations by author)

In all specifications, the included variables explain around 10% of the variation in employment growth ($Adj.R^2 \pm 0.10$). The standard errors of the regression are hence fairly large and all around 0.40. *Initial size* has a highly significant negative effect on employment growth. The coefficient on this variable is around –0.06, indicating that firm A, with 1% more jobs than firm B in 2003 *ceteris paribus*, has experienced an employment growth between 2003 and 2008 which is 6 percentage points lower.

Outsourcing of the five business functions which we classified as support activities are found to have a significant positive effect on firm level employment growth: firms that have outsourced part or all *financial services*, *HRM*, *ICT services*, *facility management* or *engineering services* in the considered period exhibited higher growth rates than firms of the same size and sector that have not outsourced this kind of activities. For example, firms that have outsourced activities relating to *facility management*, such as cleaning or catering, have an average growth rate of employment which is 9.7 percentage points higher than firms that did not source this function *ceteris paribus*. The results contradict the hypothesis that outsourcing causes net job losses at firm level. They rather suggest that the shift of labour to an external supplier is counterbalanced by an increase of employment in other activities.

The results of the OLS estimations for the core business functions are less unambiguous. Similar to the effects found for supporting business functions, outsourcing of *logistic and transport* activities is found to have a significant positive employment effect. With respect to three other core functions, *marketing and sales*, *customer services*, and *main activity*, no significant effect of outsourcing on employment is found. The within variation in the two groups (outsourcers and non-outsourcers) is notably large compared to the differences between the groups. Hence, the hypothesis that outsourcing of core activities has a negative impact on firm level employment growth is not supported.

Thus far, we can conclude that the overall results of the OLS regressions presented in table 3 contradict the belief that outsourcing has a negative effect on firm level labour demand. Outsourcers did not experience lower growth rates of employment than firms that did not outsource in the 5-year period considered. In the case of supporting business functions, outsourcers even showed significantly higher average growth rates than firms that did not outsource.

The results for one business function remarkably deviate from this general trend. Outsourcing of *R&D* has a strong negative effect on firm level employment growth. Although the estimations for this business function are based on a relatively small population (less than half of the firms), the estimated difference in employment growth rate between outsourcers and non-outsourcers is highly significant (*p*-value = .0003). The results suggest that for this core function, the hypothesis that outsourcing has a negative impact on firm level employment growth is confirmed.

Possible explanations for this deviating trend might be found in *R&D* related or firm characteristics. Employment growth in firms which consider *R&D* as a core function may be more sensitive to outsourcing of this business function than firms where *R&D* is a supporting activity. Firms transferring *R&D* to an company within the enterprise group may face more job losses than firms which outsource to an external organisation, since the strategic decision to relocate the activity aims at competitive advantage at group level and not at the level of the individual enterprise. Subsidiaries, which do not take strategic decisions themselves, may lose more jobs due to relocation than head offices or independent firms. The same may apply to firms facing strong competition. Several interactions between the suggested explanatory variables have been explored, but none is found to be significant. The negative effect of outsourcing of *R&D* on employment growth remains significant for all categories of firms.

Three possible explanations remain. First, outsourcing of this strategic business function, which is closely related to the end product and to the innovation capacities of the firm, is indeed 'risky' (Quélin & Duhamel, 2003). As Bettis, Bradley & Hamel (1992) have argued, it may reduce organisational innovation (Kotabe, 1990), shift knowledge to the supplier, who can become a competitor (Prahalad & Hamel, 1990), and hence lead to a loss of overall market performance in the long run (Gilley & Rasheed, 2000). Second, *R&D* outsourcing might be correlated with other unobserved variables which influence firm level employment, such as firm age (Gilley, McGee & Rasheed, 2004) or corporate restructuring processes (Lei & Hitt, 1995). Third, firms experiencing lower growth rates might be the ones that decide to outsource *R&D* activities, in pursuit of gaining access to external competencies and knowledge. Hence, the causal relationship between outsourcing and employment growth might go in the reverse direction.

The latter two scenarios, omitted variables and reverse causality, might equally be a problem in the OLS estimations of the other business functions. This would mean that the results in table 3 are biased. We will address these issues in the next paragraphs.

5.2 IV regression

Consistent estimation of the coefficients of *outsourcing* in the OLS regressions presented above depends on the lack of correlation between the regressors and the error term ε_i. There are several reasons to assume, however, endogeneity of outsourcing. First, there is serious potential for simultaneous causality bias, and second, omitted variables might bias the OLS estimators.

Expanding firms may be the ones that are more likely to engage in outsourcing strategies, for example in pursuit of new alliances in emerging markets. This could lead to simultaneous causality. Alternatively, contracting firms may be the ones that are inclined to outsource certain activities in the expectation that lowering operational cost would improve productivity. Hence it is unclear in which direction the bias would go. Furthermore, one could think of omitted variables at firm level that are correlated with outsourcing and affect employment growth, such as a shift in customer demands (Baden-Fuller, Targett & Hunt, 2000), technological innovation (Bartel, Lach, Sicherman, 2005), or corporate restructuring (Lei & Hitt, 1995).

In order to address possible bias of the OLS estimators, we consider instrumental variables (IV) regression using two-stages least squares (TSLS) estimators. Using instrumental variables that explain variation in *outsourcing* that is uncorrelated with the error term, can allows us to consistently estimate the regression coefficients. Several studies estimating firm level effects of outsourcing use lagged levels of the endogenous variables as instruments (Görg & Hanley, 2004; Girma & Görg, 2004; Heshmati & Pietola, 2006). Unfortunately, lagged values of outsourcing or related variables are not included in our data set, which necessitates the search for other valid instruments. A good instrument is one that affects outsourcing but not employment growth, other than through its effect on outsourcing. Below we test the validity of several instruments with respect to outsourcing of the ten business functions considered.

Table 5 reports the parameter estimates of the TSLS regressions. We treat *outsourcing* as an endogenous regressor. *Initial size* and the sector dummies are considered as exogenous. Dependent on the regression for each of the business functions, a different set of instruments is included. In order to be valid, the instrumental variables should satisfy two assumptions: (1) they should be relevant, i.e. their correlation with *outsourcing* should be strong enough and (2) they should be exogenous, i.e. they should be uncorrelated with the error term. Table 5 reports two test statistics.

Assumption (1) is tested by means of the first-stage *F*-statistic. The first stage consists of an OLS regression estimating the effect of the instruments and the exogenous variables on outsourcing. The reported *F*-statistic is the test of the joint hypothesis that all the coefficients on the instruments equal zero. A rule of thumb for checking the relevance of the instruments in case of a single endogenous regressor is that the first-stage *F*-statistic exceeds 10 (Stock & Watson, 2007, p. 419).

Assumption (2) is checked by means of the overidentifying restrictions test, commonly called the *J*-statistic. To this end, an OLS regression of the residuals from the TSLS regression on the instruments and the included exogenous variables is used (Stock & Watson, 2007, p. 444). The *J*-statistic equals $q*F$, where q is the number of instruments and F is the test of the joint hypothesis that all the coefficients on the instruments in the OLS regression equal zero. If the instruments are not weak and the errors are homoscedastic, then, under the null hypothesis that the instruments are exogenous, the *J*-statistic has a χ^2_{q-k} distribution, with k the number of endogenous regressors. If the null hypothesis is rejected (p-value <.05), at least one instrument is not exogenous. The overidentifying restrictions test can neither be applied in the absence of strong instruments, nor in specifications where the number of instruments is less or equal to the number of endogenous regressors.

A valid instrument has sufficient explanatory power in predicting the outsourcing decision without directly affecting employment growth. For each business function, a candidate instrument is the binary variable *supporting activity*, which assesses the position of the business function in the firm's value chain. The variable is coded as zero if the business function is considered by the firm as a core activity that generates added value, and as one if the business

function plays a supporting role. Besides this, it is tested whether *share of export turnover*, *shift of strategic decisions abroad*, *strength of domestic competition*, and *increased competition* can be used as valid instruments. Depending on the business function, the strongest set of instruments is included in the specification.

Table 5 Effect of outsourcing of business functions on firm level employment growth: results of TSLS regressions [a]

Dependent variable: Δln(*empl*) over 5-year period (2003-2008)							
	Support business functions				Core business functions		
	Financial services	HRM	ICT services	Facility manage-ment	Logistics & transport	R&D	Marketing & sales
Outsourcing of business function: $outbf_i$	-0.067	0.032	0.288	0.485	0.511*	-0.779	-0.021
	(0.427)	(0.367)	(0.241)	(0.462)	(0.296)	(0.479)	(0.365)
Initial size: ln ($empl_0$)$_i$	-0.066***	-0.067***	-0.063***	-0.073***	-0.059***	-0.077***	-0.072***
	(0.011)	(0.008)	(0.009)	(0.012)	(0.010)	(0.013)	(0.009)
Sector dummies	x	x	x	x	x	x	x
First-stage regression results							
Included instrumental variables:	*p*-values of the significance test of the coefficients on the included instruments						
-Business function is supporting activity			*.025***		*.038***	*.006****	*<.001****
-Share of export turnover					*.003****		
-Strategic decisions relocated abroad		*.018***					
-Domestic competition				*.009****			
-Increased competition	*.009****	*.048***	*.003****				
Number of included instruments	1	2	2	1	2	1	1
Tests for validity of instruments							
(1) First-stage *F*-statistic [b]	6.79	4.56	6.98	6.88	6.56	7.72	13.17
(2) Overidentifying Restrictions Test							
J-statistic	-	0.04	0.06	-	0.56	-	-
p-value [c]	-	*.841*	*.862*	-	*.454*	-	-
Degree of overidentification	0	1	1	0	1	0	0
N	1367	1359	1174	1111	983	634	1067

Notes:
[a] No IV regression for Engineering services, Customer services, Main activity because no instrument with *p*-value <.01 in first stage was found
[b] If $F < 10$, the set of instrumental variables is weak
[c] If $p < .05$, one of the instrumental variables is not exogenous
Standard errors in parentheses; * significant at 10%, ** significant at 5%, *** significant at 1%
Source: NSSO and KEROSINE outsourcing survey (calculations by author)

Table 5 lists the variables which are included as candidate instruments in the first-stage regressions. In order to given an idea of the explanatory power of each individual instrument, the *p*-values indicating the significance of the coefficients in these regressions are reported. The variable *supporting activity* is found to have a significant positive effect on outsourcing in the case of several business functions: firms regarding the business function as a support function are more likely to have taken the decision to outsource this business function than firms regarding the business function as a core activity. This correlation reflects one of the main motives for outsourcing, the focus on core activities (Quélin & Duhamel, 2003; Quinn, 1992). In the specifications of some business functions, another candidate instrument could be added. In the case of seven business functions, a set of instruments explaining a significant part of the variation in outsourcing is found. For these business functions, an IV regression using TSLS has been performed.

Most sets of candidate instruments, however, do not meet the condition of a first-stage *F*-statistic exceeding 10, which means that they are weak instruments. Hence, the TSLS estimations of the coefficients are biased and the reported standard errors are not meaningful. This also implies that applying the overidentifying restrictions test, by making use of the residuals from the TSLS regression, loses its significance.

Only in the specification of the business function *marketing and sales*, a strong instrument could be found. The variable *supporting activity* has sufficient power to predict the outsourcing decision, and the reported *F*-statistic of the first stage is 13.17. Since only one strong instrument is found, the overidentifying restrictions test could not be applied. In the TSLS regression, the coefficient on our variable of interest, *outsourcing*, is not significantly different from zero. This confirms the conclusion drawn from the OLS regression, that outsourcing of *marketing and sales* activities does not have a significant effect on firm level employment growth. The coefficient and standard error of initial size hardly differs from the OLS results.

5.3 How to proceed

We conclude this section with two suggestions on how to proceed. First, the poor results we obtained from TSLS estimation do not allow to determine if it is necessary to use instrumental variables method rather than OLS estimation. Since for most business functions, the set of available instruments is too weak to produce unbiased IV estimates, the best way to proceed is to look for better instruments outside the data set. A possible set of valid instruments is one that includes determinants of outsourcing. Amiti & Wei (2005), for example, used indicators of technological change as instruments for service offshoring at the sectoral level. Girma & Görg (2004) have proposed wage rates for skilled and unskilled workers to capture the cost-saving motive for outsourcing. Another type of variables that can be considered as candidates for valid instruments are lags of the variables included in the model. Arellano and Bond (1991) have introduced a consistent generalised method of moments (GMM) estimator for the parameters of such a model. In our case, this could be achieved by including firm level employment in the years before the period of observation. An advantage of this approach is that reliable firm level employment data from 1999 on should be easily obtained from the NSSO data set.

Second, we neglected another important aspect of the data in the TSLS regressions, i.e. heteroscedasticity of the error term. In the OLS regressions reported in table 2 and 3, we did take into account that the errors are heteroscedastic. In IV regression with heteroscedastic errors, however, the J-statistic as defined above has no chi-squared distribution which makes the reported results of the overidentifying restrictions test unreliable. In addition, the TSLS estimator is not an efficient IV estimator when the errors are heteroscedastic. In this case, generalised method of moments estimation is the preferred method for obtaining efficient IV estimators (Stock & Watson, 2007, p. 733). Hence we can conclude that in order to obtain efficient estimations of the parameters in our model, we should look for valid instruments, possibly lags of the dependent variable, and apply generalised method of moments estimation.

6. Discussion

The aim of this paper has been to empirically investigate whether the decision to outsource business activities has an impact on firm level employment growth. The analysis has been performed on the basis of a representative data set of employers containing survey results linked to employment data. The results of OLS regressions showed clear positive relations between outsourcing and employment growth in the case of support functions and *logistics and transport*, a negative relation in the case of outsourcing of *R&D*, and no significant relation in the case of other core functions. The direction of the causal relationship has been investigated by considering IV regression analysis. Lack of sufficiently strong instruments has hampered this approach.

The discussion of problems related to possible endogeneity and of other technical weaknesses of the analysis, is presented above, as well a suggestions on how to proceed. This section points out some more general points of discussion.

A first, and maybe fundamental shortcoming of the study, is that the main variable of interest, outsourcing of a particular business function, measures the binary outcome of an outsourcing decision without giving an indication size of the activities that have been outsourced. This leaves us with rather rough results, since firms that have outsourced a business function previously performed by a small number of employees, are treated equally to those having relocated entire business departments. It seems reasonable to assume that the employment outcome is considerably different in either case. In other words, if we want to more accurately estimate the effect of outsourcing on firm level employment growth, we should be able to measure outsourcing as a continuous, or at least as an ordinal variable.

A second and related problem is that we made an *a priori* distinction between core and support business functions, assuming that which functions are core and support is similar in all firms. In reality, however, this distinction varies across sectors and even across firms, and is not possible to determine which functions are more strategic *in general*. If we really expect a different effect from outsourcing of core and support functions, we should be able to distinguish between individual firms that consider a particular business as core and those where it is considered peripheral. Only additional data collection can handle these first two problems.

Third, the analysis suffers from a certain lack of clarity with respect to the short and medium term effects. Apart from reverse causality discussed above, the 5-year period of the measurement does not allow to disentangle both effects. It is possible that the short term employment effects of outsourcing are indeed negative, and that jobs are cut as a result, but that the medium term effects in terms of productivity & employment are positive. These two effects can counterbalance each other in the observed data.

Finally, it is important to stress that the present analysis only investigates one side of the labour market consequences of outsourcing, namely the employment changes at the level of the outsourcing firm. We have not been able to analyse the shift of employment that occurs between firms, nor to the estimate the net effects for aggregate labour demand. To this end, also the change in labour demand at the side of the supplier should be investigated. Hence, to what extent increased verticalisation leads to aggregate employment growth remains an open question for future research.

7. Conclusion

This paper contributes to a growing body of empirical literature on the effects of outsourcing on labour demand. We look at it from a firm-level perspective, and empirically study the effect of outsourcing on employment growth at the level of the individual firm. The strength of the analysis is that it covers all sectors of the economy, and that it takes into account outsourcing of all kinds of activities, both production of materials and delivering of services.

The firm-level perspective has urged us to redefine the common research approach in the field in a number of ways. First, we have taken a dynamic view of outsourcing, measuring it as a shift of activities previously performed in-house to an external supplier, and not just as the sum of intermediate inputs. Second, we did not distinguish between domestic and foreign outsourcing, since this distinction is not an antecedent of the firm level decision to outsource. Third, we did differentiate between outsourcing of various business functions, since these are expected to be related to different rationales for outsourcing and hence to result in different firm level outcomes.

To this end, we have used a classification of ten business functions which determines the functional structure of the firm.

The analysis has been based on a customised data set linking survey and administrative data of a representative set of 1415 firms in the Flemish region of Belgium. An exploratory analysis has been performed by using ordinary least squares (OLS) regression. Next, instrumental variables (IV) approach has been considered to mitigate problems of endogeneity and simultaneous causality.

The results of the OLS regressions contradict the belief that outsourcing has a negative effect on firm level labour demand. Controlling for initial size and sector, outsourcers do not experience lower growth rates of employment than firms that did not outsource. In the case of six business functions - *logistic and transport*, *financial and legal services*, *HRM*, *IT services*, *facility management*, and *engineering services* - outsourcers even show significantly higher average growth rates than firms which did not outsource these activities. *R&D* outsourcing is an exception. Here, a negative relationship between outsourcing and employment growth is found.

The results from the OLS regressions could not be confirmed by the use of an IV approach. The reason is that only in the case of one business function, marketing and sales, a strong instrument could be found. This leaves us with the open question whether the correlations we found are the result of a straightforward causal relation. Firms with high growth rates might be the ones that engage more in outsourcing. Alternatively, like in the case of R&D, firms experiencing lower growth rates might be the ones that decide to outsource activities in pursuit of gaining access to external knowledge.

The best way to proceed with the analysis would be to look for better instruments. We suggest that by including firm level employment in the years before the period of observation, and by applying generalised method of moments, a more robust estimation of the parameters of our model could be achieved.

References

Abraham K. & Taylor T. (1996). Firm's Use of Outside Contractors: Theory and Evidence. *Journal of Labor Economics*, 14(3), pp. 394-424.

Alexander M. & Young D. (1996). Outsourcing: Where's the value?. *Long Range Planning*, 29(5), pp. 728-730.

Amiti M. & Wei S.J. (2005a). *Service Offshoring, Productivity, and Employment: Evidence from the United States*, IMF Working Paper No. 05/238.

Amiti M. & Wei S. (2005b). Fear of Service Outsourcing: Is it Justified?. *Economic Policy*, 20(42), pp. 308-347 .

Ang S. & Cummings L.L. (1997). Strategic Response to Institutional Influences on Information Systems Outsourcing. *Organization Science*, 8(3), pp. 235-256.

Arellano M. & Bond S. (1991). Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations. *The Review of Economic Studies*, 58(2), pp. 277-297.

Arnold U. (2000). New dimensions of outsourcing: a combination of transaction cost economics and the core competencies concept. *European Journal of Purchasing & Supply Management*, 6(1), pp. 23-29.

Avonds L. (2005). *Een vergelijkende analyse van de Input-Outputtabellen van 1995 en 2000*. Federaal Planbureau. Working paper 4-05. Brussels.

Baden-Fuller Ch., Targett D. & Hunt B. (2000). Outsourcing to outmanoeuvre: Outsourcing re-defines competitive strategy and structure. *European Management Journal*, 18(3), pp. 285-295.

Barney J. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, 17(1), pp. 99-120.

Bartel A.P., Lach S. & Sicherman N. (2005). *Outsourcing and Technological Change*. CEPR Discussion Paper No. 5082.

Bettis R., Bradley S. & Hamel G. (1992). Outsourcing and Industrial Decline. *The Executive*, 6(1), pp. 7-22.

Bosch G. & Wagner A. (2005). Measuring economic tertiarisation. A map of various European service societies. In: G. Bosch & S. Lehndorf (eds.). *Working in the Service Sector. A tale from different worlds*. Routledge. London and New York.

Bradford Jensen J. & Kletzer L.G. (2007). *Measuring Tradable Services and the Task Content of Offshorable Services Jobs*. Paper prepared for the NBER-CRIW conference on "Labor in the New Economy", November 16-17, 2007, Washington DC.

Brown S.P. (2008). Business Processes and Business Functions: a new way of looking at employment. In: *Monthly Labor Review*, 131(12), pp. 51-70.

Coase R.H. (1937). The Nature of the Firm. *Economica*, 4(16), pp. 386-405.

Crino R. (2007). *Service offshoring and white-collar employment*. CESifo Working Paper Series No. 2040.

Davenport T. (1993). *Process Innovation: Reengineering work through information technology*. Harvard Business School Press. Boston

Deavers K.L. (1997). Outsourcing: A corporate competitiveness strategy, not a search for low wages. *Journal of Labor Research*, 18(4), pp. 503-519.

Delmar F., Davidsson P. & Gartner W.B. (2003). Arriving at the high-growth firm. *Journal of Business Venturing*. 18(2), pp. 189-216.

Dodsworth M. & Constable M. (2006). Outsourcing: the employee perspective. In: P. Barrar & R. Gervais (eds.). *Global Outsourcing Strategies: An International Reference on Effective Outsourcing Relationships*. Gower Publishing. Aldershot / Burlington. pp. 77-116.

Domberger S. & Jensen P. (1997). Contracting out by the public sector: theory, evidence, prospects. *Oxford Review of Economic Policy*, 13(4), pp. 67-78.

Dunne P. & Hughes A. (1994). Age, Size, Growth and Survival: UK Companies in the 1980s. *The Journal of Industrial Economics*, 42(2), pp. 115–140.

Egger H. & Egger P. (2003). Outsourcing and skill-specific employment in a small economy: Austria after the fall of the Iron Curtain. *Oxford Economic Papers*, 55(4), pp. 625-643.

Egger P., Pfaffermayr M. & Weber A. (2007). Sectoral adjustment of employment to shifts in outsourcing and trade: evidence from a dynamic fixed effects multinomial logit model, *Journal of Applied Econometrics*, 22(3), pp. 559-580.

Falk M. & Wolfmayr Y. (2005). Employment Effects of Trade in intermediate Inputs with the EU Member States and Asia. *Aussenwirtschaft*, 60(4), pp. 441–462.

Falk M. & Wolfmayr Y. (2008). Services and materials outsourcing to low-wage countries and employment: Empirical evidence from EU countries. *Structural Change and Economic Dynamics*, 19(1), pp. 38-52.

Falk M. & Koebel B.M. (2002). Outsourcing, Imports and Labour Demand. *The Scandinavian Journal of Economics*, 104(4), pp. 567-586.

Feenstra R.C. & Hanson G.H. (1996). Globalization, outsourcing and wage inequality. *The American Economic Review*, 86(2), pp. 240-245.

Feenstra R. C. & Hanson G.H. (1999). The Impact of Outsourcing and High-Technology Capital on Wages: Estimates For The United States, 1979-1990. *Quarterly Journal of Economics*, 114(3), pp. 907-940.

Fixler D.J. & Siegel D. (1999). Outsourcing and productivity growth in services. *Structural Change and Economic Dynamics*, 10(2), pp. 177-194.

Flecker J., Holtgrewe U., Schönauer A., Dunkel W. & Meil P. (2009). Restructuring across value chains: Case study evidence from the clothing, food, IT and public sectors. In: U. Huws (ed.). *Value chain restructuring in Europe in a global economy*. HIVA K.U. Leuven. Leuven.

Flecker J. (2005). *Networks or just a new breed of multinationals? Relocation of eWork and the global restructuring of value chains*. Paper presented at the 'ICT, the knowledge society and changes in work' Workshop, 9-10 June, 2005, The Hague.

Geishecker I. (2008). The impact of international outsourcing on individual employment security: A micro-level analysis. *Labour Economics*, 15(3), pp. 291-314.

Geishecker I. & Görg H. (2008). Winners and losers: A micro-level analysis of international outsourcing and wage. *Canadian Journal of Economics*, 41(1), pp. 243-270.

Gereffi G. & Korzeniewicz M. (eds.) (1994). *Commodity Chains and Global Capitalism*. Praeger Publishers. Westport.

Gereffi G., Korzeniewicz M. & Korzeniewicz R.P. (1994). Introduction: Global Commodity Chains. In: G. Gereffi & M. Korzeniewicz (eds.). *Commodity Chains and Global Capitalism*, Praeger Publishers. Westport. pp. 1-14.

Gereffi G., Humphrey J. & Sturgeon T. (2005). The governance of global value chains. *Review of International Political Economy*, 12(1), pp. 78-104.

Geurts K., Ramioul M. & Vets P. (2009). *Using employee flows to improve measures of job creation and destruction and firm dynamics: The case of Belgium*. MPRA Paper No. 15306.

Gilley K.M. & Rasheed A.A. (2000). Making More by Doing Less: An Analysis of Outsourcing and its Effects on Firm Performance. *Journal of Management*, 26(4), pp. 763-790.

Gilley K.M., Rasheed A.A. & Al-Shammari H. (2006). Research on Outsourcing: Theoretical Perspectives and Empirical Evidence. In: P. Barrar & R. Gervais (eds.). *Global Outsourcing Strategies: An International Reference on Effective Outsourcing Relationships*. Gower Publishing. Aldershot / Burlington, pp. 17-32.

Gilley K.M., McGee J.E. & Rasheed A.A. (2004). Perceived environmental dynamism and managerial risk aversion as antecedents of manufacturing outsourcing: the moderating effects of firm maturity. In: *Journal of Small Business Management*, 26(2), pp. 117-133.

Girma S. & Görg H. (2004). Outsourcing, Foreign Ownership, and Productivity: Evidence from UK Establishment-level Data. *Review of International Economics*, 12(5), pp. 817-832.

Globerman S. & Vining A.R. (2006). The outsourcing decision: A strategic framework. In: P. Barrar & R. Gervais (eds.). *Global Outsourcing Strategies: An International Reference on Effective Outsourcing Relationships*. Gower Publishing, Aldershot / Burlington, pp. 3-16.

Görg H. & Hanley A. (2005). Labour demand effects of international outsourcing: Evidence from plant-level data. *International Review of Economics and Finance*, 14(3), pp. 365–376.

Görg H. & Hanley A. (2004), Does Outsourcing Increase Profitability?. *The Economic and Social Review*, 35(3), pp. 267-288.

Görzig B. & Stephan A. (2002). *Outsourcing and Firm-level Performance*. DIW Discussion Paper No. 309. Berlin.

Head K. & Ries J. (2002). Offshore production and skill upgrading by Japanese manufacturing firms. *Journal of International Economics*, 58(1), pp. 81-105.

Heshmati, A. & Pietola K. (2006), The Relationship between Corporate Competitiveness Strategy, Innovation, Increased Efficiency, Productivity Growth and Outsourcing. In: P. Barrar & R. Gervais (eds.). *Global Outsourcing Strategies: An International Reference on Effective Outsourcing Relationships*. Gower Publishing. Aldershot / Burlington, pp. 77-116.

Huws U. (2006). The restructuring of global value chains and the creation of a cybertariat. In: C. May (ed.). *Global Corporate Power. International Political Economy Yearbook Volume 15*, Lynne Rienner Publishers. Boulder, Colorado.

Huws U. & Ramioul M. (2006). Globalisation and the restructuring of value chains. In: U. Huws (ed.). *The transformation of work in a global knowledge economy: towards a conceptual framework*. WORKS Project report, Workpackage 3: Theories and concepts, pp. 13-28.

Jovanovic, B. (1982). Selection and the Evolution of Industry, in *Econometrica*, 50(3), pp. 649-670.

Kletzer L. (2000). Trade and Job Loss in U.S. Manufacturing, 1979-94. In: R. Feenstra (ed.). *The impact of international trade on wages*. University of Chicago Press. Chicago.

Knabe A. & Koebel B. (2006). The economic rationale and labour markets effects of outsourcing: A survey. In: P. Barrar & R. Gervais (eds.). *Global Outsourcing Strategies: An International Reference on Effective Outsourcing Relationships*. Gower Publishing. Aldershot / Burlington, pp.167-182.

Kotabe M. (1989). "Hollowing out" of U.S. multinationals and their global conpetitiveness: An intra-firm perspective. Journal of Business Research; 19(1), pp. 411-433.

Kotabe M. (1990), The Relationship between Offshore Sourcing and Innovativeness of U.S. Multinational Firms: An Empirical Investigation. *Journal of International Business Studies*, 21, pp. 623-638.

Michel B. (2009). *The impact of offshoring on employment in Belgium*. Federal Planning Bureau, Working Paper 1-09. Brussel.

Lei D. & Hitt M.A. (1995). Strategic Restructuring and Outsourcing: The Effect of Mergers and Acquisitions and LBOs on Building Firm Skills and Capabilities. In: *Journal of Management*, 21(5), pp. 835-859.

Liu, R. & Trefler D. (2008). *Much ado about nothing: American jobs and the rise of service outsourcing to China and India*. NBER Working Paper No. W14061.

OECD (2007a). *Offshoring and Employment. Trends and impacts*, OECD. Paris.

OECD (2007b). *Staying Competitive in the Global Economy. Moving up the Value Chain*. OECD. Paris.

Olsen K.B. (2006). *Productivity impacts of offshoring and outsourcing: A review*. STI Working Paper 2006/1. OECD. Paris.

Porter M. E. (1985). *Competitive Advantage: Creating and Sustaining Superior Performance*. Free Press. New York.

Prahalad C.K. & Hamel G. (1990). The core competence of the corporation. *Harvard Business Review*, 68(3), pp. 243-265.

Quélin B. & Duhamel F. (2003). Bringing together strategic outsourcing and corporate strategy. Outsourcing motives and risks. *European Management Journal*, 21(5), pp. 647-661.

Quinn, J.B. (1992). *Intelligent enterprise: A knowledge and service based paradigm for industry*. Free Press. New York.

Statistics Denmark, Statistics Finland, Statistics Netherlands, Statistics Norway& Statistics Sweden (2008). *International sourcing: Moving business functions abroad*. Copenhagen.

Stock J.H. & Watson M.W. (2007). *Introduction to econometrics*. Pearson Education. Boston.

ten Raa T. & Wolff E.N. (2001). Outsourcing of Services and the Productivity Recovery in U.S. Manufacturing in the 1980s and 1990s. *Journal of Productivity Analysis*, 16(2), pp. 149-165.

Van Welsum D. & Reif X. (2006). *Potential impacts of international sourcing on different occupations*. DSTI Information Economy Working Paper. OECD. Paris.

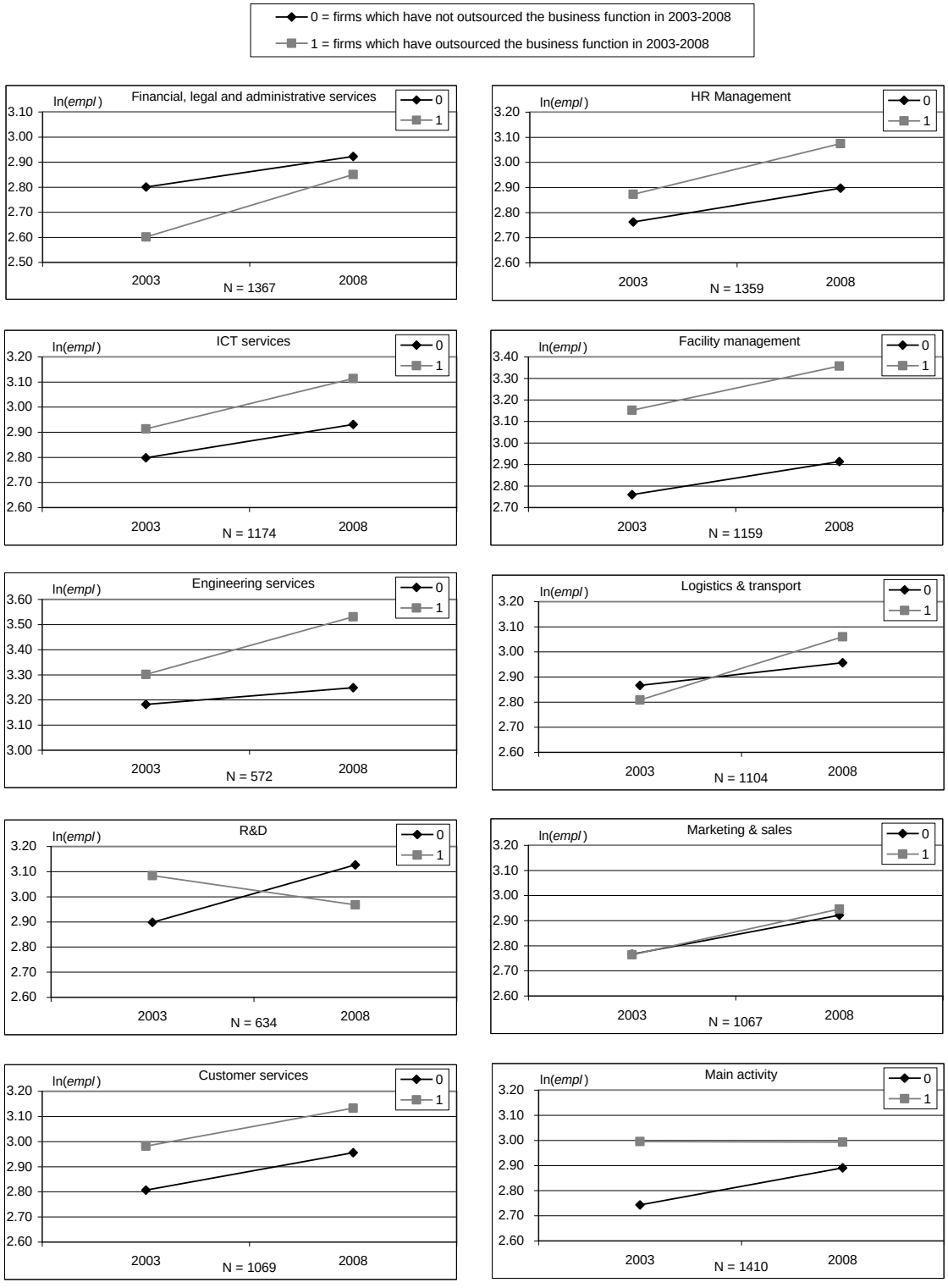
Williamson O.E. (1975). *Markets and hierarchies: Analysis and antitrust implications*. Free Press New York.

Williamson O.E. (1989). Transactions costs economics', in R. Schmalensee & R.D. Willig (eds.), *Handbook of Industrial Organization. Volume 1*. Elsevier. Amsterdam, pp. 135-182.

Wooldridge J.M. (2002). *Econometric analysis of cross section and panel data*. MIT Press.

Annex

Figure A.1 Relative employment evolutions of outsourcers versus non-outsourcers of ten business functions



Note: weighted means according to population of Flemish firms with more than 5 employees
Source: NSSO and KEROSINE outsourcing survey (calculations by author)

Table A.1 List of business functions

	Business function	Description
1.	Main activity	the production of goods or the provision of services to the market
2.	Research & development	activities aimed at developing new products or services or improving existing products or services
3.	ICT services	activities relating to IT and telecommunications infrastructure: this includes hardware and software as well as the support of other company activities
4.	Engineering services	activities related to engineering technology: activities performed by architects, engineers or technicians with a view to developing and improving the company's infrastructure, or certain technical or technological products and processes
5.	Facility management	activities related to the management of facilities (buildings, goods and services), such as cleaning, catering and security
6.	Logistics and transport	activities related to the purchasing, storage, registration, packaging, transport and distribution of goods
7.	Marketing and sales	activities related to external communication, such as market research and opinion polling, advertising, telemarketing, sales, pricing, e-business, trade fairs, newsletters
8.	Customer service	activities relating to customer support during or after the sale of goods and services
9.	Financial, legal and administrative management	activities such as accounting, auditing and financial management, legal services, secretarial and administrative support
10.	Human resources management	activities such as recruitment and selection, personnel administration, payroll and pension administration, including education and training of staff

Table A.2 The 36 strata of the survey sample; number of observations in the sample, population sizes in italic

		Firm size in number of employees			
	Sector	6-10	11-100	+100	Total
1.	Food	33	50	38	121
		299	*553*	*120*	*972*
2.	Textile & clothing	35	50	22	107
		136	*318*	*55*	*509*
3.	Paper & publishing	42	48	14	104
		167	*303*	*58*	*528*
4.	Chemicals	15	49	15	79
		30	*119*	*81*	*230*
5.	Metal products	41	48	36	125
		300	*656*	*62*	*1018*
6.	Wholesale	43	43	45	131
		1522	*2231*	*163*	*3916*
7.	Transport & logistics	41	45	35	121
		616	*1368*	*128*	*2112*
8.	IT	35	35	10	80
		155	*279*	*38*	*472*
9.	Health & social work	44	58	90	192
		287	*1143*	*338*	*1768*
10.	Manufacturing (rest)	45	46	47	138
		2255	*3371*	*445*	*6071*
11.	Private services (rest)	51	49	43	143
		4342	*4608*	*445*	*9395*
12.	Public services (rest)	43	31	10	84
		718	*965*	*163*	*1846*
Total		468	552	405	1425
		10827	*15914*	*2096*	*28837*

Source: NSSO and KEROSINE outsourcing survey (calculations by author)

Table A.3 Selected list of variables

	Variable	Categories
	Source: NSSO administrative dataset	
$empl_0$	Number of employees on 30/06/2003	discrete value
$empl_t$	Number of employees on 30/06/2008	discrete value
	Absolute employment growth 2003-2008	$empl_t - empl_0$
$\Delta\ln(empl)$	Relative employment growth 2003-2008	$\ln(empl_t) - \ln(empl_0) \in [-2,+2]$
	Sector	Food (NACE 15), Textile & clothing (NACE 17, 18), Paper & publishing (NACE 21, 22), Chemicals (NACE 24), Metal products (NACE 28), Wholesale (NACE 51), Transport & logistics (NACE 60, 63.1, 63.2, 63.4), IT (NACE 72), Health & social work (NACE 85), Manufacturing (rest), Private services (rest), Public services (rest)
	Main sector	Manufacturing (NACE 10 - 41), Private services (NACE 50 - 72, 74, 93), Public services (NACE 73, 75 - 92), Construction (NACE 45)
	Source: KEROSINE employer survey, background questions	
	Firm is part of a larger company group	1 = yes, 0 = no
	Firm is head office or subsidiary	1 = head office, 0 = subsidiary
	Head office is based in Belgium or abroad	1 = Belgium, 0 = abroad
	Strategic decisions are taken in Belgium or abroad	1 = Belgium, 0 = abroad
	Strategic decision making is relocated abroad in 2003-2008	1 = yes, 0 = no
	Competition from domestic companies in 2008	five-point scale from 1 (very weak) to 5 (very strong)
	Competition from foreign companies in 2008	five-point scale from 1 (very weak) to 5 (very strong)
	Change in competition since 2003	1 = increase, 0 = stable or decrease
	Firm is usually among the first in the sector to adopt new technologies	1 = yes, 0 = no
	Distribution of total turnover:	
	- share of turnover in the Belgian market	continuous value
	- share of turnover in the European market	continuous value
	- share of turnover outside Europe	continuous value
	Export turnover as share of total turnover	continuous value
	Share of low-skilled to medium-skilled employees	continuous value
	Source: KEROSINE employer survey, business function (b.f.) questions	
	b.f. is relevant for the firm	1 = yes, 0 = no
	b.f. is core or supporting activity	1 = supporting, 0 = core
	b.f. is carried out by the firm's own workforce	0 = no, 1 = yes, 2 = partially
	b.f. is carried out by another firm	1 = by firm of same company group, 2 = by firm outside company group, 3 = both
	Country where b.f. is carried out	nominal variable
outbf	b.f. has been outsourced in 2003-2008	1 = yes, 0 = no
	Jobs have been cut as result of outsourcing	1 = yes, 0 = no

Table A.4 Share of firms which have outsourced business functions in 2003-2008; total economy - manufacturing - private services

	Weighted means (%), standard errors between brackets					
	Denominator: firms where business function is relevant			Denominator: all firms		
	Total economy	Manufacturing (excl. Construction)	Private services	Total economy	Manufacturing (excl. Construction)	Private services
Outsourced business function						
Financial, legal, admin.	15.30	16.39	16.53	14.81	15.94	15.95
	(1.44)	(2.34)	(2.23)	(1.40)	(2.27)	(2.16)
HR management	14.80	17.75	14.84	13.91	17.00	14.04
	(1.50)	(2.42)	(2.35)	(1.42)	(2.33)	(2.24)
ICT services	34.62	27.69	36.28	25.54	19.33	28.06
	(2.18)	(2.74)	(3.37)	(1.70)	(1.97)	(2.77)
Facility management	15.69	15.92	15.00	11.83	11.80	11.98
	(1.66)	(2.42)	(2.50)	(1.27)	(1.81)	(2.03)
Engineering services	23.76	17.96	21.43	7.38	8.01	4.23
	(2.57)	(3.67)	(5.62)	(0.86)	(1.69)	(1.17)
Logistics & transport	19.98	29.40	21.13	14.32	25.64	15.10
	(1.90)	(3.38)	(2.96)	(1.40)	(3.03)	(2.18)
R&D	18.11	15.26	24.55	5.59	8.38	5.61
	(2.82)	(3.66)	(6.01)	(0.95)	(2.09)	(1.51)
Marketing & sales	13.24	8.71	14.44	9.76	7.13	11.23
	(1.70)	(2.51)	(2.58)	(1.27)	(2.07)	(2.04)
Customer services	2.47	0.51	3.22	1.83	0.40	2.33
	(0.67)	(0.29)	(1.18)	(0.50)	(0.22)	(0.86)
Main activity	6.69	7.45	5.02	6.65	7.34	5.02
	(1.00)	(2.09)	(1.30)	(1.00)	(2.06)	(1.30)

Note: weighted shares according to population of Flemish firms with more than 5 employees
Source: NSSO and KEROSINE outsourcing survey (calculations by author)

Table A.5 Share of firms which report job destruction caused by outsourcing

	Number of outsourcers	Share of outsourcers reporting job destruction			
	N	Weighted share	Standard deviation	95% confidence limit	
Outsourced business function					
Financial, legal, admin.	236	0.099	0.032	0.036	0.162
HR management	233	0.061	0.032	-0.003	0.125
ICT services	428	0.030	0.009	0.013	0.048
Facility management	215	0.138	0.036	0.068	0.209
Engineering services	172	0.031	0.017	-0.002	0.064
Logistics & transport	252	0.146	0.041	0.065	0.226
R&D	104	0.129	0.053	0.023	0.236
Marketing & sales	130	0.053	0.023	0.007	0.098
Customer services	27	0.238	0.113	-0.011	0.488
Main activity	107	0.214	0.051	0.113	0.316

Note: weighted shares according to population of Flemish firms with more than 5 employees
Source: NSSO and KEROSINE outsourcing survey (calculations by author)

Table A.6 Firms which have outsourced business functions in 2003-2008 and the location of the supplier(s)

	Number of outsourcers	Share of outsourcers with domestic supplier(s)		Share of outsourcers with foreign supplier(s)	
	N	Weighted share	Standard deviation	Weighted share	Standard deviation
Outsourced business function					
Financial, legal, admin.	236	0.962	0.023	0.043	0.024
HR management	233	0.977	0.021	0.049	0.024
ICT services	428	0.923	0.020	0.101	0.021
Facility management	215	0.994	0.005	0.044	0.028
Engineering services	172	0.962	0.012	0.063	0.015
Logistics and transport	252	0.949	0.021	0.214	0.039
R&D	104	0.897	0.041	0.222	0.063
Marketing and sales	130	0.942	0.026	0.181	0.049
Customer services	27	0.834	0.098	0.308	0.125
Main activity	107	0.912	0.031	0.238	0.066

Note: weighted shares according to population of Flemish firms with more than 5 employees
Source: NSSO and KEROSINE outsourcing survey (calculations by author)