The effects of outsourcing on unemployment

Evidence from micro-data in The Netherlands

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Abstract

Although it is usually recognized that international outsourcing can reduce costs for firms, there are also concerns for the effects on domestic employment. Economic theory predicts that there should be no employment effects in the long-run at the aggregate level, but there may be redistributional short-run effects that can be harmful for social cohesion. This paper uses duration models to explore whether employees that work for firms that outsource their activities have a higher risk of being fired involuntary. This is done by using linked employer-employee data, which combine information on outsourcing at the firm level and information about unemployment benefits. We find that employees that worked for firms that outsourced were more likely to lose their jobs. This result appears to be caused by domestic outsourcing, and not by international outsourcing. Moreover, after adjusting for job duration, the risk of losing a job is higher for females, younger employees and foreign-born employees.

Key words: outsourcing, unemployment, duration models
JEL-codes: F23, J64

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1 Introduction

The last few decades have shown a substantial increase in both domestic and international outsourcing. Outsourcing involves the purchase of intermediate goods or services from a third party, which were previously produced within the firm (Görg et al., 2008). Even though the definition of the word outsourcing has shifted somewhat towards that of offshoring (often used for international outsourcing), we use it to refer to both domestic and international outsourcing. Data from Statistics Netherlands show that the ratio between production and value added in the Dutch manufacturing sector increased from 3.4 in 1988 to 4.4 in 2008. Furthermore, the importance of imported intermediaries has increased substantially over time. In 2009, the Dutch input-output table showed that 62 percent of Dutch imports (excluding imports for transit and re-exports) were used as intermediary inputs, while only 38 percent consists of final goods. Crino (2008) shows that the share of intermediaries in international trade has been increasing in almost all advanced economies. All these trends imply that the use of outsourcing is increasing.

Even though the increased division of labour associated with outsourcing is likely to result in increased productivity and wages in the long run, the short-run transitional effects are less clear. Economic theory suggests that in the long run, outsourcing will have no effect on the total level of employment. In the long run, increased specialization and technological advancements that substitute labour result in higher productivity of labour, and hence in higher real wages, rather than in higher unemployment. It could have a long-run effect of the composition of the type of jobs in a country. While outsourcing could reduce the need for production jobs, it could increase the need for transaction jobs, since the outsourcing contracts need to be managed and monitored. However, outsourcing may have negative effects in the form of temporary unemployment and distributional effects, which can be harmful for social cohesion. The size of these transitional effects is not necessarily equivalent to the size of outsourcing, since other countries could also be outsourcing jobs to the Netherlands. Outsourcing is often associated with the displacement of jobs. When outsourcing is done domestically, it would at most lead to a regional shift in employment. However, as part of the process of internationalization, international outsourcing has become more relevant.

There has been substantial attention of policy makers and the general public for the potential negative consequences of (especially international) outsourcing. Particularly when the economy is in recession, firms that relocate their activities to foreign countries often make the headlines. Since international specialization takes place according to comparative cost advantages, the transitional effects will be heterogeneous across employees that perform different types of tasks. The nature and size of such transitional effects are highly relevant from a policy perspective. On the one hand, if transition effects are substantial, knowledge about their nature is needed if policy makers want to provide support to those who are negatively affected. On the other hand, if there are no significant transitional effects, unfounded fear for outsourcing could result in protectionist measures that reduce productivity.

This paper adds to the existing literature in at least three ways. First, even though the widespread public fear for outsourcing is related mostly to unemployment, most of the literature focuses on wages or

broader employment patterns. The microdata that are used in this paper allow us to directly estimate the impact of outsourcing on unemployment. Second, while most studies focus on only international outsourcing, we are one of the first to estimate the impact of both foreign and domestic outsourcing on unemployment in an integrated manner. Third, we estimate the effect of outsourcing on the probability of becoming unemployed as well as the effect of outsourcing on the probability of finding a new job after becoming unemployed.

Our aim is to add to the knowledge about the short-term effects of both domestic and international outsourcing, by considering the risk of involuntary job loss in firms that outsource part of their activities. For this purpose, we rely on a large set of microdata on the level of individual employees and firms, which were provided by Statistics Netherlands (CBS). We use data on unemployment benefits in order to determine when a job ended involuntarily. These data are linked to information about all employer-employee relations, which are based on the tax statements about wages that firms submit to the tax authority. This allows us to approximately identify the job that an employee had prior to receiving unemployment benefits. We use unique survey data to determine which firms did or did not outsource in the period 2001–2006, and relate this to the risk of involuntary job loss. This is done using duration and survival models, where the probability of involuntary unemployment is estimated, given the duration of the job and a number of variables related to individual workers and firms.

The remainder of this paper is organized as follows. Section 4.2 discusses the previous theoretical and empirical literature that addresses the outsourcing decision of firms and the consequences of outsourcing for employees. Section 4.3 describes the data related to outsourcing, employers and employees, and unemployment benefits, that are used in our empirical analysis. This section also explains how these data were linked to each other. Section 4.4 explains the Cox proportional hazard model. The empirical results are discussed in Section 4.5, and the conclusions are summarized in Section 4.6.

2 Previous literature

A large theoretical literature has emerged that attempts to explain the determinants of outsourcing behaviour of firms. The advantages of outsourcing are mainly in the increased production efficiency through specialization that is offered by vertical disintegration. There are several reasons why outsourcing an activity can potentially be cheaper than producing it within the firm, for example due to lower wages (Autor et al., 2003; Diaz-Mora, 2008; and Girma and Görg, 2004). This is particularly relevant for international outsourcing, as wages can differ substantially between countries. Abraham and Taylor (1996) mention that even domestic outsourcing can reduce the wage bill, for example when the outsourcing firm is unionized and the contractor is not. Economies of scale form another explanation. If for some part of the production process economies of scale apply, costs will be lower if all firms outsource this particular part to one other party. For example, many small firms outsource their wage administration to an accountancy firm.

While outsourcing may increase production efficiency, the transaction costs associated with outsourcing parts of the production process limit the possibilities to benefit from vertical disintegration. This makes the decision on whether or not to outsource an important aspect of the optimization of the value chain. The literature that views the outsourcing decision of firms as a transaction costs optimization problem is largely based on the work of Williamson (1975, 1985 and 1991) and of Grossman and Hart (1986). This literature states that the decision to either produce a product within the firm, or to purchase it on the market, is essentially a trade-off between intra-firm transaction costs and inter-firm transaction costs. In this context, transaction costs should be defined as all costs that are associated with the commencement, execution, and compliance of a transaction (Den Butter, 2012). Intra-firm transaction costs are based on how internal processes are organized. Examples of intra-firm transaction costs are principle-agent costs, or the costs of searching for suppliers. Examples of inter-firm transaction costs are search costs, contract costs, and enforcing costs (Den Butter, 2012).

Grossman and Helpman (2002) model domestic and international outsourcing in a general equilibrium framework, where firms outsource to either partners in the (advanced) North, or in the low-wage South. In this model, firms face a trade-off between friction costs when buying inputs from other firms, or the lesser production efficiency of a vertically integrated firm. Several extensions to this model have followed. In Antràs (2003), frictions do not only occur between firms (when outsourcing parts of the production), but also within integrated firms. Antràs and Helpman (2004) introduce heterogeneity in final goods and analyse the effects for international trade. They predict that a reduction in trade costs will result in relatively higher growth of inter-firm trade compared to intra-firm trade. In Grossman and Helpman (2004), the organization of firms as well as their location and the locations of their suppliers is the outcome of principal-agent relation between firms and their employees and suppliers.

Acemoglu et al. (2003) take a somewhat different approach, and develop a model where firms start to outsource activities as they move closer to the technological frontier, which enables them to relieve management and increase their focus on innovation. More generally, Bartel et al. (2008) argue that higher technological change results in more outsourcing because keeping up with the latest developments in production technology becomes more costly. In their view, the increased relative importance of outsourcing during the last decades is to some extent explained by changed expectations about technological progress.

In the end, the decision of firms about the amount of vertical integration, the locations of their own subsidiaries, as well as their domestic and foreign suppliers, boils down to the simultaneous optimization of production costs and inter-firm and intra-firm transaction costs. Relocating activities that were previously performed within the firm to suppliers outside the firm, involves a changing employment structure. Furthermore, international outsourcing could result in shifts in relative demand for different types of labour, which may result in a changing wage distribution, because labour is rather immobile across national borders. It should therefore come as no surprise that the possible adverse effects of this trend on domestic wages and employment have attracted considerable attention from the scientific literature.

Several theoretical papers address the relationship between international outsourcing, labour demand and wages (see, e.g., Feenstra and Hanson, 1996a and Deardorff, 2001). Relatively simple extensions to the standard Heckscher-Ohlin and Stolper-Samuelson trade models predict that low skilled workers will lose from international outsourcing (because they have to compete with large pools of low skilled labour). The more recent literature argues that globalization and biased technological progress have resulted in polarization of wages and employment (see, e.g., Autor et al., 2003).

The theoretical literature has focused mainly on relative factor demand, which determines unemployment and wages of different types of workers, rather than unemployment. The reason for this is that such models often assume that labour markets are competitive. An exception to this are the articles by Mitra and Ranjan (2010) and Egger and Kreickemeier (2008). In the model of Mitra and Ranjan (2010), international outsourcing is associated with an increase in wages and a decrease in unemployment if labour is mobile between industries. In fact, they find that domestic employment of a firm that outsources part of its activities to a foreign country may be higher than domestic employment of a firm that keeps all production within the home country. On the other hand, when labour is immobile between industries, unemployment may increase within sectors that outsource. Although labour could be immobile between sectors in the short run, in the long run this is unlikely. Egger and Kreickemeier (2008) predict that unemployment will increase in countries with low unemployment benefits, while it may decrease in countries with high unemployment benefits, albeit not when low skilled labour is outsourced to low wage countries.

The empirical literature has focused mostly on wages, or on aggregate employment, and on international outsourcing. The evidence found by these studies is rather mixed. A negative impact on wages and employment is found by Feenstra and Hanson (1996b and 2001), Scheve and Slaughter (2004), Crino (2010) and Baumgarten et al. (2010). Other studies found no significant effects of international outsourcing on wages or employment (Amiti and Wei, 2005; Mankiw and Swagel, 2006; Liu and Tefler, 2008; Criscuolo and Garicano, 2010).

More recently, however, a number of studies has emerged that use microdata to estimate the effects of international outsourcing on unemployment. Egger et al. (2007) estimate a dynamic fixed effect multinomial logit model on Austrian microdata, and find that international outsourcing reduces both the probability that workers remain employed in the manufacturing sector, as well as the probability that individuals switch to the manufacturing sector. Liu and Trefler (2008) estimate the impact of international outsourcing in the service sector to India and China on a number of labour market outcomes, and find small negative or zero effects of international outsourcing on all labour market outcomes that were taken into consideration. Liu and Trefler (2011) find that imports of services from India and China are associated with the transition of workers towards lower paid occupations, and find that the probability of becoming unemployed increased by 0.9 percentage points. Much of the negative impact of international outsourcing, however, occurs when workers switch to lower quality occupations. Munch (2010) finds that international outsourcing increases the unemployment risk in Denmark by about one percentage point. However, this effect is much larger for men,

workers above 50 and low-skilled workers. Bachmann and Braun (2011) also find rather heterogeneous results for different subgroups on the labour market when estimating the impact of international outsourcing on German unemployment. While outsourcing has no effect or even a slight positive effect on aggregate job stability, they find a negative effect for medium-skilled and older workers.

3 Data and stylized facts

This paper uses two main types of data, which were provided by Statistics Netherlands (CBS). One is a linked employer-employee dataset and the other is a firm survey on outsourcing. The survey on outsourcing was deployed by Eurostat in twelve European countries in 2007. Some descriptive statistics of this survey for Denmark, Finland, Norway, the Netherlands, and Sweden are published by Statistics Denmark et al. (2008).[1] This study only uses the data that were obtained from firms in the Netherlands, which were kindly provided by Statistics Netherlands (CBS). The Dutch survey was sent to 1,503 firms in the non-financial business economy which had at least 100 employees in 2007 and received 1,002 responses.[2]

The survey asked firms whether they had outsourced in the period 2001–2006. The phrasing of the question was prescribed by Eurostat as: *What type of functions has your enterprise sourced in the period 2001–2006?* The survey distinguished between outsourcing of core business functions, and several types of support business functions. It was possible to check a box for domestic outsourcing, for international outsourcing, and for no outsourcing. Note that the measure of outsourcing that is used in this paper is not a perfect measure. It is only a binary measure which is measured over a relatively large period of time. We only know that a firm outsourced between 2001–2006, but not when it actually took place. This makes identification of the effect more difficult. Additionally, we do not know if the firm outsourced once in this period or multiple times, or what the magnitude of outsourcing was. Finally, we also do not know whether firms did or did not outsource before 2001.

Most of the firms (74.2 percent) did not outsource any activities between 2001 and 2006. International outsourcing (15.6 percent) occurred slightly more often than domestic outsourcing (14.1 percent). Figure 1 contains a Venn diagram that shows the share of firms that outsourced domestically, internationally, or both.

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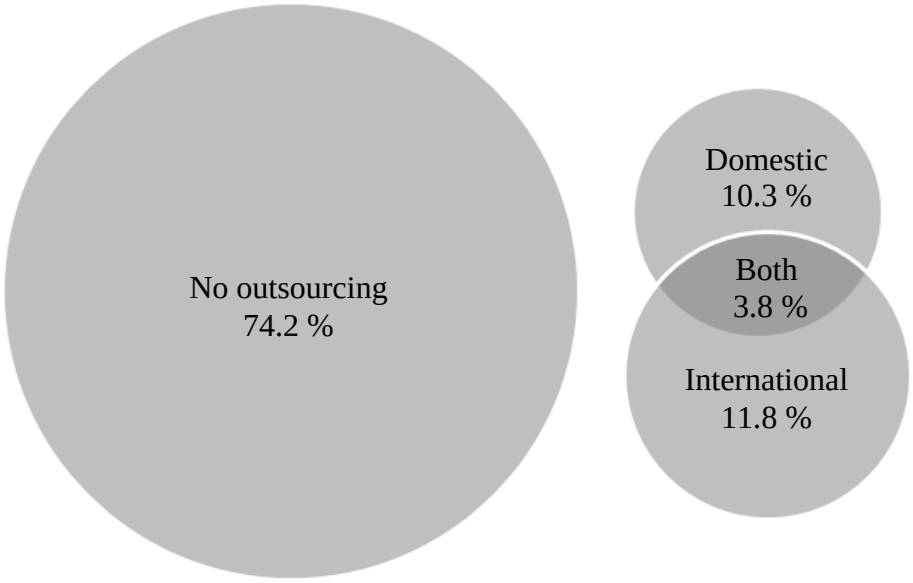
[1] It is possible that some descriptive statistics reported in this chapter differ slightly from those reported by Statistics Denmark et al. (2008). These differences can occur because the latter study used weights based on sector and size class, while this study does not.

[2] The 1,503 firms were selected from a population of 4,633 firms that met the selection criteria. They were selected using stratified sampling, using twelve strata based on size (100–200 employees, 200–500 employees, more than 500 employees) and activity (high tech manufacturing, medium and low tech manufacturing, knowledge intensive business services, other activities). See also Statistics Denmark et al. (2008).

Figure 1 Outsourcing shares by destination



The share of firms that outsourced domestically and internationally are also shown for each business function in Table 1. The number of firms that outsourced the same activity both domestically and internationally is negligible. Second, Table 1suggests that firms that outsource an activity that is considered to be part of their core business, are more likely to outsource internationally (9 percent) than domestically (4 percent). For almost all types of support activities, the share of firms that outsourced them domestically is larger than the share of firms that outsourced them internationally. The most popular type of support activities to outsource were ICT services (6 percent domestic and 4 percent international).

We combined the answers on the questions about support business functions in order to create four different binary measures for outsourcing: domestic outsourcing of core functions, domestic outsourcing of support functions, international outsourcing of core functions and international outsourcing of support functions. The small number of firms that outsourced both domestically as well as internationally are included in both measures.

The data used for the linked employer-employee dataset are part of a database referred to as the 'Sociaal Statistisch Bestand' (SSB). From this database, we use a branch called SSB-Banen and a branch called SSB-WW. The former contains information about all jobs in the Netherlands. This is based on the wage administration, which firms have to submit to the tax authority. This allows us to identify the start and end date of employer-employee relations, their duration, and the fiscal wage. The second branch, SSB-WW, contains all the unemployment benefits in the Netherlands. This information comes from the 'Uitvoeringsinstituut Werknemersverzekeringen' (UWV), which is the Dutch governmental organization in charge of administrating unemployment benefits. We use the SSB-WW to determine the start and end date of the unemployment benefits.

Table 1 Outsourcing shares by activity and destination (in percent)

	Only domestic outsourcing	Only international outsourcing	Both types of outsourcing
Core business functions:			
Production of goods and services for the market	4	9	1
Support business functions:			
Distribution and logistics	4	3	0
Marketing, sales and after sales services, including help desks and call centres	3	2	0
ICT services	6	4	0
Administrative and management functions	5	3	0
Engineering and related technical services	2	1	0
Research and development	1	2	0
Other types of functions	1	0	0

The advantage of using data on unemployment benefits is that it ensures that the job ended involuntarily. If we would only use data on whether or not someone gets a new job after the end of the current job, we would overestimate involuntary unemployment. The reason for this is that an employee can voluntarily end his job without getting a new job, for example because he starts his own company, retires, or takes a sabbatical. When an employee receives unemployment benefits, it is more likely that the job really ended involuntarily, because employees that quit their job voluntarily are not eligible for unemployment benefits. It is not possible to determine how many employees do lose their job involuntarily, while not being eligible for unemployment benefits, but this group is likely to be rather small since the requirements for receiving unemployment benefits are not very strict. Employees are automatically insured for unemployment benefits. Under current regulations, the main requirement is a work history of 26 weeks in the past 36 weeks. This requirement should be met for all the employees in our data, since we only included jobs that lasted at least six months. Employees that are fired due to extreme misbehaviour are not eligible for unemployment benefits, so we do not observe this group as being involuntarily unemployed. However, this group is expected to be very small.

The disadvantage of using data on unemployment benefits is that the match between end dates of jobs and start dates of unemployment benefits is not very good. We merged the data on end dates of jobs from the SSB-Banen with the data on start dates of unemployment benefits from the SSB-WW to determine which job was the cause for unemployment benefits. Under normal circumstances, when an employee loses his job he would be eligible for unemployment benefits shortly after the last day of his job. However, this was often not the case for the observations in our dataset. It is not clear why the dates did not match very well. It could be that end dates of jobs are not very well administered. To allow for some flexibility with respect to the matching of jobs with unemployment benefits, we allowed the dates to deviate by one month. This means that we considered a match to be successful if the unemployment benefits started within one month before or

within one month after the end date of the job. The share of jobs that we were able to match to the start of receiving unemployment benefits in this way was still only 5.4 percent.

The consequence of the poor matching results is that we underestimate the hazard rate of becoming unemployed. Jobs that end in involuntary unemployment, but could not be matched with the start of unemployment benefits within a month before or after the end date of the job, are not considered as involuntary unemployment in the model. Instead, these jobs leave the sample in the same way as jobs that are ended voluntarily. Although this problem will underestimate the base hazard rate, it should not affect the estimates of the explanatory variables in the model, assuming that these are not correlated with the success rate of the matching between jobs and unemployment benefits. For the model that is applied to the probability of getting out of involuntary unemployment, it is not an issue at all, because in that model we do not require a match between the dates of the unemployment benefits and the new job: the first job that is observed is considered to end the status of unemployment.

Table 2 presents a number of descriptive statistics for all jobs, jobs that did not end in involuntary unemployment, and jobs that did end in involuntary unemployment. This only includes jobs that existed for at least six months, had a size of at least two days per week, and earned at least the minimum wage. Workers that became involuntarily unemployed are relatively more often female and more often foreign workers born in middle and lower income economies.[3] Employees that became unemployed on average earn somewhat higher wages than employees that did not become unemployed during the period that our data covers. This is likely to be related to the financial compensation that an employer has to pay when he ends an indefinite labour contract. This compensation is not required when the employer does not prolong a temporary contact. In that case the employee is still considered to be involuntarily unemployed and is eligible for unemployment benefits.

Note that the average unemployment duration is an underestimation, because our data are censored at the end of 2008. Similarly, the share of unemployed individuals that will eventually find a new job will be somewhat higher than the share that finds a new job before 2009. Also note that the unemployment duration is defined here as the period between the start of involuntary unemployment and the start of a new job. Some people may not find a new job within the period covered by our data, but this does not necessarily imply that they are involuntarily unemployed for the full period. When unemployed individuals for example start their

[3] We created a variable that indicates whether or not a person is born in a high-income foreign country and a variable that indicates whether a person is born in any other foreign country. We classified countries that had a GDP per capita of over 20,000 USD as a high-income country. According to the World Economic Outlook database of the International Monetary Fund (IMF) these include Luxembourg, Norway, Qatar, Switzerland, Denmark, Australia, Sweden, the United Arab Emirates, the United States, Canada, Ireland, Austria, Finland, Singapore, Belgium, Japan, France, Germany, Iceland, the United Kingdom, Italy, Kuwait, Hong Kong, New Zealand, Spain, Brunei, Cyprus, Greece, Israel, Slovenia, Portugal, the Bahamas and South Korea.

own business, start an education, or retire, they remain unemployed in our data, but are no longer unemployed according to the definition used in most unemployment statistics.

Table 2 Descriptive statistics, 2000–2008

	All jobs	Jobs not ending in involuntary unemployment	Jobs ending in involuntary unemployment
Number of observations	734,598	695,987	38,611
Wage (in 2008 euros)	56,124	55,709	63,617
	(268,316)	(261,532)	(369,770)
Age	39.47	39.53	38.38
	(11.75)	(11.32)	(10.61)
Females	0.295	0.291	0.378
	(0.456)	(0.454)	(0.485)
Foreign workers from high-income countries	0.040	0.041	0.037
	(0.197)	(0.197)	(0.190)
Foreign workers from lower income countries	0.109	0.103	0.214
	(0.311)	(0.303)	(0.410)

Note: standard deviations are shown in parentheses.

Table 3 presents descriptive statistics by industry for a number of key variables on employees. The highest incidence of unemployment can be observed among employees that were previously employed by a car manufacturer. In this industry, as much as 8.9 percent of the jobs ended in involuntary unemployment with unemployment benefits. There is no clear difference between manufacturing and services industries. For example, employees that work in the business services sector have the second highest probability of becoming involuntarily unemployed (6.7 percent). The lowest incidence of unemployment is observed in the sector other goods, where about 2.3 percent of the jobs ended in involuntary unemployment. Even though employees in the public sector have an even smaller probability of getting fired, they are not included in our sample because this sector is not included in the outsourcing survey.

Table 3 Descriptive statistics by industry

	Observations (jobs)	Average annual fiscal wage (in 2008 euros)	Percentage of jobs ending in unemployment	Percentage of unemployed that find a new job before 2009	Average unemployment duration (in years)
Mining and quarrying	1,441	70,215	2.3	83	0.78
Food, beverages and tobacco	36,748	60,283	5.0	69	1.41
Textile, clothing and leather products	3,497	60,682	6.3	72	1.48
Wood, paper and printing	16,840	56,540	5.9	77	1.29
Chemical products, rubber and plastic products	44,284	78,695	4.5	74	1.36
Other manufacturing (non-metallic mineral products, recycling, utilities)	14,229	57,103	3.0	74	1.55
Basic metals and metal products	19,873	51,080	5.7	85	1.02
Machinery and equipment	26,481	55,033	4.5	83	1.09
Office, electrical and communication machinery, medical instruments	41,683	69,128	3.7	74	1.17
Motor vehicles and other transport equipment	19,138	52,594	8.9	79	0.95
Other goods	52,735	31,725	2.3	69	1.36
Construction	31,556	53,140	3.5	83	1.13
Reparation and selling of motor vehicles	8,225	44,348	5.1	86	0.78
Wholesale trade	24,060	56,432	6.1	84	0.91
Retail trade	23,018	33,991	4.0	85	0.76
Hotels and restaurants	15,487	32,263	4.9	85	0.93
Transportation	15,699	43,206	3.4	83	0.80
Transport and travel services	11,207	52,256	4.4	87	0.66
Post and communication	8,744	53,358	5.0	87	0.71
Real estate and renting	6,348	57,899	4.9	86	1.00
Computer services	34,296	71,015	3.9	86	1.07
Other business services	279,009	58,070	6.7	85	0.73
All sectors	734,598	56,124	5.3	82	0.93

The same variables are also summarized based on the type of outsourcing used by the firms (see Table 4). The majority of the employees worked for firms that did not outsource in the period 2001–2006. However, the number of employees that worked for firms that did outsource is large considering that this group contains only about 26 percent of the firms in the data. This implies that firms that outsourced have considerably more employees than firms that did not outsource. The average wage is lower than the overall average for firms that outsourced domestically (45,000 euro), and higher than the overall average for firms that outsourced internationally (67,150 euro) or outsourced to both destinations (81,300 euro). The share of jobs that ended in involuntary unemployment was the highest for firms that outsourced only domestically (7.3 percent) and the lowest for firms that outsourced only internationally (4.0 percent). This implies that employees have the highest (lowest) risk of getting involuntarily unemployed at firms that have outsourced only domestically (internationally). Section 4.5 explores this relationship more formally using the Cox proportional hazard model, which also controls for job duration and other control variables. Although employees that work for firms that outsourced internationally have a relatively low risk of becoming involuntarily unemployed, they have a relatively high average unemployment duration (1.18 years). So if these employees lose their job, they seem to have more difficulty finding a new job. The opposite applies to employees from firms that outsourced only domestically: they have the highest risk of losing their job and the lowest average unemployment duration. As expected, the ranking of the share of unemployed employees that find a new job before 2009 is exactly the opposite of the ranking of the average unemployment duration.

Table 4 Descriptive statistics by type of outsourcing

	Obser-vations (jobs)	Average annual fiscal wage (in 2008 euros)	Percentage of jobs ending in un-employment	Percentage of unem-ployed that find a new job before 2009	Average unem-ployment duration (in years)
No outsourcing	432,439	56,176	4.8	82	0.94
Only domestic outsourcing	170,277	45,016	7.3	83	0.78
Only international outsourcing	102,625	67,150	4.0	79	1.18
Both types	29,256	81,325	4.6	71	1.42
All firms	734,597	56,124	5.3	82	0.93

4.4 Empirical model

We use a Cox proportional hazard model (Cox, 1972) to determine the effect of several types of outsourcing on the probability that an employee involuntarily loses his job and on the probability that an unemployed person finds a new job. The Cox proportional hazard model allows us to correct for the duration of the job spell or the unemployment spell, as well as for other control variables. This section will give a technical description of the model based on the original article by Cox (1972). This description applies to the case where we model the transition from employment to involuntary unemployment, but the methodology is similar for the case of a transition from involuntary unemployment back to employment.

If we denote the job duration by T, the probability $P(t)$ that a job ends and a worker becomes involuntarily unemployed within time t can be written as:

$$P(t) = P(T \leq t). \tag{1}$$

Similarly, the probability $S(t)$ that a job survives longer than time t, can be written as:

$$S(t) = P(T > t) = 1 - P(t). \tag{2}$$

The model aims to explain the hazard rate of becoming involuntarily unemployed. This hazard rate is equal to the probability density function of becoming involuntarily unemployed, conditional on the duration of the job. The hazard rate $h(t)$ is the probability that a job will end in involuntary unemployment within a short time period, Δt, given that the job survived up until time t. The hazard rate can be expressed as:

$$h(t) = \lim_{\Delta t \to 0} \frac{P(t \leq T \leq t + \Delta t \mid t \leq T)}{\Delta t}. \tag{3}$$

The Cox proportional hazard model estimates the hazard rate by using a semi-parametric approach. The hazard rate is estimated as a function of a baseline hazard rate function that varies over time, and k explanatory variables that enter the model linearly:

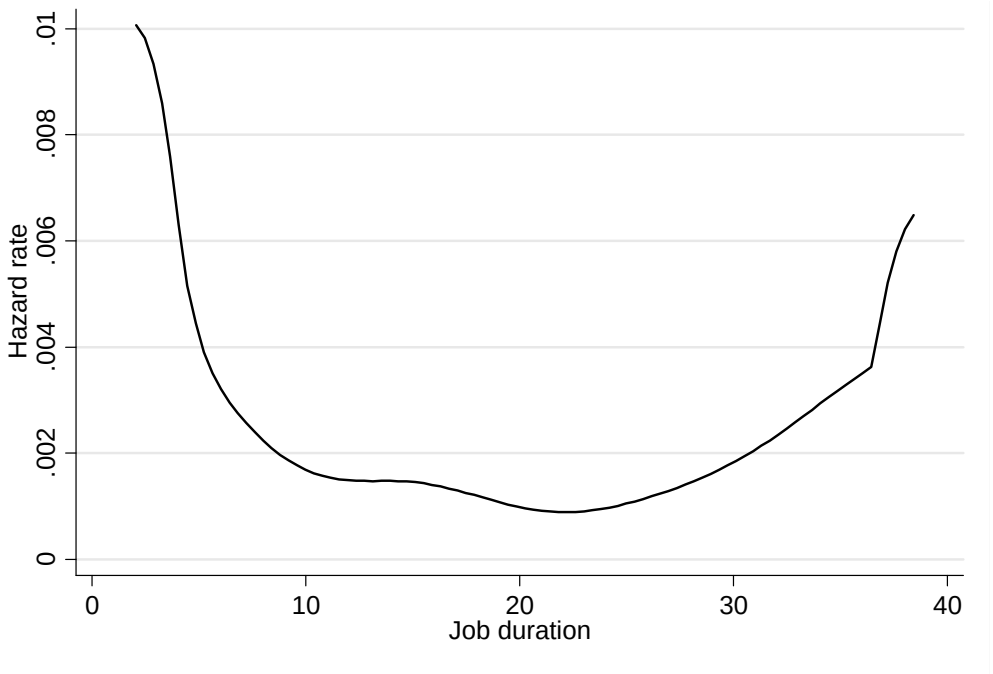
$$\log h_i(t) = \alpha(t) + \sum_{k=1} \beta_k x_{ki}. \tag{4}$$

The dependent variable is the natural logarithm of the hazard rate. The first term of the right hand side represents the base hazard rate, which varies over the duration of the job. It is comparable to the constant in a regular regression model, but it varies over time:

$$\alpha(t) = \log h_0(t). \tag{5}$$

This term captures differences in the hazard rate that are the result of the duration of the job. The model assumes that the pattern of this base hazard rate does not differ between different groups. Figure 2 shows the development of the average hazard rate over the duration of a job. This function was estimated for all jobs in the Netherlands, not just the jobs of firms that were available in the outsourcing survey.

Figure 2 Smoothed hazard rate of losing a job and receiving unemployment benefits



The horizontal axis depicts the job duration in years and the vertical axis contains the base hazard rate $h(t)$. The shortest job duration in our data is 0.5 years, since we removed all jobs with a shorter duration. Some jobs have a very long duration, but since the number of these jobs is very small, they have almost no effect on the estimation results.[4] Not too much value should be attached to the extreme part of the right-tail of Figure 2, since part is only based on a very small number of observations. Figure 2 shows that new jobs with a short duration start with a relatively high hazard rate. The hazard rate decreases for jobs with a longer duration, but starts to increase again after a duration of about 25 years. A possible explanation for this is the existence of temporary contracts. In the Netherlands, it is generally not possible to agree to several sequential temporary contracts.[5] Therefore, jobs with a short duration can be either jobs with a temporary contract or with a permanent contract, while jobs with a longer duration are generally permanent jobs. If firms have to reduce the amount of employees, it is likely that will first end the contracts of temporary employees, because firing an employee with a permanent position can be very costly. A firm that wants to fire an employee has to go through expensive procedures and provide monetary compensation to the employee, which is often based on the number of years of employment. Additionally, when firms are forced to reduce the number of employees, labour unions often negotiate that firms first have to fire the employees that joined the firm last. This means

[4] In two alternative specifications, we removed the jobs with a duration above 25 or above 40, which has almost no impact on the results. This chapter always reports the results of the specification including all jobs with a duration of at least six months.

that jobs with a short duration have a higher risk to end in case of large reorganizations, which would explain the higher average hazard rate for these jobs. A third possible explanation is that firms need some time to evaluate whether or not the employee is suitable for the job. Especially in the first few years, a firm can decide to fire an employee that is not performing well enough. If an employee is still not fired after several years, this probably means that the employee is performing sufficiently well and therefore the hazard rate will decrease.

The finding that the hazard of becoming unemployed starts to increase again for jobs that lasted for a long time is a somewhat unexpected result, considering that the cost of firing an employee generally increases with the job duration in the Netherlands. However, the result is consistent with Hassink (1999) and Gielen and Van Ours (2004), who independently find that the probability to become unemployed increases for older workers in the Netherlands. Although they do not provide a full explanation for this phenomenon, it is attributed to the fact that older workers are relatively expensive, while their productivity could decrease as a result of out-dated knowledge and insufficient abilities regarding technological advancements. This argument refers to the efficient layoff rule of Lazear (1995). Furthermore, older workers are less likely to leave the firm voluntarily when they notice that the prospects of the firm are decreasing, for example because they are less likely to find a new job, or because they feel more attached to their current job. Additionally, a possible explanation for the relatively high hazard rate for jobs with a long duration is that some functions might simply disappear. Jobs that started several decades ago might have become redundant as a result of technological change.

The second term of the right hand side of equation (4) includes the explanatory variables. These include a number of control variables, as well as the indicators for outsourcing that were introduced in the previous section. The control variables are gender, age, country of birth, firm size, and sector dummies. The variable firm size is measured as the natural logarithm of the amount of full-time equivalents employed by the firm. The outsourcing indicator is a binary variable that indicates whether or not a firm outsourced in the period 2001–2006. Alternatively, we distinguish two binary variables, for domestic outsourcing and for international outsourcing. While the model allows a flexible base hazard rate, which varies with job duration, the effect of the covariate variables is estimated to be time invariant.

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[5] Under current labour market regulations, the fourth sequential temporary contract will automatically become a permanent contract.

The model is estimated using the partial likelihood estimator developed by Cox (1972). The interpretation of the estimated coefficients is that an increase in the value of the independent variable by one corresponds to a change of the natural logarithm of the hazard ratio by β. This corresponds to a change of the hazard ratio by e^{β}. In the next section, which presents the estimation results, all coefficients are reported as the exponent of β. This means that the reported values can be interpreted as hazard ratios. When a variable increases by one, the hazard rate can be multiplied by the reported values. For variables that are denoted in natural logarithms, like wage and firm size, the reported values can be interpreted as an elasticity. For both types of variables, a value of one implies that the variable has no effect on the hazard rate, and a value above (below) one implies that the variable increases (decreases) the hazard rate.

4.5 Estimation results

4.5.1 From employment to unemployment

The first part of our empirical analysis considers the probability that an employee loses his job. The relevant variable is the hazard of unemployment after a certain job duration. When we compare this probability for firms that outsourced parts of their activities in the period 2001–2006 with firms that did not outsource in that period, there appears to be little difference. Panel A in Figure 3 shows the smoothed hazard estimates and the Kaplan-Meier survival estimates for employees working in both groups of firms, plotted as a function of job duration. The Kaplan-Meier survival estimates represent the estimated share of employees that do not become involuntarily unemployed. The Kaplan-Meier survival estimates are used, because all jobs that are still active at the end of 2008 leave our sample at that time, without information on whether it will eventually lead to involuntary unemployment or not. The method developed by Kaplan and Meier (1958) is able to deal with these kind of right-censored data. For employees working for a firm that outsourced, the hazard rate is somewhat higher for young and for old jobs, while it is smaller for the jobs in between. The left part of the figure is the most relevant, because a large share of jobs has a relatively short duration. Overall, the difference between both groups of firms looks small, which could indicate that the employees who had their jobs outsourced were re-assigned within the firm. It is also possible that positive productivity effects and negative transitional effects are somewhat in balance. In firms that do not outsource, productivity growth might be lower which could result in decreasing employment. Firms that outsource might grow faster due to higher productivity growth (consistent with the predictions of Mitra and Ranjan, 2010), which increases employment in these firms, but at the same time it is likely that some employees get fired during the process of outsourcing.

This comparison is also made for firms that did or did not outsource domestically and for firms that did or did not outsource internationally. The panels B and C in Figure 3 show that the higher probability of unemployment for employees with short job durations working for firms that outsourced, is caused by domestic outsourcing. In firms that outsourced internationally, the hazard rate was actually smaller for jobs

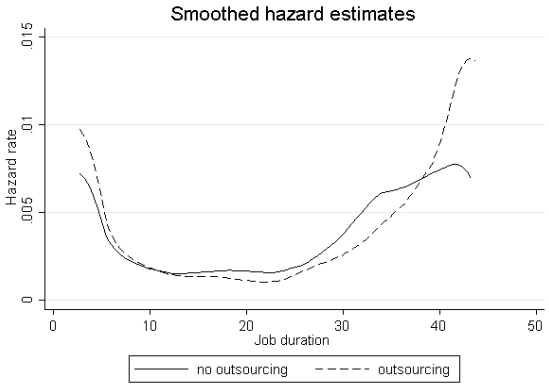
with a short duration. Note that these figures should only be used as an indication of the differences between the hazard rates of both groups. They only control for job duration, and not for any other characteristics of the firms or the employees, like the size of the firms or the age of the employees. We used the Cox proportional hazard model to determine the relationship between the hazard rate of losing a job and several firm and employee characteristics. Table 5 shows the estimation results of the Cox proportional hazard model. Since we have included a number of firm-level variables in our specifications and because there usually are multiple observations per firm, we have estimated firm-level clustered standard errors.

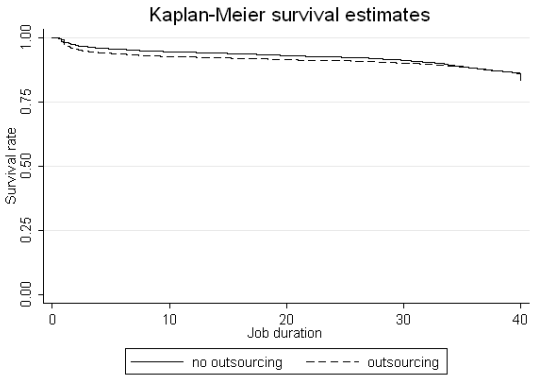
The first model specification only includes control variables, like gender, age, fiscal wage, country of birth and firm output. A coefficient of one implies that we have not found an effect of this variable on the risk of becoming unemployed. The statistical significance levels are based on the null-hypotheses that states that there is no effect, which means that the coefficient is equal to one. The estimation results indicate that, given the job duration, the probability of losing a job and receiving unemployment benefits is higher for female employees, younger employees, and employees born in low-income countries. The coefficients for the total output of the firm and the fiscal wage of the employee are not statistically significant. The risk of becoming involuntarily unemployed is particularly high for female employees (about 45 percent higher than males) and for employees that are born in a country with a GDP of less than 20,000 USD in 2010 (about 170 percent higher than for Dutch employees).

For the first specification in Table 5, the sector dummies are shown graphically in Figure 4. This figure shows the point estimates of each sector dummy with a 95 percent confidence interval. The reference sector is wholesale trade, which is omitted. The sectoral hazard rates are adjusted for the control variables that are included in specification (I) in Table 5. The risk of becoming unemployed is particularly low for employees working in the sectors other goods (0.28), mining and quarrying (0.39), other manufacturing (0.43), and electronics (0.44). For example, this means that an employee that works in the sector electronics, is 56 percent less likely to become involuntarily unemployed than a similar employee working in the wholesale trade sector. The risk of becoming unemployed is relatively high in the sectors other business services (1.14), and in the reference sector wholesale trade (1). The sector dummies are not reported for the other specifications, but they are similar to those shown in Figure 4.

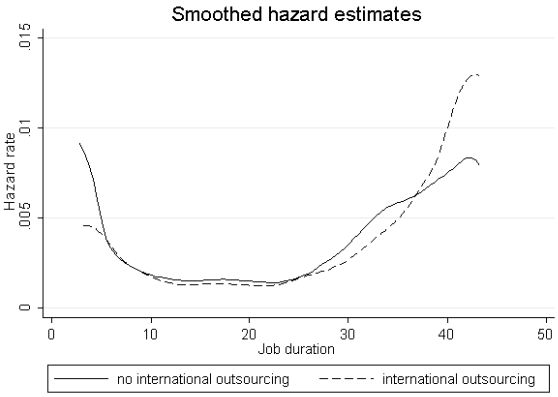
Figure 3 Hazard and survival rates of losing a job and receiving unemployment benefits

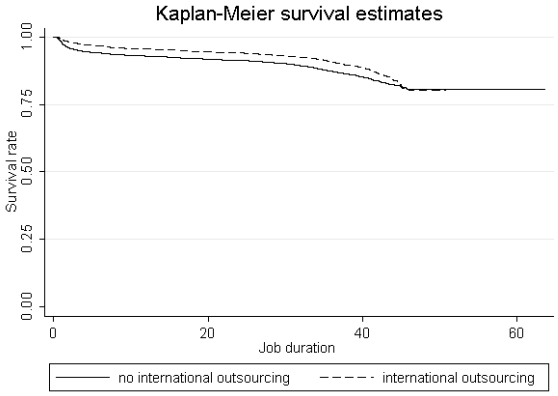
A. Outsourcing versus non-outsourcing firms



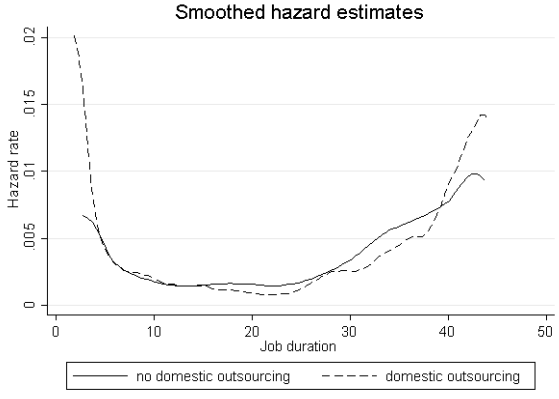


B. Internationally outsourcing versus not internationally outsourcing firms





C. Domestically outsourcing versus not domestically outsourcing firms



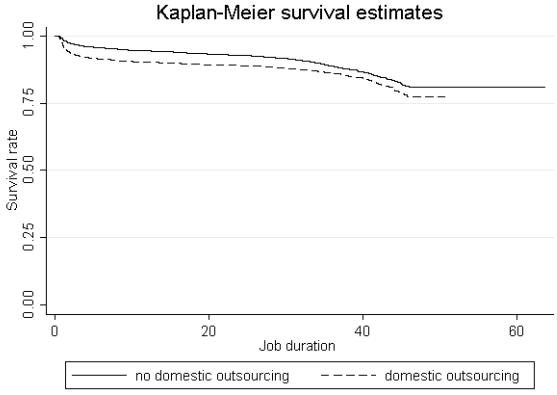
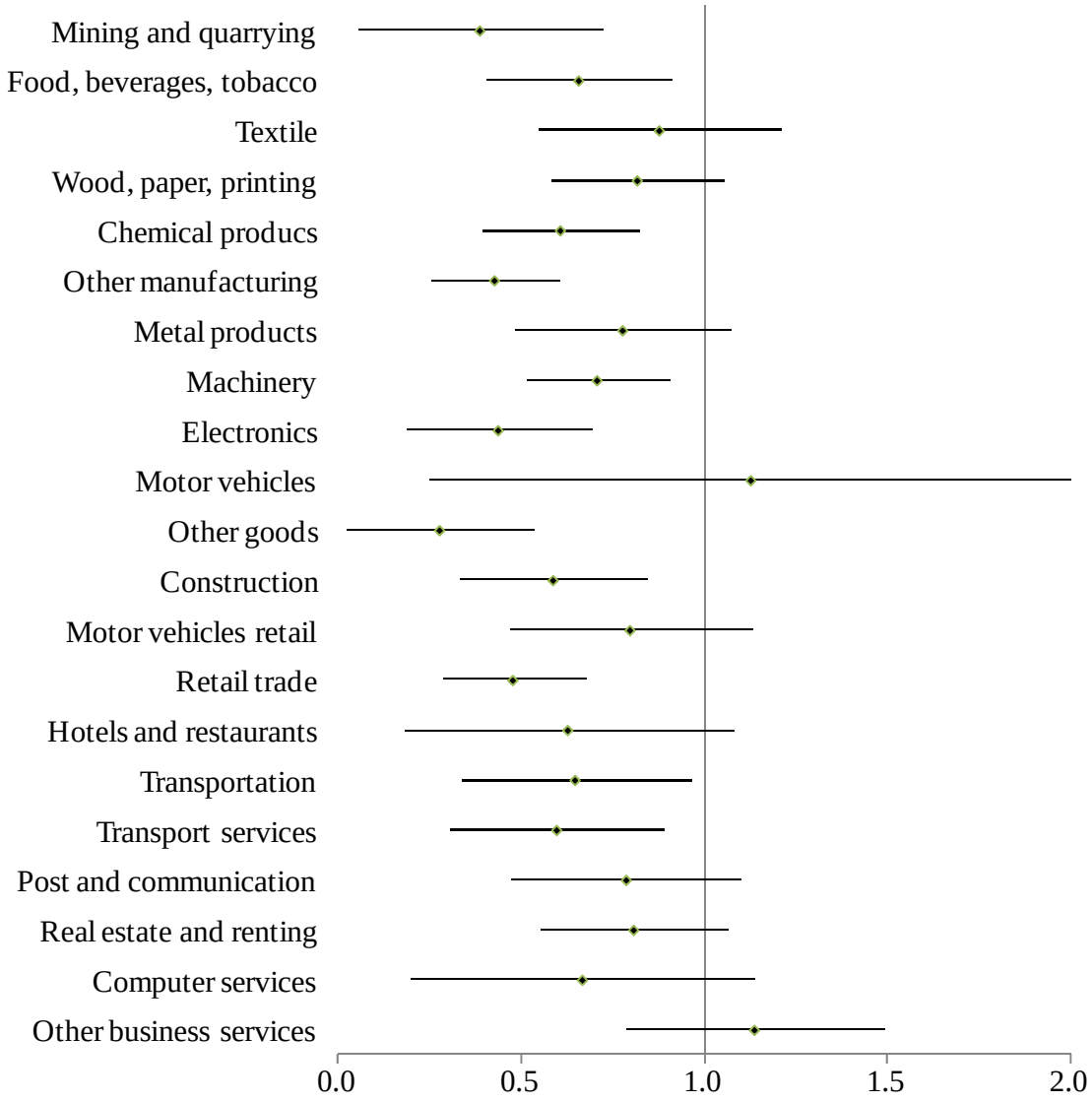


Table 5 Cox proportional hazard model estimation results for probability of losing a job and receiving unemployment benefits

	Dependent: hazard rate of becoming unemployed		
	(I)	(II)	(III)
Female	1.42***	1.43***	1.45***
	(0.14)	(0.13)	(0.13)
Age	0.96***	0.96***	0.96***
	(0.01)	(0.01)	(0.01)
Ln(annualized fiscal wage)	0.92	0.93	0.96
	(0.25)	(0.23)	(0.23)
Employee from foreign high-income country	1.22	1.23	1.28*
	(0.19)	(0.18)	(0.19)
Employee from foreign low-income country	2.69***	2.70***	2.71***
	(0.18)	(0.17)	(0.18)
Ln(firm size)	1.05	1.03	1.01
	(0.14)	(0.11)	(0.09)
Outsourced		1.21	
		(0.23)	
Outsourced internationally			0.68***
			(0.10)
Outsourced domestically			1.52**
			(0.32)
Observations	734,597	734,597	734,597
Failures	38,611	38,611	38,611
Total duration (in million years)	6.65	6.65	6.65
Sector dummies	22	22	22
Number of clusters	995	995	995

Notes: standard errors (corrected for cluster-correlation) are shown in parentheses. Significance levels for deviations from 1 are indicated by *** (1%), ** (5%) and * (10%).

Figure 4 Point estimates and 95 percent confidence intervals for sectoral hazard rates of losing a job and receiving unemployment benefit (relative to the wholesale trade sector)



In specification (II) in Table 5, a dummy is added which indicates whether or not a firm outsourced in the period 2001–2006. In specification (III) this dummy is split in two dummies, for international and for domestic outsourcing. The coefficients of the control variables do not change much compared to specification (I). As indicated by the results estimated for specification (II), the coefficient for the outsourcing variable is positive but not statistically significant. Although we would expect that employees working for firms that outsourced in the period 2001–2006 would have a higher risk of becoming unemployed, we do not find statistically significant evidence in support of this hypothesis. This seems to be related to the different effects we find for domestic and international outsourcing. In specification (III), these two types of outsourcing are included separately. It turns out that the risk of losing a job is in fact lower for firms that have been outsourcing internationally, while it is higher for firms that outsourced domestically. Employees are 32 percent less likely to lose their job if they work in a firm that engages in international outsourcing, and 52 percent more likely to lose their job if they work in a firm that outsourced domestically.

A possible explanation for these findings is that firms that outsource internationally are able to increase their productivity, which allows them to grow faster, which is likely to result in increased labour demand. Another possible explanation is that international outsourcing requires more labour to manage the contracts than domestic outsourcing contracts. In that case, the number of jobs that is effectively outsourced would be lower, but the cost savings associated to one outsourced job would be larger, because international outsourcing enables firms to benefit from comparative cost advantages.

The previously discussed models use a linear specification with respect to the logarithm of the fiscal wage. However, the relationship between wage and the risk of losing a job may not be linear. It is possible that certain wage groups are more affected by outsourcing than others, for example because some job types are easier to outsource than others (see, e.g., Akçomak et al., 2011). Therefore we repeat the model with dummies for four wage groups. The groups are based on the quartiles of the distribution of real annual fiscal wages across all firms in the dataset. Note that our data only contain employees that earn at least the minimum wage. The wages are normalized to 2008 wages by adjusting for inflation and real wage changes over time. The quartile boundaries are about 27,900 euro, 38,100 euro and 54,000 euro. The first specification in Table 6 shows that the relationship between wage and the risk of getting unemployed is indeed not linear. The first quartile is omitted, so the coefficients of the other three quartiles are relative to the first wage quartile. The first wage quartile has the highest risk of getting unemployed, since the coefficients of all other quartiles are below one. Employees in the third wage quartile have the lowest risk of getting unemployed.

In the second specification of Table 6, we include interaction effects between the variables that indicate whether the firm did or did not outsource and the wage quartile variables. Since the interaction term between the first quartile and the outsourcing dummy is omitted, the outsourcing variable provides the effect on the risk of getting unemployed for the first wage quartile. This coefficient is 1.71, and statistically significant. To obtain the effect on outsourcing for the other wage quartiles, we need to multiply this coefficient with the relevant interaction effect. For example, for the second wage quartile this is 1.71 x 0.77 =

1.32. Note that the stars for the coefficients of wage quartiles two, three and four, indicate a statistically significant difference with the first wage quartile, which is the reference group. These results reveal that the effects of outsourcing differ strongly between the four wage quartiles. The risk of getting unemployed increases by 71 percent for the first wage quartile, by 32 percent for the second wage quartile, and it has almost no effect for employees in the other two wage quartiles.

Finally, the third model specification includes interaction effects for domestic outsourcing as well as for international outsourcing. For the reference group (the first wage quartile) international outsourcing decreases the risk of getting unemployed (0.74), while the coefficient for domestic outsourcing strongly increases the risk (2.05). This is in line with the previous results in Table 5, which did not include any interaction effects. One of the most interesting results is that domestic outsourcing increases the risk of getting unemployed particularly for employees earning wages in the lowest quartile (2.05), while the effect becomes smaller for the higher wage groups. After multiplying the international outsourcing coefficient of the first wage quartile with the interaction terms of the other wage quartiles, we find a coefficient of 1.85 for the second quartile, 1.29 for the third quartile and 0.90 for the fourth quartile. Interestingly, international outsourcing decreases the hazard rate for all wage quartiles. This effect is the largest for the second wage quartile (0.55) and for the third wage quartile (0.64).

Additionally, in firms that outsource internationally, employees in the first quartile of the wage distribution (0.74) actually have a somewhat smaller hazard rate than employees in the highest wage quartile (0.86), although this difference is not statistically significant. This is likely to be related with the type of jobs that are being outsourced domestically and internationally. For many types of jobs with low wages, it is not possible to outsource internationally. A good example are cleaning jobs, which pay relatively low wages, but cannot be outsourced internationally because the job has to be performed locally. They can, however, be outsourced domestically, which explains the result that the risk of getting unemployed for employees with low wages is particularly increased when firms outsource domestically, and not when they outsource internationally. Even though these jobs are unlikely to be outsourced internationally and therefore less vulnerable from competition from low wage countries, as the polarization literature predicts (Autor et al., 2006; Goos et al., 2009), they may be outsourced domestically.

Table 6 Cox proportional hazard model estimation results, for probability of losing a job and receiving unemployment benefits, including wage-outsourcing interacting terms

	Dependent: hazard rate of becoming unemployed		
Female	1.33***	1.35***	1.37***
	(0.10)	(0.08)	(0.09)
Age	0.97***	0.97***	0.97***
	(0.01)	(0.01)	(0.01)
Second wage quartile	0.58***	0.67***	0.66***
	(0.04)	(0.05)	(0.05)
Third wage quartile	0.38***	0.49***	0.48***
	(0.04)	(0.07)	(0.06)
Fourth wage quartile	0.56**	0.77	0.75
	(0.15)	(0.21)	(0.19)
Second wage quartile × outsourced		0.77	
		(0.21)	
Third wage quartile × outsourced		0.57***	
		(0.12	
Fourth wage quartile × outsourced		0.52***	
		(0.12)	
Second wage quartile × outsourced domestically			0.90
			(0.25)
Third wage quartile × outsourced domestically			0.63*
			(0.16)
Fourth wage quartile × outsourced domestically			0.44***
			(0.10)
Second wage quartile × outsourced internationally			0.74
			(0.14)
Third wage quartile × outsourced internationally			0.87
			(0.17)
Fourth wage quartile × outsourced internationally			1.16
			(0.26)
Employee from foreign high-income country	1.21	1.20	1.25
	(0.19)	(0.17)	(0.17)
Employee from foreign low-income country	2.49***	2.46***	2.46***
	(0.17)	(0.17)	(0.17)
Ln(firm size)	1.04	1.00	0.97
	(0.18)	(0.09)	(0.07)
Outsourced		1.71***	
		(0.06)	
Outsourced internationally			0.74**
			(0.09)
Outsourced domestically			2.05***
			(0.34)
Observations	734,597	734,597	734,597
Failures	38,611	38,611	38,611
Total duration (in million years)	6.65	6.65	6.65
Sector dummies	22	22	22

Notes: standard errors (corrected for cluster-correlation) are shown in parentheses. Significance levels for deviations from 1 are indicated by *** (1%), ** (5%) and * (10%).

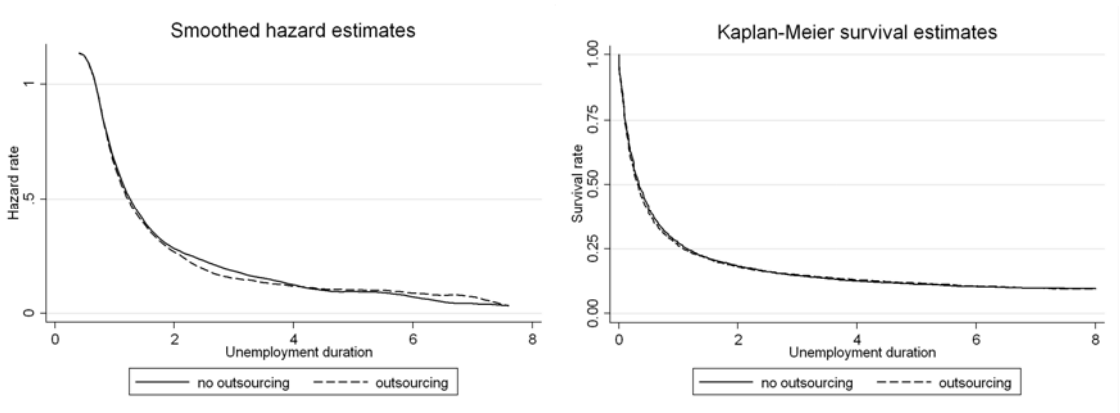
4.5.2 From unemployment back to a job

The second part of the analysis focuses on the probability of finding a new job, after a period of unemployment. For this part we only use the data for employees that lost their job and received unemployment benefits. Panel A in Figure 5 shows the estimated hazard and survival rates, plotted against the number of years after the end of their last job. The figure shows that there is almost no difference between employees that used to work for a firm that outsourced or for a firm that did not outsource. The probability of finding a new job is very high in the first year after losing a job and becomes much smaller after a longer period of unemployment. This is likely to be related to a loss of skills that occurs after longer periods of inactivity, but also to selection effects. Employees with high unobserved abilities are likely to find a job quicker than workers with lower abilities, which results in a decreasing potential of the workers that remain unemployed after a longer time. For both groups, almost 75 percent of the employees found a new job within one year. About ten percent of the employees from our dataset did not find a job within nine years. However, this does not mean that these employees were unemployed for this entire period. For example, they might have started their own business, or they might have retired. So this figure somewhat overestimates the unemployment duration of employees, but this should not be problematic for comparing the job market entry rates between employees from firms that did or did not outsource.

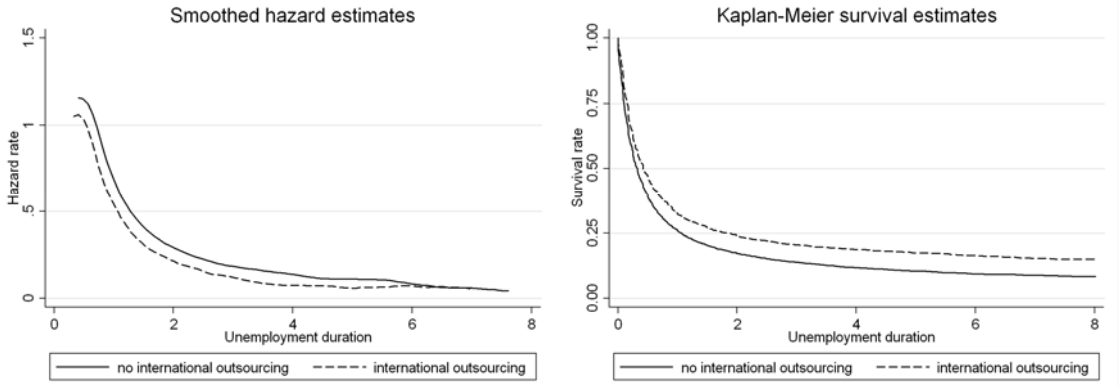
The panels B and C in Figure 5 make the same comparison for international outsourcing and for domestic outsourcing. It is interesting to see that the small difference in the estimated survival rates presented in panel A seems to be the result of two opposite differences that cancel out: employees from firms that outsourced internationally (panel B) were less likely to find a new job and employees from firms that outsourced domestically were slightly more likely to find a new job (panel B). We expect that the explanation for this is that jobs that are lost due to international outsourcing are at a comparative disadvantage in the Netherlands and are therefore disappearing to foreign countries. Employees that were previously working in such jobs will therefore have more trouble finding a new similar job, and may have to change their skills by training and education. For employees that lost their job due to domestic outsourcing, this argument does not apply, since domestic outsourcing only leads to reallocation between firms within the Netherlands, even though employment might be slightly reduced due to a higher labour productivity that is made possible by enhanced specialization.

Figure 5 Hazard and survival rates for getting out of unemployment by finding a new job

A. Outsourcing versus non-outsourcing firms



B. Internationally outsourcing versus not internationally outsourcing firms



C. Domestically outsourcing versus not domestically outsourcing firms

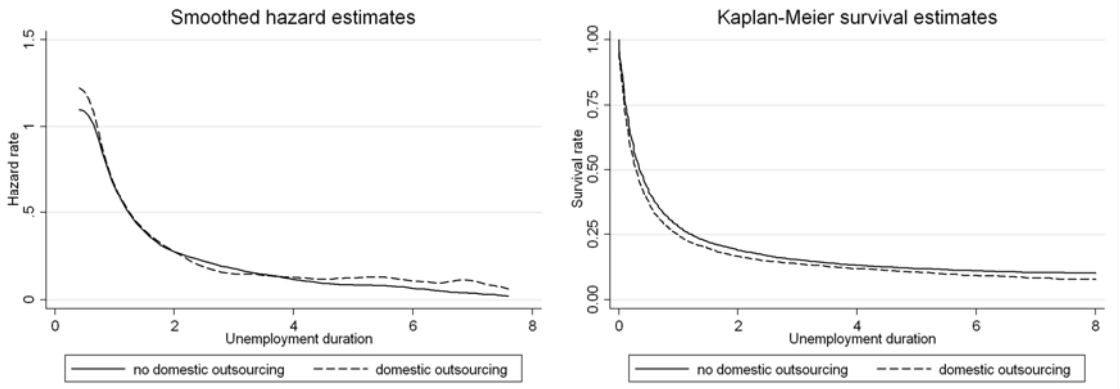


Table 7 shows the estimation results of the Cox proportional hazard model applied to the probability of finding a new job after a period of unemployment. These regressions only include the employees that became unemployed in the period 2000–2008, which are about 30,500 observations. It is possible that some individuals have lost their jobs multiple times during this period. In that case each lost job is considered as one independent observation. In the context of a hazard model, a failure is a unit of observation that leaves the current state of unemployment, so more than 80 percent of the observed individuals found a new job within our sample period. This does not mean that the other 20 percent never found a new job, since we do not observe unemployed individuals after the year 2008 and we do not observe whether people find a job after this year. The share of employees that never find a new job after unemployment is probably below, but somewhere close to, ten percent, as indicated by the survival rate estimates shown in Figure 5. And this includes former employees that are no longer looking for a new job.

Specification (I) in Table 7 does not yet include any outsourcing indicators. The results of this specification suggest that unemployed former employees are less likely to find a new job if they are female, are older, had a higher wage in their previous job, or are born in a foreign country. This may be related to the length of the period people are willing to search for a new job. For example, woman may be able to afford longer search periods, since they are more often than men the secondary earner of a family in the Netherlands. It is also possible that these groups have more difficulty finding a new job. For example, foreigners might have more difficulty with finding a new job because they are less fluent in the Dutch language. And older people might have more difficulty with finding a new job because of a discrepancy between their wage and their productivity. Additionally, people that worked for the same employer for many years may depend relatively strongly on firm-specific capital, which is less useful when they have to find a new job at a different employer.

The size of the firm of their previous job has no effect on the likelihood of finding a new job. The sector dummies point estimates and their 95 percent confidence intervals are shown in Figure 6. Although the differences in the hazard rate of becoming unemployed were often statistically significant (see Figure 4), the differences are much smaller and less often statistically significant for the hazard rate of finding a new job after being involuntarily unemployed. The only sectors that deviated statistically significantly from the wholesale trade sector are other goods (0.57), food, beverages, and tobacco (0.80), other business services (1.09), and transport services (1.14). Since there are significant differences in the risk of becoming involuntarily unemployed (inflow of unemployment) while the differences in the probability of finding a new job are much smaller (outflow of unemployment), this suggests that there is a substantial sectoral component in unemployment.

Specification (II) in Table 7 also includes a dummy for whether or not the firm of their previous job outsourced part of its activities. This has no significant effect on the likelihood of finding a new job. However, when we look at international and domestic outsourcing separately in specification (III), the likelihood of finding a new job is significantly lower for former employees of firms that outsourced

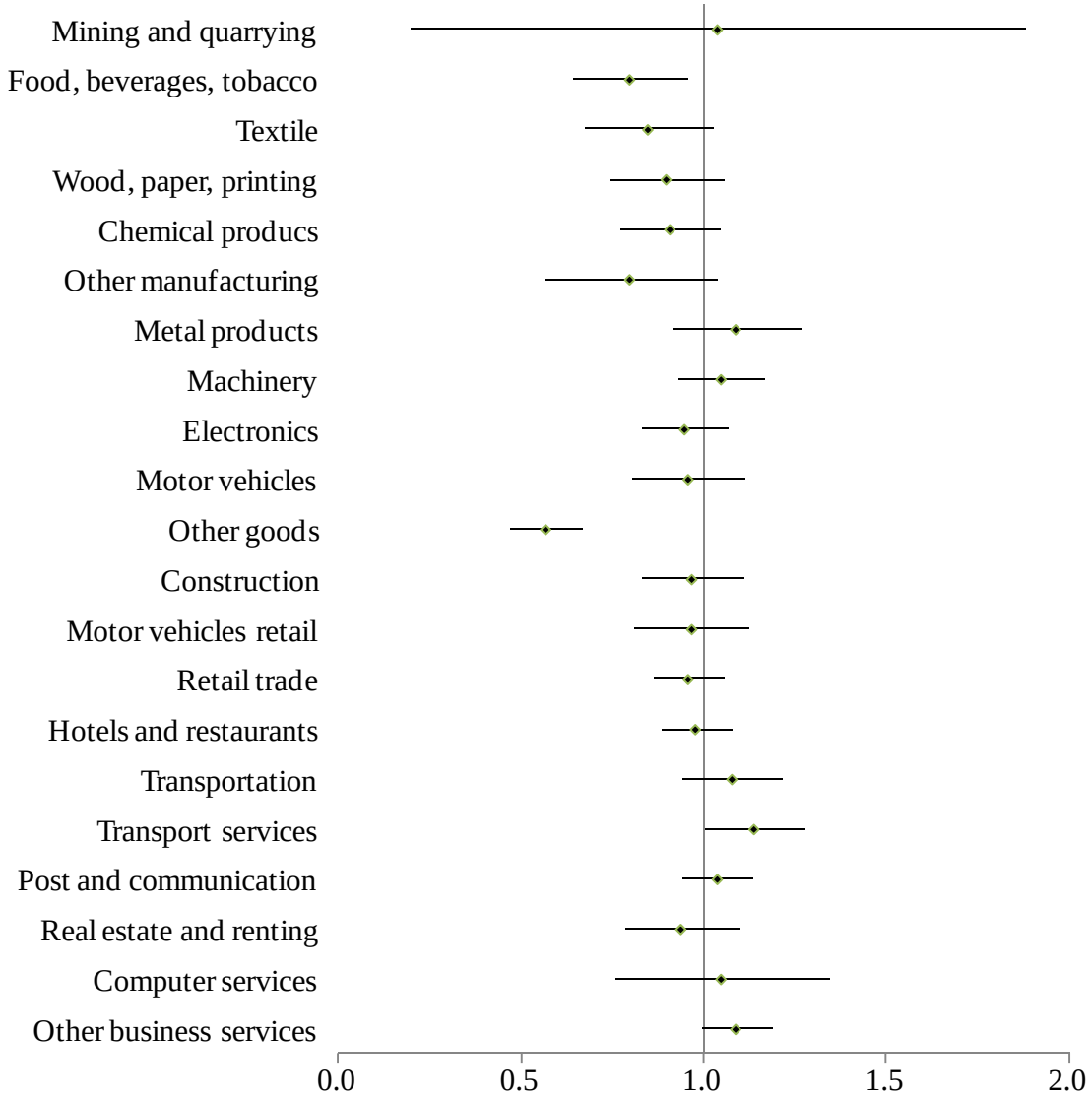
internationally and higher for former employees of firms that outsourced domestically. This result is consistent with the picture in Figure 5 and suggests that there is a general trend in the type of jobs that are being outsourced, which results in a longer unemployment period for employees that lost their job due to international outsourcing. We do not show the results with non-linear interaction effects of wages, since these did not yield any statistically significant results.

Table 7 Cox proportional hazard model estimation results, for probability of finding a new job after receiving unemployment benefits

	Dependent: hazard rate of finding a job after unemployment		
	(I)	(II)	(III)
Female	0.93***	0.93***	0.93***
	(0.02)	(0.02)	(0.02)
Age	0.97***	0.97***	0.97***
	(0.004)	(0.004)	(0.004)
Ln(annualized fiscal wage)	0.86***	0.86***	0.87***
	(0.02)	(0.02)	(0.02)
Employee from foreign high-income country	0.89***	0.90***	0.90***
	(0.03)	(0.03)	(0.03)
Employee from foreign low-income country	0.84***	0.84***	0.84***
	(0.01)	(0.02)	(0.02)
Ln(total firm output)	1.00	1.01	1.01
	(0.01)	(0.01)	(0.01)
Outsourced		0.93**	
		(0.03)	
Outsourced internationally			0.91*
			(0.05)
Outsourced domestically			0.94
			(0.04)
Observations	30,489	30,489	30,489
Failures	25,002	25,002	25,002
Total duration (in years)	28,356	28,356	28,356
Sector dummies	22	22	22

Notes: standard errors (corrected for cluster-correlation) are shown in parentheses. Significance levels for deviations from 1 are indicated by *** (1%), ** (5%) and * (10%).

Figure 6 Point estimates and 95 percent confidence intervals for sectoral hazard rates of finding a new job after receiving unemployment benefits (relative to the wholesale trade sector)



6 Conclusions

This paper combined data on unemployment benefits with data from a survey on outsourcing to determine how outsourcing is related to the risk of losing a job as well as the probability of finding a new job after becoming unemployed. We used a Cox proportional hazard model to control for the duration of the job, as well as for other characteristics of the firms and the employees. Our measure for outsourcing is a binary variable that indicates whether or not a firm outsourced any of its activities in the period 2001–2006. Additionally, we distinguished between domestic and international outsourcing.

The first part of this paper considered the probability that an employee would involuntarily lose his job. Our results suggest that the risk of involuntary job loss is relatively high for jobs with a low tenure, is the smallest for jobs with a tenure between 10 and 25 years, and increases again after that. One of the reasons for the higher hazard rate for jobs with a low tenure is that firms that have to reduce the amount of employees are more likely to fire or not extend contracts of temporary employees, because firing an employee with a permanent position can be very costly. After controlling for job duration, the estimation results show that the risk of involuntary job loss is higher for female employees, younger employees, and employees born in low-income countries. We can think of two explanations for these results. The most likely explanation is that employees in these groups relatively often have temporary jobs. A more theoretical explanation is that some types of employees have a higher variance in terms of the extent of the success of a match between employer and employee. If we assume that employers are rational, and are aware of these higher rates of firing employees, they would not hire these employees unless there was a probability of a higher reward. A higher variance of the benefits of a contract for the employer could explain why they do still hire these employees, since they are aware of higher firing rates but also gain more when the match is successful.

The risk of involuntary unemployment has no statistically significant relationship with the general outsourcing variable. However, this seems to be the result from a positive effect of domestic outsourcing and a negative effect of international outsourcing. Employees were 32 percent *less* likely to lose their job if they worked in a firm that outsourced internationally, and 52 percent *more* likely to lose their job if they worked in a firm that outsourced domestically. A possible explanation for this is that firms that outsource internationally, are able to increase their size and employment. A second possible explanation for the difference between the effects of domestic and international outsourcing is that internationally outsourcing contracts require more labour to manage the contracts than domestic outsourcing contracts.

The second part of this paper considered the probability of finding a new job after being involuntary unemployed. Again, we employed a Cox proportional hazard model, but in this case it is based on the unemployment duration instead of the job duration. The results suggest that female employees, older employees, employees with a higher wage, and foreign-born employees are less likely to find a new job after an involuntary job loss. This may be related to the length of the period people are willing to search for a new job. For example, woman may be able to afford longer search periods, since they are more often than men the secondary earner of a family in the Netherlands. It is also possible that these groups have more difficulty

finding a new job. For example, foreigners might have more difficulty with finding a new job because they are less fluent in the Dutch language. And older people might have more difficulty with finding a new job because of a discrepancy between their wage and their productivity. Additionally, people that worked for the same employer for many years may depend relatively strongly on firm-specific capital, which is less useful when they have to find a new job at a different employer.

We find no relationship between domestic outsourcing and the probability of finding a new job. However, former employees of firms that have outsourced internationally are about nine percent less likely to find a new job. This is probably the case because jobs that are lost due to international outsourcing are actually leaving the country. In the case of domestic outsourcing, the jobs only relocate to a different region within the Netherlands, or they might stay in the same region and only move to a different firm. Employees that lose their job as a result of domestic outsourcing are often able to perform the same task in a different firm. When firms outsource activities internationally, this suggests a comparative disadvantage of the Netherlands in these tasks. This implies that the demand for these tasks in the Netherlands is decreasing, and employees might not be able to find a new job in which they can perform the same task as in their previous job. They might have to change their skill set, by training or education, before they are able to find a new job, which can explain why they are less likely to find a new job.

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