Chapter 2

How Do Industry, Firm and Worker Characteristics Shape Job and Worker Flows?

In all OECD countries, many new firms are created every year. At the same time, many existing firms expand, while others contract or even shut down. In the process, many jobs are created and workers are hired; even as many positions are suppressed and workers separate from their employers. The chapter presents stylised facts on gross job flows (i.e. job creation and destruction by firms) and gross worker flows (i.e. hirings and separations) drawing from internationally harmonised data. A wide range of empirical questions are investigated, as a prerequisite for assessing the role of policies in shaping job and worker flows. How large is the reallocation of jobs and workers? Which are the firms that create and destroy the most jobs? In which industries are hiring and dismissal rates largest? Who changes jobs most often? Are labour resources reallocated from the least to the most efficient firms? To address these questions, the chapter goes beyond aggregate data on job and worker flows by analysing industry-level and micro-data. Moreover, by stressing cross-country differences in labour flow patterns, the chapter underlines the potential role for country-specific policies and institutions.
2. HOW DO INDUSTRY, FIRM AND WORKER CHARACTERISTICS SHAPE JOB AND WORKER FLOWS?

Introduction

Market-based economies are characterised by a continuous reallocation of labour and other productive resources across firms and workers. New firms are created; existing firms expand, contract or shut down. A number of firms do not survive their first few years in the market, while other successful businesses develop rapidly (e.g. OECD, 2003a; and Bartelsman et al., 2005). In the process, large numbers of jobs are created and destroyed. Some workers are hired to fill new positions and others to replace previous employees who have left existing jobs. Simultaneously, other workers are dismissed, either because of post suppressions or because their employers decide to replace them with different workers. Moreover, some workers quit their jobs, often because they have found a different job that better matches their skills and needs.

This continuous process of labour reallocation is largely driven by market forces, which create better business opportunities and destroy inefficient production activities. Indeed a growing body of evidence suggests that the firm entry and exit process, as well as the reallocation of resources from declining to expanding businesses, contributes significantly to productivity and output growth (e.g. Griliches and Regev, 1995; Foster et al., 2001; and Bartelsman et al., 2009). From the perspective of workers, labour reallocation is also a process through which better job opportunities are created and seized (e.g. Postel-Vinay and Robin, 2002; Connolly and Gottschalk, 2004; and Contini and Villosio, 2007). Continuous reallocation is therefore one of the engines of economic growth and welfare enhancement.

Notwithstanding these benefits, however, labour mobility involves costs. Opening and filling new vacancies is costly for firms. Searching for, and switching to, new jobs is also costly for workers, particularly when it was not their choice to separate from their previous job (e.g. OECD, 2003b, 2005). Other, less direct costs can be associated with mobility: for example, high quit rates might discourage the accumulation of firm-specific human capital and destroy stocks of corporate common competences. But these costs can be counterbalanced by additional benefits. From the perspective of firms, new recruits bring new skills that enlarge the firm’s knowledge base and facilitate the adoption of new technologies. Similarly, the opportunities to change employers create incentives for workers to invest in general human capital. Nevertheless, the costs and benefits of mobility are not uniformly distributed across workers and labour reallocation has important distributional consequences.

Understanding how these flows are affected by policies and institutions, and assessing their consequences for economic performance are key questions for policy makers. However, the knowledge base for addressing these questions is still insufficient. With few specific exceptions (notably Haltiwanger et al., 2006, on job flows), cross-country comparative evidence relies on the comparison of findings of national studies based on data constructed using different definitions and sources. In particular, there is essentially no study that simultaneously analyse internationally harmonised data on both job and worker flows for a large number of countries. As a necessary preliminary step to policy
analysis, this chapter focuses on collecting harmonised data on these flows and using these data to tease out a number of stylised facts concerning the process of labour reallocation in OECD countries.

How large is the reallocation of jobs and workers? Which are the firms that create and destroy more jobs? In which industry are dismissal rates larger? Which workers change jobs most often? Are labour resources reallocated from the least to the most efficient firms? These are some of the empirical questions that this chapter addresses. In order to do so, the chapter goes beyond aggregate data on job and worker flows by analysing disaggregated and micro-data along a number of different dimensions. Moreover, by stressing cross-country differences in labour flow patterns, the chapter underlines the potential role for country-specific policies and institutions. A more detailed analysis of the effects of specific policies and institutions as well as of the economic and welfare consequences of labour mobility is beyond the scope of the present chapter and is left for future editions of the OECD Employment Outlook.1

The chapter presents internationally harmonised measures of gross job flows (i.e. job creation and destruction by firms) and gross worker flows (i.e. hirings and separations). The analysis of both types of labour flows is insightful: job flows essentially reflect reallocation driven by labour demand (the expansion and contraction of employment by firms). By contrast, worker flows are the result of a mix of demand, supply and purely matching factors, which depend on both firm and worker characteristics. The chapter is therefore organised as follows. Section 1 examines the distribution of job and worker flows at the industry level, emphasizing similarities across countries and underscoring cross-country differences. Section 2 investigates the role of firm characteristics in determining job creation and destruction and highlights how country specificities shape these patterns. Section 3 looks at the impact of selected workers’ characteristics on worker flows. Some concluding remarks are provided in the last section.

Main findings

- In OECD countries, labour reallocation is large and exceeds substantially net employment changes, even at the industry level. Each year, more than 20% of jobs, on average, are created and/or destroyed, and around one-third of all workers are hired and/or separate from their employer. Labour reallocation across industries and net employment growth account for less than one fifth of these flows, implying that most labour reallocation occurs within industries.

- The use of new, internationally harmonised data, however, allows establishing that job and worker flows are remarkably different across countries: in countries such as the United States or the United Kingdom, annual job and worker reallocation are as large as 25% and 45%, respectively, of dependent employment. By contrast, in a number of continental European countries, less than 15% of jobs are created and/or destroyed and about 25% of all workers are hired or separate from their employer in a given year.

- Labour reallocation is greater in countries with relatively lax dismissal regulations and in countries with a high share of temporary workers. More generally, national differences in the regulation and the prevalence of fixed-term employment contracts or informal employment relationships appear to be closely associated with cross-country differences in job and worker reallocation rates.
2. HOW DO INDUSTRY, FIRM AND WORKER CHARACTERISTICS SHAPE JOB AND WORKER FLOWS?

- Despite the fact that worker reallocation is much larger than job reallocation, cross-country differences in hirings and separations are essentially due to cross-country differences in job creation and destruction, suggesting that policies and institutions affecting firm employment growth patterns are key determinants of overall worker mobility.

- Job and worker flows are driven by a continuous process of labour reallocation and not necessarily by net employment growth. Hirings and separations, as well as job creation and job destruction appear to be closely correlated across countries: in a given year, countries that create more jobs and where hirings are more frequent also destroy more jobs and workers quit or are dismissed more often.

- Job and worker reallocation appear to be larger in expanding industries. Job and worker flows vary significantly across industries, but cross-industry distributions are similar across countries. Job and worker flows tend to be larger in service industries than in manufacturing, although a few service industries are characterised by low labour turnover. Job destruction and quits vary somewhat less across industries than do job creation, hiring and dismissals, which appear to be particularly affected by cross-industry differences in the global evolution of product demand and industry life cycles.

- Less productive firms appear to destroy more jobs and more productive firms to create more jobs, in essentially all countries for which data are available. Therefore, from an accounting perspective, labour reallocation appears to positively contribute to productivity growth. In particular, the extent of the staff contraction in downsizing firms appears to be strongly negatively correlated with the firm’s pre-contraction efficiency level. Labour and capital adjustments also appear to go hand-in-hand: employment growth (or firm expansion) tends to be larger in firms that are investing in new capital equipment.

- Which firms create or destroy more jobs? The process of firm churning through which newly created firms replace older and obsolete firms accounts for roughly one-third of total job reallocation. The remaining two-thirds is due to the process of expansion of successful incumbents at the expenses of inefficient, contracting firms. In particular, young firms create more jobs while older firms destroy more jobs, even if there is much cross-country heterogeneity in the relationship between firm age and job destruction: reallocation from older to younger firms is substantial in countries such as Japan, the United Kingdom or the United States; by contrast, downsizing is not related with firm age in France and Italy.

- Not surprisingly, younger workers are the most mobile, but age profiles of worker flows appear to be affected by country-specific characteristics. While hiring rates tend to decline with age in all countries, younger prime-age workers have much larger separation rates than their older counterparts in countries with relatively high mobility rates (such as Denmark and the United States) or in countries with a significantly larger share of youth in temporary contracts (such as France and Finland). Worker reallocation is also more important at the extremes of the skill distribution, likely reflecting structural changes in the demand for skills.

1. Job and worker flows in the business sector: how do they vary across countries and industries?

   Reallocating of jobs across industries is large...

Since the mid-1990s, total employment of OECD economies has grown on average by about one half of a percentage point per year (see Chapter 1). But the employment growth...
of industries has been uneven. Certain industries, notably in manufacturing, have tended to contract in most countries, while others (typically services) have expanded steadily, giving rise to a substantial reallocation of labour resources across industries. This continuous process of structural adjustment of OECD economies has been widely investigated in the economic literature, including OECD work (e.g. OECD, 2000, 2001, 2003a, 2006, 2007). When the business sector is decomposed into about 20 industries, for example, the absolute net rate of industry employment change, be it positive or negative, was on average about 4% per year, depending on the period and countries considered. As the corresponding average growth in the business sector was about 1 percentage point, this suggests that each year, on average, about 3% of jobs are destroyed in some industries, while an equal number of jobs are created in others. In other words, reallocation of labour resources across industries is three times as large as net aggregate employment growth.

Net employment changes at the industry level, however, hide much greater churning at the firm level. This section looks at the distribution across industries and countries of job reallocation – that is job creation and destruction by firms – and worker reallocation – hiring and separations of workers (see Box 2.1 for detailed definitions). For this purpose, internationally harmonised datasets on job and worker flows are used. Data on job flows by country and industries are from Haltiwanger et al. (2006) and Bartelsman (2008). Data from these two sources are constructed using the same protocol from either business registers or tax files and are therefore comparable (see also Bartelsman et al., 2009) and refer to firms as units of observation. Data on worker flows are derived from employment and job tenure figures obtained from individual micro-data available in national Labour Force Surveys. As the industry-level information of labour force survey data can be imprecise, these data are further harmonised on the basis of industry-level EU KLEMS employment data when possible, in order to ensure comparability over time at the industry level (see Annex 2.A1 for more details). Hirings are directly derived from job tenure data (see Box 2.1), while separations are obtained as difference between hirings and employment growth. One important limitation of the data collected for this chapter is that job and worker flows are not always available for the same countries and years. As a consequence, these data are more suitable for comparisons of job flows and/or worker flows across countries than of flows within countries. Nevertheless, by and large, this section shows that the picture that emerges by comparing job flows across countries is similar to that obtained by the comparison of worker flows across countries. Therefore, job and worker flows are treated together in this section, in order to highlight the generality of the statements that are made.

1.1. Job and worker flows at the industry level

... but the turnover of jobs and workers within industries is much larger

On average, for the eleven countries for which comparable data for recent years are available, average annual gross job reallocation – see Box 2.1, and Annex 2.A1 for data construction and sources – was about 22% of dependent employment in the business sector between 1997 and 2004 (Figure 2.1). Of this, industry-level excess job reallocation – the difference between gross job reallocation and the absolute value of net employment growth of the industry – was on average about 18% of dependent employment, suggesting that about 9% of all jobs were destroyed in some firms but were offset by an equal number of jobs created in other firms within the same industry every year. From an accounting perspective, this is almost three times as much as the number of jobs that were, on average, created or destroyed in each industry due to net employment growth and
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Lost at exiting and contracting firms. Note too that net employment growth for the group is simply the group level as the sum of job creation and destruction. Finally, it is useful to define the difference between job creation and job destruction, while job reallocation can also be calculated at the level of this firm (note, however, that other definitions would lead to different numbers, see Davis et al., 1996). Put it another way, job creation is the sum of values over all of the firms in the group being considered. For ease of style, the chapter often omits the qualifier “gross” when the context makes it clear that the flows being discussed are gross flows. Gross flows are defined so as to be non-negative. They are also defined so as to exclude job vacancies which remain unfilled or jobs that begin and end within the interval of observation (a year in this chapter). As employment is subject to short-term fluctuations (due for example to seasonal activity, temporary fluctuations in product demand or difficulties in filling vacancies after quits), the period of time over which these flows are measured is key. For example, the annual rates of job creation and destruction analysed in this chapter will tend to be smaller than the sum of flows that can be calculated at a higher frequency during the same year (e.g. the sum of quarterly flows for all the four quarters of a given year).

Gross worker flows reflect movements of workers into jobs (hirings) and out of jobs (separations) over a specified period of time. Because of data availability, this chapter adopts the definition of worker reallocation used by Davis and Haltiwanger (1999), which is based on the comparison of worker statuses at two different points in time. In this chapter, therefore, hirings are defined as the number of workers who are with the firm at time t but were not with that employer at time t-1, and separations as the number of workers who were with the firm at t-1, but not at t. The following hypothetical example can illustrate the definitions of job and worker reallocation. Suppose a given firm has 95 employees at year t-1 and 105 at t. During this period, ten people were hired to fill newly created posts. Suppose also that five other workers left the firm and were replaced by new recruits, another five workers were temporarily laid-off but re-called during the period and yet another five people were hired on fixed-term contracts that expired during the period and were not renewed. Job reallocation at the level of this firm (i.e. the absolute value of the net change in employment, as defined above) is equal to ten. By contrast, worker reallocation would be equal to twenty according to the definition adopted for this chapter (note, however, that other definitions would lead to different numbers, see e.g. Davis et al., 2006).

At a greater level of aggregation (e.g. a group of firms with given characteristics, the industry, or the whole economy), job reallocation, job creation and job destruction can be obtained by simply adding up their values over all of the firms in the group being considered. Put it another way, job creation is the sum of employment growth at all entering and expanding firms, while job destruction is the total number of jobs lost at exiting and contracting firms. Note too that net employment growth for the group is simply the difference between job creation and job destruction, while job reallocation can also be calculated at the group level as the sum of job creation and destruction. Finally, it is useful to define excess job reallocation as the difference between total job reallocation and the absolute net change in total employment. This difference provides a measure of simultaneous and off-setting job creation and job destruction by different firms belonging to the same group. Excess reallocation thus represents the reallocation of labour resources between firms within the same group whereas the group’s absolute net employment change provides a measure of reallocation across different groups of firms (e.g. different industries).

Worker flows are aggregated in an analogous manner, that is, by summing hirings and separations over all members of the specified group. As with job flows, for any group of job matches involving individuals with the same characteristics (e.g. a particular age or employed in a particular industry), excess worker reallocation can be defined as the difference between worker reallocation and the group’s absolute net change in employment. This provides a useful measure of the number of job matches that are created and destroyed, over and above the minimum necessary to accommodate net employment growth. Excess worker reallocation, thus, reflects the reshuffling of workers and jobs within the same group.

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**Box 2.1. Definitions and accounting identities**

At the level of an individual production unit (the firm in this chapter), gross job reallocation (also commonly called gross job turnover, see for example Davis and Haltiwanger, 1992, 1999; Davis et al., 1996; and OECD, 1996), is simply the absolute value of the net change in employment between two points in time. In this terminology, job creation, at the level of the individual firm, is equal to the net employment change, if the latter is positive, and zero otherwise. Conversely, job destruction, is equal to the absolute value of the net change, if the latter is negative, and zero otherwise. Job reallocation, job creation and job destruction are commonly called gross job flows, in order to differentiate them from the more familiar measures of net employment growth. Net and gross job flows coincide at the level of a single firm, but that is no longer the case when groups of firms are considered. For ease of style, the chapter often omits the qualifier “gross” when the context makes it clear that the flows being discussed are gross flows. Gross flows are defined so as to be non-negative. They are also defined so as to exclude job vacancies which remain unfilled or jobs that begin and end within the interval of observation (a year in this chapter). As employment is subject to short-term fluctuations (due for example to seasonal activity, temporary fluctuations in product demand or difficulties in filling vacancies after quits), the period of time over which these flows are measured is key. For example, the annual rates of job creation and destruction analysed in this chapter will tend to be smaller than the sum of flows that can be calculated at a higher frequency during the same year (e.g. the sum of quarterly flows for all the four quarters of a given year).

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reallocation of labour resources across industries. Similar findings are reported by Haltiwanger et al. (2006), the only cross-country comparative study in the literature based on internationally harmonised data on job flows.

The turnover of workers is even greater than that of jobs. For the purpose of this chapter, internationally harmonised data on worker flows were constructed for 22 countries9 (see above). From these data, it appears that annual worker reallocation (i.e. the sum of hirings and separations) averaged across industries, was about 33% of dependent employment during 2000-05 (Figure 2.1, Panel B). Of this, industry-level excess worker reallocation (i.e. the difference between total worker reallocation in each industry and the absolute value of industry-level net employment growth) was about 30% of dependent employment. This implies that, each year, on average about 15% of all job matches were destroyed but were offset by new matches with other firms and/or with other workers within the same industry.

Job and worker flows presented in Figure 2.1 cannot be directly compared since they refer to different countries and years. An additional reason for caution is that the two sets of flow estimates are based on different data sources: job flows are aggregated from firm-level data, whereas worker flows are obtained from labour force surveys (see Annex 2.A1). Nevertheless, by comparing job and worker flows for the same countries and industries and a limited number of years, one can obtain a rough measure of the degree of labour reallocation which is in excess of that required to accommodate gross job flows and, hence, arises from employers churning workers or workers quitting and being replaced without any change in the total employment of the firm (so-called "churning flows", see Box 2.1). Internationally harmonised data on both job and worker flows have never been exploited so
Figure 2.1. Job and worker reallocation rates vary by industry

Average job and worker reallocation by industry, average percentage rates

Panel A. Average job reallocation rates 1997-2004

Panel B. Average worker reallocation rates 2000-05


far to investigate this issue. This chapter contributes to filling this gap by analysing such data for eight countries between 1997 and 2004 (Box 2.2). It appears that, in each industry, on average, about one third of all hirings and separations (amounting to about 11% of dependent employment) can be attributed to the reallocation of workers within continuing jobs.

Gross job and worker flows appear to vary dramatically across industries (Figure 2.1). Excess job reallocation is as high as 28% in real estate services, possibly due to fluctuations in housing demand and the small size of firms in this industry (see below) and as low as 8% in the electricity, gas and water supply industry (likely due to the large and stable market share of big corporations in this industry). Put another way, between 4% and 14% of jobs, on average, are destroyed each year, while being offset by job creation at other firms in the
Box 2.2. Comparing worker and job flows: churning flows

Several country-specific studies, covering several market economies, compare job and worker flows using data from the same firm-level source (see among others Hamermesh et al., 1996; Albaek and Sorensen, 1998; Abowd et al., 1999; Burgess et al., 2000; Hohti, 2000; Arai and Heyman, 2000; Haltiwanger and Vodopivec, 2002, 2003; Ilmakunnas and Maliranta, 2003; Golan et al., 2006; Davis et al., 2006; and Corseuil, 2008). These country studies find substantial churning flows – that is, large worker flows in excess of job flows (see Box 2.1). However, it is difficult to establish the extent to which the results of these studies can be compared across countries due to cross-country differences in definitions and survey structures. By contrast, job-flow data used for this chapter are comparable across countries insofar as they are aggregated from firm-level data based on the same protocol (see Annex 2.A1). The same occurs for worker-flow data, insofar as they are constructed from similar questions in labour force surveys. Therefore, with some caution, by comparing worker and job flows for the same countries, industries and years, it is possible to obtain a measure of churning flows that is roughly comparable across countries and industries.

How reliable are the figures obtained in this way? Estimates from Davis et al. (2006) can provide a good benchmark, insofar as they use data from the same enterprise survey and a definition of worker flows similar to that used in this chapter (except for being quarterly). They find that churning flows represented on average 46% of total worker flows in ten US states between 1998 and 2002. According to the data used in this chapter, aggregate US churning flows amounted to 33% of total US worker flows between 2002 and 2004. These two estimates do not appear too different when one takes into account the fact that the ratio of worker to job flows is likely to be larger in quarterly data and that worker flows can be seriously overestimated in enterprise surveys due to transcription and coding errors (by up to 15% in the United States, see Abowd and Vilhuber, 2005; Benedetto et al., 2007). Nevertheless, the figures presented below must be taken with great caution, since they are based on data for only one or two years in the case of many countries.

The first figure below shows a decomposition of the worker reallocation rate into absolute net growth, excess job reallocation and churning rates. On average, 35% of total worker flows are due to churning, compared with 54% due to excess job reallocation and the remaining 11% due to net employment changes at the industry level. Workers employed in hotels and restaurants appear to experience by far the largest mobility due to a large proportion of churning flows (56% of total hirings and separations). Large churning flows appear also at the root of large total worker flows in construction, food processing, and trade. By contrast, in other manufacturing, real estate and other professional services, large total flows appear to be mainly due to large job flows. In fact, they appear at the bottom end of the distribution of the ratio of churning flows to total flows, where less than one-third of total flows stems from firms churning workers or employees quitting and being replaced. Interestingly, all low-mobility industries – mainly manufacturing – where average excess worker reallocation amounts to less than 25% of dependent employment can be found in this group.

Do churning flows differ across countries? The second figure below presents an estimate of churning rates adjusted by industry composition – that is, the average churning flows that would be observed if each country had the same industrial structure as the average country – for the eight countries for which it can be computed. With the exception of Hungary, where churning flows amount to only 5.2% of dependent employment, average churning rates appear to vary little across countries, ranging from 12% to 16.8%. The little cross-country variation is also confirmed by a simple analysis of variance. While the industry dimension appears to account for 40% of total cross-country/cross-industry variance in churning rates, less than 8% of this variance appears to be explained by the country dimension. As a matter of comparison, the proportion of the total variation in job flows accounted for by the country dimension is more than four times as large, while the proportion explained by the cross-industry variation is similar.

Finally, and not surprisingly, job and worker flows are on average strongly correlated across countries. However, a simple regression of total worker reallocation on total job reallocation (including a constant) gives a coefficient of 0.98, insignificantly different from unity. In other words, a 1-percentage-point increase in job reallocation is associated with an equal increase of worker reallocation, with no increase in churning. This appears consistent with findings of Burgess et al. (2001) and Davis et al. (2006) who show that, at the firm level, average churning flows in the United States appear to be independent of job flows: firms’ staff increases are obtained by increasing hiring without reducing separations and, vice versa, for staff contractions.
Box 2.2. Comparing worker and job flows: Churning flows (cont.)

Decomposition of total worker reallocation in the non-farm business sector, 1997-2004

Average industry rates, in percentage


Adjusted churning rates, 1997-2004

Average rates adjusted for industry composition, by country, in percentage


same industry. Similarly, excess worker reallocation varies on average between almost 62% in the hotels and restaurants industry (suggesting that more than 30% of job matches are destroyed and replaced in this industry each year) and 14% in the electricity, gas and water supply industry.

The distribution of job and worker flows is similar across countries…

Industry distributions of job and worker reallocation rates appear also strongly correlated across countries. For all of them, the distribution of worker reallocation rates is significantly correlated with the average distribution presented in Figure 2.1 and, in all but four countries, the correlation coefficient is above 0.8. Similar correlations are found for gross job flows, with the sole exception of the United Kingdom, consistent with previous findings in the literature (e.g. Micco and Pages, 2006; and Haltiwanger et al., 2006). This suggests that industry-specific technological, organisational and demand characteristics, which do not vary much across countries, have a strong influence on the intensity of job and worker reallocation.

… but there are strong cross-country differences in the overall level of job and worker reallocation…

Does the cross-country similarity of job and worker flow distributions mean that country-specific policies can have only second-order effects on gross job and worker flows? This conclusion would be hasty. First, industry composition is endogenous, and possibly related to policies and institutions. Second, while industry distributions appear to be correlated, the overall level of reallocation flows does vary across countries. A simple analysis of variance shows that between 30% and 40% of the cross-country/cross-industry variation in job and worker reallocation rates is explained by their cross-country variation (Table 2.1). The finding that there is a significant country effect shaping both gross job and

**Table 2.1. Both country and industry characteristics appear to influence job and worker reallocation rates**

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Note: The table reports the percentage of the overall variance accounted for by countries, industries or the overall model (that is the percentage explained by the whole regression). F-statistics in italics (with degrees of freedom in parentheses). All components are significant at the 1% statistical level. As the percentage of the variance explained by each dimension depends on the number of its categories, F-statistics and the ratio of explained variance to the number of degrees of freedom provide information on the relative importance of each dimension. Total number of observations is 180 for gross job flows and 490 for worker flows.

Source: OECD estimates based on the country/industry sample reported in the notes to Figure 2.1.

StatLink: [http://dx.doi.org/10.1787/706738705668](http://dx.doi.org/10.1787/706738705668)
worker reallocation rates is in stark contrast with a common thrust of part of the literature, which, on the basis of anecdotal evidence or casual comparison of country-specific studies, argues that aggregate flows, and particularly gross job flows, are similar across countries (see for instance Pries and Rogerson, 2005; and Koeniger and Prat, 2007, and the literature cited therein).

How does labour reallocation vary across countries? Controlling for industry composition, job flows appear to be greater in the United Kingdom, the United States, Brazil and Mexico, with excess job reallocation at or above 25% of dependent employment (Figure 2.2). By contrast excess job reallocation rates tend to be just below 15% in Germany, Slovenia and Sweden. These patterns are mirrored for worker flows: with total worker reallocation above 40% of dependent employment, English-speaking countries (Ireland, the United Kingdom and the United States) are at the top of the distribution, together with Denmark and countries that experienced strong employment growth during the period (such as Spain and Turkey). However, when job and worker flow data are compared for the same countries, industries and year, it emerges that churning flows vary little across countries (see Box 2.2) and that the cross-country variation in worker flows is essentially accounted for by the cross-country variation of job creation and job destruction. This finding suggests that policies and institutions affecting firm employment growth patterns are also key determinants of worker mobility.

... which might be explained by institutional specificities

What might explain the tendency for job and worker reallocation to be much larger in some countries than in others, even after controlling for industry composition? Not surprisingly, countries with a small share of temporary workers tend to have low worker reallocation. In particular countries with excess reallocation at or below 30% of dependent employment (see Figure 2.2) have all a share of temporary workers (adjusted for industry composition) at or below 11%, suggesting that the prevailing type of contract is one of the possible explanations. But that is not the whole story. In fact, English-speaking countries, as well as Denmark and Turkey, all have low shares of temporary contracts and large reallocation rates. And a number of Mediterranean countries (Portugal, Spain and to some extent Greece) appear to have too little mobility compared with what one would expect by looking at their share of temporary contracts. Although a detailed analysis of this issue is beyond the scope of this chapter, it does not seem unlikely that reallocation rates in Denmark and Turkey are mainly related to the effectiveness of the Danish flexicurity system and the share of Turkish workers not covered by standard employment protection (see e.g. OECD, 2004, 2005, 2008a). Conversely, it is possible to make the conjecture that the position of English-speaking and most of the Mediterranean countries is somewhat related the degree of stringency of employment protection in these countries. In fact, among the countries for which adjusted data on worker reallocation are available, English-speaking countries appear to be at the bottom of the distribution of the OECD indicator of the stringency of employment protection and Greece, Portugal and Spain at the top. This appears consistent with the literature on institutions and gross job flows, which, with few exceptions, tend to suggest a negative relationship between job reallocation and the degree of stringency of employment protection legislation (see Box 2.3).
2. HOW DO INDUSTRY, FIRM AND WORKER CHARACTERISTICS SHAPE JOB AND WORKER FLOWS?

1.2. Looking inside job and worker reallocation

Job reallocation is defined as the sum of job creation and destruction, and worker reallocation as the sum of hires and separations. How do these components of gross flows co-vary so as to determine reallocation rates? For example, does a high rate of job creation

Figure 2.2. There are significant cross-country differences in job and worker reallocation rates across all industries

Country averages of job and worker reallocation rates expressed in percentages and adjusted by industry composition

Panel A. Job reallocation and excess job reallocation, 1997-2004

Panel B. Worker reallocation and excess worker reallocation, 2000-05


StatLink   http://dx.doi.org/10.1787/706421014180
2. HOW DO INDUSTRY, FIRM AND WORKER CHARACTERISTICS SHAPE JOB AND WORKER FLOWS?

Box 2.3. **Empirical evidence on the link between employment protection and job flows**

There is a large number of country-specific studies that investigate the impact of employment protection legislation and jurisprudence on job flows. Autor et al. (2007) study the impact of the adoption of wrongful-discharge protection norms by state courts in the United States on several performance variables constructed using establishment-level data. By using cross-state differences in the timing of adopting stricter job security provisions, they find a negative effect of these provisions on employment flows and firm entry. Using Italian firm-level data, Boeri and Jimeno (2005) exploit exemption clauses exonerating small firms from job security provisions within a difference-in-differences approach. Their estimates confirm a significant effect of employment protection on job turnover and job destruction in particular. Similar findings are obtained by Schivardi and Torrini (2008), using an Italian matched employer-employee dataset, and by Kugler and Pica (2008), who exploit an Italian reform that in 1990 increased firing restrictions for small firms. On the contrary, Bauer et al. (2007) do not find any significant effect of employment protection legislation on turnover using German matched employer-employee data. Exemptions from procedural requirements for dismissal are also found to have no impact on hiring or firing in exempted firms in Sweden (von Below and Thoursie, 2008) and Portugal (Martins, 2007). Finally, Venn (2009) analyses the impact on hirings of recent Australian and Turkish reforms of dismissal costs that apply differently to small and large firms, and report large negative effects on hirings in Turkey but limited impacts in Australia. Nevertheless, differences in the extent of the exemptions limit the comparability of these findings.

Few studies look at the impact of employment protection on job turnover from a multi-country perspective. Haltiwanger et al. (2006) and Micco and Pages (2006), use a difference-in-differences estimator on a cross-section of industry-level data for several OECD and non-OECD countries (16 and 18 countries, respectively). They find that the negative relationship between layoff costs and job flows is more negative in industries where US layoffs are larger. Similar results are found by Cingano et al. (2009), who apply a similar methodology on firm-level data for several European countries, and by Gomez-Salvador et al. (2004) who look at the impact of employment protection legislation using a more classical linear regression analysis based on European firm-level data and controlling for the effect of other labour market institutions. Finally, on the same data, Messina and Vallanti (2007) find that strict employment protection significantly damps job destruction over the cycle with mild effects on job creation. The negative impact of employment protection on job turnover, job creation and job destruction is found to be larger in industries where total employment is contracting and where firms cannot achieve substantial reductions in employment levels purely by relying on voluntary quits.

reflect strong economic growth and, hence, go hand-in-hand with low job destruction? Conversely, do job creation and destruction co-vary positively, because they reflect the process of resource reallocation in labour markets? Analogous questions can be posed concerning the relationship between hiring and separation rates. This section presents cross-country and cross-industry evidence on these questions.

**Industries that create more jobs also destroy more jobs**

Job creation and destruction rates appear to be part of the same economic process. Within countries, the cross-industry distributions of job creation and destruction rates are
positively correlated and this relationship is strong in most cases (Figure 2.3). Moreover, the correlation coefficient between hiring and separation rates is above 0.8 in two-thirds of the countries for which data are available and significant in all but one country (Turkey). Put another way, industries that create more jobs and hire more workers also destroy more jobs and are characterised by more separations. These correlations have often been observed in the literature (e.g. Davis et al., 1996; and Coen-Pirani and Lee, 2007), and are consistent with a variety of theoretical explanations, including those related to the diffusion of demand and technological shocks in industries (e.g. Mortensen and Pissarides, 1994) and differences in life-cycle stages of industries (e.g. Jovanovic, 1982; and Klepper, 1996).

Both countries and industries appear to influence creation and destruction of jobs and job-matches

Not only are job creation and job destruction rates (as well as hiring and separation rates) highly correlated across industries, reflecting intrinsic differences in volatility of demand and technological shocks across industries, but their industry distributions are also quite similar across countries (see Bassanini and Marianna, 2009). However, cross-country correlations are always greater in the case of job creation and hirings than in the case of job destruction and separations, with the only exception of Brazil. Similarly,
industry-specific effects account for about 44% and 51% of the overall variability (across countries and industries) of job creation and hiring rates, respectively (Table 2.2), while they explain a much smaller part of overall variability in job destruction and separation rates (24% and 37%, respectively). This suggests that industry-specific factors, which apply to all countries, are more important drivers of the creation of jobs and job matches, than of job destruction and separations. For example, it is likely that rapid worldwide diffusion of technological and organisational changes across competitors in the globalised market and common evolution of global product demand shape the similarity of firms’ job creation and hiring behaviours across countries.

Table 2.2. **Both country and industry characteristics influence the creation and destruction of jobs and job-matches**

Analysis of variance of cross-country/cross-industry data on job creation, job destruction, hirings and separations

<table>
<thead>
<tr>
<th></th>
<th>Country</th>
<th>Industry</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Job flows</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Job creation</td>
<td>30.9</td>
<td>43.8</td>
<td>69.5</td>
</tr>
<tr>
<td>(15.32 (10))</td>
<td>12.04 (18)</td>
<td>12.30 (28)</td>
<td></td>
</tr>
<tr>
<td>Job destruction</td>
<td>39.2</td>
<td>23.6</td>
<td>59.8</td>
</tr>
<tr>
<td>(14.66 (10))</td>
<td>4.91 (18)</td>
<td>7.96 (28)</td>
<td></td>
</tr>
<tr>
<td>Worker flows</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hirings</td>
<td>32.4</td>
<td>51.4</td>
<td>85.2</td>
</tr>
<tr>
<td>(46.31 (21))</td>
<td>67.04 (23)</td>
<td>58.06 (44)</td>
<td></td>
</tr>
<tr>
<td>Separations</td>
<td>33.3</td>
<td>37.2</td>
<td>71.7</td>
</tr>
<tr>
<td>(24.90 (21))</td>
<td>25.44 (23)</td>
<td>25.62 (44)</td>
<td></td>
</tr>
</tbody>
</table>

Note: The table reports the percentage of the overall variance accounted for by countries, industries or the overall model (that is the percentage explained by the whole regression). F-statistics in italics (with degrees of freedom in parentheses). All components are significant at the 1% statistical level. As the percentage of the variance explained by each dimension depends on the number of its categories, F-statistics and the ratio of explained variance to the number of degrees of freedom provide information on the relative importance of each dimension. Total number of observations is 180 for gross job flows and 490 for worker flows.

Source: OECD estimates based on the country/industry sample reported in the notes to Figure 2.1.

http://dx.doi.org/10.1787/706754330450

By contrast, cross-country differences appear to be far more important in explaining job destruction and separations. The cross-country variation in job destruction and separation rates accounts for 39% and 33% of total variation, respectively (Table 2.2). Nevertheless, the portion of total variation in hirings and job creation that is explained by cross-country differences is almost identical. This suggests that both sets of labour flows are likely to be affected by country-specific policies and institutions.

Even after controlling for industry composition, the cross-country distributions of job creation and destruction rates appear to be positively correlated (Figure 2.4, Panel A). The same pattern holds for hirings and separations (Figure 2.4, Panel B). As a consequence this implies that there is no or limited correlation between aggregate job and worker reallocation and net employment growth. Not surprisingly, the ranking of countries in Figure 2.4 closely resembles the cross-country distribution of total and excess reallocation (see Figure 2.2). In countries with large informal sectors (Brazil, Mexico, Turkey), large shares of temporary workers (Finland, Poland, Spain) or relatively flexible regulations for open-ended contracts (Denmark, the United Kingdom, the United States) more than 14% of all jobs are destroyed annually and more than 20% of the employees separate, at least once, from their employer.
However, this high rate of mobility out of jobs is matched by comparably high flows of newly-created jobs and new hires. By contrast, countries with both annual hiring and separation rates below 15% (such as Austria, the Czech Republic and Greece) have all low shares of temporary contracts or moderate-to-rigid dismissal regulations.

1.3. Dismissals

From the point of view of the worker, labour mobility may represent either a cost or an opportunity. When separations occur at the initiative of the employer, displaced workers often experience periods of joblessness as well as possible wage penalties and lower job security once they find another job (see for example, OECD, 2003b, 2005). However,
separations often occur at the initiative of the worker and their magnitude is indicative of the breadth of opportunities that workers face in the labour market. By contrast, dismissals less ambiguously reflect an involuntary change in status for the worker.

What is the share of dismissals in total separations? Answering this question is not easy because information on the reasons for separation is seldom collected by labour force surveys. Roughly comparable industry-level data are available for five countries between 1995 and 2007. Although available data do not correspond to the same countries and years as in Figure 2.1, a simple comparison with Figure 2.5 suggests that dismissals amount to no more than one fourth of total separations. However, the proportion of dismissals in total separations varies significantly across industries and appears to be related to the employment growth rate of the industry. This is particularly the case if one excludes construction and a few service industries – hotels and restaurants and other business services – characterised by relatively high dismissal rates, but even higher separation rates. In expanding industries, the average of dismissal rates, across countries for which data are available, is about 3% of total dependent employment, although with a large heterogeneity across industries. By contrast, in downsizing manufacturing industries

Figure 2.5. **Industry-level dismissal rates are greater than net employment contraction**

*Average percentage rates, by industry, 1995-2007*

![Graph showing industry-level dismissal rates and net employment growth](image-url)
dismissal rates can be much larger. In particular, in textiles, more than 6% of employees are dismissed each year, on average. What is more, in downsizing industries, job-match destruction by dismissal is always far greater than net employment contraction.

The importance of industry-specific characteristics in shaping dismissal patterns should not hide the fact that there are also significant cross-country differences. Figure 2.6 shows average annual dismissal rates, by country, controlling for industry composition: dismissal rates range between about 3% of dependent employment in France and Germany to almost 5% in the United States.21

Figure 2.6. Average dismissal rates vary by country
Percentage rates adjusted for industry composition, 1995-2007

Note: Adjusted dismissal rates are estimated average rates that would be observed in each country if it had the same industry composition as the average of France, Germany, the United Kingdom and the United States. Australia, 1995-2001; France, 2006-07; Germany, 2003-07; the United Kingdom, 1997-2005; the United States, 1996-2006 (even years only).

Overall, job creation, hirings, job destruction, separations and dismissals appear to be shaped by country-specific factors that are likely to be related, at least in part, to cross-country differences in labour market regulations and the prevalence of temporary employment contracts or informal employment relationships. Moreover, job destruction and separations vary somewhat less across industries than do job creation, hirings and dismissals, which appear to be particularly affected by cross-industry differences in the global evolution of product demand and industry life cycles. However, beyond the sector of activity, what are the characteristics of employers who create or destroy more jobs? Also, which types of worker are more mobile? Finally, do these characteristics differ across countries and how are they shaped by national policies and institutions? The next section will try to shed some light on the first (and, to some extent, the third) of these issues, while the third section will focus on workers’ characteristics.

2. Labour market flows through the lenses of firms: which firms create and destroy more jobs?

2.1. Entry, exit and continuers

The job-flow statistics presented in the previous section do not distinguish between firm start-ups, shutdowns and reallocation involving ongoing firms – the latter term referring to incumbent firms that are active during the whole reference period, often called “continuers” or “continuing firms”. Distinguishing among these categories of firms is important because there is evidence that in OECD countries more than 10% of all firms
enter and more than 5% shut down their operations in an average year. Moreover, in most cases, less than 50% of entrants survive more than four years (see e.g. Bartelsman et al., 2009). But even though firm churning is large, the average size of both entering and exiting firms is often very small, and therefore firm churning typically accounts for only a limited share of gross job flows (see e.g. Haltiwanger et al., 2006). On average, entry and exit of firms appear to account for about one-third of total job reallocation in the business sector. Cross-industry variation is also small: start-ups and shutdowns account for 29% to 36% of gross job reallocation in all industries, except in the energy and financial intermediation industries (21% and 26%, respectively).

Most of the main stylised facts discussed above as regards total job flows appear to hold also if attention is restricted to job creation and destruction by entry and exit. In particular: i) industry distributions of job creation and destruction rates by entry and exit are strongly correlated across countries; ii) industries that create more jobs by entry also destroy more jobs by exit in all countries and, at the industry-level, reallocation rates are positively correlated with net employment growth; iii) the cross-industry variation explains 47% of the total variance of job creation by entry and a much smaller proportion in the case of job destruction by exit; and iv) country-specific factors appear to have a similar role in explaining both job creation by firm entry and job destruction by firm exit (see Bassanini and Marianna, 2009). Adjusting for industry composition, reallocation by entry and exit is larger than 9% of dependent employment in Brazil, Mexico, the United Kingdom and the United States (Figure 2.7). At the other extreme less than 5% of all jobs are created or destroyed by entry in the Netherlands.

Figure 2.7. Job reallocation due to firm entry and exit varies by country
Percentage rates adjusted by industry composition, 1997-2005

2. HOW DO INDUSTRY, FIRM AND WORKER CHARACTERISTICS SHAPE JOB AND WORKER FLOWS?

The same stylised facts also hold when attention is restricted to surviving incumbent firms (continuers). This is not surprising because the expansion and contraction of continuing firms account for a large share of gross job flows. There is one exception, however. The industry-level correlation between job creation and job destruction rates within countries is much smaller in the case of continuers. Indeed, this correlation is often insignificant, and is even negative for two countries. This suggests that the reason why industries that create more jobs also destroy more jobs is essentially related to the fact that firm entry and exit rates are positively correlated across industries, as predicted by theories of firm learning and industry life cycles (see above). The next subsection digs deeper into this issue by looking at how this relationship changes if data are broken down by firm characteristics such as firm age and size.

2.2. Job creation and destruction conditional on firm survival: the role of firm age and size

Age and size are key firm dimensions shaping job creation and destruction patterns

Two key dimensions of a firm are strongly associated with the magnitude of its job flows: size and age (see e.g. Davis et al., 1996). The importance of the size dimension has been particularly stressed for entrants and shutdowns: firm entry and exit – and the associated creation and destruction of jobs – are highly concentrated among small businesses, which is reflected in a negative relationship between job turnover (job creation and destruction) and firm size. However, a similar relationship appears to hold also for continuers (see e.g. Haltiwanger et al., 2006). Similarly, young establishments create and destroy more jobs, according to several US studies (e.g. Davis et al., 1996; and Faberman, 2003, 2007). The relationship between job destruction and age, nevertheless, appears to be essentially related to the fact that the probability of exiting declines as an establishment ages, suggesting that young firms follow a “up-or-out” pattern with very rapid net growth for survivors balanced by a very high exit rate (Acs et al., 1999; Faberman, 2007; Haltiwanger et al., 2008). Consistent with these findings, using data on continuing firms for 13 European countries, Gomez-Salvador et al. (2004), find no declining relationship, on average, between job destruction and firm age.

The effects of firm size and age on job reallocation have not been simultaneously studied before in a cross-country comparative perspective. Gomez-Salvador et al. (2004) is perhaps the only partial exception insofar it uses both broad firm age and size classes as controls in a European multi-country study of institutional determinants of gross job flows. Yet, no systematic analysis of these two dimensions is provided in their article. As firms are typically small at birth and then grow if they survive the initial harsh market test, there is a strong correlation between firm age and size, so that their effects on job flows could easily be confounded. Does the commonly-observed relationship between larger firm size and lower job reallocation simply reflect the fact that job creation declines with age? And, what is the relationship between firm age and job destruction, once the effect of size is controlled for? For this chapter, a new internationally harmonised database of firm-level micro-data for 11 OECD countries was constructed (see Annex 2.A1 for more detail on data construction). This allows analysing these issues in some detail, even though empirical results must be treated with some caution since the analysis is restricted to firms with on average 20 or more employees due to data limitations (which will be termed medium and large firms hereafter).

Firm age appears to be the most important determinant of job creation, at least excluding the smallest firms as well as shutdowns. When firms that have similar characteristics in terms of country, industry, firm size and age classes, are grouped into...
cells, it appears that age explains a substantially larger share of the overall variation in job creation and total job reallocation than does size (Table 2.3). The simple average difference between firms younger and older than 20 years accounts for about 21% of the total variance, in the case of job creation rates, and about 13% in the case of overall job reallocation. Variation across firm-size classes that is unrelated with age appears to play a smaller role. Only 4% of the variation of job reallocation by country, industry, size and age appears to be due to differences across the three firm-size classes considered here. One needs to be cautious before drawing general conclusions on the role of firm size, however, insofar as small firms (with less than 20 employees), are excluded from the analysis. As shown by Haltiwanger et al. (2006), including small firms would have resulted in much greater variance of job reallocation rates and, as a consequence, might have resulted in a larger share explained by firm size.

By contrast the age dimension appears to play a more limited role in the case of job destruction than for job creation (less than 2% of the variance in job destruction is explained by this dimension). This suggests that job destruction patterns of medium and large firms do not vary systematically with their age, at least conditional on their size. But does this result simply reflect cross-country differences in the relationship between age and job destruction? Furthermore, the patterns revealed in Table 2.3 might mask further composition effects. For instance, one might conjecture that, within each country, more dynamic geographical areas, where business opportunities are wider, create more jobs and are characterised by greater firm entry and, therefore, smaller firm size and younger firms. To what extent is the covariation between firm age and job creation simply due to regional disparities within countries? In order to answer these questions, for medium and large firms, Figure 2.8 presents average firm-level job creation and job destruction rates as a function of firm age, by country, controlling for detailed industry, geographical area and remaining size categories (see Box 2.4 for the methodology).
Figure 2.8. **Job creation declines with firm age in medium and large continuing firms, but no such pattern is found for job destruction**

Average percentage rates adjusted by firm-size, industry, region and year, by country, 2000-06
Figure 2.8. Job creation declines with firm age in medium and large continuing firms, but no such pattern is found for job destruction (cont.)

Average percentage rates adjusted by firm-size, industry, region and year, by country, 2000-06

Note: Firms with less than 20 employees or aged less than two years are excluded. Estimated adjusted rates are obtained on the basis of the procedure described in Box 2.4, and their precision, for each country varies as a function of the size of the sample. Precision also declines with age; therefore, rates for firms older than 60 years are not shown. Sample size by country (calendar years in parentheses): Belgium: 33 867 (2000-04); Denmark: 14 673 (2001-05); France: 116 152 (2000-04); Italy: 28 281 (2002-03); Japan: 26 669 (2004-06); Poland: 8 726 (2001-04); Spain: 93 306 (2001-04), Sweden: 31 700 (2000-05); the United Kingdom: 40 968 (2000-04); the United States: 14 482 (2005-06).

Box 2.4. **Firm-level analysis of job flows**

For the purpose of this chapter, two types of firm-level analyses are implemented. First, standard regression analysis is used to identify, in a semi-parametric way, the relationship between job creation (job destruction) and firm age controlling for geographical areas, industries and size classes (or firm size controlling for areas, industries and age). More precisely, the following model is estimated through Ordinary Least Squares:

\[ J_{igt} = \alpha + \lambda_g D_g + \lambda_j D_j + \lambda_s D_s + \lambda_a D_a + \varepsilon_i \]

where \( J \) stands for the job-creation (job-destruction) rate, defined at the firm level \( i \), \( \alpha \) is a constant, \( \varepsilon \) is a standard error term and \( D \) stand for a series of dummies (with coefficient \( \lambda \)s to be estimated), including for detailed geographical areas \( g \) (identified by the first two digits of the zip code, for about one hundred dummies per country), detailed industry \( j \) (two digits of the ISIC Rev. 3 classification), detailed firm-size class \( s \), with the exclusion of firms with less than 20 employees (20-29 employees, 30-39 employees and so on with a range of ten employee for each class, up to 300 employees, then a range of 25 employees each class up to 500, then 50 up to 700, then 100 up to 1 000, plus one category for 1 000 employees or more), firm age \( a \), measured in years, and the calendar year \( t \). The sum of firm-age coefficients is further constrained to be equal to the average job-creation (job-destruction) rate (or, in the case of the analysis of job flows as a function of firm size, the sum of firm size coefficients is imposed to be equal to the average rate). To the extent that the sample of firms is representative of the population of firms in a country, estimated coefficients on age dummies (or on firm-size classes) represent estimated average rates controlling for other co-variates. These coefficients are then plotted against age in Figure 2.8.

The distribution of firms in the Amadeus and Orbis datasets, however, does not match the economy-wide distribution of firms in the population. This is due to the fact that large firms and specific industries (such as the banking industry in the United States) are over-represented. For this reason, following Schwellnus and Arnold (2008), the sample of each country and year is stratified by firm-size classes and detailed industry, for which the actual distribution of firms is available – based on Eurostat’s Structural Business Statistics for European countries, the Establishment and Enterprise Census for Japan and the OECD Firm-level database for the United States. Then firms are randomly drawn from each stratum, with the number of observations being calibrated to ensure that the distribution of firms in the sample matches the distribution of the population. In order to use the maximum available information, all available firms are drawn from the stratum that is the most under-represented in the raw data, according to the information available on the population of firms. From each other stratum, the number of firms in the sample is set at a level that keeps the ratio between the number of firms in the sample and in the population constant across strata. At the end of the sampling procedure, more than 350 000 firms are retained. Sample size by country is as follows: Belgium, 33 867; Denmark, 14 673; France, 116 152; Italy, 28 281; Japan, 26 669; Poland, 8 726; Spain, 93 306; Sweden, 31 700; the United Kingdom, 40 968; and the United States, 14 482.

Firm-level data are also used in the analysis of job reallocation and productivity (see the next subsection). In that analysis, firm-level net employment growth is considered, insofar as the sign of job reallocation matters. More precisely, as the objective of the analysis is to estimate the covariation of employment and productivity after controlling for firm heterogeneity, a simple SUR model is implemented: both productivity (or investment) measures and changes in log employment levels are simultaneously regressed on the covariates indicated above (that is fitting the same model as above but substituting log employment levels and productivity – or investment – for job creation rates in the above equation and jointly estimating the two equations). Then the correlation amongst residuals is examined. The same stratification and random sampling procedure as above is applied in order to ensure the representativeness of the sample (see Annex 2.A1 for more details).
In all countries for which data are available, job creation rates decline significantly with age, as shown in Figure 2.8. With the exceptions of Denmark, France, and Sweden, job creation rates decline by 6 percentage points or more between the second and the sixtieth year of firm life (conditional on survival and other characteristics). The decline of job creation, as the firm ages, appears to be steeper when the firm is young and then gradually flattens out. By contrast, job creation rates rise with firm age in some countries but, in general, the relationship is weaker and the curve is essentially horizontal in many others. The increase in job destruction with age is particularly steep in Japan, Poland and the United States. In these three countries, conditional on survival, and controlling for other characteristics, firms aged from 50 to 60 years tend to destroy, as a percentage of their own employment, twice as many jobs as firms about five years after birth. This relationship appears, on the contrary, particularly flat in France and Italy.

**Within industries, firms that create more jobs destroy fewer of them**

Cross-country differences in the relationship between age and job destruction are reflected in the cross-age correlation between job creation and job destruction rates, within each industry. More generally, within each industry and country, specific characteristics such as age determine the pattern of employment growth of each surviving firm. While industries that create more jobs destroy more jobs, in countries such as Denmark, Japan, Poland, the United Kingdom and the United States, the characteristics of firms that create more jobs are substantially different from those of firms that destroy more jobs and vice versa (at least once entrants, shutdowns and the smallest firms are excluded, see Figure 2.9). By contrast, in other countries, and particularly in France and Spain, there is no relationship between job creation and job destruction, while Belgium, Finland, Italy and Sweden are characterised by negative but insignificant correlations.

What explains the negative relationship between firm age and job destruction, or more generally between job creation and job destruction across groups of continuing firms characterised by different age, size and industry? One tentative interpretation of these negative correlations is that, while, as noticed above, entry and exit rates are mainly driven by the industry life cycle and the process of firm learning after birth (see above for references),28 the dynamics of firm growth conditional on survival appears consistent with predictions of Schumpeterian growth theories (e.g. Aghion and Howitt, 1998). According to the latter, each firm enters the market with a new vintage of up-to-date technology that is, in general, only marginally improved during the firm’s life. In this view, older firms are typically characterised by more obsolete technologies and tend to be replaced by younger, more efficient firms. To the extent that product markets are imperfectly competitive, firms with different degrees of efficiency will coexist in the market, but older (less efficient) firms will tend to lose market shares and, consequently, re-adjust the size of their staff. However, is there any evidence that labour resources are reallocated from inefficient to efficient firms? And, do we see this occurring in all market economies? The next subsection will look at the link between productivity and firm expansion and contraction.

### 2.3. Gross job reallocation and productivity

Most studies have investigated the link between job reallocation and labour productivity using dynamic accounting decompositions, particularly in a single country, including studies for the United States, the United Kingdom, Canada and several developing economies (see e.g. Griliches and Regev, 1995; Haltiwanger, 1997; Foster et al.,
2. HOW DO INDUSTRY, FIRM AND WORKER CHARACTERISTICS SHAPE JOB AND WORKER FLOWS?

A few studies have investigated these issues using cross-country data (e.g., Brown and Earle, 2008; Bartelsman et al., 2009). These studies typically decompose aggregate labour productivity growth into the contribution of firm entry and exit – which is positive if entrants are more productive than exiting firms – and, for continuers, the contribution of within-firm (within-plant) productivity growth at a given employment level and that due to job reallocation among continuing firms. The latter can be further decomposed into a between effect – which is positive if, on average, more productive firms create more jobs and destroy fewer jobs than less productive ones – and a cross effect, which is positive if, at the firm level, net employment growth is positively correlated with productivity growth. These studies tend to find large positive contributions from within-firm productivity growth independent of labour reallocation. Nonetheless, they usually find a positive contribution from firm entry and exit – implying that labour tends to be reallocated from less efficient exiters to more efficient entrants – and a positive between effect – meaning that labour tends to be reallocated from less to more efficient continuing firms. The policy conclusion of this strand of literature is that static allocative efficiency would be maximised if governments removed barriers to labour reallocation.

By contrast, the evidence on the cross effect is more mixed. In particular, downsizing firms appear to have above-average labour productivity growth. This pattern can be explained by different lags in factor adjustments (such as those resulting from quicker adjustment of the mobile factor – labour – with respect to the quasi-fixed factor – physical capital) or by the prevalence of strategically-defensive forms of downsizing: inefficient firms reduce the scale of their operations as they strive to restore their competitiveness. In the few studies that go

Figure 2.9. The correlation between job creation and destruction rates across groups of firms is generally negative

Note: Correlation coefficients among job creation and job destruction rates. Firm-level data are grouped into cells according to 21 industry characteristics, three firm-size classes and two firm-age classes. Firms with less than 20 employees are excluded. Belgium, 2000-04; Denmark, 2001-05; Finland, 2002-04; France, 2000-04; Italy, 2002-03; Japan, 2004-06; Poland, 2001-04; Spain, 2001-04; Sweden, 2000-05; the United Kingdom, 2000-04; and the United States, 2005-06.


2001; Disney et al., 2003; Aw et al., 2001; Baldwin and Gu, 2006).
beyond labour productivity and measure efficiency by multi-factor productivity (MFP), however, this cross effect tends to be less negative (e.g. Brown and Earle, 2008).

Firms are, however, heterogeneous. Dynamic accounting decompositions show that labour tends to be reallocated from less to more efficient firms within a country or an industry. However, it cannot be excluded that this association is simply brought about by the correlation of both employment growth and productivity with other firms’ characteristics, rather than a causal effect of greater efficiency on employment growth. For instance, firms in growing metropolitan areas may be more efficient and expand their employment faster than firms in depressed areas. If this were the case, the dynamism of a few geographical clusters, and the reallocation of labour among clusters with different degrees of dynamism, would be the engine of growth, justifying policy efforts to remove possible impediments to labour reallocation only when targeted at lifting geographical barriers to mobility.

This chapter contributes to shedding some light on the link between the performance of medium and large continuing firms and job reallocation by exploiting comparable cross-country micro-data. Specifically, the covariation of job reallocation and a number of performance measures is analysed, conditional on firm age, detailed firm-size classes, detailed geographical area, detailed industry and common time shocks (see Box 2.4). These data are available for a sufficiently large and representative number of firms in ten OECD countries. Table 2.4 shows firm-level correlations between residual employment growth and residual performance measures (that is between employment growth and performance measures that are not accounted for by the firm’s characteristics indicated above) in each of these countries.

Firm-level employment changes appear to be correlated with the firm’s efficiency level at the beginning of the period with few exceptions, even after controlling for firm heterogeneity. This holds whether efficiency is proxied by labour productivity – consistent with most of the literature on dynamic accounting decompositions – or is more appropriately measured by MFP. Interestingly, when the MFP measure is used, the correlations are stronger. Overall, these results confirm previous findings that the positive “between effect” usually found in decompositions is unlikely to be simply the outcome of firm-level heterogeneity. Job flows among continuers effectively reallocate labour resources from less efficient to more efficient firms. However, these findings should not lead to the conclusion that efficiency would be optimised by maximising labour reallocation, insofar as the analysis developed here does not allow making any statements on dynamic consequences of the degree of reallocation, for example on investments in match-specific human capital.

By undertaking a separate analysis for job-creating and job-destroying firms, it is possible to explore further the sources of the productivity-enhancing effect of job reallocation. Efficiency levels turn out to be particularly important for job destruction. Table 2.4 shows, in fact, that while, among declining firms, less efficient firms tend to experience greater job losses, among expanding firms more efficient firms do not create significantly more jobs, except in Italy and the United Kingdom. On the contrary, in a number of countries, expanding firms with higher labour productivity levels tend to display smaller rates of employment growth.

Consistent with the literature on dynamic accounting decompositions, moreover, employment and labour productivity growth appear to be negatively correlated, confirming the evidence on the cross effect discussed above. This correlation is rather widespread: not
Table 2.4. The firm’s efficiency levels and employment growth are positively correlated
Residual correlation coefficients between employment growth and other performance variables

<table>
<thead>
<tr>
<th></th>
<th>Employment growth (all)</th>
<th>Employment growth (growing firms)</th>
<th>Employment growth (declining firms)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Labour productivity</td>
<td>Multi-factor productivity level</td>
<td></td>
</tr>
<tr>
<td>Belgium</td>
<td>0.0155</td>
<td>−0.1107***</td>
<td>0.1252***</td>
</tr>
<tr>
<td>Denmark</td>
<td>−0.1039***</td>
<td>−0.1052***</td>
<td>−0.0535**</td>
</tr>
<tr>
<td>Finland</td>
<td>0.0492***</td>
<td>−0.0788***</td>
<td>0.1711***</td>
</tr>
<tr>
<td>France</td>
<td>0.0901***</td>
<td>−0.0086</td>
<td>0.2004***</td>
</tr>
<tr>
<td>Italy</td>
<td>0.1244***</td>
<td>0.0418***</td>
<td>0.0167</td>
</tr>
<tr>
<td>Japan</td>
<td>0.0680*</td>
<td>0.0235</td>
<td>0.0977***</td>
</tr>
<tr>
<td>Poland</td>
<td>0.1150***</td>
<td>0.1041***</td>
<td>0.2469***</td>
</tr>
<tr>
<td>Spain</td>
<td>0.0404***</td>
<td>−0.0289***</td>
<td>0.1098***</td>
</tr>
<tr>
<td>Sweden</td>
<td>0.0978***</td>
<td>−0.0277***</td>
<td>0.1167***</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>0.0701***</td>
<td>0.0581***</td>
<td>0.1339***</td>
</tr>
<tr>
<td></td>
<td>Labour productivity</td>
<td>Multi-factor productivity level</td>
<td></td>
</tr>
<tr>
<td>Belgium</td>
<td>−0.2052***</td>
<td>−0.1065***</td>
<td>−0.1460***</td>
</tr>
<tr>
<td>Denmark</td>
<td>−0.0782***</td>
<td>−0.0914***</td>
<td>−0.1404***</td>
</tr>
<tr>
<td>Finland</td>
<td>−0.1556***</td>
<td>−0.1055***</td>
<td>−0.1629***</td>
</tr>
<tr>
<td>France</td>
<td>−0.2170***</td>
<td>−0.1684***</td>
<td>−0.1953***</td>
</tr>
<tr>
<td>Italy</td>
<td>−0.1918***</td>
<td>−0.1389***</td>
<td>−0.2363***</td>
</tr>
<tr>
<td>Japan</td>
<td>−0.3041***</td>
<td>−0.2706***</td>
<td>−0.2948***</td>
</tr>
<tr>
<td>Poland</td>
<td>−0.1978***</td>
<td>−0.3370***</td>
<td>−0.1187***</td>
</tr>
<tr>
<td>Spain</td>
<td>−0.2614***</td>
<td>−0.2305***</td>
<td>−0.2242***</td>
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<tr>
<td>Sweden</td>
<td>−0.1253***</td>
<td>−0.0988***</td>
<td>−0.0405***</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>−0.1338***</td>
<td>−0.0820***</td>
<td>−0.1449***</td>
</tr>
<tr>
<td></td>
<td>Real investment rate</td>
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<tr>
<td>Belgium</td>
<td>0.0843***</td>
<td>0.0395**</td>
<td>0.0410**</td>
</tr>
<tr>
<td>Denmark</td>
<td>0.0962***</td>
<td>−0.0282</td>
<td>0.1559***</td>
</tr>
<tr>
<td>Finland</td>
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<td>0.1455***</td>
<td>0.1569***</td>
</tr>
<tr>
<td>France</td>
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<td>0.0945***</td>
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<td>−0.0240**</td>
</tr>
<tr>
<td>Poland</td>
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<td>0.0415</td>
<td>−0.1693***</td>
</tr>
<tr>
<td>Spain</td>
<td>0.0654***</td>
<td>0.0665**</td>
<td>0.0358**</td>
</tr>
<tr>
<td>Sweden</td>
<td>0.0984**</td>
<td>0.0736**</td>
<td>0.0754**</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>0.1776***</td>
<td>0.1862**</td>
<td>0.0984**</td>
</tr>
</tbody>
</table>

*, **, *** statistically significant at 10%, 5%, 1% levels, respectively.

Note: Size-weighted correlation coefficients among residuals from the employment growth and performance equations of Seemingly Unrelated Regressions (SUR) models including firm age, detailed firm-size classes, detailed geographical areas, detailed industry and common time dummies as co-variates. Growth rates are specified as changes of log variables. Productivity levels are lagged one year. Labour productivity is defined as value added per head. Firms with less than 20 employees are excluded. Data refer to continuing firms with published accounting data. Belgium, 2000-04; Denmark, 2001-05; Finland, 2002-04; France, 2000-04; Italy, 2002-03; Japan, 2004-06; Poland, 2001-04; Spain, 2001-04; Sweden, 2000-05; and the United Kingdom, 2000-04.


only does employment decline faster than output in downsizing firms, but also output grows less than employment in expanding firms. However, this occurs, in most cases, without any clear relationship between employment growth and efficiency growth – the latter measured by MFP growth. Conversely employment growth is unambiguously correlated with investment: fast-growing firms tend also to have greater investment rates.
This suggests that factor adjustments go hand-in-hand with limited effects on efficiency. As a consequence, the negative “cross effect” often found in productivity decompositions is possibly the outcome of slight differences in the timing of physical capital and labour adjustments.\textsuperscript{30} In addition, in two countries (Denmark and Sweden), there is some evidence that defensive downsizing plays a key role: in these countries staff contractions tend to bring about significant increases in efficiency and real investment in physical capital appears smaller, the greater the extent of the staff contraction.\textsuperscript{31}

Overall, in all countries, the contribution of both the extensive margin – firm entry and exit – and the intensive margin – growth and contraction of continuers – to job reallocation appear important. Firm age turns out to be a key determinant, at least for continuers: young firms create more jobs and older firms destroy more jobs, although cross-country differences are large. Nonetheless, country specificities matter also as regards the overall level of reallocation. Finally, in almost all countries for which data are available, job reallocation appears to enhance static efficiency in the sense that inefficient firms destroy more jobs and efficient ones create more jobs. In particular, for downsizing firms the extent of the staff contraction appears to be closely correlated with the firm’s pre-contraction efficiency level.

3. Labour flows as a source of opportunities and costs for workers: which are the workers affected by greater mobility?

Firm characteristics are important determinants of job and worker flows. But there are significant differences in the exposure to mobility across workers. This section explores a set of workers’ characteristics associated with the patterns of worker flows across industries and countries.

**Hiring and separations are higher among women, young adults and low qualified workers in all countries**

In all countries, except Sweden, controlling for differences in the composition of employment by industry, age and educational attainment, hiring rates are higher for women than for men (Figure 2.10).\textsuperscript{32} The same is also true for separations, with the exceptions of Austria, and Hungary. These hiring and separation patterns result in larger reallocation rates for women than for men. On average, almost 19% of female employees do not remain with the same employer in two consecutive years, against 17% for their male counterparts. More frequent spells of joblessness are likely to be a key factor in gender differences in reallocation rates. However, in some countries, these patterns can probably be explained also by the greater share of women having a fixed-term contract. In fact, gender differences in reallocation rates appear particularly large in Spain (more than 10 percentage points), the country with the largest share of temporary workers.

In most countries, worker mobility is concentrated among younger prime-age adults (aged from 25 to 34 years). More precisely, there is a strong negative correlation between workers’ age and hiring rates in all countries. Hiring rates for people aged between 25 and 34 years are above the country mean by at least 5 percentage points in ten out of 17 countries and particularly higher in Finland, France, Spain and the United States. They then decline with age as workers settle in their jobs and careers and gain experience and seniority. Similarly, separation rates also tend to decline with age, but the age profile is less steep and tends to become flatter above a certain age threshold in many countries. These patterns are not surprising and often observed in the literature (see e.g. Ryan, 2001). They are likely to
Figure 2.10. **Worker mobility is higher among women, young adults and low qualified workers**

Percentage rates adjusted by industry composition and other individual characteristics, 2000-05

**Panel A. Gender**

*Hirings*

*Separations*

*Worker reallocation*
Figure 2.10. **Worker mobility is higher among women, young adults and low qualified workers** (cont.)

Percentage rates adjusted by industry composition and other individual characteristics, 2000-05

Panel B. Age

<table>
<thead>
<tr>
<th></th>
<th>25-34</th>
<th>35-44</th>
<th>45-54</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hirings</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Separations</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Worker reallocation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Figure 2.10. **Worker mobility is higher among women, young adults and low qualified workers** (cont.)

Percentage rates adjusted by industry composition and other individual characteristics, 2000-05

Panel C. **Educational attainment**

Note: Data are ranked in ascending order of worker reallocation rates. Reallocation rates are estimated average rates that would be observed in each country if it had the same industry composition and individual characteristics as the average country other than the characteristic of interest. The rates are based on 2002-05 for the Czech Republic; 2000-03 for Ireland; 2000-04, for Norway; 2004-05, for Poland; 2003-05 for the Slovak Republic; 2002-07 for Switzerland; 2007 for Turkey, and 2000, 2002 and 2004 for the United States.

StatLink: http://dx.doi.org/10.1787/706662861371
reflect two intertwined phenomena. On the one hand youth engage in “job-shopping” in the early stage of their career in order to find the job that best matches their skills. Better job opportunities in terms of pay and working conditions tend to drive youth job mobility, and job changes in their first years of work experience tend to have a positive impact on their future career paths of youth (Topel and Ward, 1992; Le Minez and Roux, 2002). On the other hand, in many countries, the share of youth labour flows that results from involuntary separations is not negligible: young workers are more often engaged in temporary jobs, as employers use fixed-term contracts to screen new recruits, but also to adjust to changing aggregate demand conditions (see e.g. Barlet et al., 2007). Separations rates of younger adults appear particularly high, in comparison with those of more experienced workers, in Denmark, Finland, France, Germany, Norway and the United States.

Low-qualified workers – with less than upper secondary education – have consistently greater probability of separation than more qualified workers in all countries, except in Italy – where qualified youth are often older than 25 years at the time of their first entry in the labour market (see OECD, 2008b) – but there is no systematic relationship between separation hazards and education at higher educational attainment levels. By contrast, hiring varies less by skill levels, except in Denmark, Hungary and in the United States – where hiring rates are substantially higher in the case of low-skilled workers – and Italy, Norway and Sweden – where hiring rates are significantly larger for the most educated. These patterns suggest that structural changes in the demand for skills, leading to fewer labour market opportunities for low-educated workers, are reflected in greater separation rates for low-skilled workers than in reductions of hiring. Structural changes in the demand for skills are also reflected in the relative high mobility of workers with more than upper secondary education. Overall, labour reallocation appears to be greater at the extremes of the skill distribution (that is, U-shaped), except in countries with the highest overall mobility (such as Finland, United States and Denmark) where it decreases monotonically as the level of educational attainment increases.

**Gender mobility differences are larger in low-mobility industries, while the opposite holds for age differences**

Looking at the distribution of reallocation rates across industries, it appears that hiring and separation rates of women are about 30% larger than those of men in manufacturing, where mobility rates are generally low, whereas the gender difference is smaller in services, where mobility rates are generally high (with gender differences often below 10%, if any, see Bassanini and Marianna, 2009). Hiring rates also decline with age in all industries and so do separation rates but their age profiles tend to become flatter as age increases. More precisely, separation rates vary little with age in low-worker-mobility sectors, particularly in manufacturing, except in declining sectors such as the textiles industries where younger adults separate more often than other adults from their employer. By contrast, in high-mobility sectors mostly in services, separation rates of young adults are higher, possibly as a result of the larger use of fixed-term positions in these industries, typically occupied by young workers.

Hiring rates of workers with different qualifications are similar across industries, albeit somewhat higher for high-qualified workers in some industries. In contrast, separation rates follow broadly two patterns depending on the industry. In high-mobility industries, more specifically in non-manufacturing, separation rates within each industry first decline markedly then remain flat as educational attainment increases. In other industries, they are greater at the extremes of the skill distribution.
Conclusions

This chapter provides a number of stylised facts concerning reallocation of labour resources in OECD countries and some other market economies. Labour reallocation is substantial: each year a large number of jobs are created and/or destroyed, and a large number of workers are hired and/or separate from their employer. These gross labour flows are an order of magnitude larger than aggregate net employment changes. Job and worker reallocation within industries are also far larger than those associated with structural changes in the economy and the associated reallocation across industries. Job creation, hirings, job destruction and separations tend to be positively correlated across industries and to be larger in most service industries than in goods producing industries. By contrast, dismissals tend to be more frequent in declining manufacturing industries. Younger firms (including entrants) create more jobs, but job destruction rates among continuing firms tend to increase with firm age. There is also evidence that jobs are reallocated from inefficient to more productive firms, making an important contribution to productivity growth. Among different demographic groups, younger workers are the most mobile. Worker reallocation is also larger at the extremes of the skill distribution, possibly due to structural changes in the demand for skills.

Country specificities appear to account for a large share of total variation in both job and worker flows. This suggests that country-specific policies and institutions are likely to play an important role in determining the level of job and worker reallocation. Country-specific factors also appear to interact with a number of these characteristics, notably by affecting the way jobs are reallocated from older to younger firms, as well as the age profile of worker separations.

These results raise several questions that call for further investigation. Is there an optimal level of labour reallocation from both an efficiency and equity viewpoint? Which are the institutions and policies that affect the level of reallocation and how do they do so? Why are labour resources reallocated from older to younger firms in certain countries, but not in others? How do institutions affect the distribution of hirings and separations across groups of workers? How do institutions affect the share of dismissals within total separations and how does this share affect the level of insecurity borne by workers? What are the implications of different country patterns for employment and productivity growth? Building upon the stylised facts presented in this chapter and the concordant development of gross flows data that are harmonised across a number of countries, as well as the extension and update of OECD regulatory indicators, it would be possible to shed some light on these policy-relevant questions in next editions of the Employment Outlook.

Notes

1. Also for this reason, labour mobility taking the form of inflows to, and outflows from, non-employment is not analysed in this chapter (for recent and more general discussion and analysis of this issue, see Petrongolo and Pissarides, 2008; Elsby et al., 2008; Boeri and Garibaldi, 2009).
2. That is approximately the OECD STAN standard level of disaggregation, which is an intermediate level between one and two digits in the ISIC Rev. 3 classification.
3. See, for example, Figure 2.1 below and Timmer et al. (2007).
4. The firm is defined here (as well as in the studies referred to above) as “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”.

5. EU KLEMS is a large internationally harmonised database that contains industry-level data for most OECD countries (see O’Mahony and Timmer, 2009).

6. These include eight OECD countries (Finland, Germany, Hungary, Mexico, Portugal, Sweden, the United Kingdom, and the United States) two accession countries (Estonia and Slovenia) and one enhanced-engagement country (Brazil).

7. All the data used for this chapter refer to the non-farm business sector, except when indicated otherwise.

8. Excess job reallocation would be smaller if a finer industry disaggregation were employed. However, the literature has shown that excess reallocation remains large in comparison with net growth even within narrowly defined industries (see Davis and Haltiwanger, 1999). Put it another way, growing and contracting firms coexist in the same industry, no matter how narrowly the latter is defined.

9. These include 21 OECD countries (Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Norway, Poland, Portugal, Slovak Republic, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States), plus one accession country (Slovenia).

10. As already noticed, country-specific figures presented in Box 2.2 must be taken with great caution, however, since they are based on data for only one or two years in the case of many countries.

11. This can easily be explained by the large share of seasonal workers and relatively bad working conditions in this industry.

12. See Bassanini and Marianna (2009). These correlations do not appear to be driven by specific outliers.

13. The analysis carried out above shows that looking at simple country-specific averages would be erroneous for two reasons: i) because in unadjusted aggregate data, given the importance of the cross-industry variation, countries that specialise in low-mobility industries would have low reallocation rates even if they had above-average reallocation rates in all industries; and ii) because data are not available for certain industries in certain countries – for instance, comparing unadjusted data, the United Kingdom would have much lower job reallocation rates, since job flows are available only in manufacturing for that country. As a consequence, all country rates presented in this chapter are adjusted by industry composition. See Annex 2.A1 for details on the adjustment method.

14. Adjusted shares of temporary workers by country are reported in Annex 2.A1. The discussion here is limited to worker flows due to the small number of countries for which gross job flow data are available.

15. Employment protection indicators are reported in Annex 2.A1. A more detailed analysis would be necessary to confirm the validity of this conjecture. In particular, the theoretical literature has also pointed out that product market regulation can have important effects on job flows, particularly through its effect on firm entry (e.g. Koeniger and Prat, 2007). Given the close correlation in the degree of stringency of product and labour market regulations, according to OECD indicators (see Conway et al., 2005), it cannot be excluded that patterns in Figure 2.2 are also due to the effect of these regulations.

16. According to the first group of theories, positive or negative correlations can emerge depending on the degree of heterogeneity of shocks. Conversely, the second group of theories relates job creation and destruction patterns to differences in the breadth of business opportunities that are available in different industries depending on their life cycle. Mass entry of firms would occur in industries where technological opportunities are larger, together with a process of fast learning and competitive selection that would generate mass exit and shakeouts (for evidence, see for example, Klepper and Simons, 2005).

17. In most labour force surveys this question is asked only to people that are not in employment (but have previous employment experience).

18. Available layoff data used in this chapter come from enterprise surveys for two countries (France, 2006-07, and Germany, 2003-07) and labour force surveys for the other three (Australia, 1995-2001; the United Kingdom, 1997-2005; and the United States, 1996-2006, even years only). The precise definition and reference period differs across surveys and these differences are likely to oversate dismissals in Germany, France and, to a limited extent, the United Kingdom with respect to the United States (see Annex 2.A1). Data for Australia refer only to seven non-manufacturing industries. For this reason, Australia is excluded from unadjusted industry averages.
19. This does not imply, however, that the bulk of separations is voluntary: in order to avoid severance payments or higher taxes (in experience-rating systems), employers can, by modifying working conditions, induce workers to quit.

20. As already noted in the literature (e.g. Bassanini et al., 2009), within-country cross-industry distributions of dismissal rates appear also closely correlated across countries: for each available country, the correlation between the industry distribution of dismissal rates for that country and the average industry distribution obtained excluding that country is never smaller than 0.44, significant at conventional statistical levels.

21. Unfortunately data are available for too few countries to make any general statement on the cross-country distribution of dismissals. However, it is suggestive to note that, within the five countries for which data are available, dismissals appear lower in countries that have more stringent regulations concerning individual and collective dismissals and vice versa for countries with less binding legislation (see Annex 2.A1).

22. According to Bartelsman et al. (2009), in all countries for which comparable data are available, the average size of entrants is never greater than 60% of the average incumbent, and in many OECD countries this figure is as low as 30%. The size of firms shutting down their business operations is often small too (see e.g. Brandt, 2004).

23. As usual, when computing job-reallocation rates for start-ups and shutdowns, total dependent employment of each industry is used at the denominator, in order to get meaningful economic figures.

24. Slovenia and the United Kingdom (see Bassanini and Marianna, 2009).


26. Small firms are under-represented in the original micro-data. It seems therefore cautious to eliminate the smallest firms. The 20 employee threshold is somewhat arbitrary and is chosen only to be consistent with the size classes for which population weights can be constructed, drawing on the OECD Firm-level database, Eurostat’s Structural Business Statistics and the Japanese Establishment and Enterprise Census.

27. Three size classes (20-49 employees, 50-99 employees and 100 employees or more), two age classes (less than 20 years, and 20 years or more – that is approximately less than the sample mean and more than the sample mean) and 21 industries (those used in Figure 2.1 plus mining) are considered here.

28. As suggested by the high correlation between firm entry and exit rates at the industry (as well as size and age) level (see above).

29. Most of these studies look also at the relationship between reallocation of output shares and multi-factor productivity growth, but they rarely look at job reallocation and multi-factor productivity growth.

30. For example, labour adjustments could prompt capital adjustments that might be however spread over a longer time period. Some caution must be exercised, nonetheless, in interpreting these results since annual productivity growth data might be plagued by large measurement error.

31. Although, when restricting the sample to declining firms, there is no significant relationship between the extent of downsizing and MFP growth in Sweden, downsizing firms appear to experience faster MFP growth than firms with stable or increasing employment in this country.

32. All figures in this section are adjusted for composition with respect to other characteristics. For example, Panel A in Figure 2.10 presents estimated patterns by country and gender that would occur in each country if it had the same structure in terms of industry, age and educational attainment as the average country. For the analysis of this section, workers' flows are aggregated into cells by country (17 countries, those in Figure 2.2 except Poland, Portugal, Slovak Republic, Slovenia and Turkey), industry (23 non-farm and non-mining business sectors, those in Figure 2.1, except the fuel industry), gender (men and women), age (prime-age adults aged 25-34, 35-44 and 45-54 years) and educational attainment (less than upper secondary, upper secondary and some post-secondary and tertiary levels). The age coverage is limited to prime-age adults in order to circumvent measurement errors due to small sample sizes for older workers and to avoid capturing the extreme variability in job hiring and separations amongst youths, due to part-time employment while studying.
2. HOW DO INDUSTRY, FIRM AND WORKER CHARACTERISTICS SHAPE JOB AND WORKER FLOWS?

33. This would suggest that churning rates might also be constant by skill level (see Box 2.2): firms might accommodate their demand for skills by increasing dismissals of workers with low educational attainment (without reducing hirings from this group) and increasing hirings of more-educated workers (without reducing separations).

Bibliography


2. HOW DO INDUSTRY, FIRM AND WORKER CHARACTERISTICS SHAPE JOB AND WORKER FLOWS?


ANNEX 2.A1

Sources and Definitions

Job flows and co-variates: sources and definitions

Industry-level data

Data on job flows by country and industries are from Bartelsman (2008), except for four countries (Brazil, Germany, Mexico and the United Kingdom) for which they are from Haltiwanger et al. (2006). Data from these two sources are constructed from business registers and tax files using the same protocol and are therefore comparable (see also Bartelsman et al., 2009). Data refer to firms as unit of observation defined as “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”.

Although data are in principle available on an annual basis, period averages are used in order to maintain comparability with what is done with worker flow and micro-data. Data from the above-mentioned sources include information on entry, exit and continuers. However, they exclude, in a given year, job creation and destruction from continuing firms that will exit the following year (that are called “about-to-die” firms hereafter). As a consequence, job turnover of continuers is underestimated. However, using data from the Census Bureau for the United States, it is possible to evaluate this downward bias to no more than 10% in most industries in the United States. This results in an even smaller bias when the rate for all firms – startups, shutdowns and continuers – is computed, as in Section 1. The downward bias, however, appears to be far greater – up to 30% – in two industries (mining and telecommunications). These industries are therefore either excluded (mining) or aggregated with other industries (telecommunications) in all countries.

In the analysis of job creation and destruction by entry and exit, when no comparison with continuers is made, data for several countries for 2005 from the OECD Business Demographics database are added to the sample. In addition, for the United Kingdom, data from Hijzen et al. (2007), covering a longer period (1998-2005), are used. Although in principle more complete, to the extent that they do not exclude job turnover of “about-to-die” firms, these data are not comparable to the other sources mentioned above as regards continuers and cannot be used in the rest of the analysis.

Firm-level data

Firm-level data are from the August 2006 edition of the Amadeus database for European countries and the August 2008 edition of the Orbis database for the non-European countries. Both databases are produced by Bureau van Dijk. Data used in this
chapter refer to firms with unconsolidated publicly-available published account data. Limited financial account data are used for the United States, where there is no obligation for the firm to publish its accounts. As, in these data, it is not possible to identify firms’ closures from firms that exit the sample for other reasons and very young firms are under-represented due to lags in the publication of accounts for start-ups, these data are suitable only for the analysis of continuing firms.

Implausibly large (or steadily constant) employment changes are filtered out. In order to do so the sample is restricted to firms-by-year observations where employment growth data are available also for either the preceding or the following year (a minimum of three consecutive employment data is therefore required for each firm). In addition, observations with one of the following characteristics are also excluded: i) no employment change in the current, preceding and following years (or with missing employment growth in one of these years and zero growth in the other two); ii) employment changes greater than 1 000 units and percentage log employment growth greater than 50%, both in absolute terms; and iii) absolute percentage log employment growth greater than 60%. Two other exclusion criteria are applied to observations with non-missing employment growth data in the current, preceding and following years: iv) percentage log employment growth greater than 30% and smaller than ~20% in two consecutive years accompanied by changes in the wage bill with opposite sign; and v) percentage log employment growth greater than 40% and smaller than ~30% in two consecutive years. Three additional exclusion criteria, which substitute for iv) and v) above, are applied at the extremes of a firm spell of non-missing employment data: vi) absolute percentage log employment growth greater than 50% and absolute changes in log employment growth greater than 80 percentage points in the current or following year; vii) percentage log employment growth greater than 30% and absolute changes in log employment growth greater than 30 percentage points in the current or following year and log employment growth 1.5 times greater than (or opposite sign of) wage bill growth in the current year; and viii) percentage log employment growth smaller than ~20% and absolute changes in log employment growth greater than 30 percentage points in the current or following year and log employment growth 1.5 times greater than (or opposite sign of) wage bill growth in the current year. For each country, years with too few valid observations per industry are also excluded. As a consequence, data cover only: Belgium (2000-04), Denmark (2001-05), Finland (2002-04), France (2000-04), Italy (2002-03), Japan (2004-06), Poland (2001-04), Spain (2001-04), Sweden (2000-05), the United Kingdom (2000-04) and the United States (2005-06). Obviously these filters might introduce biases in measured job flows and the direction of the bias is unknown, a priori, but biases are likely to be larger in unadjusted data.

Population weights by firm size and detailed industry – obtained from Eurostat's Structural Business Statistics for European countries, the Establishment and Enterprise Census for Japan and the OECD Firm-level database for the United States – are used to obtain aggregate turnover rates. As small firms are under-represented in these data, firms with less than 20 employees, on average, are excluded. Aggregate data are also averaged across years, in order to smooth out fluctuations that can simply be the result of measurement error.

The analysis of job flows uses several other covariates including labour productivity (defined as real value added per employee), multi-factor productivity (unadjusted by factor quality, see Schwellnus and Arnold, 2008), investment rate (change in capital stock in real terms minus depreciation and divided by real value added), age (observation year minus date of incorporation), detailed geographical areas (codified through dummies corresponding to
the first two digits of the zip code) and industry (up to two-digit levels of the NACE classification). Specific filters are applied to eliminate implausible values in the case of productivity and investment data (following Schwellnus and Arnold, 2008).

The distribution of firms in the Amadeus and Orbis datasets, however, does not match the distribution of firms in the population. This is due to the fact that large firms and specific industries (such as the banking industry in the United States) are over-represented. For this reason, the sample of each country and year is stratified by firm size classes and detailed industry, for which the actual distribution of firms is available – based again on Eurostat’s Structural Business Statistics for European countries, the Establishment and Enterprise Census for Japan and the OECD Firm-level database for the United States. Then firms are randomly drawn from each stratum, with the number of observations being calibrated to ensure that the distribution of firms in the sample match the distribution of the population. In order to use the maximum available information, all available firms are drawn from the stratum that is the most under-represented in the raw data, according to the information available on the population of firms. From each other stratum, the number of firms in the sample is set at a level that keeps the ratio between the number of firms in the sample and in the population constant across strata.

**Worker flows: sources and definitions**

Data to estimate worker reallocation, hiring and separation rates among dependent employees (henceforth called employment) come from the European Labour Force Survey (EULFS) for European countries for the period 1997 to 2005, depending on countries and data availability, and the bi-annual January Displaced workers/Job tenure supplement of the Current Population Survey (CPS), for even years from 1996 to 2004, for the United States.

Employment, Hirings and Separations are reported at the OECD-STAN industry level of disaggregation, an intermediate level between one and two digits in the ISIC Rev. 3 classification, for 24 industries in the non-farm business sector. Data are further harmonised by using levels and annual growth rates by industry from EU-KLEMS for the countries for which the latter are available (see www.euklems.net). In Section 3, the data series are further broken down by gender, age – 15-24, 25-34, 35-44, 45-54, 55-64 years, and highest completed education levels – less than upper secondary (Low), upper secondary and some post-secondary (Medium), and tertiary level (High). At this level of disaggregation the fuel industry is excluded, due to its small size.

Annual hiring and separation rates are computed using the methodology explained below. However, in narrowly-defined industries they might vary considerably from year to year due to the small sample size (and the fact that the industry is typically not included in LFS sample designs). To filter out these, by and large, spurious movements, averages across years are calculated.

Hirings \( (H) \) reflect movements into jobs and refer to a point in time and correspond to the number of dependent employees who have been working for their current employer for no more than the past 12 months including the survey reference week. Symmetrically, job stayers \( (JS) \) are defined as those who have been working for more than one year with the same employers. Employment, excluding observations with missing tenure information \((E_T)\), is defined as the sum of the two terms:

\[
E_T = H + JS
\]
where \( i \) refers to countries, \( j \) to industries, \( t \) to years and \( m \) to worker characteristics such as gender, age and education. Separations reflect movements out of jobs in the past 12 months and are obtained by exploiting the basic accounting identity:

\[
S_{ijm} = H_{ijm} - \Delta E_{ijm} \quad (1)
\]

However, adjustments are necessary because: i) missing tenure information and/or errors in the reporting of job tenure data might differ between two survey waves; and ii) employment movements at disaggregate industry level in LFS might differ from national account information. Let’s see these adjustments in order.

First, an adjusted lagged value of \( E_T \) (called \( LE_T \) hereafter) is defined in such way that it is consistent over time with \( E_T \) and with year-to-year employment changes resulting from LFS employment data without excluding observations with missing tenure (\( E \)).

\[
LE_{ijm} = \frac{E_{ijm} - E_{ijm}}{E_{ijm}}
\]

\( LE_T \) is further adjusted to account for cohort effects affecting beginning and end years of age groups to produce unbiased year-on-year employment changes by age group.

Second, the distribution of employment across worker groups is combined with industry-level employment from the March 2008 public release of EUKLEMS (denoted with \( E_K \)). For countries for which EUKLEMS data are not available, it is set \( E_K = E \). More precisely, an adjusted employment level that can be used in the accounting identity (1) is derived as follows:

\[
E_{ijm} = \frac{E_{ijm} - K_{ij}}{E_{ijm}}
\]

Similarly, one-year lagged employment is calculated as follows:

\[
E_{ijm} = \frac{E_{ijm} - K_{ij}}{E_{ijm}}
\]

Adjusted hirings, consistent with EU-KLEMS employment, are then derived from:

\[
H_{ijm} = \frac{H_{ijm} - E_{ijm}}{E_{ijm}}
\]

Finally, hiring rates are obtained from:

\[
HR_{ijm} = \frac{H_{ijm}}{E_{ijm} + E_{ijm}}
\]

Adjusted separations (\( S_{corr} \)) are derived from the following accounting identity:

\[
S_{ijm} = E_{ijm} - H_{ijm} - S_{ijm}
\]

Hence:

\[
S_{ijm} = H_{ijm} - S_{ijm}
\]

Finally, separation rates are obtained from:

\[
SR_{ijm} = \frac{S_{ijm}}{E_{ijm} + E_{ijm}}
\]
2. HOW DO INDUSTRY, FIRM AND WORKER CHARACTERISTICS SHAPE JOB AND WORKER FLOWS?

Dismissals: sources and definitions

Data for dismissals come from country-specific sources:

Australia: Source: Australian Bureau of Statistics (1997, 2001), covering employment in the final year and dismissals in the same year and over the two preceding years. Dismissals are annualised by dividing the total amount by three.

France: Source: data extracted from the 2006-07 DMMO-EMMO surveys by the French Ministry of Labour (DARES). They include annual dismissals as well as employment at the start and end of the period. Original data collection in the DMMO-EMMO survey is, however, quarterly.

Germany: Source: data extracted by IAB from the 2003-07 waves of the IAB Establishment Panel and including dismissals over the first six month of each year and employment at the start and end of the period. Rates are annualised by multiplying them by two.

The United Kingdom: Source: directly computed from UK Quarterly Labour Force (waves 1997-2005). An individual is considered to have been laid off if he/she was made redundant in the period covered by the survey (a quarter). Only wage and salary employees in the private sector are considered. Employment data are constructed accordingly. Dismissal rates are annualised by multiplying them by four.

The United States: Sources: Bassanini et al. (2009) for 2004; updated using the same methodology and adapted industry mappings for the other years using various waves of CPS Displaced Workers Supplement (1996-2006, even years). An individual is considered to have been laid off if he/she lost his/her job in the most recent year covered by each survey, because of plant closing or moved, insufficient work, or position or shift abolished. Only wage and salary employees in the private-for-profit sector are considered.

For countries for which total employment is not available at the start of the period (Australia and the United States), denominators are adjusted by subtracting from each industry’s end-of-period employment the corresponding rate of employment change reported in EUKLEMS (March 2008 public release) for that industry and country.

Adjustments for industry-composition (or for composition by demographic characteristics)

When indicated in the text, country-level indicators are adjusted for industry-composition using the following procedure: first, employment shares of each industry are computed for each country and then averaged across countries; second, a weighted regression of the given indicator on industry and country dummies is estimated using frequency weights proportional to employment shares and imposing the constraint that the average of the coefficients of country dummies is equal to the global sample. Estimated coefficients of country dummies will then correspond to the adjusted indicators.

In Section 3 adjustments are made for both industry-composition and composition effects due to other demographic characteristics. The procedure, in this case is the same as above except that dummies by chosen characteristic and country (for example gender and country in Panel A of Figure 2.10) are used instead of country dummies and dummies by other characteristics and industry (for example age, educational attainment and industry in Panel A of Figure 2.10) replace industry dummies.
Country-level indicators adjusted for industry composition are computed for several job and worker flow measures as well as the share of workers with a temporary contract. Adjusted shares are reported in Table 2.A1.1 below together with OECD indicators of employment protection.

Table 2.A1.1. **Adjusted share of temporary workers and employment protection indicators, 2000-05**

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</tr>
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n.a.: Not available.


StatLink: [http://dx.doi.org/10.1787/706834618370](http://dx.doi.org/10.1787/706834618370)