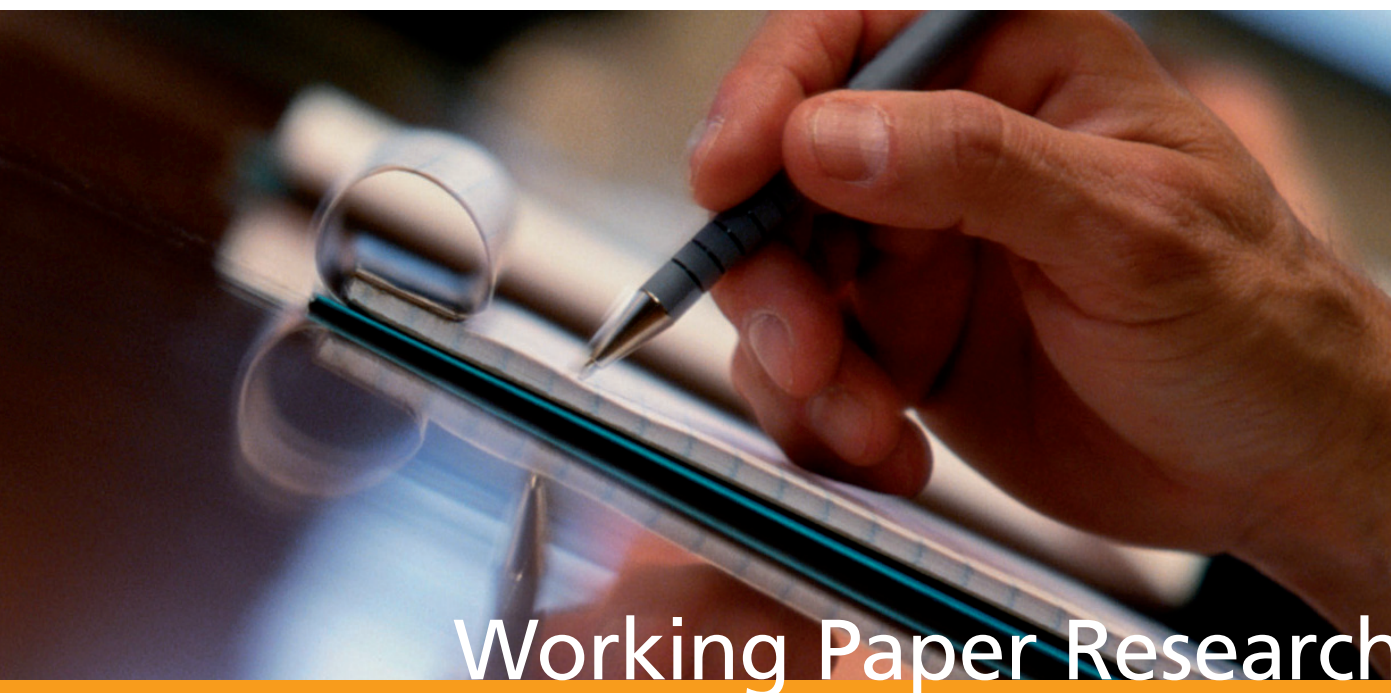The use of fixed-term contracts and
the labour adjustment in Belgium

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Abstract

This paper aims to document and analyse the use of fixed-term contracts (FTC) and to analyse the dynamics of labour adjustment by type of labour contract at the firm level, drawing on the detailed breakdown of both the labour force and labour entries and exits that are available in the "Belgian Firms' Social Balance Sheets" dataset. It also aims to investigate the structure of labour adjustment costs by type of labour contract, using the methodology proposed by Goux, Maurin and Pauchet (2001). Results first indicate that flexible labour contracts are not only used to facilitate short-term labour adjustment but also as a screening device. The findings also suggest that when a firm decides to introduce flexible labour into its production process, it does also this to meet long-run objectives such as implementing minimising costs innovations. It is further estimated that the introduction of FTCs does not seem to affect the speed of indefinite-term contracts (ITC) adjustment. Our results also tend to indicate that the FTC is a key adjustment variable in response to cost shocks and to unexpected demand fluctuations while, in response to expected fluctuations in output, firms then prefer to adjust their level of permanent employment. Finally, and as far as the structure of labour adjustment costs in Belgium is concerned, the marginal recruitment cost under an ITC represents 12.4% of the marginal termination cost of ITC, while the marginal cost associated with the recruitment under an FTC only accounts for 0.8% of its ITC counterpart.

Corresponding authors:

Emmanuel Dhyne, NBB, Research Department (e-mail: emmanuel.dhyne@nbb.be) and Warocqué Research Center, Université de Mons.

Benoit Mahy, Warocqué Research Center, Université de Mons and Département d'Economie Appliquée, Université Libre de Bruxelles (e-mail: benoit.mahy@umh.ac.be).

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1. Introduction

The observation of persistently high unemployment rates in Europe since the 1970s has generated in-depth investigations of the causes of this phenomenon and of the way to reduce it. Among the many sources investigated, the high degree of regulation of European labour markets and, more precisely, the high level of labour adjustment costs in Europe, were explanations frequently put forward by economists. For instance, Bentolila and Bertola (1990) suggest that "…*dynamics and uncertainty must be taken into considerations when modelling employment dynamics in Europe: the highly regulated nature of European labour markets constrains the flexibility of firms' employment policies in such ways that hiring a worker is definitely a risky proposition*...".

If the classical economic theory considers labour input to be variable, its adjustment at the firm level, especially in response to adverse shocks, was legally restricted and therefore costly to operate in industrialised countries. Indeed, during the second half of the twentieth century, most European countries introduced a range of regulations governing labour contracts. At the same time, indefinite-term labour contracts became the norm in Western Europe. Such contracts were not only motivated by risk-aversion considerations from the employee side but also as a way to protect firms' investment in specific human capital from undesired and/or excessive labour turnover in periods of low unemployment rates.

However, in the last two decades, employment protection legislation has been softened in most European countries, which have introduced and/or facilitated the use of fixed-term contracts or temporary agency workers to increase the degree of labour flexibility at the firm level. This evolution towards more flexible labour contracts was also motivated by industrial organisation considerations. While mass production tends to favour the planning of production and therefore the smoothing of changes in the labour force (Holt, Modigliani, Muth and Simon, 1960), the spread of elements of the Japanese "lean production" model (e.g. just-in-time production) in the industrialised countries during the 1990s increased the need for flexible labour management.

Therefore, enterprises now have the choice to manage their labour force in order to respond to shocks by using either indefinite-term contracts (ITC) or fixed-term contracts (FTC) and/or temporary agency workers (AW) [1]. If a firm chooses one of the last two options, temporary employment may be used as a buffer to product demand fluctuations. This leads to a division of the labour force into a *core* component, which is relatively well protected from demand fluctuations, and a *peripheral* component, which is at risk to demand fluctuations (Booth, Francesconi and Frank, 2003).

From the employer's point of view, following the distinction made by Leclair and Roux (2005), the use of FTCs has two major objectives. The primary objective of using flexible labour contracts is to facilitate labour adjustment. Secondly, it is also a convenient selection tool. Before signing an ITC with a new employee, a firm may prefer to use an FTC during a screening period in order to properly evaluate this new employee.

From the employee side, it is also a way for an ITC job-seeker who is hired under a flexible labour contract to send a positive productivity signal not only to his current employer but also to other potential employers. As documented in Booth, Francesconi and Frank (2002) for Britain or Dhyne and Mahy (2002) for Belgium,

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[1] In response to shocks, firms may also adjust the total hours worked using either overtime (in the case of positive shocks) or temporary unemployment (in the case of negative shocks). However, this paper focuses on the labour force adjustments only.

FTCs are often "a stepping stone to permanent work". For instance, Dhyne and Mahy (2002) show that, when an FTC worker changes employment status, it is for an ITC position in two out of three cases.

In Belgium, the use of flexible labour contracts is relatively more regulated compared to other European countries (see OECD, 2004). Examples of such regulation include the maximum number of consecutive FTCs that can be set for a worker, the maximum length of an FTC, and some sectoral restrictions to the use of AWs. Therefore, FTCs are less common in Belgium than in its three main trading partners, namely France, Germany and the Netherlands. According to the 2005 EU Labour Force Survey, around 15% of the labour force was employed under FTCs in France, Germany and the Netherlands while only 8.9% of the Belgian labour force was employed under such temporary contracts.

The purpose of this paper is firstly to provide a descriptive analysis of the relative importance of the use of flexible labour contracts by Belgian firms and, secondly, to set out an econometric analysis of the determinants of FTC and AW use at the firm level.

To tackle these issues, we use detailed information available in the "social balance sheets" that have to be filed by Belgian firms every year. Using Belgian companies' social accounts provides an opportunity to document their use of FTCs and AWs over the period 1998-2005, in terms of both the share of FTCs in total employment and the share of the firms that are using these contracts.

Indeed, if the share of total employment under FTCs provides an estimate of the size of the employment buffer that may be used by firms to absorb short-term variations, it is also important to estimate the fraction of firms that have chosen to split their labour force into a core and a peripheral component. It is further interesting to analyse the determinants of the firm's decision to use flexible contracts, for example in order to capture whether a firm reacts to internal growth by recruiting FTC employees and/or AW.

Following this rather descriptive analysis, we then present econometric estimations of the impact of the use of FTC at the firm level on employment dynamics. In particular, we seek to analyse the differences in the dynamics of labour adjustment by type of contract. We also investigate the structure of labour adjustment costs of ITC and FTC workers more specifically. More precisely, using the methodology proposed by Goux, Maurin and Pauchet (2001), we describe the degree of asymmetry in labour adjustment costs by type of contract.

Regarding this more analytical part of the paper and compared to previous empirical works on labour adjustment at the micro level in Belgium (Konings and Roodhooft, 1997, Dhyne, 2001), the social accounts dataset also improves the quality of data significantly.

The reason is that previous empirical works were based on the analysis of manpower at the firm level, as registered in the appendices to company annual accounts. Labour adjustment was then measured as the net change in total manpower between two consecutive years. With the additional information available in the social accounts, we now not only observe the net changes of the labour force over two consecutive years, but also look at gross employment entries and exits that have taken place during a specific year. So our understanding of the labour adjustment process can be improved.

Another improvement on the existing empirical literature lies in our assessment of how quickly firms respond to shocks affecting employment. As social balance sheets also provide several sub-divisions of

both the manpower and the gross employment flows at the firm level[2], we use the distribution of labour stocks and flows by type of contract in order to better assess the response time of individual firms to shocks that alter their optimal labour demand. Previous statistical analyses of the degree of employment persistence at the firm level, that were based on net changes of total manpower, may underestimate the degree of rigidity associated with ITC workers and overestimate the degree of rigidity associated to FTC workers. To our knowledge, this paper is the first that provides measures of labour rigidity by type of contract for the Belgian economy.

In addition to a more relevant measure of the degree of employment persistence, the breakdown of the labour force by type of contract also enables a better identification of the structure of labour adjustment costs which are probably the main factor explaining employment rigidity, and especially the degree of asymmetry in ITC adjustment costs. The detailed analysis of the employment flows available in the social balance sheets also enables a distinction between labour movements that are costly (e.g. ITC and FTC recruitments or ITC redundancies) or not (e.g. ITC voluntary resignations, ITC (early) retirements, FTC terminations).

This paper is structured as follows.

In section 2, we present some statistical information about the evolution of employment in Belgium by type of contract over the recent past. We also further describe the sample of Belgian firms that we use.

In section 3, we document the use of flexible labour contracts by Belgian firms. We try to describe which firms use FTCs or AWs. More specifically, we investigate whether firms that use flexible labour contracts not only use these contracts to rapidly respond to labour demand shocks but also consider these types of contracts as structural components of their labour force. We do this through an econometric analysis of the use of FTCs and AWs using dynamic probit models.

Section 4 covers the econometric analysis of the consequences of FTC use on employment dynamics. In this section, we also assess the relative importance of recruitment and contract termination costs by type of contract. Finally, our main findings are summarised in the concluding section 5.

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[2]   For instance, statistical information on labour stock by gender, level of education and type of labour contract is available. Annual recruitments and employment terminations by gender, level of education and type of contract are also documented as well as the type of termination [voluntary departure, redundancy, (early) retirement, and end of labour contract].

2.   Relative demand for FTC and ITC in Belgium

2.1.   A cross-country perspective: Belgium and its three main trading partners

Based on the Eurostat Labour Force Surveys, Table 1 describes the relative use of temporary employment in Belgium, Germany, France and the Netherlands in the years 1990, 1998, 2003 and 2005.

**Table 1 – Temporary employees as a percentage
of the total number of employees by gender**

	Men + Women				Men				Women			
	1990	1998	2003	2005	1990	1998	2003	2005	1990	1998	2003	2005
Belgium	5.3	7.8	8.6	8.9	3.3	5.9	6.4	6.8	8.6	10.4	11.3	11.4
France	10.5	13.8	13.4	14.1	9.4	12.9	11.7	13.3	12.0	14.9	15.2	15.0
Germany	10.1$^{(1)}$	12.3	12.2	14.1	9.4$^{(1)}$	12.1	12.1	14.4	10.9$^{(1)}$	12.5	12.3	13.8
Netherlands	7.6	12.7	14.5	15.5	6.1	10.2	12.7	14.3	10.2	16.1	16.6	16.9

Source: Eurostat.

[(1)] 1991, including ex-DDR.

This table highlights the increasing trend in the relative use of temporary contracts over the whole period in the four countries considered. It also indicates the common evidence that more women than men are employed in temporary jobs. Compared to the situation observed among its three main trading partners, it also shows that the use of flexible employment contracts is less developed in Belgium[3].

From an employer's point of view, the relative use of temporary jobs under an FTC as opposed to an ITC can be explained through relative wage and adjustment costs. From an institutional point of view, relative adjustment costs depend positively on the degree of protection against ITC dismissals and negatively on the degree of strictness of regulation of temporary jobs. Table 2 compares these two explanatory factors among the 4 countries under consideration.

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[3]   Aside from the evidence described in Table 1, additional data drawn from the Labour Force Survey show that the median length of temporary contracts does not seem to change very much during the 1990-2005 period, except in France. France is also the country where the median length of temporary contracts is the lowest (between 4 and 6 months), while Germany is characterised by the highest one (between 19 and 24 months). The median contract length in Belgium and in the Netherlands lies between 7 and 12 months.

Table 2 – Overall strictness of FTC and ITC regulations

	Overall strictness of protection against (individual) dismissals			Overall strictness of regulation on temporary employment		
	1990	1998	2003	1990	1998	2003
Belgium	1.7	1.7	1.7	4.6	2.6	2.6
France	2.3	2.3	2.5	3.1	3.6	3.6
Germany	2.6	2.7	2.7	3.8	2.3	1.8
Netherlands	3.1	3.1	3.1	2.4	1.2	1.2

Source: OECD Employment Outlook 2004.

The fact that the use of FTC is less developed in Belgium seems to be party explained by its softer legislation against ITC dismissals[4] together with stronger regulation of temporary employment, as documented by the OECD (2004). Conversely, Germany and the Netherlands both have tougher legislation on employment protection and softer regulation of temporary employment. However, this explanation is not convincing enough to explain the higher use of FTCs in France. This country does actually have stricter regulations on temporary employment in two out of the threeyears considered.

In terms of relative wage costs, Table 3 shows that the average wage of FTC workers in Germany and in the Netherlands was only between 70 and 75% of the ITC average wage in 2002, while FTC average wages are around 80% of the ITC average wage in Belgium. However, this argument does not help to understand the more intensive use of FTC workers in France whose relative wage costs are the highest among the four considered countries.

Table 3 – Average wage by type of contract in 2002

	Belgium	Germany	France	Netherlands
ITC average wage	2464.7	2714.4	2231.5	2528.2
FTC average wage	2000.8	2021.2	2122.6	1781.2
% of FTC wage in terms of ITC	*81.2*	*74.5*	*95.1*	*70.5*

Source: 2002 Structure of Earnings Survey, Eurostat.

2.2. A time series perspective: Evidence from Belgian firms

Since 1996, Belgian firms which have to file annual accounts with the National Bank also have to provide social balance sheets. These social accounts provide a detailed breakdown of the labour force at the end of each accounting year and an analysis of the labour movements that have taken place during that period. Therefore, these social balance sheets not only provide information about the labour stock, but also about

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4   Considering that dismissals should mostly concern ITC workers.

the labour flows at the microeconomic level[5]. As the quality of the data collected for the first two years was not as good as in the following periods, we restricted our observation period from 1998 to 2005.

Table 4 summarises the use of ITCs and FTCs[6] by Belgian firms.

Table 4 – The relative use of ITCs and FTCs by Belgian firms

	1998	1999	2000	2001	2002	2003	2004	2005
ITC (in 1,000 FTE)	1435.6	1477.8	1575.3	1599.5	1582.8	1576.9	1590.6	1594.0
% of ITC in manpower	*94.5*	*94.5*	*94.7*	*95.3*	*95.5*	*95.6*	*95.6*	*95.5*
FTC (in 1,000 FTE)	84.0	85.4	87.3	79.6	74.8	72.5	72.7	74.8
% of FTC in manpower	*5.5*	*5.5*	*5.3*	*4.7*	*4.5*	*4.4*	*4.4*	*4.5*

Source: Saks, Heuse, Delhez (2008).

The statistical information drawn from the Belgian social balance sheets, presented in Table 4, seems to confirm the lower use of FTCs in Belgium previously documented in Table 1. Their decline between 2000 and 2004 also indicates that FTCs were used by Belgian firms to absorb the economic downturn encountered during that period.

The figures presented above refer to the breakdown of manpower by type of contract for the total population of Belgian firms that have to file social balance sheets. In order to perform our econometric estimations, we further restricted our analysis to the sample of large Belgian firms fulfilling the following criteria:

- the accounting period must cover a full 12-month period;

- must be profit-maximising[7];

- declare a positive wage bill and a positive labour force;

- use the full-format accounting scheme[8];

- must be observed for at least four consecutive years over the period 1998-2005;

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[5] A detailed statistical description of the social accounts is published annually in the Economic Review of the National Bank of Belgium.

[6] In the social accounts, total manpower is broken down into 4 categories: workers under indefinite-term contracts, workers under fixed-term contracts, workers under replacement contracts and workers under contracts for the execution of a specific task. In our analysis, the so-called ITC covers the first category while FTC covers the 3 other categories.

[7] A firm is considered to be profit-maximising on the basis of its legal status. Public companies and non-profit associations are excluded from the sample.

[8] A firm has to use the full-format accounting scheme if its average manpower is at least equal to 100 workers or if it meets at least two of the three following criteria: average manpower of at least 50 workers, annual turnover of at least 7,300,000 EUR, total assets of at least 3,650,000 EUR.

- the breakdown by type of contract must be consistent with the total manpower, in terms of both stocks and flows;

- the breakdown by type of termination must be consistent with total terminations[9];

- must not operate in the following NACE-BEL sectors: 65xxx, 66xxx, 67xxx, 745xx[10].

After applying these criteria, our sample is composed of 7,082 firms in 1998, rising to 9,894 firms in 2002, and ending with 7,868 firms in 2005[11].

For each company in the sample, we observe the following variables:

- the total wage bill;

- the annual turnover;

- the number of ITCs at the end of the accounting year[12];

- the number of FTCs at the end of the accounting year[12];

- the number of hours worked during the accounting year[12];

- the number of recruitments under ITC during the accounting year[12];

- the number of recruitments under FTC during the accounting year[12];

- the number of redundancies during the accounting year[12];

- the number of retirements during the accounting year[12];

- the number of early retirements during the accounting year[12];

- the number of workers leaving the firm for other reasons (e.g. ITC resignations or FTC terminations) during the accounting year[12];

- the average number of AWs that worked for the company during the accounting year[12];

- the number of hours worked by AWs during the accounting year.

As our data do not provide a detailed breakdown of termination by type of contract, we make the three following assumptions.

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[9] In the social accounts, labour contract terminations are divided into 4 categories: redundancies, retirements, early retirements, and leave for other reasons.

[10] NACE-BEL 65xxx, 66xxx and 67xxx codes cover the financial and the real estate sectors, while NACE-BEL745xx codes cover the sector of temporary agencies.

[11] The decreasing number of sampled firms after 2002 is a simple technical consequence of our fifth selection criteria (the company has to be observed at least for four consecutive years) and is therefore not to be interpreted as any decline in the number of firms in the population.

[12] All employment variables are measured in terms of employees, not in terms of full-time equivalents.

Firstly, we assume that all redundancies, retirements and early retirements only concern ITCs. Secondly, if the total of ITC terminations is larger than the sum of redundancies and retirements, we consider the remaining ITC terminations as resignations. Thirdly, in our breakdown of ITC terminations, we consider that ITC redundancies are the only type of ITC termination that generates adjustment costs.

The use of ITCs and FTCs in our sample is summarised in Table 5[13].

While FTCs represent a relatively small fraction of the total labour force registered at the end of each accounting year (between 6.1 and 4.4%), they represent a large share of the annual flows (between 40.3 and 53.4% of total recruitments and between 40.2 and 50.4% of total terminations) observed in our sample. Moreover, the annual FTC recruitments or terminations are between 2 and 3.4 times larger than the stock of FTCs at the end of the year. This could indicate that firms use FTCs to manage short-term variations in demand.

Table 5 also illustrates that, while FTCs only account for a small share of total employment, their use is relatively widespread. In a given year, between 51.8 and 56.9% of sampled firms are using this type of contract. The use of AWs is even more widespread, as between 58.1 and 63.5% of the sampled firms hire these workers during the observation period.

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[13]   As mentioned above, our selection criteria influence the evolution of the total number of sampled firms each year. Therefore, they also affect the evolution of the total number of sampled ITC and FTC.

Table 5 –The use of ITC and FTC among sampled firms

	1998	1999	2000	2001	2002	2003	2004	2005
Manpower[1]								
ITC	682,910	703,870	756,926	810,425	820,629	788,155	762,616	736,609
In % of manpower	*93.9*	*94.3*	*94.1*	*94.8*	*95.4*	*95.6*	*95.5*	*95.4*
FTC	44,521	42,457	47,806	44,339	39,592	36,554	36,199	35,259
in % of manpower	*6.1*	*5.7*	*5.9*	*5.2*	*4.6*	*4.4*	*4.5*	*4.6*
Labour recruitments (entries)[2]								
ITC recruitments	114,318	124,082	152,458	151,863	125,957	122,347	119,702	103,747
In % of total entries	*52.2*	*54.0*	*57.3*	*59.7*	*54.9*	*50.3*	*50.5*	*46.6*
FTC recruitments	104,519	105,630	113,423	102,404	103,351	121,002	117,475	118,695
In % of total entries	*47.8*	*46.0*	*42.7*	*40.3*	*45.1*	*49.7*	*49.5*	*53.4*
Labour terminations (exits)[2]								
ITC redundancies	30,826	30,036	30,185	39,209	42,428	40,214	34,253	31,058
in % of total exits	*16.0*	*14.5*	*13.2*	*16.4*	*17.9*	*16.4*	*15.2*	*14.1*
Other ITC terminations[3]	70,604	82,602	102,112	103,342	94,314	91,453	83,929	78,040
in % of total exits	*36.7*	*39.9*	*44.5*	*43.3*	*39.9*	*37.7*	*37.1*	*35.4*
FTC terminations	91,140	94,494	97,173	96,018	99,924	113,460	107,745	111,048
in % of total exits	*47.3*	*45.6*	*42.3*	*40.2*	*42.2*	*46.3*	*47.7*	*50.4*
% firms using FTC	53.7	56.9	56.6	54.9	52.8	51.8	51.9	52.2
% firms using temp agency	60.6	61.0	61.9	60.2	58.2	58.1	59.4	63.5
# firms	7,082	7,853	8,640	9,469	9,894	9,273	8,589	7,868

[1] total stock measured at the end of the accounting year.

[2] total flows registered during the accounting year.

[3] i.e. retirements, early retirements and resignations.

It is also worth noting that total FTC terminations are always lower than FTC entries. This could also indicate that firms not only use FTCs as a buffer to absorb variations in demand, but also as a selection device for ITC hiring. Some workers are first hired under an FTC during an evaluation period and their contract is further converted into an ITC if they are selected.

Considering that ITC redundancies only account for around 15% of total employment terminations, Table 5 also indicates that a large fraction of employment contract terminations are cost-free for the firm[14].

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[14] Indeed, retirements, resignations, firings for a cause and FTC terminations do not necessarily generate termination costs. However, if we consider that the firm will have to partly replace these departures, hiring (replacement) costs will then have to be borne.

As documented in other studies (e.g. Davis, Haltiwanger and Schuh, 1996, for the US, Goux, Maurin, Pauchet, 2001, for France, Van der Linden, 1999, Pisu, 2008, and Heuse, Saks, 2009, for Belgium), labour turnover is much higher than the figure reflected by the net employment creation rate. It is therefore important to distinguish between gross and net employment flows in order to understand labour allocation more precisely (Garibaldi, Konings and Pissarides, 1997), as set out in Table 6.

Table 6 – Net and gross labour flows among sampled firms[1]

	1998	1999	2000	2001	2002	2003	2004	2005
ITC recruitments	15.7	16.6	18.9	17.8	14.6	14.8	15.0	13.4
ITC redundancies	4.2	4.0	3.8	4.6	4.9	4.9	4.3	4.0
Other ITC terminations[2]	9.7	11.1	12.7	12.1	11.0	11.1	10.5	10.1
FTC recruitments	14.4	14.2	14.1	12.0	12.1	14.7	14.7	15.4
FTC terminations	12.5	12.7	12.1	11.2	11.6	13.8	13.5	14.4
Net employment creation	*3.6*	*3.0*	*4.5*	*1.8*	*-0.8*	*-0.2*	*1.4*	*0.3*

[1] as a percentage of total employment registered at the end of year.

[2] i.e. retirements, early retirements and resignations.

Table 6 first indicates that ITC recruitments largely consist of replacing ITC terminations. Returning to allocation rate considerations, we also confirm that the net employment creation rate is a poor indicator of labour allocation and of potential access for suppliers to the labour market. Considering, for example, the situation in 2005, a net employment creation of 0.3% corresponds to a 28.8% recruitment rate and a 28.5% termination rate.

3.   The probability of Belgian firms using flexible contracts

As illustrated in section 2 above, 51.8 to 56.9% of our sampled firms use FTCs to manage their labour force in a given year during the period 1998-2005. And an even slightly higher percentage uses AWs. We therefore want to shed some light on factors explaining the decision to introduce both types of flexible contract in the labour force at a microeconometric level.

Following Boockmann and Hagen (2001) and Pfeifer (2007) who analyse the use of FTCs in West Germany, we estimate a random effect probit model that determines the probability of a Belgian firm employing at least one FTC during a given year. However, we extend their analysis by assuming that a firm may decide to introduce FTCs in its labour force not only in response to short-term considerations but also from a long-term perspective. Indeed, hiring workers under an FTC (or some other flexible form) is useful not only in the short run to adjust employment in response to shocks or as a screening device, but also in the long run as a way of implementing cost-saving innovations.

From a long-run point of view, the fact that a firm decides to break down its manpower into a core component of ITC and a peripheral component (Booth, Francesconi and Frank, 2003) has some

consequences in terms of employment organisation. On the one hand, ITCs should be devoted principally to highly qualified jobs with a high content of firm-specific human capital. On the other hand, FTCs should be reserved for less qualified jobs with a lower content of firm-specific human capital, as each individual FTC worker should be easily replaced by another. Therefore, this might imply adjusting the production process to this new form of labour organisation. For instance, the introduction of FTC might imply designing part of the production process so as not to require specific human capital. Such an adaptation of the production process may be considered as a sunk cost of introducing flexible labour into the production process. This implies that, once a firm decides to introduce a flexible component into its labour force, it may decide to do this on a "permanent" basis.

Therefore, it might be reasonable to assume some persistence in the decision to bring FTCs into the production process. In other words, if a firm decides to introduce flexible contracts among its labour force at time t, it will do so afterwards as well. To test such an assumption, we estimate a dynamic probit model of the probability of using FTCs, including one-year lagged FTCs as an explanatory variable.

The probability that firm i uses FTC at year t is specified as:

$$Prob[FTC_{it} = 1] = \Phi\left(\beta_1 + \rho FTC_{i,t-1} + \beta_2 q_{it}^u + \beta_3 sp_i + \beta_4 sw_i + \beta_4 sb_i + Dummies + \beta_5 FTC_{it_0} + u_i\right) \quad (1)$$

where: FTC_{it} equals 1 if firm i uses FTC at year t, 0 if not;

q_{it}^u. is the unexpected demand shock faced by firm i at year t;

sp_i is the average share of part-time employment in firm i's total employment during its observation period;

sw_i is the average share of female employment in firm i's total employment during its observation period;

sb_t is the average share of blue-collar employment in firm i's total employment during its observation period.

We first briefly explain the choice of the other explanatory variables. First, the unexpected demand shocks faced by firm i are computed as the residuals from the estimation of an AR(1) process on the firm's output using the S-GMM estimation procedure developed by Blundell and Bond[15]. Positive (negative) shocks should increase (decrease) the need to use temporary work in the composition of labour.

The average share of blue-collar workers can be considered as a proxy for the share of labour positions that do not require high skills and firm-specific human capital. In the presence of a larger share of blue collars, a firm can put a larger fraction of its labour force under FTC for cost-saving reasons, e.g. in order to avoid wage pressure associated with seniority.

The average share of female employment is not *per se* an explanatory factor of the decision to introduce flexible contracts. However, it might be positively related to the probability of using FTCs for institutional

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[15] We estimated that $q_{it} = 0.82\, q_{it-1}$ + sectoral and yearly dummies, where q_{it} is the log of firm i turnover at year t. The residuals of this estimation are used to proxy q_{it}^u, the unexpected changes in demand at year t.

reasons. Indeed, as many women entered the labour market concomitantly with the relaxing of labour legislation on the use of flexible contracts, they should have been more concerned by FTC hirings.

In terms of labour management behaviour, the average share of part-time employment can be associated with a higher propensity for firms to use atypical work. As such, it should also be accompanied by a higher probability of using FTCs as a complementary way for firms to introduce flexible work in their labour force.

In order to control for any potential correlation between the lagged use of FTCs by firm i, FTC_{it-1}, and the random effect u_i, we follow the estimation strategy described in Wooldridge (2002), assuming that the expected value of u_i is related to the initial use of FTCs. Therefore, our specification includes the initial use of FTCs, FTC_{it0}, as an additional control variable which equals 1 if firm i uses FTCs during its first observation year, 0 if not.

In addition to these explanatory variables, we include 4 firm-size dummies, 5 yearly dummies and 20 sectoral dummies in our specification. The size dummies are based on the average total employment at the firm level. Based on its average employment, a firm is classified in one of the five following size groups: less than 5 employees, between 5 and 19 employees, between 20 and 49 employees, between 50 and 99 employees, at least 100 employees. Our size dummies refer to the last 4 groups. The sectoral dummies are defined at the level of the main branches of the NACE classification.

A second probit model with the same explanatory variables is then also specified to estimate the probability to use AW.

Focusing firstly on the dynamic aspects of our probit models, our estimates presented in Table 7 significantly indicate that once a firm decides to use flexible types of labour, it keeps on doing so for the consecutive periods. This first seems to confirm that companies actually use flexible types of labour from a long-run cost-minimising perspective, considering that part of their production process does not require the use of specific human capital. From an internal labour market point of view, these firms therefore do not engage in long-term relationships with a significant fraction of their employees and choose to permanently assign part of their positions to temporary employees.

Table 7– Dynamic probit equations for Belgian firms to use FTC and AW

Variable	FTC Coeff.	FTC Std. error	FTC Marg. Eff.	AW Coeff.	AW Std.error	AW Marg. Eff.
Constant	-1.930	0.057	-	-1.858	0.060	-
Use of FTC/AW at *t-1*	1.488	0.024	0.541	1.296	0.028	0.453
Unexpected shocks	0.053	0.016	0.021	0.078	0.017	0.027
Avg(%part-time)	0.357	0.084	0.140	-0.454	0.094	-0.156
Avg(%women)	0.230	0.054	0.090	0.192	0.061	0.066
Avg(%blue collar)	0.085	0.044	0.033	**0.007**	**0.042**	**0.002**
Size 1	0.684	0.044	0.237	0.617	0.046	0.239
Size 2	1.060	0.047	0.386	1.035	0.050	0.395
Size 3	1.321	0.053	0.484	1.225	0.056	0.455
Size 4	1.721	0.059	0.610	1.768	0.065	0.583
Year = 2001	-0.081	0.029	-0.031	-0.102	0.030	-0.035
Year = 2002	-0.131	0.029	-0.050	-0.136	0.031	-0.047
Year = 2003	-0.195	0.029	-0.075	-0.168	0.031	-0.058
Year = 2004	-0.192	0.029	-0.074	-0.121	0.031	-0.041
Year = 2005	-0.213	0.030	-0.083	**0.053**	**0.033**	**0.017**
Sector DA	**0.027**	**0.054**	**0.010**	0.445	0.069	0.142
Sector DB	-0.226	0.006	-0.090	**-0.030**	**0.078**	**-0.011**
Sector DC	**-0.048**	**0.357**	**-0.019**	**-0.684**	**0.401**	**-0.266**
Sector DD	-0.202	0.100	-0.080	0.266	0.122	0.090
Sector DE	**0.036**	**0.060**	**0.014**	0.206	0.071	0.071
Sector DF	**0.446**	**0.282**	**0.161**	0.868	0.382	0.235
Sector DG	0.153	0.070	0.059	0.562	0.095	0.172
Sector DH	**-0.061**	**0.075**	**-0.024**	0.603	0.110	0.182
Sector DI	**-0.026**	**0.067**	**-0.010**	0.277	0.083	0.093
Sector DJ	**0.034**	**0.053**	**0.013**	0.381	0.067	0.124
Sector DK	**0.030**	**0.075**	**0.012**	0.277	0.091	0.093
Sector DL	**0.011**	**0.080**	**0.004**	**0.127**	**0.098**	**0.045**
Sector DM	**0.075**	**0.105**	**0.029**	0.354	0.140	0.117
Sector DN	-0.347	0.075	-0.138	**0.031**	**0.088**	**0.011**
Sector E	**0.158**	**0.440**	**0.061**	**0.879**	**0.576**	**0.237**
Sector F	-0.103	0.049	-0.040	-0.225	0.056	-0.085
Sector G	**0.012**	**0.031**	**0.005**	0.099	0.034	0.035
Sector H	0.674	0.147	0.229	**0.238**	**0.131**	**0.081**
Sector I	-0.100	0.041	-0.039	**-0.015**	**0.046**	**-0.005**
Sector K	**-0.011**	**0.039**	**-0.004**	**-0.055**	**0.043**	**-0.020**
Use of FTC/AW at *t0*	0.472	0.025	0.183	0.915	0.033	0.321
σ_u	0.411	0.026	-	0.544	0.027	

In bold, not significant at the 5% level.   Size 1: 5 <= average(manpower) < 20; Size 2 : 20 <= average(manpower) < 50;

Size 3: 50 <= average(manpower) < 100; Size 4 : average(manpower) >= 100.

Explained variable: binary variable that takes value one if firm *i* uses FTC/AW at year *t*.

Sectors are defined in Appendix A.

Obviously, the use of FTCs and AWs is not only determined by long-run considerations. Stigler (1939), quoted by Roux (2007), defines flexibility as a way for a firm to minimise additional costs induced by small

shocks around output optimal level. Shocks and the use of flexibility measures should therefore be positively correlated. Goux, Maurin and Pauchet (2001) or Pucci and Valentin (2005) further explain the use of short-term labour contracts by the uncertainty of firms' economic environment in relation to adjustment costs.

Our results support these arguments. As can also be observed from Table 7, positive (negative) unexpected demand shocks significantly increase (decrease) the probability of using both FTCs and AWs. This indicates that firms tend to react to these unexpected positive demand shocks by introducing flexible forms of labour contract among their labour force. Moreover, the impact of unexpected demand shocks seems to be stronger on the probability of introducing the most flexible form of labour contracts.

Turning to the results related to the impact of the labour force composition, the signs of marginal effects of part-time employment first differ between probabilities of employing FTC workers or AWs. Although the average share of part-time employment positively and significantly influences the probability of using FTC, it negatively and significantly affects the probability of using AW. Based on these estimates, it seems that when a firm decides what kind of flexibility measure to introduce into its production process, it tends to consider FTCs and part-time workers as complements and AWs and part-time workers as substitutes.

Unambiguous results are then estimated with respect to the impact of the share of female employment, which is significantly and positively related to the probability of using both FTCs and AWs. This result appears quite standard from a labour market dualism point of view, where the shares of female employment and of flexible jobs are positively correlated (Dhyne and Mahy, 2002).

Finally, the average share of blue-collar workers positively affects the probabilities of using each type of temporary job, though not significantly as far as AWs are concerned. Cahuc and Zylberberg (2004) stress the fact that *"technological change generally goes along with profound change in the organisation of production".* This change allows firms to improve their profitability through the use of additional labour flexibility practices like FTCs and AWs, and these practices can probably be implemented to a larger extent amongst blue-collar occupations.

Considering the impact of the size of the firm, our results clearly indicate that the larger the firm, the higher the probability of the firm using both types of flexible employment. It consequently seems that small firms, i.e. those with less than 5 employees, prefer to use ITCs instead of either FTCs or AWs. For such small firms, choosing a pattern characterised by a high turnover of the labour force might be too disruptive for their production process. So they would prefer to build long-term relationships with their employees. It also seems reasonable to assume that bigger firms can use technological innovations to specialise tasks and to recruit a lower-skilled FTC or AW labour force in order to minimise their user costs of labour. In the context of French firms, Roux (2007) also observes a positive relationship between the relative use of flexible labour contracts, referring to part-time employment in this case, and the firm size.

It is worth mentioning that our selection criteria, especially the fact that sampled firms are those using full-format annual accounts, might underestimate the weighting of small companies. So our estimate of the share of firms using FTCs probably has to be considered as an upper bound.

Considering results related to year dummies, it is also interesting to note that the probability of using either type of flexible contract declined significantly in most years after 2001, following the downturn in economic activity at the turn of the century. This obviously reflects the fact that firms are not so often confronted with

positive short-term demand shocks during an economic slowdown. This finding also goes against the rather naïve intuition that more and more firms should necessarily have introduced flexible forms of labour among their manpower in time.

Finally, it is quite remarkable that, while the probability of using FTC was still declining in 2005, the probability of using AW was already going up. This may indicate that the latter form of flexible contract is more sensitive to an upturn in the economy.

4.   The dynamics of FTC and ITC adjustment among Belgian firms

In section 3, we estimated and commented on the use of two kinds of flexible contracts, FTC and AW. Given the observed importance of these contracts, we now first investigate how the use of FTCs affects the dynamics of labour adjustment. To our knowledge and considering other previous microeconometric estimations (Konings and Roodhooft, 1997, Dhyne, 2001) based on evidence among Belgian firms, it is the first time that labour demand dynamics have been estimated for the Belgian economy while distinguishing between flexible and non-flexible forms of labour contract. Our approach is therefore original in the sense that it enables the implications of relative use of FTCs on labour adjustment dynamics to be investigated. Our estimates may also be relevant in terms of policy implications, for example to estimate whether relaxing ITC/FTC regulation significantly improves employment adjustment.

Secondly, we also want to get a better understanding of the structure of labour adjustment costs associated with FTCs and ITCs. Following Goux, Maurin, Pauchet (2001), we make use of the statistical information on gross employment flows by type of contract provided in the social accounts to estimate the degree of asymmetry between recruitment and contract termination costs for ITC and FTC separately.

4.1.   The use of FTC and the dynamics of labour adjustment

Assuming quadratic and symmetric labour adjustment costs, we first consider the following simple dynamic labour demand equation proposed by Nickell (1986):

$$l_{it} = \beta_1 + \beta_2 l_{it-1} + \beta_3 q_{it} + \beta_4 w_{it} + Dummies + u_i + \varepsilon_{it} \tag{2}$$

where: l_{it} represents the log of employment level of firm i at year t;

q_{it} represents the log of output, measured by the real turnover, of firm i at year t;

w_{it} represents the log of average real wage of firm i at year t.

We then allow for labour demand to react differently to output, q_{it}, depending on whether the output change is expected, q^e_{it}, or not, q^u_{it}. As in section 3, q^u_{it} is computed as the residual of the regression of a simple AR(1) model on firms' output[16], while q^e_{it} is the fitted value of that regression. The equation to be estimated is therefore the following:

$$l_{it} = \beta_1 + \beta_2 l_{it-1} + \beta_{31}q^e_{it} + \beta_{32}q^u_{it} + \beta_4 w_{it} + Dummies + u_i + \varepsilon_{it} \qquad (2')$$

The wage variable included in this equation, w_{it}, is the log of average real wage per employee. Therefore, its computation does not take into consideration the type of contract used. As we do not observe the wage bill breakdown between FTCs and ITCs, we cannot evaluate the average wage per ITC and FTC separately. Therefore, we assume that the ratio of the average wage for an FTC over the average wage of an ITC is constant over time, which implies that these two average wages are proportional to the average wage per employee. Considering the information provided by the Structure of Earnings Surveys conducted in 1995 and 2002, this assumption seems to be quite reasonable as FTC average wages were just 80.9% of ITC average wages in 1995 and 81.1% in 2002.

Yearly and sectoral dummies are included in the equation in order to capture sectoral discrepancies in the degree of labour intensity or sectoral wage differentials and aggregate cyclical pattern.

Using an appropriate GMM estimation technique[17], our strategy is to estimate this equation on (i) a first sub-sample of firms that employ staff under both FTCs and ITCs in each year *t* and (ii) a second sub-sample of firms that only employ workers under ITCs. Using the first sub-sample, we estimate equation (2') considering the evolution of FTC and ITC separately. The results are presented in Table 8.

If we first consider the results associated with ITC workers, our estimates of their degree of persistence are relatively close to what Konings and Roodhooft (1997) and Dhyne (2001) obtained for total employment using Belgian accounting data. More precisely, they are estimated to be 0.765 and 0.769 in the two sub-samples, while the degree of persistence of total employment was estimated to lie between 0.60 and 0.71 in Konings and Roodhooft (1997) and to be close to 0.80 in Dhyne (2001). It is worth noting that the degree of ITC rigidity does not seem to be different between firms that employ ITC workers only and firms employing both FTC and ITC workers. So the introduction of FTCs does not seem to affect the speed of ITC adjustment.

As expected, the speed of FTC adjustment is much faster than that for ITCs. Based on our estimates, the median adjustment lag of ITC workers fluctuates between 2.59 to 2.64 years, while it takes only 0.79 year for FTC to perform the same 50% of the required adjustment. These results strengthen those obtained in section 3 and clearly show that FTC are used as an adjustment buffer by individual firms.

Considering the estimated impact of the determinants of labour demand, it is worth analysing the impact of wages on both ITC and FTC employment. Like Konings and Roodhooft (1997), our estimates of long-run employment elasticity to wages are quite important in the three equations, especially for FTC workers. This is also the case for their labour demand short-term elasticity to the average real wage, which is above one.

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[16] See section 3 and footnote 16 for details.

[17] i.e. the S-GMM estimation procedure developed by Blundell and Bond with the Windmeijer correction of the standard errors. The estimation is conducted using the DPD module developed for Ox.

This short-term elasticity is between around six and ten times higher than that estimated for ITC in the different sub-samples. It therefore seems that, once a firm is confronted to an excessive increase in its wage bill, it rather decides to lay off its temporary workers even if their average wage is lower than the average wage under an ITC. In addition, and comparing our (though not significant) estimates between the two samples, we find that ITCs seem to be nearly twice as protected against wage fluctuations when FTCs are brought into the firm. Similar results have also been estimated for Spain by Benito and Hernando (2008).

Table 8 – S-GMM estimation of Belgian firms' dynamic labour demand equations

	Sample of firms that employ both FTC and ITC		Sample of firms that employ only ITC
	$Log(ITC)_t$	$Log(FTC)_t$	$Log(ITC)_t$
Constant	**-0.546** **(1.207**)	9.968 (4.692)	**0.345** **(1.590)**
$Log(explained\ var.)_{t-1}$	0.765 (0.132)	0.417 (0.032)	0.769 (0.096)
Expected output	0.219 (0.063)	**0.190** **(0.189)**	0.200 (0.074)
Unexpected shocks	0.241 (0.051)	0.244 (0.123)	0.177 (0.062)
$Log(wages)_t$	**-0.181** **(0.242)**	-1.874 (0.744)	**-0.323** **(0.213)**
# of firms	2766	2766	496
Sargan test (p-value)	**28.48 (0.996)**	**20.07 (1.000)**	**29.75(0.992)**
d.f. for Sargan test	51	51	51
AR(1) test	-5.524	-14.58	-4.780
AR(2) test	**0.298**	**-0.164**	**1.614**

+ Yearly + Sectoral dummies
Instruments: Unexpected shocks: strictly exogenous variable
                 equations in differences: all variables lagged 2 and 3 years;
                 equations in levels: all variables in first differences lagged 1 year.
In bold, not significant at the 5% level. Standard errors in brackets.

Turning finally to labour demand elasticity with respect to output, our results first indicate that the short-term response of ITC to expected changes does not depend on whether firms use either only ITC or both types of contract. Considering the response of FTC workers, our results indicate that it is not significantly affected by anticipated changes in output but much more so by unexpected changes. These findings tend to indicate that the FTC is an important component of firms' adjustment to both cost and unexpected demand shocks. On the contrary, expected shifts in output are also addressed by permanent changes in the labour force through ITC adjustments.

4.2. The structure of adjustment costs by type of contract

In section 4.1, we reported on the fact that labour dynamics differ significantly by type of contract, the adjustment being faster among FTC than ITC. At least one - and probably the most important - reason for such a fast adjustment concerns relative adjustment costs associated with both types of contract, and more precisely relative differences in either recruitment or contract termination costs.

In this sense, estimating adjustment costs and the potential asymmetry between recruitment costs and contract termination costs is instructive as they condition the labour dynamics adjustment process at the firm level (Cahuc and Zylberberg, 2004) and dictate how fast firms can adjust to shocks. In terms of policy implications, it also gives additional insight as to how to define targeted measures in order to favour the employment adjustment process towards its optimal level. And estimating adjustment costs by type of contract enables these policies to be made even clearer.

So, the purpose of this section is first to investigate the structure of adjustment costs by type of contract. Existing evidence on the structure of Belgian adjustment costs suggests that recruitment costs are significantly lower than termination costs (Dhyne, 2001). However, these estimates do not provide a measure of the relative importance of these two kinds of adjustment costs.

In order to estimate both types of adjustment costs, we follow the methodology proposed by Goux, Maurin and Pauchet (2001), who developed a model of labour adjustments concerning ITC and FTC. In this model, firms can either hire workers directly under an ITC or under an FTC that is then converted into an ITC at the end of the year.

More precisely, they assume that firm i transforms l_{it} units of labour into y_{it} units of goods by the following production function:

$$y_{it} = f\left(l_{it};\varepsilon_{it}\right)$$ (3)

where: ε_{it} is a productivity shock which is observed at the beginning of period t.

Observing their productivity shocks, firms have to decide at the beginning of the year if they either increase (by recruiting h_{it} workers) or reduce (by making f_{it} redundancies) the number of their ITCs, given that q_{it} workers are voluntarily quitting the firm (for another company or for retirement). They also have to decide how many FTCs (s_{it}) they want to hire.

At the end of period t, the firm then has to decide how many FTCs it wants to keep in its manpower by transforming them into ITCs (t_{it}). The r_{it} remaining FTCs are terminated.

So x_{it}, the number of ITCs at the end of year t working for firm i, is given by:

$$x_{it} = x_{i;t-1} + h_{it} + t_{it} - f_{it} - q_{it} \,.$$ (4)

and l_{it}, the units of labour used during year t, becomes:

$$l_{it} = x_{it} + r_{it} \,.$$ (5)

The firm's optimisation programme is the following:

$$\text{Max } E_t \left\{ \sum_{\tau=0}^{\infty} \delta^{\tau} \left[F\left(l_{i,t+\tau}; \varepsilon_{i;t+\tau}\right) - w_{i,t+\tau}^I \left(x_{i,t+\tau} - t_{i,t+\tau}\right) - w_{i,t+\tau}^F s_{it} - C_H\left(h_{i,t+\tau}\right) - C_F\left(f_{i,t+\tau}\right) - C_S\left(s_{i,t+\tau}\right) - C_R\left(r_{i,t+\tau}\right) \right] \right\}$$

$$\text{subject to} \quad h_{i,t+\tau} \geq 0 \; ; \; f_{i,t+\tau} \geq 0 \; ; \; r_{i,t+\tau} \geq 0 \; ; \; t_{i,t+\tau} \geq 0$$

$$s_{i,t+\tau} = r_{i,t+\tau} + t_{i,t+\tau}$$

$$x_{i,t+\tau} = x_{i,t+\tau-1} + h_{i,t+\tau} + t_{i,t+\tau} - f_{i,t+\tau} - q_{i,t+\tau}$$

$$l_{i,t+\tau} = x_{i,t+\tau} + r_{i,t+\tau}$$

$$C_H\left(h_{i,t+\tau}\right) = \frac{1}{2} c_H h_{i,t+\tau}^2 \; ; \; C_F\left(f_{i,t+\tau}\right) = \frac{1}{2} c_F f_{i,t+\tau}^2 \; ; \; C_S\left(s_{i,t+\tau}\right) = \frac{1}{2} c_S s_{i,t+\tau}^2 \; ;$$

$$C_R\left(r_{i,t+\tau}\right) = \frac{1}{2} c_R r_{i,t+\tau}^2$$

where w_{it}^I and w_{it}^F represent respectively the average ITC and FTC wage paid by firm i in year t. $C_H(.)$ and $C_S(.)$ are quadratic recruitment cost functions respectively for ITC and FTC, while $C_F(.)$ and $C_R(.)$ are the respective quadratic termination cost functions. Voluntary quits do not generate adjustment costs. δ represents the real discount factor.

At the optimum level, a firm should be indifferent to marginally adjusting its ITC labour force in year t (by recruiting or by terminating an additional ITC) or proceeding to this adjustment in the next year. This first of all implies that the marginal return to one additional ITC in year t should be equal to the discounted expected marginal cost of this adjustment in the next year:

$$E_t \left\{ \frac{\partial F\left(l_{it}; \varepsilon_{it}\right)}{\partial l} - w_{it}^I - \left[C_H'\left(h_{it}\right) - C_F'\left(f_{it}\right) \right] + \delta \left[C_H'\left(h_{i,t+1}\right) - C_F'\left(f_{i,t+1}\right) \right] \right\} = 0 \tag{6}$$

At the optimum, the marginal benefit of directly hiring an ITC worker should also be equal to the benefit associated with the addition of one ITC through the transformation of an FTC. Assuming that a positive number of FTCs are transformed into ITCs, the following relation must therefore also hold:

$$\frac{\partial F\left(l_{it}; \varepsilon_{it}\right)}{\partial l} - w_{it}^I - \left[C_H'\left(h_{it}\right) - C_F'\left(f_{it}\right) \right] = \left[\frac{\partial F\left(l_{it}; \varepsilon_{it}\right)}{\partial l} - w_{it}^F - C_S'\left(s_{it}\right) \right]$$
$$+ \frac{r_{it}}{t_{it}} \left[\frac{\partial F\left(l_{it}; \varepsilon_{it}\right)}{\partial l} - w_{it}^F - C_S'\left(s_{it}\right) - C_R'\left(r_{it}\right) \right] \tag{7}$$

The second expression in brackets on the right-hand side of equation (7) captures the fact that, in order to select one ITC through the transformation of one FTC, a firm not only has to hire this worker under an FTC (the first expression in brackets on the right-hand side) but it also has to recruit and reject r_{it}/t_{it} additional FTC workers in order to find the appropriate candidate for its ITC position.

By multiplying (6) by r_{it} and (7) by t_{it} and combining the two equations, Goux, Maurin and Pauchet (2001) derive the following equation that describes the dynamics of both ITC and FTC workers, assuming that w_{it}^I and w_{it}^F are proportional to the average wage w_{it}:

$$E_t \left\{ \left(\tilde{h}_{it} - \tilde{f}_{it}\right) - \frac{c_F - c_H}{c_F + c_H} \left(\tilde{h}_{it} + \tilde{f}_{it}\right) - 2 \frac{c_S}{c_F + c_H} s_{it}^2 - 2 \frac{c_R}{c_F + c_H} r_{it}^2 - \phi w_{it} s_{it} \right\} = 0 \tag{8}$$

or
$$\left(\widetilde{h}_{it} - \widetilde{f}_{it}\right) = \frac{c_F - c_H}{c_F + c_H}\left(\widetilde{h}_{it} + \widetilde{f}_{it}\right) + 2\frac{c_S}{c_F + c_H}s_{it}^2 + 2\frac{c_R}{c_F + c_H}r_{it}^2 + \phi w_{it}s_{it} + v_{it} \qquad (9)$$

with $\quad \widetilde{h}_{it} = s_{it}h_{it} - \delta r_{it}h_{i,t+1}\quad$ and $\quad \widetilde{f}_{it} = s_{it}f_{it} - \delta r_{it}f_{i,t+1}\qquad$ and $v_{it} \sim N(0, \sigma_v)$

Using (9), one can recover the structure of the adjustment costs by regressing a measure of "net" flows $\left(\widetilde{h}_{it} - \widetilde{f}_{it}\right)$ on a measure of "gross" flows $\left(\widetilde{h}_{it} + \widetilde{f}_{it}\right)$, squared values of FTC recruitments and FTC terminations, s_{it}^2 and r_{it}^2, and a measure of weighted labour costs, $w_{it}s_{it}$.

A positive coefficient associated with the "gross" flows $\left(\widetilde{h}_{it} + \widetilde{f}_{it}\right)$ means that ITC marginal termination costs, c_F, are larger than ITC marginal recruitment costs, c_H, while the reverse is true if the coefficient is negative. This coefficient also enables the relative importance of ITC marginal recruitment and termination costs to be estimated. Indeed, it can be shown that $c_F = \frac{\left(1 + \hat{c}_1\right)}{\left(1 - \hat{c}_1\right)}c_H$ where $\hat{c}_1$ is the estimated value of the coefficient associated with the "gross" flows. Similarly, it can be shown that $c_s = \frac{\hat{c}_2}{\left(1 - \hat{c}_1\right)}c_H = \frac{\hat{c}_2}{\left(1 + \hat{c}_1\right)}c_F$ with $\hat{c}_2$ is the estimated value of the coefficient associated with s_{it}^2.

The coefficients associated with the squared FTC recruitments and terminations also enable testing for the significance of FTC marginal adjustment costs, respectively c_S and c_R. However, compared to Goux, Maurin and Pauchet (2001), we assume in this paper that there is no marginal termination cost associated with FTCs and so we set c_R at 0[18].

The restricted equation is estimated by S-GMM using a sub-sample from our main sample. In this sub-sample, firms must hire a positive number of FTCs each year and transform a positive number of them into ITCs each year. The number of transformed FTCs is by assumption equal to the difference between FTC recruitments and FTC terminations in a given year. Estimation results considering a real discount rate δ equal to 0.9 are presented in Table 9[19].

The economic interpretations of our results, in terms of the relative importance of adjustment costs for FTC and ITC and in terms of the structure of those adjustment costs, are the following.

Firstly, these results indicate that the marginal recruitment cost associated with FTCs is not statistically significant. Nevertheless, this coefficient is positive, which is coherent with its economic interpretation. It seems therefore that the adjustment of FTC workers does not generate important adjustment costs. Based on the estimates, the marginal recruitment cost of FTCs only represents 0.1% of the marginal ITC termination cost and 0.9% of the marginal ITC recruitment cost. Considering that the average firm hires 14.7 ITC and 12.9 FTC workers during the observation period, these results also imply that the average recruitment cost of one FTC is only 0.8% of the average recruitment cost of one ITC.

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[18] Unrestricted estimations of equation (9) lead to multicolinearity problems among the regressors, as the squared values of FTC recruitments and FTC terminations are highly correlated.

[19] As in Goux, Maurin and Pauchet (2001), changing the value of the real discount rate does not affect our estimation results.

Secondly, the coefficient associated with the "gross flows" variable is not only significantly positive but also significantly smaller than one. This indicates that the ITC marginal recruitment cost is significantly positive and smaller than the ITC marginal termination cost. Based on our estimates, the recruitment cost of one additional ITC should only represent 12.4% of the cost of one additional ITC termination. Considering that we observe on average 4.1 ITC redundancies for 14.7 ITC recruitments in the sample, the average cost of recruiting one ITC is 45.1% of the average cost of one ITC redundancy.

So, compared to Goux, Maurin and Pauchet (2001) who estimate that marginal recruitment costs only represent 2.5% of termination marginal costs in France, our results estimate a lower degree of asymmetry between adjustment costs. Considering the strictness of legislation against ITC dismissals in France and Belgium (OECD, 2004), this could be interpreted as the result of lower termination costs in Belgium.

Finally, the coefficient associated with the "wage" variable is negative but not significant. It indicates that the average FTC wage might be lower than the average ITC wage, as to be expected considering the higher human capital that should be encountered among ITC workers.

Table 9 - Estimated adjustment costs by type of contract

Variables	Estimated coefficient
$\left(\widetilde{h}_{it} + \widetilde{f}_{it}\right)$	0.780 (0.012)
$s_{it}{}^2$	**0.002** (0.003)
$w_{it}s_{it}$	**-0.001** (0.002)
# of firms	159
Sargan test (p-value)	**24.81** (0.962)
d.f. for Sargan test	39
AR(1)	**-1.694**
AR(2)	**-0.4060**

+ Yearly dummies

Instruments: equations in differences: growth rate of annual turnover and average wage lagged at least 2 years.

equations in levels: growth rate of annual turnover and average wage in first differences lagged 1 year.

In bold, not significant at the 5% level. Standard errors in brackets.

5. Conclusion

The purpose of this paper was to analyse the differences in the dynamics of labour adjustment, after consideration of the type of labour contract. We also aimed at investigating the structure of labour adjustment costs, using the methodology proposed by Goux, Maurin and Pauchet (2001).

Drawing on the detailed description of the composition of both the labour force and the labour entries and exits at the firm level available in the social balance sheets over the 1998-2005 period, we first analysed the factors influencing the use of flexible labour contracts by Belgian firms.

The statistical evidence presented in sections 2 and 3 indicates that the use of flexible contracts seems to achieve three different objectives.

Firstly, FTCs/AWs are typically used by firms to respond to (unexpected) short-term shocks.

Secondly, FTCs are also used as a selection device by Belgian firms. The fact that the number of FTC recruitments was always greater than the number of FTC terminations during our observation period seems to indicate that some FTCs are indeed converted into ITCs.

Thirdly, our estimation results also indicate that FTCs/AWs are not only used to absorb short-term fluctuations but are also designed to form a structural component of the labour force. Our dynamic probit estimations do actually seem to suggest that when a firm decides to introduce flexible components into its labour force, it does so from a long-term perspective. Based on long-term cost-minimising arguments, firms seem to structurally assign part of their employment positions to temporary workers. This is particularly true if the production process can be designed in a way that does not require the use of firm-specific skills.

In terms of labour dynamics, our results confirm that FTC adjustment is faster than ITC adjustment. Our findings also indicate that FTCs are not only more rapidly adjusted but are also more affected by changes in labour costs. As in Konings and Roodhooft (1997) or Dhyne (2001), we find that long-run estimates of the labour demand elasticity with respect to wages are high. This is particularly true for demand for FTC workers. As far as firm behaviour is concerned, our results tend to indicate that the FTC is a key adjustment variable in response to cost shocks and to unexpected demand fluctuations. On the contrary, in response to expected fluctuations in output, firms tend to adjust their permanent employment level.

In terms of the structure of labour adjustment costs, our results tend to suggest that they are less asymmetric in Belgium than in France. While Goux *et al.* (2001) estimate that the marginal recruitment cost of ITC workers is only 2.5% of the marginal termination cost of ITC workers in France, we find that the figure is12.4% in the Belgian case. Considering that, on average, 14.1 ITC recruits are observed for 4.1 ITC redundancies, the average cost of recruiting one ITC still represents 45.1% of the average cost of one ITC redundancy. Finally, we estimate that the average recruitment cost of one FTC is only 0.8% of the average recruitment cost of one ITC.

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Appendix – Nomenclature of sectoral dummies

Sector DA: Manufacture of food products; beverages and tobacco
Sector DB: Manufacture of textiles and textile products
Sector DC: Manufacture of leather and leather products
Sector DD: Manufacture of wood and wood products
Sector DE: Manufacture of pulp, paper and paper products; publishing and printing
Sector DF: Manufacture of coke, refined petroleum products and nuclear fuel
Sector DG: Manufacture of chemicals, chemical products and man-made fibres
Sector DH: Manufacture of rubber and plastic products
Sector DI: Manufacture of other non-metallic mineral products
Sector DJ: Manufacture of basic metals and fabricated metal products
Sector DK: Manufacture of machinery and equipment not elsewhere classified
Sector DL: Manufacture of electrical and optical equipment
Sector DM: Manufacture of transport equipment
Sector DN: Manufacturing not elsewhere classified
Sector E: Electricity, gas and water supply
Sector F: Construction
Sector G: Wholesale and retail trade; repair of motor vehicles, motorcycles, and personal and household goods
Sector H: Hotels and restaurants
Sector I: Transport, storage and communication
Sector K: Real estate, renting and business activities

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