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PARIS SCHOOL OF ECONOMICS  
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WHY WAS SHORT-TIME WORK UNATTRACTIVE  
DURING THE CRISIS ?

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PARIS SCHOOL OF ECONOMICS  
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# Abstract

In many OECD countries, the sharp increase in unemployment rates during the crisis has stimulated the implementation of various labor market policies, with the purpose of reducing layoffs. Among these LMPs, short-time work schemes have held a prominent place. Several economists underlined the contribution of the *Kurzarbeit*<sup>1</sup> to the German “job miracle”. However, short-time work take-up rates remained quite low in most countries, including France.

This master thesis is the first one to examine the (under-)use of short-time work arrangements in France during the crisis. Given the absence of theoretical literature on the topic, we develop a basic illustrative model to present our main predictions. We then combine several extensive and original databases to draw up a detailed picture of short-time work establishments in France and highlight the main determinants of the propensity to use the scheme.

Our empirical estimations provide three key findings. First, the vast majority of French establishments adjusted to the crisis through a reduction of temporary and short-term contracts. Short-time work establishments, which mainly employed permanent workers and therefore could not adjust easily on their extensive margin, were therefore the exception rather than the rule on a quite flexible French labor market.

Second, when studying a small sample extracted from the REPOSE survey, we find that short-time work establishments seem to share some characteristics with typical German establishments. For example, they are more often export-oriented and more used to negotiate with their employees’ representatives than non-STW establishments. Consequently, the

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<sup>1</sup> The German short-time work scheme is called *Kurzarbeit*.

success of short-time work in Germany is probably highly country-specific and might not be directly reproducible in France.

Finally, we use a reform implemented in January 2009 - a differentiated increase in the state compensation level according to establishments' size - to investigate the impact of the generosity of the scheme. The results suggest that the reform increased slightly the propensity to use short-time work for the establishments which benefited from higher levels of state compensation. Further research is nevertheless needed to refine these estimates.

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## Introduction

With the economic crisis, short-time work<sup>1</sup> has grown in popularity. The Global Jobs Pact, adopted by the International Labor Organization’s tripartite constituents in June 2009, as well as the Spring edition of the 2010 IMF World Economic Outlook jointly promoted the use of short-time work schemes as a prime labor policy instrument to mitigate the negative consequences of the crisis. Many OECD countries did adopt short-time work schemes or extended the scope of existing ones (Hijzen and Venn (2011)).

The popularity of this scheme was backed up by the German example: the federal work-sharing program (Kurzarbeit) was presented as a leading driver of the German “job miracle”. Many economists praised its effectiveness in preserving jobs. In one of his influential Op-Ed columns (*New-York Times*, November 2009), Paul Krugman claimed that if Germany “got through the recession with remarkably few job losses”, this was partly attributable to the use of short-time work schemes. In France, the government presented STW<sup>2</sup> as a key instrument

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<sup>1</sup> Short-time work (STW) is defined in a 2010 European Commission report on short-time work (Arpaia et al. (2010)) as a *temporary* reduction in employees’ activity below the legal working time in order to maintain an existing employer/employee relationship. Employees receive a compensation for their wage loss that is partly paid by the State and partly by their employer.

<sup>2</sup> STW stands for short-time work, also called short-time working arrangements, short-time work schemes or short-time compensation in the literature

to contain a raising unemployment rate. It also reaffirmed its willingness to push further the reforms, in order to make short-time work more attractive.

In view of this massive plebiscite, it is striking to see how little short-time working arrangements have been studied in the economic literature. In the eighties and nineties, a few theoretical papers provided arguments in favor of short-time work in order to avoid “excessive” job losses (Hall and Lazear (1984) and Hall (1995)<sup>3</sup>). In a notable paper, Abraham and Houseman (1994) demonstrate that short-time work increased the internal flexibility in European countries where job regulations were stringent during the 1973-1990 period. Apart from these two important papers, short-time work schemes did not receive researchers’ attention.

More recently, some empirical papers have tried to estimate the jobs impact of short-time work during the crisis, by running cross countries analysis (Arpai et al. 2010; Hijzen and Venn 2010; Boeri and Bruecker 2011; Cahuc and Carcillo 2011). They converged to the conclusion that STW schemes had a positive impact on jobs preservation during the economic downturn<sup>4</sup>.

However, an important question has been left out so far: why has short-time work been used so little, in spite of its positive macroeconomics effects?

In all Member States of the European Union,<sup>5</sup> the share of employees who took part in STW was below 3% during the crisis.<sup>6</sup> In France, short-time work arrangements did not attract more than 5% of the establishments at the peak of the crisis, even though the government tried actively to foster their use.

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<sup>3</sup> The authors argue that, in presence of production technologies allowing for some substitutability in the labor input between the number of employees and the number of hours worked per employee, temporary shocks or recessions lead to “excessive” job losses

<sup>4</sup> Even though we observe a great heterogeneity across countries

<sup>5</sup> With the exception of Belgium where the share of employees who took part in STWA was around 5%

<sup>6</sup> Figures extracted from the OECD employment outlook 2009 [20]

Whereas researchers have generally focused on the macroeconomics effects of short-time work arrangements, we argue that highlighting the main determinants of STW take-up rates and understanding how STW interacts with other labor flexibility instruments is the first step toward improving its design and its targeting. It is also a way of partly addressing the following question: can the success of the German STW be directly replicated in France?

The goal of this paper is not to discuss the effectiveness of short-time work in France. We do not pretend either to establish an exhaustive list of the causal determinants of establishments' management decisions during the crisis. In a more modest way, the purpose and scope of this paper is to draw up a multidimensional description of the establishments that used short-time work.

This descriptive work is original in several respects. First, we provide information about the use of short-time work in France *during the crisis*, which has never been done before. We combine a large number of datasets to provide an extensive analysis of the potential determinants of STW take-up rates. We take into account the interactions between short-time work and other labor flexibility tools (short-term contracts, temporary contracts, working time accounts). We also consider the role of establishments' internal organization and employers' expectations in affecting their propensity to use short-time work. There is no specific emphasis on these factors in the previous literature, whereas they do affect STW take-up rates in a significant way.

Second, we evaluate the impact of the state compensation level - an important factor of the generosity of STW schemes - on the propensity to use short-time work arrangements. So far, the governmental reforms have focused on the level of the "specific allocation". This compensation was raised in January 2009 for the first time, and was increased again in February 2012. Up until now, though, the effectiveness of such reform has not been evaluated.

Our work is structured in two main parts. In the first chapters, we provide an overview of the literature jointly with a brief description of the STW regulation in France (chapter 2). We propose an illustrative theoretical model to highlight our predictions about the main determinants of STW use (chapter 3). We also present a range of descriptive statistics to identify the most obvious determinants of the use of STW (chapter 4).

In a second part, we isolate three types of factors that could explain the lack of attractiveness of STW in France.

First, we examine the interaction between STW and more common flexibility tools, such as temporary contracts and short-term contracts to test what we call the “institutional hypothesis” (chapter 5). Then, we argue that the internal organization of the establishments and their expectations regarding the economic recovery have been two key determinants of the use of STW, as they were in Germany (chapter 6). In this part, we also analyze the potential effect of the adoption of the 35 hours week on the propensity to use short-time work. We claim that the internal flexibility provided by the 35 hours week might have played the same role as the “working time accounts” in Germany, reducing the need for short-time work.

Finally, we focus on the specific design of the French STW scheme. We discuss the possibility to foster the use of STW through an increase in the “specific allocation” - a compensation paid by the State to STW establishments. Using a difference-in-difference approach, we estimate the impact of the 2009 reform (chapter 7).



## An overview of the literature and a short description of the French regulation

The economic literature on short-time work arrangements has been limited so far. We briefly present some macroeconomic papers which constitute the major part of the existing literature. We then focus on microeconomic papers that describe STW establishments before and throughout the crisis. We finally discuss our contribution to this literature.

A description of the regulation of the French STW scheme follows this literature review.

### 2.1 Literature Review

*Macroeconomic studies on short-time work, from the nineties to the current crisis*

The earliest studies dedicated to STW in the nineties rely on cross-country comparisons to explore the consequences of short-time work schemes. **In these seminal works, short-time work schemes were put forward to challenge the widespread opposition between the flexibility of the U.S labor market and the rigidity of the European ones.**

In a landmark paper, Abraham and Houseman (1994) argue that work-sharing in Belgium, Germany and France made strong employment protection compatible with labor market flexibility in the nineties. Using quarterly time series data for these three countries and for the United-States, they show that the adjustment of total hours worked to changes in output is similar in all these countries. However, the channels of adjustment are different: European countries reduce weekly hours worked whereas the United-States primarily reduce the level of employment. According to the authors, this difference may be attributed to these countries' labor market institutions. In Europe, the existence of STW programs provided some internal flexibility to make up for the lack of external flexibility (high firing costs).

A similar study carried out by Van Auerode (1994) analyzes the adjustment of hours and employment in 10 OECD countries over the period 1969-1988. Van Auerode claims that the generosity of the STW system<sup>1</sup> determines its effectiveness. In countries with generous STW scheme, the speed of adjustment of total hours worked is even higher than in the US over the period studied. On the other hand, in countries with less generous short-time compensation programs, hours adjustment cannot compensate the slower employment adjustment.

While STW has been very little studied during the 2000's, **the strong increase in short-time work take-up rates during the great recession has spawned renewed interest in this topic. Several macroeconomics papers evaluate the impact of STW on employment during the crisis.**

Hijzen and Venn (2010) investigate the effectiveness of STW schemes in preserving jobs during the crisis, using quarterly data for 19 OECD countries and four industries, over the period 2003-2009. They benchmark the cross-country comparison during the crisis to the period that preceded it to account for the employment and hours regulations that affect labour-demand adjustment regardless of the crisis. They also control for the extent of

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<sup>1</sup> The generosity of the STW system as compared with the generosity of the traditional unemployment insurance system

short-time compensation programs in each country. Interestingly, they distinguish between permanent and temporary workers. They find that STW had a important and significant impact on preserving permanent jobs, with estimates indicating that 0.7% to 0.8% of jobs were saved in Germany and Japan. On the other hand, they conclude that STW had no impact on the employment of temporary workers.

The results of Hijzen and Venn (2010) are confirmed in Arpai et al. (2010). This paper is based on data from 27 European countries over the period 1991Q2- 2009Q3. The authors evaluate the impact of STW on the annualized change in employment in the manufacturing sector, using an interaction term between a dummy signalling countries with short-time compensation programs and another dummy standing for the 2008-2009 recession. They also include country fixed effects. They conclude that STW schemes have been effective in reducing the variability of employment during the global recession.

A more recent paper by Cahuc and Carcillo (2011) uses the OECD (2010) quarterly database on short-time work take-up rates (updated for 25 countries). They instrument short-time work take up rates with a set of parameters that describe the features of short-time work programs before the entry into recession in these 25 countries (generosity of the compensation, maximum duration, eligibility criteria...etc). Thus, their identification assumption is that STW take-up rates is correlated to this range of parameters. This IV method increases both the magnitude and the significance of the coefficients they get, which reflects a potential endogeneity bias in standard OLS regressions. As in Hijzen and Venn (2010), the authors conclude that short-time work programs have been successful in preserving jobs and keeping unemployment down for permanent workers, whereas the results are not significant for temporary workers.

These papers offer the advantage of directly estimating the potential benefits of the use of STW at a macroeconomic level. A cost-benefit analysis of such a scheme is essential given the amount of public spending spent on this policy. However, short time work schemes' design

and efficiency vary a lot across countries. Some countries like Germany and France share similar STW schemes but display highly different STW take-up rates. The macro estimates we get when we apply the same coefficients to all these countries - according to the features of their STW scheme - are therefore imprecise. This disparity calls for a micro-economic analysis.

*Micro studies: description of STW establishments and estimation of the impact of STW on economic layoffs*

**Another approach is to focus on a specific country and use firm-level data to estimate the impact of STW on layoffs and firm survival or to describe the specific profile of the firms that use STW.**

Again, the interest for the topic is not new. An interesting paper was published by Juan M. Mesa (1984) in the *International Labor Review*. To our knowledge, this paper is one of the few papers that directly deal with the determinants of the use of STW. The author tries to understand *why* employers find STW attractive, based on the results of two specific STW programs in Canada and California. He considers a large number of factors that could determine the use of STW. He mainly discusses three hypotheses: (1) STW is likely to “reduce costs of rehiring and training new workers when business picks up” (2) STW has a positive effect on employees’ morale whereas “the disruption caused by layoffs will probably generate significant costs in terms of productivity” (3) STW might be costly in terms of increase wage bill, fringe benefits and costs of personnel administration and supervision. Based on qualitative data collected from various interviews with managers, workers and government representatives who are affected by STW programs, the author evaluates the relevance of these three hypotheses.

From a management point of view, he finds that productivity differential (hypothesis 2) does not determine the use of STW. On the other hand, savings on rehiring and training costs appear to be the main justification for STW. Establishments that face higher difficulties

in recruiting new workers and incur higher training costs are more likely to use STW. Since firms face heterogeneous costs of recruiting and training, this paper confirms that STW is beneficial for a specific type of firm : describing these firms more precisely is the main objective of our paper.

Some recent microeconomics papers have already described STW establishments and highlighted some of their characteristics. **But most of these papers are exclusively based on German data - drawn from the IAB establishment panel.**

Using the 2003 wave of the survey, Deeke (2005) provides descriptive evidence that firms which apply short-time work schemes tend to rely less on flexible work contracts such as temporary and part-time contracts. They also display less employment volatility.

Crimann et al. (2010) confirm these results, based on the 2003 and 2009 waves. They find that the propensity to use STW is negatively correlated to the use of temporary contracts. They also exhibit a positive correlation between establishment's size and their propensity to use STW. More importantly, they point out that export-orientation increases the probability of using STW.

Boeri and Bruecker (2011) find similar results, based on the 2008 and 2009 waves. They also present a few additional results. They observe that a large share of firms under STW have a worker council in place and that a slightly higher share of these firms are led by professional management compared to the sample average. Moreover, STW establishments are over-represented among firms reporting a turnover decline in 2008. These findings suggest that German firms which use STW were quite specific regarding their management strategies.

Such studies, which draw a comprehensive picture of establishments using STW during the crisis, are exceedingly rare in France. Calavrezo (2009) and Calavrezo et al. (2010) analyze the determinants and efficiency of STW in France over the 1995-2005 period, using firm level data for establishments with at least 50 employees. They evidence a “substitution

effect” between work-sharing<sup>2</sup> and STW which might partly explain the very low take-up rate of STW schemes in France between 1995 and 2005. Considering the correlation between STW and redundancies, they find that the establishments which used STW also laid off some of their workers more intensively. Overall, over the period, it seems that STW establishments are more likely to face structural difficulties than non-STW establishments.

For the crisis period, Chagny (2010) describes the legal framework of STW in France and presents some very aggregated figure. The author points out that French firms have preferred to adjust through a massive reduction in the number of temporary workers or workers with fixed term contracts rather than through the adoption of STW during the crisis.

#### *Our contribution to this literature*

The main purpose of our paper is to fill the gap in the French literature concerning the use of STW during the crisis. Following the micro approach adopted in Boeri and Bruecker (2011) and Crimann et al. (2010) for German firms, as well as in Calavrezo (2009) for French firms over the 1995-2005 period, we point out the main characteristics of the French firms that used short-time work during the recent crisis.

**However, our approach differs from the previous literature in two main respects. First, we use an exhaustive administrative data set that provides information about the number of STW hours consumed by French establishments between 2007 and 2010. These data have never been analyzed before.** Even though STW take-up rates were quite low in France - and much lower than in Germany - the completeness of our data provides robust descriptive statistics, based on a very large number of observations.

**Second, the question addressed in this paper is highly original. Whereas most of the existing papers focus on the efficiency of STW, either at the firm-level or at the country level, we try to identify the circumstances under which STW**

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<sup>2</sup> i.e. the reduction in weekly working time

is *effectively* used by firms on the ground. Our approach is thus closer to Mesa (1984). The use of STW in France remained surprisingly low during the crisis in spite of the substantial efforts of the government to promote this instrument. As a consequence, we do think that identifying the determinants of the propensity to use STW is a matter of importance. It may highlight the limits of the current scheme's design, or reveal that this instrument is not fully adapted to the current French labor market. Beyond this, it provides some additional information about the functioning of the French labor market during the crisis.

## 2.2 The regulation of STW in France

The regulation of short-time work has changed during the period 2008-2010 due mainly to the economic crisis. As our period of analysis is 2007-2010, we exclusively concentrate on the description of the STW regulation after 2008.

### *General features*

STW can be applied for the following reasons: downturns in economic cycles; difficulties in the acquisition of raw materials or energy; transformation, restructuring or modernization of the firm; and exceptional natural disasters, among other types of difficulties. According to the law, the instrument is meant to be used as a temporary tool. Its main objective is to prevent permanent layoffs of employees in situations of temporary economic difficulties. Employees on STW keep their contractual bond with the employer and they are partially indemnified for the salary loss due to STW.

The claiming system is quite complex. Before being able to use STW, establishments have to consult the plant's works council and then apply for an authorization with the French administration at the "department (French territorial division) level" (Unit territoriale - UT). If their request is justifiable, the French administration (UT) provides an authorization for a specified number of STW hours.

After using these STW hours, employers must address each month a request for compensation to the French administration indicating the amount to be reimbursed. If the firm does not comply with these procedures, the employer must pay “standard” wages. Additionally, social contributions on the STW compensation are lower.

We do notice that, even if establishments receive a compensation from the State for each STW hour consumed, this allowance is paid *after* the use of STW. Employers have therefore to pay it in advance to their employees, before getting reimbursed.

In firms with fixed working hours, compensated hours are calculated as the difference between the number of hours that are supposed to be worked and the number of hours effectively worked during the month. With the decrease in legal working hours, the law stipulates that STW is activated when hours worked are less than 35 hours per week, or below collective working hours (if it is inferior to the legal weekly limit). As a result, establishments have to prioritize the use of flexible working hours associated with worksharing.

#### *The three components of the compensation*

The allowance paid for every hour of STW includes three components:

- A specific allocation (“allocation spécifique”) which is a support paid by the State to the employer. There is a shifting rate for this support: the allocation is 3.84 Euros per hour for firms with less than 250 employees or 250 employees and 3.33 Euros per hour for firms with more than 250 employees. One will note that this compensation rate depends on the size of the *firm* whereas the authorization to use STW is given to the *establishment*.
- The national tripartite agreement of 1968 amended in 2009 established that employers pay employees for each hour of STW an amount of 60% of their gross salary with a lower bound of 6.84 Euros per hour. This amount of money represents the sum of the specific allocation of STW and of conventional allocations of STW. In exceptional



situations, if there are strong threats to employment, the government can pay a higher compensation rate of STW. In this case, STW conventions can be concluded with the State having different coverage rates (50%, 80% or 100%). So, besides the specific allocation of STW, the State pays a complementary allocation related to the concluded convention.

For example, for a STW convention with a rate of 100% for a firm with more than 250 employees, for each hour of STW the State pays 3.33 Euros for the specific allocation of STW and 3.51 Euros for the complementary allocation related to the concluded convention ( $3.33+3.51=6.84$  Euros). In may 2009, a new kind of STW convention was created: the “long lasting partial activity convention” (“Activité Partielle de Longue Durée” APLD). For each hour of STW covered by an APLD convention, employers receive the specific allocation of STW (3.33 or 3.84 Euros depending upon the size of the firm) and an APLD allocation. For the APLD allocation, the first 50 hours covered by an APLD convention are paid by the State (1.90 Euros per hour). If the number of hours covered by the APLD convention exceeds 50 hours, the number of excess hours is compensated by the Unédic (the institution that pays unemployment benefits in France). In this case, the Unédic pays employers 3.90 Euros per hour no matter the size of the firm. For example, a firm which has less than 250 employees and which puts them on STW for 40 hours being covered by an APLD convention, will receive from the State 3.84 Euros per hour for the specific allocation of STW and 1.90 Euros per hour for the APLD allocation.

- A complementary allocation which guarantees employees a minimum legal monthly remuneration equal to the net level of the minimum wage (Smic).

### *Several reforms since the end of 2008*

Since the end of 2008, several changes in the STW laws took place to reinforce the role of this job protection scheme. First, the legal duration of STW was extended : the maximal consecutive duration of STW changed from 4 to 6 consecutive weeks per year and per employee and the legal maximal duration of STW over the year increased from 600 to 1000 STW hours per employee in all sectors. Second, employees' compensation rose from 50% to 60% of the gross salary and the financial support from the State (the specific allocation mentioned before) changed from 2.13 to 3.33 Euros per hour in firms with more than 250 employees and from 2.44 to 3.84 Euros per hour in firms with less than 250 or 250 employees.

In may 2009, the government, the social partners and the institution in charge of the unemployment insurance (Unédic) decided to adopt a new STW agreement permitting a better compensation for employees and covering longer periods of time. This scheme is called "long lasting partial activity" ("Activité Partielle de Longue Durée" APLD). This kind of agreement was consistently favored by the French administration as it is more attractive for both firms and employees. An APLD agreement has the same legal basis as "regular" STW schemes (recourse conditions, maximal number of STW hours, etc.) and it covers a maximal period of compensation of 12 month.

APLD agreements permit a higher compensation for employees than "regular" STW (APLD covers 75% of the gross salary in comparison with 60% for "regular" STWA). The compensation of an APLD agreement is financed by the State and by the Unédic. When an APLD agreement is signed, firms commit to preserve the employment of employees on STW during a period of time equal to the double of the period of the agreement. If firms do not respect this condition they have to reimburse the STW and APLD compensations.

## A basic theoretical model and its implications

A large number of determinants might play a role in employers' decisions to use STW rather than layoffs. To highlight the leading determinants and deal effectively with our extremely rich dataset, it is useful to think of a simple model. This chapter proposes such a model and discusses its implications.

We identify four main factors that might affect the propensity to use STW: the administrative costs of STW, the presence of alternative labor market tools (such as short term contracts and temporary contracts), the degree of firm-specificity of employees' human capital and employers' expectations about the recovery. We suggest some empirical strategies to evaluate the relative importance of these factors.

### 3.1 A basic model

As indicated in our literature review, there is almost no theoretical literature on STW. Traditional employment-hours trade-off models are not fully satisfactory. They partly explain why fixed cost, training costs and firm's technology play a role in defining firms' propensity to cut hours instead of reducing employment. But they fail to take into account all the costs and benefits that are specific to short-time work programs, such as administrative costs

and productivity effects. More importantly, they ignore the fact that STW is a temporary measure which highly depends on employers' expectations.

We can think of a simple model to illustrate the main determinants of employers' decision to use STW rather than layoffs. This model is partly built on the hypotheses discussed in Mesa (1984) - see chapter 2.

At time  $t = 0$ , the establishment is hit by a negative output shock. This shock is temporary: the recovery is supposed to occur at time  $t = \alpha$ , with uncertainty about  $\alpha$ .

The establishment wants to maximize its profits. We assume that it initially employs a single worker A, with a production function  $Y = f(L_A)$ . It can either choose to keep worker A and use STW during the crisis (from  $t = 0$  to  $t = \alpha - 1$ ) (option A) or to layoff worker A at time  $t = 0$  and hire worker B when business picks up again, at time  $t = \alpha$  (option B).

If the employer chooses option A, he faces some administrative costs  $C^{ad}$ . These costs represent expenditures on the administration of the program (which depend for example on the design of the claiming system). If he chooses option B, he incurs firing and hiring costs  $F$ .

We only consider two levels of wages  $w_{STW,i}$  and  $w_{norm,i}$ .  $w_{STW,i}$  represents the *monthly* wage paid by the employer to worker  $i$  when using STW, including fringe benefits.  $w_{norm,i}$  represents the *monthly* wage paid by the employer to worker  $i$  in normal times. Since the number of hours worked under STW is lower than in normal times, we have  $w_{STW,i} \leq w_{norm,i}$ . However, since the employer has to compensate for a part of the loss work,  $\frac{w_{STW,i}}{h_{STW}} \geq \frac{w_{norm,i}}{h_{norm}}$  where  $h_{STW}$  represents the number of hours worked when using STW and  $h_{norm}$  represents the number of hours worked in normal times<sup>1</sup>. Put differently, if the *monthly wage* is lower under STW than in normal times, the *hourly wage* is higher under STW.

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<sup>1</sup> Indeed, the employer pays the same hourly wage under STW as in normal times. But when he uses STW, the employer also has to compensate the worker for a part of the *non-worked hours*. As a result, the monthly wage divided by the total number of hours *effectively* worked is higher under STW than in normal times

As a result, for a constant productivity per hour<sup>2</sup>,  $\frac{\partial Y}{\partial L_i^{STW}} - w_{STW,i} \leq \frac{\partial Y}{\partial L_i^{norm}} - w_{norm,i}$  ( $\forall i \in \{A,B\}$ )<sup>3</sup>.

We assume that  $w_{norm,B} = w_{norm,A}$  meaning that worker B would earn the same monthly wage as worker A when the recovery occurs (if A is fired during the crisis and B hired after the crisis). A more realistic model would allow for these two wages to differ because wages generally increase with experience within the firm.

Our model can be written as follows:

$$E_0^\alpha \left[ \left( \sum_{t=\alpha}^{\infty} \frac{\partial Y^t}{\partial L_A^{norm}} - w_{norm,A}^t \right) + \sum_{t=0}^{\alpha-1} \left( \frac{\partial Y^t}{\partial L_A^{STW}} - w_{STW,A}^t \right) \right] - C^{ad} \geq E_0^\alpha \left[ \sum_{t=\alpha}^{\infty} \left( \frac{\partial Y^t}{\partial L_B^{norm}} - w_{norm,B}^t \right) \right] - F \quad (3.1)$$

where  $E_0^\alpha$  represents the expectations of employers at time  $t = 0$  about the date  $\alpha$  of the economic recovery.

## 3.2 Predictions of the model and discussion

### 3.2.1 Administrative costs

**Administrative costs of STW  $C^{ad}$  might reduce its attractiveness. In a recent report, the French Court of Auditors pointed out that these administrative costs could explain the low attractiveness of STW in France, as compared to the Italian or German schemes.**

We showed that the claiming system was quite inconvenient for employers because firms had to require a formal authorization before using STW (see chapter 2, section 2). The

<sup>2</sup> In this model, we rule out any diminishing returns to hour of work. This would be an important factor to consider if ones studies the intensive margin of the use of STW, but it would significantly complicate our analysis of the extensive margin.

<sup>3</sup>  $\frac{\partial Y}{\partial L_i^{norm}}$  represents the monthly production of worker i in normal times and  $\frac{\partial Y}{\partial L_i^{STW}}$  his monthly production under STW

complexity of the system might have dissuaded some establishments from using it. More fundamentally, the fact that firms have to pay the entire compensation in advance before getting reimbursed might constitute a heavy burden for firms in economic distress. This implies that the most indebted firms, or those which suffered the most from the crisis might be unlikely to use STW.

Of course, the level of the state compensation also affects  $w_{STW,A}^t$ , the wage of worker A under STW. A higher level of compensation reduces the wage burden for the employer, though a decrease of  $w_{STW,A}^t$ . However, if firms are too severely affected by the crisis and therefore cannot advance STW expenditures, a higher level of state compensation might not affect their propensity to use STW.

The impact of these administrative costs cannot be fully tested at the micro level because all the establishments in France face similar administrative costs. Cross-countries comparisons might appear more informative. Macroeconomics papers that focused on this question underline the importance of the cost to employers in explaining the variation of STW take-up rates across countries (Hijzen and Venn 2010; Cahuc and Carcillo 2011). To this regard, the French STW scheme is less favorable for employers than the Italian or German ones, where employers only pay for a part of the social security contributions and do not need to advance any cost.

First, we do have information about the annual level of debt of a large number of establishment over the period. We can also control for the variation in their value added. According to our hypothesis, we should observe a negative correlation between the level of debted of an establishment and its propensity to use STW.

Furthermore, some administrative changes have been implemented during the period. Eligibility criteria have been relaxed, maximum duration has been extended. More interestingly for our analysis, the level of the state compensation increased in the first quarter of 2009. In our model, this represents a decrease in  $w_{STW,A}$ . Since this increase was larger for

firms with less than 250 employees than for firms with more than 250 employees, we can try to identify the impact of this reform on the propensity to use STW. This might give us an idea about the importance of the generosity of the scheme in determining its attractiveness, as mentioned in Van Audenrode (1994).

### *3.2.2 Alternative adjustment tools - Firing and hiring costs*

Firing and hiring costs  $F$  might also affect significantly the trade off between STW and layoffs. **At the macro-level, economists argue that the degree of rigidity of the labor market in France, Italy or Germany could partly explain the higher attractiveness of STW in those countries**, as compared to the US. In those countries where firing permanent workers appears highly difficult and costly, STW turns out to be a good alternative to adjust the wage bill during downturns.

This **institutional approach** has two different implications. First, it suggests that **the attractiveness of STW is partly determined by its interaction with other workforce management tools**. When a downturn occurs, tools such as pre-retirement schemes, working-time accounts, non-renewal of short-term and temporary contracts, transfers between establishments provide many alternatives to short-time work. For instance, Calavrezo et al. (2009) evidence a substitution effect between working time reduction and short-time work over the 1995-2005 period in France, due to the adoption of the 35-hour working week. Similarly, Burda and Hunt (2012) stressed the leading role of working-time accounts in the “German job miracle” during the crisis<sup>4</sup>. Taking into account these alternatives labor market arrangements is crucial to understand the relative attractiveness of STW as compared to other labor flexibility tools.

Second, we should observe a higher use of STW in establishments that have some difficulties in recruiting workers when the economy recovers. Recruitment costs represent the probability of a good matching between the firm and the new worker when the economy

<sup>4</sup> Burda and Hunt (2012) argue that working time accounts might have played a bigger role than STW in preserving jobs

recovers. More generally, we can think of these as opportunity costs of searching for the appropriate worker when the business picks up. These recruitment costs are increasing in the degree of specificity of the establishment and decreasing in the level of unemployment rate on the specific labor market of the establishment. They might also depend on the characteristic of the product market on which the establishment operates. For example, the opportunity cost of searching for a new worker is higher for firms involved in just-in-time production which need to react quickly.

Since we have detailed data about establishments' workforce flows at the quarterly level, we partly examine the first hypothesis. The idea is to see whether firms that use STW systematically adopt specific workforce management strategies, for example by relying less strongly on temporary and short term contracts than other firms. We can first compare the inflows and outflows of STW establishments with the flows of establishments that do not use the scheme. This might allow us to identify potential substitution effect between STW and temporary or short term contracts.

A lower turnover rate might reflect, among other things, higher recruitment costs. To examine further this hypothesis, we can use the REPOSE survey. In this survey, employers were asked about the characteristics of their main market. If firms operate on large<sup>5</sup> and competitive markets then the opportunity cost of the recruitment process might be an incentive for them to use STW rather than layoffs.

### 3.2.3 *Employers' expectations*

The second term on the left-side of the equation,  $\sum_{t=0}^{\alpha-1} (\frac{\partial Y^t}{\partial L_A^{STW}} - w_{STW,A}^t)$  reflects the severity of the output shock. If the shock is large<sup>6</sup> and if we assume that wages are rigid,  $(\frac{\partial Y^t}{\partial L_A^{STW}} - w_{STW,A}^t)$  might turn negative for several quarters. In our equation,  $\alpha$  represents

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<sup>5</sup> A large market means that the firm can rely on foreign countries' recovery when the domestic demand is weak

<sup>6</sup> A large shock means that the demand for the establishment's product is close to zero, i.e.  $Y \approx 0$



expectations of employers about the duration of the crisis. The propensity to use STW will be decreasing in the parameter  $\alpha$  because firms cannot sustain wages that are higher than marginal productivity for a long period of time. As a result, an increasing pessimism about the imminence of a recovery reduces the use of STW. On the contrary, establishments that are expecting a quick recovery because they operate on markets that are less affected by the crisis might be more likely to use STW.

Again, the use of the REPOSE survey might help us identifying some characteristics of firms that are likely to be correlated with employers' expectations. Another indicator could be the evolution of establishments' productive investment throughout the crisis. If firms that use STW do maintain their investment at a higher level than non-STW firms, it would suggest that  $\alpha$  plays a leading role in employers' decision to use STW.

#### 3.2.4 *The firm-specific capital explanation*

Finally, the comparison between  $\sum_{t=\alpha}^{\infty} (\frac{\partial Y^t}{\partial L_A^{norm}} - w_{norm,A}^t)$  and  $\sum_{t=\alpha}^{\infty} (\frac{\partial Y^t}{\partial L_B^{norm}} - w_{norm,B}^t)$  - i.e. the difference in productivity between worker A and worker B when the business picks up - might also explain the propensity to use STW rather than layoffs, when the productivity of a worker requires high firm-specific skills. If firm-specific human capital accumulation is large, losing of a worker who have been working in the firm for a long time might have substantial effects on the firm's output when the business picks up. **This human capital hypothesis has three main implications.** (1) First, we should observe a **higher propensity to use short-time work in firms that require a higher level of specific skills.** (2) Second, when STW is used for a part of the workers only, **STW should be more often used for more skilled workers than for unskilled ones.** (3) Finally, **the stronger the firm's investment in its employees' human capital, the higher its propensity to use STW when a temporary shock occurs.**

The first implication would require data on the level of education and seniority of workers in the firm, as a proxy for the degree of firm-specific skills. Unfortunately, we do not have

any data on the stock of workers at the establishment level. The second hypothesis can be tested more easily, since we do know the occupation of the workers affected by STW each quarter, as well as the occupation of people who are laid-off during the same quarter. We can therefore observe whether unskilled workers are more likely to be laid off than skilled workers when a firm chooses to use STW for a part of its workforce only.

The third hypothesis could be partly addressed by cross countries comparisons. For example, we know that German firms tend to spend more on their employees' training than French firms, which might partly explain higher STW take up rates in Germany. But we also have rough data about training expenditures of firms in REPOSE, which can be used as a proxy for firms' investment in specific capital accumulation.

### *3.2.5 Discussion of the shortcomings of this model*

Our model is only illustrative. It could be easily improved and extended by the inclusion of other costs and benefits related to the use of STW. More fundamentally, it has two major shortcomings that we ignored for simplicity.

First, this model does not include the potential externalities of STW on the productivity of workers who are not directly affected by STW. This argument, which can be called "morale effect" of STW, is put forth by the advocates of STW. Indeed, STW might enhance the productivity of all the workers, whether they have reduced their working time or not. This point is raised in Mesa (1984) to explain why some Canadian firms increased their productivity thanks to the use of STW. Unfortunately, this argument is hardly testable because we do not have data on workers' productivity. It could nevertheless suggest that firms which care more about employees' motivation and satisfaction have a higher propensity to use STW.

Another limitation of our model arises from the fact that it does not take into account the intensive margin. By choosing the number of hours of STW per worker, employers have control over  $\sum_{t=0}^{\alpha-1} (\frac{\partial Y^t}{\partial L^{STW}} - w_{STW,A}^t)$ . This parameter is essential to determine the optimal

consumption of STW on the intensive margin, but this is beyond the scope of this paper.

### 3.3 Conclusion

We have therefore identified four main hypotheses to explain the use of STW. In the following chapters, we implement some of the empirical strategies mentioned above to examine the respective importance of these four determinants. In chapter 5, we mainly test the institutional hypothesis. In chapter 6, we use the REPONSE survey to highlight the role of employers' expectations and test the relevance of the firm-specific human capital explanation. Finally, the burden of the administrative costs is discussed in chapter 7, where we evaluate the impact of an increase in the state compensation level on STW consumption.

## Descriptive statistics : some comments on cross-sectors differences

In this first empirical part, we analyze the quarterly evolution of STW consumption throughout the crisis. We describe the establishments which used STW between 2007 and 2010 and identify which workers were affected, using an exhaustive dataset.

These basic descriptive statistics are briefly compared with figures obtained for Germany or California to highlight some invariant characteristics of STW establishments. We notice that the distribution of STW consumption across sectors is highly similar in these three countries. We therefore try to explain these cross-sectors differences, based on the different predictions of our model.

## 4.1 Presentation and description of the data

Our main dataset is made up of two administrative datasets. The first one (DMMO) provides exhaustive information about labor flows in French establishments with 50 employees or more, at the quarter level. For each inflow or outflow of workers in the establishment, we know the age and the occupational category of the workers concerned<sup>1</sup>. The type of contract used (permanent or short-term) is also reported. Moreover, the data set indicates the stock of temporary workers in the firm at the end of each quarter.

The second dataset (SILEX-Aglae) reports the number of STW hours consumed by French establishments, as well as the number of workers placed on STW, on a monthly basis. The workers affected by STW are divided into three rough category, corresponding to managerial positions, intermediaries positions (employees, technicians and supervisors) and laborers. When firms do not use STW for all their labor input adjustments, we can see which workers they ask to work share and which workers they lay off.

We aggregate the information contained in SILEX-Aglae at the quarter level. If a firm used STW more than once in a quarter, the number of workers affected within each occupational category for a given quarter is the *maximum* number of people affected in this category over the period<sup>2</sup>. Our implicit assumption is that the workers affected by STW during a given month remain roughly the same over the quarter. The number of hours consumed is merely the sum of the number of hours consumed each month.

We merge these two datasets using the identification number of establishments. Our unit of analysis is therefore an establishment (identified by its SIRET number) in a given quarter. Our baseline assumption is that SILEX-Aglae is exhaustive, meaning that the establishments which do not appear in the dataset have not used STW over the period 2007-2010. Since

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<sup>1</sup> This information is highly valuable, since the theory predicts that firms are likely to lay-off unskilled workers first while relying on STW or other type of labor input adjustments for their skilled workers.

<sup>2</sup> For example, if 15 workers are placed on STW in January, 20 workers are affected in February and 18 workers are affected in March, we consider that 20 workers were placed on STW during the first quarter

establishments need to report their consumption in the SILEX-Aglae file to be compensated for the STW hours consumed, this assumption is not strong.

The DMMO file is supposed to be exhaustive since it is a legal obligation for French establishment with 50 employees or more to fill it on a monthly basis <sup>3</sup>. However, we do lose a significant number of observations when we merge the DMMO file with SILEX-Aglae. About 20% of the observations included in SILEX-Aglae are not referenced in the DMMO file. We compare the average number of hours consumed (and average number of workers affected) for each decile of STW consumption in the SILEX-Aglae sample with the average number of hours consumed in the final sample (Appendix A, figures A.1 and A.2). The distribution of hours consumed is very similar in the two samples for the 9 first deciles. But we do observe a marked difference for the top decile of the distribution: within that decile, establishments which are not in the DMMO file consumed much more STW hours in average than establishments which are in the DMMO file. We argue that losing these extreme observations is not a big concern to the extent that these outliers are not very representative of the average STW establishment.

In the merged dataset, we have 602668 observations for the period. They represent all the French establishments with 50 employees or more that have reported their labor flows in the DMMO file over the period. We delete 379 observations for which the number of workers at the beginning of the quarter is missing. We impute a zero value for the variables related to STW consumption to all the establishments which were not in the SILEX-Aglae original file. We create a new dummy variable equal to 1 if the establishment consumes at least 1 hour of STW during the quarter, and 0 elsewhere. We end up with 602289 observations.

We restrict our analysis to the period 2007-2010 for various reasons. First, we are in-

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<sup>3</sup> Art. L. 1221-16. of the French Labor Code

terested in studying STW during the crisis, because firms are likely to have primarily used STW for economic reasons and on a temporary basis. In other words, they mostly used STW in accordance with its initial goal, as a response to an economic shock. It was not the case before the crisis. For instance, Calavrezo (2009) finds some evidence that STW was often used for structural reasons and on a recurrent basis over 1995-2005.

Second, usage rates have increased a lot during the crisis and the use of STW was promoted by the government through various changes in its regulation. Differences in STW consumption across firms have widened, making it easier to identify some specific characteristics of firms that used STW intensively, as compared to those which did not.

Studying the 1995-2005 period did not provide such variations. The implementation of the 35-hours week had made STW somewhat obsolete. Indeed, establishments used to rely first on the flexibility provided by the annualization of working time when they had to deal with an economic downturn. As a result, STW was not the flexibility tool it was meant to be.

As it became more publicized and while the 35-hours were already largely implemented, STW have been used by a broader range of firms during the recent period.

## 4.2 The evolution of STW consumption between 2007 and 2010

### *General figures*

Figures 4.1 and 4.2 show the quarterly evolution of the number of hours consumed and the number of workers affected by STW between 2007 and 2010 in establishments with 50 employees or more. The use of STW was very limited between 2007Q1 and 2008Q3, probably for the reasons mentioned above <sup>4</sup>. In average, 331 thousands of hours were consumed each

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<sup>4</sup> Implementation of the 35-hours week and lack of awareness on the part of employers, but also a better economic climate

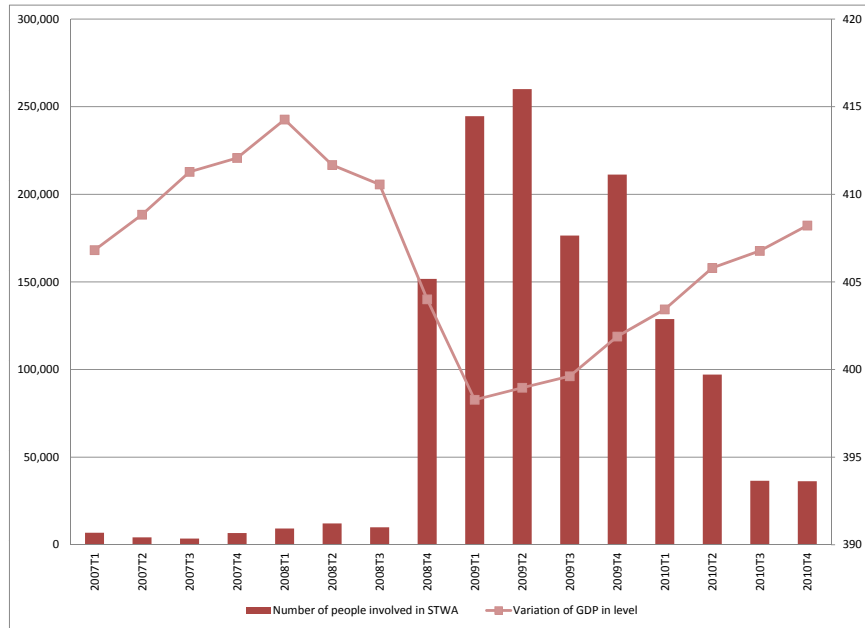


FIGURE 4.1 – Quarterly evolution of the number of people placed on STW arrangements. *Source: SILEX-Aglae and DMMO databases . Field: Establishments in France with at least 50 employees*

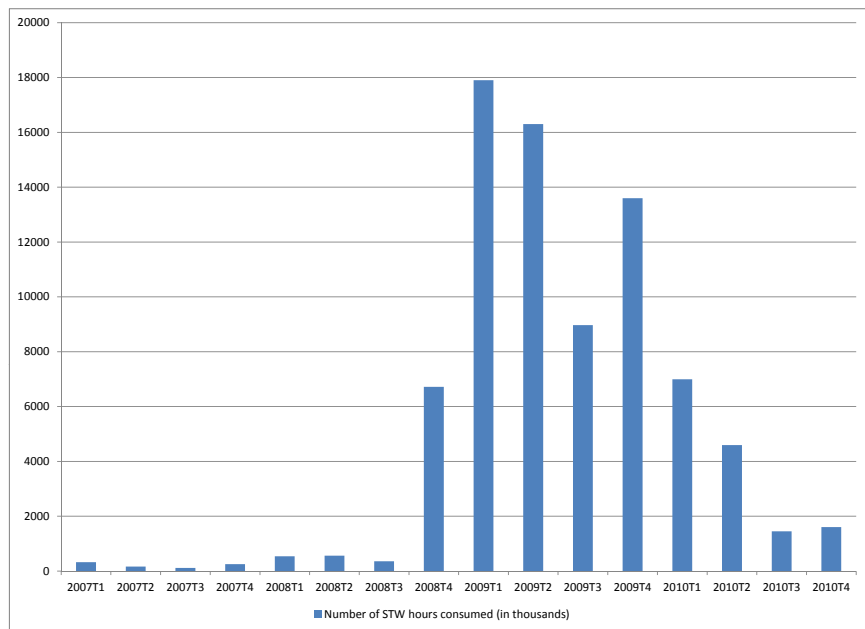


FIGURE 4.2 – Quarterly evolution of the number of STW hours consumed. *Source: SILEX-Aglae and DMMO databases . Field: Establishments in France with at least 50 employees*



quarter and 7540 employees were placed on STW. These figures explain why STW have not received much attention before the crisis.

During the crisis, the number of STW hours consumed as well as the number of workers affected increased sharply. This increase started in 2008Q4, until reaching its peak point during the first two quarters of 2009. In 2009, 14 millions hours were consumed by over-50 employees establishments and 223 000 employees were placed on STW in average each quarter. Not surprisingly, the use of STW was countercyclical (figure 4.1). Nevertheless, we observe a significant increase during the last quarter of 2009 whereas the GDP had already started to recover.

Similar patterns can be observed for Germany or Belgium, although STW was used more intensively in these two countries.

In 2010, the use of STW decreased significantly. In the last quarter of 2010, 1.6 millions of STW hours were consumed and 36000 workers were affected by STW. This sharp decrease in STW consumption confirms that STW was mainly used to deal with a severe economic shock rather than for structural reasons. However, one will notice that the number of hours consumed and the number of people placed on STW were ten times higher in 2010Q4 than in 2007Q2, for a same level of GDP (volume). This more intense use of STW in 2010Q4 may come from the high level of uncertainty about future economic growth that affected employers' decisions in 2010. An alternative - and complementary - explanation is that firms became more familiar with the arrangement during the crisis and therefore continued to use it more intensively after the peak of the crisis ("path dependency" reason).

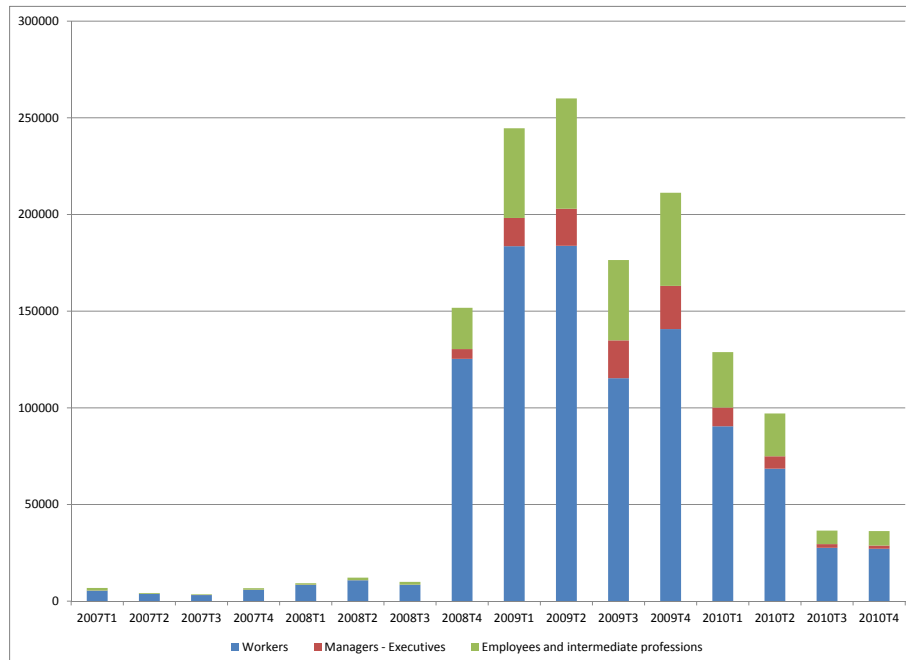


FIGURE 4.3 – Allocation of STW hours among professional groups.  
*Source: SILEX-Aglae and DMMO databases . Field: Establishments in France with at least 50 employees*

*Who were the workers affected ?*

STW was almost exclusively used for laborers<sup>5</sup> before the crisis, as illustrated on figure 4.3. During the crisis, it was extended to intermediate occupations and managers. In 2009, more than 20% of the STW hours consumed were allocated to intermediate professions and almost 10% were allocated to managers. This trend did not disappear in the last quarters of 2010, since 20% of the STW hours consumed in 2010Q4 were still dedicated to intermediate professions.

In light of the various theories we mentioned, this result may appear quite surprising.

<sup>5</sup> In this subsection, we use workers or laborers indifferently when we refer to the occupational category of blue-collar

One would have expected to find a larger share of managers under STW, if we assume that they are more skilled than workers. Even if this share did increase during the crisis, it remained eight times smaller than the share of workers affected by STW.

A first explanation would be that the workers affected by STW have highly firm-specific skills, whereas managers have more general and transferable skills. Since we do not distinguish between skilled workers and unskilled workers, this explanation cannot be ruled out.

Another explanation is that establishments were more likely to use other types of flexibility tools to adjust managers' working time. The adoption of the 35-hour work week in 1998 requires that weekly work time average to 35 hours *across the year*. If managers are used to work more than 35 hours in normal times, they can take days off during economic downturns instead of using STW. According to the law regulating STW, these "RTT"<sup>6</sup> days-off accumulated over the year have to be liquidated before using STW.

This adjustment mechanism might have played the same role as the working time accounts in Germany. Boeri and Bruecker (2010), Hunt and Burda (2011) or Crimmann et al. (2010) emphasize the importance of these working time accounts during the recession. They might have played an even bigger role in preventing lay-offs than STW. We'll try to examine this hypothesis further using the REPOSE datafile, in chapter 6.

A third explanation would refer to the "morale effects" of lay-offs. If STW is essentially used to preserve employees' motivation by avoiding lay-offs, we expect workers to be the first ones affected by STW because they would have been the first ones to be laid off in the absence of STW. This explanation would illustrate the positive externalities of STW that are not included in our model.

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<sup>6</sup> RTT stands for *Reduction du Temps de Travail*

### 4.3 The characteristics of establishments using STW : distribution across sectors

Some papers have already described German firms that use STW. Deeke (2005) finds that these firms are characterized by a lower rate of turnover, a higher share of long-terms contracts and a weaker reliance on flexible work contracts. Crimmann et al. (2010) confirm these results for the crisis period and add that the establishment size is positively correlated with the use of work-sharing. In both studies, manufacturing sectors exhibit the highest usage rate of STW. Studying the use of STW in California, MaCurdy et al. (2002) find similar results. Do these observations also apply to French STW establishments?

Tables 4.1 and 4.3 describe the size of establishments that use STW and their concentration in different sectors - as compared to establishments that do not use the scheme. As observed in Germany case and California, establishments that used STW were larger than establishments that did not. More than 20% of STW firms had more than 250 workers whereas less than 15% of non-STW firms were equally large. If we consider the distribution of the number of STW hours consumed, the over-representation of firms with more than 1000 employees is even more striking since they consumed one third of the total amount of STW hours (table 4.2).

Establishments using STW were disproportionately concentrated into the industrial sector (table 4.3). More precisely, 50% of the number of STW hours consumed <sup>7</sup> were consumed by firms belonging to one of these six industrial sectors : automobile (37%), machine equipment (13%), Fabricated Metal products (11%), metallurgy (10%), Rubber and Plastics (8%) and Textile Mill and Leather Products (3%). We notice that the automobile sector was by far the biggest consumer of STW hours, with more than one third of the total number of hours consumed in this sector. Again, these cross-sectors differences are observable in other

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<sup>7</sup> For these figures, we only take into account the establishments for which we have been able to impute a sector identifier in the Naf. 2.2. revision, which was defined in 2009. This means that firms which disappeared in 2009 or later are not taken into account in table 4.3.

countries. In California, MaCurdy et al. (2004) find that electronic producers, industrial machinery producers, primary metals manufacturers, and rubber and plastic producers are industries that comprise the largest percentages of work sharing firms.

To the extent that same differences are observed in various countries, they might reflect specific and permanent characteristics of some industrial sectors, these characteristics being correlated with the propensity to use STW. For example, MaCurdy et al. (2004) claim that many of the jobs in these industries require workers to learn skills that are not acquired in high school or college. This could be a first explanation to explain the within-sector differences in the use of STW, in line with the human firm-specific capital approach we mentioned earlier. We can try to examine further the relevance of alternative explanations.

**Table 4.1** – Size and industrial sectors of STW establishments

*Source: SILEX-Aglae and DMMO databases . Field: Establishments in France with at least 50 employees*

	STW establishments	Non STW establishments
Establishment size		
50-249	78.83%	85.97%
250-499	12.98%	9.61%
500-999	5.40%	3.29%
More than 1000	2.79%	1.13%
Total	100%	100%
Sector		
Agriculture	0.25%	0.53%
Industry	81.58%	27.45%
Construction	1.90%	7.14%
Services	16.27%	64.88%
Total	100%	100%

**Table 4.2** – Number of hours consumed according to establishments' size (in millions)

*Source: SILEX-Aglae and DMMO databases. Field: Establishments in France with at least 50 employees*

	STW establishments	
<b>Establishment size</b>		
50-249	29.5	36.6%
250-499	12.9	18.5%
500-999	1.2	12.7%
More than 1000	25.9	32.2%
TOTAL	80.5	100%

*First explanations to shed light on cross-sectors differences*

Whereas similar between-sector and within-sector differences are observed in many countries that have STW programs, few papers propose convincing explanations of these differences. Looking at a few basic figures, we try to highlight some factors that might explain those differences across sectors.

**Table 4.3** – Industrial sectors with the highest consumption of STW  
*Source: SILEX-Aglae and DMMO databases. Field: Establishments in France with at least 50 employees*

	STW hours consumed	Number of workers affected
Textile Mill and Leather Products	3.00%	3.12%
Rubber and Plastics	8.39%	9.70%
Metallurgy	9.55%	9.14%
Fabricated Metal products	10.67%	11.32%
Machine equipment	12.89%	10.81%
<b>Automobile</b>	<b>37.37%</b>	<b>36.26%</b>
Other industries	18.13%	19.65%
Total industry	100.00%	100.00%

### *Variability of the value added*

Establishments that have to deal frequently with economic downturns and upturns might be more likely to use STW. Indeed, labor adjustments through hires and layoffs would appear much more costly for these firms than a simple reduction of the working time during short periods of economic downturns. In our model, an increase of the variability of the value added translates into a higher opportunity cost of recruitment searching ( $F$ ).

The variability of the quarterly value added can be an indicator of the structural volatility of different sectors. We would expect this volatility to be positively correlated with a larger use of STW. As evidenced on figure ??, the car industry was indeed much more volatile than the other sectors over the period and also more deeply hit by the crisis. In 2009Q1, the metallurgy and the equipment sectors were also severely affected. On the contrary, the valued added of the service and construction sectors appear pretty stable. These sectors were also less affected by the crisis. As a result, the larger consumption of STW hours by car industry, metals manufacturers, rubber and plastic producers and textile producers is not surprising.

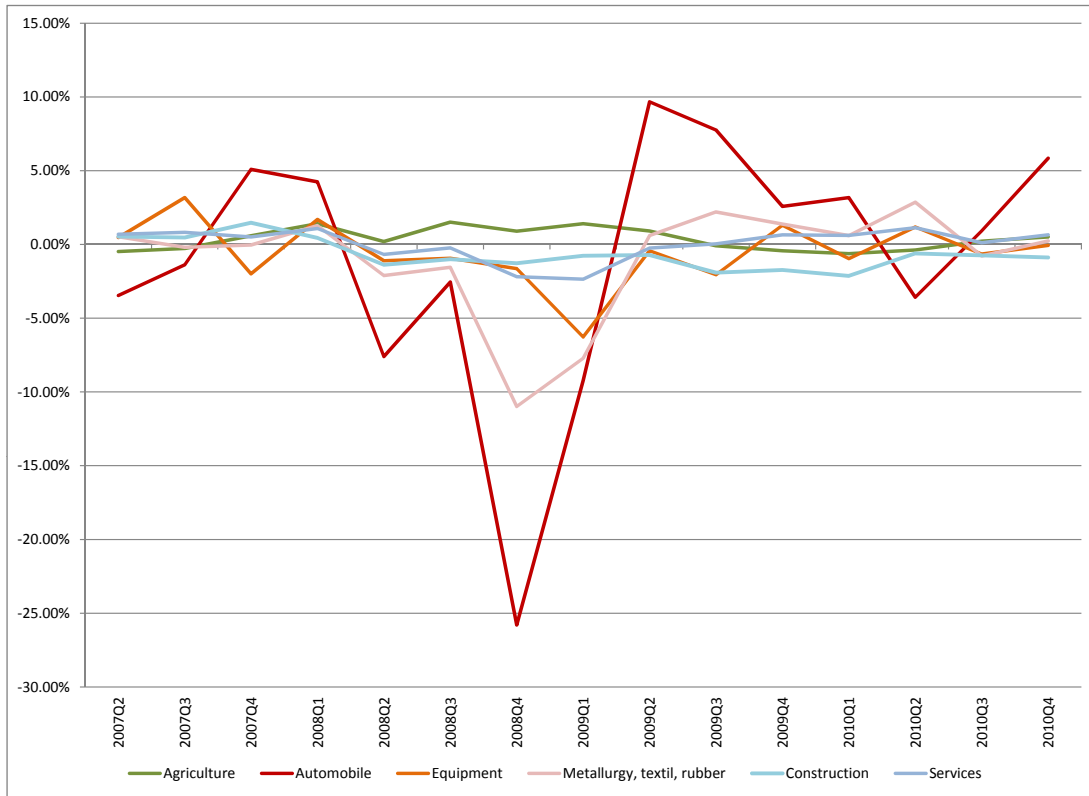


FIGURE 4.4 – Variation of value added across sectors.  
*Source: National accounts, INSEE. Field: All establishments in France.*

### *Skill composition of the workforce*

MaCurdy et al. (2004) emphasize differences in the degree of firm-specific skills across sectors to explain differences in STW consumption. According to the human capital theory, sectors with higher share of skilled workers are supposed to comprise largest percentages of work sharing firms. Is this explanation convincing to understand the high concentration of STW establishments in industry?

Table 4.4 compares the skill composition of the workforce across sectors. The industry sector does not have a higher share of high skilled workers than the tertiary sector (13% of



**Table 4.4** – Skill composition of the workforce: comparison across sectors  
*Source: INSEE. Field: all Establishments in France*

	Agriculture	Industry	Construction	Services
Chief executives	0.84	0.62	0.94	0.57
Managers	3.62	13.29	5.46	13.19
Intermediate professions	8.31	20.86	12.97	18.83
Employees	4.26	9.97	6.76	35.27
Skilled worker	6.2	36.69	53.93	15.77
Unskilled worker	1.42	17.4	19.24	14.86
Farmworker	75.18	0.32	0.22	0.45
Missing	0.17	0.85	0.48	1.07
TOTAL	100.00	100.00	100.00	100.00

managers in each sector). But the industry sector does have a much higher share of skilled workers than the tertiary sector. Actually, it could be the case that the firm-specific skills of skilled workers are more valued than the general skills of managers, because firms need to invest more in the on-the-job training of skilled workers. In this case, the human capital theory is a good framework to explain between sectors differences: firms in the industry sector are more likely to use STW than firms in the services sector because they employ a higher share of skilled workers.

### *A flexicurity tool ?*

Finally, a striking difference between services and industry is the relative share of fixed term and permanent contract (table 4.5). Whereas 78% of people working in the industry have a permanent contract, it is only the case for 66% of people in Trade, Transportation and Hotel Industry, and 41% in the other services. The share of fixed-term contract is twice as high in the services as in the industry. This is in line with the institutional approach we put forward in our model. It seems to corroborate the hypothesis that firms used STW when they did not have any alternative flexibility tool. We examine this hypothesis further in the next subsection and in the next chapter.

**Table 4.5** – Type of contract: differences across sectors  
*Source: INSEE. Field: all Establishments in France*

	Agriculture	Industry	Construction	Trade, Transport, Hotel industry	Other services
Apprenticeship contract	0	2.84	6.43	2.44	0.84
Fixed-term contract	2.73	10.99	14.24	24.22	22.05
Permanent contract	9.10	78.00	76.42	65.59	41.26
Temporary contract	0	0.03	0.04	0.09	29.25
Other contract	0.10	2.43	2.21	3.76	3.20
Missing information	88.07	5.71	0.66	3.90	3.40
TOTAL	100.00	100.00	100.00	100.00	100.00

Of course, the three explanations partly overlap and we cannot really disentangle them. Firms that face higher uncertainty or employ more skilled workers are also more likely to use permanent contracts to retain workers. Since they use permanent contracts, layoffs are more costly, which make the use of STW more attractive.

#### 4.4 Conclusion

These basic figures allow us to point out a few striking facts about establishments that used STW during the crisis: they were much larger than non-STW establishments, much more concentrated in the manufacturing sector and more particularly in the automobile sector and metal products industry. Globally, their consumption of STW has been counter-cyclical and STW hours were mainly used for blue-collar workers. Nevertheless, the number of managers affected increased substantially during the crisis and remained higher than its pre-crisis level when the economy started to slowly recover.

The concentration of STW consumption in a limited number of industrial sectors reveals that STW establishments are quite specific. In particular, they are mostly concentrated in sectors where the share of permanent contracts relative to fixed-term contracts is especially high. This notable difference between STW and non-STW establishments calls for a further examination of the interaction between short-time work and alternative adjustment mech-

anisms. Using the detailed information we have about workforce flows, we focus on this institutional analysis in the next chapter.

## Short-time work and external labor flexibility: a substitution effect?

Our descriptive part points out that the establishments which use short-time work are concentrated in sectors that employ a high share of permanent workers relatively to fixed-term contracts workers. This result is consistent with the findings of Boeri and Bruecker (2011) that “the share of temporary agency workers in a firm and the share of workers with a fixed-term contract are negatively correlated with the take-up of short-term benefits”.

In this chapter, we examine further the workforce flows of short-time work establishments to analyze the interactions between short-time work and external labor flexibility tools. In particular, we investigate whether the recourse to short-time work is used as a complement to the external flexibility provided by short-term and temporary contracts, or whether these two forms of flexibility are mutually exclusive. This latter case would indicate that establishments relying mostly on external labor flexibility do not need short-time work to reduce their labor costs.

We then describe the profile of the workers laid off when an establishment uses short-time work and redundancies at the same time. This observation pro-

vides arguments to discuss the firm-specific human capital explanation which predicts that more skilled workers should be protected by short-time work in priority.

We find some evidence that short-time work was used by establishments that mainly employ permanent workers whereas non-STW establishments strongly rely on temporary workers and fixed-term contracts. In accordance with the theory, when establishments lay off workers for economic reasons, STW establishments tend to fire a higher share of young workers and unskilled workers than non-STW establishments. This last point would suggest that short-time work reinforces the duality of the labor market, as mentioned in previous papers (Crimmann et al. (2010); Boeri and Bruecker (2011)).

## 5.1 Economic situation of STW establishments before and throughout the crisis

To analyze the correlation between workforce flows and the propensity to use short-time work, we need to introduce some economic controls. In this section, we present our economic data and describe briefly the economic situation of STW establishments before and throughout the crisis.

Establishments using STW are likely to be concentrated in sectors which were severely hit by the crisis, while these sectors may also be characterized by specific workforce flows (a lower than average turnover for example). On the other hand, if establishments using STW are more affected by the crisis in average, the reduction of their workforce flows may be nothing but a consequence of the higher economic uncertainty they are facing. When we do not control for economic shocks at the firm level, the features that appeared to distinguish between establishments using STW and the others may simply reflect the heterogeneous impact of the crisis on these firms. In this chapter, we thus introduce some economic indicators.

### *Description of the economic data*

We do not have any economic indicator for the entire sample but we have economic data for about two third of the establishments in our sample. This attrition could be an issue if the missing information about economic health is not random but correlated to specific characteristics of the firms that also determine the use of STW. In Appendix B, we provide some basic descriptive statistics to show that the new sample is highly similar to the previous one regarding a range of observable characteristics. The merging of our main sample with economic data does not seem to significantly bias our sample.

The economic data we use come from official tax returns information, collected by the regional commercial courts (*Greffes des tribunaux de commerce*). This information is therefore reliable, even though we observe a significant share of missing information. These

economic data concerned firms and not directly establishments. Since STW consumption and workforce flows are given at the establishment level, we need to assume that output shocks affecting one firm affect all the establishments of this parent firm in a similar way.

We delete all the observations for which the value added of the firm was missing in 2007, 2008, 2009 or 2010. To reduce the effect of outliers, we drop all the observations with a variation in the value added greater than 500% (in absolute terms) and a variation in the level of debt larger than 500% between two consecutive years. Finally, we keep only the establishments for which we have no missing information in the DMMO file. This lead us to delete about 20% of our observations, but it improves the reliability of the information about inflows and outflows.

We end up with 395320 observations. For each observation, we have the establishment's value added and total revenue, its level of debt, its level of investment on a yearly basis. We can therefore control for the establishment's value added or revenue either in 2007, 2008, 2009 or 2010. We thus obtain reliable indicators of the global economic health of the establishment before the crisis and throughout the crisis.

#### *Descriptive statistics about establishments' economic situation*

To control for the economic situation of establishments, we use several economic indicators.

We first control for the variation in the value added of the establishment between two consecutive years, this indicator beings the most common in the literature. We alternatively use the variation in the total revenue as a robustness check. We also consider the variation of the value added between 2007 and 2009 as an indicator of the severity of the crisis, to take into account that the shock might affect employers' decisions with a certain lag.

We may think that the establishments which used STW were already in poor economic situations before the crisis, as it was the case over the period 1995-2005 (see Calavrezo (2010)). On the contrary, one might claim that STW establishments are likely to be less indebted than their non-STW counterpart because the use of STW requires a significant

financial buffer to compensate for the loss work.

Table 5.1 gives a first picture of the economic situation of the two groups, comparing establishments that used STW at least once between 2007 and 2010 to those which did not. There is no significant difference between the two groups, except for the variation in the value added between 2008 and 2009. Quite surprisingly, the establishments that used STW seem to have been less strongly affected by the crisis in average, since the average increase in their value added between 2008 and 2009 was twice as large as the average increase in non-STW establishments' value added. However, we need to control for establishments' size and sector of activity to check the robustness of this result.

### *Baselines regressions*

Table 5.5 presents some simple regressions to show how different economic indicators correlate with the propensity to use STW. It also exhibits the respective importance of the factors mentioned in our descriptive part.

**Table 5.1** – Economic situations of short-time work establishments - Average level of debt and investment

	STW establishments	Non-STW establishments	Prob > F
Average variation of the VA between...			
2007 and 2008	0.38%	0.31%	-
2008 and 2009	0.68%	0.31%	-
2009 and 2010	0.22%	0.10%	**
Average level of debt			
2006	15.33%	17.77%	***
2007	15.53%	17.07%	***
2008	15.34%	17.79%	***
2009	15.22%	16.99%	***
2010	14.75%	16.21%	***
Average level of investment			
2006	17.65%	17.13%	-
2007	17.18%	14.85%	***
2008	16.93%	16.16%	-
2009	14.37%	15.20%	-

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$



We use a logistic model, but we do check that using a probit model gives similar results. The coefficients are odd ratio estimates, meaning that we are looking at the impact of a one unit change in the independent variable on the probability of using STW rather than not using it.

**A large and significant impact of the establishment's size and sector of activity** The size of the establishment is strongly positively correlated to the use of STW. The odd ratio estimate is about 1.2, meaning that a one percent increase in the size of the establishment is associated with a 20% increase in the odds ratio of using STW. The coefficients of the industry dummy variables are even higher. For example, being in the automobile sector rather than in the service sector is associated with an odd ratio estimate of 17.30. This is the largest coefficient in table 5.5, which is consistent with the descriptive figures presented in table 4.3. Being in the construction sector is associated with a small reduction in the probability of using STW rather than not using it. A higher share of women is also associated with a reduction in the odds ratio of using STW.

These results are consistent with the results found in Germany. All the papers do find that the establishment's size is positively and significantly correlated with the propensity to use STW. However, in Germany, being in the construction sector is highly positively correlated with the use of STW.

**STW establishments were more strongly affected by the crisis than non-STW establishments...** The introduction of economic health controls does not affect the coefficients. In particular, one notices that the impact of the variation in value added between 2007 and 2008 is close to zero and not significant. This indicates that non-STW establishments were not performing better than STW establishments before the crisis.

The impact of the variation in value added between 2008 and 2009 is strongly negative and significant. STW establishments were therefore more strongly affected by the crisis than non-STW establishments.

**... but both types of establishments have similar structural economic situations** We might be concerned about the fact that, even though they were affected by the crisis in a similar way, STW establishments may have been in a different structural situation than non-STW establishments before the crisis.

The fact that STW firms did not have worse economic results in 2006 or 2007 (coefficients close to zero) than other firms seems to confirm that STW was not used to deal with structural problems. To strengthen this intuition, we compare the level of debt and investment of establishments before and throughout the crisis.

Table 5.2 suggests that the level of debt does not significantly differ between STW establishments and non-STW establishments, whatever the year considered. The coefficients are extremely close to zero and the null hypothesis cannot be rejected. Of course, a similar level of debt does not mean that the perspectives of growth of the firms were identical. We therefore look at their level of productive investment, as a proxy for their expectations of growth. Again, the differences between the two groups are not significantly different from zero and the coefficients tend towards 0 (table 5.3).

These results demonstrate that the use of STW was not primarily driven by structural economic difficulties. It thus justifies that we pay a large attention to a range of non-financial criteria when trying to explain the low use of STW.

## 5.2 How does the use of short-time work interfere with external labor flexibility ?

The interaction between internal and external flexibility is a crucial point to understand employers' decision to use short-time work. In our literature review, we present several papers (Abraham and Houseman (1993); Audenrode (1994)) which claim that the lack of external flexibility in European countries increased the attractiveness of short-time work

**Table 5.2** – Impact of the level of debt on the propensity to use STW

<b>Dependent variable: use of STW (binary variable)</b>			
	t=2007	t=2008	t=2009
Log of establishment size	1.26*** [1.17 - 1.37]	1.26*** [1.16 - 1.37]	1.28*** [1.18 - 1.39]
Value added in year t	1.00*** [1.00 - 1.00]	1.00*** [1.00 - 1.00]	1.00*** [1.00 - 1.00]
Level of debt in year t	1.00 [0.99 - 1.00]	1.00 [0.99 - 1.00]	1.00 [1.00 - 1.00]
Controls for industrial sector	YES	YES	YES
Intercept	-5.17	-5.17	-5.25
Number of Observations used	130736	130736	130736
Number of Observations Read	133072	133072	133072

Notes: 95% Wald Confidence Limits in parentheses. The standard errors are clustered at the establishment level. The dependent variable is a binary variable equal to 1 if the establishment consumes STW hours during the quarter, equal to 0 elsewhere. The coefficients are odd ratios estimates.

**Table 5.3** – Impact of the level of investment on the propensity to use STW

<b>Dependent variable: use of STW (binary variable)</b>			
	t=2007	t=2008	t=2009
Log of establishment size	1.27*** [1.17 - 1.39]	1.22*** [1.12 - 1.33]	1.30*** [1.17 - 1.45]
Value added in year t	1.00*** [1.00 - 1.00]	1.00*** [1.00 - 1.00]	1.00*** [1.00 - 1.00]
Productive investment in year t	1.00 [0.99 - 1.00]	1.00 [0.99 - 1.00]	1.00 [1.00 - 1.00]
Controls for industrial sector	YES	YES	YES
Intercept	-5.32	-5.09	-5.43
Number of Observations used	130736	130736	130736
Number of Observations Read	133072	133072	133072

Notes: 95% Wald Confidence Limits in parentheses. The standard errors are clustered at the establishment level. The dependent variable is a binary variable equal to 1 if the establishment consumes STW hours during the quarter, equal to 0 elsewhere. The coefficients are odd ratios estimates.

during the nineties. But the external flexibility of French establishments has increased a lot over the past decade. In a recent report, the Court of Auditors argues that French firms may have preferred to adjust to the crisis through a reduction of temporary workers and short-term contracts rather than using short-time work. In other words, a lot of firms were probably flexible enough on their extensive margin and did not need to use STW.

On the other hand, it is naive to think that external flexibility and internal flexibility are mutually exclusive. Establishments that used short-time work also laid-off some of their workers. In this case, our illustrative model would predict that the workers placed on STW are the more skilled ones (with a better occupation and a higher seniority within the firm). Thus, the use of short-time work may reinforce the duality of the labor market, as evidenced in several papers (Crimann et al. (2010); Boeri and Bruecker (2011)).

We examine successively the relevance of these two main predictions. Controlling for the sector of activity, the size and the economic situation of the establishment, we first look at the correlation between different types of inflows and outflows and the propensity to use STW. We focus then on the establishments which use both short-time work and layoffs for economic reasons to describe the profile of laid-off workers.

### *5.2.1 Short-time work and workforce flows: combination of external and internal flexibility in short-time work establishments*

In table 5.5, we first notice that the number of hires (in log) is negatively correlated with the propensity to use STW rather than not using it, whereas the number of exit (in log) is positively correlated with the dependent variable. The coefficient associated with the number of hires is large, suggesting that STW establishments hire much less people when they use STW than the other establishments. This finding is intuitive, since STW establishments need to reduce their labor costs. The number of exits during this quarter is significantly higher

for establishments using STW, but the magnitude of this coefficient is small compared to the other coefficients.

In column 2 (Table 5.6), we analysis these outflows in more details. We notice that a decrease in the number of temporary workers during the quarter is negatively correlated with the propensity to use STW. This result is consistent with previous studies, saying that the possibility to adjust through a decrease in temporary workers reduces the need for STW. The non renewal of short term contracts, on the other hand, is positively correlated with the propensity to use STW (even though this coefficient is much smaller than for the number of economic layoffs).

This higher number of “ends of fixed term contracts” in STW establishments might simply come from the fact that STW establishments need to get rid off a larger number of workers than non-STW establishments. To test this hypothesis, we look at the share of the adjustment that operates through the end of short-term contracts (CDD), while controlling for the number of outflows (Table 5.7, column 1). For a same number of outflows, STW establishments use a larger share of economic layoffs than non STW establishments and a smaller share of non-renewed fixed-term contracts.

We do not have any information about the stock of workers hired with short term contracts in these establishments. However, we can see in table 5.4 that over the period 2007-2010 establishments that used STW at least once have fewer inflows and outflows of short-term contract workers. In other terms, STW establishments cannot adjust through a reduction of temporary workers<sup>1</sup> and short term workers because they mostly employ permanent workers. The use of STW makes up for this lack of external flexibility.

Perhaps more surprisingly, the number of layoffs due to non-economic reasons is also strongly correlated with the propensity to use STW, and this magnitude is even larger than for the number of economic layoffs(table 5.6). The number of pre-retirement is negatively

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<sup>1</sup> We do find that the stock of temporary workers at the end of the quarter t-1 is significantly negatively correlated to the use of STW

correlated with the propensity to use STW, which suggests that this mechanism might have been used during the crisis as a flexibility tool to reduce the number of workers. Finally, the number of dismissals is significantly negatively correlated to the use of STW. We do not know how to interpret these figures, but they do confirm that STW establishments adopt specific workforce management strategies. Further work would need to be done on this topic.

### *5.2.2 Does short-time work reinforce the duality of the labor market ? The profile of laid-off workers*

We observe that establishments slightly increase the share of economic layoffs while using STW for some of their workers. If establishments use STW for a part of their workers only and layoff another part of their workforce for economic reasons, we might be able to test the predictions of our model. In particular, if we know which workers are affected by STW and which ones are fired, we can test whether the firm-specific human capital hypothesis is relevant empirically. This theory would predict a larger share of unskilled people among laid off workers relative to the other professional groups. If the amount of firm-specific skills increases with experience, we should also observe a larger proportion of young people among the workers laid off for economic reasons and a small share of senior workers.

In table 5.7, we analyze more precisely the distribution of economic layoffs and end of short term contracts among different occupational groups and different age category in STW establishment. We only consider the establishments which use economic layoffs.

Our hypothesis is that STW is used as an alternative to layoffs. As a consequence, if the structure of the group of laid-off workers differs between STW and non-STW establishments (regarding the skill level and age category of laid-off workers), it might implicitly reflect the structure of the group affected by STW in STW establishments.

Table 5.7 (column 2) shows the correlation between the use of STW and the proportion of unskilled workers, skilled workers and managers who are laid off for economic reasons (controlling for the number of economic layoffs). The coefficient of the proportion of unskilled

workers is the largest and the most significant: this suggests that STW establishments are more likely to use economic layoffs for unskilled workers. Since we cannot control for the number of unskilled workers in each establishments, we cannot rule out the hypothesis that STW establishments are characterized by a larger number of unskilled workers. The proportion of skilled workers is also positively correlated to the use of STW, but the coefficient is much smaller and less significant (5% level). The proportion of managers laid off is negatively correlated with the use of STW but is not significant (probably because the number of managers laid off for economic reasons is generally very small and does not vary a lot).

As we said before, the decomposition of STW consumption into three occupational categories (workers, intermediate positions and managers) does not allow us to distinguish between skilled and unskilled workers. However, the fact that the proportion of skilled workers among laid-off workers has a smaller impact on the propensity to use STW than the proportion of unskilled workers among laid-off workers may suggest that STW is used primarily for skilled workers. If this case, the firm-specific human capital theory would be relevant to explain the propensity to use STW. But we cannot derive any clear conclusion from these results since the stock of workers in each category is an omitted variable.

Table 5.7 (column 3) presents the correlation between the use of STW and the age category of the workers laid off. If STW is used to protect more experienced workers, we should observe a lower share of senior workers among workers laid off in STW establishments. Our empirical findings seem consistent with this hypothesis, since a decrease in the proportion of people over 55 among laid off workers is associated with an increase in the propensity to use STW. This coefficient is quite large, and significant at the 5% level. The proportion of people laid off under 25 is positively correlated with the use of STW but this coefficient is not significant.

### 5.3 Conclusion

Overall, these results confirm our predictions. Establishments using STW are less likely to adjust through a reduction of temporary contracts or short-term contracts. The main explanation is probably that, for some reasons, these establishments mainly rely on permanent contracts. As a result, they face higher firing and recruiting costs than non-STW establishments, which make them more likely to use STW.

Since STW is costly, these establishments do not use it for their entire workforce. They are more likely to use layoffs for economic reasons than non STW establishments. But for a same number of economic layoffs STW establishments fire a higher proportion of unskilled workers, a lower proportion of managers and a lower proportion of senior workers than non-STW establishments. Even though not controlling for the stocks of workers in each category prevents us from drawing any clear conclusion, these findings are consistent with a firm-specific capital motivation for using STW rather than lay offs.

These results have important implications regarding the impact of STW on the duality of the labor market. Some papers argued that STW reinforced the duality of the labor market, by protecting workers with permanent contracts while short term and temporary workers were laid off. This statement would need to be tempered. In fact, STW was mainly used by firms which do not rely on short term contracts and temporary contracts in normal times. Put differently, STW was an additional source of flexibility for firms that would not have used intensively temporary contracts and short term contracts otherwise. On the other hand, firms that rely more intensively on adjustment through precarious contracts did not use STW, even for their core workers. It remains true, though, that young and less skilled workers were the first ones to be laid-off in STW establishments.

Thus, these results somehow bring us back to Abraham and Houseman (1993). The authors argue that the rigidity of European labor markets was the main determinant of the



use of STW. Since American establishments could directly rely on their extensive margin to adjust, they did not need to use STW schemes.

Over the 2007-2010 period, the same opposition can be observed on the French labor market. This labor market has been largely deregulated since the nineties. Nowadays, establishments which rely on short term contracts and temporary contracts - some contractual arrangements designed to increase their external flexibility - are less likely to use STW.

The use of STW is therefore restricted to establishments that do not have alternative adjustment tools. These firms were exceptions rather than the rule. In a way, the French labor market might have not been rigid enough to justify the use of STW.

**Table 5.4** – Description of the workforce flows in STW establishments

*Source: SILEX-Aglae and DMMO databases. Field: Establishments in France with at least 50 employees*

	STW establishments	Non-STW establishments
Number of hires with fixed-term contracts	4.66	13.74
Number of hires with permanent contracts	1.46	12.28
End of fixed-term contract	4.55	18.5
Layoffs for economic reasons	1.67	0.24
Number of temporary agency workers	3.80	5.32
Rate of turnover	12.00%	35.05%
Rate of inflows	6.55%	21.21%
Rate of outflows	5.45%	13.84%

**Table 5.5** – The leading role of the establishment’s size and sector of activity

Dependent variable: use of STW (binary variable)					
	Baseline controls only	Pre-crisis economic variables		Crisis controls	
Log of establishment size	1.17*** [1.09-1.26]	1.17*** [1.08 - 1.26]	1.17*** [1.08 - 1.26]	1.18*** [1.10 - 1.27]	1.15*** [1.06-1.24]
Automobile	17.30*** [13.41-22.34]	17.13*** [13.23-22.18]	17.28*** [13.38-22.31]	14.77*** [11.14-19.57]	15.27*** [11.48-20.29]
Metallurgy	11.94*** [8.91-16.01]	11.92*** [8.87-16.02]	11.85*** [8.84-15.88]	8.52*** [5.95-12.20]	9.38*** [6.65-13.22]
Textile Mill	9.27*** [6.49-13.24]	9.21*** [6.42-13.22]	9.25*** [6.49-13.19]	9.22*** [6.43-13.24]	8.88*** [6.22-12.69]
Machine equipment	10.23*** [7.97-13.24]	10.31*** [8.01-13.27]	10.29*** [7.99-13.17]	7.88*** [5.83-10.66]	8.97*** [6.85-11.75]
Fabricated Metal Products	9.28*** [7.41-11.62]	9.21*** [6.42-13.22]	9.29*** [7.42-11.64]	8.15*** [6.40-10.40]	8.61*** [6.82-10.87]
Rubber and Plastics	8.84*** [6.88 - 11.35]	8.81*** [6.83 - 11.35]	8.73*** [6.81 - 11.20]	8.69*** [6.74 - 11.19]	8.24*** [6.39 - 10.63]
Other industries	2.42*** [1.95 - 3.01]	2.44*** [1.96 - 3.04]	2.41*** [1.94 - 2.99]	2.44*** [1.94 - 3.06]	2.40*** [1.92 - 3.01]
Construction	0.39*** [0.23 - 0.65]	0.39** [0.23 - 0.66]	0.39*** [0.23 - 0.65]	0.43*** [0.26 - 0.73]	0.43*** [0.26 - 0.73]
Agriculture	2.72 [0.63 - 11.70]	2.89 [0.67 - 12.42]	2.73 [0.63 - 11.72]	2.57 [0.59 - 11.25]	2.68 [0.63 - 11.49]
Services	Ref.	Ref.	Ref.	Ref.	Ref.
Female share	0.46*** [0.32 - 0.65]	0.46*** [0.32 - 0.65]	0.46*** [0.32 - 0.65]	0.51*** [0.35 - 0.73]	0.49*** [0.35 - 0.70]
Variation in value added					
... between 2006 and 2007		1.00 [0.99 - 1.00]			
... between 2007 and 2008			0.85 [0.67 - 1.01]		
... between 2008 and 2009				0.18*** [0.09 - 0.37]	
... between 2007 and 2009					0.33*** [0.17 - 0.63]
Intercept	-5.00	-4.97	-4.99	-4.77	-4.86
Number of Observations used	133072	130544	130544	130544	130544
Number of Observations Read	202654	202654	202654	202654	202654

Notes: 95% Wald Confidence Limits in parentheses. The standard errors are clustered at the establishment level. The dependent variable is a binary variable equal to 1 if the establishment consumes STW hours during the quarter, equal to 0 elsewhere. The coefficients are odd ratios estimates.

**Table 5.6** – Type of outflows in STW establishments

<b>Dependent variable: use of STW (binary variable)</b>		
Log of establishment size	1.70*** [1.55 - 1.89]	1.96*** [1.76 - 2.18]
Variation in Value Added 2008-2009	0.41 [0.25 -0.65]	0.22*** [0.12 -0.41]
Hires (log)	0.37*** [0.34 -0.40]	0.39*** [0.36 - 0.42]
Exit (log)	1.21*** [1.14 - 1.29]	.
Variation in temporary workers stock		0.70*** [0.66 - 0.73]
Layoffs for economic reasons (log)		1.34*** [1.22 - 1.47]
Ends of fixed-term contracts (log)		1.17*** [1.08 - 1.27]
Transfers into another establishment (log)		0.79*** [0.69 - 0.91]
Retirement (log)		1.00 [0.89 - 1.12]
Layoffs for other reasons (log)		1.71*** [1.52 - 1.92]
Dismissals (log)		0.81*** [0.73 - 0.91]
Pre-retirement (log)		0.27*** [0.12 - 0.59]
Controls for industrial sector	YES	YES
Intercept	-6.32	-6.66
Number of Observations used	133072	133072
Number of Observations Read	133072	124755

Notes: 95% Wald Confidence Limits in parentheses. The standard errors are clustered at the establishment level. The dependent variable is a binary variable equal to 1 if the establishment consumes STW hours during the quarter, equal to 0 elsewhere. The coefficients are odd ratios estimates.

**Table 5.7** – The profile of laid-off workers in STW establishments

<b>Dependent variable: use of STW (binary variable)</b>			
Log of establishment size	1.98*** [1.78 - 2.19]	1.34*** [1.12 - 1.61]	1.30*** [1.08 - 1.56]
Variation in VA 2007-2009	0.25*** [0.14 - 0.44]	0.76 [0.42 - 1.38]	0.74 [0.40 - 1.36]
Hires (log)	0.40*** [0.37 - 0.43]	0.53*** [0.45 - 0.63]	0.53*** [0.45 - 0.63]
Exit (log)	1.23*** [1.16 - 1.30]	.	.
Variation in temporary workers stock	0.72*** [0.69 - 0.76]	0.68*** [0.59 - 0.79]	0.68*** [0.59 - 0.79]
Share of exits “economic layoffs”	2.11*** [1.67 - 2.66]	.	.
Share of exits “ends of fixed term contracts”	0.85** [0.73 - 1.00]	.	.
Layoffs for economic reasons (log)	.	1.11* [1.00 - 1.22]	1.16*** [1.05 - 1.29]
Share of unskilled workers among “economic layoffs”	.	2.79*** [1.86 - 4.20]	.
Share of skilled workers among “economic layoffs”	.	1.26 [0.93 - 1.74]	.
Share of managers among “economic layoffs”	.	0.80 [0.56 - 1.45]	.
Share of workers under 25 among “economic layoffs”	.	.	1.43 [0.78 - 2.61]
Share of workers over 50 among “economic layoffs”	.	.	0.77** [0.60 - 0.99]
Controls for industrial sector	YES	YES	YES
Intercept	-6.53	-4.15	-3.90
Number of Observations used	133072	5984	5984
Number of Observations Read	114159	133072	133072

Notes: 95% Wald Confidence Limits in parentheses. The standard errors are clustered at the establishment level. The dependent variable is a binary variable equal to 1 if the establishment consumes STW hours during the quarter, equal to 0 elsewhere. The coefficients are odd ratios estimates.

## 6

# Employers' expectations and social dialogue within the firm: some specific characteristics of STW establishments

In the previous chapters, we showed that STW establishments are characterized by a lower turnover rate and a greater reliance on permanent contracts than other establishments. They are therefore quite specific in the French industrial landscape. In this chapter, we examine further this specificity using the REPONSE survey. We investigate more particularly the respective importance of employers' expectations and social dialogue within the firm as leading determinants of the use of STW. We also analyze briefly how the potential internal flexibility resulting from the adoption of the 35 hours week may have affected the propensity to use short-time work arrangements.

## 6.1 Presentation of the 2005-2006 REPONSE survey

**The role of employers' expectations** is pointed out by studies focusing on German firms. In Germany, most of the firms which used STW were export-oriented. Since Germany was severely affected by the crisis, firms that could not operate on international markets had pessimistic expectations concerning the recovery. As  $\alpha$  increases<sup>1</sup>, the costs of STC compared to its future benefits becomes too high.

**The *acceptability* and morale effects of STW** play also a crucial role. In the executive report of a recent ILO report concerning work inequalities during the crisis, the authors argue that “The ‘German miracle’ [...] seems to be explained not only by significant public funding but also social dialogue to stimulate short-time working schemes [...] Social dialogue has made it possible to negotiate alternatives to layoffs in a number of companies and sectors”. In other words, a culture of negotiation and consensus in the establishment may promote short-time work instead of layoffs.

Since the REPONSE survey does ask a few questions about the adoption of the 35 hours week, we also complement the previous chapter by looking at the reported **impact of the 35 hours week** on STW establishments. Over the period 1995-2005, the “working time accounts” generated by the adoption of the 35 hours week was an important internal flexibility tool which have competed with STW schemes (Calavrezo et al. (2009)). STW establishments, which prove to be quite rigid on their extensive margin, might also have reacted differently to the adoption of the 35 hours week. In this part, we examine the possible interaction between the two internal flexibility tools.

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<sup>1</sup> An increase in  $\alpha$  means that the employer has pessimistic expectations about the imminence of an economic recovery.

### *Presentation of the REPONSE survey*

The REPONSE<sup>2</sup> survey of the Ministry of Employment deals with internal organization and management in French establishments of more than twenty employees which belong to the market sector (i.e. excluding agriculture and public administrations).

This survey describes the situation of establishments on markets. For example, chief executives are asked about their ability to fix their prices, the size of their main market (international, european, national or local) and their strategy to remain competitive. This information is highly valuable because it provides some proxy for potential determinants of the use of STW. Indeed, we claimed that the characteristics of the market are likely to influence employers' expectations and recruitment costs - parameters  $\alpha$  and  $F$  in our model. We argued that establishments operating on large markets may expect a quick recovery and then are more likely to use STW. Moreover, competitive pressures force them to react quickly when the economy starts recovering and therefore increase the opportunity cost of their recruitment process. Again, this should increase their propensity to use STW rather than layoffs. When studying the German *Kurzarbeit*, Crimmann et al. (2010) stress that STW firms are indeed more likely to operate on an international market and face higher competition.

Second, the survey provides further information about the internal organization of establishments, from the quality of social dialogue within the firms to the context of implementation of the 35 hours week.

Even though our simple model does not make it explicit, we expect the quality of the social dialogue within the firm to affect the use of STW. Firms with a stronger culture of consensus and negotiations might be more likely to use STW because they are more concerned about the morale effect of layoffs or more able to discuss both level of employment and cost of labor with employees. Put differently, STW establishments might be closer to the German model

<sup>2</sup> REPONSE stands for "Relations professionnelles et négociations d'entreprise". This survey is similar to the British "Workplace Employment Relations Survey" (WERS).

of co-determination than non-STW establishments.

The REPONSE dataset contains information to test this hypothesis. For example, we can know whether the establishments have union delegates. We have indirect information about the relationships between union delegates and the administration and direct information about the type of conflicts occurring within the establishment.

Finally, we pointed out that the adoption of the 35 hours week may have reduced the need for STW because employees could reduce their working time by using RTT days off. All establishments in 2007 were supposed to have adopted the 35 hours week. Thanks to REPONSE, we know whether employers consider that this reform had a negative impact on their employment and productivity. We expect the propensity to use STW to be correlated with the effect of the 35 hours week, to the extent that these two arrangements compete to provide internal flexibility.

### *Merging and selection bias*

We use the 2005-2006 wave of the management questionnaire, which means that the information is collected by questionnaire from the establishment's management (usually the top manager or the human resources manager). Since these data were collected in 2006 whereas we look at STW consumption and work-flows in 2007-2010, we need to assume that firms' management practices have not evolved a lot over the period 2005-2009.

The sample contains 2930 observations that are uniquely identified by their SIRET number (establishment identification number). We merge this file with our original data set using the SIRET identification number. We aggregate the information about establishments' consumption of STW and workforce flows over the 2007-2010 period in order to keep one single observation per establishment for the period. The establishment size, the proportion of female workers in the establishment, the number of workforce flows are averaged over the



period. We create a new dummy variable equal to one if the establishment used STW at least one quarter during the period.

We have 1278 observations in our final data set, with 202 establishments that used STW at least during once over the period. It is important to note that this final sample is *not* representative of all establishments of 50 employees or more in France. First, establishments which were created after 2006 are excluded from this new data set. These more recent establishments may have different ways of using STW compared to older establishments. The conclusions we can draw from the data set may not hold for them. Second, in the REPONSE data set, establishment weights are provided to adjust for sample stratification and non-response. We cannot use these weights after the merging. Due to the initial sample stratification, our final findings cannot be extended to all establishments with 50 employees and more. Some types of establishments may be over represented in our final sample whereas the weights were supposed to correct for this over-representation in the original REPONSE data set. Finally, our results might be bias because we cannot control for non-response. This would be an issue if response rates are very different between STW firms and non STW firms or if the probability of responding is correlated with some determinants of the use of STW. We cannot know empirically how large this bias is. Since we are concerned about the external validity of our results, we restrict our conclusions to the sample we study. Our findings would need to be confirm based on a more recent wave of the survey REPONSE to deal with this attrition issue.

We create new variables, picked up from the REPONSE survey. They are described in Appendix C.

***Brief description of the new sample : the establishments in the new sample are larger and display a lower employment volatility***

We provide some descriptive statistics to compare the new sample with the original SILEX-Aglae sample (Appendix B). Establishments in our final data set are in average twice as large as establishments in the DMMO-Aglae data set. More than 25% of them have more than 500 employees whereas this proportion is about 5% in our main data set. These big firms are also characterized by a smaller turnover over the 2007-2010 period (less than 10%, whereas the turnover of firms in the original dataset is around 17%). This lower turnover rate seems firstly driven by a lower proportion of hires. Finally, the firms in the REPOSE-DMMO dataset are even more concentrated in the industry sector than in our main dataset.

We are therefore analyzing a specific sample where big firms from the industry sector are over represented. Since these firms are also more likely to use STW, it is not surprising to find a much higher proportion of STW establishments in this new sample: 15% of them used STW at least once over the period. These STW firms also consume STW more intensively, since the average number of hours consumed and average number of people affected in these firms are more than twice as large as in the firms from our main sample.

## 6.2 Descriptive Statistics

***Demographics figures : STW establishments employ a higher proportion of senior workers and a smaller proportion of young workers***

The REPOSE survey provides basic information about the stocks of workers in the establishment. This information was missing in the previous section (main sample). We therefore describe briefly the demographic characteristics of STW establishments to test the robustness of our conclusions about workforce flows.

Table 6.1 shows that STW establishments' workforce is composed of 65% workers and 5% employees whereas non-STW establishments' workforce is composed of 39% workers and 22% employees. This is consistent with the fact that STW establishments are mostly concentrated in the industrial sector, where the share of workers is high. Nevertheless, this difference remains significant when we control for the industrial sector<sup>3</sup>.

Second, STW establishments employ a higher share of senior workers than non-STW establishments: 21% of their workforce is over 50, compared to 18% in non-STW establishments. On the contrary, STW establishments employ a smaller proportion of young people than non-STW firms, with 20% of workers under 30 in the former and 25% in the latter. These differences remain significant when we control for the industrial sector and the severity of the economic shock.

A higher share of senior workers might reflect a higher degree of firm-specific skills, in particular when those workers have spent their entire career within the same firm. This result may therefore be consistent with a firm-specific human capital explanation of the propensity to use STW.

If this demographic feature also applies to our main sample<sup>4</sup>, it would mean that the higher share of young people among laid-off workers in STW establishments is not driven by a higher proportion of young people in these establishments, but does reflect a deliberate choice of employers to protect their core workers with STW, while laying-off their less-skilled workers.

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<sup>3</sup> In order to control for the industrial sector, we run a logistic regression with the propensity to use STW as dependent variable and the same explanatory variables as in chapter 3. We include demographic variables in this regression. The results are not shown in this paper but they are available upon request

<sup>4</sup> This would need to be confirmed with data on stocks for the whole sample. The selection bias arising from the merging with REPOSE prevents us from extrapolating our conclusions to the whole sample, as explained in section 6.1

**Table 6.1** – Distribution of the establishment’s workers by age and socio professional category

	STW Establishments	Non STW establishments	Prob > F
Socio-professional category:			
Executive and manager	10.64	16.80	***
Intermediate professions (technicians and associate professionals)	19.27	21.71	***
Employees	5.33	22.37	***
Workers	64.58	38.81	***
Age category:			
Under 30	20.26	25.03	***
Between 30 and 40	30.20	30.19	
Between 40 and 50	28.81	26.48	***
Over 50	20.74	18.30	**

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

### *Descriptive statistics*

Table 6.2 is consistent with most of our predictions. Overall, the characteristics of the market seem to be highly correlated with the use of STW. 85% of STW establishments are export-oriented (with an European or international market), whereas it is the case for only 46% of non-STW establishments. They are twice as likely as non STW establishments to be hold by a foreign shareholder. STW establishments also face higher competitive pressure since almost 50% of them report having little flexibility to set their prices. Moreover, 19% of them report innovation as being a strategic criteria to remain competitive whereas this proportion is lower for non-STW establishments (13%), even though this difference is not significant. These three indicators converge to the idea that STW establishments need to react quickly when the economic activity picks up. In this context, employers are both more optimistic about the recovery - they can operate in countries which were less affected by the crisis - and more concerned about recruitment costs because a lack of skilled workers when the recovery occurs would undermine significantly their market share. This is in line with our predictions.

**Table 6.2** – [Employers' expectations and internal organization: descriptive statistics

	<b>STW</b>	<b>Non-STW</b>	<b>Prob &gt; F</b>
<b>General characteristics of the firm :</b>			
Quoted on the stock market	58.42%	46.75%	***
The main shareholder is a foreign resident	34.16%	15.71%	***
The firm was created more than 20 years ago	81.22%	72.05%	***
Average hourly wage	11.84	13.19	
<b>Characteristics of the market :</b>			
Difficulties for forecasting the economic activity	20.30%	14.13%	**
Report having a european or international market	80.20%	45.72%	***
Report innovation as being the first strategic criteria to be competitive	17.82%	13.95%	-
Report having little flexibility for setting prices	45.05%	34.67%	***
<b>Internal organization :</b>			
Presence of unions delegates in the establishment	94.55%	77.99%	***
Employers report that unions delegates... ... sometimes interfere with the ordinary course of business	29.21%	28.49%	-
... serve the employees	81.68%	72.81%	***
Peaceful social climate	81.09%	83.36%	-
Social dialogue	69.61%	55.40%	***
Negotiations influence managers' decisions	35.91%	26.93%	**
Recent negotiation about employment	16.02%	9.97%	**
Number of human resources managers	10.67%	9.16%	-
Establishment's managers frequent a club of entrepreneurs or managers	40.59%	26.30%	***
The establishment is a member of an employers' federation	84.16%	68.68%	***
<b>Training expenditures :</b>			
At least 4% of the wage bill is devoted to training	16.34%	20.98%	-
Average time of adaptation before a new employee is fully operational (in hours)	800	1200	***
<b>Consequences of adopting the 35 hours week :</b>			
Working time reduced because of the Aubry laws	88.40%	93.83%	*
Adopting the 35 hours week has deteriorated . employment	20.30%	9.84%	***
. competitiveness	64.85%	46.80%	***
<b># observations</b>	<b>202</b>	<b>1076</b>	

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

*Internal organization* The proportion of STW establishments with union delegates is 17 percentage points higher than the proportion of non-STW establishments with union delegates. This difference may translate into different propensities to use STW if union delegates favor the use of STW to preserve employment. Nevertheless, union delegates might also prefer to preserve both the level of wages and employment of the core workers (on the basis of seniority within the firm) while laying off the newest workers. As a consequence, the impact of unionization on the use of STW might be ambiguous.

STW establishments are not less likely than non-STW establishments to report that union delegates “sometimes hinder the economic activity of the firm”. They are not more likely to declare that the social climate in their establishment is “peaceful” than non-STW establishments. On the other hand, they are more likely to consider that negotiations do influence managers’ decisions and more used to hold discussions with their employees before any important change (significant at the 5% level).

We claimed that the administrative costs associated with STW might have a deterrent effect on its use. As a consequence, establishments which are able to handle these administrative costs more easily, thanks to an efficient human resources department for instance, should be more likely to use STW. Although the number of people working in the human resources department is a very imperfect measure of the quality of this department, we do not find a significant difference between STW and non-STW establishments. On the other hand, we do find that STW firms are proportionally more involved in employers’ federations. Their managers are also more likely to frequent clubs of entrepreneurs or managers on a regular basis. This could affect the use of STW through an “information channel” if employers get a better knowledge about STW in these meetings.

*Impact of the 35 hours week* A striking fact is that STW firms have more strongly suffered from the adoption of the 35 hours week. In particular, twice as many STW establishments (20%) as opposed to non STW establishments (10%) declare that the adoption of the 35

hours week had deteriorated employment in their firm. 65% of STW establishments also report that the 35 hours week had worsened their competitiveness, whereas only 47% of non-STW establishments agree with this statement. Overall, establishments that used STW during the crisis faced greater difficulties in implementing the 35 hours week in the past.

This comparison of means reveals large differences between establishments which used STW at least once during the crisis and those that did not. However, these different parameters are likely to be correlated with the size of the establishment, its economic health or its sector of activity. To quantify the respective importance of these different parameters, we run several logistic regressions. We use the probability of having use STW at least once over the period as the dependent variable.

### 6.3 Empirical Results

Table 6.3 shows the results of a logistic regression similar to the regressions presented in chapter 5. The first column (1) shows the results of a baseline regression. The second and third columns focus respectively on the role of the "internal organization" (column 2) and of the characteristics of the market (column 3). In the last column, we present our richer regression to test the robustness of these results. As a robustness check, we run probit regressions with the same variables (not presented here). We obtain similar results.

#### *6.3.1 Unions representation and social dialogue within the firm: are STW establishments closer to the German model of co-determination?*

**Social dialogue : STW establishments are more used to run discussions with their employees** The presence of union delegates is positively correlated with the use of STW. It is significant at the 5% level and its magnitude is quite high, suggesting that the presence

of union delegates is associated with a 150<sup>5</sup>% increase in the odd ratios of using STW. Nevertheless, given the very large number of establishments that have union delegates, this variable is not a precise proxy of the importance of social dialogue within the establishment.

The variable “dialogue” is probably a better indicator of the importance of social dialogue within the establishment. It indicates whether the top managers have negotiated with their employees before implementing any big change. This ability to run discussions with employees might ease the use of STW. This variable is indeed positive and significant in column 2, meaning that establishments that are more used to discuss with their employees (or their representatives) are also more likely to use STW. Even if this variable is imprecise, this first result might reflect that French establishments with a strong culture of consensus - a feature that characterized German firms - were more likely to use STW. However, more variable and observations would be needed to confirm this hypothesis.

The number of conflicts over the three last years is similar in both establishments, the coefficient being close to zero and not significant. The variables reflecting the “social climate” within the firm or recent discussions about employment while negotiating wages are not significant either, even though they enter in the regression with the expected positive sign.

#### **Administrative costs : no clear impact of the number of human resources managers**

The descriptive statistics point out that STW establishments’ managers are more likely to participate into different types of human resources managers and entrepreneurs clubs. However, this variable is not significant in the regression and tends to zero when the characteristics of the market are taken into account (column 4). The total number of human resources managers does not have any significant impact either. This is quite unsurprising since the number of human resources managers mainly depends on the size of the establishments. We therefore create a dummy variable equal to one if the establishment employs

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<sup>5</sup>  $\exp(0.9)=2.5$



10 workers or more for its human resources management<sup>6</sup> which corresponds to the quartile of establishments with the highest number of workers in their human resources department. This dummy variable is weakly significant, but does not have the positive impact we may expect. The fact that our variables are only poor proxies for the quality of the human resources management department probably explains these weak and somehow surprising results.

**Training : STW establishments spend less money on training** Another key feature of the so-called "German model" is the generous financial participation of employers to the continuous training of their employees (Pishcke (2000)). According to our model, an establishment that invests a lot in its employees' work-related training is more likely to use short-time work (it corresponds to the situation where  $\sum_{t=\alpha}^{\infty} (\frac{\partial Y^t}{\partial L_A^{norm}} - w_{norm,A}^t) \gg \sum_{t=\alpha}^{\infty} (\frac{\partial Y^t}{\partial L_B^{norm}} - w_{norm,B}^t)$ ).

Our empirical estimation seems to invalidate this prediction: spending more than 4% on training is associated with a lower propensity to use STW. This coefficient is highly significant and large as compared to the other coefficients.

However, this result does not allow us to rule out the firm-specific human capital argument. First, the variable "training expenditures" reported in the survey might not overlap the implicit training costs coming from the on-the-job acquisition of firm-specific skills. The accumulation of firm-specific skills might be more related to workers' seniority within the firm and the degree of specificity of the task performed rather than to explicit training expenditures. Second, we saw that establishments usually use STW for a small part of their workers. In particular, managers were less affected by STW than skilled workers. As we do not know which proportion of the training expenditures are dedicated to managers and which proportion is dedicated to workers, it is hard to derive any clear conclusion from this result.

This result is nevertheless consistent with the fact that STW establishments report in

<sup>6</sup> We choose this threshold because only 25% of the establishments employ 10 people or more in their human resource management department.

average a shorter duration to the question “How long does it take before someone is perfectly operational ?” (variable *Time before operationality*). In average, it takes 800 hours in STW establishments need before a new employee is fully operational (i.e. about 6 months for a full-time worker) whereas this adaptation takes about 1200 hours in non-STW establishments (i.e. 9 months for a full time worker). Even if this coefficient is very close to zero in table 6.3, it is negative and highly significant.

Overall, these results would suggest that, in this sample, the firm-specific capital accumulation does not explain the propensity to use STW.

### *6.3.2 The characteristics of the market: employers’ expectations and competition*

**Export-oriented establishments are more likely to use STW** Having little scope for setting prices is positively correlated with the probability of using STW. The coefficient of the degree of openness of the establishments is also positive and significant at the 1% level: having an international or european market is associated with a 170% increase in the odds ratio of using STW. Establishments that are export-oriented and need to remain competitive are therefore more likely to use STW, which is consistent with our predictions. This result is also in line with Boeri and Bruecker (2011) who find that firms facing international competition are the most likely to use STW in Germany.

### *6.3.3 The negative impact of the 35 hours week in short-time work establishments*

The potential internal flexibility provided by the implementation of the 35 hours week might have played an important role during the crisis. We do observe that the effect of the variable ”RTT employment” and ”RTT competitiveness” are significant in column 3. Moreover, they are the only variables about the internal organization that remain significant when the characteristics of the market are included in the regression (column 4).

Establishments that faced some difficulties in adjusting their employment level after the adoption of the 35 hours week were more likely to use STW during the crisis. The 35 hours week can provide some internal flexibility at a much lower cost than STW, if establishments decide to annualize working time. It might be the case that these STW establishments were less able to take advantage of this potential flexibility introduced by the 35 hours week, for some reasons that would need to be clarified. STW was therefore used to adjust hours only in the establishments which could not use the "RTT" as an internal flexibility tool. Even if more detailed information would be necessary to confirm this intuition, these results seem to echo the leading role played by the working-time accounts in Germany (Burda and Hunt (2011))

## 6.4 Conclusion

This chapter confirms that the establishments which used short-time work schemes during the crisis were highly specific. They were mainly export-oriented, which implies that they had better expectations about the recovery but also needed to react quickly when the recovery occurs. They were more likely to engage in social dialogue with union representatives before taking important decisions. In this respect, short-time work establishments seem closer to typical (medium-size) German firms than the other French establishments.

This result suggests that the specificity of each country's industrial fabric significantly determines the efficiency of short-time work schemes. Even though French and Germany share similar short-time work programs, the success of the German *Kurzarbeit* might be difficult to replicate in France. Even if these conclusions would need to be confirmed using a larger number of observations, they reveal interesting areas to explore in future research.

**Table 6.3** – Logistic regressions - propensity to use STW

	Baseline reg	Internal orga.	Market charac.	All variables
Size (log)	0.290*** (2.71)	0.207 (1.62)	0.228** (1.96)	0.192 (1.42)
Female share	-1.228** (-2.15)	-1.378** (-2.32)	-1.229** (-2.06)	-1.291** (-2.10)
Variation in VA 07/09	-0.518** (-2.53)	-0.601*** (-2.80)	-0.421* (-1.85)	-0.519** (-2.12)
Union delegates		0.903** (2.38)		0.632 (1.60)
Conflicts		0.00606 (0.02)		0.123 (0.41)
Social dialogue		0.442** (2.00)		0.296 (1.28)
Negotiations employment		0.109 (0.37)		0.0578 (0.19)
Social climate		0.200 (0.69)		0.308 (1.01)
Number of resource managers		-0.00504 (-0.72)		-0.00569 (-0.84)
RTT competitiveness		0.490** (2.25)		0.385* (1.68)
RTT employment		0.774*** (2.77)		0.853*** (2.94)
Employers' federation		-0.0474 (-0.15)		-0.0271 (-0.08)
Entrepreneurs Club		0.149 (0.67)		0.0787 (0.34)
Openness			1.027***	0.919***

**Table 6.3 – continued from previous page**

	(1)	(2)	(3)	(4)
			(3.87)	(3.35)
Innovation			-0.207 (-0.74)	-0.288 (-1.00)
Competition			0.619*** (2.89)	0.566** (2.55)
Quoted on the stock market			-0.00628 (-0.03)	-0.0407 (-0.18)
Outsourcing			0.879*** (2.69)	0.853** (2.56)
Training expenditures			-0.575** (-2.02)	-0.549* (-1.86)
Foreign Shareholder			0.656*** (2.75)	0.664*** (2.68)
Time before operationality			-0.000303*** (-3.15)	-0.000303*** (-3.09)
_cons	-3.875*** (-5.66)	-4.832*** (-5.58)	-4.942*** (-6.45)	-5.846*** (-6.09)
Control for industrial sector	YES	YES	YES	YES
<i>N</i>	1020	1011	1020	1011
Pseudo R <sup>2</sup>	0.31	0.31	0.33	0.35

*z-test* statistics in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

## Evaluating the impact of the “specific allocation”

There is a strong intuition that the design of the short-time work scheme - in particular the generosity of the state compensation - does affect the attractiveness of this labor market policy instrument. Thus, the level of the state compensation was at the heart of several governmental reforms, in January 2009 and February 2012.

However, little is known about the real impact of the state compensation level on STW consumption. Could an increase in the generosity of the scheme significantly foster the use of STW? In this last chapter, we try to estimate the causal impact of the state compensation level - more precisely of its “specific allocation” part - on STW consumption. We exploit a discontinuity between firms with less than 250 employees and firms with 250 employees or more regarding the level of compensation they are eligible for. Using a difference-in-difference approach, we estimate the impact of the 2009 reform which widened the compensation gap between these firms. Even though the results suggest a slightly positive impact of the reform on the propensity to use STW, we do not find any positive impact on the number of hours consumed.

## 7.1 Motivation for using a difference-in-difference approach

### 7.1.1 Presentation of the 2009 reform

Since the onset of the crisis, the fixed amount of the *specific allocation* (“allocation spécifique”)<sup>1</sup> has been defined according to the *full-time equivalent size of the parent firm*. Establishments that belong to firms with 250 full-time equivalent employees or less receive a higher compensation for each hour of STW consumed than establishments whose parent firm employs 250 full-time equivalent workers or more. The reform introduced in January 2009 increased the amount of this specific allocation for all establishments. However, the increase was larger for establishments whose parent firm had less than 250 full-time equivalent employees. As a result, the compensation gap between firms with 250 FTE employees or less and bigger firms widened. This specific feature of the reform motivates our difference-in-difference approach.

Before the reform, the state compensation was equal to 2.44 euros per hour for firms with 250 FTE employees or less and 2.13 euros per hour for firms with more than 250 FTE employees. The reform increased this compensation to 3.84 euros/hour for firms with less than 250 FTE employees, and to 3.33 euros/hour for firms with more than 250 FTE employees.

At the same time, the minimum hourly wage paid by the establishment to a worker for each hour of STW is defined by the law and does not depend on the firm’s size. It implies that STW establishments have to fill the gap between the state compensation and this minimum threshold. Even if the compensation gap between smaller and larger establishments was not very large (it varied from 0.31 \$ before the reform to 0.51 \$ after the reform), the 2009 reform might have affected differently the propensity to use STW in these two groups.

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<sup>1</sup> The *specific allocation* corresponds to the fixed compensation provided by the state to STW establishments for each hour of STW consumed. Cf. chapter 2, section 2.

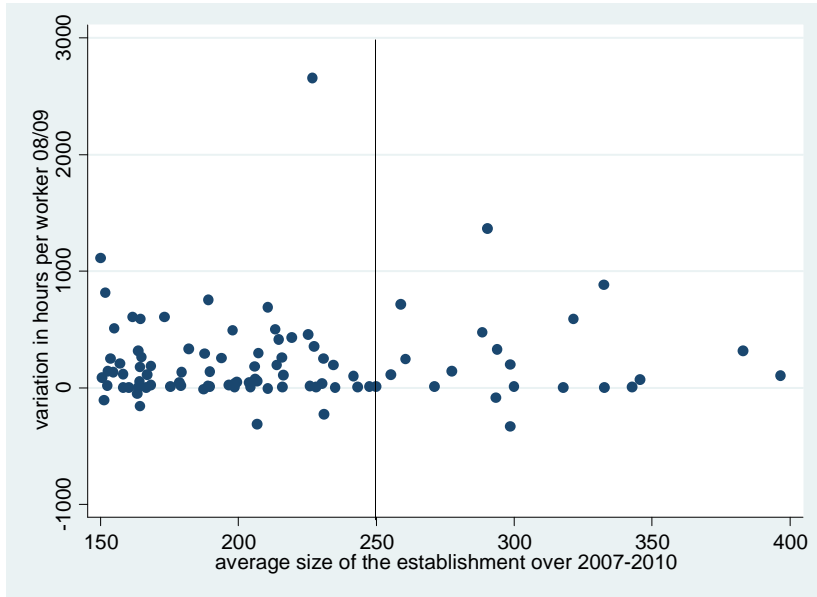


FIGURE 7.1 – Variation of the number of hours consumed (per worker) between 2008 and 2009 as a function of full-time equivalent establishments’ size

### 7.1.2 Graphical evidence

Figure 7.1 shows the variation of the total number of hours consumed per worker between 2008 and 2009, according to firms’ FTE size. For simplicity, we only look consider single-establishment firms and we exclude all the firms that did not use STW at all.

This graph suggests that the 250 FTE employees cutoff point does constitute a threshold. The average consumption of the firms above this threshold looks higher than the average consumption of the firms below this threshold. But more importantly, we notice an increase in the variance of the average consumption above the threshold and a much larger density of firms using STW below the threshold.

If the state compensation level was the only systematic difference between the two groups (*ceteris paribus*), we could use a regression discontinuity design to evaluate the impact of



the specific allocation on the propensity to use STW.

However, the 250 FTE employees threshold is not exactly arbitrary. This threshold is also used to distinguish between small and medium firms<sup>2</sup> and big firms. These two categories of firms are sometimes eligible for different public policies. It might have interfered with their propensity to use STW over the period. For instance, if firms with less than 250 FTE employees were eligible for a larger number of public policies to cope with the crisis, they might have relied less strongly on short-time work schemes.

This concern motivates our difference-in-difference approach. The two groups may have experienced different policies over the period; this could have affected differently their propensity to use STW. But the probability that these policies changed exactly in January 2009 is low. If the reform of the state compensation is the only one that affected differently the two groups in January 2009, we can properly identify the impact of the level of the state compensation on STW consumption.

## 7.2 Our empirical strategy

### *Model*

Our independent variables are the propensity to use STW, the number of hours consumed and the number of people placed on STW. The underlying idea is to assess whether the use of STW and the intensity of use did increase after the reform, which was supposed to make it more attractive.

To measure the impact of the reform, we run the following regression:

$$Y_{it} = \alpha + \gamma D_i + \delta \lambda_t + \beta D_i \lambda_t + \pi X_i + \epsilon_i \quad (7.1)$$

$D_i$  is a dummy variable equal to 1 if the establishment is in the treated group;  $\lambda_t$  is a dummy variable equal to 0 before the reform and 1 after the reform;  $X_i$  is a set of controls

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<sup>2</sup> These firms are called *PME* in France

(sector, variation in value added, FTE establishment's size). The interaction term  $D_i\lambda_t$  captures the effect of the reform, since it is equal to 1 only for treated individuals in the post-reform period.

The main assumption of this model is that, in the absence of a treatment, the two groups would have followed similar trends regarding their consumption of STW and their propensity to use it. We cannot test this hypothesis, but we can use the quarterly data we have to compare the trends of the two groups over a few quarters before and after the reform.

Figures 7.2 and 7.3 show the quarterly evolution of STW consumption for these two groups. We define firms between 150 and 250 FTE employees as the treated group and firms between 251 and 500 FTE employees as the control group.

Figure 7.2 presents the quarterly evolution of the number of establishments using STW within each group. The two lines overlap until 2008Q3, which reflects that almost no establishment used STW before this date. We notice a clear divergence in 2008Q4, with a higher increase in the number of establishments using STW in the control group. Since we know that the size of the establishment is a strong determinant of its propensity to use STW (cf. chapter 5), this result is not surprising. More interestingly, we notice that the two trends seem to converge in 2009Q1: the increase in the number of establishments using STW is much larger in the treated group than in the control group. This catch-up effect may reflect the impact of the reform, which fostered the use of STW in the treated group. Finally, the two groups follow similar trends over the last quarters of 2009.

Figure 7.3 shows the quarterly evolution of the total number of STW hours consumed by each group. In this case, the trends start to diverge before the reform. We do observe already a large difference between the two groups in 2008Q4 (before the reform). This divergence is not cancelled out in 2009Q1: we do not observe any catch-up effect during the first quarters of 2009. This graph does not indicate any clear impact of the reform.

Thus, the first graph seems to back up the hypothesis of a significant impact of the reform on the propensity to use STW. In the following section, we examine the robustness of this causality once the variation in value added between 2007 and 2009, the sector of activity, and the size of the establishments are controlled for.

FIGURE 7.2 – Comparison of treatment and control group, total number of establishments using STW each quarter

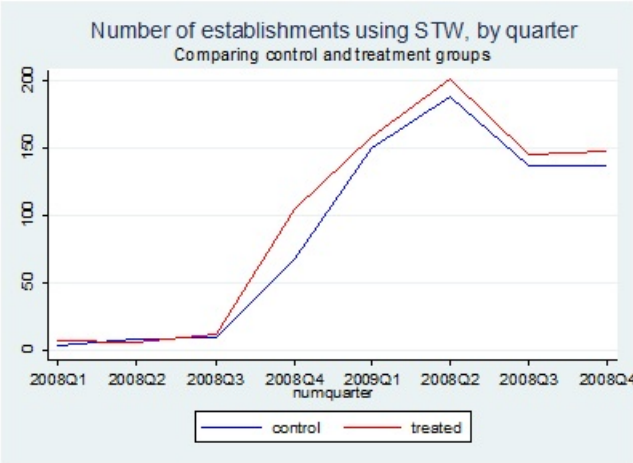
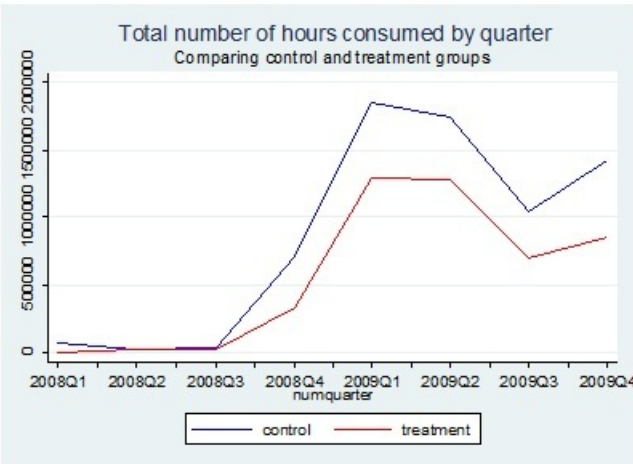


FIGURE 7.3 – Comparison of treatment and control group, total number of hours consumed each quarter



### *Defining the timing of the reform*

*The timing of the reform* The difference in difference approach has a drawback: it requires a precise definition of the timing of the reform, which can be challenging.

The reform was announced in 2008Q4. Moreover, a circular was published in 2008Q4 asking the local authorities to extend the eligibility criteria in order to foster the use of STW. Thus, a significant number of firms were probably quite aware of the coming change at the end of 2008 and have been able to adjust their STW consumption in 2009Q1.

At the end of 2008, the information firms had about STW probably increased: an growing number of articles about STW were published in the newspapers and the French government was promoting this measure as a key example of its determination to fight against the crisis. However, since employers need to file an application before getting the authorization to consume STW hours, those who had not anticipated the reform may have adjusted their consumption with a certain lag. To take into account these different scenarios, we consider successively 2009Q1 and 2009Q2 as being the post-reform quarter, and we take 2008Q4 as the pre-reform benchmark.

### *Data issue*

As mentioned before, the assignment rule depends on the full-time equivalent number of workers in the parent firm. One issue arises from the fact that the full-time equivalent number of workers in each firm is not available at the quarterly level in our data. We only have information about the FTE number of workers in the firm at the end of each year (December 2007, December 2008 and December 2009). It seems reasonable to consider that the FTE number of workers in December 2008 properly reflects the FTE number of workers in the pre-reform period. Concerning the post-reform period, we have to make the assumption that the full-time equivalent number of workers at the end of 2009 is a good indicator of the full-time equivalent number of workers in 2009Q1 or 2009Q2. Put differently, we consider

implicitly that the FTE number of workers in the firms remains pretty stable over the year.

## 7.3 Results

### *7.3.1 Effect of the 2009 reform on the propensity to use STW*

Table 7.1 shows the results for our reference treatment and control groups (considering [150;250] FTE employees as the treated group and [251;500] FTE employees as the control group). In appendix, we present the results when we include more observations in our treatment and control groups ([100;250] and [251;750] - table D.1).

We find a positive impact of the treatment on the propensity to use STW, which is weakly significant (10% level). Quantitatively, it would represent a 40% increase in the odds ratio of using STW, which is not negligible. Nevertheless, this coefficient is small as compared to the coefficient  $\lambda$  of the time dummy variable.

Considering 2009Q2 as the after-treatment period (column 2 in each table) does not change qualitatively the results, but the coefficient of interest becomes slightly smaller. It probably reflects a fading-out of the impact of the reform after a few quarters.

### *Robustness checks*

To test the robustness of these results, we use different placebo control and treatment groups. We define two groups by choosing an arbitrary threshold and we observe whether we find an impact of the “reform” for these two groups, whereas they have been assigned to the same treatment. The first placebo treatment includes all the establishments between 151 and 200 employees in the control group and all the establishments between 100 and 150 employees in the treated group - the results are presented in table 7.2. 150 employees constitutes a “fake” threshold since firms on each side of this threshold did receive the same treatment (i.e. the high level of state compensation). These placebo treatment and control groups are interesting because we have a large number of observations in each group without being very far from

the “real” threshold of 250 employees. We simulate a second placebo treatment (table D.2 in Appendix), including all the establishments between 101 and 150 FTE employees in the control group and all the establishments between 50 and 100 FTE employees in the treated group. This placebo treatment allows us to have an extremely large sample. Finally, we consider a third placebo treatment (table D.3 in Appendix), including all the establishments between 801 and 2000 employees in the control group and all the establishments between 650 and 800 employees in the treated group. Such a threshold leads to a smaller sample size.

None of these placebo treatments provides significant results. In particular, table 7.2 shows that the impact of the treatment is close to zero and highly insignificant, whereas the number of observations is comparable to the number of observations used for the real treatment and control groups. These results are confirmed by the implementation of a large number of alternative placebo treatments (which are not shown here for practical reasons, but available upon request), that all give small and insignificant coefficients for the impact of the treatment.

Overall, it seems that the reform did have a positive impact on the propensity to use STW, even though the significance of the coefficient is weak. These results are robust to changes in the definition of the treatment and control groups.

#### *Effect of the 2009 reform on the number of hours consumed and number of workers placed on STW*

Did the reform increase the intensity of use of STW? We do not seek to decompose the effect into a participation effect and an intensive margin effect but simply take the number of hours consumed or number of people affected by STW as alternative dependent variables. In other words, the participation effect and the intensity of use are mixed together in these results. A careful analysis of the intensive margin would try to isolate the intensive margin effect from the extensive margin one, by choosing an exclusion variable that correlates with

**Table 7.1** – Impact of the 2009 reform on the propensity to use STW - all establishments [150-500]

Binary variable: Propensity to use STW		
	(1) 2009Q1	(2) 2009Q2
Treated ( $\gamma$ )	-0.287* (-1.74)	-0.348** (-2.12)
After_reform ( $\lambda$ )	0.568*** (4.20)	0.871*** (6.73)
Treated_after ( $\beta$ )	0.368* (1.80)	0.341* (1.73)
Size (log)	0.529*** (6.19)	0.362*** (4.61)
Industry	2.317*** (16.22)	2.270*** (17.64)
Construction	-2.267** (-2.25)	-1.913*** (-2.66)
Variation in VA 07/09	-0.246*** (-4.35)	-0.169*** (-2.98)
Intercept	-7.394*** (-15.05)	-6.433*** (-14.35)
<i>N</i>	9342	9264
Pseudo R <sup>2</sup>	0.18	0.18

*z-test* statistics in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

The treated group includes all the establishments with more than 149 employees and less than 251 employees; the control group includes all the establishments with more than 250 employees and less than 501 employees. The after-reform period is defined as 2009Q1 in column 1 and 2009Q2 in column 2.

the propensity to use STW (extensive margin) but not with the intensity of use of this scheme (intensive margin). Given our limited knowledge about these determinants, we leave this analysis for future work. The results presented here must therefore be read cautiously.

Tables 7.3 and 7.4 show a negative impact of the treatment on the number of hours consumed and number of workers affected. These coefficients are not significant when we consider the establishments with 150-250 FTE employees as treated and the establishments with 251-500 FTE employees as non-treated (first column of each table) but they become significant when we consider a larger sample on each side of the threshold (second column of each table). Nevertheless, this probably does not reflect a causal impact of the treatment. Indeed, the implementation of placebo treatments also give negative and significant results (tables D.4 and 4.5 in Appendix D).

Actually, this negative impact of the “treatment” might reflect a non log-linear impact of the size on the intensity of STW consumption. Indeed, the treated firms are smaller than the non-treated ones (whether we consider placebo treatment or real ones) and we observed that the size is one of the strongest determinant of the intensity of STW consumption. To test this hypothesis, we include different polynomial order of the establishments’ size in our regression. This does not affect the coefficients and give insignificant coefficients for higher orders of the establishments’ size.

Overall, these negative coefficients rule out the hypothesis that the 2009 reform did promote significantly the use of STW on the intensive margin. More probably, it alleviated the financial burden of establishments that were already using STW. But understanding better how establishments deal with this intensive margin remains necessary - it is left for future work.



### 7.3.2 *Additional robustness checks*

So far, we have been assuming that the FTE number of workers in 2009Q1 and 2009Q2 was equal to the FTE number of workers at the end of 2009. If this assumption does not hold, because the firm has reduced a lot its workforce in 2009, our definition of the treatment and control group is misleading. Indeed, we are likely to consider an establishment as being treated (less than 250 FTE employees at the end of 2009 in its parent firm) whereas it was actually not treated because its parent firm had more than 250 FTE employees at the beginning of 2009. To deal with this issue, we can use the quarterly information we have about the number of workers in each firm (without full-time equivalence). We consider only the establishments with less than 20% of female workers, on the basis that part-time employment mainly concerns women. This restriction increases the probability that the number of workers in the firm each quarter is close to the FTE number of workers. We run the same regressions as before.

The estimates do not differ qualitatively from the previous results. However, we notice that the magnitude of the treatment effect increases. A more precise evaluation of the reform would thus require data on the “full-time equivalent” number of workers in each establishment on a quarterly level.

Finally, one might be concern that some establishments do not appear in our data set in the two periods. If we have more missing information for smaller establishments than for larger ones, our results might be biased. To rule out this concern, we run the regressions on the establishments for which we do not have any missing information. The results are very similar to the previous regressions<sup>3</sup>. It seems to confirm a slight and positive impact of the treatment on the propensity to use STW. Again, the impact on the number of hours consumed is negative but insignificant.

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<sup>3</sup> Consequently, we do not present these tables here. They are nevertheless available upon request

## 7.4 A crowding out effect due to the proliferation of alternative measures during the crisis ?

A large number of policies were adopted during the crisis to help small and medium size firms<sup>4</sup> to overcome the crisis. These policies might have affected differently the establishments, depending on their size. This may bias our regressions, in particular when we consider the number of hours consumed.

Let's assume that establishments are budget constrained and decide to consume STW hours so as to reduce their labor costs. In this case, the amount of STW hours consumed only depends on the establishment's budget constraint. As a consequence, any policy which loosens the budget constraint of the establishment will have an impact on the number of STW hours consumed (or on the number of workers affected by STW). The establishment will reduce the number of STW hours consumed because the amount of labor costs it needs to save decreases.

One of these anti-crisis policies, administered by the public bank OSEO, has consisted in helping some firms which were credit constrained during the crisis. The public bank proposed loans to firms that could not borrow because of the crisis, conditioning on the fact that those firms did not have structural problems (it only targeted establishments considered as "*viable*"). The adoption of this scheme in 2008Q4 affected firms with less than 250 FTE employees only, without being accessible to firms with 250 FTE employees or more. Firms with less than 250 employees that were eligible to this scheme might have therefore reduced their consumption of STW. On the contrary, the establishments which remained credit constrained but could not benefit from this policy - in particular, firms with more than 250 employees - kept their STW consumption level unchanged.

The eligibility criteria for the loans are not precisely defined. We know that firms with more than 250 employees cannot benefit from it and that firms which are not considered as

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<sup>4</sup> called "PME" in French, i.e. firms with less than 250 employees and more than 20 employees

“viable” cannot benefit from it either. More importantly, we can assume that the firms that asked for the loans were the most credit constrained, with high level of debt and low liquidity ratio. Under this assumption, a correlation between the level of debt or the liquidity ratio of firms and their consumption of STW would reflect a substitution effect between these two policies.

To examine this hypothesis, we run the same regressions as before adding the liquidity ratio of establishments in 2008 or 2009. This does not affect qualitatively the results and this variable is not significant. Adding the level of debt in 2008 or 2009 is not significant either, without affecting the other coefficients of the regression (table 7.5).

However, these indicators are very basics and might not determine the possibility for firms to receive loans. Even if we do not find any evidence of a crowding out effect, this hypothesis would need to be examined further. The small and medium firms might have preferred alternative measures, which were developed during the last quarters of 2008 and first quarters of 2009, rather than increasing their consumption of STW. As in chapter 5, the attractiveness of STW is partly determined by the alternative tools that establishments can use. In this respect, a cost/benefit comparison between STW and other LMP tools would be interesting, whereas most of the papers have focused exclusively on the correlation between STW and layoffs so far.

## 7.5 Conclusion

Thus, the 2009 reform has affected slightly the propensity of firms to use STW. It increased the participation of the establishments which received the highest increase in their state compensation. Nevertheless, these results have to be interpreted with caution. Indeed, they might partly reflect an heterogeneity between firms with less than 250 employees and firms with more than 250 employees, since the common trends hypothesis before the reform is not straightforward. The interaction between short-time work schemes and other types of public

policies offered to medium-size firms during the crisis would need to be investigated further.

Moreover, while positive and significant, the impact of the 2009 reform remained limited. It also has faded out quite quickly, as suggested by the lower coefficients when we look at the second quarter of 2009. At the same time, its costs for public finances was high. Even if increasing the state compensation level is effective in promoting short-time work schemes, it might not be the most efficient tool to increase STW consumption at less cost. The previous chapters of this thesis have tried to consider alternative levers of action for future reforms.

**Table 7.2** – Robustness check - Placebo treatment [100-200]

Binary variable: Propensity to use STW		
	(1)	(2)
After reform:	2009Q1	2009Q2
Placebo	0.151 (0.71)	0.0936 (0.44)
After_reform	0.944*** (4.68)	1.199*** (6.12)
Placebo_after	-0.0718 (-0.28)	0.0303 (0.12)
Size (log)	0.594*** (3.65)	0.372** (2.59)
Industry	2.546*** (14.66)	2.305*** (15.90)
Construction	-1.170 (-1.61)	-0.660 (-1.41)
Variation in VA 07/09	-0.00955 (-1.49)	-0.00856 (-1.45)
Intercept	-8.172*** (-9.41)	-6.837*** (-9.00)
<i>N</i>	7296	7231
Pseudo R <sup>2</sup>	0.17	0.17

*z-test* statistics in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

The treated group includes all the establishments with more than 99 employees and less than 151 employees; the control group includes all the establishments with more than 150 employees and less than 201 employees. The after-reform period is defined as 2009Q1 in column 1 and 2009Q2 in column 2.

**Table 7.3** – Impact of the 2009 reform on the number of STW hours consumed

Dependent variable: Number of STW hours consumed		
	(1)	(2)
After reform:	2009Q1	2009Q1
Treat./control groups:	150-250/251-500	100-250/251-750
Treated	-57.10 (-0.65)	-12.88 (-0.19)
After_reform	533.0*** (5.88)	554.0*** (7.58)
Treated_after	-140.4 (-1.10)	-228.6** (-2.40)
Size (log)	475.4*** (9.64)	518.5*** (13.66)
industry	943.9*** (13.76)	865.0*** (17.12)
construction	17.06 (0.15)	14.88 (0.18)
Variation in VA 07/09	-3.075 (-0.81)	-1.625 (-0.79)
Intercept	-2499.6*** (-9.62)	-2707.0*** (-13.48)
<i>N</i>	9342	15845
Adjusted R-squared	0.04	0.04

*z-test* statistics in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

In column 1, the treated group includes all the establishments with more than 149 FTE employees and less than 251 FTE employees; the control group includes all the establishments with more than 250 FTE employees and less than 501 FTE employees. In column 2, the treated group includes all the establishments with more than 99 FTE employees and less than 251 FTE employees; the control group includes all the establishments with more than 250 FTE employees and less than 751 FTE employees. The after-reform period is defined as 2009Q1 in both columns.

**Table 7.4** – Impact of the 2009 reform on the number of workers affected

Dependent variable: Number of workers affected		
	(1)	(2)
After reform:	2009Q1	2009Q1
Treat./control groups:	150-250/251-500	100-250/251-750
Treated	-2.183** (-2.06)	-1.139 (-1.13)
After_reform	5.264*** (4.84)	6.910*** (6.25)
Treated_after	-0.878 (-0.57)	-3.392** (-2.35)
Size (log)	7.192*** (12.16)	8.753*** (15.23)
Industry	14.66*** (17.81)	14.16*** (18.51)
Construction	0.353 (0.26)	0.373 (0.30)
Variation in VA 07/09	-0.0394 (-0.86)	-0.0192 (-0.61)
Intercept	-36.27*** (-11.63)	-44.28*** (-14.56)
<i>N</i>	9342	15845
Adjusted R-squared	0.06	0.05

*z-test* statistics in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

In column 1, the treated group includes all the establishments with more than 149 FTE employees and less than 251 FTE employees; the control group includes all the establishments with more than 250 FTE employees and less than 501 FTE employees. In column 2, the treated group includes all the establishments with more than 99 FTE employees and less than 251 FTE employees; the control group includes all the establishments with more than 250 FTE employees and less than 751 FTE employees. The after-reform period is defined as 2009Q1 in both columns.

**Table 7.5** – Testing the possibility of a crowding-out effect

Dependent variable: Number of STW hours consumed					
	(1)	(2)	(3)	(4)	(5)
Treated	-57.10 (-0.65)	-50.07 (-0.57)	-65.81 (-0.73)	-59.52 (-0.68)	-61.18 (-0.69)
After_Reform	533.0*** (5.88)	510.2*** (5.67)	536.2*** (5.82)	508.6*** (5.68)	516.7*** (5.71)
Treated_after	-140.4 (-1.10)	-116.3 (-0.92)	-139.9 (-1.08)	-114.0 (-0.91)	-129.0 (-1.01)
Size (log)	475.4*** (9.64)	462.8*** (9.45)	478.3*** (9.54)	455.4*** (9.37)	472.6*** (9.57)
Industry	943.9*** (13.76)	919.5*** (13.47)	935.9*** (13.40)	938.0*** (13.84)	936.5*** (13.64)
Construction	17.06 (0.15)	12.91 (0.11)	13.62 (0.12)	22.00 (0.20)	16.67 (0.15)
Variation in VA 07/09	-3.075 (-0.81)	-2.963 (-0.79)	-3.845 (-0.89)	-2.908 (-0.78)	-3.009 (-0.79)
Level of debt in 2008		-0.313 (-0.21)			
Level of debt in 2009			-0.825 (-0.55)		
Liquidity_ratio_2008				-2.046 (-0.73)	
Liquidity_ratio_2009					0.458 (1.00)
_cons	-2499.6*** (-9.62)	-2427.9*** (-9.40)	-2497.9*** (-9.43)	-2397.0*** (-9.35)	-2483.5*** (-9.53)
<i>N</i>	9342	9213	9155	9235	9257
Adj R-squared	0.04	0.04	0.04	0.04	0.04

*t* statistics in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

The treated group includes all the establishments with more than 149 employees and less than 251 employees; the control group includes all the establishments with more than 250 employees and less than 501 employees. The after-reform period is defined as 2009Q1 in all columns.



## Conclusion

The demand for short-time work in France did increase significantly during the recent crisis. Based on the success of the German scheme and following the recommendations of various organizations (ILO, OECD), the French government reformed the former scheme to promote short-time work as a prime labor market instrument during the crisis. However, at the peak of the crisis, the number of establishments using STW remained quite low in France compared to Germany, Belgium or Italy - which have similar labor market regulations. This paper highlights some leading factors that need to be considered to understand why STW schemes were shunned by most of the French establishments.

**The first finding is that short-time work was competing with other types of labor flexibility instruments such as fixed term contracts, temporary work and working time accounts. For an overwhelming majority of French establishments, these latter flexibility instruments were cheaper than the use of short-time work.** Unlike this vast majority of establishments, STW establishments were characterized by a lower share of fixed term contracts and temporary contracts than other firms. When the crisis hit them, they could not use these external flexibility tools and had to rely on internal

flexibility. The “working time accounts” resulting from the adoption of the 35 hours week might have provided internal adjustment margins for a significant number of establishments, as was the case in Germany. We find that STW establishments in our sample were more likely to have suffered from the adoption of the 35 hours week than non-STW establishments. Even though this indicator is vague, it might suggest that those establishments were less likely to use working time accounts. This question would surely need to be addressed in future work, using qualitative and quantitative data about the use of working time accounts during the crisis.

**Second, employers’ expectations about the imminence of the recovery have probably mattered a lot in affecting take-up rates. We evidence that STW establishments operate on larger markets and face stronger competitive pressure than non-STW establishments. These establishments were therefore expecting a quick recovery driven by international demand,** whereas non-STW establishments operating on the French market had pessimistic expectations. Labor costs are still high for STW establishments: if the crisis is expected to last, STW loses its attractiveness. As evidenced in Burda and Hunt (2011), this was also the case in Germany. The specificity of the German economy, which has a large and powerful export-oriented sector, might thus partly explain the higher take-up rates of short-time work in this country.

**These two points converge to the same conclusion: short-time work remained too costly for French establishments in a context of high uncertainty, as compared to alternative flexibility tools.** Can we then think of a way to improve the design of the current scheme in France?

Our results suggest that the 2009 reform had a slightly positive impact on the propensity to use STW. Firms that experienced a higher increase in the level of their state compensation and benefited from higher absolute level of compensation were more likely to start using

STW. Nevertheless, the significance of these results is weak and would need to be confirmed with a more detailed evaluation. It would require for example a better identification of the timing of the reform, using monthly data. It would also necessitate to identify precisely all the reforms that were implemented at the beginning of 2009 and might have interfered with the increase in the state compensation level. Discussing further the potential crowding-out effects that might have resulted from the multiplication of labor market policies during the crisis is a promising and challenging objective for future work.

**Finally, the fact that the use of short-time work was the exception rather than the rule sheds light on the current French labor market. Most of the establishments were flexible and did not need to pay high layoffs costs when the crisis occurred. In this regard, the French labor market has evolved significantly since the nineties.**

In order to remain attractive, the French short-time work scheme would thus need to be redefined. If this instrument could provide internal flexibility in the nineties, it turns out to be more costly than alternative flexibility tools today. On the other hand, its ability to prevent human capital depreciation and therefore to generate productivity gains in the medium run is probably underestimated by employers. Unlike what happened in Germany, the will to preserve a high skilled labor force was not an important motivation for French establishments. STW establishments were not more innovative than non-STW ones, neither more concentrated in high-skilled industries. Thus, reinforcing the combination between short-time work and training appears to be crucial. If short-time work can play a leading role in times of crisis, its attractiveness - as well as its macro-level benefits - depend now on its ability to be more than an additional flexibility instrument.

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# Appendix A

Appendix A : Merging DMMO with AGLAE

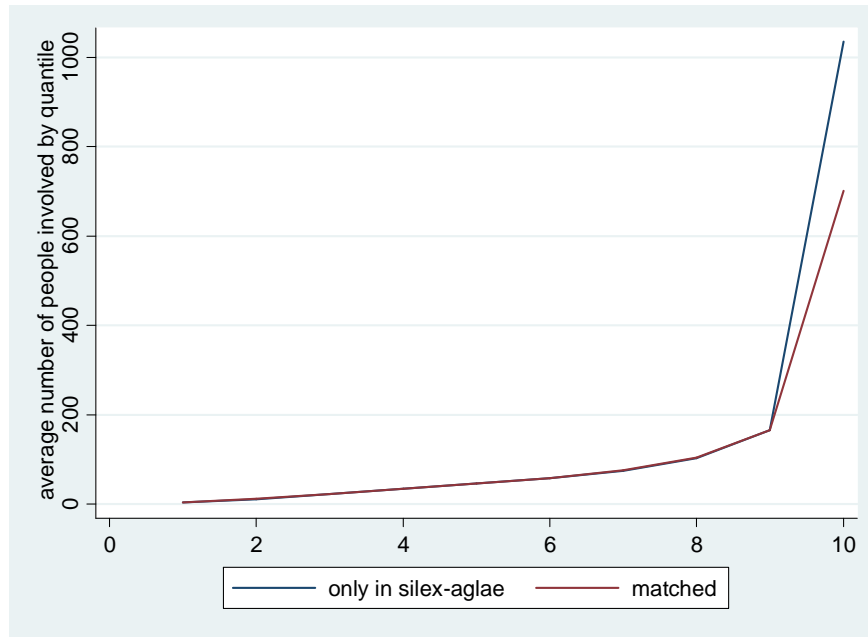


FIGURE A.1 – Average number of people affected by decile in the merged dataset and in the SILEX-Aglae dataset

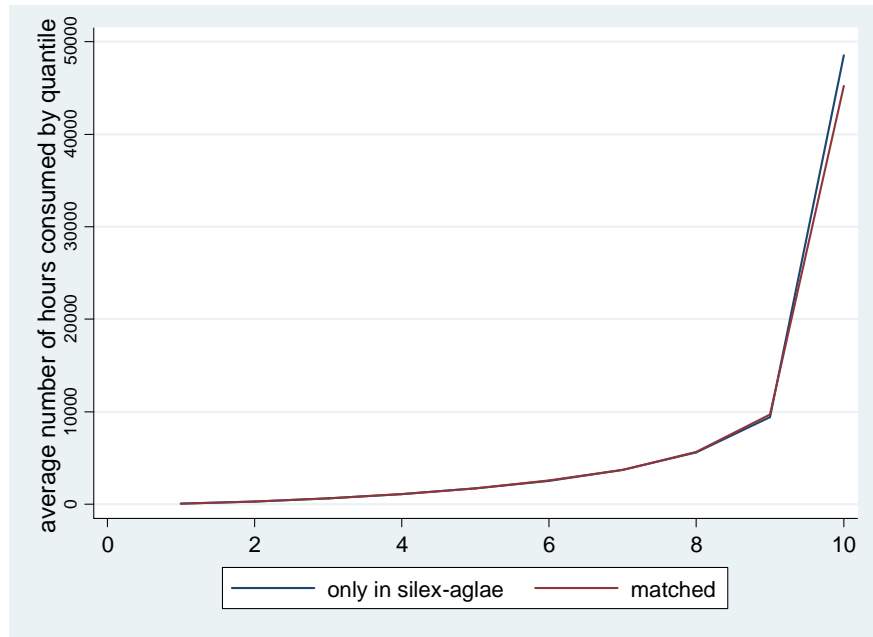


FIGURE A.2 – Average number of hours consumed by decile in the merged dataset and in the SILEX-Aglae dataset



# Appendix B

Appendix B : Merging DMMO-AGLAE with economic  
data

**Table B.1** – Merging and selection bias

	<b>DMMO-Aglae</b>	<b>DMMO-Aglae with economic data</b>	<b>REPONSE</b>
<b>Average establishment size</b>	165.38	168.12	431.79
50-249	81.07%	85.23%	52.77%
250-499	9.67%	10.24%	18.72%
500-999	3.33%	3.41%	20.54%
More than 1000	1.16%	1.11%	7.63%
<b>Sector</b>			
Agriculture	0.52%	0.43%	0%
Industry	28.31%	33.28%	48.27%
Construction	7.02%	9.29%	5.98%
Services	63.82%	56.68%	45.67%
<b>STW consumption</b>			
Percentage of establishments using STW	1.85%	2.17%	15.68%
Average number of workers affected in STW establishments	125	138	364
Average number of hours consumed in STW establishments	7219	7882	46045
<b>Quarterly Workforce flows</b>			
Average number of inflows each quarter	18.25	17.46	24.56
Average number of outflows each quarter	18.34	17.55	25.59
Turnover	17.29%	13.71%	7.60%
<b># observations</b>	<b>602 289</b>	<b>395 320</b>	<b>1 154</b>

# Appendix C

## Appendix C : Description of the variables created in chapter 6

We create a range of new variables, picked up from the answers given in the REPONSE survey:

- *Union delegates* is equal to 1 if the establishment has union delegates , 0 elsewhere
- *Openness* is equal to 1 if the establishment reports having an international or european market, 0 elsewhere
- *Innovation* is equal to 1 if the establishment reports innovation as being the most important component of its strategy to be competitive, 0 elsewhere
- *Competition* is equal to 1 is the establishment reports having "a low margin or no margin to set its prices", 0 elsewhere
- *Outsourcing* is equal to 1 if the establishment uses outsourcing, 0 elsewhere
- *Training expenditures* is equal to 1 if the establishments spends more than 4% of its revenue for training, 0 elsewhere
- *Time before operationality* is equal to the average number of hours required before a new worker is fully operational

- *Foreign shareholder* is equal to 1 if the main shareholder is a foreigner, 0 elsewhere
- *Conflicts* is equal to the number of conflicts that occurred in the firm between 2002 and 2005
- *Social dialogue* is equal to 1 if the establishment holds discussions with its employees before any important change, 0 elsewhere
- *Social climate* is equal to 1 if the person interviewed reports that the climate in the firm is “peaceful”, 0 elsewhere
- *Negotiations employment* is equal to 1 if negotiations about employment took place recently, 0 elsewhere
- *RTT employment* is equal to 1 if the establishment considers that the adoption of the 35 hours week has deteriorated its employment, 0 elsewhere
- *RTT competitiveness* is equal to 1 if the establishment considers that the adoption of the 35 hours week has deteriorated its competitiveness, 0 elsewhere
- *Employers’ federation* is equal to 1 if the establishment is part of an employers’ federation, 0 elsewhere
- *Entrepreneurs Club* is equal to 1 if the establishments’ managers frequent a club of entrepreneurs on a regular basis, 0 elsewhere

# Appendix D

Appendix D : Robustness checks (chapter 7)

**Table D.1** – Impact of the 2009 reform - Robustness check with all establishments in [100-750]

Binary variable: Propensity to use STW		
	(1) 2009Q1	(2) 2009Q2
Treated	-0.172 (-1.32)	-0.258** (-2.02)
After_reform	0.515*** (4.47)	0.822*** (7.47)
Treated_after	0.393** (2.47)	0.399*** (2.61)
Size (log)	0.514*** (7.72)	0.346*** (5.64)
Industry	2.507*** (21.36)	2.305*** (23.14)
Construction	-1.998** (-2.79)	-1.319*** (-3.14)
Variation in VA 07/09	-0.00285 (-0.34)	-0.00372 (-0.53)
Intercept	-7.506*** (-19.27)	-6.413*** (-18.16)
<i>N</i>	15845	15681
Pseudo R <sup>2</sup>	0.18	0.18

*z-test* statistics in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

The treated group includes all the establishments with more than 99 FTE employees and less than 251 FTE employees; the control group includes all the establishments with more than 250 FTE employees and less than 751 FTE employees. The after-reform period is defined as 2009Q1 in column 1 and 2009Q2 in column 2.

**Table D.2** – Impact of the 2009 reform - Robustness check with placebo treatment [50-100/101-150]

Binary variable: Propensity to use STW		
	(1) 2009Q1	(2) 2009Q2
Placebo	-0.162 (-0.93)	-0.193 (-1.12)
After_reform	0.872*** (5.53)	1.239*** (8.13)
Placebo_after	0.241 (1.23)	0.294 (1.55)
Size (log)	0.596*** (4.58)	0.530*** (4.11)
Industry	2.764*** (20.13)	2.580*** (22.95)
Construction	0.0408 (0.13)	-0.262 (-0.91)
Variation in VA 07/09	-0.0101** (-1.99)	-0.0104** (-2.31)
Intercept	-8.213*** (-12.37)	-7.725*** (-11.85)
<i>N</i>	16108	15945
Pseudo R <sup>2</sup>	0.18	0.20

*z-test* statistics in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

The treated group includes all the establishments with more than 50 FTE employees and less than 101 FTE employees; the control group includes all the establishments with more than 100 FTE employees and less than 151 FTE employees. The after-reform period is defined as 2009Q1 in column 1 and 2009Q2 in column 2.

**Table D.3** – Impact of the 2009 reform - Robustness check with placebo treatment [650-800/801-2000]

Binary variable: Propensity to use STW		
	(1) 2009Q1	(2) 2009Q2
After reform:		
Placebo	-0.362 (-1.33)	-0.323 (-1.19)
After_reform	0.513*** (3.39)	0.686*** (4.66)
Placebo_after	-0.407 (-1.05)	-0.604 (-1.56)
Size (log)	0.414*** (5.62)	0.381*** (5.31)
Industry	2.613*** (12.37)	2.118*** (12.20)
Construction	0 (.)	-2.576** (-2.54)
Variation in VA 07/09	0.0127*** (3.05)	0.0203*** (3.05)
Intercept	-6.974*** (-15.61)	-6.374*** (-15.27)
<i>N</i>	4493	5296
Pseudo R <sup>2</sup>	0.19	0.19

*z-test* statistics in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

The treated group includes all the establishments with more than 649 FTE employees and less than 801 FTE employees; the control group includes all the establishments with more than 800 FTE employees and less than 2001 FTE employees. The after-reform period is defined as 2009Q1 in column 1 and 2009Q2 in column 2.



**Table D.4** – Impact of the reform on the number of STW hours consumed - Placebo treatments

Dependent variable: Number of STW hours consumed		
	(1)	(2)
After reform:	2009Q1	2009Q1
Placebo treat./control groups:	100-150/151-200	650-800/801-2000
Placebo	42.44 (0.63)	-348.7 (-1.22)
After_reform	437.2*** (5.68)	798.4*** (4.72)
Placebo_after	-169.6* (-1.76)	-136.4 (-0.33)
Size (log)	296.8*** (5.43)	930.2*** (10.34)
Industry	654.6*** (13.18)	1556.7*** (8.69)
Construction	-19.94 (-0.24)	143.0 (0.66)
Variation in VA 07/09	-0.772 (-0.45)	11.70 (1.21)
[1em] Intercept	-1597.5*** (-5.74)	-4894.6*** (-10.58)
<i>N</i>	7296	5390
Adjusted R-squared	0.04	0.05

*t-test* statistics in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

In column 1, the treated group includes all the establishments with more than 99 FTE employees and less than 151 FTE employees; the control group includes all the establishments with more than 150 FTE employees and less than 201 FTE employees. In column 2, the treated group includes all the establishments with more than 649 FTE employees and less than 801 FTE employees; the control group includes all the establishments with more than 800 FTE employees and less than 2000 FTE employees. The after-reform period is defined as 2009Q1 in both columns.

**Table D.5** – Impact of the reform on the number of workers affected - Placebo treatments

Dependent variable: Number of workers affected		
	(1)	(2)
After reform:	2009Q1	2009Q1
Placebo treat./control groups:	100-150/151-200	650-800/801-2000
Placebo	0.937 (1.12)	-7.095 * (-1.66)
After reform	4.757*** (4.98)	7.810*** (3.09)
Placebo_after	-2.024* (-1.69)	6.834 (1.11)
Size (log)	3.957*** (5.83)	15.46*** (11.49)
Industry	9.727*** (15.78)	26.42*** (9.87)
Construction	-0.255 (-0.25)	2.419 (0.74)
Variation in VA 07/09	-0.00946 (-0.44)	0.112 (0.77)
Intercept	-21.09*** (-6.11)	-79.07*** (-11.43)
<i>N</i>	7296	5390
Adjusted R-squared	0.04	0.06

*t*-test statistics in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

In column 1, the treated group includes all the establishments with more than 99 FTE employees and less than 151 FTE employees; the control group includes all the establishments with more than 150 FTE employees and less than 201 FTE employees. In column 2, the treated group includes all the establishments with more than 649 FTE employees and less than 801 FTE employees; the control group includes all the establishments with more than 800 FTE employees and less than 2000 FTE employees. The after-reform period is defined as 2009Q1 in both columns.