Insurance Between Firms: The Role of Internal Labor Markets *

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Abstract

We provide evidence that French business groups rely on Internal Labor Markets (ILMs) to respond to shocks calling for labor adjustments that are costly to perform in frictional external labor markets. ILM activity is higher in more diversified groups, where affiliated firms are more likely to be subject to unrelated shocks. Adverse shocks leading to closures and mass layoffs in a group trigger ILM activity, boosting the proportion of separating workers (mainly blue collars) redeployed to other group units as opposed to external labor market destinations; this effect is stronger when the adversely hit unit is subject to more stringent employment protection regulation. The ILM reallocation operates more intensely towards groups units that are more efficient, enjoy better growth opportunities, and have not run out of financing capacity. Positive shocks (i.e. the closure of a large competitor) and the ensuing growth opportunities also translate into increased ILM activity, with (mostly high-skilled) workers allocated to the favorably-affected firms in the group. Overall, our evidence supports the claim that ILMs emerge as a co-insurance mechanism across group-affiliated firms, providing job opportunities to groups' employees as a by-product.

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1 Introduction

We investigate the claim that Internal Labor Markets (ILMs) allow complex organizations to accommodate idiosyncratic shocks calling for labor adjustments in their productive units. To the extent that hiring and firing costs plague the external labor market, labor adjustments may be less onerous to perform within the internal labor market. Through the ILM, different productive units in corporate groups and conglomerates can provide mutual insurance to each other: units hit by an adverse shock can avoid termination costs by redeploying part of their employees to healthier units; similarly, units faced with profitable growth opportunities can swiftly draw on the human capital available within the ILM, curbing search and training costs that can considerably constrain expansion.

In the paper, we provide direct evidence that Internal Labor Markets operate within French business groups. We examine how ILMs work in bad times, in good times, and "on average" (across bad, normal, and good times). Average measures of ILM activity allow us to assess how (horizontal) mobility is used across firms, within business groups, whereas most of the ILM literature has focused on vertical mobility, within firms. They also constitute a benchmark against which to measure the effect of shocks. We first examine adverse shocks. When adverse shocks hit individual group subsidiaries, we investigate whether groups' ILMs operate as an efficient co-insurance mechanism, redeploying workers from adversely hit units towards healthier subsidiaries. We also explore the role of external labor market frictions in driving this response. Finally, we look at positive shocks. When positive shocks hit individual group subsidiaries, we investigate whether the ILM helps groups redeploy workers to these subsidiaries that enjoy these new growth opportunities. To accomplish these different empirical analyses, we rely on extremely precise data sources perfectly suited for our task. More precisely, we merge a so-called "matched employer-employe" data set provided by the INSEE (Institut National de la Statistique et des Études Économiques), allowing us to follow individual job-to-job transitions, with detailed information on the structure of business groups in France, i.e. the different firms that comprise each group, together with administrative fiscal data on balance sheets and income statements for virtually all French firms, including in particular all those that belong to a group.

We focus here on the functioning of ILMs within business groups, a widespread organizational form in both developed and developing economies for the reasons that we detail just below.[1]

An established view in the economic literature is that corporate groups fill an institutional void

[1]Business groups account for a large fraction of the economic activity in many of the countries where they are active. See La Porta, Lopez-de Silanes, and Shleifer (1999) and Faccio, Lang, and Young (2001).

in countries and periods where external labor and financial markets display frictions (Khanna and Palepu (1997), Khanna and Yafeh (2007)). While a large body of work has analyzed groups' internal *capital* markets, little attention has been devoted to understand whether groups operate internal labor markets and the precise operating mechanisms.[2] Our paper contributes to fill this gap by providing direct evidence on the activity and the role of ILMs in groups.[3] One advantage of studying ILMs within business groups (i.e. groups of firms) rather than stand-alone multi-establishment firms (i.e. groups of establishments) is that we can precisely measure profits, productivity, debt, cash holdings and other balance sheet items in the former when, by contrast, this study is hampered by the absence of similar data for the various establishments. This allows us to answer questions on the characteristics that affect the directions of human capital mobility across group-affiliated firms through the ILM.

We first show that French groups actually operate internal labor markets, accounting for the endogeneity of group structure. Indeed, intense within-group mobility may not be *per se* evidence that ILMs function more smoothly than external labor markets. For instance, high intra-group mobility may be observed because group-affiliated firms are intensive in occupations for which workers' mobility is intrinsically high.

In order to isolate the contribution of the ILM channel to the probability that a worker is hired by a group-affiliated firm, we need to account for the (time-varying) "natural propensity" each firm has to hire workers transiting from job-to-job between two occupations. The availability of detailed matched employer-employee panel data allows us to directly measure the *excess probability* that a worker is hired by a given firm if she was originally employed in the same group (over the probability to be hired by that firm if she was originally employed outside the group).

For the average group-affiliated firm, the probability to absorb a worker previously employed in the same group exceeds by 9 percentage points the probability to absorb a worker not previously employed in its group. We take this result as evidence of the existence of ILMs in groups. This ILM activity is most intense for high-skill workers. Group-affiliated firms in France are thus prone to draw upon their group labor force rather than upon the external labor market: why is this the case? While the

[2]Several papers have studied internal capital markets in groups, showing that internal capital markets make group-affiliated firms more resilient to shocks and to product market competition than stand-alone firms. See Gopalan, Nanda, and Seru (2007), Almeida, Kim, and Kim (2015), and Boutin, Cestone, Fumagalli, Pica, and Serrano-Velarde (2013), as well as Maksimovic and Phillips (2013) for a recent survey.

[3]France represents and interesting case study for investigating corporate groups. From 1999 to 2010, firms affiliated with groups accounted for around 40% of total employment, with substantial variability observed across sectors: in the financial sector affiliated firms account for more than 80% of total employment, whereas in agriculture the percentage is below 10%. Within manufacturing, on average affiliated firms account for almost 70% of total employment, but such share can be as high as 90% in automotive and energy.

personnel economics literature has emphasized the role of *vertical ILMs* in designing employee careers, our evidence suggests that internal promotions explain only in part why groups operate ILMs. Indeed, ILM activity computed restricting attention to horizontal job changes remain very high. Furthermore, ILM activity is larger in groups that are more diversified.[4]

To further understand diversification component of of *horizontal ILMs*, we explore their role as a mutual insurance mechanism across affiliated firms against idiosyncratic shocks that call for costly labor adjustments.

To study how ILMs allow groups to respond to *negative shocks*, hence in bad times, we turn to a difference-in-difference identification strategy, using firm closures and mass layoffs. For each group-affiliated closing firm, we identify the set of all the actual and potential destinations of the displaced workers. Our unit of observation is a pair – firm of origin/firm of destination – and a year, in which the firm of origin shuts down. We then look at the evolution of employment flows at closure relative to normal times in pairs of firms affiliated with the same corporate group as opposed to pairs that do not belong to the same group. Following this displacement event, with workers flowing from the closing firm, the comparison between the flows just at closure relative to normal times allows us to identify the ILM effect.

Firm closures within a group are shown to trigger ILM activity: in bad times w.r.t. to normal times, the fraction of workers displaced by a closing group subsidiary and redeployed to a group-affiliated destination-firm is larger than the fraction redeployed to an external labor market destination-firm by more than 11 percentage points. We then show that ILM activity responds more strongly to the closure of group units that experience larger firing costs. Indeed, the closure of subsidiaries with 50 and more employees - which according to French labor laws are subject to more stringent employment protection regulations - generates a larger increase in ILM flows than for the closure of subsidiaries with just less than 50 employees. We also find that employees of a closing group-affiliated firm move to unemployment much less often than employees of a closing stand-alone firm. Consistent with these results, the main beneficiaries of ILM activity at closure are blue-collar workers, reversing the pattern observed in "average times". These results strongly suggest that groups rely on ILMs to overcome employment protection regulations and unions' pressure, particularly when faced with potentially

[4]Sectoral and geographical diversification make it more likely that group units are exposed to unrelated shocks. On the other hand, diversification might also hinder ILM activity: it is more difficult to redeploy workers across group units operating in different sectors if sector-specific skills are required; similarly, it is more difficult to move workers across geographically dispersed units because of trade union resistance and employment protection regulation. Our results suggest that the former effect of diversification on ILM activity prevails.

large-scale separations costs (see Kramarz and Michaud (2010)). In addition, we find that employees displaced from closing subsidiaries are redeployed, within the ILM, to more efficient group units and to units that enjoy better growth opportunities. We also find that displaced workers are less actively reallocated to those units that lack the financial muscle to expand their workforce.

To further investigate these cross-insurance mechanisms, we study how groups use ILMs when faced with *positive shocks*, namely when a group subsidiary experiences a growth opportunity following the death of a large competitor when other subsidiaries in the same group do not have similar opportunities. Our results show that group-affiliated firms in the affected (but non-declining) industry increase their ILM use – rather than the external labor market – when hiring managers and other high-skill workers.[5] Therefore, ILMs within groups help alleviate the costs faced on the external market in the search and hiring of skilled human capital (see Kramarz and Michaud (2010)).

By investigating the existence and the functions performed by internal labor markets in groups, where human capital is actively reallocated across subsidiaries, this paper builds a bridge across the labor/personnel economics literature and the finance literature. The labor/personnel literature has mostly studied the functioning of internal labor markets *within firms*. Focusing on internal careers, a large body of work has shown how implicit insurance mechanisms and incentives to accumulate human capital can be provided through internal promotions.[6] Our results suggests that *vertical careers* explain only partially why business groups operate internal labor markets. By contrast, we provide evidence that groups use *horizontal ILMs* to accomodate various economic shocks in the presence of frictions.

Within the finance literature, many have claimed that internal labor markets in business groups operate alongside internal capital markets to make up for under-developed and frictional external markets. However, little empirical work has investigated the precise functioning of ILMs in groups. In a small sample of large business groups in Chile and India, Khanna and Palepu (1999) find that intra-group mobility is high for managerial occupations. Belenzon and Tsolmon (2015) provide evidence that corporate groups prevail in Western European countries where employment protection regulation is stricter, suggesting that groups derive larger benefits from ILMs in the presence of external labor market frictions. In a recent paper, Faccio and O'Brien (2015) present evidence from a large sample of publicly-traded companies in 56 countries consistent with the hypothesis that business groups operate

[5]Before showing that this result holds in general, we focus on the Parmalat case in the milk industry since the demise of Parmalat due to the discovery of a major accounting fraud is a clear case of "exogenous" death that had a potential impact on the industry's competitors.

[6]See Gibbons and Waldman (1999), Lazear (1999), and Waldman (2012) for comprehensive surveys. For more recent contributions to this literature, see Friebel and Raith (2013) and Ke, Li, and Powell (2014).

internal labor markets, that they use to respond to economic shocks differently from stand-alone firms. We support this hypothesis with direct evidence: by tracking individual employees' movements across group-affiliated firms, we find that French business groups respond to idiosyncratic shocks by reallocating labor internally.

Our investigation of ILMs in business groups also complements Tate and Yang (2015a), who study internal labor markets in diversified multi-plant firms. In their paper, they find that workers forced to leave diversified firms after a plant closure are more likely to move to industries with better prospects (whether through the internal or the external labor market) than workers displaced from single-plant firms. The former also suffer smaller wage losses than the latter, even when they leave their original firm. This suggests that employment within a diversified firm makes workers more "redeployable" across industries, potentially because human capital investment is less firm-specific.[7]

Finally, our work contributes to a line of research looking at how firms provide insurance to their employees. Related to our finding that internal labor markets allow business groups to provide *employment* insurance to workers, a recent paper by Chen, Jiang, Ljungqvist, Lu, and Zhou (2015) unveils a similar role for state groups' internal *capital* markets in China. On the employment insurance side, papers find evidence that family businesses provide employees with such insurance (see Sraer and Thesmar (2007) and Ellul, Pagano, and Schivardi (2015)). However, these papers do not investigate the mechanism through which family owned firms and groups manage to protect employment when faced with shocks – whether by reallocating employees internally or relying on internal capital markets to prop up their weaker units. Another line of research has asked whether firms provide *wage* insurance to workers against both temporary and permanent shocks (see Guiso, Pistaferri, and Schivardi (2005)). The question of whether diversified groups are better able to provide wage insurance to their workers lies beyond the scope of this paper, and is the next step in our research agenda. However, we present some elements showing that, in groups after a negative shock, displaced workers' hourly wages tend to be insured when hours of work are not.

The paper proceeds as follows. Section 2 lays out a series of empirical predictions. In Section 3 we describe the data. Then, we present our empirical strategy and discuss our results in Sections 4 for "average" times, in 5 for bad times, and in 6 for good times. Section 7 concludes.

[7] In related paper, Tate and Yang (2015b) provide evidence suggesting that firms engage in diversifying acquisitions partly to reap the benefits of establishing an ILM. While these authors point to a bright side of internal labor markets, Silva (2013) unveils their inefficiencies. He documents wage convergence within diversified firms, whereby conglomerate plants in low-wage sectors overpay workers as compared to stand-alone firms when the conglomerate is also present in high-wage industries.

2 Theoretical Background

Internal labor markets may emerge within organizations as an optimal response to frictions that make labor adjustments costly to perform on the external labor market. In this section we lay out the mechanisms through which ILMs can create value, and put forward a series of testable predictions with the aim of investigating how different labor market frictions determine ILM activity.

Consider first a firm hit by an adverse shock and willing to downsize its labor force: direct and indirect costs of displacing workers may arise due to labor market regulation and union pressure. For stand-alone firms, the main route to decreasing labor adjustment costs is through labor hoarding, arguably a suboptimal choice following a permanent shock, and possibly not a financially feasible option even in case of temporary shocks (see Sharpe (1994)). Group-affiliated firms have a further option available: they can redeploy workers within the group's internal labor market, achieving the desired labor force adjustments at substantially lower costs. Indeed, severance payments and dismissal penalties can be avoided altogether when employees move within the ILM, even across different subsidiaries of a corporate group. For instance, dismissals can be turned into costless voluntary separations by offering workers an alternative job within the same group.[8] Also, in case of collective terminations involving more complex employment protection procedures, union pressure can be assuaged and labor law demands met more easily by redeploying (part of) the dismissed workers within the group's ILM. In light of this, we expect *negative* shocks that lead to layoffs to trigger ILM activity. We also expect such ILM response to be more intense when employment protection legislation is more stringent and separation costs are larger.

The ability to absorb employees from the internal labor market may also be valuable when productive units are willing to expand their labor force in response to *positive* shocks. Indeed, the ILM is likely to suffer less from information asymmetry concerning workers' characteristics (Greenwald (1986)), and may perform better than the external labor market in matching a vacancy with the specific skills required.[9] Hence, we expect that in response to positive shocks that create growth opportunities, group-affiliated firms will rely more intensely on the group's ILM (as opposed to the

[8] Furthermore, in some employment protection systems, transfers among group-affiliated firms are penalty-free, to the extent that workers need not be dismissed and re-hired when moving across firms affiliated with the same group (see Belenzon and Tsolmon (2015))

[9] Previous work has documented that search and training costs are particularly important in the (external) market for skilled human capital (see Abowd and Kramarz (2003) and Blatter, Muehlemann, and Schenker (2012)). This is further supported by recent evidence that firms engage in acquisitions (Ouimet and Zarutskie (2013)) and vertical integration (Atalay, Hortacsu, and Syverson (2014)) mainly to secure scarce human capital.

external labor market) to expand their labor force.

To summarize, internal labor markets may create value by allowing different productive units within the same organization to provide each other with mutual insurance against shocks that, otherwise, would call for costly external labor adjustments. As long as mobility costs within the ILM are not high, firms' owners benefit from the co-insurance the ILM provides against both negative and positive shocks. We expect the co-insurance role of the internal labor market to be more pronounced in more diversified groups, where different units are subject to imperfectly correlated shocks. Indeed, when group units are subject to *negatively* correlated shocks, both the redeploying and the absorbing end of an ILM transaction may benefit from the ILM ex-post, as long as workers move from the units facing adverse shocks towards those with profitable expansion opportunities.[10] Hence, we expect efficient ILMs to reallocate human capital more intensely towards well-managed units operating in high-growth sectors, but also to group units that have the financing capacity to seize growth opportunities.[11]

To the extent that group-affiliated firms hit by adverse shocks adjust labor using ILMs, their workers may receive employment insurance as a side product. This happens if reallocation through the ILM reduces the exposure of group-affiliated workers to unemployment risk, as compared to workers employed by stand-alone firms. The existing empirical literature has so far investigated whether *firms* provide insurance to their workers, either by insulating their wages from shocks (see Guiso, Pistaferri, and Schivardi (2005)) or by offering greater employment stability (see Sraer and Thesmar (2007) and Ellul, Pagano, and Schivardi (2015)). We expect that, thanks to their ILM, *business groups* are able to provide employment insurance to their employees against adverse shocks hitting their individual subsidiaries.

3 The Data

The implementation of the empirical strategies described in Section **??** requires detailed information on both workers and firms. First, we need to observe workers' labor market transitions, i.e. workers'

[10] In other words, the ILM allows growing and healthy units to "subsidize" poorly performing units by absorbing their excess labor force, at the same time benefiting from access to human capital at lower information costs. Cestone, Fumagalli, Kramarz, and Pica (2014) emphasize that the ILM does not share this special feature with the internal capital market, where healthy subsidiaries never benefit *ex post* from financially supporting those group units experiencing a negative shock.

[11] A related albeit different question is whether the ILM redeploys employees more or less intensely towards subsidiaries that are directly controlled by the parent as opposed to indirectly controlled subsidiaries in pyramidal groups (we thank Bill O'Brien for raising this issue). Unfortunately, the LIFI only provides information on whether firms are controlled by a common ultimate owner (whether directly or indirectly), and thus are part of the same group. Hence, our data does not allow us to explore the relationship between groups' ILMs and their precise ownership structure.

yearly transitions from firm to firm. Second, for each firm, we need to identify the entire structure of the group that firm is affiliated with, so as to distinguish transitions originating from (landing to) the firm's group and transitions that do not originate from (land to) the group. Third, we need information on firms' characteristics. We obtain this information for France putting together three data sources from INSEE (*Institut National de la Statistique et des Études Économiques*).

Our first data source is the DADS (*Déclarations Annuelles des Données Sociales*), a large-scale administrative database of matched employer-employee information collected by INSEE. The data are based upon mandatory employer reports of the earnings of each employee subject to French payroll taxes. These taxes essentially apply to *all* employed persons in the economy (including self-employed). Each observation in DADS corresponds to a unique individual-plant combination in a given year, with detailed information about the plant-individual relationship. The data set includes the number of days during the calendar year that individual worked in that plant, the (gross and net) wage, the type of occupation (classified according to the socio-professional categories described in Table A1), the full time/part time status of the employee. Moreover, the data set provides the fiscal identifier of the firm that owns the plant, the geographical location of both the employing plant and firm, as well as the industry classification of the activity undertaken by the plant/firm. The DADS Postes, the version of the DADS we work with, is not a full-fledge panel of workers: in each annual wave the individual identifiers are randomly re-assigned. Nevertheless, we are able to identify workers year-to-year transitions as each wave includes not only information on the individual-plant relationships observed in year t, but also in year $t-1$. This structure allows us to identify workers transiting from one firm to another along two consecutive years.[12]

The identification of group structure is based on the yearly survey run by the INSEE called LIFI (*Enquête sur les Liaisons Financières entre sociétés*), our second data source. The LIFI contains information which makes it a unique data set for the study of business group activity. It collects information on direct financial links between firms, but it also accounts for indirect stakes and cross-ownerships. This is very important, as it allows the INSEE to precisely identify the group structure even in the presence of pyramids. More precisely, LIFI defines a group as a set of firms controlled, directly or indirectly, by the same entity (the head of the group). The survey relies on a formal definition of *direct* control, requiring that a firm hold at least 50% of the voting rights in another

[12]If an individual exhibits multiple firm relationships in a given year, we identify his/her main job by considering the relationship with the longest duration and for equal durations we consider the relationship with the highest qualification.

firm's general assembly. This is in principle a very tight threshold, as in the presence of dispersed minority shareholders real control can be achieved with substantially lower equity stakes. However, we do not expect this to be a major source of bias in our sample, as most French firms are private and in France ownership concentration is strong even among listed firms.[13] Thus, for each firm in the French economy, the LIFI allows us to assess whether such firm is group-affiliated or not and, for affiliated firms, to identify the head of the group and all the other firms affiliated with the same group.

The third data source we rely upon is the FICUS, which contains information on firms' balance sheets and income statements. It is constructed from administrative fiscal data, based on mandatory reporting to tax authorities for all French tax schemes, and it covers the universe of French firms, with about 2.2 million firms per year. The FICUS contains accounting information on each firm's assets, leverage and cash holdings, as well as capital expenditure, cash flows and interest payments.

The data span the period 2002-2010. We remove from our samples the occupations of the Public Administration (33, 45 and 52 in Table A1) because the determinants of the labor market dynamics in the public sector are likely to be different from those of the private sector. We also remove temporary agencies and observations with missing wages. Finally, we also remove from the data set those employers classified as "*employeur particulier*": they are individuals employing workers that provide services in support of the family, such as cleaners, nannies and caregivers for elderly people.[14] These restrictions leave us with, on average, 1,574,000 job-to-job transitions per year during the sample period, with detailed information regarding the occupation of origin and of destination of each worker.

4 Internal Labor Markets at Work

4.1 Measuring ILM activity : Are group firms more likely to hire on the ILM rather than on the external labor market?

Our first task in this paper is to document whether French groups actually operate internal labor markets. If ILMs display less severe frictions than external labor markets, we should observe that affiliated firms disproportionately rely on their group's ILM in order to adjust their labor force. In other words, group-affiliated firms should be more likely to absorb workers originating from their own

[13] Bloch and Kremp (1999) show that ownership concentration is pervasive in France. For non listed companies with more that five hundreds employees, the main shareholder's stake is 88%. The degree of ownership concentration is slightly lower for listed companies, but still above 50% in most cases.

[14] We remove also those employers classified as 'fictitious' because the code identifying either the firm or the plant communicated by the employer to the French authority does not belong to the existing ones and is, therefore, incorrect.

group rather than from other firms in the economy.

Because group structure (in terms of sectors, regions, occupations) is endogenous and may affect within-group mobility patterns, we face an identification challenge when assessing whether internal labor markets facilitate within-group job-to-job mobility. In fact, documenting that a large proportion of the workers hired by an affiliated firm were previously employed in the same group is not *per se* evidence that internal labor markets function more smoothly than external labor markets: intra-group mobility may be high simply because groups are composed of firms that are intensive in occupations among which mobility is naturally high, perhaps for technological reasons. In order to identify the contribution of the internal labor market channel to the probability that a worker is hired by a firm affiliated with the same group as the originating firm, we need to control for the firm-specific – possibly time-varying – "natural" propensity to absorb workers transiting between any two given occupations.[15] We do this by applying the following methodology.

Consider the quadruplet $\{o, z, k, j\}$, where o is the occupation in the firm of origin k, z the occupation in the firm of destination j. In what follows, we restrict attention to destination firms, j, that are group-affiliated. Denote as c the set of workers in occupation o at $t-1$ who move to occupation z in any firm at time t. We model the probability that worker i, moving from occupation o in firm k to occupation z, finds a job in the group-affiliated firm j at time t as follows:

$$E_{i,c,k,j,t} = \beta_{c,j,t} + \gamma_{c,j,t} BG_{i,k,j,t} + \varepsilon_{i,k,j,t} \tag{1}$$

where $E_{i,c,k,j,t}$ takes value one if worker i moving from occupation o in firm k finds a job in occupation z in firm j at time t and zero otherwise. $BG_{i,k,j,t}$ takes value one if worker i's firm of origin k belongs to the same group as the firm of destination j at time t, and zero otherwise. The term $\beta_{c,j,t}$ is a firm-occupation pair specific effect that captures the time-varying natural propensity of firm j to absorb workers transiting from occupation o to occupation z. This accounts for the fact that occupation o may allow a worker to develop skills that are particularly suitable to perform occupation z in firm j.

Our parameter of interest $\gamma_{c,j,t}$ measures the *excess* probability of a worker moving from o to z between firm k and firm j at time t if firm k is affiliated to the same group as j, as compared to a similar worker coming from some k firm outside the group. The error term $\varepsilon_{i,k,j,t}$ captures all other factors that affect the probability that worker i moving from occupation o to occupation z between firm k and

[15] In other words, we need to properly build the counterfactual probability to hire workers, making a job-to-job transition between two given occupations, if they originally worked in a non-affiliated firm.

firm j. We assume that $E(\varepsilon_{i,k,j,t}|BG_{i,k,j,t}, c \times k \times j \times t) = 0$: conditional on observables, namely group affiliation and the firm-of-origin×firm-of-destination×occupation-of-origin×occupation-of-destination time-varying effect, the error has zero mean.[16]

Direct estimation of equation (1) would require a data set with one observation for each job mover and potential firm of destination for each year. As our data set contains about 1,574,000 job-to-job transitions and approximately 40,000 group-affiliated firms per year, direct estimation of the model would require the construction of a data set with as many as 62 billion observations per year. In order to estimate the parameters of equation (1) while keeping the dimensionality of the problem reasonable, we follow Kramarz and Thesmar (2013) and Kramarz and Nordström Skans (2014).[17] We define

$$R^{BG}_{c,j,t} \equiv \frac{\sum_{i \in c,k} E_{i,c,k,j,t} BG_{i,k,j,t}}{\sum_{i \in c,k} BG_{i,k,j,t}} = \beta_{c,j,t} + \gamma_{c,j,t} + \widetilde{u}^{BG}_{c,j,t} \tag{2}$$

where $R^{BG}_{c,j,t}$ is the fraction of workers that, in year t, are hired by firm j among all workers moving from occupation o to z whose firm of origin k belongs to the same group as firm j.[18]

We then compute the fraction of workers that are hired by firm j among all workers moving from occupation o to z and whose firm of origin k does not belong to the same group as firm j:

$$R^{-BG}_{c,j,t} \equiv \frac{\sum_{i \in c,k} E_{i,ck,,j,t}(1 - BG_{i,k,j,t})}{\sum_{i \in c,k}(1 - BG_{i,k,j,t})} = \beta_{c,j,t} + \widetilde{u}^{-BG}_{c,j,t} \tag{3}$$

Notice that the subscript k disappears since we sum over all firms of origin, hence over all k's. Taking the difference between the two ratios eliminates the firm-occupation-year pair effect $\beta_{c,j,t}$:

$$G_{cj,t} \equiv R^{BG}_{c,j,t} - R^{-BG}_{c,j,t} = \gamma_{c,j,t} + u^{G}_{i,j,t}. \tag{4}$$

We estimate the parameter $\gamma_{c,j,t}$ for each occupation pair-firm as the difference between two probabilities: that of a given firm j absorbing workers (transiting between two occupations o and z) who are separating from affiliated firms, and that of a given firm j absorbing workers (transiting between

[16] In Appendix A.6, we also address the related but not identical question of whether workers who find a job in a group are more likely to originate from an affiliated unit as compared to workers who find a job outside that group.

[17] Kramarz and Thesmar (2013) assess whether the probability of being hired in a given firm is larger when the individual and the firm's CEO belong to the same network, while Kramarz and Nordström Skans (2014) find that graduates from a given class whose fathers are employed in a firm are more likely to be hired by that firm.

[18] This fraction might be high because firm j tends to overhire workers moving between occupations o and z and happens to be part of a group intensive in occupation o. In this case, one observes many transitions from occupation o to occupation z in firm j originating from j's group, but this cannot be ascribed to the internal labor market channel.

two occupations o and z) who are separating from non-affiliated firms for every year t.

Result: *The coefficient* $\widehat{\gamma}_{c,j,t}$ *estimated in equation* (4) *is equal to the coefficient obtained from direct estimation of equation* (1).

Proof: See Appendix A.2.

We now have a potential measure of ILM activity for each triplet (occupation pair ×firm-of-destination × year).

To ensure that the internal and external labor markets are as homogeneous as possible, we restrict attention to the transitions occurring between occupation o and occupation z originating from firms k that are in geographical areas (French departments) where firm j's group is active.[19,20] With this restriction we have approximately one million ILM estimates per year.

Before examining the full set of $\widehat{\gamma}_{c,j,t}$, we aggregate them at the firm level, taking both simple and weighted averages of the estimated $\widehat{\gamma}_{c,j,t}$.[21] This allows us to estimate for each group-affiliated firm in our sample time-varying but firm-specific *average excess probabilities* $\widehat{\gamma}_{j,t}$.

Table 1 (Panel A) presents descriptive statistics of these firm-level average excess probabilities. For the average firm, the probability to absorb a worker already employed in the same group exceeds by about 9 percentage points the probability to absorb a worker on the external labor market between 2003 and 2010. The weighted averages are very similar to the unweighted results (bottom part of the panel). Table A.6 in Appendix A.6 complements Table 1 by building an alternative measure of ILM intensity based on worker outflows: on average, the probability that a worker separates from a firm if she is moving to an affiliated firm exceeds by about 9 percentage points the probability that the worker separates from that firm if she is moving to a non-affiliated firm through the external labor

[19] In the administrative division of France, *departments* represent one of the three levels of government below the national level, between the region and the *commune*. There are 96 departments in mainland France and 5 overseas departments. We focus on mainland France.

[20] A broader definition of c is the set of workers moving within a given occupation pair in the *whole French economy*. This definition may raise the concern that the subset of workers originating from firm j's group and the subset originating from any other firm in France are not homogeneous. This is particularly relevant if a group's units are all located within the same department: then, all the transitions originating from the group will also originate from that particular department, whereas the transitions originating from outside the group may come from any department in France. In this respect, the two pools of workers firm j can draw upon are not fully comparable. Excess probabilities $\gamma_{c,j,t}$ computed using this broader definition of c turn out to be slightly higher than the ones obtained imposing the department restriction. The same holds when we compute excess probabilities imposing a region restriction, i.e. define c as the set of workers moving within an occupation pair in the same *regions* where firm j's group operates. The corresponding tables are available upon request.

[21] The weights reflect the importance of the transitions from occupation o to occupation z for the group firm j is affiliated with. In other words, the weight is the ratio of the number of transitions from occupation o to occupation z that originate from firm j's group to the total number of transitions (for all the occupation pairs associated with firm j) that originate from firm j's group.

market.

Group-affiliated firms are thus particularly prone to draw from their group labor force rather than from the external labor market: why is this the case? As pointed out by the personnel economics literature, corporate groups and diversified firms may rely on their *vertical ILM* to shape employees' careers. However, we conjecture that groups may as well operate an *horizontal ILM* as a way to adjust their labor force in response to idiosyncratic shocks hitting some of their productive units. In Panel B of Table 1, we focus on the subset of excess probabilities computed for job-to-job transitions between identical occupations of origin and destination. This should rule out many job transitions up the career ladder, to the extent that a promotion often results in a move across different occupational categories (e.g. a non-qualified blue collar promoted to qualified blue collar). The results in Panel B show that even when focusing on *same occupation* transitions, average excess probabilities remain high: for a group-affiliated firm, the probability to absorb a worker already employed in the same group exceeds by 7 percentage points the probability to absorb a worker on the external labor market.[22] This suggests that the design of employees' careers explains only in part why French groups operate internal labor markets.

4.2 ILMs and group diversification

The enormous amount of heterogeneity hiding behind figures shown in Table 1 calls for further investigation. The estimated ILM parameter $\widehat{\gamma}_{j,t}$ is positive only for firms belonging to the top quartile of the distribution and is negative for firms in the bottom decile: clearly, not all group-affiliated firms rely on the internal labor market. Which firm and group characteristics help explain this pattern? Indeed, the population of French groups is also highly heterogeneous along many dimensions: there exist relatively few, very large groups, with many large affiliates that are diversified both from a sectoral and geographical perspective; and many small groups, with few small affiliates, that are hardly diversified.[23]

As explained in Section 2, if the ILM operates as a co-insurance mechanism between affiliated firms, we expect group diversification to be a significant determinant of ILM activity. In Tables 3 and 4 we investigate whether our estimated measures of ILM activity are larger for firms affiliated with

[22] Similar results hold for our ILM measures based on outflows (see Table A.6 in Appendix A.6).

[23] Looking at the distribution of group size in France, measured by group total employment, one finds out that groups belonging to the top decile on average have 20 affiliates, employ 800 workers per unit, operate in 7 different four-digit industries and in 4 different regions. Instead, groups in the rest of the population have on average less than 5 units, employ less than 50 workers per-unit, operate in less than 3 different four-digit sectors and mostly in the same region.

more diversified groups.

Table 3 focuses on sectoral diversification. We build a time-varying measure of group diversification by (i) calculating the share of the group total employment that is accounted for by units active in each macro/4-digit sector, and (ii) taking the (opposite of the) sum of the squared values of these shares.[24] Columns 2 and 3 show that diversification across macro sectors (agriculture, service, finance, manufacturing, automotive and energy) is associated with more intense ILM activity only for large groups, while this is not the case for average-sized groups. This result is in line with the intuition that labor is less redeployable across very distant industries, which in turn may hinder ILM activity; this effect is arguably less important in large groups where the internal labor market is thicker and the array of skills available wider. Conversely, and as expected, diversification across 4-digit sectors boosts ILM activity irrespective of group size (column 4), the more so the larger the group. The effect of diversification is sizable: in a group of average size, a one-standard deviation increase in (4-digit) diversification boosts ILM activity (as measured by γ) by 0.0081 percentage points, which represents a 8.9% increase in the average excess probability. In a group which is one-standard deviation larger than the average, the increase in ILM activity equals 0.0246 percentage points, which represents as much as 27% of the average excess probability (see Table 2).[25]

Table 4 focuses instead on geographical diversification. We first compute the share of total employment of the group that is accounted for by units located within the Paris area and outside the Paris area, respectively. Our measure of diversification is the (opposite of the) sum of the squared values of these shares. Then we perform the same exercise by computing employment shares using regions, i.e. the share of total employment of the group accounted for by units located in each of the 22 regions in metropolitan France. As shown by columns 1 and 3, firms rely more on the ILM when they are affiliated with a more geographically diversified group. This effect is stronger in larger groups (columns 2 and 4). Also in this case the magnitude of the effects is large: in a group of average size, a one-standard deviation increase in diversification across regions boosts ILM activity by 0.01 percentage points, which represents a 11.8% increase in the average excess probability. In a group which is one-standard deviation larger than the average, the increase in ILM activity is 0.03 percentage points, i.e. as much as 33.3% of the average excess probability. A priori, geographical

[24] Essentially, we compute an Herfindahl-Hirschman Index based on the employment shares of the group in the different macro/4-digit industries.

[25] Tables 3 and 4 show a negative correlation between the number of affiliated firms and the excess probability, in the presence of a group fixed effect. Indeed, in years when groups lose one or more units due to closures, ILM activity intensifies, hence larger excess probabilities are observed (see the results in Table A13 in Appendix A.7).

dispersion allows group units to be exposed to unrelated regional shocks, thus creating more scope for co-insurance to be provided via the horizontal ILMs. On the other hand, moving workers across more distant geographical areas might be difficult, due to trade union resistance and employment protection regulation. Our results suggest that the former effect prevails.[26]

4.3 ILMs and human capital: high-skill versus low-skill occupations

We next explore whether the internal labor market for high-skilled employees works differently from the ILM for blue-collars and other low-skilled workers. This may happen because external labor market frictions vary considerably across different occupational categories. On the one hand, the external labor market for more skilled employees is characterized by higher hiring costs, which may be substantially reduced when expanding group-affiliated firms draw human capital from the ILM. On the other hand, both firing costs and the demand for employment insurance are likely to be more pronounced for low-skilled employees, who are more unionized and are not self-insured through their human capital.

Using the 2-digit occupational categories available in the DADS (see Table A1), we build four broad categories that correspond to decreasing degrees of human capital and skill: *Managers/High-Skill* (managerial and superior intellectual occupations), *Intermediate* (technicians and other intermediate administrative jobs), *Clerical Support*, and *Blue Collar* occupations. Our estimated parameters $\widehat{\gamma}_{c,j,t}$ at the triplet level $\{o, z, j\}$ for each year t become now our dependent variable and we augment the specification estimated in Tables 3 and 4 by adding indicators for the occupation of origin and occupation of destination.

Results in Table 5 indicate that the activity of ILMs varies significantly across occupational categories, and is most intense for high-skill occupations. Columns 1 and 2 show that the excess probability to hire an employee from the group's ILM rather than from the external labor market is significantly higher in the case of managers and other high-skill employees (the excluded category), as compared to Intermediate Occupations, Clerical workers and Blue Collars (both for the occupation of origin and destination).[27] Consistently with results in Panel B of Table 1, we also observe that the excess prob-

[26]Tables A10 and A11 in Appendix A.6.1 show that similar qualitative results are obtained when we focus on our "outflow" measure of ILM activity.

[27]In Appendix A.5 we present rankings of the disaggregated parameters $\gamma_{c,j,t}$ estimated at the occupation pair-firm level, and the same clear pattern emerges: ILM activity is stronger for high-skill occupations (such as top managers, engineers, high-level technicians and lawyers) and weaker for unskilled occupations (blue collars, drivers and shop assistants).

ability is lower when the occupation of origin coincides with the occupation of destination, suggesting that ILM activity can be *in part* ascribed to vertical career moves. Even when focusing on *horizontal* job moves, we observe a more intense ILM activity for high-skill versus low-skill occupations (column 3). This suggests that search costs and informational frictions are likely to play an important role in explaining groups' reliance on internal labor markets.

In columns 4 to 7 we explore the role of sectoral diversification. In column 6 we document that diversification only boosts *horizontal* ILM activity, as captured by the *Same Occupation* dummy interacted with *Diversification*. This provides further support to the hypothesis that groups rely on *horizontal* ILMs as an insurance mechanism across firms, as opposed to the vertical ILM which is instrumental to the design of employees' careers.[28]

The excess probabilities estimated in this section measure an "average" activity of group ILMs that can be triggered by different factors, including job rotation programs, internal career paths, as well as (negative or positive) shocks hitting part of a group.[29] The precise role of ILMs in bad times is studied now.

5 The ILM Response to Adverse Shocks: Bad Times

As explained in Section 2, in the presence of external labor market frictions an ILM can emerge as a cross-firm insurance mechanism within business groups, allowing firms hit by an adverse shock to alleviate separation costs. Therefore, we exploit episodes of firm closures and mass layoffs.[30]

We first identify all episodes in which firms experience a drop in employment from one year to the next of 90% or more during our sample period, 2002-2010. For each eventually-closing firm, we identify the set of all actual and potential destination firms of the displaced workers and compute the bilateral employment flows for each firm pair.[31] In order to avoid identifying as closures situations

[28]Columns 5 and 7 suggest that the positive effect of diversification on ILM intensity is stronger for Blue Collars and Clerical Support workers as compared to managers and other high-skill professionals. This is consistent with the idea that more diversified groups rely on their ILM to offer employment insurance to those workers who value it most (see Section 5). By contrast, high-skills workers' human capital might industry-specific (rather than firm-specific) and thus difficult to redeploy across industries (see Neal (1995)).

[29]In Appendix A.7 we present results showing that our measure of ILM activity increases following firm closure events within the group, which suggests that adverse shocks are a major trigger.

[30]We are of course aware that these episodes may not be entirely exogenous as groups may choose which firms to close/downsize and when. Yet, as long as groups do not selectively close affiliated firms with the aim of redeploying their workers to their other units, these events do generate some exogenous variations useful when studying ILMs.

[31]We consider as potential destination any firm that absorbs at least one employee, in at least one year, from firm i. Destination firms affiliated with the same group as firm i are referred to as "ILM destination-firms", while the others as "External destination-firms", hereafter.

in which firms simply change identifier, we remove all the cases in which more than 70% of the lost employment ends up in a single other firm. Table 6 shows the number of closing firms we identify by firm size. Consistent with figures from INSEE, we find that the incidence of closures among firms with more than 10 employees is approximately 4%, while the incidence of closures among very small firms is twice as large.[32] The data also confirm that the effect on the real economy of the 2008 financial crisis materializes in 2009, with an increase in the closure rate.

Thus, our unit of observation is a pair – firm of origin/destination firm – in a given year, in which the firm of origin is a group-affiliated firm that eventually closes down (or dramatically reduces its labor force) within our sample period.

We then study the evolution of bilateral employment flows at closure relative to normal times (i.e. at least four years before closure) in pairs affiliated with the same group as opposed to pairs not affiliated with the same group. Following a shock that generates a large outflow of workers from the "closing" firm, the time dimension – i.e. the comparison between the flows at closure time relative to flows in normal times – allows us to control for all the time-invariant pair-specific determinants of the bilateral flow (in other words, we take into account that two specific firms may experience intense flows of workers even in normal times). The second difference, i.e. the comparison between pairs affiliated with the same group and pairs not affiliated with the same group, identifies the horizontal ILM effect.[33]

Formally, we estimate the following model:

$$f_{ijt} = \alpha_t + \phi_{ij} + \phi_0 BG_{jt} + \phi_1 SameBG_{ijt} + \phi_2 d_{it} + \phi_3 c_{it} \times BG_{jt} + \phi_4 c_{it} \times SameBG_{ijt} + \varepsilon_{ijt} (5)$$

where f_{ijt} is the ratio of employees moving from an affiliated firm of origin i to a destination firm j in year t to the total number of job-to-job movers that leave firm i in year t; the term α_t represents a set of year dummies; ϕ_{ij} is a firm-pair fixed effect in our main specification; BG_{jt} is a dummy that takes value 1 if the destination firm is affiliated with any group in year t; $SameBG_{ijt}$ takes value 1 if the destination firm is affiliated with the same group as firm i in year t. The term d_{it} indicates a set of dummies capturing the distance to closure (measured in years) of firm i. The dummy c_{it} takes the value 1 in the last two years of firm i's activity and is interacted with both BG_{jt} and $SameBG_{ijt}$.

[32] See Royer (2011) for a detailed study on closures in the French economy using DADS.

[33] Exploiting closure/large layoff events helps us capture the extent of the *horizontal* ILM activity, i.e. within-group moves that are *not* instrumental to the design of employee careers, as opposed to the vertical (career-related) ILM activity that plausibly takes place mostly in normal times.

The variable of interest is the interaction between $SameBG_{ijt}$ and c_{it}. Its coefficient ϕ_4 captures the differential effect of closures on the bilateral employment flows (relative to normal times) within firm pairs that belong to the same group relative to pairs that do not.

Since we measure employment flows at the *firm of origin-destination firm* level, we can control for unobserved heterogeneity at the pair level. We are also able to explore the characteristics of the firms that hire the displaced workers through the ILM, something we do in subsection 5.3.[34]

Figure 1 provides information on the performance of group-affiliated firms in the years before they close down or embark on a mass layoff. Their return on assets and sales, as well as their sales deteriorate in the last two-three years before the closure/mass layoff. Interestingly, closing/downsizing group subsidiaries see their coverage ratio fall below 1 in the last year, which suggests that many closures in our sample are associated with financial default. Table 7 presents the different flows involved.

Then, Table 8 presents our estimation results. Estimates confirm descriptive evidence: at closure (relative to normal times), the fraction of displaced workers redeployed to an internal labor market destination-firm is almost 12 percentage points larger than the fraction redeployed to a non affiliated firm (column 2). Given that at closure the average flow to an external labor market destination-firm is 0.039 (Table 7), our estimates imply that the increase in flows to ILM destination-firms is three times as large as the average external flow. In column 1 we also present results obtained from an alternative specification which includes only firm-of-origin fixed effect.

Results in columns 3 and 4 show that the closure shock has heterogeneous effects across different occupational categories. In this case the dependent variable f_{ijtk} is the proportion of employees of occupational category k (in the firm of origin) moving from firm i to firm j in year t relative to the total number of job-to-job movers that leave firm i in year t. As in Section 4.3, we consider four occupational categories: managers, intermediate occupations, clerical support and blue collars, with blue collars being the excluded category. Results are similar across the two specifications: firm closure intensifies ILM activity most for blue collar workers and to a lesser extent for the other occupational categories. More precisely, at closure the fraction of blue collar workers (the excluded category) redeployed to an affiliated firm increases more than the fraction redeployed to a non-affiliated firm, as indicated by the positive and significant coefficient of *Closure* $\times$ *Same Group*. The triple interactions of *Closure* $\times$ *Same Group* with the other occupational categories are all negative, showing that the stronger effect

[34]Last but not least, this approach has the advantage of allowing us to study, within the same framework, the impact of ILM activity both on quantities (workers flows) and prices (workers wages), and thus to infer whether groups are able to provide workers with some degree of employment insurance.

of the closure shock on internal flows as compared to external flows is less pronounced for the other types of workers.[35] Note also that, in normal times, the opposite pattern emerges: the difference between the fraction of workers redeployed to an ILM destination-firm with respect to the fraction redeployed to a non-affiliated firm is larger for managers and intermediate occupations relative to blue collars and clerical workers, as indicated by the coefficient of *Same Group* interacted with the different occupational categories.

5.1 Employment protection regulation and the ILM

Within this empirical framework, we investigate how labor market regulation spurs ILM activity. To do so, we exploit the firm size thresholds contained within the various French labor market regulations. The consensus view is that the 50-employee threshold is critical, a size above which the regulation of employment protection and union rights becomes significantly stricter (see Appendix A.3 for more detail). Indeed, in France, firms with 50 or more employees are subject to substantially more stringent labor regulation than smaller firms, both in terms of higher dismissal costs and stronger union power.[36] Figure 3 shows that distribution of firm size in France, measured in terms of number of employees: firms seem to bunch just below 50, which suggests that the stricter EPL that applies above 50 matters for firms' choices. Previous work has studied the distortions that this type of legislation creates by discouraging firms' expansion.[37]

Adopting a regression discontinuity-like approach, we explore whether group-affiliated firms which are above the 50-employee threshold at closure rely disproportionately more on the ILM than firms that are below 50, controlling for the intensity of bilateral worker flows in normal times. We therefore estimate the following model:

$$\begin{aligned} f_{ijt} \;=\; & \alpha_t + \phi_{ij} + \phi_0 BG_{jt} + \phi_1 SameBG_{ijt} + \phi_2 d_{it} + \phi_3 c_{it} \times BG_{jt} + \phi_4 c_{it} \times SameBG_{ijt} + \\ & \phi_5 D_i^{50} \times SameBG_{ijt} + \phi_6 D_i^{50} \times BG_{jt} + \phi_7 D_i^{50} \times c_{it} + \phi_8 D_i^{50} \times BG_{jt} \times c_{it} + \\ & \phi_9 D_i^{50} \times SameBG_{ijt} \times c_{it} + X_{it} + \varepsilon_{ijt} \end{aligned} \tag{6}$$

[35] In column (3) and (4), the coefficients of the triple interactions are not significantly different from each other, but are significantly different from the coefficient of *Closure* × *Same Group* at 5%.

[36] In case of collective dismissals (i.e. dismissals of at least 10 workers during a 30 days period), firms with 50+ employees are required to formulate an "employment preservation plan" in close negotiation with union representatives. The aim of the plan is to lay out solutions to facilitate reemployment of terminated workers. In practice, the obligations entailed by the plan substantially increase termination costs (by raising both lay-off costs and union bargaining power). Note that the "employment preservation plan" must be formulated also in the event of closure. See Appendix A.3.

[37] In their study of the impact of size-contingent labor laws, Garicano, LeLarge, and VanReenen (2013) focus precisely on the French 50-employee threshold.

where the specification in equation (5) is augmented with the time-invariant dummy D_i^{50} – equal to one for firms with 50 or more employees at closure – fully interacted with BG_{jt}, $SameBG_{ijt}$ and c_{it}. We also include two (third or fourth degree) polynomials in firm size at closure separately for normal times and closure times (in the matrix X_{it}). The coefficient of interest ϕ_9 measures the differential impact of closure on within-group flows for firms above 50 versus firms below 50 employees.

To achieve proper identification this approach requires firms to be randomly allocated above and below the 50-employee threshold. The use of firm (and pair) fixed effects already controls for all the time-invariant unobserved factors that may affect the propensity of firms to self-select into (or out of) treatment. However, fixed effects do not account for the selection due to time-varying factors. To control for this, as in Leonardi and Pica (2013), we instrument the treatment status (and all the interacted terms) with the (average) firm size in normal times (and the associated relevant interactions), i.e. at least four years before closure. The validity of this instrument relies on the closure being unexpected in normal times.

We expect that for large group-affiliated firms that close down or engage in a mass layoff, the flow of workers to ILM destination-firms (as opposed to the external labor market) increases more dramatically than for smaller firms.

Table 9 shows results from the estimation of equation (6). Column (1) includes firm-of-origin fixed effects, column (2) pair fixed effects and column (3) shows IV results (with pair fixed effects) using firm size in normal times as an instrument for size at closure. The first three columns restrict to closing firms between 40 and 60 employees. The remaining two columns show robustness checks using different size windows. Interestingly, the coefficient of *Closure*×*Same Group* is positive and significant, indicating that closures intensify ILM activity even for closing firms with less than 50 employees, which in France are subject to lighter but non-negligible employment protection legislation. However, the coefficient of the triple interaction *Closure*×*Same Group*×*Dummy empl*> 50, which measures the impact of closure on ILM flows differentially for firms above 50 employees, is everywhere positive and significant (in column (2) marginally so at 5%). This suggests that group-affiliated firms hit by adverse shocks increasingly rely on the ILM the more stringent the employment protection rules.

This allows us to establish a causal link between a specific labor market friction, namely employment protection regulation, and ILM activity.

5.2 Employment insurance provided by the ILM

Our finding that closing group units extensively redeploy labor through the internal labor market suggests that workers employed in group-affiliated firms are provided with implicit employment insurance against adverse shocks hitting their company. To corroborate this hypothesis, we study whether upon closure group-affiliated firms have fewer employees become unemployed as compared with stand-alone firms. Table 10 displays the average ratio of a firm's employees moving to unemployment over the total number of employees leaving the firm in the same year – in stand-alone versus group-affiliated firms. At closure (relative to normal times), the proportion of workers that become unemployed increases in stand-alone firms, while it decreases in affiliated firms.

This unconditional evidence is confirmed by the regression results displayed in Table 11 column (1): the coefficient of *Closure* × *Firm of origin group affiliated* is negative and significant. At closure (relative to normal times) the fraction of workers separating from a group-affiliated firm that become unemployed is 8 percentage points smaller than the fraction of workers that separate from a stand-alone firm. This suggests that, when the firm is hit by a negative shock, workers' exposure to unemployment is 34.8% lower in BG-affiliated firms as compared to stand-alone firms. In column (2) of Table 11 we investigate whether this effect differs across occupational categories: our results show that the effect is significantly larger for blue collar workers (the excluded category) and becomes weaker as we move up to the more skilled occupational categories. This adds further support to the view that ILMs allow groups to provide employment insurance to employees with fewer outside options and possibly stronger union support.

We then ask whether the preservation of employment ensured by the internal labor market comes at a cost for business groups' employees. Table 12 examines the change in hours worked, in the hourly wage and in the annual wage, for workers transiting from firm i to firm j at time t (the unit of observation is now the worker).

The coefficient of *Closure* × *Same Group* indicates that closures have a more detrimental effect on hours worked (as well as on the annual wage) for employees redeployed to an ILM destination-firm as compared to employees that find a new job in the external labor market, with no differential impact on the hourly wage (in our baseline specification with pair fixed effects). By interacting *Closure* × *Same Group* with different occupational dummies, we find that these effects are similar across different occupational categories.[38] These results suggest that the higher job stability granted by the group

[38] Managers seem to enjoy an hourly wage premium when moving within the group (*Same Group* × *Managers*), almost

does come at a cost: hours worked are reduced and so does the annual wage.

5.3 Employment flows at closure: Where do workers go ?

We also exploit our difference-in-difference set-up to study the characteristics of those firms that absorb a closure shock by hiring the displaced workers through the ILM.[39] If groups run ILMs efficiently, one would expect them to reallocate displaced employees to firms that are not experiencing an adverse shock, and ideally to firms that would benefit from absorbing the workforce of closing units, i.e. well managed firms with profitable growth opportunities. Absorbing firms must also have the necessary financial muscle to expand their workforce. We explore these issues in Tables 13 and 14.

In Table 13, we classify firms depending on whether they operate in a booming sector or one experiencing a downturn (columns 1 and 2), and in low- versus high-growth sectors (column 3). As for previous results, our main specification controls for pair fixed effects (results are unchanged when we control instead for firm of origin fixed effects). Column (1) shows that ILM flows increase at closure time with respect to normal times by 3 percentage points more if the destination firm is in a booming sector.[40] Column (2) shows that there is instead a negative – albeit non significant – differential effect if the destination firm is in a sector experiencing a recession. Column (3) provides evidence that group ILMs reallocate displaced workers more intensely towards group affiliates operating in high-growth sectors, where firms are more likely to have profitable investment opportunities.[41] This suggests that ILMs are run efficiently.

We explore this idea further in Table 14, where, instead, we measure destination-firms charac-

completely dissipated upon closure (*Same Group* × *Closure* × *Managers*). Those effects vanish in column (4) in which we control for the pair fixed effect, suggesting that the wage premium in normal times is due to the managers (self) selecting into high-wage firms.

[39] We can control for firm-level characteristics because we investigate the activity of ILMs within *groups* of affiliated firms. This is in contrast to work focusing on diversified firms, where ILMs reallocate workers across firm segments or establishments with no independent establishment-level economic outcomes.

[40] *Destination firm in a Boom (bust)* is a dummy variable that takes value 1 if the destination firm operates in a sector that is experiencing a boom (bust) in the year following the closure. Booms and busts are identified from the fluctuations of real sectoral sales, where nominal sales are deflated by 2-digit industry-specific price deflators (the lower number of observations are due to missing prices for some sectors), following the Braun and Larrain (2005) peak-to-trough criterion. Troughs occur when (the log of) real sales are below their trend (computed using a Hodrick-Prescott filter with a smoothing parameter of 100) by more than one standard deviation. For each trough, we go back in time until we find a local peak, which is defined as the closest preceding year for which (detrended) real sales are higher than in the previous and posterior year. A bust goes from the year after the local peak to the year of the trough. The same procedure is used to identify sectoral booms. A peak occurs when current real sales are more than one standard deviation above their trend. Once a peak is identified, we go back in time until we find a local trough, i.e., the closest preceding year for which (detrended) real sales are lower than in the previous and posterior year. The years falling between a local trough and a peak are labelled as a boom.

[41] Sectors are classified according to whether the growth rate of real sales over our sample period fall in the first decile, above the median, or in the top decile of the distribution.

teristics at the firm-level, and in "normal times" (i.e. before being affected by the firm of origin's closure).[42] In columns (2) and (3) we ask whether after a closure, groups reallocate employees mainly towards more efficiently run firms, as well as firms that have been expanding. In column (2) we classify destination-firms according to their efficiency, as measured by estimated TFP.[43] We find that, following closures, ILM flows increase by 5 percentage points more when destination firms have larger-than median TFPs. Column (3) shows that following a closure in the group, the differential increase in ILM flows (*Closure* × *Same Group*) is 5 percentage points larger for destination-firms that had undertaken larger capital expenditures well before the closure shock hit the group.

The closure of a group-affiliated firm may well generate an expansion opportunity for its well-managed, high-growth affiliates, to the extent that hiring costs may be lower in ILMs. However, the ability to seize such opportunity is likely to depend on a firm's financing capacity. Thus in Table 14 we also investigate whether the reallocation of displaced workers within groups depends on the financial status of the potential ILM destination-firms. To this aim, for each destination firm we build two measures of financial health: leverage (book value of long-term debt divided by total assets) and interest coverage (earnings before interest, taxes and depreciation, divided by interest expense).[44]

Columns (4) and (5) show that following a closure in the group, the differential increase in ILM flows (*Closure* × *Same Group*) varies for destination firms at different percentiles of the distribution of leverage and coverage. The diff-in-diff effect is significantly smaller for destination firms whose leverage falls in the top decile of the distribution, and for destination-firms with an interest coverage ratio in the bottom decile. Overall, this suggests that while closures trigger ILM activity, groups are less prone to redeploy displaced workers to highly levered and distressed affiliates.

In the next section, we examine the effects of positive shock affecting some of the firms within a group.

[42]For every firm pair, the destination firm's characteristics are measured in "normal times", i.e. by averaging, respectively, total assets, TFP, capital expenditure, debt/assets and interest coverage over the period that dates *at least* four years before the firm of origin's closure. This is because a firm's closure is likely to affect the size, efficiency, investment policy and financial status of both its external and ILM destination-firms.

[43]We estimate TFP following the method of Levinsohn and Petrin (2003) , which extends the Olley and Pakes (1996) approach using materials instead of investment to control for firm-level unobserved productivity shocks. Tables A2, A3 and A4 in the Appendix display labor and capital coefficients as well as estimated TFP for each one-digit sector. The coefficients reported in Table A2 are in line with those estimated by Garicano, LeLarge, and VanReenen (2013) on French manufacturing firms. Table A4 shows that group-affiliated firms across all sectors display larger TFP levels than stand-alone firms. (see Boutin, Cestone, Fumagalli, Pica, and Serrano-Velarde (2013) for a similar result).

[44]Very high levels of leverage and very low interest coverage ratios may signal that a firm has limited financing capacity (possibly due to debt overhang and binding debt covenants), and thus does not enjoy the financial flexibility necessary to expand its workforce.

6 The ILM Response to Positive Shocks: Good Times

To investigate further the coinsurance role of the internal labor market, we now turn to positive shocks. We ask whether groups rely on their ILMs to expand the labor force in those units that face an unexpected growth opportunity, focusing on the exit of a large industry competitor as the source of the shock. As pointed out in earlier work (see Lang and Stulz (1992)), a competitor's exit may be due to a firm-specific shock, so other firms in the industry benefit from it, or an industry-wide shock, which is bad news for other firms as well. To our purposes, we need to identify exit events that are not due to industry-wide shocks.

To do so, we first focus on one particular event that affected the French milk industry in 2004: the collapse of a large foreign competitor following the discovery of a major accounting fraud. Second, we identify in our sample period episodes of firm closures that we can confidently ascribe to firm-specific shocks. In both cases, we investigate whether other (group-affiliated) firms in the shocked industry increased their reliance on the ILM in response to the large competitor's exit.

6.1 Collapse of a large competitor: Parmalat

Until 2004, the Parmalat multinational was a major competitor for the many French firms and groups operating in the production and sale of milk products. Parmalat's fallout followed the sudden discovery, in December 2003, of a huge accounting fraud that led many commentators to rename it "Europe's Enron."[45] Following this revelation, Parmalat filed for bankruptcy (see Tayan and Rajan (2008)). This makes it an ideal event to study how corporate groups react to an unexpected shock that may have created an expansion opportunity.

To check that the Parmalat collapse represented a positive shock for its French competitors, we proceed as follows. We consider the 4-digit industries in which Parmalat was present in France (the treated industries) and all other 4-digit industries within the same broader 2-digit industries.[46] We analyze the change in a number of variables (employment, sales, total assets and property plant and equipment) before and after Parmalat's collapse, for the ten largest competitors in each treated

[45] By 2003, Parmalat had grown from an Italy-based family firm into a multinational giant owning over 130 subsidiaries in 30 different countries. At the end of 2002, Parmalat reported EUR 10.3 billion in assets, including EUR 3.4 billion in cash and cash equivalents. However, in December 2003, following Parmalat's default on EUR 150 million in bonds in spite of its large cash position, Bank of America revealed that a EUR 3.9 billion account held by Parmalat at the bank did not exist.

[46] Parmalat operated in France through own local subsidiaries in five 4-digit industries: wholesale milk trade, milk production, butter, cheese, and other milk production. These industries belong to the "food sale and production" 2-digit industry.

industry (relative to the non-top-ten firms) and we compare it with the change in the same variables for the ten largest firms in all the other industries within the same 2-digit industries. More in detail, we estimate the following equation:

$$\begin{aligned} y_{its} &= \alpha_t + \delta_s + \delta_0 Top10_{its} + \delta_1 Post2004 + \delta_2 TS_s + \delta_3 Top10_{its} \times Post2004 + \\ &\quad \delta_4 Top10_{its} \times TS_s + \delta_5 Post2004 \times TS_s + \delta_6 Top10_{its} \times Post2004 \times TS_s + \varepsilon_{its} \end{aligned} \tag{7}$$

where y_{its} is the employment (sales, total assets, fixed assets) of firm i, at time t, active in sector s. Sector s is a 4-digit sector that belongs to the 2-digit industries where Parmalat was present; the term α_t represents a set of year dummies; δ_s is an industry fixed-effect; $Top10_{its}$ is a dummy that takes value 1 if firm i at time t ranks among the first ten largest firms in industry s; $Post2004$ takes the value 1 after the Parmalat collapse, and TS_s represents a set of dummies that identify the treated sectors. We identify those industries in which Parmalat's collapse represented an expansion opportunity by looking at the coefficient δ_6 of the triple interaction, which measures the differential effect of the Parmalat shock on the major players in the treated sectors as opposed to the major players in the control sectors. We consider as "shocked" only the treated sectors for which the coefficient δ_6 is positive and significant *at least* in the regressions concerning the evolution of employment *and* sales.

Table 15 reports the results of this preliminary stage in which we explore whether the main competitors in the five different 4-digit industries where Parmalat was present benefited from Parmalat's collapse. A minimal reasonable requirement should that the coefficient δ_6 be positive and significant at least in the regressions on employment *and* sales. We find that this is the case in two 4-digit industries, namely "Wholesale milk trade" and "Other milk production". In addition, whenever a beneficial effect on sales and employment shows up, it also appears in terms of total and fixed assets. This makes us confident that, at least in these two sectors, the major market players took advantage of Parmalat's collapse.

We then study the evolution of bilateral employment flows following the Parmalat collapse, in firm pairs where the destination-firm is a group-affiliated company operating in one of the "shocked" industries. We study how the flow of workers within firm pairs affiliated with the same group (the ILM flow) evolves after the positive shock, as opposed to the flow of workers between firms not affiliated with the same group (the external labor market flow).

Formally, we estimate the following model:

$$\begin{aligned} f_{ijt} &= \alpha_t + \phi_{ij} + \phi_0 BG_{jt} + \phi_1 SameBG_{ijt} + \phi_2 Post2004 + \\ &\quad \phi_3 Post2004 \times BG_{jt} + \phi_4 Post2004 \times SameBG_{ijt} + \varepsilon_{ijt} \end{aligned} \tag{8}$$

where f_{ijt} is the ratio of employees hired by a group-affiliated firm i (active in one of the shocked sectors) in year t and previously employed by firm j, to the total number of job-to-job movers hired by firm i in year t; the term α_t represents a set of year dummies; ϕ_{ij} is a firm-pair fixed effect in our main specification; BG_{jt} is a dummy that takes value 1 if the firm of origin is affiliated with any group in year t; $SameBG_{ijt}$ takes value 1 if the firm of origin is affiliated with the same group as firm i, in year t; $Post2004$ takes the value 1 after the Parmalat collapse. The variable of interest is the interaction between $SameBG_{ijt}$ and $Post2004$. Its coefficient ϕ_4 captures the differential effect of the positive shock on the bilateral employment flows (relative to normal times) within firm pairs that belong to the same group relative to pairs that do not.

We present our estimates of the above equation (8) in Table 16. There, we study the bilateral flows of workers hired by group-affiliated firms in the two subsets of milk industries: the shocked ones ('Wholesale milk trade" and "Other milk production"), and the three non-shocked ones, where the Parmalat collapse does not appear to have generated an expansion opportunity. We use the latter to provide a placebo test. Table 16 confirms our prediction: after 2004, firms in the shocked industries increased the fraction of workers absorbed from their group's ILM by 2.9 to 3.5 percentage points more than the fraction of workers hired on the external labor market (columns 1 and 2). We observe no differential effect in the three non-shocked industries (columns 3 and 4).

6.2 Closures of large competitors

To go beyond the Parmalat case, we extend the above approach to large closure events as potential positive shocks hitting industries. More in detail, we identify closure episodes of firms with more than 500 workers – on average – in normal times, i.e. at least 3 years prior to the closure event (well before the closing firm starts shrinking). This allows us to identify 115 large closure events happening in 102 different 4-digit industries.[47]

In order to identify large closures that are due to idiosyncratic reasons, we study whether these

[47] The identification of closures follows the procedure described in detail in Section 5.

events benefit the main competitors in the industry, in which case we can confidently assume that they do not reflect macroeconomic or sector-wide shocks. As in the Parmalat case, *for each closure event*, we build a treatment group that includes all firms that operate in the same 4-digit industry as the large closing firm; the control group includes all the other firms present outside the specific 4-digit industry but in the same 2-digit industry as the closing firm.[48] We then analyze the differential evolution of the variable of interest (employment, sales, total assets and fixed assets), before and after the closure event, for the top ten firms in the market where the closing firm was present (vs. the remaining firms) and compare it with the evolution of the same variable for the ten largest firms in the other industries.

For each closure event and for each variable of interest, we run a regression similar to equation 7. We look at the coefficient δ_6 of the triple interaction $Top10_{its} \times PostClosure \times TS_s$, where s is a 4-digit industry that belongs to the 2-digit industry in which the large closing firm was present, $Top10_{its}$ is a dummy that identifies the ten largest firms in industry s, $PostClosure$ is a dummy that identifies the period following the closure event and TS_s is a dummy that identifies the 4-digit industry in which the closing firm operated. Consistently with the Parmalat case study, we label as "shocked" only the treated industries for which the coefficient δ_6 is positive and significant in, at least, the regressions on employment *and* sales.

Tables 17 and 19 show the results of this preliminary stage. We identify 16 industries (listed in table 17) for which the coefficient δ_6 of the triple interaction $(Top10 \times PostClosure \times TreatedSector)$ is positive and significant at least in the regressions on the evolution of employment *and* sales. In most of the cases, the coefficients for the evolution of total and fixed assets are also positive and significant. Table 18 shows some descriptive statistics for these "shocked" sectors. Typically the shocked industries experience a single large closure event. In the few cases with multiple closure events, we take the year of the first closure event as the year of closure. The table also shows the average size of the closing firm in normal times, i.e. at least 3 years prior to the closure event.

We then examine the bilateral flows of workers hired by group-affiliated firms in these 16 shocked industries.[49] Table 21 shows the regression results: after the shock, within-group flows go up relative to flows from the external labour market, both in the specification with firm of origin fixed effects

[48] We exclude from the control group all the firms that operate in 4-digit industries belonging to the same 2-digit category as the closing firms and that experience themselves a large closure event.

[49] We have removed the flows that originate from closing firms that are affiliated with groups having units active in the shocked industries. We want to avoid that the hires that we measure are ILM reallocations due to negative shocks hitting the closing firms.

and in the specification with firm pair fixed effects (columns (1) and (2)). When controlling for pair fixed effects, we find that firms react to the positive shock increasing the fraction of workers absorbed from ILM partners by 1 percentage points more than the fraction of workers absorbed from external labor market firms. Given that after the shock the average flow from an external labor market firm of origin is 0.0218 (see Table 20), our estimates imply that the increase in flows from ILM firms of origin is half of the average external flow. Column (3) of Table 21 shows that this effect does not show up in the closure year, i.e. in the last year of activity of the closing firm (i.e. the coefficient of *Closure year* $\times$ *Same Group* is not significant). In fact, the closure year mixes pre-shock and post-shock behavior, since we do not know in which exact part of the year the closing firm has actually downsized its activity. The effect is positive and significant in the three years following the shock, while it vanishes afterwards. Interestingly, column (4) shows that the effect is driven by hires in managerial positions. This suppoirts our prediction that expanding group-affiliated firms rely on the ILM to alleviate search costs and informational frictions that are particularly pronounced in the external market for skilled human capital.

Finally, the last two columns of Table 21 provide a placebo test. Column (6) shows the result of the placebo on the subset of sectors in which the coefficient δ_6 in the preliminary stage regressions concerning sales and employment is not significant.[50] Column (5) shows the results of the placebo on all the sectors in which employment and sales of the top ten competitors did not *both* go up after the large closure.[51] Reassuringly, in both cases the coefficient of interest is now very small and not significantly different from zero.

7 Conclusions

We exploited a matched employer-employee data set merged with information on firms' group affiliation, to investigate whether and why French business groups operate Internal Labor Markets. Our evidence supports the claim that groups rely on their ILMs to respond to shocks calling for labor adjustments that are costly to perform in frictional external labor markets. ILMs thus emerge as a mutual insurance mechanism across group-affiliated firms, allowing them to slash both firing and hiring costs. As a by-product of ILM activity, implicit employment insurance is provided to group workers.

[50] The involved sectors and the coefficients of the preliminary stage regression are listed in Table 19, panel A.

[51] The involved sectors and the coefficients of the preliminary stage regression are listed in Table 19, panels B and C.

We find that, even after accounting for the endogeneity of group structure, group-affiliated firms are significantly more prone to draw employees from the ILM than from the external labor market. More diversified groups – whose units are more likely to be exposed to unrelated shocks - display a more intense ILM activity. We then provide direct evidence that adverse shocks hitting some group units trigger ILM activity. Relying on a difference-in-difference strategy, we find that following closures and mass layoffs, the proportion of separating workers redeployed to group-affiliated units as opposed to external labor market destination-firms increases dramatically. This effect is stronger when closure/mass layoffs affect group-affiliated firms subject to larger firing costs.

Our evidence also suggests that group ILMs operate efficiently: upon closure events, the ILM reallocates displaced workers more intensely towards group units that are more efficient and enjoy better growth opportunities. The intensity of this increase in ILM flows after a shock also depends on the financial health of the potential destination destination-firms within the group, in line with the intuition that the ability to seize the opportunity to draw valuable human capital from the ILM is constrained by a firm's financing capacity.

Our study suggests that both separation costs and hiring costs are alleviated within internal labor markets. Indeed, we observe that in "normal times" group-affiliated firms rely on the ILM mainly to adjust their skilled human capital, which is typically characterized by high search and training costs. However, adverse shocks leading to closures and mass layoffs trigger most markedly the ILM for lower-skilled occupations, for which firing costs and union pressure are likely to be larger.

Previous research on business groups and diversified firms has focused so far on the role of internal capital markets: in the presence of financial market frictions, the ability to redeploy capital internally allows affiliated units to better respond to shocks than stand-alone firms. Our paper highlights an analogous role for the internal labor markets. Thanks to ILMs, groups are better able to respond to shocks, as they can more easily redeploy human capital to its most productive use, bypassing the frictions that plague external labor markets.

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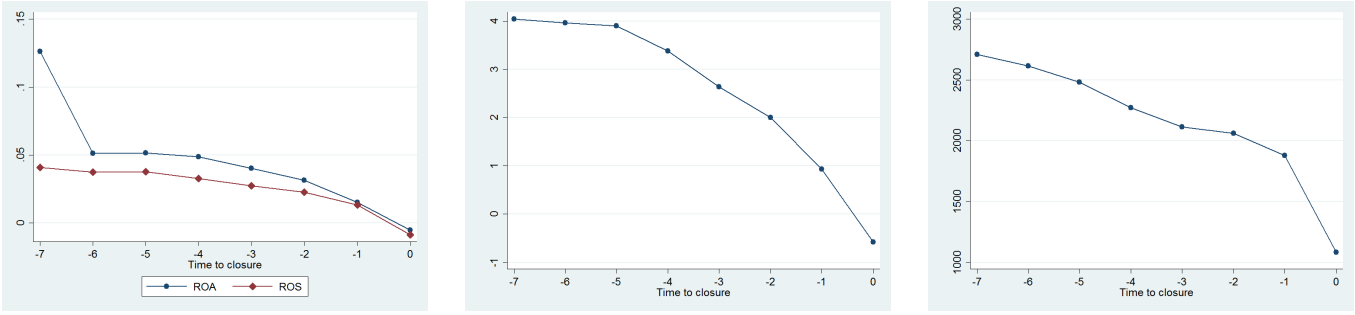
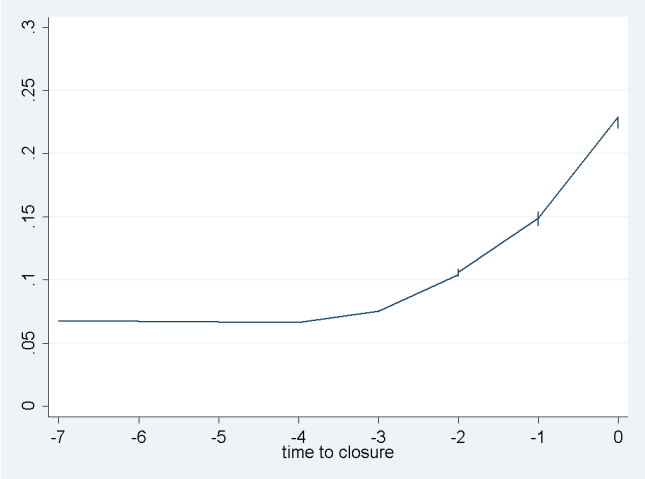
Figure 1. Evolution of performance indicators for group affiliated closing firms



(a) ROA and ROS (b) Coverage (c) Sales

Note: ROA denotes return on assets; ROS return on sales; coverage is the ratio of EBITDA over interest payments. Sales are measured in thousands of Euros. Time to closure indicates the number of years before the closure event.

Figure 2. Evolution of the intensity of ILM activity in BG-affiliated closing firms



Note: Excess probability to originate from an affiliated firm for a worker who finds a job in that firm's group, as opposed to a worker who finds a job outside the firm's group. Time to closure indicates the number of years before the closure event.

Diversification (Paris Area) is computed as the opposite of the sum of the squares of all affiliated firms' employment shares, where each share is the ratio of the total employment of affiliated firms active in/outside the Paris Area to total group employment. *Diversification (Region)* is computed as the opposite of the sum of the squares of the employment shares of all affiliated firms, where each share is the ratio of the total employment of affiliated firms active in a given region to total group employment.

Table 1. Mean excess probability of within-group job-to-job transitions by year

	Panel A: Job transitions between any two occupations								**Panel B: Job transitions within same occupation**							
			Percentiles								Percentiles							
Year	Mean	St.Dev.	10	25	50	75	90	*N*	Mean	St.Dev.	10	25	50	75	90	*N*
	Unweighted firm-level aggregation								**Unweighted firm-level aggregation**							
2003	0.089	0.231	-0.001	0.000	0.000	0.010	0.333	37475	0.066	0.202	-0.001	0.000	0.000	0.000	0.199	34971
2004	0.093	0.237	-0.001	0.000	0.000	0.012	0.333	36691	0.069	0.209	-0.001	0.000	0.000	0.001	0.222	34103
2005	0.093	0.237	-0.001	0.000	0.000	0.012	0.333	38870	0.070	0.210	-0.001	0.000	0.000	0.000	0.211	36134
2006	0.093	0.237	-0.001	0.000	0.000	0.011	0.333	41868	0.070	0.210	-0.001	0.000	0.000	0.000	0.213	39069
2007	0.087	0.229	-0.001	0.000	0.000	0.007	0.333	44362	0.065	0.201	-0.001	0.000	0.000	0.000	0.177	41403
2008	0.084	0.226	-0.001	0.000	0.000	0.006	0.332	47356	0.065	0.202	-0.001	0.000	0.000	0.000	0.166	44542
2009	0.096	0.242	-0.001	0.000	0.000	0.012	0.364	40736	0.075	0.218	-0.001	0.000	0.000	0.001	0.250	38213
2010	0.095	0.244	-0.001	0.000	0.000	0.009	0.349	42045	0.073	0.217	-0.001	0.000	0.000	0.000	0.249	39329
	Weighted firm-level aggregation								**Weighted firm-level aggregation**							
2003	0.083	0.227	-0.001	0.000	0.000	0.010	0.250	37475	0.062	0.198	-0.001	0.000	0.000	0.001	0.150	34971
2004	0.087	0.233	-0.001	0.000	0.000	0.011	0.308	36691	0.065	0.205	-0.001	0.000	0.000	0.001	0.166	34103
2005	0.087	0.232	-0.001	0.000	0.000	0.011	0.324	38870	0.065	0.205	-0.001	0.000	0.000	0.001	0.166	36134
2006	0.086	0.232	-0.001	0.000	0.000	0.011	0.300	41868	0.065	0.204	-0.001	0.000	0.000	0.001	0.166	39069
2007	0.081	0.224	-0.001	0.000	0.000	0.008	0.250	44362	0.061	0.196	-0.001	0.000	0.000	0.000	0.143	41403
2008	0.078	0.221	-0.001	0.000	0.000	0.007	0.250	47356	0.061	0.197	-0.001	0.000	0.000	0.000	0.142	44542
2009	0.090	0.238	-0.001	0.000	0.000	0.013	0.333	40736	0.070	0.213	-0.001	0.000	0.000	0.001	0.199	38213
2010	0.090	0.240	-0.001	0.000	0.000	0.010	0.333	42045	0.068	0.212	-0.001	0.000	0.000	0.001	0.175	39329

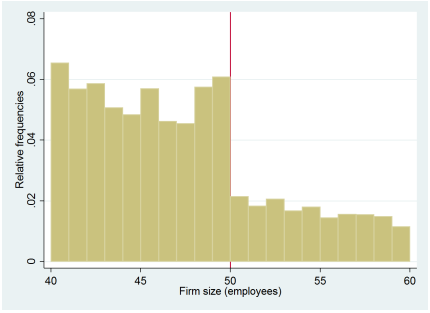
Note: The left hand side (Panel A) considers job-to-job transitions between any two occupations, where we restrict the set c to be the set of all transitions occurring between occupation o and occupation z that originate from the same departments in France where firm j's group is active. In the right-hand side (Panel B), the set c includes only transitions occurring between occupation o and occupation z in which occupation o is equal to occupation z, restricting to transitions that originate from the same departments in France where firm j's group is active. The first column indicates the year in which workers transiting from one job to another were hired by the affiliated firm j. The upper parts of Panels A and B present simple averages. The bottom part of Panel A shows weighted averages where the weight associated to each $\gamma_{c,j}$ is the ratio of the number of transitions from occupation o to occupation z that originate from fim j's group to the total number of transitions (for all the occupation pairs associated with firm j) that originate from j's group. The bottom part of Panel B shows weighted averages where the weight associated to each $\gamma_{c,j}$ is the ratio of the number of transitions from occupation o to occupation z, with $o = z$, that originate from fim j's group to the total number of transitions (for all the occupation pairs associated with firm j) that originate from j's group.

Table 2. Descriptive Statistics

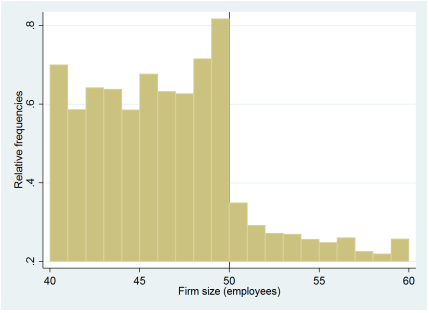
	Mean	**St.dev.**	**Min**	**Max**	**N**
$\overline{\gamma}_{jt}$	0.091	0.23	-0.63	1	289,689
Firm size (empl.)	157.83	1468.45	0.005	217640	289,689
(Log) Firm size	3.593	1.481	-5.298	12.291	289,689
Rest of the group size (empl.)	10955	29375.43	0.001	349038	289,689
(Log) Rest of the group size	6.107	2.786	-6.908	12.763	289,689
Number of 4 digit sectors	11.52	18.57	1	92	289,689
Number of macrosectors	1.88	0.99	1	6	289,689
Number of regions	5.4	6.45	1	22	289,689
Diversification (macro sectors)	-0.87	0.18	-1	-0.26	289,689
Diversification (4-digit sectors)	-0.58	0.27	-1	-0.08	289,689
Diversification (Paris)	-0.85	0.19	-1	-0.5	289,689
Diversification (Regions)	-0.71	0.30	-1	-0.08	289,689
% of firms that close	0.015	0.12	0	1	289,689
# of firm closures in the rest of the group (in year t)	1.76	5.45	0	68	289,689
# of firm closures in the rest of the group (in year t-1)	1.98	5.75	0	68	289,689
% of firms affiliated with groups in which at least one (other) firm closes down (in year t)	0.28	0.45	0	1	289,689
% of firms affiliated with groups in which at least one (other) firm closed down (in year t-1)	0.32	0.46	0	1	289,689
# of plant closures in the group (in year t)	16.23	92.27	0	2149	289,689
# of plant closures in the group (in year t-1)	18.9	101.92	0	2149	289,689
% of firms affiliated with groups in which at least one (other) plant closes down (in yeat t)	0.45	0.50	0	1	289,689
% of firms affiliated with groups in which at least one (other) plant closed down (in yeat t-1)	0.50	0.50	0	1	289,689

Note: *Firm size* is measured by (full time equivalent) total employment; *Rest of the group size* is measured by the (full time equivalent) total employment of all other firms in firm j's group. A group's *Diversification (macrosectors)* is computed as the opposite of the sum of the squares of all its affiliated firms' employment shares, where each share is the ratio of the total employment of affiliated firms active in a given macrosector to total group employment. Macrosectors are agriculture, service, finance, manufacturing, energy, automotive. A group's *Diversification (4-digit)* is computed as the opposite of the sum of the squares of all its affiliated firms' employment shares, where each share is the ratio of the total employment of affiliated firms active in a given 4-digit sector to total group employment. *Diversification (Paris Area)* is computed as the opposite of the sum of the squares of all affiliated firms' employment shares, where each share is the ratio of the total employment of affiliated firms active in/outside the Paris Area to total group employment. *Diversification (Region)* is computed as the opposite of the sum of the squares of the employment shares of all affiliated firms, where each share is the ratio of the total employment of affiliated firms active in a given region to total group employment. We denote as firm/plant closure a situation in which a firm/plant sees its employment drop by more than 90% from one year to the other. We do not consider as closures events where more than 70% of the lost employment ends up in the same firm/plant. We denote as closure year a firm/plant's last year of activity, before at least 90% of the firm/plant's workforce is lost. For a given affiliated firm j, *# of firm closures in the rest of the group (in year t)* measures the number of firms in the rest of the group that close in year t, i.e. that are in their last year of activity in year t. *# of firm closures in the rest of the group (in year t-1)* measures the number of firms in the rest of the group that closed in year $t-1$, i.e. that were in their last year of activity in year $t-1$.

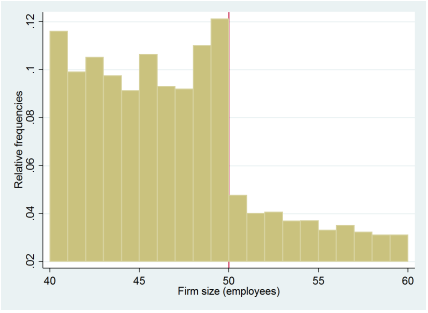
Figure 3. Firm size distribution around the 50 employee threshold (year 2006)



(a) Stand-alone firms



(b) Business group affiliated firms



(c) All firms

Table 3. ILM activity and group sectoral diversification

Variables	(1)	(2)	(3)	(4)	(5)
(Log) Firm size	0.009***	0.009***	0.009***	0.009***	0.009***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
(Log) Rest of the group size	0.001	0.001	0.000	0.001	0.004*
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
(Log) Number of affiliated firms	-0.084***	-0.084***	-0.085***	-0.085***	-0.088***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
State Control	-0.025	-0.025	-0.020	-0.024	-0.009
	(0.024)	(0.024)	(0.022)	(0.023)	(0.017)
Foreign control	-0.043	-0.043	-0.038	-0.042	-0.029
	(0.026)	(0.026)	(0.026)	(0.026)	(0.021)
Diversification (Macrosectors)		-0.006	-0.009		
		(0.007)	(0.007)		
Diversification × Rest of the group size			0.012***		
			(0.003)		
Diversification (4 digit)				0.014*	0.030***
				(0.006)	(0.006)
Diversification (4d) × Rest of the group size					0.022***
					(0.003)
N	289,689	289,689	289,689	289,689	289,689
Firm × Group and year fixed effect	Yes	Yes	Yes	Yes	Yes

Note: Dependent variable: Excess probability for firm j to hire a worker originating from the same group as j. *Firm size* is measured by (full time equivalent) total employment; *Rest of the group size* is measured by the (full time equivalent) total employment of all the other firms affiliated with the same group as firm j. *State Control* is a dummy variable taking the value 1 if the head of the group is state-owned. *Foreign Control* is a dummy variable taking the value 1 if the head of the group is located outside France. A group's *Diversification (macrosectors)* is computed as the opposite of the sum of the squares of all its affiliated firms' employment shares, where each share is the ratio of the total employment of affiliated firms active in a given macrosector to total group employment. Macrosectors are agriculture, service, finance, manufacturing, energy, automotive. A group's *Diversification (4-digit)* is computed as the opposite of the sum of the squares of all its affiliated firms' employment shares, where each share is the ratio of the total employment of affiliated firms active in a given 4-digit sector to total group employment. The variables *Rest of the group size*, *Number of firms in the group*, *Diversification* are normalized to have zero mean. One star denotes significance at the 5% level, two stars denote significance at the 1% level, and three stars denote significance at the 0.1% level.

Table 4. ILM activity and group geographical diversification

Variables	(1)	(2)	(3)	(4)
(Log) Firm size	0.009***	0.009***	0.009***	0.009***
	(0.001)	(0.001)	(0.001)	(0.001)
(Log) Rest of the group size	0.001	0.001	0.002	0.004*
	(0.001)	(0.001)	(0.001)	(0.002)
(Log) Number of affiliated firms	-0.085***	-0.087***	-0.087***	-0.090***
	(0.003)	(0.003)	(0.003)	(0.003)
State Control	-0.024	-0.016	-0.025	-0.013
	(0.023)	(0.021)	(0.022)	(0.018)
Foreign control	-0.044	-0.039	-0.043	-0.035
	(0.026)	(0.023)	(0.025)	(0.021)
Diversification (Paris Area)	0.039***	0.022*		
	(0.008)	(0.009)		
Diversification × Rest of the group size		0.024***		
		(0.004)		
Diversification (Region)			0.043***	0.040***
			(0.007)	(0.007)
Diversification (Reg.) × Rest of the group size				0.027***
				(0.004)
N	289,689	289,689	289,689	289,689
Firm × Group and year fixed effect	Yes	Yes	Yes	Yes

Note: Dependent variable: Excess probability for firm j to hire a worker originating from the same group as j. *Firm size* is measured by (full time equivalent) total employment; *Rest of the group size* is measured by the (full time equivalent) total employment of all the other firms affiliated with the same group as firm j. *State Control* is a dummy variable taking the value 1 if the head of the group is state-owned. *Foreign Control* is a dummy variable taking the value 1 if the head of the group is located outside France. *Diversification (Paris Area)* is computed as the opposite of the sum of the squares of the employment shares of all firms affiliated with a group, where each share is the ratio of the total employment of affiliated firms active in the Paris Area/outside the Paris Area over the total group employment. *Diversification (Region)* is computed as the opposite of the sum of the squares of the employment shares of all firms affiliated with a group, where each share is the ratio of the total employment of affiliated firms active in a given region over the total group employment. The variables *Rest of the group size*, *Number of firms in the group*, *Diversification* are normalized to have zero mean. One star denotes significance at the 5% level, two stars denote significance at the 1% level, and three stars denote significance at the 0.1% level.

Table 5. Heterogeneity of ILM activity by occupation

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(Log) Firm Size	0.008***	0.008***	0.008***	0.008***	0.008***	0.008***	0.008***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
(Log) Rest of the group size	-0.010***	-0.010***	-0.010***	-0.010***	-0.010***	-0.010***	-0.010***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
(Log) Number of affiliated firms	-0.014***	-0.014***	-0.014***	-0.014***	-0.014***	-0.014***	-0.014***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
State Control	-0.011**	-0.011**	-0.011**	-0.011**	-0.011**	-0.011**	-0.011**
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Foreign Control	-0.031***	-0.031***	-0.030***	-0.031***	-0.031***	-0.031***	-0.031***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Occupation of destination (Managers/High-Skill excluded)							
Intermediate Occupation	-0.002***	-0.002***	-0.002***	-0.002***	-0.002***	-0.002***	-0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Clerical Support	-0.005***	-0.005***	-0.005***	-0.005***	-0.005***	-0.005***	-0.005***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Blue Collar	-0.004***	-0.004***	-0.003***	-0.004***	-0.005***	-0.004***	-0.004***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Occupation of origin (Managers/High-Skill excluded)							
Intermediate Occupation	-0.003***	-0.003***	-0.003***	-0.003***	-0.003***	-0.003***	-0.003***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Clerical Support	-0.006***	-0.006***	-0.005***	-0.006***	-0.006***	-0.006***	-0.005***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Blue Collar	-0.005***	-0.005***	-0.004***	-0.005***	-0.004***	-0.005***	-0.004***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Same Occupation		-0.002***	0.001***			-0.002***	-0.000
		(0.000)	(0.000)			(0.000)	(0.000)
Same Occupation × Intermediate Occupation			-0.002***				-0.000
			(0.000)				(0.000)
Same Occupation × Clerical Support			-0.005***				-0.000
			(0.000)				(0.001)
Same Occupation × Blue Collar			-0.007***				-0.004***
			(0.000)				(0.001)
Diversification (4-digit)				-0.004	-0.022**	-0.008	-0.022*
				(0.007)	(0.008)	(0.007)	(0.008)
Div. × Intermediate Occupation (dest.)					0.015***		0.013***
					(0.002)		(0.002)
Div. × Clerical Support (dest.)					0.028***		0.023***
					(0.003)		(0.003)
Div. × Blue Collar (dest.)					0.028***		0.023***
					(0.003)		(0.003)
Diversification × Same Occupation						0.009***	-0.003
						(0.001)	(0.002)
Div. × Int. Occ. × Same Occ.							0.011***
							(0.001)
Div. × Clerical Support × Same Occ.							0.024***
							(0.002)
Div. × Blue Collar × Same Occ.							0.032***
							(0.002)
N	8,992,670	8,992,670	8,992,670	8,992,670	8,992,670	8,992,670	8,992,670
Firm × Group and year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: Dependent variable: Excess probability for firm j to hire a worker transiting from occupation o to occupation z if she originates from the same group as j. *Firm size* is measured by (full time equivalent) total employment; *Rest of the group size* is measured by the (full time equivalent) total employment of all the other firms affiliated with the same group as firm j. *State Control* is a dummy variable taking the value 1 if the head of the group is state-owned. *Foreign Control* is a dummy variable taking the value 1 if the head of the group is located outside France. The occupational categories are the ones indicated in Table A1. The category Managers/High-Skill groups category 2 and 3. *Same Occupation* is a dummy variable taking the value 1 if the (2-digit) occupation of origin is equal to the (2-digit) occupation of destination. *Diversification (4-digit)* is computed as the opposite of the sum of the squares of the employment shares of all firms affiliated with a group, where each share is the ratio of the total employment of affiliated firms active in a given 4-digit sector to the total group employment. The variable *Diversification* is normalized to have zero mean. One star denotes significance at the 5% level, two stars denote significance at the 1% level, and three stars denote significance at the 0.1% level.

Table 6. Firm closures

	Number of closing firms			Percentage of closing firms		
	All firms	< 10 employees	≥ 10 employees	All firms	< 10 employees	≥ 10 employees
2002	134398	117898	16500	9.03	10.25	4.87
2003	130538	114079	16459	8.68	9.78	4.88
2004	135848	123211	12637	8.92	10.30	3.73
2005	123244	109912	13332	8.13	9.38	3.88
2006	128429	114978	13451	8.21	9.49	3.82
2007	136002	121576	14426	8.54	9.91	3.95
2008	115529	105122	10407	7.15	8.40	2.74
2009	158014	139456	18558	9.63	10.99	5.01

Note: We denote as closure a drop in employment from one year to the next by 90% or more. In order to avoid denoting as a closure a situation in which a firm simply changes identifier, we remove all the cases in which more than 70% of the lost employment ends up in a single other firm.

Table 7. Bilateral employment flows: descriptive statistics

	Years to closure	Extra-group flows	Intra-group flows
Normal times	-7	0.025	0.103
		(0.112)	(0.246)
		[57209]	[1728]
	-6	0.023	0.090
		(0.100)	(0.247)
		[101167]	[3240]
	-5	0.026	0.101
		(0.115)	(0.242)
		[152979]	[5339]
	-4	0.026	0.101
		(0.116)	(0.241)
		[224543]	[7423]
(Dropped in baseline)	-3	0.029	0.108
		(0.123)	(0.252)
		[281617]	[9869]
	-2	0.034	0.117
		(0.133)	(0.259)
		[328681]	[12251]
Closure times	-1	0.037	0.284
		(0.142)	(0.380)
		[362870]	[15611]
	0	0.041	0.362
		(0.152)	(0.402)
		[229778]	[9665]

Note: The years to closure indicate the number of years before the firm of origin closes down. For each year we report, separately for non-affiliated and affiliated destination firms, the average ratio of employees moving in year t from an affiliated firm of origin i to a destination firm j, to the total number of job-to-job movers leaving firm i in the same year. Standard deviations are reported in parentheses and the number of observations in square brackets.

Table 8. Bilateral employment flows: closure vs. normal times

Variables	(1)	(2)	(3)	(4)
Destination firm group affiliated	-0.0013***	0.0011	-0.0021***	0.0015***
	(0.0003)	(0.0007)	(0.000)	(0.000)
Same Group	0.0334***	-0.0122**	0.0018	-0.0096***
	(0.0019)	(0.0041)	(0.001)	(0.001)
Closure × destination firm group affiliated	0.0004	0.0025***	-0.0001	0.0005
	(0.0004)	(0.0006)	(0.000)	(0.000)
Closure × Same Group	**0.1487*** **	**0.1187*** **	**0.0452*** **	**0.0378*** **
	(0.0039)	(0.0050)	(0.002)	(0.002)
Same Group × Managers			0.0161***	0.0161***
			(0.002)	(0.002)
Same Group × Intermediate Occupations			0.0093***	0.0093***
			(0.001)	(0.001)
Same Group × Clerical Support			0.0010	0.0010
			(0.001)	(0.001)
Closure × Same Group × Managers			**-0.0082** **	**-0.0082** **
			(0.002)	(0.002)
Closure × Same Group × Intermediate Occupations			**-0.0129*** **	**-0.0129*** **
			(0.002)	(0.002)
Closure × Same Group × Clerical Support			**-0.0112*** **	**-0.0112*** **
			(0.002)	(0.002)
N	1,171,552	1,171,552	4,686,112	4,686,112
Firm of origin FE	YES	NO	YES	NO
Firm of origin × destination firm FE	NO	YES	NO	YES
Year dummies	YES	YES	YES	YES
Time to closure dummies	YES	YES	YES	YES

Note: Dependent variable in Columns (1) - (2): fraction of employees moving from group-affiliated firm i to firm j in year t to the total number of job-to-job movers leaving firm i in year t. Dependent variable in Columns (3) - (4): fraction of employees originally undertaking occupation k moving from group-affiliated firm i to firm j in year t to the total number of job-to-job movers leaving firm i in year t. The occupational categories are the ones indicated in Table A1. The category Managers groups category 2 and 3. Firm i is a firm that eventually closes within our sample period. *Destination firm group affiliated* is a dummy variable that takes the value 1 if firm j is group affiliated. *Same Group* is a dummy variable taking the value 1 if firm i and firm j belong to the same group. *Closure* is a dummy variable taking the value 1 in the last two years of firm i's activity. All relevant second and third level interactions are included. In columns (3) and (4) the coefficients of the interactions involving the occupational dummies do not vary across the two specifications because the (either firm-of-origin or pair) fixed effect is defined at the firm level and does not affect the differential effect of the occupational categories. One star 5% significance, two stars 1% significance, and three stars 0.1% significance. Standard errors are clustered at the firm of origin level.

Table 9. Bilateral employment flows and employment protection legislation

	FE estimates		IV estimates		
Firm size window	40-60	40-60	40-60	35-65	45-55
Same Group	0.0381***	0.0073	0.0325**	0.0165	0.0135
	(0.0093)	(0.0198)	(0.0113)	(0.0097)	(0.0165)
Destination firm group affiliated	-0.0023	-0.0027	-0.0029	0.0020	0.0051
	(0.0019)	(0.0045)	(0.0052)	(0.0047)	(0.0084)
Closure × destination firm group affiliated	0.0018	0.0080*	0.0072	-0.0013	-0.0131
	(0.0027)	(0.0037)	(0.0042)	(0.0042)	(0.0075)
Closure × Same Group	0.1211***	0.0785***	0.0810***	0.0970***	0.0933***
	(0.0158)	(0.0222)	(0.0107)	(0.0106)	(0.0171)
Closure × Firm size> 50	0.0016	0.0007	-0.0092	-0.0136	-0.0129
	(0.0036)	(0.0054)	(0.0235)	(0.0517)	(0.0163)
Destination firm group affiliated × Firm size> 50	-0.0019	0.0026	0.0024	-0.0044	-0.0113
	(0.0032)	(0.0072)	(0.0090)	(0.0085)	(0.0143)
Same Group × Firm size> 50	-0.0023	-0.0127	-0.0499**	-0.0241	-0.0274
	(0.0153)	(0.0295)	(0.0185)	(0.0173)	(0.0278)
Closure × destination firm group affiliated × Firm size> 50	0.0028	0.0010	0.0024	0.0140	0.0317**
	(0.0046)	(0.0056)	(0.0074)	(0.0075)	(0.0121)
Closure × same group × Firm size> 50	**0.0515***	**0.0705**	**0.0817*****	**0.0421***	**0.0647***
	(0.0261)	(0.0370)	(0.0182)	(0.0195)	(0.0312)
N	53,544	53,544	40,795	56,387	17,855
Firm of origin FE	YES	NO	NO	NO	NO
Firm of origin × destination firm FE	NO	YES	YES	YES	YES
Year dummies	YES	YES	YES	YES	YES
Time to closure dummies	YES	YES	YES	YES	YES

Note: Dependent variable: fraction of employees moving from group-affiliated firm i to firm j in year t to the total number of job-to-job movers leaving firm i in year t. *Destination firm group affiliated* is a dummy variable that takes the value 1 if firm j is group affiliated. *Same Group* is a dummy variable taking the value 1 if firm i and firm j belong to the same group. *Closure* is a dummy variable taking the value 1 in the last two years of firm i's activity. In the first two columns $Firm\ size > 50$ is a time-invariant dummy taking the value 1 for firms with 50 or more employees at closure. In the last three columns $Firm\ size > 50$ is instrumented using the (average) firm size in normal times, i.e. at least four years before closure. All relevant second and third level interactions are included. We restrict to closing firms between 40 and 60 employees in the first three columns, between 35 and 65 in the fourth column, between 45 and 55 in the last column. One star 5% significance, two stars 1% significance, and three stars 0.1% significance. Standard errors are clustered at the firm of origin level.

Table 10. Flows to unemployment: descriptive statistics

	Stand-alones	**BG-affiliated firms**
Normal times	0.18818	0.2410
	(0.3184)	(0.2643)
	[312,284]	[22,975]
Closure	0.2294	0.2188
	(0.3566)	(0.2837)
	[1,226,615]	[44,360]

Note: *Closure* indicates the year of firm closure and the previous year. *Normal times* indicates more than four years before closure. We compute the average ratio of employees moving to unemployment in year t from a firm of origin i, over the total number of employees leaving firm i in year t. Firm of origin i is a firm that eventually closes within our sample period. The table reports the average ratio at closure and in normal times, separately for stand-alone versus group-affiliated firms. Standard deviations are reported in parentheses and the number of observations in square brackets.

Table 11. Flows to unemployment: closures vs. normal times

	(1)	(2)
Firm of origin group affilliated	0.0538***	0.0143***
	(0.0030)	(0.0015)
Closure × Firm of origin group affiliated	**-0.0785*** **	**-0.0376*** **
	(0.0030)	(0.0016)
Closure × Firm of origin affiliated × Managers		**0.0324*** **
		(0.0020)
Closure × Firm of origin affiliated × Intermediate Occ.		**0.0218*** **
		(0.0020)
Closure × Firm of origin affiliated × Clerical Support		**0.0171*** **
		(0.0021)
N	1,606,734	6,593,384
Firm of origin FE	YES	YES
Year dummies	YES	YES
Time to closure dummies	YES	YES

Note: Dependent variable in column (1): fraction of employees moving from firm i to unemployment in year t, to the total number of employees leaving firm i in year t. Firm i is a firm that eventually closes within our sample period. *Closure* is a dummy variable taking the value 1 in the last two years of firm i's activity. *Firm of origin group affiliated* is a dummy variable taking the value 1 if the firm of origin is group affiliated. Dependent variable in column (2): fraction of employees originally undertaking occupation k and moving from firm i to unemployment in year t to the total number of employees leaving firm i in year t. The occupational categories are the ones indicated in Table A1. The category Managers groups category 2 and 3. All relevant second and third level interactions are included. One star denotes significance at the 5% level, two stars denote significance at the 1% level, and three stars denote significance at the 0.1% level. Standard errors are clustered at the firm of origin level

Table 12. Wage changes: closures vs. normal times by occupational categories

	Change in Hours Worked		Hourly Wage Change		Annual Wage Change	
	Origin	Pair	Origin	Pair	Origin	Pair
Variables	(1)	(2)	(3)	(4)	(5)	(6)
Destination firm group affiliated	0.0904***	0.0483	0.0426***	0.0295	0.1357***	0.0724
	(0.018)	(0.055)	(0.006)	(0.032)	(0.018)	(0.055)
Same Group	0.1667***	0.0482	0.0174	-0.0157	0.1873***	0.0374
	(0.033)	(0.046)	(0.017)	(0.028)	(0.035)	(0.054)
Closure × destination firm group affiliated	-0.0008	0.0353	-0.0123	-0.0142	-0.0136	0.0229
	(0.024)	(0.053)	(0.008)	(0.031)	(0.025)	(0.054)
Closure × Same Group	**-0.0962***	**-0.1005***	**0.0160**	**-0.0079**	**-0.0806**	**-0.1104***
	(0.043)	(0.044)	(0.019)	(0.026)	(0.045)	(0.051)
Male	0.0391***	0.0240***	0.0040**	0.0006	0.0437***	0.0246***
	(0.004)	(0.003)	(0.001)	(0.002)	(0.004)	(0.003)
Age	0.0438***	0.0304***	-0.0013	-0.0064***	0.0420***	0.0239***
	(0.003)	(0.002)	(0.001)	(0.001)	(0.003)	(0.002)
Age squared	-0.0005***	-0.0004***	0.0000	0.0001***	-0.0005***	-0.0003***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Duration	-0.0045***	-0.0039***	0.0003***	0.0003***	-0.0042***	-0.0036***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Same Group × Managers	-0.0985*	0.0045	0.1079***	0.0491	0.0157	0.0629
	(0.049)	(0.044)	(0.026)	(0.038)	(0.050)	(0.053)
Same Group × Intermediate Occupations	-0.0214	0.0934	0.0370*	0.0142	0.0086	0.1085
	(0.044)	(0.062)	(0.018)	(0.024)	(0.046)	(0.065)
Same Group × Clerical Support	-0.0364	-0.0104	0.0091	0.0216	-0.0261	0.0109
	(0.057)	(0.067)	(0.022)	(0.029)	(0.062)	(0.070)
Closure × Same Group × Managers	**0.0830**	**0.0141**	**-0.0840****	**-0.0330**	**-0.0092**	**-0.0280**
	(0.051)	(0.044)	(0.028)	(0.039)	(0.051)	(0.053)
Closure × Same Group × Intermediate Occupations	**-0.0098**	**-0.0888**	**-0.0262**	**0.0019**	**-0.0280**	**-0.0873**
	(0.046)	(0.063)	(0.019)	(0.025)	(0.048)	(0.065)
Closure × Same Group × Clerical Support	**0.0415**	**-0.0047**	**-0.0238**	**-0.0175**	**0.0187**	**-0.0211**
	(0.069)	(0.068)	(0.025)	(0.031)	(0.071)	(0.071)
N	905,089	905,089	905,087	905,087	909,556	909,556
Firm of origin FE	YES	NO	YES	NO	YES	NO
Firm of origin × destination firm FE	NO	YES	NO	YES	NO	YES
Year dummies	YES	YES	YES	YES	YES	YES
Time to closure dummies	YES	YES	YES	YES	YES	YES

Note: In columns (1)-(2) the dependent variable is the percentage change in the number of hours worked of a worker, originally undertaking occupation k, transiting from affiliated firm i to firm j in year t. In columns (3)-(4) the dependent variable is the percentage change in the hourly wage of a worker transiting from affiliated firm i to firm j in year t. In columns (5)-(6) the dependent variable is the percentage change in the annual wage of a worker transiting from affiliated firm i to firm j in year t. The occupational categories are the ones indicated in Table A1. The category Managers groups category 2 and 3. *Destination firm group affiliated* is a dummy variable that takes the value 1 if firm j is group affiliated. *Same Group* is a dummy variable taking the value 1 if firm i and firm j belong to the same group. *Closure* is a dummy variable taking the value 1 in the last two years of firm i's activity. *Duration* measures the number of days spent by the worker in the firm of origin. All relevant second and third level interactions are included. One star denotes significance at the 5% level, two stars denote significance at the 1% level, and three stars denote significance at the 0.1% level. Standard errors are clustered at the firm of origin level

Table 13. ILM flows at closure and destination firm's sector (boom/bust and growth)

Variables	(1)	(2)	(3)
Destination firm group affiliated	-0.004	-0.0004	-0.0107***
	(0.001)	(0.001)	(0.0026)
Same Group	-0.0291***	-0.0240***	-0.0345***
	(0.006)	(0.007)	(0.0157)
Closure × destination firm group affiliated	-0.0007	-0.0007	0.0084***
	(0.001)	(0.001)	(0.0025)
Closure × same group	**0.1499*** **	**0.1662*** **	**0.1255*** **
	(0.008)	(0.009)	(0.0187)
Destination firm sector in Boom	-0.0001		
	(0.001)		
Destination in Boom × Closure	-0.0007		
	(0.001)		
Destination in Boom × Same Group	-0.0028		
	(0.009)		
Destination in Boom × Closure × Same Group	**0.0314***		
	(0.014)		
Destination firm in Bust		-0.0011	
		(0.000)	
Destination in Bust × Closure		0.0005	
		(0.001)	
Destination in Bust × Same Group		-0.0141	
		(0.009)	
Destination in Bust × Closure × Same Group		**-0.0159**	
		(0.013)	
Sector Growth of Real Sales below 10pct × Closure × Same Group			**-0.0317***
			(0.0135)
Sector Growth of Real Sales above 50pct × Closure × Same Group			**-0.0098**
			(0.0153)
Sector Growth of Real Sales above 90pct × Closure × Same Group			**0.0318***
			(0.0143)
N	688,390	688,390	844,031
Firm of origin × destination firm FE	YES	YES	YES
Year dummies	YES	YES	YES
Time to closure dummies	YES	YES	YES

Note: Dependent variable: fraction of employees moving from group-affiliated firm i to firm j in year t to the total number of job-to-job movers leaving firm i in year t. Firm i is a firm that eventually closes within our sample period. *Destination firm group affiliated* is a dummy variable that takes the value 1 if firm j is group affiliated. *Same Group* is a dummy variable taking the value 1 if firm i and firm j belong to the same group. *Closure* is a dummy variable taking the value 1 in the last two years of firm i's activity. *Destination firm in a Boom (bust)* is a dummy variable that takes value 1 if the destination firm operates in a (3-digit) sector that is experiencing a boom (bust) in the year following the closure. Booms and busts are identified from the fluctuations of real sectoral sales, where nominal sales are deflated by industry-specific price deflators, following the Braun and Larrain (2005) peak-to-trough criterion. Troughs occur when (the log of) real sales are below their trend (computed using a Hodrick-Prescott filter with a smoothing parameter of 100) by more than one standard deviation. For each trough, we go back in time until we find a local peak, which is defined as the closest preceding year for which (detrended) real sales are higher than in the previous and posterior year. A bust goes from the year after the local peak to the year of the trough. The same procedure is used to identify sectoral booms. A peak occurs when current real sales are more than one standard deviation above their trend. Once a peak is identified, we go back in time until we find a local trough, i.e., the closest preceding year for which (detrended) real sales are lower than in the previous and posterior year. The years falling between a local trough and a peak are labelled as a boom. *Sector Growth of Real Sales* is a variable that measures the growth rate of real sales over the sample period in each 3-digit sector. *Sector Growth of Real Sales below 10pct* is a dummy variable that takes the value 1 if the destination firm j operates in a (3-digit) sector that belongs to the bottom decile of the distribution of *Sector Growth of Real Sales*. One star 5% significance, two stars 1% significance, and three stars 0.1% significance. Standard errors are clustered at the firm of origin level.

Table 14. ILM flows at closure and destination firm's size, TFP, investment, and financial health

Variables	(1)	(2)	(3)	(4)	(5)
Destination firm group affiliated	0.0059	-0.0019	0.0012	0.0020	0.0017
	(0.0042)	(0.0028)	(0.0021)	(0.0011)	(0.0016)
Same Group	-0.0132	-0.0205	-0.0055	-0.0086	-0.0062
	(0.0228)	(0.0181)	(0.0127)	(0.0065)	(0.0087)
Closure × destination firm group affiliated	0.0020	0.0042	0.0050**	0.0023**	0.0008
	(0.0039)	(0.0024)	(0.0018)	(0.0009)	(0.0011)
Closure × same group	**0.0562***	**0.0622****	**0.0933*****	**0.1416*****	**0.1541*****
	(0.0256)	(0.0218)	(0.0155)	(0.0081)	(0.0094)
TA below 10pct × Closure × Same Group	**-0.0188**				
	(0.0925)				
TA above 50pct × Closure × Same Group	**0.0561***				
	(0.0216)				
TA above 90pct × Closure × Same Group	**0.0570*****				
	(0.0118)				
TFP below 10pct × Closure × Same Group		**-0.0296**			
		(0.0674)			
TFP above 50pct × Closure × Same Group		**0.0528***			
		(0.0245)			
TFP above 90pct × Closure × Same Group		**0.0187**			
		(0.0145)			
CAPEXbelow 10pct × Closure × Same Group			**-0.0290**		
			(0.0253)		
CAPEX above 50pct × Closure × Same Group			**0.0528****		
			(0.0179)		
CAPEX above 90pct × Closure × Same Group			**-0.0122**		
			(0.0104)		
LEV below 10pct × Closure × same group				**-0.0456**	
				(0.0236)	
LEV above 50pct × Closure × same group				**0.0133**	
				(0.0118)	
LEV above 90pct × Closure × same group				**-0.0483***	
				(0.0233)	
COV below 10pct × Closure × same group					**-0.0367****
					(0.0107)
COV above 50pct × Closure × same group					**-0.0004**
					(0.0130)
COV above 90pct × Closure × same group					**-0.0153**
					(0.0156)
N	705,413	495,042	788,004	700,253	637,665
Firm of origin × destination firm FE	YES	YES	YES	YES	YES
Year dummies	YES	YES	YES	YES	YES
Time to closure dummies	YES	YES	YES	YES	YES

Note: In columns (1)-(3) the dependent variable is the fraction of employees moving from group-affiliated firm i to firm j in year t to the total number of job-to-job movers leaving firm i in year t. In columns (4)-(5) the dependent variable is the fraction of employees moving in year t from group-affiliated firm i to any destination-firm j *not* operating in the financial sector, divided by the total number of job-to-job movers leaving firm i in year t. Firm i is a firm that eventually closes within our sample period. *Destination firm group affiliated* is a dummy variable that takes the value 1 if firm j is group affiliated. *Same Group* is a dummy variable taking the value 1 if firm i and firm j belong to the same group. *Closure* is a dummy variable taking the value 1 in the last two years of firm i's activity. The variable TA measures the (average) book value of assets of destination firm j in "normal times", i.e. more than four years before the closure of firm i. Since a destination firm j can be the labor market partner of different firms of origin, each identifying different 'normal times', the normal time value is averaged over all the possible pairs involving firm j. *TA below* $10pct$ is a dummy variable taking the value 1 if the destination firm j belongs to the bottom decile of the distribution of TA. *TA above* $50pct$ is a dummy variable taking the value 1 if the destination firm j's TA is above the median. *TA above* $90pct$ is a dummy variable taking the value 1 if the destination firm j belongs to the top decile of the distribution of TA. Similar results hold if we measure firm size by the book value of Property, Plants and Equipment. The variable TFP measures the (average) value of TFP of destination firm j in normal times. Firm j's TFP is recovered from the labor and capital coefficients estimated using the Levinsohn and Petrin (2003) methodology by 1-digit sectors (according to the NAF 2008 classification). The estimation has been done on the population of French firms appearing in FICUS between 2002 and 2010. $CAPEX$ measures (average) investment in tangible assets of destination firm j in "normal times". LEV measures the (average) ratio of long-term debt to total assets of destination firm j in "normal times". COV measures the (average) ratio of EBITDA to interest expense of destination firm j in "normal times". All relevant second and third level interactions are included. One star 5% significance, two stars 1% significance, and three stars 0.1% significance. Standard errors are clustered at the firm of origin level.

Table 15. Effect of Parmalat collapse on its French competitors' performance

	Sales	Employment	Total Assets	Fixed Assets
Variables	(1)	(2)	(3)	(4)
Top 10 × Wholesale Milk Trade × Post2004	0.1779***	0.2383***	0.1210*	0.1278**
	(0.0459)	(0.0324)	(0.0511)	(0.0466)
Top 10 × Other Milk Production × Post2004	0.4343***	0.2282***	0.5029***	0.3438***
	(0.0466)	(0.0324)	(0.0509)	(0.0473)
Top 10 × Milk Production × Post2004	0.0124	-0.3459***	0.2670***	-0.1436**
	(0.0459)	(0.0324)	(0.0512)	(0.0468)
Top 10 × Butter × Post2004	0.1058*	0.0637	0.0661	-0.9385***
	(0.0467)	(0.0327)	(0.0539)	(0.0472)
Top 10 × Cheese × Post2004	-0.1081*	0.0253	-0.1438**	-0.0537
	(0.0465)	(0.0324)	(0.0511)	(0.0471)
N	1,489,260	1,004,524	1,321,175	1,215,149
Sector FE	YES	YES	YES	YES
Year dummies	YES	YES	YES	YES

Note: All outcome variables are in logs. The table also includes the lower level interaction terms between *Top 10* (dummy equal to 1 if the firm ranks among the first 10 in the 4-digit sector), *Post2004* (dummy equal to 1 after the Parmalat collapse, i.e. after 2004) and the relevant 4-digit sector dummy. *Fixed Assets* is property plant and equipment. One star denotes significance at the 5% level, two stars denote significance at the 1% level, and three stars denote significance at the 0.1% level. Standard errors are clustered at the 4-digit sector level.

Table 16. Bilateral employment flows following the Parmalat 2004 shock

	Shocked Sectors		**Non Shocked Sectors**	
	Destination FE	Pair FE	Destination FE	Pair FE
Variables	(1)	(2)	(3)	(4)
Same Group	0.0135	0.0066	0.0277***	0.0230*
	(0.0096)	(0.0217)	(0.0055)	(0.0107)
Firm of origin group affiliated	0.0003	-0.0020	-0.0010	-0.0013
	(0.0037)	(0.0070)	(0.0014)	(0.0027)
Post2004 × firm of origin group affiliated	-0.0040	-0.0038	-0.0009	-0.0002
	(0.0046)	(0.0054)	(0.0017)	(0.0018)
Post2004 × same group	**0.0293***	**0.0350***	**-0.0035**	**-0.0013**
	(0.0118)	(0.0143)	(0.0066)	(0.0071)
N	22,219	22,219	50,013	50,013
Firm of destination FE	YES	NO	YES	NO
Firm of origin × firm of destination FE	NO	YES	NO	YES
Year dummies	YES	YES	YES	YES

Note: Dependent variable: fraction of employees hired by group-affiliated firm i (active in a shocked or non-shocked sector) in year t and previously employed by firm j, to the total number of job-to-job movers hired by firm i in year t. *Firm of origin group affiliated* is a dummy variable that takes the value 1 if firm j is group affiliated. *Same Group* is a dummy variable taking the value 1 if firm i and firm j belong to the same group. *Post2004* is a dummy equal to 1 after the Parmalat collapse, i.e. after 2004. One star denotes significance at the 5% level, two stars denote significance at the 1% level, and three stars denote significance at the 0.1% level. Standard errors are clustered at the firm of destination level.

Table 17. Effect of large firm closures on competitors' performance – Part I

Code	Sector	**Sales**	**Employment**	**Fixed Assets**	**Total Assets**
158H	Manufacture of sugar	2.2373***	0.1247**	0.8866***	1.7234***
		(0.1121)	(0.0641)	(0.0973)	(0.0950)
159S	Production of mineral water	0.2529***	0.219***	0.1773**	0.4395***
		(0.0763)	(0.0573)	(0.0695)	(0.0652)
159T	Production of soft drinks	0.8036***	0.3133***	0.3011***	0.455***
		(0.0765)	(0.0572)	(0.0696)	(0.0659)
221E	Publishing of journals and periodicals	0.2976***	0.1672**	0.0845	0.4163***
		(0.0705)	(0.0784)	(0.1149)	(0.0817)
241E	Manufacture of other inorganic basic chemicals	0.2732**	0.3624***	0.0841	0.2643**
		(0.1450)	(0.0867)	(0.1785)	(0.1190)
292D	Manufacture of lifting and handling equipment	0.3458***	0.1203***	0.1852***	0.2665***
		(0.0382)	(0.0333)	(0.0421)	(0.0397)
295G	Manufacture of machinery for textile, apparel and leather production	0.1213**	0.1413***	0.1135***	0.0172
		(0.0463)	(0.0356)	(0.0413)	(0.0427)
314Z	Manufacture of accumulators, primary cells and primary batteries	0.3991**	0.3628***	0.1303	0.3601***
		(0.1289)	(0.0841)	(0.0888)	(0.0881)
452B	Construction of sundry buildings	0.2568***	0.3657***	0.2931***	0.2557***
		(0.0667)	(0.0621)	(0.0681)	(0.0591)
513W	Non specialized wholesale of food	0.8191***	0.6718***	1.0424***	0.6735***
		(0.0506)	(0.0429)	(0.0690)	(0.0511)
514N	Wholesale of pharmaceutical goods	0.2061***	0.4194***	0.6825***	0.1433**
		(0.0761)	(0.0599)	(0.0940)	(0.0631)
518L	Wholesale of electric equipment	0.3374***	0.2548***	0.1609**	0.6672***
		(0.0730)	(0.0528)	(0.0750)	(0.0592)
526B	Specialized retail sale via mail order	0.317***	0.2065**	0.2187**	0.3587***
		(0.0743)	(0.0787)	(0.1166)	(0.0861)
526H	Vending machine sale	0.5171***	0.1334**	0.5503***	0.6267***
		(0.0717)	(0.0581)	(0.1044)	(0.0674)
631B	Non harbour cargo handling	0.9739**	0.4194**	1.3155**	0.9637**
		(0.2930)	(0.2032)	(0.5487)	(0.4063)
743B	Technical analyses, testing and inspections	0.5515***	0.5986***	0.6417***	0.6094***
		(0.1431)	(0.1444)	(0.1279)	(0.1957)

Note: Estimated coefficients for the triple interaction term ($Top10 \times PostClosure \times TreatedSector$) in the regressions concerning the evolution of sales, employment, total assets and fixed assets (i.e., property plant and equipment) after the closure of a large competitor. The sectors displayed are those for which the coefficient is positive and significant in both the sales and employment regression. All outcome variables are in logs. One star denotes significance at the 5% level, two stars denote significance at the 1% level, and three stars denote significance at the 0.1% level. Standard errors are clustered at the 4-digit sector level.

Table 18. Descriptives on large firm closures in the shocked sectors

Code	Sector	Number of closures	Size of closing firm in normal times	Year of closure	Number of bilateral flows
158H	Manufacture of sugar	1	1689.5	2008	3,240
159S	Production of mineral water	1	4339.75	2004	7,983
159T	Production of soft drinks	1	620	2004	8,583
221E	Publishing of journals and periodicals	1	578.5	2004	110,006
241E	Manufacture of other inorganic chemicals	1	915.7	2006	2,864
292D	Manufacture of lifting and handling equipment	1	847.5	2004	28,647
295G	Manufacture of machinery for textile, apparel and leather production	1	830.75	2005	3,816
314Z	Manufacture of accumulators, primary cells and primary batteries	1	1244.5	2005	3,277
452B	Construction of sundry buildings	1	513.25	2007	144,912
513W	Non specialized wholesale of food	2	2471.9	2004	19,110
514N	Wholesale of pharmaceutical goods	3	999.1	2007	84,069
518L	Wholesale of electric equipment	5	1103.2	2006	43,309
526B	Specialized retail sale via mail order	1	767	2007	28,134
526H	Vending machine sale	1	1065.25	2005	12,976
631B	Non harbour cargo handling	1	713.25	2008	5,359
743B	Technical analyses, testing and inspections	1	1063.5	2005	69,081

Table 19. Effect of large firm closures on competitors' performance – Part II

Code	Sector	Sales		Employment		Fixed Assets		Total Assets	
		Coeff.	St.Err.	Coeff.	St.Err.	Coeff.	St.Err.	Coeff.	St.Err.
	Panel A								
155C	Manufacture of cheese	0.0567	(0.1120)	0.056	(0.0653)	-0.0538	(0.0973)	-0.0885	(0.0948)
158A	Industrial manufacture of bread and fresh pastry	0.0979	(0.0762)	0.0184	(0.0572)	0.1365**	(0.0696)	0.1462**	(0.0653)
158P	Processing of tea and coffee	0.182	(0.1342)	-0.0227	(0.0951)	0.3542**	(0.1309)	0.4039***	(0.1351)
174C	Manufacture of other made-up textile articles	-0.0828	(0.0860)	0.0076	(0.0691)	-0.1659	(0.0992)	-0.101	(0.0626)
211C	Manufacture of paper and paperboard	0.4775	(0.2567)	0.0643	(0.1506)	0.2749	(0.3059)	0.415	(0.2286)
212E	Manufacture of household and sanitary goods and of toilet requisites	0.2567	(0.3281)	0.2485	(0.1699)	-0.1344	(0.2956)	0.3329	(0.2191)
222C	Printing n.e.c.	-0.0648	(0.1245)	-0.1083	(0.1394)	-0.0294	(0.1385)	-0.1544	(0.1018)
241J	Manufacture of fertilizers and nitrogen compounds	0.2246	(0.1708)	0.0677	(0.0800)	0.0539	(0.1530)	-0.0719	(0.1234)
251E	Manufacture of other rubber products	-0.1245	(0.1126)	-0.1283	(0.1078)	-0.2645**	(0.1045)	-0.1652**	(0.0769)
252C	Manufacture of plastic packing goods	-0.0712	(0.1114)	-0.2103	(0.1057)	-0.1239	(0.1036)	-0.1026	(0.0767)
252H	Manufacture of plastic-based technical parts	-0.0422	(0.1054)	-0.0152	(0.0968)	0.0148	(0.0793)	-0.0055	(0.1009)
271Y	Manufacture of basic iron and steel and of ferro-alloys	-0.3344	(0.3665)	-0.3019	(0.2671)	-0.4736	(0.4892)	-0.6421	(0.4019)
284B	Cutting, pressing	-0.3154	(0.2233)	-0.1033	(0.2154)	-0.3335	(0.2529)	-0.3579	(0.2532)
287G	Manufacture of fasteners and screw machine products	-0.0202	(0.0761)	-0.0299	(0.0585)	0.2717***	(0.0830)	-0.0394	(0.0784)
312A	Manufacture of low tension electricity distribution and control apparatus	-0.2312	(0.1588)	0.0022	(0.1029)	-0.2777	(0.1737)	-0.0323	(0.1285)
321C	Manufacture of electronic active components	0.121	(0.1953)	0.1131	(0.1553)	0.1836**	(0.0358)	0.4451	(0.2184)
332B	Manufacture of scientific instruments	0.0783	(0.1251)	0.0791	(0.1001)	-0.0199	(0.1377)	0.244	(0.1410)
333Z	Manufacture of industrial process control equipment	0.3769	(0.4855)	0.2413	(0.4318)	0.1533	(0.4911)	0.3922	(0.5689)
361C	Manufacture of other office and shop furniture	-0.0731	(0.1005)	0.1156	(0.1006)	-0.0469	(0.1334)	-0.0115	(0.0835)
503A	Wholesale of motor vehicle parts and accessories	-0.1897	(0.1397)	0.0043	(0.1005)	-0.1746	(0.2648)	-0.317	(0.1991)
524H	Retail sale of furniture	-0.1131	(0.0745)	0.0526	(0.0787)	-0.1463	(0.1165)	0.0388	(0.0861)
551A	Tourism hotels and motels with restaurant	-0.0594	(0.1271)	0.0069	(0.0691)	-0.1728	(0.0995)	0.0406	(0.0661)
552E	Other provision of tourist lodgings	-0.2419	(0.2629)	0.0171	(0.1911)	-0.2134	(0.2096)	-0.0791	(0.1732)
553B	Fast food restaurants	-0.2298	(0.2077)	-0.0248	(0.1311)	-0.0279	(0.1629)	-0.11	(0.1164)
602M	Interurban freight transports by road	-0.0489	(0.1773)	-0.3054	(0.185)	-0.0777	(0.2802)	-0.1931	(0.2364)
634B	Chartering	0.1338	(0.2922)	0.3158	(0.2025)	0.9454	(0.5502)	0.3389	(0.4055)
642C	Telecommunications, except radio and television transmission	-0.2472	(0.5263)	0.0374	(0.2398)	-0.3482	(0.3337)	-0.2823	(0.3509)
702A	Letting of dwellings	0.2723	(0.1662)	0.213	(0.1452)	0.4838	(0.2982)	0.2892**	(0.1412)
703C	Management of residential building on a fee or contract basis	0.1791	(0.2393)	0.1279	(0.2041)	0.091	(0.34)	-0.0779	(0.216)
723Z	Data processing	-0.0441	(0.2258)	0.1219	(0.1764)	0.0632	(0.2057)	-0.083	(0.2981)
745B	Temporary work	-0.0899	(0.12)	-0.1679	(0.1389)	-0.3882***	(0.1147)	-0.0843	(0.1707)
748B	Film processing	-0.4295	(0.2528)	-0.0335	(0.2390)	-0.1931	(0.2152)	-0.5176	(0.3689)
748D	Packaging activities	-0.0827	(0.2016)	0.0939	(0.1922)	0.1277	(0.1695)	0.1059	(0.2850)
	Panel B								
151E	Industrial production of meat products	-0.1239	(0.0907)	-0.1562***	(0.0544)	-0.1699**	(0.0794)	-0.0827	(0.0791)
158V	Manufacture of other food products n.e.c.	0.125	(0.0765)	-0.1083**	(0.0562)	0.1323**	(0.0661)	0.0044	(0.0646)
159J	Manufacture of cider and other fruit wines	-0.0005	(0.0770)	-0.207***	(0.0572)	-0.0242	(0.0697)	-0.0194	(0.0667)
177C	Manufacture of knitted and crocheted pullovers and similar articles	-0.1914**	(0.0693)	-0.2983***	(0.0459)	-0.2584***	(0.0859)	-0.4604***	(0.0525)
193Z	Manufacture of footwear	0.0465	(0.0470)	-0.1751***	(0.0081)	0.0972	(0.0447)	0.0058	(0.0491)
262C	Manufacture of ceramic sanitary fixtures	-0.2108**	(0.1016)	0.5602***	(0.2001)	-1.2667***	(0.1480)	0.732***	(0.0800)
273G	Wire drawing	-0.7209***	(0.1384)	-0.481***	(0.1054)	-0.076	(0.1905)	-0.3254**	(0.1407)
274C	Production of basic aluminium	-0.1579	(0.1741)	-0.4672***	(0.1300)	-0.4488**	(0.2304)	-0.4841**	(0.1608)
274D	First processing of aluminium	-0.4707***	(0.1388)	-0.1522	(0.1018)	-0.5858***	(0.1919)	-0.4055**	(0.1398)
275E	Casting of light metals	-0.4709***	(0.1307)	-0.203**	(0.0886)	-0.634***	(0.1381)	-0.2364**	(0.1075)
282D	Manufacture of central heating radiators and boilers	-0.2071**	(0.0747)	0.04	(0.0593)	-0.0837	(0.0839)	-0.1415**	(0.0769)
285D	Machining, except turning	-0.3001**	(0.1090)	-0.2024**	(0.0975)	-0.2093	(0.1272)	-0.2665**	(0.1135)
297C	Manufacture of non-electric domestic appliances	-0.2412***	(0.0632)	-0.4931***	(0.0526)	0.0298	(0.0629)	-0.3638***	(0.0526)
311B	Manufacture of high power electric motors, generators and transformers	-0.5346***	(0.0927)	-0.051	(0.0529)	-0.0374	(0.0731)	-0.5803***	(0.0694)
316A	Manufacture of electrical equipment for engines and vehicles n.e.c.	-0.5783***	(0.1686)	-0.876***	(0.1224)	-0.8024**	(0.2476)	-0.3809**	(0.1795)
316D	Manufacture of electric equipments n.e.c	-0.291**	(0.0928)	-0.0673	(0.0528)	0.3278***	(0.0733)	-0.0895	(0.0697)
322B	Manufacture of wired telecommunication equipment	0.0708	(0.1713)	-0.2625**	(0.0839)	-0.4345***	(0.0190)	-0.1622	(0.1865)
351B	Building of civilian ships	-0.1356	(0.1288)	-0.3016**	(0.1390)	-0.632***	(0.1319)	0.1637	(0.1135)
351E	Building and repairing of pleasure and sporting boats	-0.6868**	(0.3232)	-0.0656	(0.2613)	0.283	(0.3742)	0.0203	(0.3353)
361A	Manufacture of chairs and seats	-0.3415***	(0.0949)	-0.3873***	(0.1114)	-0.3353**	(0.1370)	-0.2785***	(0.0892)
402C	Distribution and trade of gaseous fuels through mains	-0.1741**	(0.0719)	-0.7448***	(0.0736)	0.4156**	(0.1277)	-0.6247**	(0.2069)
452C	Construction of civil engineering structures	-0.2342***	(0.0528)	0.1135**	(0.0463)	-0.0794	(0.0482)	-0.2134***	(0.0444)
452D	Underground works	0.1282**	(0.0531)	-0.1348***	(0.0464)	-0.301***	(0.0491)	-0.1686***	(0.0444)
511R	Agents specializing in the sale of particular products	-0.1839**	(0.0756)	0.1707***	(0.0597)	-0.2969***	(0.0964)	-0.3787***	(0.0644)
512A	Wholesale of grain, seeds and animal feeds	-0.2002**	(0.0954)	0.1315**	(0.0740)	-0.0365	(0.1151)	0.2076**	(0.0864)
521A	Retail sale of frozen products	-0.3019***	(0.0626)	-0.0868	(0.0656)	-0.0194	(0.0970)	-0.3047***	(0.0703)
524L	Retail sale of electrical household appliances and radio and television goods	-1.329***	(0.0563)	-1.6156***	(0.0567)	-1.4642***	(0.0567)	-1.6079***	(0.0482)
526G	Home sale	0.5699***	(0.0798)	-0.1062**	(0.0581)	-0.0692	(0.1179)	0.0769	(0.0714)
553A	Traditional style restaurants	-0.8844***	(0.1963)	-0.8128***	(0.1301)	-0.8072***	(0.1646)	-0.7193***	(0.1165)
555C	Collective catering on contract basis	-0.4964**	(0.1819)	-0.296***	(0.0785)	-0.4052**	(0.1298)	-0.1986**	(0.0895)
631D	Refrigerated storage and warehousing	-0.408**	(0.1364)	-0.5204***	(0.1078)	-0.4738	(0.2593)	-0.3923**	(0.1796)
633Z	Activities of travel agencies and tour operators	-0.3732	(0.2202)	-0.4932**	(0.1548)	-0.4787	(0.3994)	-0.4167	(0.3130)
741G	Business and management consultancy activities	-2.8802***	(0.2653)	-2.3639***	(0.2432)	-4.8498***	(0.2156)	-5.0473***	(0.3677)
748K	Related services to production	-1.5058***	(0.1512)	-1.7771***	(0.1508)	-2.9374***	(0.1247)	-2.0213***	(0.1920)
900G	Sanitation, remediation and similar activities	-0.144	(0.1125)	-0.2912**	(0.0799)	-0.7629***	(0.0336)	-0.2052	(0.1154)
	Panel C								
143Z	Mining of chemical and fertilizer minerals	0.1258	(0.0979)	0.1313**	(0.0681)	0.329	(0.2403)	-0.0478	(0.0935)
151F	Cooked meats production and trade	0.22***	(0.0764)	-0.0787	(0.0562)	0.0467	(0.0661)	0.004	(0.0641)
152Z	Processing and preserving of fish and fish products	0.242**	(0.1342)	-0.0409	(0.0951)	-0.1257	(0.1310)	-0.0761	(0.1352)
157C	Manufacture of prepared pet foods	0.0389	(0.0907)	0.1064**	(0.0548)	-0.3305***	(0.0798)	-0.1236	(0.0806)
202Z	Manufacture of veneer sheets, plywood, laminboard, and other panels and boards	0.6224**	(0.1862)	0.2908	(0.2051)	0.5575**	(0.2670)	0.1015	(0.2067)
241A	Manufacture of industrial gases	1.9225***	(0.1857)	0.115	(0.0904)	-0.1902	(0.1573)	1.542***	(0.1373)
244A	Manufacture of basic pharmaceutical products	-0.1494	(0.1453)	0.2146**	(0.0864)	0.6171***	(0.1769)	-0.1511	(0.1187)
287C	Manufacture of light metal packaging	-0.1113	(0.0764)	0.1103**	(0.0586)	-0.2248**	(0.0831)	-0.4511***	(0.0791)
361M	Manufacture of mattresses	0.5525**	(0.1925)	0.1852	(0.1653)	0.4356**	(0.2012)	0.3459**	(0.1623)
365Z	Manufacture of games and toys	0.5282***	(0.1206)	-0.1344	(0.1266)	0.0669	(0.1580)	-0.1034	(0.1055)
515C	Wholesale of metals and metal ores	0.1712**	(0.0754)	0.0838	(0.0598)	0.0112	(0.0932)	0.2622***	(0.0631)
518G	Wholesale of computers, computer peripheral equipment and software	0.2305**	(0.0948)	0.08	(0.0740)	0.3952***	(0.1146)	0.2939***	(0.0840)
602B	Road scheduled passenger land transport	0.3344**	(0.1505)	-0.2067	(0.15)	-0.1365	(0.2971)	0.0184	(0.2183)
631E	Non refrigerated storage and warehousing	0.3621**	(0.1351)	0.0562	(0.1106)	0.6717**	(0.2004)	0.3072	(0.1531)
711A	Short term renting of automobiles	0.6906	(0.545)	0.727**	(0.2702)	-0.1302	(0.5357)	0.3021	(0.4980)
713C	Renting of construction and civil engineering machinery and equipment	0.332	(0.413)	0.631***	(0.1898)	0.3129	(0.3595)	0.2874	(0.3235)
725Z	Maintenance and repair of office, accounting and computing machinery	0.7115**	(0.2189)	-0.0148	(0.1543)	0.7034**	(0.1743)	0.4174	(0.2911)
744B	Advertising agency, advertising consultant	0.1095	(0.1662)	0.4813**	(0.1624)	0.0836	(0.1412)	0.0727	(0.2475)

Note: Estimated coefficient for the triple interaction term ($Top10 \times PostClosure \times TreatedSector$) in the regressions concerning the evolution of sales, employment, total assets and fixed assets (i.e., property plant and equipment) after the closure of a large competitor. The sectors displayed are those for which the coefficient is: (*i*) not significant in both the sales and employment regression (panel A); (*ii*) negative or not significant in the sales and the employment regression (panel B); (*iii*) negative or not significant in either the sale or the employment regression (panel C). All outcome variables in logs. One star denotes significance at the 5% level, two stars denote significance at the 1% level, and three stars denote significance at the 0.1% level. Standard errors are clustered at the 4-digit sector level.

Table 20. Descriptives on bilateral flows before and after the closure of a large competitor

	Extra-group Flows	Within-group Flows
Before the shock	0.0215	0.0638
	(0.0983)	(0.1875)
	[183,429]	[6,173]
After the shock	0.0218	0.0717
	(0.1000)	(0.1957)
	[374,814]	[10,950]

Table 21. Bilateral employment flows and large competitors' closures

	Shocked Sectors				Non Shocked Sectors	
Variables	(1)	(2)	(3)	(4)	(5)	(6)
Firm of origin group affiliated	0.0004	0.0037***	0.0043***	-0.0033***	0.0014***	0.0020***
	(0.0004)	(0.0009)	(0.0009)	(0.0004)	(0.0003)	(0.0005)
Same Group	0.0271***	0.0006	0.0005	-0.0012	0.0021	0.0032
	(0.0025)	(0.0049)	(0.0050)	(0.0016)	(0.0017)	(0.0023)
Post shock × firm of origin group affiliated	-0.0028***	-0.0037***		-0.0010	-0.0037***	-0.0044***
	(0.0005)	(0.0006)		(0.0004)	(0.0003)	(0.0004)
Post shock × Same Group	**0.0058***	**0.0115*****		**0.0013**	**0.0006**	**0.0008**
	(0.0029)	(0.0030)		(0.0015)	(0.0014)	(0.0018)
Shock year × Same Group			**0.0062**			
			(0.0040)			
Shock year + 1 × Same Group			**0.0112***			
			(0.0043)			
Shock year + 2 × Same Group			**0.0107***			
			(0.0042)			
Shock year + 3 × Same Group			**0.0200*****			
			(0.0046)			
Shock year + 4 × Same Group			**0.0116**			
			(0.0070)			
Shock year + 5 and 6 × Same Group			**0.0078**			
			(0.0069)			
Shock year × firm of origin group affiliated			-0.0013			
			(0.0008)			
Shock year + 1 × firm of origin group affiliated			-0.0005			
			(0.0008)			
Shock year + 2 × firm of origin group affiliated			-0.0066***			
			(0.0009)			
Shock year + 3 × firm of origin group affiliated			-0.0043***			
			(0.0009)			
Shock year + 4 × firm of origin group affiliated			-0.0056***			
			(0.0012)			
Shock year + 5 and 6 × firm of origin group affiliated			-0.0101***			
			(0.0013)			
Post shock × Same Group × Managers				**0.0053***		
				(0.0024)		
Post shock × Same Group × Intermediate Occupations				**-0.0010**		
				(0.0020)		
Post shock × Same Group × Clerical Support				**0.0021**		
				(0.0015)		
N	575,366	575,366	575,366	2,301,464	3,817,969	1,956,489
Firm of destination FE	YES	NO	NO	NO	NO	NO
Firm of origin × firm of destination FE	NO	YES	YES	YES	YES	YES
Year dummies	YES	YES	YES	YES	YES	YES
Time to shock dummies	YES	YES	YES	YES	YES	YES

Note: Dependent variable in Columns (1), (2), (3) and (5) and (6): fraction of employees moving from firm j to group-affiliated firm i in year t to the total number of job-to-job movers hired by firm i in year t. Dependent variable in Column (4): fraction of employees moving from firm j to affiliated firm i undertaking occupation k in year t to the total number of job-to-job movers hired by firm i in year t. The occupational categories are the ones indicated in Table A1. The category Managers groups category 2 and 3. Firm i is a group-affiliated firm that operates in a sector in which a large competitor closes during our sample period. *Firm of origin group affiliated* is a dummy variable that takes the value 1 if firm j is group affiliated. *Same Group* is a dummy variable taking the value 1 if firm j and firm i belong to the same group. *Post Shock* is a dummy variable taking the value 1 starting from the closure year. We denote as the closure year the last year of activity of a given firm. *Shock year*+1 is a dummy variable taking the value 1 in the year after the closure. All relevant second and third level interactions are included. One star denotes significance at the 5% level, two stars denote significance at the 1% level, and three stars denote significance at the 0.1% level. Standard errors are clustered at the destination firm level.

A Appendix

A.1 Professional categories in the DADS

Table A1. Professional categories in the DADS

CODE	CATEGORY
10	Farmers
2	**Top manager/Chief of firms**
21	Top managers/chiefs of handicraft firms
22	Top managers/chiefs of industrial/commercial firms with less than 10 employees
23	Top managers of industrial/commercial firms with more than 10 employees
3	**Management and superior intellectual occupations**
31	Healthcare professionals, legal professionals and other professionals
33	Managers of the Public Administration
34	Professors, researchers, scientific occupations
35	Journalists, media, arts and entertainment occupations
37	Administrative and commercial managers
38	Engineers and technical managers
4	**Intermediate occupations**
42	Teachers and other education, training and library occupations
43	Healthcare support occupations and social services occupations
44	Clergy and religious occupations
45	Intermediate administrative occupations in the Public Administration
46	Intermediate administrative and commercial occupations in firms
47	Technicians
48	Supervisors and 'agents de maitrise'
5	**Clerical Support and Sales occupations**
52	Clerical support occupations in the Public Administration
53	Surveillance and security occupations
54	Clerical support in firms
55	Sales and related occupations
56	Personal service occupations
6	**Blue collar occupations**
62	Industrial qualified workers
63	Handicraft qualified workers
64	Drivers
65	Maintenance, repair and transport qualified workers
67	Industrial non qualified workers
68	Handicraft non qualified workers
69	Agricultural worker

Source: INSEE

A.2 Equivalence between the coefficients estimated from equations (2)-(4) and those obtained from direct estimation of equation (1)

In this Section we show that the coefficient $\gamma_{c,j,t}$ estimated from equations (2)-(4) is equal to the coefficient obtained from direct estimation of equation (1).

Proof. The coefficient from the linear probability model in equation (1), estimated on a sample of N individuals, for given occupations of origin and destination, and a given firm of destination j, in year t (subscript t dropped), is the standard OLS coefficient:

$$\begin{aligned}\gamma_{c,j}^{OLS} &= \frac{Cov(E_{i,c,j}, BG_{i,j})}{Var(BG_{i,j})} = \frac{\sum_{i=1}^{N}(E_{i,c,j} - \overline{E}_{c,j})(BG_{i,j} - \overline{BG}_j)/N}{\sum_{i=1}^{N}(BG_{i,j} - \overline{BG}_j)^2/N} \\ &= \frac{\sum_{i=1}^{N} E_{i,c,j}BG_{i,j}/N - \overline{E}_{c,j}\overline{BG}_j}{\sum_{i=1}^{N} BG_{i,j}^2/N - \overline{BG}_j^2} = \frac{\sum_{i=1}^{N} E_{i,c,j}BG_{i,j}/N - \overline{E}_{c,j}\overline{BG}_j}{\overline{BG}_j - \overline{BG}_j^2} \end{aligned} \tag{9}$$

where N is the number of workers belonging to the set c.

Since $\beta_{c,j}^{OLS} = \overline{E}_{c,j} - \gamma_{c,j}^{OLS}\overline{BG}_j$, we get:

$$\begin{aligned}\gamma_{c,j}^{OLS} + \beta_{c,j}^{OLS} &= \frac{\sum_{i=1}^{N} E_{i,c,j}BG_{i,j}/N - \overline{E}_{c,j}\overline{BG}_j}{\overline{BG}_j - \overline{BG}_j^2} + \overline{E}_{c,j} - \gamma_{c,j}^{OLS}\overline{BG}_j \\ &= \frac{\sum_{i=1}^{N} E_{i,c,j}BG_{i,j}/N - \overline{E}_{c,j}\overline{BG}_j + \overline{E}_{c,j}(\overline{BG}_j - \overline{BG}_j^2) - \gamma_{c,j}^{OLS}\overline{BG}_j(\overline{BG}_j - \overline{BG}_j^2)}{\overline{BG}_j - \overline{BG}_j^2} \\ &= \frac{\sum_{i=1}^{N} E_{i,c,j}BG_{i,j}/N - \overline{E}_{c,j}\overline{BG}_j^2 - \gamma_{c,j}^{OLS}\overline{BG}_j(\overline{BG}_j - \overline{BG}_j^2)}{\overline{BG}_j - \overline{BG}_j^2} \\ &= \frac{\sum_{i=1}^{N} E_{i,c,j}BG_{i,j}/N - \overline{BG}_j^2(\overline{E}_{c,j} + \gamma_{c,j}^{OLS} - \gamma_{c,j}^{OLS}\overline{BG}_j)}{\overline{BG}_j - \overline{BG}_j^2} \\ &= \frac{\sum_{i=1}^{N} E_{i,c,j}BG_{i,j}/N - \overline{BG}_j^2(\beta_{c,j}^{OLS} + \gamma_{c,j}^{OLS})}{\overline{BG}_j - \overline{BG}_j^2}\end{aligned}$$

Hence,

$$(\overline{BG}_j - \overline{BG}_j^2)(\gamma_{c,j}^{OLS} + \beta_{c,j}^{OLS}) = \sum_{i=1}^{N} E_{i,c,j}BG_{i,j}/N - \overline{BG}_j^2(\beta_{c,j}^{OLS} + \gamma_{c,j}^{OLS}) \tag{10}$$

$$\gamma_{c,j}^{OLS} + \beta_{c,j}^{OLS} = \frac{\sum_{i=1}^{N} E_{i,c,j}BG_{i,j}/N}{\overline{BG}_j} = \frac{\sum_{i=1}^{N} E_{i,c,j}BG_{i,j}}{\sum_{i=1}^{N} BG_{i,j}} \tag{11}$$

as in equation (2). Next, substituting (9) into $\beta_{c,j}^{OLS} = \overline{E}_{c,j} - \gamma_{c,j}^{OLS}\overline{BG}_j$, we get:

$$
\begin{aligned}
\beta_{c,j}^{OLS} &= \overline{E}_{c,j} - \frac{\sum_{i=1}^{N} E_{i,c,j} BG_{i,j}/N - \overline{E}_{c,j}\overline{BG}_j}{\overline{BG}_j - \overline{BG}_j^2}\overline{BG}_j \\
&= \frac{\overline{E}_{c,j}(1-\overline{BG}_j) - \sum_{i=1}^{N} E_{i,c,j} BG_{i,j}/N + \overline{E}_{c,j}\overline{BG}_j}{1-\overline{BG}_j} \\
&= \frac{\sum_{i=1}^{N} E_{i,c,j}(1-BG_{i,j})}{\sum_{i=1}^{N}(1-BG_{i,j})}
\end{aligned}
$$

as in equation (3). □

A.3 Employment protection regulation in France

In this section we briefly summarize the main pillars of employment protection regulation in France, regarding the termination of indefinite duration contracts. We refer to Abowd and Kramarz (2003) for more details on both indefinite and fixed duration contracts.

The termination of indefinite duration contracts under French Labor Law falls under different categories: dismissal for economic reasons (be it a single or a collective dismissal); dismissal for personal cause (be it for "serious reason" or "very serious misconduct"); early and normal retirement. With the exception of terminations for "very serious misconduct", in all other terminations the employer must (i) observe a mandatory advance notice period and (ii) pay a severance payment. The advance notice period (the delay between the formal notice letter announcing the termination and the end of the employment contract) varies between 1 and 3 months, depending on the worker's seniority. Severance payments must be paid to workers with at least two years seniority: for every year of seniority, the employer pays 1/10 of the wage if the worker is paid by the month. An additional payment is due for every year of service beyond 10. Employees who are fired for economic reasons also enjoy employment priority within the firm for 1 year after the termination date, and have 1 year to dispute the dismissal.

Dismissals can only be justified in case of a "genuine and serious cause". Valid economic reasons for termination include the destruction of the worker's job, the transformation of the job or the worker's refusal to sign a new contract when a modification of the labor contract is necessary. These events are usually due either to technological change within the firm or bad economic conditions. The employer must follow a strict procedure in notifying the dismissal and providing a justification for it. If the procedure is overlooked, or the dismissal deemed unfair by a court, the employee is entitled to additional compensation (normally at least 6 months salary). While a firm's closure represents a legitimate cause for dismissal, common procedural errors can still trigger additional compensation to employees in case of dismissals prompted by the firm's closure.

In sum, the complex termination procedure and the penalties involved in case of a successful dispute impose non negligible termination costs that add to the advance notice and severance payment. This is particularly true in the case of *large* collective terminations in firms with 50 or more employees. Indeed, the termination of less than 10 workers during a 30-day period must follow a procedure similar to individual terminations: the employer must consult the personnel delegate or the union representatives, notify the Ministry of Labor in writing, provide an exit interview to the employee and possibly a retraining program. However, for firms with 50 or more employees, the dismissal of at least 10 workers during a 30-day period requires a much more complex procedure, detailed by the 2 August 1989 law. Before engaging in the collective termination, these larger firms must formulate a "social plan" (recently renamed as "employment preservation plan") in close negotiation with staff and union representatives. This is mandatory also in case of collective terminations prompted by the firm's closure.

The employment preservation plan must try to limit the total number of terminations, and facilitate reemployment of the terminated workers (e.g., by retraining and redeploying them internally or within the firm's group if possible). The procedure required to formulate and negotiate the plan is fairly long, especially if it is disputed. It involves several meetings with staff and union representatives. During this period, the Ministry of Labor is kept informed about the process, and must verify that the procedure has been followed correctly. Along the process, the plan can be disputed (NOT CLEAR WHETHER BY UNION AND STAFF REPS OR ALSO BY THE MINISTRY), for instance on the ground that not all dismissals are justified or not all reallocation options have been considered.

A.4 TFP estimation

Table A2. TFP: Labor and capital coefficients in the production function

Sector	Labor Coefficient	Capital Coefficient
Accommodation and food services	0.3186	0.1690
Administrative services	0.7085	0.0506
Arts, entertainment and recreation	0.4840	0.0774
Construction	0.4771	0.0847
Educational services	0.5466	0.0419
Healthcare and social assistance	0.2331	0.0201
ICT	0.7183	0.0582
Manufacturing	0.5420	0.0982
Mining, quarrying and oil and gas extraction	0.5015	0.0566
Other services	0.5485	0.0897
Professional, scientific and technical services	0.6747	0.0186
Real estate	0.5852	0.1083
Retail and wholesale trade	0.5340	0.0855
Transportation and warehousing	0.5441	0.1075
Utilities	0.3851	0.2275
Water production and distribution	0.4804	0.1625

Note: Labor and capital coefficients are estimated following Levinsohn and Petrin (2003) separately for each 1-digit sector (NAF 2008 classification) on the universe of French firms between 2002 and 2010. We deflate value added and materials using 2-digit sector prices and the gross capital stock using a 2-digit sector capital goods deflator. The empirical specification includes year dummies.

Table A3. Estimated TFP across sectors

Sector	Mean	Median	N
Accommodation and food services	3.3811	3.4205	1,009,928
Administrative services	3.8606	3.8805	221,507
Arts, entertainment and recreation	3.8149	3.8371	62,995
Construction	4.0717	4.0943	1,385,275
Educational services	3.9390	3.9696	95,362
Healthcare and social assistance	4.9364	4.9011	518,821
ICT	3.9940	4.0661	184,040
Manufacturing	3.9310	3.9080	730,105
Mining, quarrying and oil and gas extraction	5.2440	5.2614	3,101
Other services	3.3666	3.4194	472,083
Professional, scientific and technical services	4.4120	4.4710	622,463
Real estate	3.7624	3.8288	219,777
Retail and wholesale trade	3.8601	3.9246	2,116,558
Transportation and warehousing	3.9705	4.0094	263,143
Utilities	4.0681	4.2005	2,207
Water production and distribution	3.9865	4.0195	27,761

Note: TFP is estimated following Levinsohn and Petrin (2003) separately for each 1-digit sector (NAF 2008 classification) on the universe of French firms between 2002 and 2010. We deflate value added and materials using 2-digit sector prices and the gross capital stock using a 2-digit sector capital goods deflator. The empirical specification includes year dummies.

Table A4. Estimated TFP across sectors: stand-alone vs. group-affiliated firms

Sector	Stand-alone firms	BG-affiliated firms
Accommodation and food services	3.3419	4.6067
	(3.3982)	(4.6328)
	[978,639]	[31,289]]
Administrative services	3.7760	4.4867
	(3.8209)	(4.4407)
	[195,140]	[26,367]
Arts, entertainment and recreation	3.7278	5.0297
	(3.7747)	(5.0658)
	[58,779]	[4,216]
Construction	4.0377	5.0369
	(4.0756)	(5.0476)
	[1,338,107]	[47,168]
Educational services	3.9043	4.8340
	(3.9480)	(4.8836)
	[91,805]	[3,557]
Healthcare and social assistance	4.9179	6.2063
	(4.8928)	(6.1766)
	[511,342]	[7,479]
ICT	3.8715	4.7082
	(3.9680)	(4.7418)
	[157,084]	[26,956]
Manufacturing	3.8068	4.7573
	(3.8201)	(4.7800)
	[634,690]	[95,415]
Mining, quarrying and oil and gas extraction	4.9059	5.6995
	(4.8949)	(5.7519)
	[1,780]	[1,321]
Other services	3.3561	4.1942
	(3.4142)	(4.1483)
	[466,132]	[5,951]
Professional, scientific and technical services	4.3742	4.9070
	(4.4421)	(4.9050)
	[578,319]	[44,144]
Real estate	3.7045	4.4790
	(3.7954)	(4.5085)
	[205,235]	[14,542]
Retail and wholesale trade	3.7937	4.6031
	(3.8741)	(4.6445)
	[1,942,897]	[173,661]
Transportation and warehousing	3.8714	4.7013
	(3.9368)	(4.7272)
	[231,731]	[31,412]
Utilities	3.7417	4.9382
	(3.8070)	(4.9274)
	[1,605]	[602]
Water production and distribution	3.8085	4.6712
	(3.8872)	(4.6985)
	[22,073]	[5,728]

Note: TFP is estimated following Levinsohn and Petrin (2003) separately for each 1-digit sector (NAF 2008 classification) on the universe of French firms between 2002 and 2010. We deflate value added and materials using 2-digit sector prices and the gross capital stock using a 2-digit sector capital goods deflator. The empirical specification includes year dummies. Median values are reported in parenthesis, and the number of observations in squared brackets.

A.5 For which occupations is the ILM more active?

In this section we present more detailed results on the intensity of internal labor market activity by occupation.

Table A5. Mean excess probability of within-group job-to-job transitions - Rankings by occupation of origin/occupation of destination

Occupation of origin	Code	Mean	**Occupation of destination**	Code	Mean
Top managers of industrial/commercial firms with more than 10 employees	23	0.03623	Top managers of industrial/commercial firms with more than 10 employees	23	0.04009
Top managers of industrial/commercial firms with less than 10 employees	22	0.03183	Top managers of industrial/commercial firms with less than 10 employees	22	0.03539
Administrative and commercial managers	37	0.02567	Top managers/chiefs of handicraft firms	21	0.03080
Healthcare professionals, legal professionals and other professionals	31	0.02502	Administrative and commercial managers	37	0.02497
Engineers and technical managers	38	0.02485	Supervisors and 'agents de maitrise'	48	0.02463
Supervisors and 'agents de maitrise'	48	0.02287	Healthcare professionals, legal professionals and other professionals	31	0.02271
Top managers/chiefs of handicraft firms	21	0.02110	Engineers and technical managers	38	0.02223
Maintenance, repair and transport qualified workers	65	0.02173	Professors, researchers, scientific occupations	34	0.02179
Professors, researchers, scientific occupations	34	0.02134	Maintenance, repair and transport qualified workers	65	0.02142
Technicians	47	0.02106	Agricultural worker	69	0.02004
Teachers and other education, training and library occupations	42	0.01991	Technicians	47	0.01996
Intermediate administrative and commercial occupations in firms	46	0.01980	Intermediate administrative and commercial occupations in firms	46	0.01906
Agricultural worker	69	0.01979	Surveillance and security occupations	53	0.01857
Surveillance and security occupations	53	0.01836	Teachers and other education, training and library occupations	42	0.01823
Handicraft qualified workers	63	0.01735	Journalists, media, arts and entertainment occupations	35	0.01758
Clerical support in firms	54	0.01726	Industrial qualified workers	62	0.01753
Healthcare support occupations and social services occupations	43	0.01723	Clerical support in firms	54	0.01713
Industrial qualified workers	62	0.01716	Industrial non qualified workers	67	0.01679
Journalists, media, arts and entertainment occupations	35	0.01682	Healthcare support occupations and social services occupations	43	0.01679
Handicraft non qualified workers	68	0.01680	Handicraft non qualified workers	68	0.01652
Drivers	64	0.01603	Handicraft qualified workers	63	0.01644
Industrial non qualified workers	67	0.01494	Sales and related occupations	55	0.01544
Sales and related occupations	55	0.01479	Drivers	64	0.01466
Personal service occupations	56	0.01077	Personal service occupations	56	0.01448

Rankings are net of year effects and firm fixed effects.

Table A6. Mean excess probability of within-group job-to-job transitions - Rankings by occupation pairs net of year and firm fixed effect: top ten, bottom ten

TOP TEN

Occupation pair	Code	Mean
Professors, researchers, scientific occupations-Top managers of industrial/commercial firms with more than 10 employees	34-23	0.05179
Top managers of industrial/commercial firms with more than 10 employees -Professors, researchers, scientific occupations	23-34	0.04803
Top managers of industrial/commercial firms with more than 10 employees-Top managers of industrial/commercial firms with more than 10 employees	23-23	0.04408
Top managers/chiefs of industrial/commercial firms with less than 10 employees-Top managers of industrial/commercial firms with more than 10 employees	22-23	0.03798
Top managers of industrial/commercial firms with more than 10 employees-Administrative and commercial managers	23-37	0.03481
Top managers of industrial/commercial firms with more than 10 employees-Administrative and commercial managers	37-23	0.03410
Top managers/chiefs of industrial/commercial firms with less than 10 employees- Administrative and commercial managers	22-37	0.03320
Administrative and commercial managers-Top managers/chiefs of industrial/commercial firms with less than 10 employees	37-22	0.03201
Supervisors and 'agents de maitrise'-Supervisors and 'agents de maitrise'	48-48	0.03187

BOTTOM TEN

Occupation pair	Code	Mean
Personal service occupations-Clerical support in firms	56-54	0.0118
Handicraft non qualified workers- Handicraft qualified workers	68-63	0.01349
Industrial qualified workers-Industrial non qualified workers	62-67	0.01345
Sales and related occupations-Clerical support in firms	55-54	0.01231
Industrial non qualified workers-Industrial qualified workers	67-62	0.01203
Industrial qualified workers - Industrial qualified workers	62-62	0.01010
Handicraft qualified workers-Handicraft qualified workers	63-63	0.00984
Sales and related occupations-Sales and related occupations	55-55	0.00778
Personal service occupations-Personal service occupations	56-56	0.00608
Drivers-Drivers	64-64	0.00341

Table A7. Mean excess probability of originating from a group-affiliated firm for workers landing into the same group as compared to workers landing outside the group (outflows) - Rankings by occupation of origin/occupation of destination (net of fixed effects)

Occupation of origin	Code	Mean	**Occupation of destination**	Code	Mean
Top managers of industrial/commercial firms with more than 10 employees	23	0.0370	Top managers/chiefs of industrial/commercial firms with less than 10 employees	22	0.0351
Top managers/chiefs of industrial/commercial firms with less than 10 employees	22	0.0268	Top managers of industrial/commercial firms with more than 10 employees	23	0.0350
Administrative and commercial managers	37	0.0248	Top managers/chiefs of handicraft firms	21	0.0320
Supervisors and 'agents de maitrise'	48	0.0230	Administrative and commercial managers	37	0.0237
Healthcare professionals, legal professionals and other professionals	31	0.0223	Healthcare professionals, legal professionals and other professionals	31	0.0228
Engineers and technical managers	38	0.0213	Supervisors and 'agents de maitrise'	48	0.0223
Top managers/chiefs of handicraft firms	21	0.0195	Professors, researchers, scientific occupations	34	0.0200
Intermediate administrative and commercial occupations in firms	46	0.0181	Engineers and technical managers	38	0.0199
Technicians	47	0.0179	Intermediate administrative and commercial occupations in firms	46	0.0176
Professors, researchers, scientific occupations	34	0.0177	Teachers and other education, training and library occupations	42	0.0176
Maintenance, repair and transport qualified workers	65	0.0172	Agricultural worker	69	0.0175
Surveillance and security occupations	53	0.0168	Technicians	47	0.0173
Teachers and other education, training and library occupations	42	0.0161	Maintenance, repair and transport qualified workers	65	0.0171
Agricultural worker	69	0.0151	Surveillance and security occupations	53	0.0161
Clerical support in firms	54	0.0151	Journalists, media, arts and entertainment occupations	35	0.0155
Journalists, media, arts and entertainment occupations	35	0.0150	Healthcare support occupations and social services occupations	43	0.0152
Industrial qualified workers	62	0.0145	Clerical support in firms	54	0.0151
Handicraft qualified workers	63	0.0144	Handicraft non qualified workers	68	0.0144
Healthcare support occupations and social services occupations	43	0.0144	Handicraft qualified workers	63	0.0143
Handicraft non qualified workers	68	0.0143	Drivers	64	0.0132
Drivers	64	0.0139	Sales and related occupations	55	0.0129
Sales and related occupations	55	0.0130	Industrial qualified workers	62	0.0128
Personal service occupations	56	0.0128	Personal service occupations	56	0.0122
Industrial non qualified workers	67	0.0101	Industrial non qualified workers	67	0.0107

Table A8. Mean excess probability of originating from a group-affiliated firm for workers landing into the same group as compared to workers landing outside the group (outflows) - Rankings by occupation pairs (net of fixed effects): top ten, bottom ten

TOP TEN

Occupation pair	Code	Mean
Top managers of industrial/commercial firms with more than 10 employees-Professors, researchers, scientific occupations	23-34	0.0591
Top managers of industrial/commercial firms with more than 10 employees-Top managers of industrial/commercial firms with more than 10 employees	23-23	0.0455
Top managers of industrial/commercial firms with more than 10 employees-Top managers/chiefs of industrial/commercial firms with less than 10 employees	23-22	0.0375
Administrative and commercial managers-Top managers/chiefs of industrial/commercial firms with less than 10 employees	37-22	0.0357
Top managers of industrial/commercial firms with more than 10 employees-Administrative and commercial managers	23-37	0.0356
Professors, researchers, scientific occupations Top managers of industrial/commercial firms with more than 10 employees	34-23	0.0344
Top managers of industrial/commercial firms with more than 10 employees-Clerical support in firms	23-54	0.0347
Administrative and commercial managers-Top managers of industrial/commercial firms with more than 10 employees	37-23	0.0332
Top managers of industrial/commercial firms with more than 10 employees-Journalists, media, arts and entertainment occupations	23-35	0.0321
Top managers of industrial/commercial firms with more than 10 employees-Engineers and technical managers	23-38	0.0312

BOTTOM TEN

Occupation pair	Code	Mean
Industrial non qualified workers -Handicraft non qualified workers	67-68	0.0102
Industrial non qualified workers - Clerical support in firms	67-54	0.0100
Handicraft qualified workers-Handicraft qualified workers	63-63	0.0077
Industrial qualified workers -Industrial non qualified workers	62-67	0.0065
Sales and related occupations-Sales and related occupations	55-55	0.0055
Industrial qualified workers -Industrial qualified workers	62-62	0.0050
Personal service occupations -Personal service occupations	56-56	0.0037
Industrial non qualified workers-Industrial qualified workers	67-62	0.0032
Drivers-Drivers	64-64	0.0027
Industrial non qualified workers-Industrial non qualified workers	67-67	-0.0005

A.6 Internal labor markets at work: outflows

In the paper, we show that group-affiliated firms are more likely to hire workers already employed in their own group rather than workers employed outside the group. We now measure the ILM activity by asking a different – albeit related – question: are workers who find a job in a group more likely - as compared to workers who find a job outside that group - to originate from an affiliated firm? To answer this question, we estimate the excess probability that a worker (transiting between two occupations) originates from firm j if she lands to an affiliated firm, over the probability that the worker originates from firm j while landing to a non-affiliated firm.

As earlier, we denote as c the set of workers in occupation o at $t-1$ who move to occupation z in any firm at time t. We model the probability that worker i moving from occupation o to occupation z separates from firm j as follows:

$$E^O_{i,c,j,t} = \beta^O_{c,j,t} + \gamma^O_{c,j,t} BG^O_{i,j,t} + \varepsilon^O_{i,j,t} \tag{12}$$

where $E^O_{i,c,j,t}$ takes value one if worker i moving from occupation o to occupation z separates from firm j at time t and zero otherwise. $BG^O_{i,j,t}$ takes value one if worker i's firm of destination belongs to the same group as the firm of origin j at time t and zero otherwise.

The term $\beta^O_{c,j,t}$ is a firm-occupation pair specific effect that captures the time-varying natural tendency of workers moving from occupation o to occupation z to originate from firm j. This may be high due to the fact that carrying out occupation o in firm j endows a worker with the skills that facilitate moving to occupation z in any other firm. Our parameter of interest is $\gamma^O_{c,j,t}$, that measures the *excess* probability of a worker moving from o to z to originate from firm j if she lands at time t to a firm affiliated with the same group as j, over the probability to originate from firm j if the worker lands to a firm not affiliated with j's group. The error term $\varepsilon^O_{i,j,t}$ captures all other factors that affect the probability that worker i moving from occupation o to occupation z originates from firm j.

Again, for computational purposes, we define:

$$R^{BG,O}_{c,j,t} = \frac{\sum_{i \in c} E^O_{i,c,j,t} BG^O_{i,j,t}}{\sum_{i \in c} BG^O_{i,j,t}} = \beta^O_{c,j,t} + \gamma^O_{c,j,t} + \widetilde{u}^{BG,O}_{c,j,t} \tag{13}$$

as the fraction of workers that originate from firm j among all workers moving from occupation o to z whose firm of destination belongs to the same group as firm j. As discussed earlier, this fraction may be high because workers performing occupation o in firm j have a high propensity to move to occupation z in other firms, and the group includes firms intensive in occupation z. Hence, the observation of many transitions from occupation o in firm j to occupation z within the group cannot necessarily be ascribed to the ILM activity.

We then compute the fraction of workers that originate from firm j among all workers moving from occupation o to z and whose firm of destination does not belong to the same group as firm j:

$$R^{-BG,O}_{c,j,t} = \frac{\sum_{i \in c} E^O_{i,c,j,t} (1 - BG^O_{i,j,t})}{\sum_{i \in c} (1 - BG^O_{i,j,t})} = \beta^O_{c,j,t} + \widetilde{u}^{-BG,O}_{c,j,t} \tag{14}$$

Taking the difference between the two ratios eliminates the firm-occupation pair fixed effect $\beta^O_{c,j,t}$:

$$G^O_{cj,t} = R^{BG,O}_{c,j,t} - R^{-BG,O}_{c,j,t} = \gamma^O_{c,j,t} + u^{G,O}_{i,j,t} \tag{15}$$

We estimate the parameter $\gamma^O_{c,j,t}$ for each occupation pair-firm as the difference between two probabilities: that of originating from firm j for workers (transiting between two occupations o and z) who land to an affiliated firm, and that of originating from firm j for workers (transiting between two

occupations o and z) who land to a non-affiliated firm. As in the previous case, the sample analog of the $\gamma^O_{c,j,t}$'s estimated in equation (15) is the OLS estimate of equation (12).

A.6.1 Results on outflows

All the regressions discussed in Section 4 are replicated using $\gamma^O_{c,j,t}$ as our measure of ILM activity. Results are reported in the following tables.

A.7 Effect of closures on excess probabilities

Here we study how our main measure of ILM activity – the excess probability of hiring a worker if she was originally employed in the same group – responds to firm closures and mass layoffs occurring within the group, and ask whether such response varies across different occupations. In Table A13, columns (1)-(8), the dependent variable is the estimated $\widehat{\gamma}_{j,t}$ averaged at the firm level. Columns (1), (2), (5) and (6) show that ILM activity increases in the year following the closure of at least one firm/plant in the group.[52] Our results also show that closure is partially anticipated: the ILM activity also increases the year before closure, though to a smaller extent: column (3), (4), (7) and (8) show that in year t a firm has a more pronounced tendency to hire workers who in $t-1$ were employed by its group affiliates, when at least one group firm/plant closes down in year t (and thus in year $t-1$ was one year away from closure). In column (9) the dependent variable is instead our alternative measure of ILM activity based on outflows of workers from group-affiliated firms ($\widehat{\gamma}^O_{j,t}$). We find that the excess probability to originate from an affiliated firm for a worker who finds a job in that firm's group (as opposed to a worker who finds a job outside that group) increases by 8.6 percentage points at the time when her/his firm of origin closes down. Figure 2 displays the evolution of this excess probability for closing firms as time to closure approaches and shows that it starts increasing two years before closure.

In Table A14 we turn to the excess probability $\widehat{\gamma}_{c,j,t}$ estimated at the triplet level $\{o, z, j\}$ for each year t as a dependent variable. We investigate whether the internal labor market for managers and other high-skilled employees reacts differently to firm and plant closures occurring within the group, with respect to the ILM for other occupational categories. Interestingly, closures spur ILM activity for lower-ranked categories – mostly for Clerical Support workers and Blue Collars – but reduce ILM intensity for the Managerial/High-Skilled labor force (column 4). This may be because managers and other high-skilled employees have better outside options on the external labor market, while low-skill employees have worse outside options available; furthermore, groups may be more keen to redeploy internally workers belonging to more unionized occupational categories to avoid union-driven conflicts generated by large layoffs of low-skilled workers after a closure. Finally, we also observe that plant and firm closures within a group have a stronger positive effect on *horizontal* ILM activity (column 5), particularly so in the case of lower-skilled occupations (column 6).

In sum, we observe that a plant or a firm closure "activates" the internal labor market. This further confirms that groups rely on the ILM to coordinate the employment response of affiliated firms to shocks calling for large layoffs, thus saving firing costs and providing employment insurance to workers.

[52] More precisely, since "year of closure" denotes the last year of activity of the firm/plant before it loses at least 90% of its workforce, our results show that in year t a firm has a more pronounced tendency to hire workers who in year $t-1$ were employed by its group affiliates when *at least one* firm/plant in the group closes down (i.e. is in its last year of activity) in year $t-1$.

Table A9. Mean excess probability of originating from a group-affiliated firm for workers landing into the same group as compared to workers landing outside the group

	Panel A: Job transitions between any two occupations								**Panel B: Job transitions within same occupation**							
			Percentiles								Percentiles					
Year	Mean	St.Dev.	10	25	50	75	90	N	Mean	St.Dev.	10	25	50	75	90	N
	Unweighted firm-level aggregation								**Unweighted firm-level aggregation**							
2002	0.090	0.232	-0.001	0.000	0.000	0.013	0.333	36555	0.066	0.201	-0.001	0.000	0.000	0.001	0.185	34140
2003	0.095	0.240	-0.001	0.000	0.000	0.016	0.344	35343	0.071	0.211	-0.001	0.000	0.000	0.001	0.236	32966
2004	0.098	0.243	-0.001	0.000	0.000	0.018	0.378	36707	0.072	0.213	-0.001	0.000	0.000	0.001	0.248	34139
2005	0.095	0.239	-0.001	0.000	0.000	0.015	0.355	40517	0.071	0.210	-0.001	0.000	0.000	0.001	0.233	37950
2006	0.090	0.234	-0.001	0.000	0.000	0.013	0.333	42203	0.067	0.204	-0.001	0.000	0.000	0.001	0.205	39441
2007	0.087	0.228	-0.001	0.000	0.000	0.010	0.333	45709	0.659	0.202	-0.001	0.000	0.000	0.000	0.197	43033
2008	0.095	0.242	-0.001	0.000	0.000	0.013	0.347	40695	0.073	0.216	-0.001	0.000	0.000	0.001	0.250	38265
2009	0.100	0.248	-0.001	0.000	0.000	0.016	0.407	39549	0.075	0.217	-0.001	0.000	0.000	0.002	0.250	37070
	Weighted firm-level aggregation								**Weighted firm-level aggregation**							
2002	0.083	0.226	-0.001	0.000	0.000	0.012	0.258	36555	0.061	0.197	-0.001	0.000	0.000	0.001	0.143	34110
2003	0.088	0.235	-0.001	0.000	0.000	0.015	0.333	35343	0.066	0.206	-0.001	0.000	0.000	0.002	0.166	32966
2004	0.091	0.237	-0.001	0.000	0.000	0.016	0.333	36707	0.067	0.208	-0.001	0.000	0.000	0.002	0.166	34139
2005	0.088	0.233	-0.001	0.000	0.000	0.014	0.332	40517	0.066	0.204	-0.001	0.000	0.000	0.001	0.166	37950
2006	0.084	0.228	-0.001	0.000	0.000	0.013	0.266	42203	0.063	0.198	-0.001	0.000	0.000	0.001	0.158	39441
2007	0.080	0.222	-0.001	0.000	0.000	0.009	0.250	45709	0.061	0.197	-0.001	0.000	0.000	0.001	0.143	43033
2008	0.089	0.237	-0.001	0.000	0.000	0.013	0.333	40695	0.069	0.211	-0.001	0.000	0.000	0.001	0.181	38265
2009	0.093	0.243	-0.001	0.000	0.000	0.016	0.333	39549	0.070	0.212	-0.001	0.000	0.000	0.002	0.197	37070

Note: The left hand side (Panel A) considers job-to-job transitions between any two occupations, where we restrict the set c to all transitions occurring between occupation o and occupation z that land to the same departments in France where firm j's group is active. In the right-hand side (Panel B), we further restrict the set c to include only transitions occurring between occupation o and occupation z in which occupation o is equal to occupation z. The first column indicates the year in which workers transiting from one job to another left the affiliated firm j. The upper parts of panels A and B present simple averages. The bottom part of panel A shows weighted averages where the weight associated to each $\gamma^{O}_{c,j}$ is the ratio of the number of transitions from occupation o to occupation z that land in firm j's group to the total number of transitions (for all the occupation pairs associated with firm j) that land in j's group. The bottom part of panel B shows weighted averages where the weight associated to each $\gamma^{O}_{c,j}$ is the ratio of the number of transitions from occupation o to occupation z, with $o = z$, that land in firm j's group to the total number of transitions (for all the occupation pairs associated with firm j) that land in j's group.

Table A10. ILM activity and group sectoral diversification (Outflows)

Variables	(1)	(2)	(3)	(4)
(Log) Firm size	0.006***	0.006***	0.006***	0.005***
	(0.001)	(0.001)	(0.001)	(0.001)
(Log) Rest of the group size	0.002	0.003*	0.002	0.007***
	(0.001)	(0.002)	(0.001)	(0.002)
(Log) Number of affiliated firms	-0.082***	-0.082***	-0.082***	-0.086***
	(0.003)	(0.003)	(0.003)	(0.003)
State Control	-0.006	-0.003	-0.006	0.009
	(0.021)	(0.019)	(0.021)	(0.016)
Foreign control	-0.001	0.001	-0.001	0.012
	(0.050)	(0.050)	(0.049)	(0.048)
Diversification (Macrosectors)	0.015*	0.013		
	(0.007)	(0.007)		
Diversification × Rest of the group size		0.011***		
		(0.003)		
Diversification (4 digit)			0.012*	0.030***
			(0.006)	(0.006)
Diversification (4d) × Rest of the group size				0.023***
				(0.003)
N	279,433	279,433	279,433	279,433
Firm × Group and year fixed effect	Yes	Yes	Yes	Yes

Note: Dependent variable: Excess probability of originating from affiliated firm j for workers landing into the same group as compared to workers landing outside the group. *Firm size* is measured by (full time equivalent) total employment; *Rest of the group size* is measured by the (full time equivalent) total employment of all the other firms that are affiliated to the same group as firm j. *State Control* is a dummy variable taking the value 1 if the head of the group is state-owned. *Foreign Control* is a dummy variable taking the value 1 if the head of the group is foreign. *Diversification (macrosectors)* is computed as the opposite of the sum of the squares of the employment shares of all firms affiliated with a group, where each share is the ratio of the total employment of affiliated firms active in a given macrosectors over the total employment of the group. Macrosectors are agriculture, service, finance, manifacturing, energy, automotive. *Diversification (4-digit)* is computed as the opposite of the sum of the squares of the employment shares of all firms affiliated with a group, where each share is the ratio of the total employment of affiliated firms active in a given 4-digit sector to the total employment of the group. The variables *Rest of the group size*, *Number of firms in the group*, *Diversification* are normalised to have zero mean. Standard errors are clustered at the group level. One star denotes significance at the 5% level, two stars denote significance at the 1% level, and three stars denote significance at the 0.1% level.

Table A11. ILM activity and group geographical diversification (Outflows)

Variables	(1)	(2)	(3)	(4)
(Log) Firm size	0.006***	0.006***	0.006***	0.005***
	(0.001)	(0.001)	(0.001)	(0.001)
(Log) Rest of the group size	0.002	0.004**	0.001	0.008***
	(0.001)	(0.002)	(0.001)	(0.002)
(Log) Number of affiliated firms	-0.082***	-0.083***	-0.084***	-0.086***
	(0.003)	(0.003)	(0.003)	(0.003)
State Control	-0.005	0.004	-0.005	0.009
	(0.021)	(0.019)	(0.020)	(0.017)
Foreign control	-0.002	0.003	-0.001	0.008
	(0.050)	(0.048)	(0.049)	(0.047)
Diversification (Paris Area)	0.029***	0.016		
	(0.008)	(0.008)		
Diversification × Rest of the group size		0.024***		
		(0.004)		
Diversification (Region)			0.035***	0.030***
			(0.007)	(0.007)
Diversification (Reg.) × Rest of the group size				0.027***
				(0.003)
N	279,433	279,433	279,433	279,433
Firm × Group and year fixed effect	Yes	Yes	Yes	Yes

Note: Dependent variable: Excess probability of originating from affiliated firm j for workers landing into the same group as compared to workers landing outside the group. *Firm size* is measured by (full time equivalent) total employment; *Rest of the group size* is measured by the (full time equivalent) total employment of all the other firms that are affiliated to the same group as firm j. *State Control* is a dummy variable taking the value 1 if the head of the group is state-owned. *Foreign Control* is a dummy variable taking the value 1 if the head of the group is foreign. *Diversification (Paris Area)* is computed as the opposite of the sum of the squares of the employment shares of all firms affiliated with a group, where each share is the ratio of the total employment of affiliated firms active in the Paris Area/outside the Paris Area over the total employment of the group. *Diversification (Region)* is computed as the opposite of the sum of the squares of the employment shares of all firms affiliated with a group, where each share is the ratio of the total employment of affiliated firms active in a given region over the total employment of the group. The variables *Rest of the group size*, *Number of firms in the group*, *Diversification* are normalised to have zero mean. Standard errors are clustered at the group level. One star denotes significance at the 5% level, two stars denote significance at the 1% level, and three stars denote significance at the 0.1% level.

Table A12. Heterogeneity of ILM activity by occupation (Outflows)

Variables	(1)	(2)	(3)	(4)	(5)	(6)
(Log) Firm Size	0.004***	0.008***	0.008***	0.008***	0.008***	0.008***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
(Log) Rest of the group size	-0.006***	-0.010***	-0.010***	-0.010***	-0.010***	-0.010***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
(Log) Number of affiliated firms	-0.015***	-0.014***	-0.014***	-0.014***	-0.015***	-0.014***
	(0.002)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
State Control	-0.007	-0.011**	-0.011**	-0.011**	-0.011**	-0.011**
	(0.005)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Foreign Control	-0.030***	-0.031***	-0.030***	-0.031***	-0.031***	-0.030***
	(0.006)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Occupation of destination (Managers/High-Skill excluded)						
Intermediate Occupation	-0.002***	-0.002***	-0.002***	-0.002***	-0.011***	-0.008***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)	(0.002)
Clerical Support	-0.005***	-0.005***	-0.005***	-0.005***	-0.014***	-0.011***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)
Blue Collar	-0.005***	-0.004***	-0.004***	-0.005***	-0.014***	-0.010***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)
Occupation of origin (Managers/High-Skill excluded)						
Intermediate Occupation	-0.003***	-0.003***	-0.003***	-0.003***	-0.009***	-0.009***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)	(0.002)
Clerical Support	-0.006***	-0.006***	-0.005***	-0.006***	-0.012***	-0.012***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)
Blue Collar	-0.005***	-0.005***	-0.005***	-0.004***	-0.011***	-0.011***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)
Same Occupation		-0.003***	0.001			
		(0.000)	(0.000)			
Same Occupation × Intermediate Occupation			-0.002***			
			(0.000)			
Same Occupation × Clerical Support			-0.006***			
			(0.000)			
Same Occupation × Blue Collar			-0.007***			
			(0.001)			
Diversification (4-digit)				-0.010***		
				(0.005)		
Div × Intermediate Occupation (Origin)				0.018***		
				(0.002)		
Div × Clerical Support (Origin)				0.032***		
				(0.003)		
Div × Blue Collar (Origin)				0.033***		
				(0.004)		
Diversification (Region)					-0.016	
					(0.005)	
Div. × Intermediate occupation (Origin)					0.011***	
					(0.001)	
Div. × Clerical Support (Origin)					0.022***	
					(0.003)	
Div. × Blue Collar (Origin)					0.021***	
					(0.003)	
Own closure						0.024***
						(0.004)
N	8,804,083	8,804,083	8,804,083	8,804,083	8,804,083	8,804,083
Firm × Group and year dummies	Yes	Yes	Yes	Yes	Yes	Yes

Note: Dependent variable: Excess probability of originating from affiliated firm j for workers transiting between occupation o and occupation z landing into the same group as compared to workers landing outside the group. *Firm size* is measured by (full time equivalent) total employment; *Rest of the group size* is measured by the (full time equivalent) total employment of all the other firms that are affiliated to the same group as firm j. *State Control* is a dummy variable taking the value 1 if the head of the group is state-owned. *Foreign Control* is a dummy variable taking the value 1 if the head of the group is foreign. The occupational categories are the ones indicated in Table 1. The category Managers/High-Skill groups category 2 and 3. *Same Occupation* is a dummy variable taking the value 1 if the (2-digit) occupation of origin is equal to the (2-digit) occupation of destination. *Diversification (4-digit)* is computed as the opposite of the sum of the squares of the employment shares of all firms affiliated with a group, where each share is the ratio of the total employment of affiliated firms active in a given 4-digit sector to the total employment of the group. *Diversification (Region)* is computed as the opposite of the sum of the squares of the employment shares of all firms affiliated with a group, where each share is the ratio of the total employment of affiliated firms active in a given region over the total employment of the group. We denote as firm closure a situation in which a firm sees its employment drop by more than 90% from one year to the other. We consider as year of the closure the last year of activity of a given firm, before it loses at least 90% of its workforce. We do not consider as closures all the cases in which more than 70% of the lost employment ends up in the same firm. *Own closure* is a dummy variable that takes the value 1 if firm j closes in year t. Standard errors are clustered at the group level. One star denotes significance at the 5% level, two stars denote significance at the 1% level, and three stars denote significance at the 0.1% level.

Table A13. Effect of firm/plant closures in the group on ILM activity

Variables	Inflows (1)	Inflows (2)	Inflows (3)	Inflows (4)	Inflows (5)	Inflows (6)	Inflows (7)	Inflows (8)	Outflows (9)
(Log) firm size	0.009***	0.009***	0.009***	0.009***	0.009***	0.009***	0.009***	0.009***	0.009***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
(Log) rest of the group size	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.002
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
(Log) number of affiliated firms	-0.084***	-0.084***	-0.085***	-0.085***	-0.084***	-0.084***	-0.085***	-0.085***	-0.081***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
State Control	-0.023	-0.025	-0.025	-0.025	-0.025	-0.025	-0.025	-0.026	-0.005
	(0.022)	(0.021)	(0.023)	(0.023)	(0.023)	(0.023)	(0.024)	(0.024)	(0.021)
Foreign Control	-0.034	-0.036	-0.040	-0.040	-0.041	-0.038	-0.043	-0.040	-0.001
	(0.024)	(0.024)	(0.025)	(0.025)	(0.026)	(0.025)	(0.026)	(0.025)	(0.050)
Firm closure in rest of the group (in t-1)	0.017***								
	(0.001)								
Between 1 and 5		0.017***							
		(0.001)							
More than 5		0.026***							
		(0.003)							
Firm closure (in t)			0.009***						
			(0.001)						
Between 1 and 5				0.008***					
				(0.001)					
More than 5				0.012***					
				(0.003)					
Plant closure (in t-1)					0.015***				
					(0.001)				
Between 1 and 5						0.015***			
						(0.001)			
More than 5						0.020***			
						(0.002)			
Plant closure (in t)							0.007***		
							(0.001)		
Between 1 and 5								0.006***	
								(0.001)	
More than 5								0.013***	
								(0.002)	
Own closure									0.086***
									(0.006)
N	289,689	289,689	289,689	289,689	289,689	289,689	289,689	289,689	279,433
Firm × Group and year fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: Dependent variable in columns (1)-(8): Excess probability for firm j to hire a worker if she originates from the same group as compared to a worker not originating from the same group as j. Dependent variable in column (9): Excess probability of originating from affiliated firm j for workers landing into the same group as compared to workers landing outside the group. *Firm size* is measured by (full time equivalent) total employment; *Rest of the group size* is measured by the (full time equivalent) total employment of all the other firms that are affiliated with the same group as firm j. We denote as firm/plant closure a situation in which a firm/plant sees its employment drop by more than 90% from one year to the other. We consider as year of the closure the last year of activity of a given firm/plant, before it loses at least 90% of its workforce. We do not consider as closures all the cases in which more than 70% of the lost employment ends up in the same firm/plant. *Firm closure in the rest of the group (in year t-1)* is a dummy variable that takes the value 1 if in year $t-1$ at least one firm in the rest of the group closes, i.e. it undertakes its last year of activity in yeat $t-1$. *Firm closure (year t)* is a dummy variable that takes the value 1 if al least one firm in the group closes in year t. Similarly for plant closure. *Own closure* is a dummy variable that takes the value 1 if firm j closes in year t. Standard errors are clustered at the group level. One star denotes significance at the 5% level, two stars denote significance at the 1% level, and three stars denote significance at the 0.1% level.

Table A14. Effect of firm/plant closures in the group on ILM activity by occupation

Variables	(1)	(2)	(3)	(4)	(5)	(6)
(Log) Firm Size	0.008***	0.008***	0.008***	0.008***	0.008***	0.008***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
(Log) Rest of the group size	-0.010***	-0.010***	-0.010***	-0.010***	-0.010***	-0.010***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
(Log) Number of affiliated firms	-0.014***	-0.014***	-0.014***	-0.014***	-0.014***	-0.015***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
State Control	-0.011**	-0.011**	-0.010**	-0.010**	-0.010**	-0.010**
	(0.004)	(0.004)	(0.003)	(0.003)	(0.004)	(0.004)
Foreign Control	-0.031***	-0.031***	-0.027***	-0.027***	-0.027***	-0.026***
	(0.005)	(0.005)	(0.004)	(0.004)	(0.005)	(0.005)
Occupation of destination (Managers/High-Skill excluded)						
Intermediate Occupation	-0.002***	-0.002***	-0.002***	-0.011***	-0.002***	-0.010***
	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.001)
Clerical Support	-0.005***	-0.005***	-0.005***	-0.022***	-0.005***	-0.020***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Blue Collar	-0.004***	-0.004***	-0.004***	-0.022***	-0.004***	-0.017***
	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)
Occupation of origin (Managers/High-Skill excluded)						
Intermediate Occupation	-0.003***	-0.003***	-0.003***	-0.002***	-0.003***	-0.003***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Clerical Support	-0.006***	-0.006***	-0.006***	-0.005***	-0.006***	-0.005***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Blue Collar	-0.005***	-0.005***	-0.005***	-0.004***	-0.005***	-0.004***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Same Occupation		-0.002***			-0.011***	-0.004***
		(0.000)			(0.001)	(0.001)
At least one closure in the group (in t-1)			0.005***	-0.008***	0.002***	-0.008***
			(0.001)	(0.001)	(0.001)	(0.001)
At least one closure × Int. Occ. (dest.)				0.011***		0.010***
				(0.001)		(0.001)
At least one closure × Clerical (dest.)				0.020***		0.018***
				(0.001)		(0.001)
At least one closure × Blue Coll.(dest.)				0.021***		0.016***
				(0.001)		(0.001)
At least one closure (in t-1) × Same Occ.					0.012 ***	0.004***
					(0.001)	(0.001)
Same occupation × Int. Occ.						-0.003***
						(0.001)
Same occupation × Clerical						-0.007***
						(0.001)
Same occupation × Blue Coll.						-0.016***
						(0.001)
Same occupation × Int. Occ. × Closure						0.004***
						(0.001)
Same occupation × Clerical × Closure						0.009***
						(0.001)
Same occupation × Blue Coll. × Closure						0.016***
						(0.001)
N	8,992,670	8,992,670	8,992,670	8,992,670	8,992,670	8,992,670
Firm × Group and year dummies	Yes	Yes	Yes	Yes	Yes	Yes

Note: Dependent variable: Excess probability for firm j to hire a worker transiting from occupation o to occupation z if she originates from the same group as j. *Firm size* is measured by (full time equivalent) total employment; *Rest of the group size* is measured by the (full time equivalent) total employment of all the other firms that are affiliated with the same group as firm j. *State Control* is a dummy variable taking the value 1 if the head of the group is state-owned. *Foreign Control* is a dummy variable taking the value 1 if the head of the group is foreign. The occupational categories are the ones indicated in Table A1. The category Managers/High-Skill groups category 2 and 3. *Same Occupation* is a dummy variable taking the value 1 if the (2-digit) occupation of origin is equal to the (2-digit) occupation of destination. We denote as firm closure a situation in which a firm sees its employment drop by more than 90% from one year to the other. We consider as year of the closure the last year of activity of a given firm, before it loses at least 90% of its workforce. We do not consider as closures all the cases in which more than 70% of the lost employment ends up in the same firm. *Firm closure in the rest of the group (in year t-1)* is a dummy variable that takes the value 1 if in year $t-1$ at least one firm in the rest of the group closes, i.e. it undertakes its last year of activity in yeat $t-1$. Standard errors are clustered at the group level. One star denotes significance at the 5% level, two stars denote significance at the 1% level, and three stars denote significance at the 0.1% level.