# Insurance Between Firms: The Role of Internal Labor Markets*

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**Abstract**

We investigate how internal labor markets (ILMs) allow business groups to accommodate positive and negative shocks calling for labor adjustments. Adverse shocks affecting one unit in the organization are shown to increase workers' mobility to other units rather than external firms, with stricter employment protection in the adversely hit unit causing an additional increase in internal mobility. The ILM response to adverse shocks is also stronger when the receiving units in the organization are more productive and have a better financing capacity. We also find that affiliated units faced with positive shocks to their growth opportunities rely on the ILM for new hires, especially managers in the top layers of the organization and other high-skilled workers, thus overcoming human capital bottlenecks that may curb growth. ILMs therefore emerge as a co-insurance mechanism within organizations, allowing them to bypass both firing and hiring frictions, and providing job stability to employees as a by-product.

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# 1 Introduction

A long-standing question in economics is how firms adjust and which margins they exploit when business conditions change. A related question is whether some types of organizations are better able than others to swiftly adapt to changing economic conditions, in order to survive in bad times and thrive in good times. This paper addresses these questions by investigating the role of Internal Labor Markets (ILMs) in allowing complex organizations to accommodate positive and negative shocks calling for labor adjustments in their units. To the extent that hiring and firing costs affect the external labor market, labor adjustments may be less onerous to perform within the internal labor market. 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. Hence, through the ILM, different units in diversified and complex organizations such as business groups can provide each other with mutual insurance. This unveils a new role for the ILM, as a source of resilience and flexibility for organizations in frictional environments, in contrast to the earlier focus on ILMs as career mechanisms enabling vertical mobility within firms.

In order to address the above issues we identify negative and positive idiosyncratic shocks that hit part of an organization and observe the subsequent employment flows, distinguishing the transitions that occur within the organization from those that do not. We do this exploiting firm closures and mass layoffs as negative shocks and adopting a novel empirical strategy in the identification of the positive shocks: the sudden death of a large competitor. This allows us to study both the extent to which ILMs are used in response to changing business conditions and the role of labor market frictions in driving the ILM response.

The data requirements to accomplish this task are heavy. We need to observe the structure of the business organization, i.e. its constituting units; to measure workers' mobility between these units, as well as the economic situation of the origin and destination units. We are able to rely on unique data sources perfectly suited to our goal provided by INSEE (Institut National de la Statistique et des Études Économiques), that allow us to merge detailed information on the structure of business groups in France with a matched employer-employee data set and administrative fiscal data on balance sheets and income statements for virtually all French firms. Hence, we focus here on ILMs within business groups – i.e. groups of independent legal entities controlled by a common owner – which represent a widespread organizational form in both developed and developing economies.[1]

[1]Prominent examples of groups include Tata (India), Samsung (Korea), Siemens (Germany), Ericsson (Sweden),

Our empirical analysis develops in two parts. We first document whether group-affiliated firms rely disproportionately on ILMs relative to the external labor market, and provide measures of the "average" intensity of ILM activity. These measures reflect multiple factors that can trigger ILM activity, including job rotation programs, internal career paths, as well as shocks hitting some firms in the group. We estimate that, 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, controlling for the time-varying "natural propensity" of each firm to hire workers with given characteristics. Interestingly, our evidence suggests that internal careers explain only in part why groups operate ILMs. Indeed, ILM activity measured without counting promotions or demotions, hence by focusing on horizontal job changes, remains very high. Furthermore, ILM activity is larger in groups that are more diversified. These two findings go hand in hand in pointing to the idea that ILMs are used to accommodate idiosyncratic shocks in organizations.

To gain a deeper understanding of the co-insurance component of *horizontal ILMs*, in the second part of the paper we explore the ILM's reaction to idiosyncratic shocks. To study how ILMs allow groups to respond to *negative shocks*, we rely on firm closures and mass layoffs. For each group-affiliated eventually-closing firm, we identify the set of all the actual and potential destinations of its workers, and compute the employment flows within each pair of firms in any year. We then compare the (within-pair) evolution of bilateral employment flows at closure relative to normal times (i.e. four years before closure) in pairs of firms that belong to the same group as opposed to pairs that do not. This allows us to identify whether, in response to adverse shocks, affiliated firms rely more heavily on the ILM as opposed to the external labor market.

Closures and mass-layoffs within a group are shown to trigger ILM activity: at closure with respect to normal times, the fraction of workers 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, a threefold increase with respect to the baseline. The main beneficiaries of the ILM activity are blue-collar workers. Which labor market frictions trigger this effect? We show that the closure or downsizing of group units with just more than 50 employees – which according to French labor laws are subject to more stringent labor market regulation – generates a larger

Fiat Chrysler (Italy), LVMH (France), GE (US), Virgin (UK), News Corp (Australia) and Bradesco (Brasil). There is by now ample evidence that groups account for a consistently large fraction of the economic activity in several countries (see La Porta, Lopez-de Silanes, and Shleifer (1999), Faccio, Lang, and Young (2001) and Masulis, Pham, and Zein (2015)). Indeed, alongside large renowned groups, mid-sized business groups form the fabric of most economies in Asia, Europe and Latin America. Based on our comprehensive data, we document for instance that business groups account for 40% of total employment and 60% of value added in the French economy.

increase in ILM flows than the closure/downsizing of units with just less than 50 employees. Hence, higher firing costs and greater union power make ILMs more valuable for groups, particularly when faced with potentially large scale separations.[2] Workers also benefit from ILM reallocations: the employees of a closing group subsidiary move to unemployment much less often than the employees of a closing stand-alone firm – particularly so blue collar workers – albeit at the cost of a lower annual wage. This shows that ILMs, as a side-product, provide workers with implicit employment insurance through greater job stability within the group. Additionally, we find that employees displaced from closing subsidiaries are redeployed, within the ILM, to units that enjoy better growth opportunities and to more productive group units (the effect is twice as large if the destination firm has above-median TFP). Displaced workers are instead less actively reallocated to those units that lack the financial muscle to expand their workforce. These results are consistent with the pattern observed in "average" times showing that there is more scope for ILM activity in more diversified groups, whose firms are more exposed to idiosyncratic shocks.

To further understand these cross-insurance mechanisms, and to explore the role of *hiring* frictions, we then 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. To the best of our knowledge, no other paper has exploited large and unanticipated competitor exits as a source of exogenous variation. We do so to study how firms manage their human capital in response to favorable demand shocks. We first exploit one event that affected the French milk sector in 2004, the demise of the Parmalat multinational due to the discovery of a major accounting fraud. Second, we identify and exploit all episodes of large firm closures that can be confidently ascribed to firm-specific (rather than industry-wide) shocks, and thus represent an expansion opportunity for the remaining firms in the same sector. Our results show that group-affiliated firms in the affected sectors increase their use of the ILM – rather than the external labor market – when hiring managers and other high-skill workers. Therefore, ILMs within groups help alleviate the costs induced by an external search for skilled human capital (Kramarz and Michaud (2010)). ILMs can thus help group-affiliated firms take full advantage of sectoral booms, while stand-alone companies can be set back by a shortage of human capital.

To the best of our knowledge, this is the first paper that shows that organizations respond to the presence of labor market regulation and hiring frictions in the external labor market by operating ILMs, thereby gaining flexibility and ability to adapt to changing economic conditions. These results

[2]This is consistent with recent evidence that business groups prevail in countries where employment protection regulations are stricter (Belenzon and Tsolmon (2015)).

raise new questions on the effects of firms' organizational response to frictions. Indeed, while the use of ILMs is privately beneficial for the organizations that exploit them, whether this response is also socially beneficial remains at this stage an open question, as we discuss in the Conclusion.

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 several strands of literature. Starting with the work of Doeringer and Priore (1971), the labor/personnel literature has mostly studied the functioning of *vertical* mobility *within firms*. Focusing on promotion and wage dynamics, various authors have argued that ILMs can provide effort incentives, wage insurance against fluctuations in workers' ability, and incentives to accumulate human capital.[3] Our results suggest that these motives explain only partially why organizations operate ILMs. Indeed, we present evidence that *horizontal ILMs* are used to accommodate various economic shocks in the presence of frictions.

Within the finance literature, some authors have claimed that business groups fill an institutional void when external labor and financial markets display frictions (Khanna and Palepu (1997), Khanna and Yafeh (2007)). Several papers have studied internal *capital* markets in groups, showing that access to a group's internal finance makes affiliated firms more resilient to adverse shocks with respect to stand-alone firms (e.g. Almeida, Kim, and Kim (2015), Boutin, Cestone, Fumagalli, Pica, and Serrano-Velarde (2013), Maksimovic and Phillips (2013)). Giroud and Mueller (2015) are the first to provide evidence that, by alleviating financial constraints, internal capital markets also allow conglomerates to take better advantage of positive shocks to investment opportunities.[4] However, little attention has been devoted so far to understand whether business groups operate internal *labor* markets to accommodate negative and positive shocks in the presence of frictions. Faccio and O'Brien (2016) show that total employment in group-affiliated firms (as opposed to stand-alone firms) is less affected by business cycle fluctuations, and interpret this as indirect evidence that groups operate ILMs.[5] By observing employee flows between affiliated units, we fill this gap in the literature, and show that ILMs allow group units hit by adverse shocks to save on firing costs, and units faced with positive shocks to mitigate "human capital constraints" that may considerably

[3]See, among others, Lazear and Rosen (1981), Harris and Holmstrom (1982), and the comprehensive surveys of Gibbons and Waldman (1999), Lazear (1999), Lazear and Oyer (2012) and Waldman (2012). For more recent contributions to this literature, see Friebel and Raith (2013) and Ke, Li, and Powell (2014).

[4]Giroud and Mueller (2015) find that this internal capital market activity manifests itself in increased investment and employment in the positively shocked units in the conglomerate. However, as they do not use employer-employee data, they cannot study whether human capital is reallocated towards these units through the ILM or the external labor market.

[5]Their paper relies on a cross-country firm level database; differently from us, they do not have employer-employee data, hence ILM activity cannot be directly documented and analyzed.

curb expansion.[6] Overall, our findings suggest that ILMs create an additional channel that makes diversified organizations better equipped to withstand challenges and seize opportunities, relative to stand-alone companies.[7]

Focusing on multidivisional firms, Tate and Yang (2015) observe that a fraction of workers displaced from closing plants is retained within the firm, and document that, among the displaced workers who switch industry, those who are reallocated internally experience a higher change in sectoral Tobin's Q growth. This can be interpreted as evidence that ILMs allocate labor more efficiently than the external market does. Our paper widens and deepens the understanding of internal labor markets, by presenting three novel results. First, we investigate the frictions that cause ILM activity, and identify employment protection regulation as a major driver behind the ILM response to adverse shocks. Second, we study the ILM response not only to negative but also to positive shocks: we provide direct evidence that organizations faced with growth opportunities rely on their ILMs to hire skilled human capital, which points to hiring frictions as another important determinant of ILM activity. Third, besides providing evidence that workers move across units of the same organization, we also quantify the extent to which internal flows exceed the flows we would observe in the counterfactual scenario where the units do not belong to the same organization.

It is worth noting that we establish that ILMs operate even across units that are separate legal entities, as is the case in business groups, where the benefits derived from actively reallocating human resources across subsidiaries must be traded off against various hurdles, such as minority shareholder protection, contractual costs, and the fear of "piercing the corporate veil" between parent and subsidiary.[8] In this respect, our paper also speaks to recent work that investigates the costs and benefits of organizing production within business groups as opposed to multi-divisional firms (Belenzon, Berkovitz, and Bolton (2009) and Luciano and Nicodano (2014)).

Our paper is also related to a growing literature that explores how firms organize production in hierarchies to economize on their use of knowledge (Garicano (2000)). Caliendo and Rossi-Hansberg (2012) predict that large firms grow by adding more layers of management to the organization, while small firms just increase the number of workers without adding new layers.[9] Our findings

[6]The idea that a lack of skilled human capital may hamper growth is supported by a strand of literature emphasizing the important role of managers for firm performance (Bertrand and Schoar (2003), Bloom, Sadun, Van Reenen, Lemos, and Scur (2014), Bender, Bloom, Card, Van Reenen, and Wolter (2016)), and by evidence that frictions in the managerial labor market represent an important hurdle to firm expansion (Agrawal and Ljungqvist (2014)).

[7]See "From Alpha to Omega" *The Economist*, 15 August 2015, on how "a new breed of high-performing conglomerates" is challenging the view that diversified groups are bound to do worse than their focused counterparts.

[8]The regulation of liability within corporate groups differs substantially across countries (see Hopt (2015)). In some jurisdictions, including France, it is common to hold the parent liable vis-a-vis its subsidiaries' debt holders if the parent interfered in the management of the subsidiaries, e.g. by reallocating resources across them.

[9]Using French data, Caliendo, Monte, and Rossi-Hansberg (2015) find evidence that French manufacturing firms

suggest that when faced with expansion opportunities, group-affiliated firms use their group's ILM to economize on the costs associated with hiring employees in the top two layers of the organization (top managers, other management and high-knowledge occupations). Whether the ILM is relied upon to add a further management layer to the organization or to expand the existing layers is a question we plan to address in the future.

Finally, our work contributes to a line of research looking at how firms provide insurance to their employees. Related to our finding that ILMs allow business groups to provide *employment* insurance to workers, there is evidence that family businesses in various countries (see Sraer and Thesmar (2007) and Ellul, Pagano, and Schivardi (2015)), as well as Chinese state groups (see Chen, Jiang, Ljungqvist, Lu, and Zhou (2015)), provide their employees with such insurance. We add to this literature by investigating the extent to which ILMs allow organizations to protect employment when faced with shocks. Another closely related line of research has asked whether firms provide *wage* insurance to workers against both temporary and permanent shocks (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 among the next steps in our research agenda. However, we present some elements showing that, in groups hit by a negative shock, displaced workers' hourly wages tend to be insured while 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 for "average" times in Sections 4, for bad times in 5, and for good times in 6. Section 7 concludes.

## 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 pure 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

grow by actively managing the number of layers in their organization in a way that is consistent with these predictions. See also Caliendo, Mion, Opromolla, and Rossi-Hansberg (2016).

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.[10] 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 calling for 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 firms 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 Jaeger (2016)), and may perform better than the external labor market in matching a vacancy with the specific skills required.[11] 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 external labor market) to expand their skilled labor force.

To summarize, internal labor markets may create value by allowing different 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 ILM 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.[12] Hence, we expect

[10] 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)).

[11] 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.

[12] 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.

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.[13]

To the extent that group-affiliated firms hit by adverse shocks adjust labor using ILMs, their workers receive implicit 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

Implementing the empirical strategies consistent with the background described in Section 2 requires detailed information on both workers and firms. First, we need to observe workers' labor market transitions, i.e. workers' yearly transitions from firm to firm. Second, for each firm, we need to identify the entire structure of the group that this firm is affiliated with, so as to distinguish transitions originating from (landing into) the firm's group and transitions that do not originate from (land into) the group. Third, we need information on firms' characteristics. We obtain this information for France putting together three data sources from the INSEE (*Institut National de la Statistique et des Études Économiques*).[14]

Our first data source is the DADS (*Déclarations Annuelles des Données Sociales*), a large-scale administrative database of matched employer-employee information. 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).

[13] 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 do not allow us to explore the relationship between the ILM and the precise hierarchical structure of each group.

[14] 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.

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 the Appendix, 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 across two consecutive years.[15]

The identification of business group structures 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 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 holds at least 50% of the voting rights in another firm's general assembly. This is in principle a tight threshold, as in the presence of dispersed minority shareholders control can be exercised with smaller equity stakes. However, we do not expect this to be a major source of bias, as in France most firms are private and ownership concentration is strong even among listed firms.[16] To sum up, for each firm in the French economy, the LIFI enables 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

[15] 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.

[16] Bloch and Kremp (1999) document that in large private companies the main shareholder's stake is 88%. Ownership concentration is slightly lower for listed companies, but still above 50% in most cases.

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.[17] These restrictions leave us with, on average, 1,574,000 firm-to-firm transitions per year during the sample period.

# 4 Internal Labor Markets at Work

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

In this section we provide preliminary evidence that French groups operate internal labor markets. We do so by asking whether group affiliated firms disproportionately rely on their group's ILM in order to adjust their labor force.

Because group structure may be endogenous, for instance in terms of occupations, and may affect within-group mobility patterns, we face an identification challenge when assessing whether ILMs facilitate within-group firm-to-firm 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 ILMs 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 ILM channel to the probability that a worker is hired by a firm affiliated with the same group as the firm of origin, we need to control for the firm-specific – possibly time-varying – "natural" propensity to absorb workers transiting between any two given occupations. We do this by applying the following methodology.

We select all the workers that move from *any* firm in year $t-1$ to *any* firm in year $t$. We denote as $c$ the subset of movers employed in occupation $o$ at time $t-1$ and in occupation $z$ at time $t$. We then model the probability that worker $i$ – belonging to the set $c$ – finds a job in the group-affiliated

[17] 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 is incorrect.

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 any firm of origin (indexed by $k$) to occupation $z$, finds a job in firm $j$ at time $t$ and zero if she finds a job in any other firm. $BG_{i,k,j,t}$ takes value one if worker $i$'s firm of origin $k$ belongs to the same group as destination firm $j$, 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 $z$: it accounts for the fact that occupation $o$ may allow a worker to develop skills that are particularly suitable to perform occupation $z$ in firm $j$ at time $t$.

Our parameter of interest $\gamma_{c,j,t}$ measures the *excess* probability that, conditional on belonging to the set $c$, worker $i$ finds a job in firm $j$ if the firm of origin $k$ is affiliated with the same group as $j$, as compared to a similar worker originating from some firm $k$ outside the group. By definition, such a measure is identified only for BG-affiliated firms of destination, because there is no variation in $BG_{i,k,j,t}$ for non BG-affiliated firms. The error term $\varepsilon_{i,k,j,t}$ captures all other factors that affect the probability that such a worker finds a job in firm $j$. We assume that $E(\varepsilon_{i,k,j,t}|BG_{i,k,j,t}, c \times j \times t) = 0$: conditional on observables, namely group affiliation and the occupation-of-origin×occupation-of-destination×destination-firm time-varying effect, the error has zero mean.

In order to estimate the parameters of equation (1) while keeping the dimensionality of the problem reasonable, we implement the methodology described in Appendix A.2, following Kramarz and Thesmar (2013) and Kramarz and Nordström Skans (2014).[18]

The excess probability $\gamma_{c,j,t}$ is a measure of ILM activity for each triplet (occupation pair × destination firm) and for each year. Our data set allows us to estimate approximately one million ILM measures at the triplet level per year. We aggregate these measures at the firm level, taking both simple and weighted averages of the estimated $\widehat{\gamma}_{c,j,t}$ across occupation pairs.[19] 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

[18] 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.

[19] 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.

measures of ILM activity. 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).[20]

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, organizations 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 units. In Panel B of Table 1, we focus on the subset of excess probabilities computed for firm-to-firm transitions between identical occupations of origin and destination. This should rule out many job transitions up or down the career ladder, to the extent that a promotion (or a demotion) often results in a move across different occupational categories (e.g. an unskilled blue-collar promoted to skilled 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. This suggests that the design of employees' careers explains only partly why French groups operate internal labor markets.

### 4.2 ILMs and group diversification

The figures shown in Table 1 display an enormous amount of heterogeneity. 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.[21]

[20]Table B3 in Appendix B.2 complements Table 1 by building an alternative measure of ILM intensity based on worker outflows: on average, the probability that a worker originates from a given firm if she finds a new job within the same group exceeds by about 9 percentage points the probability that the worker originates from that firm if she finds a new job outside the group.

[21] The distribution of group size in France, as measured by the total number of full time employees, is highly asymmetric. Groups belonging to the top decile have on average 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.

In Section 2 we argued that the co-insurance role of the ILM should be more pronounced in more diversified groups. Hence, in Table 2 we investigate whether our estimated measures of ILM activity are larger for firms affiliated with more diversified groups. We do so by regressing $\widehat{\gamma}_{j,t}$ on a number of firm and group characteristics, controlling for firm×group fixed effects to account for unobserved heterogeneity at the firm×group level,[22] and year dummies to control for macroeconomic shocks common to all firms.

We build a time-varying measure of group *sectoral* diversification by taking the opposite of an Herfindahl-Hirschman Index based on the employment shares of the group in the different macro/4-digit industries.[23] Columns 1 and 2 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, diversification across 4-digit sectors boosts ILM activity irrespective of group size (column 3), the more so the larger the group (column 4).[24] The effect of diversification is sizable: in a group of average size, a one-standard deviation increase in (4-digit) diversification (see Appendix Table A2) boosts ILM activity 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.

Columns 5-8 focus instead on *geographical* diversification. We measure diversification between the Paris and non-Paris areas, and across regions.[25] As shown by columns 5 and 7, firms rely more on the ILM when they are affiliated with a more geographically diversified group. This effect is stronger in larger groups (columns 6 and 8).[26] A priori, geographical dispersion allows group units to be exposed to unrelated regional shocks, thus creating more scope for co-insurance to be provided

[22] Since firms may change the group they are affiliated with, firm effects do not capture the firm×group match-specific unobserved heterogeneity.

[23] This is obtained by first calculating the share of group employment accounted for by units active in each macro/4-digit sector; then taking the (opposite of the) sum of the squared values of these shares.

[24] Table 2 shows 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, a result we present in Table B1 in Appendix B.1.

[25] Our measure of diversification is the (opposite of the) sum of the squared values of the share of total employment of the group that is accounted for by units located within the Paris area and outside the Paris area, and in each of the 22 regions in metropolitan France.

[26] 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.

via the horizontal ILM. 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.

In Table 3, we also look at our disaggregated measure of ILM activity, the excess probability $\widehat{\gamma}_{c,j,t}$ estimated at the triplet level (occupation pair $\times$ destination-firm). This allows us to augment the specification estimated in Table 2 by adding indicators for the occupation of origin and occupation of destination, as well as a dummy *Same Occupation*, which takes value one if the occupation of origin coincides with the occupation of destination. Interestingly, in column 6 of Table 3 we document that diversification only boosts *horizontal* ILM activity, as captured by the *Same Occupation* indicator interacted with *Diversification*. This is in line with the hypothesis that groups of firms rely on the *horizontal* ILM as a mutual insurance mechanism, as opposed to the vertical ILM which is instrumental to the design of employees' careers. Indeed, Table 3 (columns 1-3) shows that "average" ILM intensity varies significantly across occupations. It is most intense for high-skill occupations,[27] suggesting that search costs and informational frictions play a role in explaining groups' use of ILMs. However, the same table (columns 5 and 7) suggests that diversification boosts ILM mostly among blue-collar and clerks suggesting that diversified groups use ILMs to offer some form of insurance to those workers likely to value it most. Section 5 will develop this point further.

The evidence presented in this section shows that ILMs do operate within French business groups. However, the excess probabilities we estimated measure an "average" ILM activity, that can be triggered by different factors, including job rotation programs, internal career paths, as well as shocks hitting some firms in a group. Indeed, the diversification results suggest that the accommodation of shocks is a major factor in ILM activity between-firms within-group. In the next two sections, by focusing on how shocks, negative and positive, affect between-firms within-group employment flows, we go beyond the descriptive evidence examined so far and turn to causal mechanisms.

# 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 become a between-firm insurance mechanism within business groups, allowing firms hit by an adverse shock to

[27] Using the 2-digit occupational categories available in the DADS (see the Appendix, Table A1), we built 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.

alleviate separation costs. To investigate how this mechanism operates, we exploit episodes of firm closures and mass layoffs. To identify which frictions trigger an ILM response, we exploit variation in employment protection regulation across firms of different size.

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. In order to eliminate false closures, i.e. situations in which firms simply change identifier relabeling a continuing activity, we remove all the cases in which more than 70% of the lost employment ends up in a single other firm. Appendix Table A3 shows the number of closing firms, by firm size. Consistent with figures from INSEE (Royer (2011)), we find that the incidence of closures among firms with more than 10 employees is approximately 4%, whereas the incidence of closures among very small firms is twice as large. 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. Figure 1 provides information on the performance of group-affiliated firms before they close or embark on a mass layoff: sales, as well as return on assets and 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.[28]

For each eventually-closing group-affiliated firm, we identify the set of all the actual and potential destinations of its workers, and compute the bilateral employment flows within each pair of firms in each year.[29] Our unit of observation is thus 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. Using these observations, we 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

[28] 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, as the above evidence seems to suggest, these events do generate exogenous variation useful when studying ILMs.

[29] 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.

same group and pairs not affiliated with the same group, identifies the impact of the closure on horizontal ILMs.[30]

Formally, we estimate the following model:

$$f_{ijt} = \alpha_t + \phi_{ij} + \phi_0 BG_{jt} + \phi_1 SameBG_{ijt} + \phi_2 d_{it} + \phi_3 c_{it} \times BG_{jt} + \phi_4 c_{it} \times SameBG_{ijt} + \varepsilon_{ijt} \quad (2)$$

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 $\alpha_t$ represents a set of year indicators; $\phi_{ij}$ is a firm-pair fixed effect in our main specification; $BG_{jt}$ is an indicator equal to 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 $d_{it}$ represents a set of indicators capturing the distance to closure (measured in years) of firm $i$. The indicator $c_{it}$ takes the value 1 in the last two years of firm $i$'s activity and is interacted with both $BG_{jt}$ and $SameBG_{ijt}$. The variable of interest is the interaction between $SameBG_{ijt}$ and $c_{it}$. Its coefficient $\phi_4$ 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.

Table 4 and Figure 3 provide descriptive evidence on the flows of workers originating from firms that eventually close and show that the average flow towards ILM destination-firms increases dramatically in the year before closure and at closure. Table 5 presents results based on the estimation of equation (2) confirming the 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 4), 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 effects.

Results in columns 3 and 4 show that the closure shock has heterogeneous effects across different

[30]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.

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, we consider four occupational categories: managers and other high-skilled workers, 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* × *Same Group*. The triple interactions of *Closure* × *Same Group* with the other occupational categories are all negative, showing that the stronger effect of the closure shock on internal flows as compared to external flows is less pronounced for the other types of workers.[31,32] Note 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 the same empirical framework, we investigate which labor market frictions spur ILM activity. Given the above evidence, labor market regulation is an obvious candidate. We therefore exploit the fact that labor market regulation in France changes discontinuously at various firm size thresholds. 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 at various moments of the firm's life, including around closure.[33] Figure 2 shows the 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 is likely to matter when firms make decisions. Previous work

[31] In columns (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%.

[32] The same pattern – i.e. that ILM activity intensifies following closures within the group and that this effect is stronger on blue collar workers – also emerges in Tables B1 and B2 in the Online Appendix, where we study the impact of closures on the excess probabilities presented in Section 4.

[33] 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 a closure. See Appendix A.4.

has studied the distortions that this type of legislation creates by discouraging firms' expansion.[34]

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

$$\begin{aligned} f_{ijt} \;=\; & \alpha_t + \phi_{ij} + \phi_0 BG_{jt} + \phi_1 SameBG_{ijt} + \phi_2 d_{it} + \phi_3 c_{it} \times BG_{jt} + \phi_4 c_{it} \times SameBG_{ijt} + \\ & \phi_5 D_i^{50} \times SameBG_{ijt} + \phi_6 D_i^{50} \times BG_{jt} + \phi_7 D_i^{50} \times c_{it} + \phi_8 D_i^{50} \times BG_{jt} \times c_{it} + \\ & \phi_9 D_i^{50} \times SameBG_{ijt} \times c_{it} + X_{it} + \varepsilon_{ijt} \end{aligned} \tag{3}$$

where the specification in equation (2) is augmented with the time-invariant indicator $D_i^{50}$ – 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 $\phi_9$ 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 such factors, following Leonardi and Pica (2013), we instrument the treatment status with the (average) firm size in normal times, i.e. at least four years before closure. The terms interacted with the treatment status – Destination firm BG affiliated, Closure, Same Group and Closure × Same Group – are also instrumented, using as an instrument their own interaction with (average) firm size in normal times. The validity of this instrument relies on the closure being unexpected in normal times.

Table 6 shows results from the estimation of equation (3). 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

[34] In their study of the impact of size-contingent labor laws, Garicano, LeLarge, and Reenen (2016) focus precisely on the French 50-employee threshold.

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*×*Firm Size*> 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 when employment protection rules become more stringent. This result allows us, we believe, 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, fewer employees of group-affiliated firms become unemployed as compared with stand-alone firms. Table 7 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, whereas this proportion decreases in affiliated firms.

This unconditional evidence is confirmed by the regression results shown in Table 8, 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 who become unemployed is 7.85 percentage points smaller than the fraction of workers that separate from a stand-alone firm and become unemployed. This indicates that, when the firm is hit by a closure shock, workers' exposure to unemployment is 34.2% lower in BG-affiliated firms as compared to stand-alone firms. In column (2) of Table 8 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 the skill ladder. 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 9 examines the change in hours worked (columns 1

and 2), in the hourly wage (columns 3 and 4) and in the annual wage (columns 5 and 6), 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 across the occupational categories. Instead, closure have no differential impact on the hourly wage (in our baseline specification with pair fixed effects).[35] These results suggest that the higher job stability granted by the group 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 again exploit our difference-in-difference set-up to study the characteristics of those group firms that absorb a closure shock by hiring the displaced workers within their ILM. 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 10 and 11.

In Table 10, 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).[36,37] 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 by 3 percentage points more (at closure with respect to normal times) if the destination firm is in a booming sector, which represents a 20% increase relative to the baseline. Column (2) shows that

[35] Managers seem to enjoy an hourly wage premium when moving within the group (*Same Group* × *Managers* in column 3), almost 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.

[36] 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.

[37] Sectors are classified according to whether the average annual 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.

there is instead a negative – albeit non significant – differential effect if the destination firm is in a sector experiencing a recession.

Column (3) of Table 10 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.[38] This complements the findings of Tate and Yang (2015), who document that among the displaced workers switching industry, those who do so within the same firm experience a higher change in sectoral Tobin's Q growth.[39] Their result is silent on the size of internal flows and on whether they intensify when the unit of destination has better prospects. Table 10 thus adds to their evidence, by showing that the proportion of displaced workers who are reallocated internally increases if the destination firm operates in a high-growth sector.[40] More in general, our paper presents three novel results on ILM activity. First, we identify the frictions that cause ILM activity. Second, we study the ILM response not only to negative but also to positive shocks. Third, we not only provide evidence that workers move across units of the same organization; we also quantify the extent to which internal flows change in response to shocks, in excess to the counterfactual flows that would have occurred had they been external.

In Table 11, we measure destination firms' characteristics at the firm-level – rather than at the industry-level – in "normal times" (i.e. before being affected by the firm of origin's closure). We are able to measure firm-level characteristics such as TFP, investment and financial strength, because we investigate the activity of ILMs within *groups* of affiliated firms, for which separate financial statements are available, rather than within multi-establishment firms.[41] In columns (1)-(3) we ask whether after a closure, groups reallocate employees mainly towards larger, more efficiently-run firms, as well as firms that have been expanding. In particular, in column (2) we classify destination firms according to their productivity, as measured by estimated TFP.[42] We find that,

[38]The effect is 25% larger than the baseline if the destination firm operates in a sector whose real sales growth rate belongs to the top decile of the distribution, and 25% smaller if the destination firm operates in a sector whose real sales growth rate belongs to the bottom decile.

[39]Tate and Yang (2015) also find that workers displaced from closing plants of a diversified firm are more likely to be retained inside the firm the larger the average Tobin's Q in the other sectors where the firm operates. This result shows that internal reallocation occurs within firms but is silent on whether the retained workers actually move towards the plants operating in more promising sectors. Also, it leaves open the question of whether conglomerates rely on their internal pool of workers more (or less) than on the external labor market to fill positions in the other sectors where the firm operates, an issue we address in Section 6 by investigating the ILM reaction to positive shocks.

[40]Additionally, the richness of our data allows us to do so exploiting only the within-pair time variation, thus controlling for any unobserved heterogeneity across firm pairs.

[41]The destination firm's characteristics are averaged over the period that precedes the firm of origin's closure *by at least* four years to address the endogeneity concern due to the fact that a firm's closure is likely to affect the size, productivity, investment policy and financial status of both its external and ILM destination-firms. We do so for total assets, TFP, capital expenditure, debt/assets and interest coverage.

[42]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 A4, A5, and A6 in the Appendix display labor and capital coefficients as well as estimated TFP for each one-digit sector.

following closures, ILM flows increase by 5 percentage points more when destination firms have larger-than median TFPs, an effect that is twice as large as the baseline effect. Column (3) shows that following a closure in the group, the differential increase in ILM flows is 5 percentage points larger for destination firms that had undertaken larger than median capital expenditures well before the closure shock hit the group, a sizeable 56% increase.

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 are lower in ILMs. However, the ability to seize such opportunities is likely to depend on a firm's financing capacity. Thus in Table 11 we also investigate whether the reallocation of displaced workers within groups depends on the financial status of the potential ILM destination-firms. 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).[43] Columns (4) and (5) show that following a closure in the group, the differential increase in ILM flows varies for destination firms at different percentiles of the distribution of leverage and coverage. The difference-in-difference effect is significantly smaller for destination firms whose leverage falls in the top decile of the distribution (4.83 percentage points smaller, a 35% drop relative to the baseline), and for destination firms with an interest coverage ratio in the bottom decile (3.67 percentage points smaller, a 24% drop relative to the baseline). Overall, this suggests that while closures trigger ILM activity, groups are less prone to redeploy displaced workers to highly levered and financially distressed affiliates.

# 6 The ILM Response to Positive Shocks: Good Times

To investigate further the co-insurance 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, as captured by the exit of a large industry competitor.[44] As pointed out in earlier work (see Lang and Stulz (1992)), a competitor's death may be due to

The coefficients reported in Table A4 are in line with those estimated by Garicano, LeLarge, and Reenen (2016) on French manufacturing firms. Table A6 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).

[43] 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.

[44] Giroud and Mueller (2015) provide empirical support to the idea that complex business organizations run an internal *capital* market which efficiently redeploys financial resources towards those units that are presented with a positive shock to their investment opportunities, and away from less productive units. Our paper complements that work by investigating whether, following an exogenous growth opportunity, complex organizations increase their use of the internal *labor* market.

some shock specific to the exiting firm, so other firms in the industry should benefit from it, or to some industry-wide shock, which is bad news for other firms as well. Hence, we must identify those exits 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 reliance on their ILM in response to this 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)). We believe this event is ideal to study how business groups react to this type of positive shocks.

To check that the Parmalat collapse indeed 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 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 precisely, we estimate the following equation:

$$\begin{aligned} y_{its} &= \alpha_t + \delta_s + \delta_0 Top10_{its} + \delta_1 Post2004 + \delta_2 TS_s + \delta_3 Top10_{its} \times Post2004 + \\ &\quad \delta_4 Top10_{its} \times TS_s + \delta_5 Post2004 \times TS_s + \delta_6 Top10_{its} \times Post2004 \times TS_s + \varepsilon_{its} \end{aligned} \quad (4)$$

[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 millions 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.

where $y_{its}$ is the (log of) 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 $\alpha_t$ represents a set of year indicators; $\delta_s$ is a 4-digit industry fixed-effect; $Top10_{its}$ is an indicator equal to 1 if firm $i$ at time $t$ ranks among the first ten largest firms in industry $s$ in terms of $y$; $Post2004$ takes the value 1 after the Parmalat collapse, and $TS_s$ represents a set of indicators that identify the treated industries.

We identify those industries in which the Parmalat's collapse represented an expansion opportunity by looking at the coefficient $\delta_6$ 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 industries. We will consider as "shocked" only the treated industries for which the coefficient $\delta_6$ will turn out to be positive and significant *at least* in the employment *and* sales regressions.

Table 12 reports the results of this preliminary stage. We find that $\delta_6$ is positive and significant in the regressions for employment *and* sales in two 4-digit industries, namely "Wholesale milk trade" and "Other milk production". In addition, for those industries a positive effect also shows up for total and fixed assets. This makes us confident that, at least in these two industries, 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 these two "positively-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).

We estimate the following equation:

$$\begin{aligned} f_{ijt} &= \alpha_t + \phi_{ij} + \phi_0 BG_{jt} + \phi_1 SameBG_{ijt} + \phi_2 Post2004 + \\ &\quad \phi_3 Post2004 \times BG_{jt} + \phi_4 Post2004 \times SameBG_{ijt} + \varepsilon_{ijt} \end{aligned} \tag{5}$$

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 $\alpha_t$ represents a set of year indicators; $\phi_{ij}$ is a firm-pair fixed effect in our main specification; $BG_{jt}$ is an indicator equal to 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 $\phi_4$ 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 the estimates of equation (5) in Table 13. There, we present estimates in two subsets of the 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. Results in Table 13 confirm 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 any large closure event. More precisely, we identify closure episodes of firms with more than 500 workers – on average – in normal times, i.e. at least 4 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.

To be sure that such closures are essentially due to idiosyncratic reasons, we study whether these events benefit the main competitors in the industry, in which case we can confidently assume that they do not reflect a negative macroeconomic or sector-wide shock. 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.[47] 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 (4). We look at the coefficient $\delta_6$ 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,

[47] We exclude from the control group all 4-digit industries (belonging to the same 2-digit category as the closing firms) in which there is a large closure event.

$Top10_{its}$ is an indicator equal to one for the ten largest firms in industry $s$, $PostClosure$ is an indicator for the period following the closure event and $TS_s$ is an indicator 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 $\delta_6$ is positive and significant in, at least, the regressions on employment *and* sales.

Appendix Tables A7 and A8 show the results of this preliminary stage. We identify 16 industries (listed in Appendix Table A7) for which the coefficient $\delta_6$ 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 A9 shows some descriptive statistics for these "shocked" industries. 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 4 years prior to the closure event.

Table 14 provides descriptive statistics on the bilateral flows of workers hired by group-affiliated firms in these 16 shocked industries.[48] The corresponding visual evidence from Figure 4 suggests that the distance between intra and extra group flows (slightly) increases after the closure of a large competitor. Results in Table 15 confirm the unconditional evidence. After the shock, within-group flows go up relative to flows from the external labor market, both in the specification with firm of origin fixed effects and in the specification with pair (firm of origin-firm of destination) 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 14), our estimates imply that the increase in flows from ILM firms of origin is half of the average external flow. Column (3) of Table 15 shows that the effect is positive and significant in the three years following the shock, and that it vanishes afterwards.[49] Interestingly, column (4) shows that the effect is driven by hires in the top two layers of the organization (managerial and other high-skilled occupations). This supports 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

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

[49] Not surprisingly, the effect does not show up in the closure year, that mixes pre- and post-shock behavior.

market for skilled human capital.

Finally, the last two columns of Table 15 provide a placebo test. Column (6) shows the result of the placebo on the subset of sectors in which the coefficient $\delta_6$ 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 Conclusion

Why are some organizations more resilient to shocks than others? Which channels allow them to swiftly respond to adverse or favorable economic conditions? In this paper we address these questions by studying how some widespread organizations, namely business groups, cope with shocks using their Internal Labor Markets. To this end, we exploit individual measures of mobility (through a matched employer-employee data set), together with information on the organization's structure (i.e., the firms affiliated with a group), and the economic outcomes of the affiliated firms.

To the best of our knowledge, ours is the first paper to show that labor market regulation and hiring frictions in the external labor market induce organizations to rely on ILMs when responding to both adverse and positive shocks. Our evidence suggests that ILMs emerge as a mutual insurance mechanism across firms of diversified groups in the presence of frictions. As a by-product of ILM activity, implicit employment insurance is provided to the organizations' workers, in particular the low-skilled.

Our findings raise several questions regarding the role of business group organizations in economic systems. The evidence provided here suggests that, in the presence of frictions, groups display a higher ability to adapt to changing business conditions with respect to stand-alone firms: thanks to the ILM, groups can swiftly downsize business units hit by adverse shocks, but also overcome human capital bottlenecks that may bind when growth opportunities arise. Hence, ILMs, alongside internal capital markets, can provide groups with a competitive advantage with respect to their stand-alone rivals, an imbalance that labor market frictions are bound to magnify.[52]

[50] These sectors and the coefficients of the preliminary stage regression are listed in Appendix Table A8, panel A.

[51] These sectors and the coefficients of the preliminary stage regression are listed in Appendix Table A8, panels B and C.

[52] Our data shows that groups enjoy strong positions in their product markets: 89 percent of the ten largest incumbents in French manufacturing industries are affiliated with business groups. In a previous paper, three of the four co-authors studied how reliance on internal capital markets can explain groups' ability to withstand competition,

A second question is how group ILMs alter the allocation of labor in the economy. On the one hand, ILMs ensure the reallocation of workers to more productive uses in situations where stand-alone companies would inefficiently hoard labor to avoid adjustment costs; on the other hand, the ability of groups to rely on the ILM, while privately beneficial in the presence of frictions, may prevent more efficient matches to emerge in the external labor market. The above considerations imply that groups have multiple and complex effects on competition, factor allocation, and the efficiency of economic systems; assessing whether economies benefit from the presence of groups is an important goal that however lies beyond the scope of this paper.

Our results are likely to extend beyond the group-type organizational form. Indeed, ILMs are even more likely to operate within other types of diversified organizations such as multi-establishment firms, where coordination across units is arguably stronger than across subsidiaries of a business group. Focusing on groups is a useful benchmark because it allows us to establish that ILMs operate even across units that are separate legal entities, as is the case for business group subsidiaries.[53]

We ultimately wish to understand how complex organizations come to life and why they take different forms. Why are some units added to these organizations as separate legal entities under the parent control rather than as establishments? The reasons why such organizations appear in the first place and why they succeed to grow is a long-standing question in economics. In order to understand the full nature of the benefits and costs associated to groups' existence, this paper's approach has used shocks that affected some of the firms within groups. To delve further into this comprehension, we will adopt complementary strategies in our next articles. First, we will examine how policy reforms, as opposed to shocks, affect the existence and structure of groups versus other organizations. The policy reform we have started to examine is the transition to the 35-hours workweek, that took place in France over the 2000s. The differential strategies used by groups versus multi-establishment firms when faced with such reforms should help us in our endeavor. Second, we also have started to look at how exchange-rate movements affect the structure of groups in contrast again with that of multi-establishment firms. In particular, by measuring flows of imports, exports, and purchases within France, together with firms' creation or destruction and their association with these flows, we will be able to assess the benefits and limits of integration. By

especially in environments where financial constraints are pronounced (Boutin, Cestone, Fumagalli, Pica, and Serrano-Velarde (2013)).

[53]Measurement is a further reason for studying complex organizations in the shape of groups comprising multiple firms rather than firms comprising multiple establishments: indeed, unlike for establishments, one can measure debt, earnings and coverage ratios for each separate group subsidiary (see Table 11 where these measures are exploited).

analyzing how groups evolve when faced with the changing environments induced by exchange-rate movements, and contrasting their reactions with those of different organizations faced with similar shocks, we hope to have a better understanding of some of the reasons for firms' creation.

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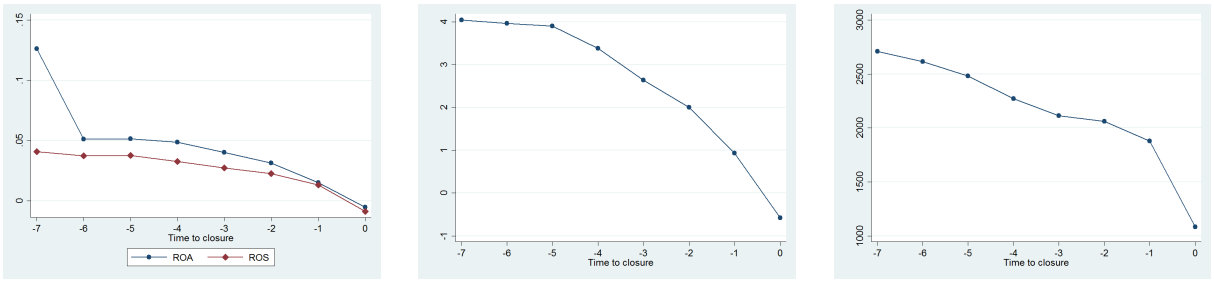
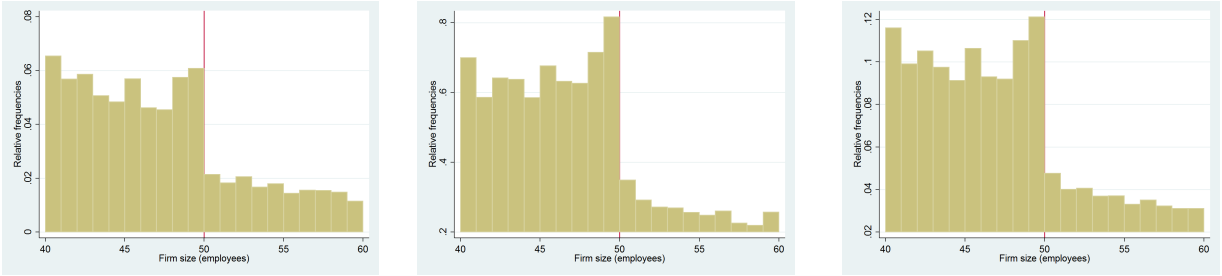
**Figure 1.** Evolution of performance indicators for group affiliated closing firms




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

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

**Figure 2.** Firm size distribution around the 50 employee threshold (year 2006)




(a) Stand-alone firms (b) Business group affiliated firms (c) All firms

**Table 1.** Mean excess probability of within-group firm-to-firm 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 firm-to-firm 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. ILM activity and group diversification**

| Variables | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| (Log) Firm size | 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) |
| (Log) Rest of the group size | 0.001 | 0.000 | 0.001 | 0.004* | 0.001 | 0.001 | 0.002 | 0.004* |
| | (0.001) | (0.001) | (0.001) | (0.002) | (0.001) | (0.001) | (0.001) | (0.002) |
| (Log) Number of affiliated firms | -0.084*** | -0.085*** | -0.085*** | -0.088*** | -0.085*** | -0.087*** | -0.087*** | -0.0909*** |
| | (0.003) | (0.003) | (0.003) | (0.003) | (0.003) | (0.003) | (0.003) | (0.003) |
| State Control | -0.025 | -0.020 | -0.024 | -0.009 | -0.024 | -0.016 | -0.025 | -0.013 |
| | (0.024) | (0.022) | (0.023) | (0.017) | (0.023) | (0.021) | (0.022) | (0.018) |
| Foreign control | -0.043 | -0.038 | -0.042 | -0.029 | -0.044 | -0.039 | -0.043 | -0.035 |
| | (0.026) | (0.026) | (0.026) | (0.021) | (0.026) | (0.023) | (0.025) | (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) | | | | |
| 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 | 289,689 | 289,689 | 289,689 | 289,689 |
| Firm×group effects and year dummies | Yes | Yes | Yes | 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 an indicator equal to 1 if the head of the group is state-owned. *Foreign Control* is an indicator equal to 1 if the head of the group is located outside France. A group's *Diversification (macrosectors/4-digit sectors/Paris/Regions)* 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 (in a given 4-digit sector; in/outside the Paris Area; in a given region) to total group employment. Macrosectors are agriculture, service, finance, manufacturing, energy, automotive. 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. Standard errors are clustered at the group level.

## Table 3. 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 effects and year dummies | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

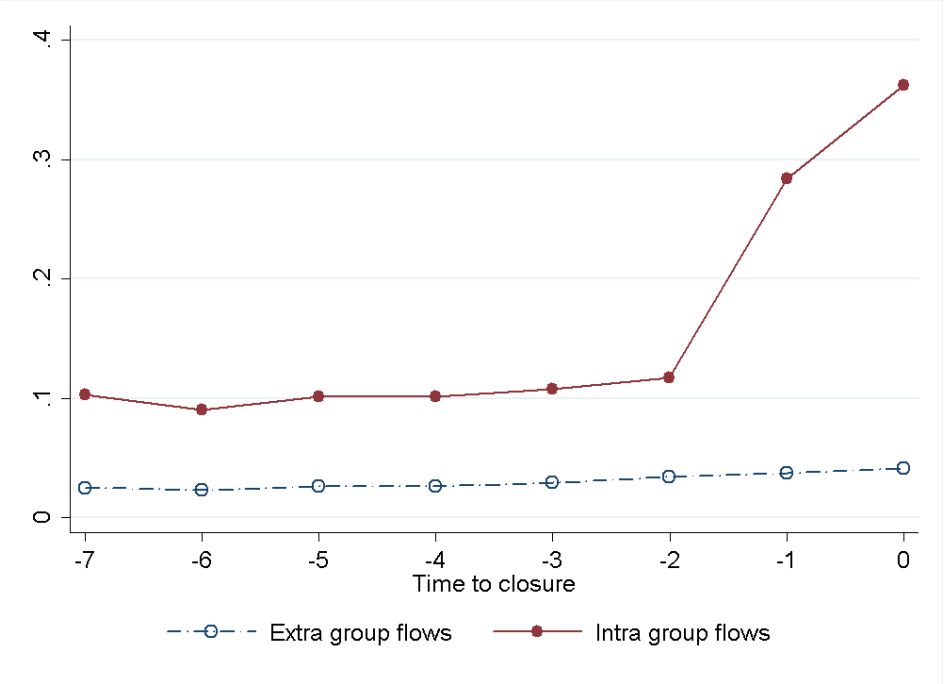
Note: Dependent variable: Excess probability for firm $j$ to hire a worker transiting from occupation $o$ to occupation $z$ if she originates from the same group as $j$. *Firm size* is measured by (full time equivalent) total employment; *Rest of the group size* is measured by the (full time equivalent) total employment of all the other firms affiliated with the same group as firm $j$. *State Control* is an indicator equal to 1 if the head of the group is state-owned. *Foreign Control* is an indicator equal to 1 if the head of the group is located outside France. The occupational categories are the ones indicated in Table A1 of Appendix A1. The category Managers/High-Skill groups category 2 and 3. *Same Occupation* is an indicator equal to 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. Standard errors are clustered at the group level.

**Table 4. 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 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, separately for pairs that belong to the same group and pairs that do not. Standard deviations are reported in parentheses and the number of observations in square brackets.

**Figure 3.** Bilateral employment flows




Note: Time to closure indicates the number of years before the firm of origin closes down. For each year the graph reports 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, separately for pairs that belong to the same group and pairs that do not.

**Table 5. 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 indicators | YES | YES | YES | YES |
| Time to closure indicators | 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 in the Appendix. 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 an indicator equal to 1 if firm $j$ is group affiliated. *Same Group* is an indicator equal to 1 if firm $i$ and firm $j$ belong to the same group. *Closure* is an indicator equal to 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 indicators 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 6. 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 an indicator equal to 1 if firm $j$ is group affiliated. *Same Group* is an indicator equal to 1 if firm $i$ and firm $j$ belong to the same group. *Closure* is an indicator equal to 1 in the last two years of firm $i$'s activity. In the first two columns *Firm size* $> 50$ is a time-invariant indicator 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 also instrumented as explained in the main text. 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 7. 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 8. Flows to unemployment: closures vs. normal times**

| | (1) | (2) |
|---|---|---|
| Firm of origin group affiliated | 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 indicators | YES | YES |
| Time to closure indicators | 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 an indicator equal to 1 in the last two years of firm $i$'s activity. *Firm of origin group affiliated* is an indicator equal to 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 9. 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 indicators | YES | YES | YES | YES | YES | YES |
| Time to closure indicators | 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 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 as in Table A1 (managers include categories 2 and 3). *Destination firm group affiliated* is an indicator equal to 1 if firm $j$ is group affiliated. *Same Group* is an indicator equal to 1 if firm $i$ and firm $j$ belong to the same group. *Closure* is an indicator equal to 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 10. 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 indicators | YES | YES | YES |
| Time to closure indicators | 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 an indicator equal to 1 if firm $j$ is group affiliated. *Same Group* is an indicator equal to 1 if firm $i$ and firm $j$ belong to the same group. *Closure* is an indicator equal to 1 in the last two years of firm $i$'s activity. *Destination firm in a Boom (bust)* is an indicator equal to 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 an indicator 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 11. 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 indicators | YES | YES | YES | YES | YES |
| Time to closure indicators | 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 an indicator equal to 1 if firm $j$ is group affiliated. *Same Group* is an indicator equal to 1 if firm $i$ and firm $j$ belong to the same group. *Closure* is an indicator equal to 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* 10*pct* is an indicator equal to 1 if the destination firm $j$ belongs to the bottom decile of the distribution of *TA*. *TA above* 50*pct* is an indicator equal to 1 if the destination firm $j$'s *TA* is above the median. *TA above* 90*pct* is an indicator equal to 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 12.** 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* (indicator equal to 1 if the firm ranks among the first 10 in the 4-digit industry), *Post2004* (indicator equal to 1 after the Parmalat collapse, i.e. after 2004) and the relevant 4-digit industry indicator. *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 13.** 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 |

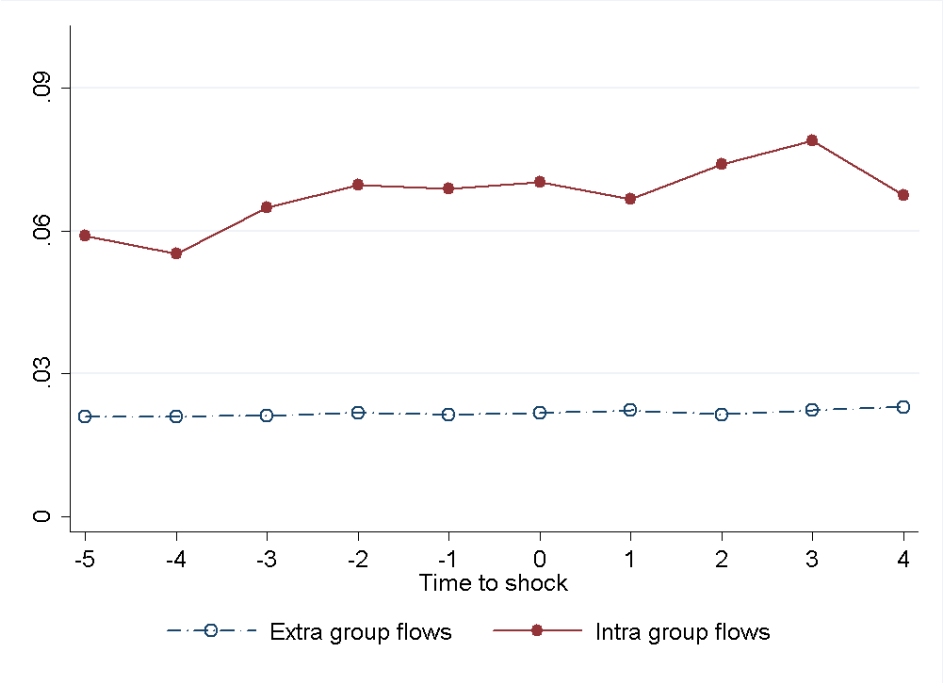
Note: Dependent variable: fraction of employees hired by group-affiliated firm $i$ (active in a shocked or non-shocked sector) in year $t$ and previously employed by firm $j$, to the total number of job-to-job movers hired by firm $i$ in year $t$. *Firm of origin group affiliated* is an indicator equal to 1 if firm $j$ is group affiliated. *Same Group* an indicator equal to 1 if firm $i$ and firm $j$ belong to the same group. *Post2004* is an indicator 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 14.** Descriptives on bilateral flows before and after the closure of a large competitor

| | Extra group Flows | Intra 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] |

Note: The table reports the average ratio of employees hired by an affiliated firm $i$ (active in one of the shocked sectors) and originating from firm $j$, to the total number of job-to-job movers hired by firm $i$ in the same year, separately for pairs that belong to the same group and pairs that do not.

**Figure 4.** Bilateral flows before and after the closure of a large competitor




Note: Time to shock indicates the distance from the closure year of a large competitor. For each year the graph reports the average ratio of employees hired in year $t$ by an affiliated firm $i$ (active in one of the shocked sectors) and originating from firm $j$, to the total number of job-to-job movers hired by firm $i$ in the same year, separately for pairs that belong to the same group and pairs that do not.

**Table 15.** 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 an indicator equal to 1 if firm $j$ is group affiliated. *Same Group* is an indicator equal to 1 if firm $j$ and firm $i$ belong to the same group. *Post Shock* is an indicator equal to 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 an indicator equal to 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 Estimation of the excess probability $\gamma_{c,j,t}$

In this Appendix we illustrate the methodology we followed to estimate the parameter $\gamma_{c,j,t}$ in equation (1).

Notice that the parameter $\gamma_{c,j,t}$ is specific to each occupation pair $\times$ group-affiliated firm of destination $\times$ year, i.e. we want a measure of ILM activity for each pair of occupations, for each firm of destination and for each year. Such a measure is identified only for BG-affiliated firms of destination (because the variable $BG_{i,k,j,t}$ has no variation in the case of non BG-affiliated firms), but the estimation sample of course includes workers who move from any (BG- and non BG-affiliated) firm to any (BG- and non BG-affiliated) firm.

Thus, direct estimation of equation (1) would require a data set with one observation for each combination of firm-to-firm mover and group-affiliated firm for each year. As our data set contains about 1,574,000 firm-to-firm 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, following Kramarz and Thesmar (2013) and Kramarz and Nordström Skans (2014) we define:

$$R^{BG}_{c,j,t} \equiv \frac{\sum_{i \in c,k} E_{i,c,k,j,t} BG_{i,k,j,t}}{\sum_{i \in c,k} BG_{i,k,j,t}} = \beta_{c,j,t} + \gamma_{c,j,t} + \widetilde{u}^{BG}_{c,j,t} \tag{6}$$

where $R^{BG}_{c,j,t}$ is the fraction of workers that, in year $t$, find a job in firm $j$ among all firm-to-firm movers transiting from occupation $o$ to $z$ whose firm of origin $k$ belongs to the same group as firm $j$. 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.

We then compute the fraction of workers that find a job in firm $j$ among all firm-to-firm movers transiting from occupation $o$ to $z$ and whose firm of origin $k$ does *not* belong to the same group as firm $j$:

$$R^{-BG}_{c,j,t} \equiv \frac{\sum_{i \in c,k} E_{i,ck,,j,t}(1 - BG_{i,k,j,t})}{\sum_{i \in c,k}(1 - BG_{i,k,j,t})} = \beta_{c,j,t} + \widetilde{u}^{-BG}_{c,j,t} \tag{7}$$

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 pair-year effect $\beta_{c,j,t}$:

$$G_{cj,t} \equiv R^{BG}_{c,j,t} - R^{-BG}_{c,j,t} = \gamma_{c,j,t} + u^{G}_{i,j,t}. \tag{8}$$

We estimate the parameter $\gamma_{c,j,t}$ for each occupation pair-firm as the difference between two probabilities: first, the probability that a worker, belonging to the set $c$ and originating from a firm affiliated with the same group as firm $j$, finds a job in firm $j$; second, the probability that a worker, belonging to the set $c$ and originating from a firm that is not affiliated with the same group as firm $j$, finds a job in firm $j$.

**Estimation procedure:** In order to estimate our parameter of interest, $\gamma_{c,j,t}$, for each year $t$ and each occupation pair $\{o, z\}$, we identify the set of firm-to-firm movers $c$ transiting from occupation $o$ to occupation $z$ between year $t-1$ and year $t$. Then, we associate each occupation pair $\{o, z\}$ with a firm $j$. For each triplet $\{o, z, j\}$, we separate those transitions that originate from the same group as firm $j$ from those transitions that do not. This allows us to compute the denominators of the ratios $R^{BG}_{c,j,t}$ and $R^{-BG}_{c,j,t}$ defined in (6) and (7).[54] For each triplet $\{o, z, j\}$, we then compute

[54] We then drop the triplets in which this distinction cannot be drawn because either all the transitions originate from $j$'s group or all the transitions originate from the external labor market. Trivially, on those sets of workers it

the number of firm-to-firm movers, transiting from occupation $o$ to occupation $z$, that find a job in firm $j$, distinguishing between those that originate from the same group as firm $j$ and those that do not. This allows us to compute the numerators of the ratios $R^{BG}_{c,j,t}$ and $R^{-BG}_{c,j,t}$ defined in (6) and (7), and ultimately to estimate our parameter of interest $\gamma_{c,j,t}$ for each triplet.

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.[55] With this restriction, we have approximately one million ILM estimates per year.

A broader definition of $c$ is the set of firm-to-firm movers transiting 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.

**Equivalence result:** *The coefficient $\widehat{\gamma}_{c,j,t}$ estimated in equation* (8) *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:

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

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

is not possible to identify the excess probabilities. This restriction is without loss of identifying variation since the discarded observations are uninformative conditional on the fixed effects.

[55] 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.

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 (6). 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 (7). □

**Table A2.** 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 as the total number of (full time equivalent) employees; *Rest of the group size* is measured as the total number of (full time equivalent) employees in firm $j$'s group, except firm $j$. A group's *Diversification (macro sectors/4-digit sectors/Paris/Regions)* 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 (in a given 4-digit sector; in/outside the Paris Area; in a given region) to total group employment. Macrosectors are agriculture, service, finance, manufacturing, energy, automotive. 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 $t-1$. The descriptive statistics displayed in this table are computed using *firm-level* data. Hence, large groups are over-represented and the average group characteristics are larger than those computed using data at the group level and mentioned in footnote 21.

## A.3 Closures rates

**Table A3. Firm closures**

| | Number of closing firms | | | Percentage of closing firms | | |
|---|---|---|---|---|---|---|
| | All firms | $< 10$ employees | $\geq 10$ employees | All firms | $< 10$ employees | $\geq 10$ employees |
| 2002 | 134,398 | 117,898 | 16,500 | 9.03 | 10.25 | 4.87 |
| 2003 | 130,538 | 114,079 | 16,459 | 8.68 | 9.78 | 4.88 |
| 2004 | 135,848 | 123,211 | 12,637 | 8.92 | 10.30 | 3.73 |
| 2005 | 123,244 | 109,912 | 13,332 | 8.13 | 9.38 | 3.88 |
| 2006 | 128,429 | 114,978 | 13,451 | 8.21 | 9.49 | 3.82 |
| 2007 | 136,002 | 121,576 | 14,426 | 8.54 | 9.91 | 3.95 |
| 2008 | 115,529 | 105,122 | 10,407 | 7.15 | 8.40 | 2.74 |
| 2009 | 158,014 | 139,456 | 18,558 | 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.

## A.4 Labor market 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 by unions and staff representatives, for instance on the ground that not all dismissals are justified or not all reallocation options have been considered.

## A.5 TFP estimation

**Table A4. 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 indicators.

**Table A5. 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 indicators.

**Table A6. Estimated TFP across sectors: stand-alone vs. group-affiliated firms**

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

## A.6 Large closures as positive shocks

**Table A7.** 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 of the triple interaction term ($Top10 \times PostClosure \times TreatedSector$) from the regressions on sales, employment, total assets and fixed assets (i.e., property plant and equipment). The included sectors are those for which the coefficient is positive and significant in both the sales and employment regressions. The remaining ones are in Table A8. 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 A8.** 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 coefficients of the triple interaction term ($Top10 \times PostClosure \times TreatedSector$) from the regressions on sales, employment, total assets and fixed assets (i.e., property plant and equipment). The included sectors 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 A9.** Descriptives on large firm closures in the shocked sectors

| Code | Sector | Number of closures | Average size of closing firm in normal times | Year of closure |
|---|---|---|---|---|
| 158H | Manufacture of sugar | 1 | 1689.5 | 2008 |
| 159S | Production of mineral water | 1 | 4339.75 | 2004 |
| 159T | Production of soft drinks | 1 | 620 | 2004 |
| 221E | Publishing of journals and periodicals | 1 | 578.5 | 2004 |
| 241E | Manufacture of other inorganic chemicals | 1 | 915.7 | 2006 |
| 292D | Manufacture of lifting and handling equipment | 1 | 847.5 | 2004 |
| 295G | Manufacture of machinery for textile, apparel and leather production | 1 | 830.75 | 2005 |
| 314Z | Manufacture of accumulators, primary cells and primary batteries | 1 | 1244.5 | 2005 |
| 452B | Construction of sundry buildings | 1 | 513.25 | 2007 |
| 513W | Non specialized wholesale of food | 2 | 2471.9 | 2004 |
| 514N | Wholesale of pharmaceutical goods | 3 | 999.1 | 2007 |
| 518L | Wholesale of electric equipment | 5 | 1103.2 | 2006 |
| 526B | Specialized retail sale via mail order | 1 | 767 | 2007 |
| 526H | Vending machine sale | 1 | 1065.25 | 2005 |
| 631B | Non harbour cargo handling | 1 | 713.25 | 2008 |
| 743B | Technical analyses, testing and inspections | 1 | 1063.5 | 2005 |

# B Appendix –For Online Publication

## B.1 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.

We denote as closures all episodes in which firms/plants experience a drop in employment from one year to the next of 90% of more during our sample period, 2002-2010. In order to eliminate false closures, i.e. situations in which firms/plants simply change identifies relabeling a continuing activity, we remove all the cases in which more than 70% of the lost employment ends up in a single other firm. See Section 5 for further details.

In Table B1, 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.[56] 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.

In Table B2 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.

[56] 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 B1. 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 an indicator equal to 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 an indicator equal to 1 if al least one firm in the group closes in year $t$. Similarly for plant closure. *Own closure* is an indicator equal to 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 B2. 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 indicators | 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 an indicator equal to 1 if the head of the group is state-owned. *Foreign Control* is an indicator equal to 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 an indicator equal to 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 an indicator equal to 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.

## B.2 Internal labor markets at work: outflows

In the paper, we show that a worker is more likely to find a job in a group-affiliated firm if she was already employed in the same group as that firm as opposed to a worker originally 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 a given firm affiliated with that group? To answer this question, we estimate the excess probability that a firm-to-firm mover (transiting between two given occupations) originates from affiliated-firm $j$ if she lands to a firm affiliated with the same group as firm $j$, over the probability that the worker originates from firm $j$ while landing to a firm not affiliated with the same group as firm $j$.

As earlier, we select all workers that move from any firm in year $t-1$ to any firm in year $t$. We denote as $c$ the subset of those employed in occupation $o$ at time $t-1$ and in occupation $z$ 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 firm-to-firm movers transiting 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 firm-to-firm movers transiting 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 a firm affiliated with the same group as $j$, and that of originating from firm $j$ for

workers (transiting between two occupations $o$ and $z$) who land to a firm not affiliated with the same group as $j$. 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).

### B.3 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.

**Table B3.** 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 firm-to-firm 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 B4. 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 | | | | 0.023*** |
| group size | | | | (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 an indicator equal to 1 if the head of the group is state-owned. *Foreign Control* is an indicator equal to 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 B5. 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 an indicator equal to 1 if the head of the group is state-owned. *Foreign Control* is an indicator equal to 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 B6. 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 indicators | 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 an indicator equal to 1 if the head of the group is state-owned. *Foreign Control* is an indicator equal to 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 an indicator equal to 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 an indicator equal to 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.