The Bright Side of Corporate Diversification: Evidence from Internal Labor Markets*

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Abstract

We estimate the labor market consequences of corporate diversification using novel worker-firm matched data from the U.S. Census Bureau. We find evidence that workers in diversified firms have more general skills than workers in focused firms. Displaced workers experience significantly smaller losses when they switch jobs or industries internally and when they move to a new firm in a new industry in which their old firm also operates. We find a significant wage premium among workers in diversified firms, consistent with their more attractive outside options. We also find more active internal labor markets in diversified firms. We find that diversified firms exploit the option to redeploy workers internally: Diversified firms redeploy workers from declining industries to expanding industries at a higher rate than the external market. Overall, our analysis suggests a bright side to corporate diversification.

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I. Introduction

What are the benefits of corporate diversification? The manufacturing plants of diversified firms have higher total factor productivity than the plants of focused firms in the cross-section (Schoar (2002)). They also achieve higher sales growth and adjust more easily to business cycles, particularly within core industries (Maksimovic and Phillips (2002)). A potential explanation is the existence of internal capital markets. To the extent that external capital markets are not efficient, firms operating multiple lines of business can generate value by re-allocating capital from divisions with excess cash to divisions with strong investment opportunities.[1] Yet, there is some evidence suggesting instead that firms engage in "socialist" cross-subsidization of weak divisions at the expense of those with good opportunities (Lamont (1997); Rajan, Servaes and Zingales (2000)).[2] A relatively unexplored alternative is the possibility that diversification creates richer and more active internal labor markets, leading to improved labor efficiency relative to focused firms.

We find evidence that diversified firms benefit from the real option to redeploy workers across their lines of business, from declining to expanding industries. There is significantly more internal movement in diversified firms than in focused counterparts. We also find that workers fare significantly better when they change jobs in internal labor markets than when they change firms, particularly when they also switch industries. Moreover, workers in diversified firms face fewer frictions in changing industries externally, provided they move to an industry in which their diversified firms operate.

We create a novel worker-plant matched panel using plant- and worker-level data from the U.S. Census Bureau which allows us to track worker movement in internal and external labor markets. Our worker-firm matched data comes from the U.S. Census Bureau's Longitudinal Employer Household Dynamics (LEHD) program. The newly developed LEHD data covers a broad cross-section of the U.S. economy[3] and includes 96% of the workers from covered states.

[1] See also Stein (2003) for a survey of the extensive literature on internal capital markets and diversification.

[2] See also Scharfstein and Stein (2000), Bernardo, Cai, and Luo (2001), and Ozbas and Scharfstein (2009).

[3] Although the LEHD program covers 48 states in the U.S., only information from 23 states is available through the Census Research Data Center (RDC).

We use the Census Bureau's Longitudinal Business Database (LBD) and Business Register Bridge (BRB) to allocate workers in multi-unit firms to individual plants, where possible. We also use plant-level information from the LBD to measure firm diversification. Our final data contains a random sample of 251,440 worker-years between 1993 and 2001 (henceforth the "random sample").

An advantage of diversified firms relative to focused firms is a greater scope within the internal labor market. We begin at the unit level, showing that workers in diversified firms are indeed more likely to switch units within the firm than workers in focused firms. In addition, a significant portion of these internal moves involve industry changes.

Next, we examine the value consequence of the heightened worker mobility in diversified firms from the perspective of both the worker and the firm. We begin with an analysis of worker wages. We find that workers in diversified firms earn a 5% wage premium over workers in focused firms, controlling for a variety of worker- and firm-level characteristics. To link this premium to worker mobility, we compare the change in wages when workers change jobs or industries in diversified and focused firms. A key identification concern is the endogeneity of the choice to change jobs. In particular, workers may be more likely to voluntarily accept a new job within their firm or industry. Since wage changes following voluntary job changes are likely to be censored below and wage changes following firing are likely to be censored above, this effect could immediately generate a pattern of better outcomes among internal movers. To avoid this confound, we construct a sample of worker-plant matched data which includes only involuntary job changes due to plant closure. Our closure sample contains 461,422 worker-years between 1993 and 2001 (henceforth the "closure sample").

We then compare outcomes for workers from diversified and focused firms who are reemployed internally or externally. This strategy does not remove all sources of endogeneity from our analysis. In particular, workers may still choose whether or not to remain in the firm following displacement, conditional on their outside options and an offer from the firm. However, such differences are less problematic for our analysis. For example, if higher quality workers choose to remain inside diversified firms than focused firms following displacement – conditional on the firm's choice to extend an offer – that suggests an important labor market advantage to

firms with a diversified structure.

Using both the random sample and the closure subsample, we find that workers fare significantly better when they change jobs in internal labor markets than in external markets. We find that the key source of wage losses in external labor markets is industry changes, consistent with Neal (1995). However, we find that workers who change industries internally within a diversified firm do not experience the same wage losses. Our results are robust to the inclusion of a variety of controls, including plant fixed effects and fixed effects for each pair of 2-digit SICs between which sample workers switch. The latter result, in particular, suggests that the human capital of workers in diversified firms is systematically different from workers in focused firms: They do better when switching industries not simply because the industries within the "portfolio" of a diversified firm are more related. Instead, they outperform workers from focused firms who make the exact same industry switch. An explanation is that workers in diversified firms possess more general skills or, in the language of Lazear (2009), their firm-specific human capital places non-zero skill weights on a broader set of skills, making it easier for them to transfer across different lines of business. To put this explanation to the test, we measure the wage losses when (displaced) workers from a diversified firm change firms and industries, but move to an industry in which their former firm also operates. We find that these workers suffer significantly smaller losses than workers who move to an industry in which their former firm does not operate. And, again, the result is robust to including fixed effects for each observed pair of 2-digit SIC code switches. Because displaced workers have limited bargaining power with the new firm, it is difficult to reconcile the finding with an alternative story in which diversified firms dissipate rents by over-paying workers. Moreover, it suggests that the informational advantage of the previous employer about worker quality is not the only reason workers do better in the internal labor market. Overall, our results suggest that workers in diversified firms receive a wage premium because they possess more flexible human capital and hence enjoy higher outside options.

Though workers extract some of the rents, we show that worker flexibility also provides an important real option to the firm. Following plant closure, multi-unit firms which continue to operate have the option to retain and redeploy or to discharge the affected workers. We find that

diversified firms are more likely to retain workers compared to their focused counterparts. In particular, they are more likely to retain workers when the expected returns to their remaining industries – measured using the weighted average of industry Q across the industries in which the firm continues to operate – is high; and, they are more likely to redeploy workers to different industries when the expected returns to their old industries – measured using realized changes in industry Q over the three years following closure – are low. Thus, diversification provides firms with an advantage relative to focused firms: they are better able to respond to changing conditions in their existing industries through the reallocation of human capital. We observe more internal movement between the industries of diversified firms following plant closures than between those same industries at the same time in the external market. These opportunities are particularly valuable if the skills firms require are scarce in the external labor market or if there are frictions in hiring workers from outside the firm.

A caveat to our analysis is that we do not distinguish whether workers with more general skills match to diversified firms ex ante or whether diversification induces workers to develop such skills over time. However, this distinction is orthogonal to our main objective: to establish that diversification provides a measurable advantage to the firm in the labor market. We are also not able to measure specific changes in firm value as a function of labor deployment given limitations of the Census data.

Our results contribute to a number of literatures. We expand on prior work using Census plant-level data to look inside the black box of the firm (Schoar (2002); Maksimovic and Phillips (2002)) not only by analyzing differences in labor forces, but also by studying the choices of firms operating in all industry classifications rather than the subset of manufacturing firms. This extension is important given the declining importance of manufacturing as a component of U.S. output.

Our analysis provides a new angle on the benefits of corporate diversification. Existing evidence on the net value implications of diversification is mixed. Lang and Stulz (1994), among others, argue that diversified firms trade at a discount relative to a portfolio of focused firms in the same lines of business. Morck, Shleifer, and Vishny (1990) show that the market discounts firms which diversify by acquisition. Yet, Graham, Lemmon, and Wolf (1998) and Campa

and Kedia (1999) dispute the interpretation of this evidence, arguing that diversified firms acquire units which are weak relative to the industry average, and that firms with lower value are more likely to diversify. Moreover, using data from the Census' LBD, Villalonga (2000) show that mis-classification of industries in the Compustat segment data may be responsible for findings of a diversification discount. Instead of focusing on the net benefit of diversification, we examine a particular unexplored mechanism by which diversification can create value: internal labor markets with a wider scope. Schoar (2002) proposes dissipation of rents to workers as a potential explanation of the diversification discount. However, our analysis suggests that wages in diversified firms – at least among rank-and-file employees – are consistent with firm value-maximization.

Our analysis also suggests more caution in the interpretation of prior research on internal capital markets. Prior studies find less sensitivity of capital expenditures to industry Q among the business segments of diversified firms (e.g., Rajan, Servaes and Zingales (2000)). We find that the labor forces of diversified firms are systematically different from those of focused firms and that diversified firms are more able to redeploy labor in response to changing industry conditions. If focused firms face constraints in the external labor market which are mitigated by the internal labor markets of diversified firms, then the observed pattern in capital expenditures might reflect value-maximizing decisions. Suppose, for example, that focused firms can only respond to an industry shock by adjusting their capital stocks. However, diversified firms can adjust both their capital and labor inputs. Then, assuming some substitutability of labor and capital, we would expect to see a greater elasticity of capital expenditures with respect to Q among focused firms.

We also contribute to the labor literature on internal labor markets. Empirical work in this area is typically limited by the availability of data. Existing papers focus on a single firm (Baker, Gibbs, and Holmstrom (1994a; 1994b)) or use data from foreign countries (Lazear and Oyer (2004a; 2004b)). We examine the internal labor markets of a large cross-section of U.S. firms that operate in (at least) 23 states and across all industries. In addition, we focus on a relatively unexplored aspect of these markets. Most existing papers focus on vertical movement in internal labor markets. For example, how, when, and with what consequences do

workers advance within the corporate hierarchy? We identify lateral movement across different business operations as another important component of internal labor markets. In particular, this aspect of internal labor markets sheds some light on the determinants of the boundaries of the firm (Hart (1995)).

Finally, we contribute to a growing literature exploring the finance applications of organization capital (e.g. Eisfeldt and Papanikolaou (2010) and Carlin, Garmaise, and Chowdhry (2009)). Rather than focusing on the implications of organization capital at a macro level, we endeavor to look inside the black box, understanding the nature of such capital and how it differs across firms.

The remainder of the paper is organized as follows. In Section II., we describe the data we use in our analysis and, in particular, the process by which we merge data across different Census products. In Section III., we estimate the magnitude of movement within the internal labor markets of multi-unit firms, comparing diversified firms to a focused benchmark. In Section IV., we measure the value consequences to workers of job changes in internal and external markets and within and across industries. In Section V., we examine whether and how diversified firms exercise their real option to redeploy workers across their business units. Finally, in Section VI., we conclude.

II. Data

We use worker-, firm-, and plant-level data from the U.S. Census Bureau to investigate differences in worker mobility and compensation across firms with different organizational structures. We identify individual plants and their ultimate owners (firm), geographic locations (state and county) and industries (4-digit SIC) using the Longitudinal Business Database (LBD). The LBD covers all non-farm establishments with paid employees in the U.S. since 1976. It also provides information on plant-level employment and payroll as well as information on plant birth or closure (if any).

We retrieve individual worker-level information – including wage, gender, and age – from the

Longitudinal Employer Household Dynamics (LEHD) program. The LEHD data is constructed using administrative records collected from the state unemployment insurance (UI) system and the associated ES-202 program. It covers 96% of total wage and salary civilian jobs in the U.S. and is generally comparable from state to state. Wages reported to the state UI system include bonuses, stock options, profit distributions, the cash value of meals and lodging, tips and other gratuities in most of the states, and, in some states, employer contributions to certain deferred compensation plans such as 401(k) plans.[4] The data contain individual worker level identifiers as well as firm- and unit- identifiers. Thus, we can track workers and their wages dynamically within and across firms. The Census Bureau currently provides access to employment records from 23 states in the LEHD data through its Research Data Center (RDC). Missing data from uncovered states imposes some limitations on our analysis. First, we generally overstate unemployment rates in our sample: a worker may have a job in one quarter and not appear in the data the next due either to job loss or to migration to an uncovered state. We cannot distinguish the two possibilities. Second, we cannot observe the entire labor force or all internal worker movement for firms which operate in both covered and uncovered states. Most of our analysis concerns changes in wages, rather than unemployment. As long as the factors affecting the decision of the state to opt into or out of the LEHD program are orthogonal to the determinants of (changes in) wages, our estimates should not suffer from selection bias.[5] Moreover, the within-sample rate of migration to a new covered state – even following plant closure – is low (approximately 2.5%). Thus, the potential impact of unobserved migration on our analysis is likely to be small.

We make several adjustments to the reported wages for our analysis. We use the quarterly consumer price index to compute real quarterly wages in beginning-of-1990 dollars. We also aggregate quarterly wages into annual real wages. Because of annual bonuses and other predictable seasonal variation, quarterly wages may not provide an accurate reflection of the worker's earnings and quarterly wage changes may not reflect real changes to the compensation contract. Thus, in any given quarter, we compute annual real wages for the preceding

[4] See http://www.bls.gov/cew/cewfaq.htm for additional details.

[5] This is likely to be the case as often the constraint which prevents the Census from making data available to researchers is pre-existing state laws.

year as the mean real wage over the prior four quarters multiplied by four. We also require at least three consecutive quarters of wage data to include the quarter in the sample and use only interior quarters in the computation. The latter restriction is necessary since the first or last quarter's wage reflects payment for an unobserved fraction of the quarter. Finally, we exclude workers younger than 16 or who earn less than $10,000 from our analysis. We identify the manager of the unit (firm) quarter-by-quarter as the worker with the highest wage in the unit (firm).

Within the LEHD data, we can identify firms using tax reporting units: federal employer identification numbers (EINs), state employer identification numbers (SEINs), and state reporting "units" (SEINUNITs). State laws require firms to file quarterly reports which link individual workers to each of their SEINs. Thus, we can track worker movement across SEINs over time. However, firms are only required to report aggregate employment and payroll information for SEINUNITs. Though it is possible to impute the SEINUNIT for each worker[6], we conduct much of our analysis at the SEIN level to minimize measurement error.

One limitation of the LEHD data is that tax reporting units do not necessarily correspond to physical business locations (or "plants"). We use plant-level information from the LBD to identify multi-unit firms (i.e. firms operating multiple plants) and to measure firm-level diversification. We construct a Herfindahl index of employment within all of the 2-digit SIC codes associated with the firm. We also use the LBD to identify plant closures. When we conduct analysis at the plant level, we restrict the sample to plants with at least 50 employees to prevent our sample from being dominated by very small private ventures. We use Compustat to measure industry-level valuations. We define industry Q as the median of the market value of assets scaled by the book value of assets within each 2-digit SIC code.[7]

Because both Census data sources include firms' EINs, it is relatively straightforward to merge firm-level information from the LBD to the worker-level information in the LEHD data. How-

[6] The Census Bureau has several imputation algorithms which make these assignments by, e.g., matching as closely as possible the sum of allocated workers and wages to the reported aggregates and by minimizing the distance between worker residence and work locations. We do not observe data on worker home addresses.

[7] Market value of assets is the book value of assets (data 6) plus the difference between market and book equity. Market equity is the fiscal year closing stock price (data 199) times common shares outstanding (data 25). Book equity is common equity (data 60) plus deferred taxes (data74).

ever, due to the distinction between plants and tax reporting units, it is not generally possible to assign individual workers uniquely to LBD plants.[8] We link workers to their LBD plants for a subset of plants as follows: If the firm only operates a single plant, it is trivial to link the firm's workers to the plant using the EIN. If the plant is part of a multi-unit firm, we first determine whether the plant is the firm's only one within its state, county, and four-digit SIC code. If so, we determine which of the firm's employees work at the plant using the Census Bureau's Business Register Bridge (BRB). The BRB links the LEHD data and the LBD at various levels of aggregation. The finest partition is at the EIN, state, county, and four-digit SIC code level. When the BRB allows data from the two sources to be merged at this level, it means that all workers from the LEHD within the partition match to all LBD plants within the partition. Thus, when we add the additional restriction that the LBD plant is unique within the partition, we achieve a match of individual workers to a unique plant. The BRB file linking the LEHD data to the LBD by EIN, state, county, and four-digit SIC is available from 1992 to 2001. However, the LEHD wage data is available through the first quarter of 2004. Thus, we can track the outcomes of workers for (at least) 2 full years following a job change.

Though this algorithm allows us to create a subsample of plant-worker matched observations, the subsample does not generally include all of the plants of large multi-unit firms. To measure worker flows within (and across) firms, we follow two strategies. First, we conduct analysis at the SEIN level, measuring worker movement using changes in the worker's SEIN of employment. Using this approach, we can perfectly identify job changes in external labor markets (using EIN changes). However, we understate the amount of worker movement within the firm since each SEIN of a multi-unit firm generally encompasses several plants. As an alternative strategy, we consider the subset of our plant-worker matched data which come from closing plants. Because the plant closes, we know each of these workers must move to a new job. We can separate the workers who move to a new firm from those who move to another plant within the firm by observing the SEIN (and EIN) of employment in the quarter following closure. An added advantage of this approach is that we measure differences in the outcomes of workers separately

[8] The numbers of plants and tax reporting units for a particular firm are generally unrelated. In some cases, the number of plants exceeds the number of tax reporting units; however, in other cases, the opposite is true.

from the endogenous choice to search for a new job.[9]

In Table 1, we provide plant-level summary statistics of the data. In Panel A, we provide summary statistics for a random sample of plants from the LBD between 1993 and 2001. The average plant has 194 workers and a payroll of $6.83 million. 58% of plants are part of multi-unit firms and 42% are part of firms which operate in at least two distinct 2-digit SIC codes. In Panel B, we see that plants from multi-unit firms do not have significantly larger employment (mean = 202), but have larger payrolls (mean=$7.59 million). 55% of the plants come from the 23 states covered by the LEHD data.

We also consider a random sample of closing plants from the LBD over the same time period. Relative to the average plant, closing plants appear to be smaller (mean employment = 188) and have smaller payrolls (mean = $5.3 million). Only half come from multi-unit firms, but the fraction from diversified firms is similar to the overall sample (39%). There are no obvious regional patterns in closure rates, but we observe a clear spike in closures in the recession year of 2001.

Finally, we provide summary statistics for the subset of closing plants we can match to individual workers in the LEHD data. One consequence of our restriction to plants which are unique within their firm, county, and 4-digit SIC is that plants are significantly less likely to be part of multi-unit firms (15%). However, conditional on being part of a multi-unit firm, the fraction of plants which are part of a diversified firm is 69%, which is similar to the overall LBD sample (71%) and only slightly lower than the LBD closure sample (79%). Matched sample plants are also smaller than the typical LBD (closing) plant, both among single- and multi-unit firms. In the full matched sample, mean employment is 134 and mean payroll is $2.33 million. The matched sample also significantly undersamples the Northeast, most likely due to the exclusion of New York from the LEHD universe. Surprisingly, we do not observe a large spike in closures in 2001, as in the random LBD sample.

[9] We impose two additional conditions in linking workers (and SEINUNITs) from the LEHD data to closing plants from the LBD. First, we require that the SEINUNIT(s) to which we link the closing plant disappear from the LEHD data in the LBD-identified closing year or within the first three quarters of the following year. Second, we consider workers who are employed in the closing plant two quarters prior to the last quarter the SEINUNIT appears in the LEHD data. Workers may begin to exit a dying plant in the months preceding closure. To the extent that such exit is not random, it may bias our estimates of ex post wages and employment outcomes if we consider only the workers remaining at the closing date.

In Table 2, we provide summary statistics at the worker level. In Panel A, we present statistics for a random sample of LEHD data worker-quarters. The average worker is 41 years old with 3.36 years of tenure in the SEIN. Women make up 46% of the workforce. 10% of the workforce is Black, 4% Asian, 9% Hispanic, and 5% other non-white. The mean annual wage is $34,660. Workers in multi-unit firms earn higher mean wages, particularly in diversified firms (mean single-unit = $30,613; mean focused multi-unit = $33,527; mean diversified = $37,121).

In Panel B, we provide summary statistics for the workers in the LBD – LEHD matched sample of closing plants. The mean worker is one year younger and women make up only 41% of the workforce. Most noticeably, mean wages are smaller ($29,933), likely reflecting the smaller plant size in the matched sample (Table 1). The pattern in mean wages across firms with different organizational structures is also less pronounced in this sample. Because we can only identify individual workers in "isolated" plants, the multi-unit firms in our sample may be less diverse or complex than unmatched firms. If so, our results may understate the impact of such structures on the opportunity sets of workers and on-going investment in human capital.

III. Internal Labor Markets and Corporate Diversification

We begin by quantifying the amount of movement in the internal labor markets of firms in our random sample of workers from the LEHD data. Does the possibility of moving among the firm's units increase the frequency with which workers in diversified firms change jobs? To answer this question, we track each worker over time, using the LEHD data to identify the SEINs and two-digit SICs in which s/he works. Since we focus much of our analysis on annual wages, we track job changes at the annual frequency. For 137,193 of the 251,440 workers, we observe a non-missing SEIN four quarters in the future. We partition this set of workers into three groups: (1) workers who continue in the same SEIN and firm (LBD firmid), (2) workers who change firms, and (3) workers who change SEINs, but remain in the same firm. The remaining 45% of workers fall in one of three categories: (1) They are unemployed. (2) They change jobs, but move to a state not covered by the LEHD data. Or, (3), they change jobs, but move to a firm which we cannot link across the LBD and the LEHD data. Though we cannot

differentiate between the latter set of outcomes, we do not see any difference in the proportion of workers from multi-unit (or diversified) firms between the full sample and the subsample of workers for whom we observe future employment. Thus, we focus on the latter set of workers to measure difference in outcomes for workers in firms with different organizational structures.

Of the 137,193 workers for whom we observe employment in both quarter $t-2$ and $t+4$,[10] 18,033 (13%) change LBD firmids. Of these workers, 13,055 (72%) also switch SEINs. In the remaining cases, the change in firmid is due to corporate restructuring rather than worker movement between different job locations. In our analysis, we focus on the former set of workers, for whom there is a clear job change. Controlling for firm and worker characteristics, we do not find significant differences across multi- and single-unit firms in the rate of employee exit; nor do we see significant differences across focused and diversified multi-units, where diversification is indicated by operations in at least two distinct 2-digit SIC codes.

We find evidence of active internal labor markets in multi-unit firms. Of the 89,099 workers who remain in the same multi-unit firm from quarter t-2 to t+4, 3,964 (4.5%) move to a different unit (i.e. to a different SEIN within the same LBD firmid). This frequency understates the true degree of internal movement since SEINs can consist of many individual plants. In Table III, we provide information on which workers within a firm are active in the internal labor market. We report the results of logit regressions in which the binary dependent variable indicates that a worker moved to a new SEIN within the same firm during the next calendar year. We restrict the sample to workers in multi-unit firms who do not leave the firm from quarter t-2 to t+4.[11] As independent variables, we include the natural logarithm of employment in the worker's SEIN as well as two measures of internal opportunities: the number of distinct units in the firm and the natural logarithm of the average employment per firm unit. We also include a number of worker characteristics: the natural logarithms of annualized wage, age, and tenure in the SEIN and indicator variables for SEIN managers (defined as the worker with highest pay in the SEIN), women, Black workers, Hispanic workers, Asian workers, and

[10] We use quarter t-2 rather than quarter t to be consistent with the assumptions we use in the closing sample. See footnote 9.

[11] The restriction to workers in multi-unit firms is important as it assures that all workers are employed in firms which have an internal labor market. Practically, the resriction ensures the same sample in our pooled and fixed-effects logit specifications.

other minority workers.[12] We also include state, industry, and year fixed effects. In Column 1, we report the estimates from this baseline specification. All standard errors are adjusted for firm-level clustering. We find that higher wage workers are significantly more likely to move to a different firm unit. The likelihood of changing divisions is not significantly different among managers than the rate predicted by their (high) wages. We also see that younger workers and workers with less tenure within the unit are significantly more likely to move. Finally, internal moves are more likely in firms with more plants. In Column 2, we add firm fixed effects to the specification. Thus, we compare the likelihood of moving to a new unit only among workers who are part of the same LBD firmid. We again find that younger workers and higher wage workers are more likely to be active in the internal labor market; however, tenure no longer has a significant impact. Thus the impact of tenure in Column 1 appears to reflect a cross-sectional relation between firms: workers in firms with more active internal labor markets have shorter tenures in their units. Overall, these basic patterns are consistent with internal labor markets as a mechanism by which workers advance to more attractive positions. Then, it is natural to explore the relation between diversification and the allocation of human capital, since diversification inherently expands the internal opportunities of a firm's workforce.

In Column 3, we add an indicator for firm diversification (operation in at least two distinct 2-digit SIC codes) to the Column 1 specification. Because diversification is a firm-level characteristic, we do not include firm fixed effects in this specification.[13] We find that workers in diversified firms are particularly likely to switch units, relative to their counterparts in focused firms. Economically, the odds of a worker in a diversified firm changing units are 1.91 times as high as the odds for a worker in a focused firm. The estimate is statistically significant at the 1% level. We also test whether the activity in internal labor market increases with the degree of diversification. We construct a firm-level Herfindahl index of employment across the 2-digit SIC codes in which the firm operates. We then define three indicator variables to capture increasing degrees of diversification: (1) $0.75 \leq \text{Herfindahl} < 1$, (2) $0.5 \leq \text{Herfindahl} < 0.75$,

[12] In the LEHD data, tenure is left-truncated. That is, we do not know how long workers have been with their firms prior to the beginning of our data sample.

[13] It is possible for a firm to become diversified (or focused) during the sample period by undergoing restructuring. However, such changes are rare and the variation within this subset of firms – which are likely to be relatively small – is of the least interest in our context.

and (3) Herfindahl < 0.5. Focused firms (the benchmark subsample) have Herfindahl indices equal to 1. In Column 4, we replace the diversification indicator with these three indicators of the degree of diversification. We find an increasing impact of the likelihood of changing units as diversification increases. The odds among the most diversified firms are 2.31 times higher than in focused firms, an effect that is significantly different from the impact of the two lower degrees of diversification.

Ultimately, it is difficult to completely disentangle the impact of firm size and diversification in this context since all of the largest firms are diversified. Thus, we also ask the degree to which extra movement in the internal labor markets of diversified firms comes from workers who switch between industries, since the capacity to make such changes is a unique feature of these markets. We find that movement to units in different 2-digit SIC codes accounts for just over 20% of the job changes in the internal labor markets of diversified firms. We also examine whether these job changes augment or substitute for industry changes in external labor markets. We run a logit regression on the sample of multi-unit workers who move to a new firm (LBD firmid).[14] The dependent variable indicates a change in 2-digit SIC code between the old and new firms. We include the same independent variables as in Column 3 of Table III. We do not find significant differences in the rate at which workers who leave diversified and focused firms switch to new industries, economically or statistically. Thus, internal labor markets in diversified firms appear to facilitate additional changes in the allocation of human capital across industries.

Our evidence thus far suggests an important relation between internal worker opportunities and corporate diversification. From the perspective of the diversified firm, internal labor markets can create value in a number of ways. First, heightened internal opportunities may allow the firm to attract (and retain) higher quality workers. Second, greater internal opportunities, particularly if there are frictions in external labor markets, can heighten worker incentives, both to exert effort and to invest in improving their human capital. For example, workers may be more likely to put in extra hours or to take advantage of company-sponsored training programs if they perceive a greater chance of advancing to a more attractive position inside the

[14] We also require a change in the worker's SEIN, since a change in LBD firmid without an SEIN change is likely to indicate an ownership change at the unit-level rather than a true job change for the worker.

firm. Finally, a firm operating in different lines of business has a real option to redeploy workers from industries with weak opportunities to industries with stronger opportunities, analogous to the role of internal capital markets in allocating scarce cash resources across investment opportunities. If the supply of external labor can be scarce or costly, then this option may be exercised. In all cases, the functioning of active internal labor markets may partially explain the higher total factor productivity of diversified firms in the cross-section.

IV. Diversification and Wages

Our analysis suggests that workers in diversified firms enjoy greater opportunities than their counterparts in focused firms. Next, we examine differences in the wage paths of workers in the two types of firm. To begin, we examine cross-sectional differences in wages in our full sample of 251,440 worker-years. In Column 1 of Table IV, we estimate a standard wage regression. The dependent variable is the natural logarithm of the annualized wage. As independent variables, we include the natural logarithms of worker age and tenure, four separate race indicators (Black, Hispanic, Asian, and other minority), and indicator variables for managers and women. We also include the natural logarithm of employment in the worker's SEIN, the number of plants in the firm, and an indicator for multi-unit firms.[15] We include fixed effects for state, year, and 2-digit SIC codes and we cluster standard errors at the firm-level. The results in our sample conform to the usual patterns in the literature. More experienced workers earn higher wages (age, tenure). Workers in larger units and in firms with multiple plants also earn higher wages (Oi and Idson (1999)). We also estimate a significant gender wage gap of 28%. This estimate is in line with Altonji and Black (1999) who report a 22% gap using data from the March 1996 Current Population Survey (which falls within our sample period).

In Column 2, we add an indicator for firm diversification to the regression. We find that workers in diversified firms earn a 5.7% premium over workers in other firms. In Column 3, we add the three indicators for degrees of diversification from Section III. in lieu of the simple diversification indicator. We find that worker wages appear to increase with diversification,

[15] Both the multi-unit indicator and the number of plants are computed using information from the LBD. Plants are LBDNUM under the firm's LBD firmid. Multi-unit firms have more than one plant.

even controlling for plant size and the number of plants in the firm.

In Columns 4 to 6, we add a control for the natural logarithm of aggregate firm employment (across all plants) to the Columns 1 through 3 specifications. In Column 5, we see that this additional control for firm size picks up about half of the effect of diversification from Column 2. However, the impact of diversification remains statistically significant and, in Column 6, we continue to see an increase in the wage premium with the degree of diversification. Given the correlation of diversification and firm size – most notably that all of the largest firms are diversified under the Column 2 definition – we take additional steps to separate the effects to the greatest degree possible. The reported estimates in Columns 4 to 6 appear to be the lower bounds of the effect of diversification: We find no additional loss of explanatory power if we include the square of firm size (as the sole additional control or in addition to the squares of the number of plants and plant size) or if we control for size less parametrically by including, for example, dummies for each decile of the size distribution. Thus, we conclude that workers in diversified firms indeed enjoy a wage premium relative to peers in focused firms.

Schoar (2002) proposes rent dissipation through higher wage payments to workers as a value-destroying consequence of corporate diversification. She provides evidence of larger aggregate wage bills in diversified firms and, in particular, higher "supplementary labor costs." However, the lack of worker-level data makes the interpretation of these differences unclear. Moreover, it is unclear to what degree the estimates of supplementary labor costs, like fringe benefits, can be attributed to rank-and-file production workers. Our analysis thus far demonstrates that workers in diversified firms indeed receive a wage premium over workers in focused firms, even after including detailed controls for workforce composition (experience, race, gender, etc.), throughout the wage distribution. However, our results also suggest that diversification may improve worker opportunities. If so, higher wage payments do not necessarily indicate rent dissipation, particularly if the human capital of diversified workers is more transferable across firms. Higher on-going investments in human capital in such firms – e.g. by heightened participation in training programs – might have both a general and firm-specific component. In the remainder of the section, we dig deeper into the black box of the firm, examining the implications to workers from changing jobs within and across firms.

An immediate issue in measuring wage changes for workers who switch jobs is the endogeneity of the job change decision. Worker allocation across jobs is the result of both a supply and demand decision. Firms can decide which workers they prefer to employ, but workers can also choose to accept a job offer, to remain in their current jobs, or to quit and search for new employment. This is particularly problematic when comparing workers who change jobs in internal markets to workers who move to a new firm. Suppose, for example, that workers who move within the firm outperform workers who move between different firms. Such a result could arise mechanically if internal movement is largely voluntary and firm changes are due to firing. Wage changes in voluntary job changes are likely to be truncated below: workers will only change jobs if the new opportunity is more lucrative than their current job. However, wage changes for fired workers are likely to be truncated above.

We use plant closures as a way to disentangle supply- and demand-driven job changes. Thus far, we have conducted most of our analysis at the SEIN level. However, SEINs are tax reporting entities, rather than physical business locations. SEINs may disappear from the data due to purely administrative changes at the firm level (i.e. the firm reorganizes its units for the purposes of tax filings) or due to real restructuring. Moreover, SEINs typically contain several plants. Thus, a continuing SEIN may mask the closure of one or more individual plants. It is not generally possible to link individual workers from the LEHD data to specific plants from the LBD. However, for a subset of closing plants identified from the LBD, we can construct a unique link (See Section II. for details.). We measure the outcomes of workers from these plants in the year following closure. These workers have no option to remain in their current jobs and the displacement is involuntary. Moreover, it is unlikely that displacement is related to skill or performance of individual workers.[16] Thus, measured differences in the outcomes of workers across diversified and focused firms should reflect differences in the opportunities or skills of those workers rather than differences in the endogenous choice to switch jobs. In addition, workers have limited bargaining power when displaced, so it is more likely that higher wages reflect higher marginal productivity or outside options than the extraction of rents.

[16] This identifying assumption may fail for managers. Thus, we always include a control for managers in our regressions and confirm that our results are not driven by the very top of the wage distribution within the closing plant.

In Section III., we demonstrate that diversified firms have more active internal labor markets than focused firms and that internal industry switches are responsible for a portion of the difference. Next, we ask what benefits these markets confer at the worker level. To begin, we compare internal to external job changes. We also compare job changes within the same 2-digit SIC code to industry changes in both internal and external labor markets. We measure wage changes as the difference in the natural logarithm of the annualized wage in quarters t+4 and t-2, winsorized at the 1% level to remove severe outliers. From our random sample of LEHD worker-years, we consider the subsample of 96,073 workers who originate in multi-unit firms and for whom we observe the (annualized) wage, the identity of the LBD firm, and aggregate plant level employment in quarter t-2. We also consider a parallel subsample of 34,236 workers from closing plants of multi-unit firms in our matched worker-plant data which satisfy the same assumptions in quarter t+4.

In Panel A of Table V, we report results on the former sample. In Column 1, we regress wage changes on the demographic controls from Table IV: age, race, gender, tenure, and an indicator for the unit manager. We also include the natural logarithm of unit employment, the natural logarithm of firm employment, the number of firm units, and state, year, and 2-digit SIC fixed effects. A problem in interpreting regressions using the wage level as the dependent variable is that individuals with higher wages may have higher unobservable skill (i.e. human capital not captured by demographic controls). To the extent that this skill correlates with variables of interest – like movement in the internal labor market – it can make the estimates difficult to interpret. By looking at wage changes, we implicitly remove an unobserved individual effect. We also include the pre-job change wage level (in log form) to control for the impact of individual skill on wage changes. The assumption is that this wage level is a sufficient statistic for the unobserved component of human capital uncorrelated with our demographic controls. So, differences in wage changes in external and internal labor markets should not reflect differences in worker quality unless those differences are not captured either by pre-job change wages or our demographic controls. Finally, we add three controls to capture the impact of changes in firm size on individual wages: the change in the number of firm units and the changes in unit- and firm- level employment. We cluster standard errors at the firm-level.

We find that workers who change jobs in external labor markets experience a 5% reduction in wages, statistically significant at the 1% level.[17] The strongly negative estimate suggests that involuntary moves may dominate voluntary changes, even in the random sample. We observe a stark difference between job changes in external and internal labor markets: workers who change jobs within the firm obtain a significant 3% increase in wages relative to non-changers and out-perform external movers by 7.9%. The increase in relative wages is consistent with firms using internal labor markets as a mechanism to reward and promote high-performing workers. Interestingly, we do not observe any impact on worker wages when the ultimate ownership of the unit in which they work changes. In Column 2, we add SEIN fixed effects to the specification. Thus, we compare workers who move within the internal labor market of the firm to workers from the same business unit who move to a new firm. We find similar, and slightly stronger, results.

In Panel B of Table V, we re-estimate the difference between internal and external job changes, but using our sample of workers who are involuntarily displaced due to plant closure.[18] Focusing on displacement mitigates the concern that internal wage changes are less tied to workers' outside options, since workers in this sample have no option of staying in their current jobs. As a result, their bargaining power with their current firms stems from their outside options. A difference with Panel A is that all workers in the regression sample necessarily change jobs. Thus, we cannot use non-changers as the benchmark sample. Instead, we simply compare internal and external job changes. In Column 3, we confirm that workers who move to a different plant within their original firms outperform workers who move to a new firm. We estimate an 8.3% difference in wages, significant a the 1% level. In this context, the control variables are of particular interest, since they measure differences in displacement costs across groups. We see that higher wage workers experience larger displacement costs, suggesting a larger loss of firm-specific capital. Consistent with this story, older workers and workers with longer tenure in the closing plant experience larger wage losses. We also see that women as well as Black

[17] Workers who move to a new firm, by definition, change both SEINs and firmids. So, the effect on wages is the sum of the estimated coefficients on *SEIN_ Changer*, *Firm_ Changer*, and *SEIN_ Changer * Firm_ Changer*.

[18] To compare internal and external job changes, we consider only the subset of workers who are re-employed by quarter *t+4*. Note that including workers who experience unemployment before finding a new job externally only adds to the disadvantage faced by workers in external markets.

and Hispanic workers lose more wages following involuntary job loss. In Column 4, we add plant fixed effects to the regression. We confirm that workers who move within the firm outperform those who change firms, even comparing workers who originate in the same closing plant. Overall, workers who remain inside their firms are better off than workers who change jobs across firms. One potential mechanism is that the former set of workers do not forfeit accumulated firm-specific capital as part of their job changes. Workers who change firms, on the other hand, need to learn the idiosyncratic aspects of the new firm's production processes and culture.

Next, we measure the implications of switching industries, in both internal and external labor markets. The ability to switch industries without leaving the firm and forfeiting organization capital is a unique advantage of workers in diversified firms. In Panel A of Table VI, we consider again the random subsample of 96,073 workers from Table V who originate in multi-unit firms. We re-estimate the specifications from Panel A of Table V, but allow for separate wage impacts among workers who move to a new job in a different industry (2-digit SIC code). We also allow for different impacts among workers who change industries within the firm and by moving to a new firm. And, we control for (relatively rare) cases in which the unit SIC code changes as part of an ownership change of the unit. In Column 1, we include fixed effects for states, years, and 2-digit SIC codes. Strikingly, we see that the entire wage loss among workers who move to a new firm occurs among workers who move to a new industry. The workers experience a significant 6.8% wage decline relative to stayers. On the other hand, workers who change firms, but stay inside the same industry experience a relative wage decline of only 1.5%, which is statistically insignificant. We continue to see that workers who change jobs within their firms earn a wage premium relative to stayers. Interestingly, the effect is stronger among workers who move to a new industry. This result suggests that workers whose human capital is transferable across the firm's operations in different industries are particularly valuable to the firm. In Column 2, we add unit fixed effects to the specification, comparing workers from the same original unit who have different job outcomes. We find similar results. Thus, our findings cannot be explained by uncontrolled heterogeneity at the unit-level (e.g. workers in different types of units or with different types of firm-specific capital switch jobs internally versus externally). Another concern is that workers who change industries within their firms

move between different industry pairs than workers who move to a new industry in the external market. This could occur if the industries in a diversified firm are more related than randomly chosen industry pairs. For example, the skills of a worker in diversified financial conglomerate may translate from commercial banking to investment banking, but less easily to copper mining. To test whether our estimates reflect the composition of the internal labor market as opposed to differences in worker human capital, we re-estimate the regression including fixed effects for old and new 2-digit SIC pairs. Thus, we compare workers who switch between the same two industries within diversified firms and across different firms. We report the results in Column 3. We again find that (only) workers who switch industries in external markets experience wage losses relative to workers who remain in their jobs.

In Panel B, we focus on our worker-plant matched sample of 34,236 displaced workers from plants of multi-unit firms. Because all job changes in this sample are involuntary, we address the concern that the differences we see in Panel A come from differences in the rates at which workers voluntarily change jobs within and across industries. We find similar results. In Column 4, we estimate the regression specification from Column 3 of Table V, but including an indicator for workers who switch 2-digit SICs and its interaction with the indicator for workers who stay inside the firm. Displaced workers who leave the firm and switch industries experience a 10.6% relative wage decline. On the other hand, workers who remain inside the firm and switch industries are no worse off than workers who say inside both their original firm and industry. In Column 5, we add plant fixed effects to the regression. Our conclusions do not change when we compare only workers displaced from the same closing plant. Finally, in Column 6, we add fixed effects for each pair of old and new 2-digit SIC codes in the sample. By including these fixed effects, we can no longer estimate the level effect of changing industries on wages. However, our estimates of the same firm effect and the interaction of the same firm effect with the indicator for changing industries are virtually unchanged.

Our results thus far suggest that diversified firms have a distinct advantage over focused firms in the labor market. Industry changes are costly for workers. However, workers who switch industries within a diversified firm do not suffer wage losses. At the worker-level, an interesting question is whether the advantage workers enjoy in switching industries within a diversified firm

carries over to changes between those same industries in the external market. We might observe such spillovers if the internal labor market effect is due to the development of human capital with applications across the diversified firm's industries through the course of employment. For example, a computer programmer who works on tax preparation software may develop a familiarity with tax law which has value to a firm specializing in preparing customer tax returns. These sorts of opportunities may be more prevalent in diversified firms.

In Panel A of Table VII, we consider this question on our random sample of multi-unit workers. We estimate the specification from Column 1 of Table VI, but partitioning the set of external 2-digit SIC changes into moves to an SIC in which the original firm operates and moves to an SIC in which it does not. Workers who move to a new industry in which their old firm does not operate experience a strongly significant 8.5% decline in wages relative to stayers. On the other hand, workers who move to a new firm in an industry in which their old firm operates experience only a modest and statistically insignificant 1.5% decline. The difference in the two effects is significant at the 1% level. In Column 2, we replicate the estimation, but including unit fixed effects. Thus, we compare only the outcomes of workers who originate in the same unit. The results are similar. Again, a key concern is that these wage differences reflect a greater similarity in the industries between which workers in the latter group move, rather than greater flexibility of the workers in diversified firms. To address this concern, we re-estimate the regression including fixed effects for each pair of old and new 2-digit SIC codes in the sample. The results, which we present in Column 3, are qualitatively similar. In this specification, we estimate a substantially smaller, though still significant impact of external industry changes. However, moving to a new industry in which the worker's original firm operates erases essentially the entire wage loss. Thus, workers from diversified firms who switch externally between the original firm's industries outperform workers from focused firms which make the same industry switch. This suggests that our results are due to differences in the human capital of diversified workers and not to characteristics of the industry pair itself.

In Panel B, we replicate the analysis on the involuntary displacement sample. In Column 4, we perform an analysis parallel to the regression in Column 1 on the random sample. We see a similar result. Displaced workers who move to a new firm in a different industry perform worse

than workers who move to a new firm in their original industry. The relative loss is roughly 12.7% and is significant at the 1% level. On the other hand, moving to a firm in an industry in which the original (diversified) firm operates erases the vast majority of the relative wage loss. We observe a significant 9.9% difference in the wage changes between the two groups. In Column 5, we demonstrate the robustness of the results to comparing only workers who are displaced from the same plant. And, in Column 6, we add 2-digit SIC code pair fixed effects. The results are similar.[19] Thus, again, the result does not reflect greater similarity of the industries in which diversified firms operate than between the typical industry pair between which workers switch in the external market. Instead, it picks up differences in the outcomes of workers from diversified firms who make the exact same industry switch as workers outside the firm. This result is particularly hard to reconcile with a story under which higher wages in diversified firms are due to rent extraction. It is hard to see why workers displaced from diversified firms would have the ability to extract rents out of their new firms. It is also hard to reconcile with a story in which the wage difference between internal and external job changes derives from an informational advantage about worker quality in the former case.

Overall, our analysis demonstrates distinct differences between labor in diversified and focused multi-unit firms. Diversified firms have more active internal labor markets than focused firms. Those markets provide opportunities for workers to change jobs without experiencing the costs typical of job changes in external markets. This is particularly the case when workers switch industries. The greater opportunities afforded to workers in diversified firms may provide an advantage in attracting and retaining the most able workers. Moreover, workers in diversified firms appear to develop more general skills which are applicable across a wide range of industries. In the language of Lazear (2009), firm-specific capital in diversified firms puts non-zero skill weights on skills applicable across all of the industries in which the firm operates. This greater flexibility (and the resulting ability to be easily redeployed throughout the organization) is consistent with the higher wages we observe among diversified firms' workers, controlling for observable demographic characteristics. Crucially, these higher wages appear to indeed reflect higher outside options as opposed to rent dissipation by diversified firms.

[19] Note, it is difficult to make the cross-group comparison in this regression because the pair fixed effects mean that we cannot estimate the level effect of changing SICs.

V. Diversification and the Redeployment Option

In the prior sections, we have demonstrated that the active internal labor markets of diversified firms provide benefits to the firms' workers. Workers appear to accrue human capital in diversified firms that is more valuable both internally and externally. Importantly, diversified firms take advantage of the greater flexibility of their workforces, redeploying workers across the firms' lines of business. Next, we ask whether this redeployment is likely to increase firm value. This question is analogous to the question of how diversified firms allocate scarce investment resources across divisions with differing opportunities. If there are constraints in the ability to hire workers with appropriate skills in the external market, do diversified firms re-allocate workers internally to the industries with the greatest opportunities? To answer this question, it is important to isolate internal industry changes which are initiated by the firm and not the worker. Thus, we focus our attention for the remainder of the paper on our sample of workers displaced by plant closure.

To begin, we estimate the impact of expected industry growth on the likelihood that displaced workers change industries. As throughout the paper, we measure industry using 2-digit SIC codes. We consider the entire sample of displaced workers who found jobs at quarter t+4, one year after the plant closure. We estimate a logit regression with a dependent variable indicating that the worker moved to a job in a new 2-digit SIC code in the year following job loss. We include our typical worker-level controls for pre-closure wage, age, race, gender, and tenure as well as an indicator variable for the plant manager. We also control for the natural logarithms of firm and plant employment and include both an indicator for multi-unit firms and a control for the total number of plants. To proxy for expected growth in the worker's current industry, we compute the realized difference in the natural logarithm of industry Q from year t+1 to year t+3.[20] Though we use future values as an independent variable, reverse causality is not a major concern since the unit of observation is an individual worker and we measure future performance at the industry level. Finally, we include an indicator variable for firm diversification (operations in at least two distinct 2-digit SIC codes) and its interaction

[20] We use the median value of Q in the 2-digit SIC code among publicly traded firms in the Compustat universe. Thus, we implicitly assume that industry Q as measured in public firms is an appropriate proxy for industry opportunities in both the public and private firms contained in our sample.

with the expected industry growth rate of the worker's current industry.

In Column 1 of Table VIII, we report the results. We see some interesting patterns among the controls: Hispanic workers and "other minority workers" (excluding Black and Asian workers) are significantly less likely to switch industries. Older workers, high wage workers, and longer tenured workers are also less likely to switch industries. On the other hand, women and managers are particularly likely to switch industries. The latter effect is strong economically and statistically and runs counter to the general impact of higher wages. Interestingly, we do not observe a significant relation between the expected trend in industry value and the likelihood that the worker switches industries in general. However, we see that workers in diversified firms are significantly more likely to switch industries when the expected growth rate of their current industry is low. Because the logit regression is nonlinear, the coefficient estimate on *Chg_ Q * Diversified* is not a measure of the interaction effect. We compute the marginal effect of the interaction on the probability of switching industries at the mean of the independent variables to be a significant 0.19. Thus, it appears that diversified firms facilitate the movement of workers out of industries which are expected to decline, relative to external markets.

Workers may trade off the costs of moving against the costs of switching industries. Thus, in Column 2, we include two additional controls to capture differences across workers on this margin: the natural logarithm of the number of plants in the same county and 2-digit SIC code as the worker's closing plant and an indicator for whether the worker was born in the state in which the closing plant is located. We do not find a material effect on the results. We also ask whether the effect is particularly strong among workers who switch industries within the diversified firm. Though the point estimate does indeed appear to be stronger among such workers, we do not estimate a statistically significant difference from the rate at which workers from diversified firms exit the declining industry in the external market.

Next, we ask whether diversified firms retain and re-deploy their workers when the returns to doing so are likely to be high. We consider only the subsample of displaced workers who originate in a diversified firm. We run a logit regression with a dependent variable indicating that the worker moved to a new job within the same diversified firm. As controls, we include our

usual indicators for race, gender, and managers together with continuous controls for worker age, tenure and pre-closure wage. We also include our usual set of firm size controls: the number of plants and the natural logarithms of plant and firm employment. We construct a measure of the future opportunities within the firm by considering the firm's industry portfolio. We compute an employee-weighted average of industry Q across the industries in which the firm still operates in the year following the plant closure and include it as an independent variable.[21] In Column 3 of Table VIII, we report the results. We find that firms are significantly more likely to retain workers inside the firm when their future opportunities are strong. In Column 4, we again add a control for whether the worker is native to the state and for the number of local plants in the worker's industry. Perhaps surprisingly, the latter control has a positive effect on the probability the worker stays inside the firm. However, the impact of weighted average industry Q is virtually unchanged. We compute the marginal effect on the probability of staying in the firm at the mean of the independent variables, finding significant estimates of 0.11 and 0.10 in Columns 3 and 4, respectively. Together with our findings from Columns 1 and 2, our results suggest that diversified firms play an important role (relative to the external labor market) in re-deploying workers from declining to expanding industries.

As a final step, we consider the impact of diversification on the allocation of workers across industries. We use the pattern of industry changes between 2-digit SIC codes among workers in focused firms as a benchmark. We then partition industry changes among workers in diversified firms into two groups: moves to industries in which the workers' original firms operate and moves to industries not spanned by their original firms. We aggregate, industry by industry, the number of workers in the former group as a fraction of the total number of workers in diversified firms who switch industries. We then aggregate across industries in which the diversified firms operate the difference between the fraction of workers who moved to the industry and the focused firm benchmark. We also restrict our attention to industry transitions which occur for at least five workers. We find that the difference is statistically significant, with a t-statistic of 2.68 (Table IX). Thus, diversified firms appear to shift the distribution of workers toward

[21] To reduce the noise in the measure, we restrict our attention to the firm's top five industries by employment. These five industries contain more than 99.6% of the total firm payroll. For the subset of firms with more than 20 SIC codes, the percentage is roughly 84%.

industries in which they operate (relative to the choices made by workers in focused firms).

If the effect is due solely to the more active internal labor markets in diversified firms, it is not particularly surprising. To see whether this is the case, we re-do the t-test, but including only industry changes among workers in diversified firms which occur in the external market. That is, we exclude internal industry changes from the comparison. We again find that industry changes among workers in diversified firms are significantly skewed toward the industries in which the diversified firm operates. This result is consistent with our finding in Table VII that workers suffer smaller wage losses when they move to such industries. Thus, there appears to be a spillover from the experience workers obtain in a diversified firm to their future career choices, even when those choices take them outside the diversified firm. Overall, diversified firms not only re-deploy workers from declining to expanding industries internally, but also facilitate broader movements of workers to industries in which their labor has a higher marginal return.

VI. Conclusion

We use a unique approach which combines worker-firm matched data from the U.S. Census Bureau's LEHD program with plant- and firm-level data from the LBD and valuation data from Compustat to look inside the black box of internal labor markets. We compare the labor allocation decisions of diversified and focused firms. Our results suggest that diversification provides an advantage to the firm through the ability to redeploy labor in response to changing industry opportunities.

First, we see that internal labor markets are significantly more active in diversified firms than focused firms, controlling for firm and plant size. We also find that the increased opportunities afforded to workers by diversified firms increase worker welfare. Workers in diversified firms earn a premium in the cross-section, controlling for various demographic and firm characteristics. And, the premium is consistent with the accumulation of general skills with value across the firm's industry portfolio. Using involuntary displacement due to plant closure as a way to disentangle firm- and worker-driven job changes, we find that workers who change jobs internally significantly outperform workers who leave their firms. We also find that workers

change industries within diversified firms without a significant loss in wages, while the entirety of the wage losses from changing jobs externally accrues to workers who change industries. Consistent with the human capital interpretation, workers who leave a diversified firm, but move to a new industry in which their former firm operates experience only a modest wage loss, significantly less than workers who move to an entirely new industry. Finally, we confirm that redeployment benefits not just the workers, but is also consistent with value maximization. We find that workers who switch industries in diversified firms are more likely to leave industries with declining opportunities. In addition, diversified firms are more likely to retain workers following plant closure when the future opportunities of their remaining segments are high.

Overall, our results complement existing research on the internal capital markets of diversified firms. A substantial body of research suggests that "dark side" theories of internal capital markets dominate empirically: diversified firms appear to engage in socialistic allocation of capital towards struggling divisions. Yet, there is evidence in the literature that diversified firms are more productive than focused firms in the cross-section. Our results provide one possible reconciliation of these results. An important and relatively unexplored mechanism through which diversification can improve productivity is the ability to redeploy workers internally to their most productive use. Our evidence suggests that diversified firms indeed take advantage of these opportunities. Thus, our results suggest more nuance is needed with regards to the value implications of diversification. Even if internal capital markets sometimes misallocate resources, there may be an offsetting benefit from the ability to redirect labor in response to changing industry conditions. Moreover, smaller capital reallocations towards industries with good opportunities does not necessarily indicate "socialistic redistribution" of resources.

Our analysis focuses on industry changes as a key difference between the internal labor markets of diversified and focused firms. An interesting question is whether internal labor markets of diversified and focused firms also differ in the way they move employees vertically through the firm's hierarchy. In our dataset, we do not observe the titles of workers inside the firm. However, it is possible to identify the individual plant which serves as corporate headquarters (Giroud (2010)) and also to identify managers of units (and, in some cases, plants) using wage

information. Thus, a careful analysis of this issue may be a fruitful avenue for future research.

Another important issue is the degree to which changes in firm structure lead to changes in internal labor market conditions. In ongoing research, we examine the labor market choices of firms which make diversifying acquisitions relative to firms which make focused acquisitions or choose not to grow by acquisition. An added advantage of this context is that the acquisition event – at least for public acquirers – provides the opportunity for direct measurement of the value consequences of different strategies for the firms in question. Overall, the newly-available firm-worker data from the Census Bureau provides important opportunities to deepen our understanding of the impact of different organizational structures on the operations of the firm and, ultimately, what factors matter in determining firm boundaries.

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Table I
Summary Statistics: Plant Level

Panel A reports summary statistics of all closing plants in the LBD, a random sample of non-closing plants from the LBD, and the subsample of closing plants from the LBD that we match with worekr-level data from the LEHD program. Panel B reports the corresponding statistics for the subsamples of plants from multi-unit firms. We define multi-unit firms as firms which operate at least two distinct plants. Standard errors are reported in parantheses for continuous variables.

	Panel A: All Firms			Panel B: Multi-Unit Firms Only		
	Closing Plants in the LBD (N=143,370)	Random Plants in the LBD (N=655,929)	Closing Plants in the LBD Matched with the LEHD (N=12,439)	Closing Plants in the LBD (N=70,811)	Random Plants in the LBD (N=383,238)	Closing Plants in the LBD Matched with the LEHD (N=1,850)
Plant Employees	188	194	134	187	202	142
	(647)	(514)	(292)	(565)	(473)	(224)
Firm Employees	22,084	25,765	4,780	44,521	43,968	31,379
	(57,124)	(83,464)	(26,992)	(74,912)	(105,480)	(63,789)
Annual Payroll ($000's)	$5,299	$6,830	$2,333	$6,676	$7,590	$3,703
	($66,606)	($383,230)	($6,709)	($92,809)	($178,102)	($9,611)
% of Multi-Unit Firms	0.49	0.58	0.15			
% of Diversified Firms	0.39	0.42	0.10	0.79	0.71	0.69
Industry Distribution						
SIC = 1	0.03	0.03	0.06	0.02	0.02	
SIC = 2	0.05	0.06	0.05	0.08	0.09	
SIC = 3	0.05	0.07	0.04	0.09	0.10	
SIC = 4	0.05	0.04	0.03	0.08	0.08	N/A*
SIC = 5	0.18	0.20	0.19	0.30	0.36	
SIC = 6	0.06	0.04	0.03	0.10	0.07	
SIC = 7	0.13	0.09	0.16	0.18	0.13	
SIC = 8	0.11	0.14	0.09	0.13	0.15	
Geographic Distribution						
LEHD State	0.57	0.55	.	0.57	0.55	.
Region = NE	0.28	0.28	0.08	0.22	0.21	0.09
Region = MW	0.27	0.32	0.16	0.22	0.25	0.18
Region = S	0.31	0.29	0.23	0.25	0.24	0.26
Region = SW	0.16	0.15	0.19	0.12	0.12	0.19
Region = W	0.21	0.19	0.29	0.15	0.14	0.22
Region = RM	0.04	0.05	0.05	0.03	0.04	0.06
Yearly Distribution						
Year = 1994	0.08	0.10	0.08	0.07	0.10	0.05
Year = 1995	0.08	0.11	0.10	0.08	0.10	0.07
Year = 1996	0.11	0.11	0.12	0.11	0.11	0.13
Year = 1997	0.10	0.11	0.09	0.10	0.11	0.07
Year = 1998	0.11	0.11	0.13	0.11	0.12	0.12
Year = 1999	0.12	0.12	0.12	0.14	0.12	0.10
Year = 2000	0.12	0.12	0.14	0.13	0.12	0.22
Year = 2001	0.21	0.12	0.14	0.17	0.12	0.17

*Some industries have a limited number of firms. Due to potential disclosure risk, we cannot report the industry distribution for this subsample.

Table II
Summary Statistics: Worker Level

Panel A reports summary statistics for a random sample of workers from the LEHD data. Panel B reports summary statistics for workers matched to closing plants in the LBD. We report statistics for the overall sample and for the subsmples of worker from single-unit firms, multi-unit focused firms, and multi-unit diversified firms. We define multi-unit firms as firms which operate at least two distinct plants and diversified firms as firms which operate in more than one two-digit SIC code. Standard errors are reported in parantheses for continuous variables.

Panel A: Random Workers in the LEHD

	Full Sample (N=251,440)	Single-Unit Firms (N=63,173)	Multi-Unit Focused Firms (N=34,042)	Multi-Unit Diversified Firms (N =154,225)
Annual Wage	$34,999	$30,613	$33,527	$37,121
	(92,402)	(64,364)	(93,173)	(101,461)
Age	41.33	42.59	40.06	41.09
	(11.10)	(11.28)	(11.30)	(10.94)
Tenure (in yrs)	3.36	3.49	3.17	3.34
	(2.61)	(2.68)	(2.52)	(2.59)
Education (in yrs)	13.79	13.89	13.73	13.76
	(2.60)	(2.60)	(2.63)	(2.59)
% of Female	0.46	0.51	0.49	0.43
Race = Black	0.10	0.10	0.10	0.10
Race = Asian	0.04	0.03	0.04	0.04
Race = Hispanic	0.09	0.10	0.09	0.08
Race = Other	0.05	0.05	0.06	0.05
% of Foreigner	0.14	0.14	0.15	0.14

Panel B: Closing Workers in the LEHD

	Full Sample (N=461,449)	Single-Unit Firms (N=395,338)	Multi-Unit Focused Firms (N=15,947)	Multi-Unit Diversified Firms (N = 50,137)
Annual Wage	$29,933	$29,751	$28,642	$31,781
	(54,517)	(56,278)	(33,666)	(44,897)
Age	39.68	39.53	39.59	40.89
	(11.43)	(11.47)	(11.53)	(10.99)
Tenure (in yrs)	2.57	2.52	2.69	2.96
	(2.20)	(2.18)	(2.51)	(2.17)
Education (in yrs)	13.66	13.64	13.64	13.82
	(2.66)	(2.67)	(2.60)	(2.60)
% of Female	0.41	0.41	0.42	0.41
Race = Black	0.10	0.10	0.13	0.11
Race = Asian	0.04	0.04	0.05	0.04
Race = Hispanic	0.12	0.13	0.10	0.09
Race = Other	0.06	0.06	0.05	0.05
% of Foreigner	0.19	0.19	0.18	0.15

Table III
Internal Job Changes

Logit regressions with coefficient estimates presented as log odds ratios. The sample consists of a random draw of workers from multi-unit firms in the LEHD data who work for the same firm in consecutive firm-years. We define multi-unit firms as firms which operate at least two distinct plants. The dependent variable is an indicator variable (SEIN_Changer) equal to one if the worker moves to a different SEIN within the firm and zero otherwise. Ln(Wage) is the natural log of the annualized wage. Ln(Age) is the natural log of worker age. Female is an indicator variable that equals to one for female workers and zero otherwise. Ln(Tenure) is the natural log of the number of quarters that a worker has spent in the SEIN. Mananger is an indicator variable equal to one for the highest paid employee in the SEIN and zero otherwise. N_plants is the number of plants owned by the firm. Ln(PlantEmp) is the natural log of aggregate SEIN employment. Ln(AvgPlantEmp) is the natural log of the average aggregate employment among the firm's plants. Diversified is an indicator variable equal to one for firms that operate in at least two distinct two-digit SIC codes. Diversified_1, Diversified_2 and Diversified_3 are indicator variables equal to one for firms with Herfindahl indices of employment across two-digit SICs greater than 0.75, between 0.5 and 0.75, and less than 0.5, respectively. All standard errors are clustered at the firm level and are reported in parentheses. *, **, and *** represent significance at 10%, 5%, and 1% level, respectively.

Dependent Variable: SEIN_Changer

	(1)	(2)	(3)	(4)
Ln(Wage)	0.224 ***	0.176 ***	0.212 ***	0.202 ***
	(0.043)	(0.047)	(0.043)	(0.043)
Ln(Age)	-0.406 ***	-0.658 ***	-0.413 ***	-0.425 ***
	(0.081)	(0.086)	(0.082)	(0.083)
Race = Black	-0.124 **	-0.077	-0.130 **	-0.128 **
	(0.061)	(0.060)	(0.061)	(0.061)
Race = Asian	0.026	0.070	0.029	0.029
	(0.096)	(0.107)	(0.097)	(0.097)
Race = Hispanic	-0.131	-0.121	-0.128	-0.123
	(0.087)	(0.094)	(0.087)	(0.087)
Race = Other Minorities	-0.010	0.021	-0.007	-0.006
	(0.070)	(0.075)	(0.070)	(0.071)
Female	0.002	-0.055	-0.002	-0.005
	(0.047)	(0.050)	(0.047)	(0.047)
Ln(Tenure)	-0.206 ***	0.036	-0.201 ***	-0.198 ***
	(0.034)	(0.047)	(0.034)	(0.034)
Manager	0.106	-0.078	0.110	0.132
	(0.253)	(0.411)	(0.257)	(0.257)
N_Plants	0.000 ***	0.000	0.000 ***	0.000 ***
	(0.000)	(0.000)	(0.000)	(0.000)
Ln(PlantEmp)	-0.034	-0.243 ***	-0.062 **	-0.062 **
	(0.028)	(0.040)	(0.030)	(0.029)
Ln(AvgPlantEmp)	0.043	-0.467 ***	0.059	0.065
	(0.039)	(0.147)	(0.041)	(0.041)
Diversified			***0.651*** ***	
			(0.119)	
Diversified_1				***0.585*** ***
				(0.128)
Diversified_2				***0.606*** ***
				(0.135)
Diversified_3				***0.840*** ***
				(0.129)
State Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
SEIN Fixed Effects		Yes		
R-Squared	0.045	0.045	0.049	0.05
N	89099	48315	89099	89099

Table IV

Wages in Focused and Diversified Firms

OLS regressions on a random sample of workers from the LEHD data. The dependent variable is the natural log of the annualized wage. Ln(Age) is the natural log of the worker's age. Female is an indicator variable that equals one for female workers and zero otherwise. Ln(Tenure) is the natural log of the number of quarters that a worker has spent in the SEIN. Mananger is an indicator variable equal to one for the highest paid employee in the SEIN and zero otherwise. N_plants is the number of plants owned by the firm. Ln(PlantEmp) is the natural log of aggregate SEIN employment. Ln(FirmEmp) is the natural log of aggregate firm employment. Diversified is an indicator variable equal to one for firms that operate in at least two distinct two-digit SIC codes. Diversified_1, Diversified_2 and Diversified_3 are indicator variables equal to one for firms with Herfindahl indices of employment across two-digit SICs greater than 0.75, between 0.5 and 0.75, and less than 0.5, respectively. All standard erros are clustered at the firm level and are reported in parentheses. *, **, and *** represent significance at 10%, 5%, and 1% level, respectively.

Dependent Variable: Ln(Wage)	(1)	(2)	(3)	(4)	(5)	(6)
Ln(Age)	0.314 ***	0.313 ***	0.310 ***	0.311 ***	0.311 ***	0.309 ***
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
Race = Black	-0.215 ***	-0.214 ***	-0.214 ***	-0.216 ***	-0.216 ***	-0.215 ***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Race = Asian	-0.069 ***	-0.069 ***	-0.068 ***	-0.068 ***	-0.067 ***	-0.067 ***
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
Race = Hispanic	-0.307 ***	-0.306 ***	-0.304 ***	-0.304 ***	-0.304 ***	-0.303 ***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Race = Others	-0.047 ***	-0.047 ***	-0.046 ***	-0.046 ***	-0.046 ***	-0.045 ***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Female	-0.280 ***	-0.280 ***	-0.279 ***	-0.280 ***	-0.279 ***	-0.279 ***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Ln(Tenure)	0.078 ***	0.078 ***	0.078 ***	0.080 ***	0.080 ***	0.080 ***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Manager	1.037 ***	1.037 ***	1.040 ***	1.023 ***	1.024 ***	1.029 ***
	(0.026)	(0.026)	(0.026)	(0.027)	(0.027)	(0.026)
N_Plants	0.000	0.000	0.000	0.000 **	0.000 **	0.000 **
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Ln(PlantEmp)	0.036 ***	0.034 ***	0.034 ***	0.016 ***	0.017 ***	0.021 ***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Ln(FirmEmp)				0.027 ***	0.025 ***	0.020 ***
				(0.003)	(0.003)	(0.003)
Multi-Unit	0.066 ***	0.025 ***	0.020 **	0.018 ***	0.006	0.005
	(0.006)	(0.008)	(0.008)	(0.007)	(0.008)	(0.008)
Diversified		0.057 ***			0.021 **	
		(0.008)			(0.009)	
Diversified_1			0.026 ***			0.001
			(0.010)			(0.010)
Diversified_2			0.067 ***			0.042 ***
			(0.011)			(0.011)
Diversified_3			0.121 ***			0.079 ***
			(0.012)			(0.013)
State Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
R-Squared	0.297	0.298	0.300	0.300	0.300	0.302
N	251440	251440	251440	251440	251440	251440

Table V
Wage Changes: Internal and External Job Changes

The table reports coefficient estimates from OLS regressions. Panel A reports results on a random sample of workers in multi-unit firms from the LEHD data. Panel B reports results on a sample of workers in closing plants of multi-unit firms. Plant closures are identified using the LBD and the sample is restricted to closing plants which uniquely link to the LEHD data. The dependent variable is the change of annualized wage from quarter (t-2) to (t+4). t is a random quarter in Panel A and is the last quarter prior to plant closure in Panel B. Ln(Wage) is the natural log of the annualized wage. Ln(Age) is the natural log of the worker's age. Female is an indicator variable that equals one for female workers and zero otherwise. Ln(Tenure) is the natural log of the number of quarters that a worker has spent in the SEIN. Mananger is an indicator variable equal to one for the highest paid employee in the SEIN and zero otherwise. N_plants is the number of plants owned by the firm, divided by 100. Ln(PlantEmp) is the natural log of aggregate SEIN employment in Panel A and plant employment in Panel B. Ln(FirmEmp) is the natural log of aggregate firm employment. Chg(N_Plants), Chg(PlantEmp), and Chg(FirmEmp) capture the difference between the old and new firm in number of plants and plant employment, respectively. Diversified is an indicator variable equal to one for firms that operate in at least two distinct two-digit SIC codes. SEIN_Changer is an indicator variable that equals one if the worker changes jobs (SEINs) within the firm and zero otherwise. Firm_Changer is an indicator variable that equals one if moves to a new firm (fimrid) and zero otherwise. For workers in closing plants (Panel B), Same_Firm is an indicator variable that equals one if the worker is retained within the firm (firmid) and zero otherwise. All independent variables except Chg(N_Plants) and Chg(Plant_Emp) are measured at t-2. Plant fixed effects are for SEINs in Panel A and plants in Panel B. All standard errors are clustered at the firm level and are reported in parentheses. *, **, and *** represent significance at 10%, 5%, and 1% level, respectively.

	Panel A: Random Sample		Panel B: Closure Sample	
	(1)	(2)	(3)	(4)
Ln(Wage)	-0.097 ***	-0.139 ***	-0.103 ***	-0.123 ***
	(0.004)	(0.006)	(0.010)	(0.012)
Ln(Age)	-0.041 ***	-0.018 ***	-0.112 ***	-0.094 ***
	(0.004)	(0.006)	(0.011)	(0.010)
Race = Black	-0.030 ***	-0.034 ***	-0.045 ***	-0.044 ***
	(0.003)	(0.004)	(0.008)	(0.007)
Race = Asian	-0.005	-0.011 *	0.003	0.003
	(0.004)	(0.006)	(0.016)	(0.011)
Race = Hispanic	-0.047 ***	-0.038 ***	-0.024 ***	-0.027 ***
	(0.004)	(0.005)	(0.008)	(0.008)
Race = Other Minorities	0.004	0.008 *	-0.012	-0.016 **
	(0.003)	(0.004)	(0.008)	(0.008)
Female	-0.045 ***	-0.057 ***	-0.038 ***	-0.048 ***
	(0.002)	(0.003)	(0.006)	(0.006)
Ln(Tenure)	-0.009 ***	-0.006 ***	-0.012 **	-0.015 ***
	(0.001)	(0.002)	(0.005)	(0.005)
Manager	0.119 ***	0.263 ***	0.015	0.047 **
	(0.020)	(0.049)	(0.023)	(0.024)
N_Plants	0.000 **	-0.001 **	-0.004 ***	
	(0.000)	(0.000)	(0.001)	
Ln(PlantEmp)	0.002 **	-0.040 ***	-0.002	
	(0.001)	(0.007)	(0.008)	
Ln(FirmEmp)	0.004 ***	0.008 ***	0.010 **	
	(0.001)	(0.004)	(0.004)	
Chg (N_Plants)	0.000 **	0.000 *	0.000 ***	0.000 ***
	(0.000)	(0.000)	(0.000)	(0.000)
Chg (PlantEmp)	0.001	0.001	-0.003 ***	-0.004
	(0.002)	(0.002)	(0.005)	(0.006)
Chg (FirmEmp)	0.005 ***	0.004 *	0.019 ***	0.021 ***
	(0.001)	(0.002)	(0.003)	(0.003)
Diversified	0.003	0.005	0.008	
	(0.003)	(0.008)	(0.014)	
SEIN_Changer	***0.030 ******	***0.037 ******		
	(0.006)	(0.008)		
Same_Firm			***0.083 ******	***0.069 ******
			(0.012)	(0.018)
SEIN_Changer * Firm_Changer	***-0.079 ******	***-0.089 ******		
	(0.009)	(0.130)		
Firm_Changer	0.000	0.005		
	(0.004)	(0.008)		
State Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Plant Fixed Effects		Yes		Yes
R-Square	0.061	0.339	0.089	0.167
N	96073	96073	34236	34236

Table VI
Wage Changes: Changes in SIC

The table reports estimated coefficents from OLS regressions. Panel A reports results on a random sample of workers in multi-unit firms from the LEHD data. Panel B reports results on a sample of workers in closing plants of multi-unit firms. Plant closures are identified using the LBD and the sample is restricted to closing plants which uniquely link to the LEHD data. The dependent variable is the change of annualized wage from quarter (t-2) to (t+4). t is a random quarter in Panel A and is the last quarter prior to plant closure in Panel B. Ln(Wage) is the natural log of the annualized wage. Ln(Age) is the natural log of the worker's age. Female is an indicator variable that equals one for female workers and zero otherwise. Ln(Tenure) is the natural log of the number of quarters that a worker has spent in the SEIN. Mananger is an indicator variable equal to one for the highest paid employee in the SEIN and zero otherwise. N_plants is the number of plants owned by the firm, divided by 100. Ln(PlantEmp) is the natural log of aggregate SEIN employment in Panel A and plant employment in Panel B. Ln(FirmEmp) is the natural log of aggregate firm employment. Chg(N_Plants), Chg(PlantEmp), and Chg(FirmEmp) capture the difference between the old and new firm in number of plants and plant employment, respectively. Diversified is an indicator variable equal to one for firms that operate in at least two distinct two-digit SIC codes. SEIN_Changer is an indicator variable that equals one if the worker changes jobs (SEINs) within the firm and zero otherwise. Firm_Changer is an indicator variable that equals one if moves to a new firm (fimrid) and zero otherwise. For workers in closing plants (Panel B), Same_Firm is an indicator variable that equals one if the worker is retained within the firm (firmid) and zero otherwise. D_DIFSIC is an indicator variable that equals to 1 if the job in quarter t+4 has a different SIC than the job in quarter t-2 and zero otherwise. All independent variables except Chg(N_Plants) and Chg(Plant_Emp) are measured at t-2. Plant fixed effects are for SEINs in Panel A and plants in Panel B. All standard errors are clustered at the firm level and are reported in parentheses. *, **, and *** represent significance at 10%, 5%, and 1% level, respectively.

	Panel A: Random Sample			Panel B: Closure Sample		
	(1)	(2)	(3)	(4)	(5)	(6)
Ln(Wage)	-0.097 ***	-0.140 ***	-0.098 ***	-0.106 ***	-0.128 ***	-0.114 ***
	(0.004)	(0.006)	(0.004)	(0.009)	(0.011)	(0.009)
Ln(Age)	-0.042 ***	-0.018 ***	-0.039 ***	-0.121 ***	-0.100 ***	-0.110 ***
	(0.004)	(0.006)	(0.004)	(0.010)	(0.010)	(0.009)
Race = Black	-0.030 ***	-0.034 ***	-0.030 ***	-0.046 ***	-0.044 ***	-0.035 ***
	(0.003)	(0.004)	(0.003)	(0.008)	(0.007)	(0.007)
Race = Asian	-0.005	-0.011 *	-0.007 *	0.000	-0.001	-0.004
	(0.004)	(0.006)	(0.004)	(0.015)	(0.011)	(0.016)
Race = Hispanic	-0.047 ***	-0.038 ***	-0.047 ***	-0.027 ***	-0.029 ***	-0.030 ***
	(0.004)	(0.005)	(0.004)	(0.008)	(0.008)	(0.008)
Race = Other Minorities	0.004	0.008 *	0.005	-0.015 *	-0.018 **	-0.018 **
	(0.003)	(0.004)	(0.003)	(0.008)	(0.008)	(0.008)
Female	-0.045 ***	-0.057 ***	-0.044 ***	-0.037 ***	-0.047 ***	-0.032 ***
	(0.002)	(0.003)	(0.002)	(0.006)	(0.006)	(0.005)
Ln(Tenure)	-0.009 ***	-0.006 ***	-0.009 ***	-0.018 ***	-0.019 ***	-0.018 ***
	(0.001)	(0.002)	(0.001)	(0.005)	(0.005)	(0.005)
Manager	0.120 ***	0.265 ***	0.117 ***	0.012	0.047 *	0.023
	(0.020)	(0.049)	(0.021)	(0.023)	(0.024)	(0.022)
N_Plants	0.000 **	-0.001 **	0.000 *	-0.003 ***		-0.003 **
	(0.000)	(0.000)	(0.000)	(0.001)		(0.001)
Ln(PlantEmp)	0.002 **	-0.040 ***	0.003 **	-0.005		-0.006
	(0.001)	(0.007)	(0.001)	(0.007)		(0.007)
Ln(FirmEmp)	0.004 ***	0.008 **	0.004 ***	0.011 ***		0.013 ***
	(0.001)	(0.004)	(0.001)	(0.004)		(0.004)
Chg (N_Plants)	0.000 **	0.000 *	0.000	0.000 ***	0.000 ***	0.000 ***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)
Chg (PlantEmp)	0.001	0.001	0.006 ***	-0.003	-0.006	-0.004
	(0.002)	(0.002)	(0.001)	(0.003)	(0.004)	(0.003)
Chg (FirmEmp)	0.004 ***	0.003	0.004 ***	0.018 ***	0.020 ***	0.016 ***
	(0.001)	(0.002)	(0.001)	(0.002)	(0.002)	(0.002)
Diversified	0.003	0.005	0.003	0.003		-0.016
	(0.003)	(0.008)	(0.003)	(0.012)		(0.012)
D_DIFSIC	***0.003***	***-0.007***		***-0.106 ******	***-0.097 ******	
	(0.006)	(0.009)		(0.018)	(0.023)	
SEIN_Changer	***0.023 ******	***0.031 ******	***0.028 ******			
	(0.006)	(0.010)	(0.006)			
SEIN_Changer * D_DIFSIC	***0.030 ** **	***0.039 ** **	***0.026 * **			
	(0.013)	(0.019)	(0.015)			
Same_Firm				***0.027 * **	***0.004***	***0.028 ** **
				(0.016)	(0.027)	(0.014)
Same_Firm * D_DIFSIC				***0.104 ******	***0.091 ** **	***0.076 * **
				(0.031)	(0.045)	(0.043)
SEIN_Changer * Firm_Changer	***-0.037 ******	***-0.043 ******	***-0.037 ******			
	(0.010)	(0.015)	(0.010)			
SEIN_Changer * Firm_Changer * D_DIFSIC	***-0.118 ******	***-0.135 ******	***-0.083 ** **			
	(0.032)	(0.044)	(0.034)			
Firm_Changer	-0.001	0.005	-0.002			
	(0.004)	(0.007)	(0.005)			
Firm_Changer * D_DIFSIC	0.032	0.043	0.049 *			
	(0.029)	(0.037)	(0.029)			
State Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes		Yes	Yes	
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Plant Fixed Effects		Yes			Yes	
SIC Pair Fixed Effects			Yes			Yes
R-Squared	0.062	0.340	0.119	0.104	0.176	0.260
N	96073	96073	96073	34236	34236	34236

Table VII
Wage Changes: Moves to SICs in which Old Firm Operates

The table reports estimated coefficents from OLS regressions. Panel A reports results on a random sample of workers in multi-unit firms from the LEHD data. Panel B reports results on a sample of workers in closing plants of multi-unit firms. Plant closures are identified using the LBD and the sample is restricted to closing plants which uniquely link to the LEHD data. The dependent variable is the change of annualized wage from quarter (t-2) to (t+4). t is a random quarter in Panel A and is the last quarter prior to plant closure in Panel B. Ln(Wage) is the natural log of the annualized wage. Ln(Age) is the natural log of the worker's age. Female is an indicator variable that equals one for female workers and zero otherwise. Ln(Tenure) is the natural log of the number of quarters that a worker has spent in the SEIN. Mananger is an indicator variable equal to one for the highest paid employee in the SEIN and zero otherwise. N_plants is the number of plants owned by the firm, divided by 100. Ln(PlantEmp) is the natural log of aggregate SEIN employment in Panel A and plant employment in Panel B. Ln(FirmEmp) is the natural log of aggregate firm employment. Chg(N_Plants), Chg(PlantEmp), and Chg(FirmEmp) capture the difference between the old and new firm in number of plants and plant employment, respectively. Diversified is an indicator variable equal to one for firms that operate in at least two distinct two-digit SIC codes. SEIN_Changer is an indicator variable that equals one if the worker changes jobs (SEINs) within the firm and zero otherwise. Firm_Changer is an indicator variable that equals one if moves to a new firm (fimrid) and zero otherwise. For workers in closing plants (Panel B), Same_Firm is an indicator variable that equals one if the worker is retained within the firm (firmid) and zero otherwise. D_DIFSIC is an indicator variable that equals to 1 if the job in quarter t+4 has a different SIC than the job in quarter t-2 and zero otherwise. Firm_SIC is an indicator variable equal to one if the SIC of the (new) job in quarter t+4 is an SIC in which the worker's quarter t-2 firm operates and zero otherwise. All independent variables except Chg(N_Plants) and Chg(Plant_Emp) are measured at t-2. Plant fixed effects are for SEINs in Panel A and plants in Panel B. All standard errors are clustered at the firm level and are reported in parentheses. *, **, and *** represent significance at 10%, 5%, and 1% level, respectively.

	Panel A: Random Sample			Panel B: Closure Sample		
	(1)	(2)	(3)	(4)	(5)	(6)
Ln(Wage)	-0.098 ***	-0.140 ***	-0.098 ***	-0.109 ***	-0.130 ***	-0.114 ***
	(0.004)	(0.006)	(0.004)	(0.009)	(0.009)	(0.009)
Ln(Age)	-0.042 ***	-0.018 ***	-0.039 ***	-0.121 ***	-0.101 ***	-0.110 ***
	(0.004)	(0.006)	(0.004)	(0.010)	(0.010)	(0.009)
Race = Black	-0.030 ***	-0.034 ***	-0.030 ***	-0.045 ***	-0.044 ***	-0.035 ***
	(0.003)	(0.004)	(0.003)	(0.008)	(0.007)	(0.007)
Race = Asian	-0.006	-0.012 **	-0.007 *	0.003	0.000	-0.003
	(0.004)	(0.006)	(0.004)	(0.014)	(0.011)	(0.016)
Race = Hispanic	-0.047 ***	-0.038 ***	-0.047 ***	-0.028 ***	-0.029 ***	-0.030 ***
	(0.004)	(0.005)	(0.004)	(0.008)	(0.007)	(0.008)
Race = Other Minorities	0.004	0.008 *	0.005	-0.016 **	-0.019 **	-0.018 **
	(0.003)	(0.004)	(0.003)	(0.008)	(0.008)	(0.008)
Female	-0.045 ***	-0.057 ***	-0.044 ***	-0.038 ***	-0.047 ***	-0.032 ***
	(0.002)	(0.003)	(0.002)	(0.006)	(0.006)	(0.005)
Ln(Tenure)	-0.009 ***	-0.006 ***	-0.009 ***	-0.018 ***	-0.020 ***	-0.018 ***
	(0.001)	(0.002)	(0.001)	(0.005)	(0.005)	(0.005)
Manager	0.119 ***	0.266 ***	0.117 ***	0.015	0.049 **	0.023
	(0.020)	(0.049)	(0.021)	(0.023)	(0.024)	(0.022)
N_Plants	0.000 **	-0.001 **	0.000 *	-0.003 ***		-0.003 ***
	(0.000)	(0.000)	(0.000)	(0.001)		(0.001)
Ln(PlantEmp)	0.003 **	-0.040 ***	0.003 **	-0.002		-0.006
	(0.001)	(0.007)	(0.001)	(0.007)		(0.007)
Ln(FirmEmp)	0.004 ***	0.008 **	0.004 ***	0.008 **		0.012 ***
	(0.001)	(0.004)	(0.001)	(0.004)		(0.004)
Chg (N_Plants)	0.000 **	0.000	0.000	0.000 ***	0.000 ***	0.000 ***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Chg (PlantEmp)	0.002	0.001	0.006 ***	-0.002	-0.005	-0.004
	(0.002)	(0.002)	(0.001)	(0.003)	(0.004)	(0.003)
Chg (FirmEmp)	0.004	0.003	0.004 ***	0.018 ***	0.020 ***	0.017 ***
	(0.001)	(0.002)	(0.001)	(0.002)	(0.002)	(0.002)
Diversified	0.003	0.005	0.003	-0.004		-0.017
	(0.003)	(0.008)	(0.003)	(0.013)		(0.012)
D_DIFSIC	0.003	-0.007		***-0.127 ******	***-0.118 ******	
	(0.006)	(0.009)		(0.021)	(0.027)	
SEIN_Changer	***0.023 ******	***0.031 ******	***0.028 ******			
	(0.006)	(0.010)	(0.006)			
SEIN_Changer * D_DIFSIC	***0.030 *****	***0.038 *****	***0.026 ****			
	(0.013)	(0.019)	(0.015)			
Same_Firm				0.031 **	0.010	0.029 **
				(0.016)	(0.026)	(0.014)
Same_Firm * D_DIFSIC				0.044	0.047	0.063
				(0.030)	(0.043)	(0.043)
D_DIFSIC * Firm_SIC				***0.099 ******	***0.095 ******	***0.038 *****
				(0.017)	(0.019)	(0.017)
Firm_Changer	-0.001	0.005	-0.003			
	(0.004)	(0.007)	(0.005)			
Firm_Changer * D_DIFSIC	0.032	0.043	0.049 *			
	(0.029)	(0.037)	(0.029)			
Firm_Changer * SEIN_Changer	-0.037 ***	-0.043 ***	-0.036 ***			
	(0.010)	(0.015)	(0.010)			
Firm_Changer * SEIN_Changer * D_DIFSIC	***-0.135 ******	***-0.153 ******	***-0.096 ******			
	(0.032)	(0.045)	(0.035)			
Firm_Changer * SEIN_Changer * D_DIFSIC * Firm_SIC	***0.070 ******	***0.069 ******	***0.031 *****			
	(0.013)	(0.018)	(0.014)			
State Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes		Yes	Yes	
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Plant Fixed Effects		Yes			Yes	
SIC Pair Fixed Effects			Yes			Yes
R-Squared	0.063	0.341	0.119	0.109	0.180	0.260
N	96073	96073	96073	34236	34236	34236

Table VIII
Labor Redeployment

Logit regressions with coefficient estimates presented as log odds ratios. In columns (1) and (2), the sample consists of workers in closing plants and the dependent variable is an indicator variable (D_DIFSIC) which equals one if the new job in quarter t+4 is in a different two-digit SIC from the lost job. Plant closures are identified using the LBD and the sample is restricted to closing plants which uniquely link to the LEHD data. In Columns (2) and (3), the sample consists only of workers in closing plants that are part of a diversified firm. The dependent variable is an indicator variable (Same_Firm) which equals one if the worker remains in the same firm after the plant closure and zero otherwise. Ln(Wage) is the natural log of the annualized wage. Ln(Age) is the natural log of the worker's age. Female is an indicator variable that equals one for female workers and zero otherwise. Ln(Tenure) is the natural log of the number of quarters that a worker has spent in the SEIN. Mananger is an indicator variable equal to one for the highest paid employee in the SEIN and zero otherwise. N_plants is the number of plants owned by the firm, divided by 100. Ln(PlantEmp) is the natural log of aggregate plant employment. Ln(FirmEmp) is the natural log of aggregate firm employment. Diversified is an indicator variable equal to one for firms that operate in at least two distinct two-digit SIC codes. Chg_Q is the change of industry-median Tobin's q of the closing plants over the two years following the closure. Firm_Q is the weighted average of industry-median q based on payroll for the remaining plants of the firm. Ln(# of Firms in CT&SIC2) is the natural log of the number of firms that exist in the same industry (based on 2-digit SIC codes) and county as the closing plant. Native to State is an indicator variable which equals one if the worker was born in the state in which the closing plant is located. The standard errors are clustered at the firm level and are reported in parentheses. *, **, and *** represent significance at 10%, 5%, and 1% level, respectively.

	D_DIFSIC		Same_Firm	
	(1)	(2)	(3)	(4)
Ln(Wage)	-0.260 ***	-0.252 ***	0.526 ***	0.482 ***
	(0.038)	(0.038)	(0.157)	(0.157)
Ln(Age)	-0.465 ***	-0.465 ***	0.259 *	0.277 **
	(0.035)	(0.036)	(0.135)	(0.134)
Race = Black	0.039	0.049	0.012	-0.057
	(0.036)	(0.036)	(0.153)	(0.154)
Race = Asian	-0.078	-0.066	0.467 ***	0.359 **
	(0.057)	(0.054)	(0.175)	(0.173)
Race = Hispanic	-0.093 **	-0.082 **	0.279 **	0.134
	(0.036)	(0.033)	(0.113)	(0.106)
Race = Other Minorities	-0.085 ***	-0.078 ***	0.200	0.150
	(0.027)	(0.027)	(0.100)	(0.095)
Female	0.036	0.038 *	0.163 **	0.174 **
	(0.023)	(0.023)	(0.077)	(0.080)
Ln(Tenure)	-0.234 ***	-0.236 ***	0.071	0.083
	(0.020)	(0.020)	(0.095)	(0.094)
Manager	0.214 ***	0.207 ***	-0.432	-0.382
	(0.047)	(0.047)	(0.296)	(0.299)
N_Plants	0.011	0.011	0.011	0.018
	(0.010)	(0.010)	(0.023)	(0.023)
Ln(PlantEmp)	-0.246 ***	-0.247 ***	0.429 ***	0.556 ***
	(0.048)	(0.048)	(0.148)	(0.149)
Ln(FirmEmp)	0.031	0.032	-0.114	-0.164
	(0.040)	(0.041)	(0.111)	(0.117)
Multi-Unit	0.311 **	0.313 **		
	(0.138)	(0.138)		
Diversified	0.067	0.059		
	(0.179)	(0.179)		
Chg_Q	0.083	0.082		
	(0.128)	(0.128)		
Chg_Q * Diversified	***-1.008 ******	***-1.008 ******		
	(0.456)	(0.455)		
Firm_Q			***1.388 ******	***1.314 ******
			(0.645)	(0.614)
Native to State		0.002		-0.093
		(0.016)		(0.059)
Ln(# of Firms in CT & SIC2)		-0.023		0.425 ***
		(0.022)		(0.158)
State Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
R-Squared	0.113	0.113	0.381	0.392
N	342477	342477	24974	24974

Table IX
Industry Migration

This table presents the results of t-tests comparing industry migration patterns for workers in closing plants. We use the subsample of workers who move to a different industry (based on 2-digit SIC) following plant closure. Within a diversified firm (i.e., operating in multiple industries based on 2-digit SIC codes), we calculate the percentage of workers moving from their previous industry to all other industries in which the firm operates (Pct_Diversified). Then, we compute the percentage of the same combination for workers from focused firms (Pct_Focused). We only include observations (Firm * Old SIC * New SIC) if there are more than five workers in the Firm * Old SIC combination. Panel A presents t-tests for the overall sample. Panel B presents t-tests including only workers who move to new firms in the diversified sample. N is the number of Old SIC - New SIC combinations included in the computation.

Panel A: Overall Sample

	Mean	Std. Error	N
Pct_Diversified	8.35%	0.61%	574
Pct_Focused	6.69%	0.36%	574
Difference	1.66%		
T-Stat	2.685		
p-value	(0.008)		

Panel B: External Job Changes Only

	Mean	Std. Error	N
Pct_Diversified	8.01%	0.61%	562
Pct_Focused	6.69%	0.36%	562
Difference	1.32%		
T-Stat	2.2682		
p-value	(0.024)		