Employee Spinoffs and Other Entrants: Stylized Facts from Brazil*

Oana T. Hirakawa†
UC San Diego

Marc-Andreas Muendler¶
UC San Diego, Princeton University, CESifo and NBER

James E. Rauch‡
UC San Diego and NBER

June 1, 2009

Abstract

Using a comprehensive linked employer-employee database from Brazil for the period 1995-2001, we are able for the first time to compare firms founded as employee spinoffs to new firms without parents and to diversification ventures of existing firms entering a new industry. Employee spinoffs are defined either as the director/manager having moved from a parent in the same industry or as one-quarter of the employees having shifted from a common parent. Depending on definition, employee spinoffs account for between one-sixth and one-third of the new firms in Brazil's private sector during this period. Regardless of definition, size at entry is larger for employee spinoffs than for new firms without parents but smaller than for diversification ventures of existing firms. Similarly, exit rates for employee spinoffs are less than for new firms without parents and comparable to those for diversification ventures of existing firms. These results suggest that we can think of some part of a firm's productivity draw in the Jovanovic (1982) model as embodied in the firm's employees and portable by them to a new firm.

Keywords: Employee spinoffs; entrepreneurship; firm performance; labor turnover

JEL Classification: L26, L25, J21

*We acknowledge support from the World Bank with gratitude. Muendler also acknowledges NSF support (SES-0550699) with gratitude.

†otocoian@ucsd.edu (*econ.ucsd.edu/∼otocoian*).

¶muendler@ucsd.edu (*www.econ.ucsd.edu/muendler*).

‡jrauch@weber.ucsd.edu (*weber.ucsd.edu/∼jrauch/*), corresponding author. Ph: +1 (858) 534-2405.

1 Introduction

Where do new firms come from? One answer is from other firms: firms lose employees, who spin off to form their own businesses. Employee spinoffs have been found to be a major source of new firms in widely varying contexts. According to the 1992 Economic Census of the United States (Bureau of the Census 1997, p. 86), 45.1 percent of non-minority male business owners "previously worked for a business whose goods/services were similar to those provided by the [current] business." Also for the United States, Cooper (1985, p. 77) reports that 60-70 percent of new full-time businesses and about 85 percent of technically oriented firms serve similar markets or utilize similar technologies as the organizations which the entrepreneurs had left. Bhidé (2000, p. 54) reports that 71 percent of the firms in the Inc 500 (a list of young fast-growing firms) were founded by entrepreneurs who "replicated or modified an idea encountered through previous employment." Rona-Tas (1997, Table 2) finds that in 1993-4 most of the CEOs at top privately founded (not privatized) firms in Hungary and the Czech Republic had been high or middle managers in state-owned firms in 1988. Finally, Elkan (1988, p. 174) states that a "survey of the hundred or so largest Nigerian industrial businesses in 1975 reported that 68 percent had been founded by former employees of expatriate firms."

It is difficult to ascertain how important are employee spinoffs on the basis of these studies. The studies either use unrepresentative samples of new firms or do not use precise criteria to define employee spinoffs. In this paper we will, for the first time, (1) compute the share of employee spinoffs in a representative sample of new firms using precise and replicable criteria, and (2) compare basic indicators of their performance to those of other entrants. For (2) we follow the classic work of Dunne, Roberts and Samuelson (1988) and examine firm entry size and exit rates relative to both new firms that are not spinoffs and existing firms entering new industries. Dunne et al. used U.S. data and did not distinguish spinoffs from other new firms. We use Brazilian data because they allow more reliable identification of employee spinoffs.

Employee spinoffs are of special interest because they raise important policy issues, especially in a less developed country context. Should an employee spinoff be allowed to compete with the former employer? Employers may be discouraged from entry or from investing in the human capital of their employees if they cannot prevent their employees from starting competing businesses or "stealing" their clients. In more developed countries, a potential solution to this dilemma is for employees to sign covenants not to compete with their employers, which they must buy out if they wish to spin off. If bargaining is efficient, they will buy out these contracts when their spinoffs yield efficiency gains, thereby reimbursing employers for their human capital investments and still realizing the benefits to the economy of competition and growth. In less developed countries, however, employees are likely to be liquidity-constrained. At the other extreme, such contracts between employers and employees may not be enforced at all.

Before we know whether such policy issues deserve priority for further study, we need

to know the quantitative importance of employee spinoffs. Our results for Brazil during the period 1995-2001 are that, depending on spinoff definition, employee spinoffs account for around one-sixth of new firms with salaried management and for one-third of new firms with five or more employees—excluding those new firms with state ownership, cooperatives, any type of holding company, and foreign subsidiaries. Regardless of spinoff definition, size at entry for employee spinoffs is larger than for new firms without parents but smaller than for diversification ventures of existing firms. Similarly, exit rates for employee spinoffs are less than for new firms without parents and comparable to those for diversification ventures of existing firms. These results suggest that we can think of some part of a firm's productivity draw in the Jovanovic (1982) and Hopenhayn (1992) models as embodied in the firm's employees and portable by them to a new firm.

Section 2 provides an overview of the literatures on employee spinoffs and divestitures. Section 3 describes the data source. Section 4 introduces our classification of new firms into employee spinoffs, divestitures and other types. Section 5 presents comparative statistics on employee spinoffs and other new firms. Section 6 documents the performance of employee spinoffs over time, relative to other types of new firms. Section 7 concludes. The Appendix provides details on the data source and the empirical implementation of definitions.

2 Related Literature

Employee spinoffs in the high-tech sector have attracted most theoretical and empirical attention. One branch of the literature asks why employees spin off. A popular answer is that employees may have private information about technological discoveries they make in the course of their employment at incumbent firms, and may want to leave the company to exploit these promising discoveries because various agency costs impede employees from contracting with their firms to develop discoveries (Anton and Yao 1995, Wiggins 1995). Another answer is that incumbents may be slow to pursue technological innovations made by employees because of organizational difficulties, compelling employees to leave the company to commercialize on their own. Such organizational difficulties can arise when the innovations require incumbents to significantly alter their business approaches (Henderson and Clark 1990), when incumbents do not possess the competencies required to pursue the innovations (Tushman and Anderson 1986), or when the innovations appeal to new users of a product but not to current customers of incumbents (Christensen 1993).

More recently, this branch of the literature has broadened beyond the focus on technological innovations. Klepper and Sleeper (2005) and Franco and Filson (2006) argue that employees may simply want to exploit knowledge they learned during their employment to become competitors with their former employers. Rauch and Watson (2003) model the case where the knowledge exploited by employees is the needs and preferences of their former employers' clients, whom they "steal" when they establish their own firms. Chatterjee and Rossi-Hansberg (2007) consider the thesis that the value of a discovery may be partly private

information so that existing firms cannot compensate employees internally for the full value of their idea and employees with high-value discoveries found spinoffs. Employees need not go into competition with their former employers, however. "Vertical" spinoffs are also possible, in which employees who manage production of inputs within their firms become external suppliers of these same inputs—a version of the "make or buy" decision in which the employee rather than the employer (or the employee in consultation with the employer) decides on external versus internal supply (Rauch 2008).

Another branch of this literature investigates the performance of high-tech spinoffs. In particular, spinoffs are compared to new plants of parents with the idea that new plants of existing firms exploit employees' innovations in house. Parents or "incumbents" may have some advantages of scale, scope, tax, or information that will allow them to commercialize a discovery made by employees more profitably than a new firm started by employees (Klepper 2001). Complementary assets of incumbent firms such as production capabilities, sales channels and marketing capabilities may be crucial to bring innovations to the market quickly and successfully (Teece 1986). On the other hand, spinoffs are free from "organizational inertia" that incumbents might possess, and which can prevent incumbents from adjusting to a new environment (Hannan and Freeman 1984, Henderson and Clark 1990). New plants of incumbent firms are more likely to inherit established processes and routines of their parent firms, which may prevent them from acting quickly, especially when the industry they enter is rapidly changing. In this regard, the models of Anton and Yao (1995) and Wiggins (1995) suggest that the innovations commercialized by spinoffs are more likely to be path-breaking or to be opening new submarkets. If that conjecture is correct, spinoffs may show greater success than new plants of incumbents.

Again, the branch of the literature on performance has broadened more recently. As the focus has moved away from high-tech spinoffs so that possession of a technological innovation is not required to start a new firm, spinoffs have been compared to other new firms rather than to new plants of existing firms. Cabral and Wang (2008) have a model and evidence from the automobile industry showing that spinoffs from surviving firms are superior to other new firms because the spinoffs are self-selected from all employees for entrepreneurial talent, whereas spinoffs from dying firms are negatively selected (at least relative to spinoffs from surviving firms) because all employees are looking to "jump ship" regardless of entrepreneurial ability. Hvide (2005) argued and presented evidence that spinoffs from large firms should be positively selected relative to spinoffs from small firms, because small firms can accurately recognize and reward employee ideas whereas large firms can only offer a higher wage, leading employees with the very best ideas to leave and start their own firms.

A separate literature analyzes divestitures and corporate spinouts. In contrast to an employee-initiated spinoff, a divestiture is a management-initiated new firm. Common forms of divestitures are corporate spinouts into standalone firms, or new firms that emerge as the results of parent firms' mergers and acquisitions, or new firms from a splitup of the parent firm into separate companies through equity transfers. Similar to the literature on employee spinoffs, one branch of the divestiture literature asks why firms divest. Cusatis, Miles

and Woolridge (1993) argue that divestitures help a parent firm restructure and save cost by alleviating the management's span-of-control problem when companies grow large. Krishnaswami and Subramaniam (1999) emphasize that a splitup of parent-firm divisions into separate companies resolves informational asymmetries between investors and managers about the profitability of individual divisions. Chemmanur and Yan (2004) point out that divestitures shrink the parent firm so that a takeover by outsiders becomes more likely, serving to discipline the incumbent management and thus improving parent-firm performance. Also similar to the literature on employee spinoffs, a branch of the divestiture literature compares performance. Cusatis et al. (1993) document that, in addition to abnormal positive stock returns for the parent firm on the divestiture announcement date, both divestitures and their parents experience significantly positive abnormal returns for up to three years after announcement. Nandy and Chemmanur (2005) use large U.S. plant panel data, combined with stock return data for their firms, and document that productivity improves at the parents' plants and, to a lesser degree, at the divested plants upon divestiture, compared to plants at firms with no divestiture.

In this paper we will not be concerned with the "why" of employee spinoffs, but as we mentioned in the introduction we will study the spinoffs' performance relative to diversifying plants of incumbents and relative to other new firms, including divestitures. We cover all sectors, not just high-tech, and attempt to establish basic empirical regularities rather than test any of the hypotheses regarding performance that we just described.

3 Data

We adopt a workforce-based definition of spinoffs and use employer-reported occupations. We study Brazilian data, where detailed occupational codes are available.[1] Our data derive from the linked employer-employee records RAIS (*Relação Anual de Informações Sociais* of the Brazilian labor ministry *MTE*), which record comprehensive individual employee information on occupations, demographic characteristics and earnings, along with employer identifiers. By Brazilian law, every private or public-sector employer must report this information every year.[2] De Negri, Furtado, Souza and Arbache (1998) compare labor force

[1]To our knowledge, occupational information is currently neither available in the U.S. Longitudinal Research Database (LRD) nor in the Longitudinal Employer-Household Dynamics (LEHD) data base. In LEHD, educational information on the workforce is imputed by census tract. The reason for imputation is that U.S. unemployment insurance records, on which the employer-employee link is based state by state, do not typically offer educational information. But occupational information has not been imputed to date.

[2]RAIS primarily provides information to a federal wage supplement program (*Abono Salarial*), by which every employee with formal employment during the calendar year receives the equivalent of a monthly minimum wage. RAIS records are then shared across government agencies. An employer's failure to report complete workforce information can, in principle, result in fines proportional to the workforce size, but fines are rarely issued. In practice, employees and employers have strong incentives to ascertain complete RAIS records because payment of the annual public wage supplement is exclusively based on RAIS. The ministry of labor estimates that well above 90 percent of all formally employed individuals in Brazil are covered in RAIS

information in RAIS to that in a main Brazilian household survey (PNAD) and conclude that, when comparable, RAIS delivers qualitatively similar results to those in the national household survey. Menezes-Filho, Muendler and Ramey (2008) apply the Abowd, Kramarz, Margolis and Troske (2001) earnings-estimation methodology to Brazil and show that labor-market outcomes from RAIS broadly resemble those in France and the United States, even after controlling for selection into formal-sector employment, except for unusually high returns to high school and college education and to experience among males. Appendix A presents further details on the data source.

A job observation in RAIS is identified by the employee ID, the employer's tax ID (CNPJ), and dates of job accession and separation. To avoid double-counting employees at new firms, we keep only one observation for each employer-employee pair, choosing the job with the earliest hiring date. If the employee has two jobs at the firm starting in the same month, we keep the highest paying one. The rules on tax ID assignments make it possible to identify new firms (the first eight digits of the tax ID) and new plants within firms (the last six digits of the tax ID). Appendix B discusses the relevant details on tax ID assignment. Our data include 71.1 million employees (with 556.3 million job spells) at 5.52 million plants in 3.75 million firms over the sixteen-year period 1986-2001 in any sector of the economy. We limit our attention to the years 1995-2001 to ensure that firms we label as new have not operated before. In addition, RAIS offers detailed industry information (at the four-digit *CNAE* level) starting in 1995. During this 7-year period, 1.54 million new firms and 2.17 million plants entered (of which 581 thousand new plants were created within incumbent firms). By 1995 macroeconomic stabilization had succeeded in Brazil. The Plano Real from August 1994 had brought inflation down to single-digit rates. Fernando Henrique Cardoso, who had enacted the Plano Real as Minister of Finance, became president, signalling a period of financial calm and fiscal austerity. Apart from a large exchange-rate devaluation in early 1999 and a subsequent switch from exchange-rate to inflation-targeting at the central bank, macroeconomic conditions remained relatively stable for the following years.

Occupational classifications in RAIS follow the *CBO* (*Classificação Brasileira de Ocupações*). This classification system with more than 350 categories allows us to identify management employees (directors/managers) for specific spinoff definitions. During our sample period, sectors are reported under the *CNAE* four-digit classification (*Classificação Nacional de Atividade Econômica*) for 654 industries, spanning all sectors of the economy. The level of detail is roughly comparable to the *NAICS 2007* five-digit level. RAIS reports earnings as the monthly average wage, expressed in multiples of the current minimum wage. We use the log of December wages as our earnings measure in performance analysis, defined as the reported December wage times the December minimum wage expressed in Brazilian Real, and deflated to the August 1994 level. Appendix A has further details on the earnings measure.

Table 1 describes the data with respect to business formation. In 1995-2001, the num-

throughout the 1990s. Data collection is typically concluded by March following the year of observation.

Table 1: EXPANSION OR DIVERSIFICATION AT EXISTING FIRMS AND ENTRY OF NEW FIRMS

Year	Existing Firms							Entrants	
	Existing	Expansion[a]		Diversification[b]		Undetermined Sector[c]		New	
	Firms	Ventures	Plants	Ventures	Plants	Ventures	Plants	Firms	Plants
1995	1,063,441	11,413	36,367	9,645	51,703	7,979	10,123	195,131	197,928
1996	1,125,299	12,372	34,932	9,678	46,526	4,284	5,893	190,309	192,966
1997	1,176,743	13,181	36,424	9,962	47,272	3,041	3,912	244,139	248,554
1998	1,270,377	13,254	36,301	9,288	43,428	1,808	2,008	220,916	223,746
1999	1,332,871	13,511	27,273	8,537	36,755	1,135	1,798	222,215	241,876
2000	1,403,903	13,010	32,518	8,101	51,638	929	1,090	234,663	240,531
2001	1,487,069	13,235	29,455	7,133	44,197	860	944	236,274	247,810
Total								1,543,647	1,593,411

[a]An expansion venture consists of all new plants started by an existing firm during a given year if these plants are in the same *CNAE* 4-digit industry as the existing firm. Specifically, we compare the sector associated with the top employee at any new plant with the mode sector of the existing firm during the previous year.

[b]A diversification venture consists of all new plants started by an existing firm during a given year if these plants are in a different *CNAE* 4-digit industry from the existing firm, comparing the sector associated with the top employee at any new plant with the mode sector of the existing firm during the previous year.

[c]An undetermined sector venture sums over all new plants of an existing firm, for which we cannot compare the new plant sector with the original firm sector. The reasons can be that the new plant has no known sector during its first year in RAIS, or that the existing firm has no known sector during its previous year in RAIS. If a firm opens four new plants during a given year, two of them in a different sector and two in unknown sectors, each plant with five employees, that firm will appear to have one new 10-employee diversification venture, and one 10-employee undetermined sector venture by our classification.

Source: RAIS 1995-2001, new firms and ventures of existing firms.
Notes: Ventures are groups of new plants.

ber of formally registered firms grows from over one million to close to 1.5 million, corresponding to an annualized rate of growth of around 6.6 percent. There is considerably more gross entry, however. Around 18.3 percent of firms in 1995 are new, and around 15.9 percent in 2001 are new, implying that exit plays an important role for net growth in the number of firms. An early peak in the formation of new firms occurs in 1997. By then the stable macroeconomic environment and the government's continued commitment to market-oriented policy offered a conducive environment for entrants. A concerted effort by the federal government since 1996 to reduce informality in the labor market may also have contributed to a higher rate of formal registration among entrants. To control for cohort-specific entry and survival patterns, our regression specifications will condition on cohort effects.

We define ventures as groups of new plants within firms. Around one to three percent of existing firms expand, diversify or otherwise grow new ventures either by starting new lines of business or by acquiring existing ventures (2.7 percent in 1995, 1.4 percent in 2001). We use the *CNAE* 4-digit industry of the new ventures and the existing firm to discern between expansions, defined as new ventures within the same *CNAE* 4-digit industry, and diversifications, defined as new ventures in a different *CNAE* 4-digit industry. In the early years, when sector information is less well reported (many undetermined sectors), expansions are slightly more frequent than diversifications. Once sector information is highly complete, however, the data show that expansions within the same industry are about 60 to 80 percent more frequent than diversifications. Although expansions average more than two plants and diversifications more than five plants, the median number of plants for both is one. A minority of multi-plant ventures therefore drives the difference in average number of plants between ventures of existing firms and new firms. We now turn to the importance of employee spinoffs among the new firms.

4 Spinoff and Divestiture Definitions

We take two complementary approaches to identifying employee spinoff firms in the RAIS data, and let each approach act as a check on the robustness of the other. In the first approach, we locate the human capital essential to founding the new firm in its director or manager.

Definition A. (Director/manager spinoff.) *A director/manager employee spinoff is a new firm whose top paid director (or top paid manager if there are no directors) previously worked for an existing firm in the same 4-digit* CNAE *industry.*

The top paid director or manager may be the owner of the firm, or may have recruited financial backing from investors who own the firm but are not employed by it. Alternatively, investors may have recruited an experienced director or manager to run a new firm that was their idea. In the latter case, some (but not all) of the human capital essential to founding the new firm is embodied in the unobserved investors. Note that the director/manager spinoff definition will miss many "vertical" spinoffs, in which the top paid director or manager leaves

his existing firm to independently produce an input he previously supplied to his former employer internally.[3] For example, an accountant for a manufacturing firm may start an accounting firm that caters to manufacturing industry. His new firm will not have the same 4-digit *CNAE* as his former employer and will therefore be missed by the director/manager spinoff definition.

Our second approach locates the human capital essential to founding the new firm in a group of employees that embodies its "core competence." Of course the core competence of a firm is unobserved, so we do not know which or how many employees embody its core competence. For help we turn to a fact about director/manager spinoffs: on average, the director/manager "brings along" from the parent 23 percent of the non-management employees of the new firm.[4] This suggests that a reasonable cutoff for the share of employees in the new firm that is needed to transfer essential technologies or work routines from the parent firm is one-quarter.

Definition B. (Quarter-workforce spinoff.) *A quarter-workforce employee spinoff is a new firm of five or more employees, at least 25 percent of whom previously worked for the same existing firm.*

We restrict this definition to new firms with five or more employees, because below five employees any new firm with an employee who can be traced to previous employment would automatically be a spinoff. In other words, by restricting ourselves to firms with five or more employees, we ensure that a "team" that embodies the core competence of the new firm must have at least two employees. An advantage of the quarter-workforce definition over the director/manager definition is that we are not restricted to firms with a paid director or manager, nor are we restricted to "horizontal" spinoffs. The obvious disadvantage is that without the presence of a director or manager it is entirely possible that no essential human capital is embodied in the group of employees.

Both spinoff definitions A and B are vulnerable to the problem that the offspring firms may not be truly new. An existing firm that divests itself of one or more divisions creates a "new" firm that is likely to satisfy both of our spinoff definitions.[5] We receive some help with this problem from the coding of firms by *natureza juridica* (legal form) in the RAIS data set. By Brazilian commercial law, there are two broad categories of legal form: incorporated firms, and associations or partnerships without independent legal existence. Most important for our purposes, associations or partnerships cannot be owned by companies, but only by physical persons. So, if an employee spinoff is an association or partnership, it is not likely to be a divestiture (spinoff legal forms). In contrast, spinoffs that are incorporated

[3]These vertical spinoffs are extensively documented for Taiwan in Chapter 7 of Shieh (1992).

[4]That is, on average 23 percent of the non-management employees of Definition A spinoffs, as counted in Table 3 below, are from the same parent firm as the top paid director or manager.

[5]One might think the same problem could arise if a firm is sold, creating a "new" firm that is again likely to satisfy both of our spinoff definitions. However, as discussed in Appendix B, a firm that is sold retains its firm identifier and therefore is not coded as a new firm in our data.

as Corporation under private control, Close corporation, or Limited liability company are quite possibly divestitures (gray area legal forms). Inverting the common criterion in the labor literature that a mass layoff is a reduction of the existing workforce by 30 percent or more (e.g. Jacobson, LaLonde and Sullivan 1993), we label a new firm a divestiture if its *natureza juridica* is coded as Corporation under private control, Close corporation, or Limited liability company, or if it has unknown legal form, and if it absorbs 70 percent or more of the employees of a plant of an existing firm.[6]

Definition C. (Divestiture.) *A divestiture is a new firm with* natureza juridica *coded as Corporation under private control, Close corporation, Limited liability company, or as unknown that absorbs 70 percent or more of the employees of a plant of an existing firm.*

Finally, we exclude from spinoffs, and from the performance analysis of the next section, branches of government, firms with state ownership, cooperatives, any type of holding company, and branches of foreign firms. For our exhaustive classification of natureza juridica into spinoff legal forms, gray area legal forms and excluded legal forms, see Table C.1 in the Appendix.

Definition D. (New firm with excluded legal form.) *A new firm with excluded legal form is a new firm with* natureza juridica *coded as Public administration, State-owned limited liability company, State-owned close corporation, Corporation with some state control, Cooperative, Consortium, Business group, or Branch of foreign company.*

Table 2 summarizes the resulting exhaustive and mutually exclusive classification of new firms under Definitions A through D. Appendix D describes the classification procedure in precise detail.

5 Employee Spinoffs and Other New Firms

We now turn to descriptive statistics that characterize the groups of new firms under our definitions. Note that the pool of new firms from which Definition A spinoffs can be drawn is restricted to those with at least one director or manager, and the pool of new firms from which Definition B spinoffs can be drawn is restricted to those with at least five employees. Table 3 covers the former pool of firms and Table 4 covers the latter pool of firms. Each table presents counts of new firms, employment and wage bills by type of new firm in the upper panels.[7] In the lower panels, the tables also report the according statistics for diversification

[6] We use the share of employees of an existing plant rather than an entire existing firm because a typical divestiture scenario is one in which a parent firm divests itself of a particular plant, which becomes a new firm. This conservative approach makes it more difficult to classify a new firm as an employee spinoff.

[7] Employment and wage bill figures are the ones recorded in December of the new firms' first year of appearance in *RAIS*. Averaging employment and wage bills over the entire calendar year is too cumbersome in *RAIS*.

Table 2: CLASSIFICATION OF NEW FIRMS

Type of New Firm	Spinoff criteria[a]	Mass Employee Shift[b]	Legal Form of New Firm[c]
Unrelated new firm	no	yes or no	spinoff
Unrelated new firm	no	no	gray area
Employee spinoff	yes	yes or no	spinoff
Employee spinoff	yes	no	gray area
Divestiture	yes or no	yes	gray area
Excluded legal form	yes or no	yes or no	non-spinoff

[a]There are two spinoff criteria: *director/manager* (Def. A) and *quarter-workforce* (Def. B). The *director/manager* criterion isolates the top employee at each new firm first by *CBO* occupation (where *director* trumps *manager*, which trumps other occupations), and second by wage. The last firm at which this top employee worked for at least three months is defined as the new firm's parent. If this parent is within the same sector as the new firm (where we use the sectors associated with the shifting employee at the two jobs), and the top employee is a manager or director, we label the new firm a spinoff (Def. A). If there are two or more director/manager employees tied for top employee, the firm is labelled a spinoff if any one (or all) of these managers' parent firms is in the same sector as the new firm. So multi-parent spinoffs are possible (rare in practice). The *quarter-workforce* criterion considers the previous employer (employment for at least three months) of all the new firm's employees, regardless of job description or pay. The parent firm is the firm that lost the largest number of employees to the new firm. The new firm is labelled a spinoff as long as it has at least five employees, and 25 percent or more of them come from the parent firm. Multi-parent spinoffs are again possible.

[b]Shift of 70 percent or more of the parent plant workforce to the new firm. The parent plant is the plant of the parent firm that lost the largest share of its employees to the new firm, where the parent firm is the last firm at which a new firm's top employee worked for at least three months under the director/manager criterion and parent firm is the firm that lost the largest number of employees to the new firm under the quarter-workforce criterion. If there are two or more parent firms, we keep the one within the same sector as the new firm for the mass employee shift criterion; remaining ties are broken at random to select a unique parent. The parent plant workforce is the employees ever employed during the year before the new firm's entry. If the new firm has no known parent, or this parent was not present during the previous year (so we cannot obtain its employees), we consider the mass employee shift criterion as not satisfied. The mass employee shift criterion of 70 percent is an inversion of the common criterion for a mass layoff, by which a mass layoff is a reduction of the existing workforce by 30 percent or more (e.g. Jacobson et al. 1993).

[c]For our classification into spinoff legal forms, gray area legal forms and excluded legal forms, see Table C.1 in the Appendix.

Note: Legal form according to *natureza juridica* variable in RAIS.

Table 3: NEW FIRMS AND VENTURES WITH DIRECTOR/MANAGER

Type of New Firm or Venture	Count	Employment (thousands)	Wage Bill (BRL million)
New Firm			
Employee spinoff (spinoff legal form)	2,647	78	38
Employee spinoff (gray area legal form)	10,383	303	138
Divestiture	3,293	336	199
Unrelated new firm (spinoff legal form)	17,810	140	50
Unrelated new firm (gray area legal form)	42,364	685	311
Excluded legal form	2,341	223	128
Venture of Existing Firm			
Diversification venture	6,879	778	429
Undetermined sector venture	808	41	25
Total	86,525	2,584	1,318

Source: RAIS 1995-2001, new firms and ventures of existing firms with at least one director/manager. Brazilian Real (BRL) deflated to August 1994.
Note: Definition of new firms as in Table 2. Definition of ventures as in Table 1.

ventures and undetermined-sector ventures of existing firms (as defined in Table 1), under the additional restriction that the ventures have at least one director or manager or that the ventures have at least five employees. These categories of ventures are added so we can make the same comparisons as in Dunne et al. (1988) between new firms and entry into new industries by existing firms. We do not consider expansion ventures in our comparisons, following Dunne et al. (1988) for whom expansion ventures are not a form of entry.

There are 76,497 new firms (other than excluded legal form) with at least one director or manager in Table 3; this is a share of 5.0 percent of all new firms. In contrast, there are 331,987 new firms (other than excluded legal form) with at least five employees in Table 4, a share of 21.5 percent. So having a director or manager proves to be much more rare than having five or more employees.

We see from Tables 3 and 4 that diversification ventures make up only 8.0 percent of new firms and ventures with director/managers and 8.1 percent of new firms and ventures with at least five employees, respectively, yet account for 30.1 percent of employees and 32.5 percent of wages of new firms and ventures with director/managers and 21.4 percent of employees and 25.2 percent of wages for new firms and ventures with at least five employees. This indicates that at time of entry the average diversification venture is much larger than the average new firm, consistent with the results of Dunne et al. (1988). We will examine this finding more closely in the next section. Tables 3 and 4 also show that director/manager spinoffs and quarter-workforce spinoffs respectively account for 17.0 and 29.3 percent of new firms with included legal form (i.e. new firms that belong to the pool of

Table 4: NEW FIRMS AND VENTURES WITH FIVE OR MORE EMPLOYEES

Type of New Firm or Venture	Count	Employment (thousands)	Wage Bill (BRL million)
New Firm			
Employee spinoff (spinoff legal form)	31,557	374	125
Employee spinoff (gray area legal form)	65,790	1,037	393
Divestiture	18,057	657	323
Unrelated new firm (spinoff legal form)	63,966	605	117
Unrelated new firm (gray area legal form)	152,617	1,737	419
Excluded legal form	8,869	1,013	531
Venture of Existing Firm			
Diversification venture	30,279	1,503	657
Undetermined sector venture	4,452	90	38
Total	375,587	7,015	2,603

Source: RAIS 1995-2001, new firms and ventures of existing firms with at least five employees. Brazilian Real (BRL) deflated to August 1994. Employment in thousands, wage bill in BRL million.
Notes: Definition of new firms as in Table 2. Definition of ventures as in Table 1.

potential spinoffs). The ranking is to be expected given the greater restrictiveness of the director/manager spinoff definition. Finally, we see that director/manager spinoffs account for 24.7 percent of employees and 23.9 percent of wages of new firms with included legal form, and quarter-workforce spinoffs account for 32.0 percent of employees and 37.6 percent of wages of new firms with included legal form. Both kinds of spinoff are therefore somewhat larger at time of entry than the average new firm.

We can assess the overlap between our two spinoff definitions by considering the subset of new firms with included legal form that have both a director/manager and at least five employees. There are 41,725 firms in this subset, of which 10,783 are director/manager spinoffs, 17,010 are quarter-workforce spinoffs, and 6,386 are both. Thus 59.2 percent of director/manager spinoffs are also quarter-workforce spinoffs but only 37.5 percent of quarter-workforce spinoffs are also director/manager spinoffs. This again emphasizes that Definition A is more restrictive than Definition B.

Table 5 shows frequencies of employee spinoffs, divestitures and unrelated new firms by *CNAE* 1-digit sector in the upper panel. The first group of three columns covers the pool of new firms with at least one director or manager and the second group of three columns the pool of new firms with at least five employees. In Brazil, most new firms and divestitures of existing firms occur in commerce, repair services, hotels and restaurants. The next two frequent broad sectors are transport, telecommunication, finance and insurance on the one hand and real estate activities and business services on the other hand. These three broad services sectors account for the bulk of new businesses. Interestingly, employee spinoffs,

Table 5: DISTRIBUTION OF NEW FIRMS BY SECTOR AND KNOWLEDGE INTENSITY

CNAE 1-digit sector, OECD (2001) classification	Director/manager			Five or more employees		
	Spinoffs	Divestitures	Unrelated	Spinoffs	Divestitures	Unrelated
Agriculture and fishery	.9%	1.6%	.9%	1.6%	1.7%	1.3%
Mining, food processing and textiles	7.4%	7.9%	5.9%	8.1%	8.2%	8.1%
Manufacture of wood and metal products, chemicals	7.3%	9.4%	6.7%	8.7%	8.2%	7.0%
Manufacture of machinery and equipment	2.6%	3.8%	2.4%	2.9%	3.0%	2.3%
Utilities and construction	2.0%	2.0%	2.1%	7.2%	6.1%	8.5%
Commerce, repair services, hotels and restaurants	58.5%	51.5%	55.7%	40.3%	50.0%	46.2%
Transport, telecommunication, finance, insurance	8.2%	8.3%	5.9%	4.9%	4.6%	3.4%
Real estate activities and business services	8.0%	10.7%	12.6%	17.8%	10.8%	13.0%
Education, health, social and public services	2.4%	1.8%	2.3%	4.2%	3.8%	4.4%
Other social or personal services	2.7%	2.9%	4.9%	3.7%	2.9%	4.8%
Unknown	0	.1%	.5%	.6%	.5%	.8%
Non-high-tech sectors	87.0%	80.7%	81.4%	81.7%	82.4%	82.8%
High-tech manufacturing[a]	2.0%	4.9%	2.3%	2.4%	2.6%	1.5%
Knowledge-intensive services[b]	10.9%	14.3%	15.8%	15.3%	14.5%	14.9%

[a]Includes High-tech and Medium-high-tech manufacturing.

[b]Includes Telecommunication, Finance and insurance, Business services (excluding real estate activities), Education and health services.

Source: RAIS 1995-2001, new firms with at least one manager/diretor or at least five employees.

Notes: All numbers in percentages. High-tech and knowledge-intensity classification according to OECD (2001) based on *CNAE* 4-digit industry. Entry size is the total of founding employees with employment at any time during the new firm's first year. The new-firms column contains new firms of excluded legal form in addition to employee spinoffs, divestitures and unrelated new firms.

divestitures and unrelated new firms exhibit a roughly similar concentration in these broad services sectors.

In the lower panel of Table 5, we filter the new firm's *CNAE* 4-digit industry through the OECD (2001) classification of economic activities into high-technology manufacturing and knowledge-intensive services. The mass of Brazil's new businesses is launched in non-high-tech manufacturing and services industries—again with a roughly similar concentration for employee spinoffs, divestitures and unrelated new firms. Around 11 percent of director/manager employee spinoffs and 15 percent of quarter-workforce spinoffs are started in knowledge-intensive services (telecommunication, finance, insurance, business services, education, health). New firms in the often referenced high-tech manufacturing industries are relatively rare. Assuringly, the distribution of new firms across sectors is similar under both pools of new firms, those with at least one director or manager and those with at least five employees. In the next section we examine the performance of both types of employee spinoff relative to other new firms and ventures within the respective pools of new firms.

6 Employee Spinoff Performance

To understand differences between employee spinoffs, other new firms and diversification ventures of existing firms upon entry, we compare measures of their initial size. Table 6 shows regressions for initial size of new firms with included legal form and diversification ventures. We omit new firms with excluded legal forms because state or foreign ownership or holding company status are already well known to be associated with larger size. Columns (1) and (2) cover firms and ventures that have at least one director or manager and columns (3) and (4) cover firms and ventures with at least five employees. Size is measured by the log of the number of employees and the log of the wage bill on December 31 of the calendar year in which the firm or venture is first observed. We drop firms and ventures with zero employees on December 31 of their birth years. The key explanatory variables are indicators for employee spinoff, divestiture, and diversification venture, alongside controls for 4-digit CNAE industry and cohort (entry year of firm or venture).[8] The omitted baseline firm type is unrelated new firms. The exponential functions of the coefficients on the key indicator variables therefore show, within an industry and within a cohort, the ratios of the sizes of employee spinoffs, divestitures, and diversification ventures of existing firms to unrelated new firms.

Diversification ventures of existing firms are three to four times larger than unrelated new firms among firms with directors or managers and about twice as large among firms with at least five employees. This is consistent with the findings of Dunne et al. (1988) for U.S. manufacturing entrants, who state (p. 504) that "new-firm entrants in each industry are on average 28.4% as large as existing producers, while diversifying-firm, new-plant entrants

[8]The industry indicators used as controls in Tables 6-10 are based on the mode sector for new firms during their first year in the data.

Table 6: SIZE AT ENTRY

	Director/manager		Five or more employees	
OLS	Log Empl.	Log Wage Bill	Log Empl.	Log Wage Bill
(exponentials of coefficients)	(1)	(2)	(3)	(4)
Employee spinoff	1.86	1.96	1.12	1.28
	(.02)***	(.03)***	(.004)***	(.005)***
Divestiture	2.65	2.92	1.40	1.59
	(.06)***	(.07)***	(.009)***	(.01)***
Diversification venture	3.12	3.89	1.69	2.10
	(.05)***	(.08)***	(.01)***	(.02)***
Obs.	79,198	79,198	347,709	347,709
R^2	.29	.31	.13	.15
Mean Dep. variable	1.75	.40	2.07	.37
CNAE industry panels	552	552	561	561
Cohort panels	7	7	7	7

Source: RAIS 1995-2001, new firms and ventures of existing firms with at least one manager/director or at least five employees. Brazilian Real (BRL) deflated to August 1994. Wage bill in BRL thousands.
Notes: Definition of employee spinoff and divestiture as in Table 2. Definition of diversification venture as in Table 1. Omitted category: unrelated new firms. Coefficients reported as exponential functions of coefficients from OLS regression, standard errors computed with the Delta method, so that reported coefficients capture the ratios of the sizes relative to unrelated new firms. All regressions condition on *CNAE* industry and cohort fixed effects. Standard errors in parentheses: * significance at ten, ** five, *** one percent.

are 87.1% ... as large." Some of our result is driven by the minority of diversification ventures with multiple plants. However, if we repeat the entire exercise at the plant level (not shown), diversification plants are still two to three times larger than plants of unrelated new firms among plants with directors or managers, and 21 percent larger (employees) or 57 percent larger (wage bill) among plants with five or more employees. In all regressions, divestitures are closer in size to diversification ventures than to unrelated firms (the same holds true at the plant level). This supports our criteria for identifying divestitures since they should look like ventures of existing firms rather than new firms. Employee spinoffs, on the other hand, are much closer to the entry size of unrelated new firms than to diversification ventures of existing firms (though the reverse is true at the plant level). The performance of director/manager spinoffs relative to diversification ventures is somewhat stronger than that of quarter-workforce spinoffs. Below, we will suggest an interpretation of our spinoff results in terms of the Jovanovic (1982) model of firm entry and exit.

A basic measure of performance is survival. Tables 7 and 8 show regressions for the exit of new firms with included legal form and diversification ventures, covering firms and ventures with at least one director or manager and firms and ventures with at least five employees, respectively. We estimate a linear probability model, using as dependent variable an

Table 7: EXIT OF NEW FIRMS AND VENTURES WITH DIRECTOR/MANAGER

Exit by	$t+1$	$t+2$	$t+3$	$t+4$	$t+5$	$t+6$
OLS	(1)	(2)	(3)	(4)	(5)	(6)
Employee spinoff	-.04 (.003)***	-.08 (.005)***	-.09 (.007)***	-.09 (.009)***	-.09 (.01)***	-.08 (.02)***
Divestiture	-.05 (.006)***	-.09 (.01)***	-.12 (.01)***	-.14 (.02)***	-.15 (.02)***	-.09 (.03)***
Diversification venture	-.03 (.005)***	-.04 (.007)***	-.03 (.009)***	-.03 (.01)***	-.02 (.01)*	-.03 (.02)*
Obs.	68,395	53,807	40,750	29,148	16,684	8,306
R^2	.02	.03	.05	.06	.08	.11
Mean Dep. variable	.10	.23	.34	.44	.52	.58
CNAE industry panels	551	544	532	525	508	459
Cohort panels	6	5	4	3	2	1

Source: RAIS 1995-2001, new firms and ventures of existing firms with at least one manager/director.
Notes: Definition of employee spinoff (director/manager criterion A only) and divestiture as in Table 2. Definition of diversification venture as in Table 1. Omitted category: unrelated new firms. All regressions condition on *CNAE* industry and cohort fixed effects. Standard errors in parentheses: * significance at ten, ** five, *** one percent.

exit indicator that takes the value of one for exiting new firms or ventures and zero otherwise. The mean of the dependent variable is therefore the share of new firms and diversification ventures that have exited after one through six years, and we see that it rises from 10 to 58 percent for firms and ventures with at least one director or manager and from 9 to 49 percent for firms and ventures with at least five employees. Again, the key explanatory variables are indicators for employee spinoff, divestiture, and diversification venture, alongside controls for 4-digit CNAE industry and cohort. As explained at the end of Appendix D, exit probabilities for diversification ventures will be overestimated relative to exit probabilities for new firms because we do not consider a new firm to have exited as long as any plant associated with it is active, even if all its initial plants have exited. We will harmonize the treatment of exit in a future draft.

In both Tables 7 and 8 the explanatory variables typically have their largest impacts after five years, with most of the impacts already felt after three years. In Table 8, a diversification venture is 7 percent less likely to exit than an unrelated new firm after five years. This is again consistent with the findings of Dunne et al. (1988, p. 513) for U.S. manufacturing entrants, who compute exit rates for diversification ventures from 6 to 14 percent lower than for new firms after five years, depending on cohort. In Table 7, however, the difference between the exit probabilities of diversification ventures and unrelated new firms fails to rise after two years, leaving the difference after five years much smaller than in Table 8. We do not have an explanation for this finding, especially since nothing similar happens for the

Table 8: EXIT OF NEW FIRMS AND VENTURES WITH FIVE OR MORE EMPLOYEES

Exit by	$t+1$	$t+2$	$t+3$	$t+4$	$t+5$	$t+6$
OLS	(1)	(2)	(3)	(4)	(5)	(6)
Employee spinoff	-.03	-.05	-.06	-.07	-.07	-.07
	(.001)***	(.002)***	(.002)***	(.003)***	(.004)***	(.006)***
Divestiture	-.03	-.07	-.09	-.11	-.12	-.11
	(.002)***	(.004)***	(.005)***	(.006)***	(.008)***	(.01)***
Diversification venture	-.02	-.03	-.05	-.06	-.07	-.08
	(.002)***	(.003)***	(.004)***	(.005)***	(.006)***	(.009)***
Obs.	307,303	251,930	197,870	145,820	87,883	43,747
R^2	.02	.04	.06	.07	.10	.12
Mean Dep. variable	.09	.20	.29	.37	.43	.49
CNAE industry panels	561	559	556	553	541	523
Cohort panels	6	5	4	3	2	1

Source: RAIS 1995-2001, new firms and ventures of existing firms with at least five employees.
Notes: Definition of employee spinoff (quarter-workforce criterion B only) and divestiture as in Table 2. Definition of diversification venture as in Table 1. Omitted category: unrelated new firms. All regressions condition on *CNAE* industry and cohort fixed effects. Standard errors in parentheses: * significance at ten, ** five, *** one percent.

relative exit probabilities of employee spinoffs and divestitures.[9] The exit performance of divestitures is even stronger than for diversification ventures in Table 8. In Table 7, the exit probabilities of divestitures are as much as 14 percent lower than for unrelated new firms. Finally, Tables 7 and 8 respectively show that Definition A and B employee spinoffs have exit probabilities as much as nine and seven percent lower than unrelated firms.

Our aim in this section is to establish stylized facts regarding employee spinoff performance relative to other new firms and ventures rather than test hypotheses about relative performance. Nevertheless, there is a mechanical reason why Definition A and especially Definition B spinoffs should show better performance, and we would like to control for this. Application of both definitions requires that we be able to track workers at a new firm to previous employment. Mechanically, then, employees at a Definition A and especially Definition B spinoff are more likely than employees at an unrelated new firm to have formal sector work experience. It would not be surprising if such firms were to survive in the formal sector longer. In the first two columns of Tables 9 and 10, therefore, we add a control variable for the share of new firm or venture employees that are "trackable". As expected, a greater share of trackable employees is associated with reduced exit probabilities for both

[9] Another puzzle is that diversification *plants* are much *more* likely to exit than plants of unrelated new firms. Plant-level results for employee spinoffs and divestitures show no such divergence from firm-level results. We hope to resolve this puzzle in a future draft.

Table 9: EXIT OF NEW FIRMS AND VENTURES WITH DIRECTOR/MANAGER: ADDITIONAL SPECIFICATIONS

	Specification 1		Specification 2		Specification 3	
Exit by	$t+1$	$t+5$	$t+1$	$t+5$	$t+1$	$t+5$
OLS	(1)	(2)	(3)	(4)	(5)	(6)
Employee spinoff	-.03 (.003)***	-.08 (.01)***	-.02 (.003)***	-.06 (.01)***	-.02 (.004)***	-.06 (.01)***
Divestiture	-.04 (.006)***	-.13 (.02)***	-.02 (.006)***	-.09 (.02)***	-.02 (.006)***	-.08 (.02)***
Diversification venture	-.02 (.005)***	-.02 (.01)	.009 (.005)**	.04 (.01)***	.008 (.005)*	.04 (.01)***
Share: Trackable employees	-.04 (.004)***	-.08 (.01)***	-.03 (.004)***	-.05 (.01)***	-.003 (.007)	-.05 (.02)*
Log Initial employment			-.03 (.0009)***	-.05 (.003)***	-.02 (.001)***	-.05 (.003)***
Share: Shifted parent employees					.003 (.001)***	.003 (.003)
Obs.	68,395	16,684	68,395	16,684	47,626	12,438
R^2	.02	.08	.02	.08	.02	.09
Mean Dep. variable	.10	.52	.10	.52	.09	.49
CNAE industry panels	551	508	551	508	548	495
Cohort panels	6	2	6	2	6	2

Source: RAIS 1995-2001, new firms and ventures of existing firms with at least one manager/director.
Notes: Definition of employee spinoff (director/manager criterion A only) and divestiture as in Table 2. Definition of diversification venture as in Table 1. Omitted category: unrelated new firms. All regressions condition on *CNAE* industry and cohort fixed effects. Standard errors in parentheses: * significance at ten, ** five, *** one percent.

new firms and ventures with at least one director or manager and new firms and ventures with at least five employees. However, the impact on exit probabilities of spinoffs is only slightly reduced in both tables.[10]

Are the lower exit probabilities of employee spinoffs (and divestitures and diversification ventures) relative to unrelated new firms explained by their larger initial sizes? To answer this question we add the log of the number of initial employees as a control variable in the third and fourth columns of Tables 9 and 10.[11] This is indeed associated with lower exit probabilities in both tables. The impact on exit probabilities of diversification ventures with

[10]The mean of "share trackable" for new firms is 61.4 percent. In a future draft we will refine this control variable to equal share trackable to employment in the same industry as the new firm or venture. Note, however, that 49 percent of Definition B spinoffs are not in the same industry as their parents.

[11]Initial employees in these tables include all founding employees with a job at the new firm at any time during the first year, rather than in December only.

Table 10: EXIT OF NEW FIRMS AND VENTURES WITH FIVE OR MORE EMPLOYEES: ADDITIONAL SPECIFICATIONS

	Specification 1		Specification 2		Specification 3	
Exit by	$t+1$	$t+5$	$t+1$	$t+5$	$t+1$	$t+5$
OLS	(1)	(2)	(3)	(4)	(5)	(6)
Employee spinoff	-.02	-.07	-.02	-.07	-.02	-.07
	(.001)***	(.004)***	(.001)***	(.004)***	(.001)***	(.004)***
Divestiture	-.03	-.12	-.03	-.11	-.03	-.10
	(.002)***	(.008)***	(.002)***	(.008)***	(.003)***	(.009)***
Diversification venture	-.02	-.07	-.01	-.06	-.01	-.05
	(.002)***	(.007)***	(.002)***	(.007)***	(.002)***	(.007)***
Share: Trackable employees	-.02	-.01	-.01	-.002	-.01	-.009
	(.002)***	(.008)*	(.002)***	(.008)	(.003)***	(.009)
Log Initial employment			-.01	-.03	-.01	-.03
			(.0007)***	(.002)***	(.0007)***	(.002)***
Share: Shifted parent employees					-.0004	-.01
					(.0007)	(.002)***
Obs.	307,303	87,883	307,303	87,883	267,782	77,992
R^2	.02	.10	.02	.10	.02	.11
Mean Dep. variable	.09	.43	.09	.43	.08	.43
CNAE industry panels	561	541	561	541	561	540
Cohort panels	6	2	6	2	6	2

Source: RAIS 1995-2001, new firms and ventures of existing firms with at least five employees.
Notes: Definition of employee spinoff (quarter-workforce criterion B only) and divestiture as in Table 2. Definition of diversification venture as in Table 1. Omitted category: unrelated new firms. All regressions condition on *CNAE* industry and cohort fixed effects. Standard errors in parentheses: * significance at ten, ** five, *** one percent.

at least five employees is slightly reduced, but the impacts on exit probabilities of employee spinoffs and divestitures with at least five employees are unchanged. There are greater changes for new firms and ventures with at least one director or manager. For employee spinoffs and divestitures, impacts on exit probabilities are now slightly below those for the same categories with at least five employees. For diversification ventures, impacts on exit probabilities are now slightly positive. This only deepens the puzzle for exit probabilities of diversification ventures with at least one director or manager. In any case, it is clear that the lower exit probabilities of employee spinoffs relative to unrelated new firms are an element of superior performance over and above greater entry size.

Finally, it is possible that some of the apparently better performance of employee spinoffs relative to unrelated new firms results from an overly restrictive definition for divestitures. In other words, some employee spinoffs may actually be planned divestitures even though they contain less than 70 percent of the employees of any plant of their parent firm. To control

for this possibility, in the fifth and sixth columns of Tables 9 and 10 we add a variable for the share of employees of the plant of the parent firm from which the new firm or venture absorbs the most workers.[12] This variable has a negative association with exit probabilities at the longer time horizon for new firms and ventures with at least five employees but a positive association with exit probabilities at the short time horizon for new firms and ventures with at least one director or manager. In both cases the coefficients for employee spinoffs are unaffected.

Dunne, Roberts and Samuelson (1989, p. 679) interpret their findings regarding the performance of diversification ventures relative to new firms in terms of the Jovanovic (1982) model of firm entry and exit. In their view a diversification venture inherits the unobserved productivity parameter of its parent and the posterior distribution of that parameter. Since the parent is selected for high productivity relative to the typical new firm by virtue of having survived for some period of time, the diversification venture is also selected for relatively high productivity and therefore relatively large size at entry. Moreover, the variance of the posterior distribution inherited by the diversification venture will be lower than the variance of the distribution for a new firm, and therefore it is less likely that the diversification venture will draw a low productivity realization that causes it to exit.

A natural extension of the reasoning of Dunne et al. (1989) to employee spinoffs is to assume that a spinoff's unobserved productivity parameter is a convex combination of the productivity parameter of an unrelated new firm and its parent firm. This will yield size at entry and exit rates that are in between those of unrelated new firms and those of diversification ventures. This interpretation is consistent with the idea that employees take knowledge from parent firms to spinoffs, but that the knowledge is not necessarily alienable intellectual property as in the literature on high-tech spinoffs.

7 Conclusion

Employee spinoffs have been found to be an important type of new businesses in many economies. Existing firms continuously lose employees, some of whom spin off to start their own businesses. Rich linked employer-employee data for Brazil allow us to systematically compare employee spinoffs to other new businesses, including management-initiated divestitures, and to diversification ventures of existing firms. While the relevance and performance of divestitures (Cusatis et al. 1993, e.g.) and diversification ventures of existing firms (Dunne et al. 1988, e.g.) has been well documented before, we are able for the first time to separately identify employee spinoffs through workforce-based definitions that draw on employer-reported occupations, firm identifiers and industry classifications, as well as firms' legal forms and mass employment shifts between firms.

[12] The number of observations drops in these columns because many unrelated new firms lack (identifiable) parent firms.

Under one criterion, employee spinoffs are defined as new firms whose top salaried director or manager moved from a parent in the same industry. Under a second criterion, employee spinoffs are defined as new firms that fill at least a quarter of their jobs with workers who shifted from a common parent. Our findings are largely consistent across the two employee-spinoff definitions and lend mutual support to the definitions. Additional restrictions set employee spinoffs apart from divestitures and other new businesses. Depending on definition, employee spinoffs account for between one-sixth and one-third of the respective new firms in Brazil's private sector during this period. Employee spinoffs grow into important employers. Considering the entry of employee spinoffs with at least a quarter of their workforce from a common parent between 1995 and 2001, for instance, shows that their total employment reaches 5.4 percent of overall formal-sector employment by 2001.

Size at entry is larger for employee spinoffs than for new firms without parents but smaller than for diversification ventures of existing firms. Similarly, exit rates for employee spinoffs are less than for new firms without parents and comparable to those for diversification ventures of existing firms. These results suggest that we can think of some part of a firm's productivity draw in the Jovanovic (1982) model as embodied in the firm's employees and portable by them to a new firm. These findings have potentially important implications for the geographic clustering of innovative activity and for the impact of employment covenants and their enforcement on entrepreneurship.

Appendix

A Employer-employee Data

Screening of employee data. Employees in RAIS are identified by the individual-specific *PIS* number (*Programa de Integração Social)*. A given plant may report the same *PIS* multiple times within a single year so that the employee can withdraw from the employer-funded severance pay account (*FGTS*) through spurious layoffs and rehires. In addition, some *PIS* values (especially very small or symmetric numbers) are recorded by an unrealistically large number of different plants. To handle these issues, we devise a systematic way to label *PIS* values that we think should not be trusted for tracking employee's employment histories: if an employee appears at more than twelve jobs in any given year, or if there is more than one apparent gender change (i.e. there are two or more years in the data when the employee is listed as being of both genders), we mark the employee has having an invalid PIS. None of the 14,272 employees caught by this rule are deleted from the data. Instead, we only disregard their work history for purposes of identifying the parent of a new firm or venture and for defining spinoffs.

To avoid double-counting employees at new firms, we keep only one observation for each employer-employee-year combination, choosing the job with the earliest hiring date. If the employee has two jobs at the firm starting in the same month, we keep the highest paying one (randomly dropping observations in case of ties).[13] For new ventures of existing firms, we apply this rule at the plant-year level, thus allowing the employee to appear once per plant during the plant's first year,[14] again choosing the job with the earliest hiring date and highest wage.

To compute the December performance measures (employment and wage bill) as reported in Tables 3 and 4, and as employed on the left-hand side in Table 6, we choose a modified version of the data cleaning described above. Instead of allowing only one observation per worker per year at the new firm or plant, we allow only one observation per worker on December 31 at the given firm or plant (in the job with the top December wage). This way we make sure that we do not lose from our count December any employees who worked in a different occupation at the firm earlier in the year.

Earnings. We use the reported December wage as our earnings measure, which is recorded in multiples of the monthly minimum wage that prevails at the time. The reported December wage in RAIS excludes the "thirteenth salary," which is a special December payment made in some sectors. Multiplying our reported December wage figures by twelve provides a good estimate of an annual wage. We calculate the wage value in Brazilian Real (BRL)

[13] The same rule applies to plants so that some new plants of new firms are dropped from the sample. The figures reported in Table 1 are based on the so treated sample.

[14] The same rule applies to new plants of existing firms in plant-level analysis.

and deflate all wages to August 1994, when Brazil adopted a new monetary regime with single-digit annual inflation rates (starting with a BRL value at par with the U.S. dollar).

The RAIS manual for respondents states explicitly the forms of payment that are considered valid components of the monthly wage rate. These include: salaries; extraordinary additions, supplements and bonuses; tips and gratuities; commissions and fees; contracted premia; overtime earnings for contracted extra hours; hazard earnings; executive earnings; cost reimbursement components if they exceed fifty percent of the base salary and are for travel or transfers necessary for the execution of the job; payments for periods of vacation, holidays and parental leave; vacation gratuities if they exceed twenty days of salary; piece wages; and in-kind remunerations such as room and board. As a rule, components are considered part of salary if they are taxable income or are subject to Brazilian social security contributions.

Payments that are not considered wage components include: severance payments for layoffs; indemnity payments for permanent maternal leave and any other indemnity payments; so-called "family payments" under Brazilian labor law; vacation gratuities if they do not exceed twenty days of salary; additional social security earnings due to an employee's illness; moving expenses; travel cost reimbursements if they do not exceed fifty percent of the base salary; scholarships for interns; meals, equipment and clothing for execution of the job; and participation in the employer's profits.

Pro-labore payments. It is common practice for owner-managers and entrepreneurs in Brazil to pay themselves a small pro-labor amount such as a single minimum wage. These pro-labore payments are not reported in RAIS. Under Brazilian tax law, active owners have a strong incentive to pay themselves pro-labore earnings. There are, for instance, old-age security contributions for which the firm would become responsible if the owner-manager paid herself a common salary, but there is no double taxation on dividends. Pro-labore distributions are payments for services by owners who do not have a dependent employment relationship. Pro-labore payments are therefore excluded from RAIS, which only includes dependent employees. Executive earnings for directors, however, are reported in RAIS. As mentioned, bonus payments for executives are part of the salary figures in RAIS, but dividends and profit distributions are not.

Occupations. Occupations are categorized using the co-called *CBO* classification codes in RAIS. For our implementation, it is not necessary to reclassify *CBO* codes to conform with the *ISCO-88* categories. Our main use of the occupational coding is to identify directors/managers. The Portuguese title 'diretor geral', for instance, is similar to the occupation of a CEO, 'diretor de financas' similar to CFO.

B Firm Identifiers

Consistent application of firm identifiers is crucial for our identification of new plants and firms. Plant-level information in RAIS is based on the so-called CNPJ identification number. The first eight digits of CNPJ numbers (CNPJ radical) define the firm and the subsequent six digits the plant/branch within the firm. The CNPJ number is assigned or extinguished, and pertaining register information updated, under legally precisely defined conditions.

The CNPJ number is administered by the Brazilian tax authority Receita Federal (the Brazilian equivalent to the U.S. IRS), where CNPJ ('cadastro nacional de pesso juridica') stands for Brazil's national register of legal juristic persons. In the CNPJ register, Receita Federal maintains information related to the firm's legal form and related matters, which is separately also recorded in RAIS.The following nine types of transactions trigger the creation or extinction of CNPJ numbers. Once extinguished, a CNPJ number cannot be reassigned to any other plant in the future.

1. *Opening a business, becoming a juristic person.* Obtain CNPJ. It is requied of any so-called juristic person in Brazil ('pessoa juridica'), a legal entity in Brazilian common and commercial law, to register a CNPJ number with the Receita Federal upon opening a business.[15]

2. *Change in business name ('nome empresarial'), or business sector ('porte da empresa'), or legal form ('*natureza juridica*').* Maintain CNPJ, update register information. Changes from individual entrepreneurs to associations or partnerships of entrepreneurs and owners, or the reverse, do not result in reported changes in legal form.

3. *Change in ownership ('quadro de sócios') at associations and partnerships, or change in management ('administradores'), or change in equity holding at associations and partnerships ('inclusão e alteração de capital social').* Maintain CNPJ, update register information. Note that changes to incorporated firms—juristic persons with independent legal existence such as a limited liability company ('sociedade por quotas de responsabilidade limitada')—are treated differently, see 8 below.

4. *Other changes to the register, including mothballing ('interrupção temporária de atividades') and resumption of operations ('reinício das atividades interrompidas temporariamente'), a change in tax status ('opção ou exclusão do simples', 'qualificação tributária'), a change of responsible physical person (human being) for the CNPJ juristic person ('pessoa física responsável perante o CNPJ'), and several other administrative cases.* Maintain CNPJ, update register information.

[15]There is also a set of legal entities that are not formally juristic persons but are put on equal legal footing with juristic persons by Receita Federal, including real estate condominiums, mutual funds, employer consortia, and foreign consulates.

5. *Bankruptcy and liquidation.* Maintain CNPJ, update register information. It pertains to the Receita Federal to administer the CNPJ of the extinguished juristic person. Liquidation may be by court order or extrajudicial settlement. The opening and closing of a bankruptcy case must be reported.

6. *Opening new plants/branches.* New plants or branches are registered with the individual CNPJ numbers, where the first eight digits (CNPJ radical) define the firm and the subsequent six digits the plant/branch within the firm.

7. *Partial divestiture/corporate spinout ('cisão parcial').* Maintain CNPJ, update register information. The newly independent firm (divestiture or spinout) receives an own CNPJ. In practice, a partial divestiture might coincide with the acquisition of an individual plant by another firm.

8. *Merger of firm with other firm ('fusão'), acquisition of firm by other firm ('incorporação') or complete divestiture/corporate spinout into newly independent firms ('cisão total').* Extinguish CNPJ of firm that undergoes change. In the case of mergers and complete divestitures, the newly independent firm(s) obtain CNPJ(s) of their own. In the case of a plant acquisition, if the divested plant is not incorporated as a firm, the acquiring firm's CNPJ radical is retained and six new digits for the new plant are added. Note that the above applies to the acquisition of the firm as a whole, not select plants within the firm (for those cases see 7).

9. *Inactivity since day of foundation ('empresa que não iniciou atividades (inativa desde a abertura)').* Extinguish CNPJ.

Important for employee spinoffs, a change in ownership at associations or partnerships does not result in a change in CNPJ, as explained under item 3. Divestitures by Definition C include both management-initiated offspring that become standalone firms (corporate spinouts or complete splitups ('cisão total')) and management-initiated offspring from parent firms' M&A activity (such as a merger ('fusão'), an acquisition ('incorporação'), and a partial splitup ('cisão parcial'). These are covered under items 7 and 8.

C Natureza Juridica (Legal Form)

By our Definitions A and B, employee spinoffs are employee-initiated offspring firms whose key employees stem from one or multiple legally separate parent firms. We choose our empirical implementation such that it is unlikely that parent firms or acquiring companies hold a capital stake in the employee spinoff (the employee spinoff may or may not face contractual obligations with the parent firm). For this purpose, we use the *natureza juridica* (legal form) variable in RAIS to discern three important types of legal form: associations or partnerships without independent legal existence, private incorporated firms, and types of

Table C.1: TREATMENT OF LEGAL FORM

Natureza Juridica (legal form)	Treatment: Spin-off	Treatment: Gray area	Treatment: Exclude	*Total*		RAIS codes
Public administration			x	6,718	.4%	1015-1996
State-owned company[a]			x	16,909	1.1%	2011-2038
Corporation		x		4,110	.3%	2046, 2054
Limited liability company		x		867,656	56.2%	2062
Partnership	x			3,008	.2%	2070-2100, 2127
For-profit association	x			47,193	3.1%	2119
Sole-proprietor company[b]	x			493,130	32.0%	2135, 2992
Cooperative			x	3,553	.2%	2143
Consortium			x	318	.02%	2151
Business group			x	436	.03%	2160
Branch of foreign company			x	153	.01%	2178
Non-profit organization	x			77,616	5.0%	3018-3999
Professional without employees[c]	x			379	.02%	4030
Professional with employees[c]	x			4,880	.3%	4049
Entrepreneurial proprietor	x			1,518	.1%	4073
Other professional[c]	x			2,408	.2%	4014-4995[d]
Unknown		x		13,662	.9%	.
Total				1,543,647	100.0%	

[a] State-owned limited liability company and close corporation, and Corporation with some state control.
[b] Includes other private businesses.
[c] Includes self employment.
[d] Excluding above codes.

Source: RAIS 1995-2001, new firms.
Note: Gray area legal forms underly Definition C. Excluded legal forms underly Definition D.

incorporated firms to be excluded from analysis. Associations or partnerships can only be owned by physical persons, not by other companies. There is minor reporting error in legal form: around .1 percent of new firms have more than one (non-missing) legal form in their first year. We assign the mode of its legal form during the year to every firm.

Table C.1 shows the frequency of natureza juridica among new firms. More than 97 percent of new firms are concentrated in just four legal forms: limited liability companies with 56 percent, sole-proprietor companies with 32 percent, non-profit organizations (5 percent) and for-profit associations (4 percent). Only the limited liability company is an incorporated legal type that can be owned by another company, whereas the remaining three legal forms among the top four are associations or partnerships without independent legal existence. As mentioned, associations or partnerships can only be owned by physical persons. The latter

three legal forms are thus also not subject to CNPJ changes, see item 3 in the preceding Appendix. We consider the latter three legal forms highly likely employee spinoffs if they satisfy the criteria of Definitions A or B. We return to the use of natureza juridica in our description of spinoff and divestiture definitions below.

D Implementation of Spinoff and Divestiture Definitions

We apply two distinct sets of spinoff criteria (Definitions A and B), each administered at the firm level (first eight digits of the CNPJ tax number).[16] To identify a potential parent firm, we use the job histories of the new firm's founding employees, where the *founding employees* are the individuals employed at the firm during its first year in RAIS.[17] In particular, we look at each of the founding employees' previous *substantial job*, which we identify in the data as the last preceding employment spell (by hiring month) with a duration of at least three months.[18] We search for the previous job as far back as the RAIS data allows us. Our data start in 1986, which gives us nine years of potential labor market experience before 1995, the year in which we first consider firm entries.

Director/manager spinoff. The *director/manager* definition (A) isolates the top employee at each new firm first by job description (where *director* trumps *manager*, which trumps other descriptions), and secondarily by wage. The previous firm at which this top employee worked for at least three months is identified as the new firm's parent. If this parent is within the same disaggregated industry (same 4-digit *CNAE* sector of which there are 654) as the new firm, and the top employee is a manager or director, we label the new firm a spinoff. For this purpose, we do not compare mode industries of the parent and new firm (since the parent firm may operate plants in several industries); instead we use the industries associated with the transferring top employee at her old and new job. If either of the two industries is missing, the spinoff definition is not satisfied. If there are two or more director/manager employees tied for top employee, the firm is labeled a spinoff if any one (or all) of these employee's parent firms is in the same industry as the new firm. So multi-parent spinoffs are possible, but they are rare in practice (multi-parent spinoffs represent 0.7 percent of all director/manager spinoffs). This definition is only applied to new firms with management-level employees, of which there are 78,838 (or about 5% of the entire new-firm employee sample).

[16] In robustness checks where we administer the spinoff definitions A and B at the plant-level, we apply the two criteria to new firm-plants using the full CNPJ code as identifier.

[17] Firm age comparisons with other data sources show that RAIS reports date of firm creation plausibly precisely. In plant-level robustness analysis, we identify the parent plant.

[18] If the employee started two or more jobs in a month, we select the highest paying job, randomly dropping ties.

Quarter-workforce spinoff. The *quarter-workforce* definition (B) considers the previous place of substantive employment (lasting at least three months) of all the new firm's employees, regardless of job description or pay. The parent firm is the firm that supplied the largest number of employees to the new firm. The new firm is labelled a spinoff as long as 25 percent or more of the new firm's employees come from the parent firm. This definition would trivially label as spinoffs all firms with four or fewer initial employees, therefore we only apply it to the 340,856 new firms (out of 1.5 million) with five or more initial employees. Multi-parent spinoffs are again possible (they constitute 4.7 percent of the quarter-workforce spinoffs).

For both definitions (A and B), if there are two or more parent firms (multi-parent spinoff), we keep the parent within the same industry for purposes of testing the mass employee shift criterion (Definition C). Any remaining ties are broken at random to select a unique parent.

Legal form of new firm. We further use legal form data (the mode calculated for each new firm) to discern clear employee spinoffs, a gray area, and clear non-spinoffs. As described above (Appendix C), incorporated firms can be owned by other companies and can thus be subject to CNPJ changes as ownership changes (Appendix B). We treat new firms that are incorporated as gray-area firms because management-initiated divestitures could be a motive of their creation (natureza juridica 2046, 2054 or 2062, or unknown). In contrast, personal businesses such as associations and partnerships cannot be owned by other companies under Brazilian commercial law, and are thus not subject to CNPJ changes. We therefore consider associations and partnerships as highly likely employee spinoffs if they satisfy the spinoff definitions (natureza juridica 2070-2135, 2992, 3018-3999, 4014-4995). We exclude from the analysis legal forms that designate employers as public administration (natureza juridica 1015-1996), state-owned companies or corporations with some state control (2011-2038) or as special companies such as cooperatives, consortia, business groups and branches of foreign companies (2143-2178). Table C.1 documents that the bulk of new firms' legal forms are included: 56.5 percent of new firms fall into the gray area and 40.8 percent of new firms are highly likely spinoffs.

We apply the following refinement to our two spinoff definitions. A firm is a spinoff if a spinoff definition is satisfied (Definition A or B) and the legal form of the new firm is clearly spinoff. A firm is also a spinoff if the spinoff definition is satisfied, the legal form of the new firm is gray area, and strictly less than 70 percent of the parent plant's workforce shift to the new plant. We now turn to the latter mass-employee shift criterion that discerns spinoffs from divestitures.

Divestitures, including corporate spinouts. If 70 percent or more of a parent plant's workforce switch to a new CNPJ from one year to the next, we call the new plant a divestiture plant. We impose no minimum size on a parent firm for this computation. This definition is based on an employee count at the parent, contrary to our spinoff definitions

which are based on employee counts at the new firm. In particular, we identify the parent at the firm level and single out the parent-firm's plant with the highest fraction of employees that shift to a new firm.[19] The denominator in the share of shifting workers is the count of substantive parent employees over the year prior to the new firm's entry.[20] If the new firm has no trackable employees, or if the parent firm did not appear in RAIS during the previous year, we cannot calculate the share of parent plant employees that shifted, and we assume that the value is below 70 percent.

The 70-percent cutoff is motivated by the reverse of the labor economists' definition of a mass layoff (e.g. Jacobson et al. 1993), by which 30 percent or more of the existing workforce experience a separation. We label all divestiture plants that originate from 70 percent of a parent plant's workforce with an according indicator in the data. So, we call a firm a divestiture if the legal form of the new firm is gray area and at least 70 percent of the parent plant's workforce switch to the new plant. The share of parent plant employees that shift to the new firm is also used as an added control in exit probability regressions. For those regressions, we also need to construct the share of shifting workers at new ventures of existing firms. For new ventures, the parent firm is simply the 8-digit root part of the existing firm's CNPJ number. Similar to divestitures, we select the parent plant with the highest share of its employees lost to the new venture to calculate the denominator for the share of shifting workers.

Unrelated startup firms. Firms with included legal form that do not fall into the spinoff or divestiture categories are in the outside comparison group.

New ventures of existing firms. During our sample period 1995-2001, 580,557 new plants are started at 152,694 existing firms. We divide these into expansion plants (same 4-digit *CNAE* industry as parent firm), diversification plants (different 4-digit *CNAE* industry), and plants for which we cannot perform the sector comparison (because either the new plant or the parent firm has no known sector). The parent firm's industry is the firm's mode *CNAE* sector during the immediately preceding year in the data.

Mode sector assignment. For regression purposes, we assign to each firm (or plant) its mode sector value for that year, computed over the raw data and over all employees (not just December-31 employees). Many firms with no employees in December of a given year go on to have a workforce in December of future years. Of the new firms from 1995 that survive through 2001, for instance, more than seven percent had zero employment on December 31 of 1995. We would lose many observations in performance regressions controlling for initial

[19] In plant-level robustness analysis, the parent is also identified at the plant level, so there is no further selection necessary.

[20] We count parent plant employees as follows. We disregard employment spells of less than three months, and we keep only one appearance of any given employee per year per plant.

year sector if we only based the sector on December-31 employees. For new ventures of existing firms, we compute the mode sector as follows: we take the mode sectors of its plants, weigh them by the number of employees of each plant, and compute the mode.

Exit. We adopt the following exit definition for the regressions in Tables 7 through 10: a plant is considered *active* (has not yet exited) in a year t if it has any employment at any time during year t or during any of the following years $t + \tau$. A new firm survives as long as any plants associated with it are active. A new venture survives only as long as at least one of its initial plants is still active.[21] We define the exit indicator variable $exit(t + \tau)$ to be 0 if the new firm or venture has not yet exited at year $t + \tau$, and to be 1 if it exited in $t + \tau$ or in a previous year. The exit indicator is only defined for firms and ventures for which it is possible to test survival. For instance, since our data end in 2001, $exit(t + 5)$ is only defined for firms and ventures that enter in 1995 or 1996.[22]

[21] Note that this means that we underestimate the survival of new ventures relative to new firms because, for a firm to survive, it is possible for all its initial plants to have exited, as long as other plants appear with the firm's 8-digit CNPJ root.

[22] Note also that this means that we underestimate survival for firms and ventures entering later in the sample because it is possible for a firm or venture to be absent from the data on one year and to re-appear in following years.

References

Abowd, John. M., Francis Kramarz, David N. Margolis, and Kenneth R. Troske, "The Relative Importance of Employer and Employee Effects on Compensation: A Comparison of France and the United States," *Journal of the Japanese and International Economies*, December 2001, *15* (4), 419–36.

Anton, James J. and Dennis A. Yao, "Start-ups, Spin-offs, and Internal Projects," *Journal of Law, Economics, & Organization*, October 1995, *11* (2), 362–378.

Bhidé, Amar V., *The origin and evolution of new businesses*, Oxford: Oxford University Press, 2000.

Bureau of the Census, *1992 Economic Census: Characteristics of Business Owners*, Washington, DC: U.S. Department of Commerce, Economics and Statistics Administration, December 1997. (Government Printing Office).

Cabral, Luis and Zhu Wang, "Spin-offs: theory and evidence," *Federal Reserve Bank of Kansas City Research Working Paper*, December 2008, *RWP 08-15*.

Chatterjee, Satyajit and Esteban Rossi-Hansberg, "Spin-offs and the Market for Ideas," *NBER Working Paper*, 2007, *13198*.

Chemmanur, Thomas J. and An Yan, "A Theory of Corporate Spin-Offs," *Journal of Financial Economics*, May 2004, *72* (2), 259–90.

Christensen, Clayton M., "The Rigid Disk Drive Industry: A History of Commercial and Technological Turbulence," *Business History Review*, Winter 1993, *67* (4), 531–88.

Cooper, Arnold C., "The Role of Incubator Organizations in the Founding of Growth-oriented Firms," *Journal of Business Venturing*, Winter 1985, *1* (1), 75–86.

Cusatis, Patrick J., James A. Miles, and J. Randall Woolridge, "Restructuring through Spinoffs: The Stock Market Evidence," *Journal of Financial Economics*, June 1993, *33* (3), 293–311.

Dunne, Timothy, Mark J. Roberts, and Larry Samuelson, "Patterns of Firm Entry and Exit in U.S. Manufacturing Industries," *RAND Journal of Economics*, Winter 1988, *19* (4), 495–515.

_ , _ , and _ , "The Growth and Failure of U.S. Manufacturing Plants," *Quarterly Journal of Economics*, November 1989, *104* (4), 671–98.

Elkan, Walter, "Entrepreneurs and Entrepreneurship in Africa," *World Bank Research Observer*, July 1988, *3* (2), 171–88.

Franco, April Mitchell and Darren Filson, "Spin-Outs: Knowledge Diffusion through Employee Mobility," *RAND Journal of Economics*, Winter 2006, *37* (4), 841–60.

Hannan, Michael T. and John Freeman, "Structural Inertia and Organizational Change," *American Sociological Review*, April 1984, *49* (2), 149–164.

Henderson, Rebecca M. and Kim B. Clark, "Architectural Innovation: The Reconfiguration of Existing Product Technologies and the Failure of Established Firms," *Administrative Science Quarterly*, March 1990, *35* (1), 9–30.

Hopenhayn, Hugo A., "Entry, Exit, and Firm Dynamics in Long Run Equilibrium," *Econometrica*, September 1992, *60* (5), 1127–50.

Hvide, Hans K., "Firm Size and the Quality of Entreprenuers," *CEPR Discussion Paper*, 2005, *4979*.

Jacobson, Louis S., Robert J. LaLonde, and Daniel G. Sullivan, "Earnings Losses of Displaced Workers," *American Economic Review*, September 1993, *83* (4), 685–709.

Jovanovic, Boyan, "Selection and the Evolution of Industry," *Econometrica*, May 1982, *50* (3), 649–70.

Klepper, Steven, "Employee Startups in High-Tech Industries," *Industrial and Corporate Change*, September 2001, *10* (3), 639–74.

__ **and Sally Sleeper**, "Entry by Spinoffs," *Management Science*, August 2005, *51* (8), 1291–1306.

Krishnaswami, Sudha and Venkat Subramaniam, "Information Asymmetry, Valuation, and the Corporate Spin-off Decision," *Journal of Financial Economics*, July 1999, *53* (1), 73–112.

Menezes-Filho, Naércio Aquino, Marc-Andreas Muendler, and Garey Ramey, "The Structure of Worker Compensation in Brazil, With a Comparison to France and the United States," *Review of Economics and Statistics*, May 2008, *90* (2), 324346.

Nandy, Debarshi and Thomas Chemmanur, "How is Value Created in Spin-Offs? A Look Inside the Black Box," *U.S. Census Bureau Center for Economic Studies Working Paper*, July 2005, *05-09*.

Negri, João Alberto De, Paulo Furtado, Natália Ribeiro de Souza, and Jorge Saba Arbache, "Mercado Formal de Trabalho: Comparação entre os microdados da RAIS e da PNAD," *IPEA Texto para Discussão*, November 1998, *840*. Instituto de Pesquisa Econômica Aplicada, Rio de Janeiro.

OECD, *Science, technology and industry scoreboard: towards a knowledge-based economy*, Paris: OECD, 2001.

Rauch, James E., "Spinout Entrepreneurship, Crony Capitalism, and Development," May 2008. UC San Diego, unpublished manuscript.

__ **and Joel Watson**, "Are There Too Many Entrepeneurs? A Model of Client-Based Entrepreneurship," *Berkeley Program in Law & Economics Working Paper*, April 2003, *87*.

Rona-Tas, Akos, "Social Engineering and Historical Legacies: Privatization and the Business Elite in Hungary and the Czech Republic," in Beverly Crawford and Arend Lijphart, eds., *Liberalization and Leninist Legacies: Comparative Perspectives on Democratic Transitions*, Berkeley, Calif.: International and Area Studies, 1997, pp. 126–141.

shyong Shieh, Gwo, *"Boss" island: The subcontracting network and microentrepreneurship in Taiwan's development*, New York: Peter Lang, 1992.

Teece, David J., "Profiting from Technological Innovation: Implications for Integration, Collaboration, Licensing and Public Policy," *Ricerche Economiche*, October-December 1986, *40* (4), 607–43.

Tushman, Michael L. and Philip Anderson, "Technological Discontinuities and Organizational Environments," *Administrative Science Quarterly*, September 1986, *31* (3), 439–465.

Wiggins, Steven N., "Entrepreneurial Enterprises, Endogenous Ownership, and the Limits to Firm Size," *Economic Inquiry*, January 1995, *33* (1), 54–69.