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Using Worker Flows in the Analysis of Establishment Turnover – Evidence from German Administrative Data

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Contents

Abstract

Economists have long been interested in the determinants and components of job creation and destruction. In many countries administrative datasets provide an excellent source for detailed analysis on a fine and disaggregate level. However, administrative datasets are not without problems: restructuring and relabeling of firms is often poorly measured and can potentially create large biases. We provide evidence of the extent of this bias and provide a new solution to deal with it using the German Establishment History Panel (BHP). While previous research has relied on the first and last appearance of the establishment identifier (EID) to identify openings and closings, we improve on this approach using a new dataset containing all worker flows between establishments in Germany. This allows us to credibly identify establishment births and deaths from 1975 to 2004. We show that the misclassification bias of using only the EID is very severe: Only about 35 to 40 percent of new and disappearing EIDs with more than 3 employees correspond unambiguously to real establishment entries and exits. Among larger establishments misclassification is even more common. We show that many new establishment IDs appear to be "Spin-Offs" and these have become increasingly more common over time. We then demonstrate that using only EID entries and exits may dramatically overstate, by as much as 100 percent, the role of establishment turnover for job creation and destruction. Furthermore correcting job creation and destruction measures for spurious EID entries and exits reduces these measures and aligns them closer with the business cycle.

Zusammenfassung

Innerhalb der Wirtschaftswissenschaften hat die Suche nach den Determinanten von Arbeitsplatzfluktuation (Arbeitsplatzabbau und -aufbau) eine lange Tradition. Für empirische Arbeiten auf diesem Gebiet werden in vielen Ländern administrative Mikrodaten verwendet. Diese Daten haben oftmals den Nachteil, dass sie Firmeneintritte und Firmenaustritte nur unzureichend abbilden können und somit zu Verzerrungen in den Analysen führen. Die Größe dieser Verzerrungen ist oftmals unbekannt und schwer kalkulierbar. Unsere Arbeit stellt den Versuch dar, die Höhe dieser Verzerrungen für das Betriebs-Historik-Panel (BHP) zu ermitteln und dafür zu korrigieren. Wurden Betriebsgründungen und Betriebsschließungen im BHP bislang über das erste bzw. letzte Auftreten einer Betriebsnummer ermittelt, verwenden wir für deren Identifizierung und Klassifizierung Angaben über Beschäftigtenströme zwischen Betriebsnummern. Hierfür verwenden wir einen Datensatz der alle Beschäftigtenströme zwischen 1975 und 2004 enthält. Unsere Analyse zeigt, dass bei der Verwendung der alten Methode lediglich 35 bis 40 Prozent aller neu auftretenden bzw. ausscheidenden Betriebsnummern mit mehr als 3 Beschäftigten tatsächliche Gründungen bzw. Schließungen darstellen. Bei vielen neu auftretenden Betriebsnummern handelt es sich nicht um Neugründungen im engeren Sinne sondern z.B. um Wechsel der Betriebsnummer oder sogenannte "Spin-Offs", also Teilabspaltungen von bereits bestehenden Betrieben. Diese Gruppen gewinnen im Laufe der Zeit zunehmend an Bedeutung. Dadurch wird der Einfluss von Betriebsfluktuation auf den Abbau und Aufbau von Arbeitsplätzen teilweise mit bis zu 100 Prozent überschätzt. Eine Korrektur für diese unechten

Gründungen und Schließungen reduziert die Größe der Arbeitsplatzfluktuation und bringt sie in eine Linie mit der konjunkturellen Gesamtentwicklung.

Keywords: establishment turnover, worker flows, job turnover, BHP

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1 Introduction

Establishment and firm turnover is a central topic in economics. The notion that producer entry and exit is an important form of reallocation of production factors and thus contributing to aggregate growth has inspired a long line of theoretical and empirical research. One aspect of this reallocation mechanism that has been particularly prominent in the political sphere is the role of this churning process in the creation and destruction of jobs. New and small producers are often referred to as an important job growth engine, while the demise of a plant is usually lamented for the number of jobs it destroys.[1] For this reason job creation and destruction has long been studied by economists to enhance the understanding of the business cycle and the adjustment processes in the economy (Davis, Haltiwanger and Schuh 1996; Bartelsman, Scarpetta and Schivardi 2005; Brown, Haltiwanger and Lane 2006). These studies typically decompose net job creation into the contributions of entering and exiting firms in addition to reallocation between existing firms.

An important source of information to study job creation and destruction is administrative data (E.g. Persson 1999; Abowd, Corbel and Kramarz 1999; Foster, Haltiwanger and Krizan 2001; Baldwin, Beckstead and Girard 2002). For Germany the best source of information of this kind is the Establishment History Panel (BHP) of the Institute of Employment Research (IAB). While this dataset is extremely rich in its variables and has the distinct advantage of covering the universe of German social security liable employment, a big drawback is the lack of good information on establishment births and deaths. Since establishments have a unique establishment identifying number (EID) used for filing employment records, previous research has usually relied on the first and last appearance of this number to identify birth and death of an establishment. This clearly rests on the assumption that cases where EIDs change during the lifetime of an establishment are very rare. If there are a large number of such cases, this way of identifying establishment births and deaths may be very misleading.[2]

In this paper we introduce a new way of identifying establishment entry and exit in the BHP. We created a new dataset containing information on all worker flows between establishments. If an establishment changes its EID, this would be reflected as a large flow of workers from a EID that ceases to exist to a new EID. Rather than coding the appearance and disappearance as an establishment exit and entry, the use of worker flow data allows us to correctly identify the EID change. Apart from classifying new EIDs into new establishments and spurious EID changes, we also identify events that appear to be associated with restructuring of the establishment/firm and could be labeled as outsourcing or Spin-Offs. As a particularly interesting application for this data we then analyze the importance of es-

[1] The impact of job destruction due to plant closings on the displaced workers has also received a lot of attention in the literature, see for example Jacobson, LaLonde, and Sullivan (1993) and von Wachter, Song and Manchester (2009).

[2] Papers using the BHP (or the IABS, an individual level dataset that derives information from the BHP) acknowledge this problem but usually cannot do much about it. One approach that is often taken is to have an additional restriction, e.g. to consider only establishments below a certain initial size as a new establishment. This is very imperfect since it rules out the possibility of establishments that start with a large initial size and it may still identify a lot of false new establishment. Furthermore this approach does not help to identify true establishment closings.

tablishment turnover for job creation and job destruction. Given the problems of previous approaches, this is the first time that claims about the importance of producer entry and exit for job creation and destruction in Germany can be empirically evaluated in a plausible way.

This paper continues as follows: Section 2 provides some background by discussing approaches taken in the international literature. Section 3 discusses the data we are using. In section 4 we describe our methodology and in particular our system to classify appearances and disappearances of EIDs. Section 5 takes this classification system to the data and provides a detailed description of establishment turnover in Germany and how it relates to job creation and destruction. Section 6 concludes.

2 Background

Administrative datasets are often of higher quality than survey based datasets, but it has long been recognized that they are not immune to measurement and coding errors. Of particular concern are errors in longitudinal identifiers such as person or firm identifiers, since such errors (when uncorrected) lead to gaps and interruptions in employment histories, and can severely bias estimates of mobility in and out of non-employment, job creation and destruction measures and tenure variables. Errors in these identifiers have much more severe impacts and are harder to detect and correct than errors in other variables such as wages.

A number of papers have documented and attempted to correct person identifiers. For example Abowd and Vilhuber (2005) describe the method used by the Longitudinal Employer-Household Dynamics Program (LEHD) at the U.S. Census and Vilhuber (2009) provides a broader overview. On the firm or establishment level, the problems are in some ways more difficult: while for person identifiers at least it is clear that the underlying unit of observation remains the same over time, firms and establishments change ownership, are restructured, break-up or relocate in ways that make it ambiguous what exactly the underlying unit of observation is that is to be tracked over time.

However a consensus has emerged that it is useful for economic research to distinguish cases where identifiers change due to a change in ownership, the legal form of the firm or simply a change of accountants. In this case the change of a firm identifier should not be counted as a firm exit in one and an entry in the next period. Furthermore it is generally thought that firm restructuring events such as merger, acquisitions and outsourcing should generally not be considered as components of job creation and destruction (For a discussion see Persson 1999; Baldwin et al. 2002; Benedetto, Haltiwanger, Lane and McKinney 2007; Vilhuber 2009; Geurts, Ramioul, Vets and Leuven 2009).

To deal with problems of longitudinal linkages, researchers and statistical agencies have employed probabilistic matching methods based on similarities in partial firm identifiers as well as information about name, location and economic activity (Eurostat/OECD 2007; Vilhuber 2009). More recently information on worker flows between employers has been

used, since it is usually presumed that if the work force is identical in two consecutive years, then there is a high probability that these records relate to the same firm or establishment. This approach has been used for administrative datasets, among others, in Italy (Revelli 1996, Contini and Revelli 2007), Finland (Vartiainen 2004), the U.S. (Benedetto et al. 2007), and Belgium (Geurts et. al 2009). This study follows most closely the approach taken by Benedetto et al. (2007).

3 Data

The Establishment History Panel (BHP) is created from German social security records. Employers, on the unit of establishments, are required to file a report for all employees who are employed during a year. This report contains information on the duration of the employment (exact start and end date), the total pay over that period and a number of demographic variables (such as education, nationality, gender, and age). The pay information is generally very accurate (since it determines the social security contributions) but top coded. There is also information on industry, occupation and work status (full-time, part-time, apprentice) available. Employers have to file a report once a year for workers that stay with them for more than one year. Since employers and individuals are uniquely identified through establishment and person IDs, it is possible to construct complete job and earnings histories for individual workers or to follow establishments over time and observe the evolution of the employee composition and total wage bill. Compared to other similar datasets (such as the Unemployment Insurance Data or the LEHD in the US) the German social security data is quite rich (in terms of demographic information) and precise (daily precision on employment dates).

As is usually the case with social security data there are some shortcomings. First, not all employment is subject to social security contributions and thus covered by this data. In particular government employees and the self-employed are not covered. Also marginal part-time employment had been exempt from social security until 1999, so that up to this date it is not included in this data. On the other hand the data does cover about 80 percent of the working population in Germany (Herberger and Becker 1983). A second problem is that the definition of an establishment in this system does not necessarily correspond to a meaningful economic unit like a firm or a plant. Establishments are identified on the basis of establishment identification numbers (EID). Those numbers are allocated to each organizational unit in a specific region and industry consisting of at least one worker liable to social insurance.[3] An establishment may consist of one or more branches. As long as they all belong to the same industry and authority district (Kreis) they might all be covered under the same EID. Once an establishment is assigned a EID this number remains constant over time. This holds especially if the establishment moves to another region or is temporarily closed. The latter prevents classifying a reopened establishment as a true entry. Despite not being a true opening, an establishment is assigned a new EID in the case of ownership change or change of industry.

[3] Since 1999 establishments with at least one marginal part-time worker are also assigned a EID.

The BHP is created by collapsing social security records data on the establishment year level. Only employment spells that cover June 30th are used so that for each establishment and year there is a record with information on characteristics and size of the employees on this date. The resulting data is a panel comprising the universe of German social security liable employment since the year 1975. Our analysis was done using BHP data for the time period 1975-2004. The strength of this data is clearly its large scope (about 2 million observations per year covering about 25 million jobs) and time span. One important weakness, and the motivation for this paper, is that it is difficult to identify establishment entry and exit in the BHP. While for each EID it can be easily determined when it appears for the first and last time, it is not clear that these dates correspond to true entries and exits. An important concern is that if a EID changes for other reasons, this would appear as an exit and an entry without any corresponding economic event. That this can happen is acknowledged in the documentation of the BHP (Dundler et al. 2006), but it is hard to judge how often this actually happens and whether this biases empirical work that ignores the issue.

The main contribution of this paper is to directly address this concern by providing a new way to identify entry and exit by using worker flows. Having access to the underlying social security records of the BHP we can observe directly how many workers move between each establishment pair between two consecutive years. We will call all workers that move from an establishment A to an establishment B, a cluster of workers. Such a cluster will represent an inflow in establishment B and an outflow in establishment A. Using the individual level social security data, we created a dataset on all worker flows where a unit of observation is one clustered flow. Of all the clustered inflows to a EID, we call the largest (most number of workers) one in a given year the maximum clustered inflow (MCI). Similarly we define the largest flow of all the clustered outflows in a year the maximum clustered outflow (MCO).[4]

Our strategy to classify new EIDs into new establishments, Spin-Offs, and id changes is based on whether the workers in a new establishment all come from the same EID or not. In practice this is done by looking whether not more than a certain percentage of the current work force at an entering EID was employed together in the previous year[5].To check this it is sufficient to know the total number of workers currently employed, and the maximum clustered inflow to the EID. Similarly, in order to classify exiting EIDs it is enough to have information on the maximum clustered outflow. We therefore restrict our flow data to the MCI and MCO and merge those to each establishment year observation in the BHP.

[4] In addition to inflows from other establishments, there are also workers that were not employed in a social security liable job on June 30th of the previous year. In our flow data we cannot distinguish between whether these workers were unemployed at that time or worked in a job not covered by our data (self-employed, government or jobs below the earnings threshold for social security). The MCI (and similarly the MCO) is the maximum of all inflows from other establishments, so if no workers come from other establishments the MCI would be 0.

[5] Brixy and Fritsch 2002 have also mentioned this possible way of entry and exit classification in the BHP before.

4 Methodology

4.1 Establishments and Firms

It is important to clarify what we mean by establishment entry and exit before discussing how to identify these events. We understand an establishment to be a local economic unit consisting of workers and capital, operating under a joint legal framework (such as being part of a firm), and producing some sort of goods or services. Examples are a manufacturing plant, a restaurant, a local branch of a bank, or a gas station. This is very different from the firm as an economic unit, which may consist of several establishments, which may create new or destroy old establishments, and which may buy or sell them. It can clearly be the case that a firm disappears but an establishment belonging to the firm continues to exist (e.g. after being taken over by a competitor) and vice versa.

It is not completely clear under which conditions one would consider an establishment in year t to be the same establishment in year t+1. If all workers are still employed at the same location but possibly by a different owner or as part of a different company, one would probably consider this a continuing establishment that experienced an ownership change. On the other hand if only the location is the same and the new owner replaced all old workers with new ones, one would likely consider this a new establishment. In between these two extremes the distinction becomes fuzzy and in practice somewhat arbitrary definitions will have to be made. In addition to ownership changes, that allow following an establishment from one year to another, and clear creations or destructions of establishments, it is also possible for establishments to break up into several units or for several establishments to merge. For this paper we completely ignore the capital aspect of establishments (for data reason) and focus on the employee side. We therefore define a new establishment an establishment where a new group of workers get together and start producing something, and we define a continuing establishment an establishment where a large part of the workforce has been employed together in the previous year. We will also take care to classify break ups and spin-offs appropriately. Since we do not have direct information on ownership structure or firm identities, it should be kept in mind that we are very limited in that dimension.

4.2 Classifying new Establishment IDs

Not all new EIDs are also new establishments since a EID can change for a number of reasons. However it is true that the way EID are assigned in Germany implies that almost all new establishments will receive a new unique EID.[6] This allows us to focus on new EID only to identify new establishments. Based on the previous discussion a new EID can correspond to either a new establishment or a continuing establishment. A new establishment

[6] Except for the qualifications in the data section of how an establishment is defined in the BHP, there is only one qualification: If a business owner essentially shuts down his business for a number of years and then reopens it, she may use the same EID again even though this may reasonably referred to as a new establishment by our definition.

is an establishment where the workforce consists largely of workers that have newly come together to the production process (either be as a new firm or as part of an existing firm).

Continuing establishments correspond to the case where a large fraction of the work force at the new establishment was employed together in the year before. We will call the EID where the largest cluster of workers have been employed together in the prior year the predecessor. If the workers at the new EID that were employed together in the year before also constituted most of the predecessor employment, then the new EID and the predecessor correspond to very similar working arrangements and we will thus call them the same establishment but with a change of the identifier (the EID). Such an ID change may be due to an important economic event, such as a change of ownership or a takeover by another company, but it may also be for reasons largely irrelevant from an economic perspective.

The other possibility for a continuing establishment is that a large fraction of the workers have been employed together in the previous year, but that they did not actually represent a large fraction of the workforce of the predecessor. We call this case a Spin-Off or break up, since a part of the predecessor is spun-off to create a new production unit. This can be further distinguished in whether or not the predecessor continues to exist or not. If not, we refer to a Spin-Off as pushed, since the group of workers is pushed out by the closing of the former unit. If the predecessor continues to exist we label the Spin-Off as pulled. Some new EID do not fit any of these patterns very well. We will come back to those later. From this discussion we can classify new EIDs into the following five broad categories:

- New establishments:
  A group of workers who come together to form a new production unit
- Continuing establishments: Spin-Off / Break Up pushed
- Continuing establishments: Spin-Off / Break Up pulled
- ID Change (because of ownership change, take over, , restructuring)
- Other / Not classifiable / Unclear

In order to apply these classifications to the data it is necessary to define cutoffs for what it means that most workers did not work together in the previous year etc. Our definitions and cutoffs follow Benedetto et al. (2007) and are displayed in Table 1. For very small establishments the ratio of MCI to employment is not a very meaningful statistic (since for example for an establishment with exactly one worker in its first year this ratio can only be 0 or 1). We therefore put all establishments with less than 4 workers in the first year into an extra category which we call small new establishments. For the establishments with more than 3 employees we use the MCI to categorize them. If the MCI is less than 30 percent of all inflows in the first year of a EID, we call this a New Establishment (mid&big). For 30 to 80 percent of MCI/inflows and less than 80 percent MCI/predecessor employment we put the new EID into a category which we call new establishment (chunky) to indicate that these are likely new establishments but that there is some possibility of misclassification. Most establishments with a higher than 80 percent MCI/inflow ratio can be considered as

continuing establishments. To distinguish between the different continuing establishment categories it is necessary to look at the predecessor. If the MCI corresponds to less than 80 percent of the predecessors total employment (in the previous year), we call the continuing establishment a Spin-Off, if it is more than 80 percent and the predecessor exits we call it an ID-change. If the predecessor exits from the previous to the current year, we call the Spin-Off pushed, otherwise pulled. The remaining fields seem odd combinations for various reasons and are thus labeled Unclear .

4.3 Classifying exiting Establishment IDs

Our method for classifying exiting establishments follows the same principle. All exiting establishments with less than 4 workers are classified as small establishment deaths, since for those the ratio of MCO to employment in the last year is not a meaningful statistic. All establishments where the ratio of MCO to employment in the year before the exit is less than 30 percent are classified as atomized deaths. Exiting establishment IDs where the MCO/last employment ratio is between 30 and 80 percent are classified as chunky deaths. It is certainly debatable what the best classification for this group is. One could both imagine that establishments of this kind are true exits, where a relatively large chunk of workers happens to end up at the same establishment, or some kind of spin-offs or takeovers that only take a relatively small fraction of workers. Since we think that any cutoff is ultimately arbitrary we put them in a separate category, which allows us later to see the importance of this group. For symmetry with the entry classification we label establishments with less than 80 percent MCO/outflow ratio and more than 80 percent MCO/successor employment ratio Spin-Offs (in this cased pushed, since the predecessor exits).

Exiting EIDs where a very large fraction - again we take 80 percent as the cutoff – of workers stay together indicate that these are not true exits. If these worker go to a new EID in the following year and this group makes up more than 80 percent of the workers in the new establishment ID, then we take this as a strong indication that this is actually simply a change of the EID and we classify this as an ID change. If the workers enter an existing EID and make up less than 80 percent of the workforce at this EID, this may correspond to a takeover of the exiting establishment and we label this takeover/restructuring. The remaining categories are labelled unclear again.

5 Results

5.1 Worker flows into new Establishment IDs

We structure our results in the following way: First we report how the total of entering and exiting establishments falls into our classification system. In this context we discuss whether our classification seems reasonable, we show the shares of establishments and workers in the different classes of entering and exiting establishments. Second, we show how the number of establishments and employment in the different categories varies over

time and how much it is correlated with the business cycle. Third, we describe how characteristics of new EID evolve with time passed since entrance by classification. This can be partly seen as an internal consistency check (e.g. we would expect new establishments to have larger growth rates than establishments that merely changed their EID) but also reveals interesting stylized facts about the different types of entries. Finally we discuss how measures of job creation and destruction are affected by our methodology.

We first report results based on pooling all years from 1976 to 2003. Overall there are 4.8 million entering and 4.2 million exiting EIDs.[7] Table 2 reports the results from classifying these establishment IDs according to the rules specified in the previous section. The table shows the number of establishments (and the fraction) in each cell specified in Table 1. It is clear (though not surprising) that the vast majority new EID, 4 million, are very small. The largest group (45 percent or 2.1 million) are new EIDs with less than 4 workers, none of whom were employed at another establishment in the year before (i.e. there is no predecessor according to our definition). The second largest group (23 percent or 1.1 million) are EIDs with less than 4 workers, where the predecessor continues to exist and the MCI is less than 30 percent of the predecessor's employment in the previous year. Both groups seem to be pretty unambiguously new establishments, since the workers did not constitute a large fraction of workers at another plant and the previous employer, if there is one, is continuing. There are a number of EIDs in the small category with continuing predecessor, where the employees made up a larger fraction of the predecessor's workforce. However since the absolute number of workers of the MCI is very small they can only constitute a large fraction at the predecessor, if the predecessor was very small as well (e.g. one worker going from a one employee establishment to a new establishment and being replaced at the old one would show up in the top right cell). Thus this is probably not an indication that these are not true new establishments.

New EID with less than 4 employees and exiting predecessor are also a large group and constitute about 11 percent of all new EIDs. Since predecessors which exit are much smaller than predecessors which continue, the MCI/Predecessor employment ratio is naturally larger in the former group. There is a sizable fraction (4 percent or 200,000) of new establishment IDs where the MCI made up more than 80 percent of the predecessor's employment. Since the MCI in this group can only be 1, 2 or 3 workers, the ratio can only be above 80 percent if the MCI made up all the employment at the predecessor. In fact most of these cases (120,000) are EID with just one worker. From the information on worker flows alone it is hard to tell whether such cases constitute workers leaving one establishment which stops employing people and go to another one or whether they stay at the same place and there is just a change in the EID. We decided to classify these EIDs as new establishments, since we felt ownership changes or industry changes are probably not that common.[8] To the extent that this is incorrect at least in terms of employment in these new

[7] For time-consistency we exclude entering EID with solely marginal employment.

[8] A possible way to investigate this further would be too look at wages of workers in these establishments before and after these events. If wages move very smoothly, this would seem more consistent with a change in ownership while big changes in wages might indicate movements to another employer. We leave this type of investigation to future research.

EID this is a pretty small group.[9] For the small new establishment IDs with less than 30 or 30 to 80 percent of MCI / predecessor employment ratio, it seems safe to assume these are true new establishments.

Among the group of larger (4 or more employees) new EID, the establishments with less than 30 percent MCI/inflow ratio are classified as new establishments (mid&big), independent of their predecessor status. In total these are about 300,000 establishments, most of which had either no predecessor or the MCI/predecessor employment ratio is less than 30 percent. The larger establishments with 30-80 percent MCI/Inflow ratio are classified as new establishments (chunky) if the MCI constituted less than 80 percent of the predecessor's employment. It seems fairly common that moderately large clusters of workers leave exiting or continuing establishments and end up at new establishments together. If these make up only a smaller fraction of the workers in the new establishment we think these can still be classified as new establishments, although this is less clear than for the New Establishment (mid&big) class. On the other hand, the cell with MCI/inflow ratio of 30-80 percent and MCI/predecessor employment ratio of more than 80 percent seems quite ambiguous and likely contains both Spin-Offs (though they would have to be fast growing), ID changes (also associated with fast growth) or new establishments that just happen to hire several workers from an exiting employer. We therefore label this cell as unclear. Since the corresponding cell where the predecessor continues seems to make little economic sense it is reassuring that there are only about 3,200 establishments in this cell.

Among the larger establishments with an MCI/inflow ratio of more than 80 percent about 130,000 have an MCI/predecessor employment ratio of less than 80 percent and thus fall into our Spin-Off pushed and Spin-Off pulled categories, depending on whether the predecessor exits or continues to exist. Finally there are about 40,000 establishments with both MCI/inflow and MCI/predecessor employment ratio of more than 80 percent, which we label as ID-changes (unless the predecessor continues, but this is again very rare).

5.2 Worker flows out of exiting Establishment IDs

Turning to exits, it is striking that the distribution over the cells is very similar to the distribution of entering EIDs. Most exiting EID, over 80 percent, are very small (less than 4 employees) and among those most have either no successor (because none of the workers are employed in the next year) or have concentrated outflows that only make up a small fraction (less than 30 percent) of the successors employment. Again the small exiting EID with higher MCO / successor employment ratios represent very small flows between very small EID, which makes it difficult to read much in to the differences in these ratios. We therefore classify these as true exiting establishments.

A smaller, but still sizable group (about 7.5 percent) of the larger exiting EIDs is such that the MCOs are a small share of overall employment in the exiting establishment (less than 30 percent). This is the group that we call atomized deaths, since the workers are

[9] About 300,000 individuals are in this group relative to over 17 million individuals among all new EID in our time period.

dispersed over several different establishments, except for the case in which the MCO makes up more than 80 percent at an entering establishment, which we classify as Spin-Off pushed. This last labeling serves mainly to keep the symmetry with the classification of new establishments, these Spin-Off pushed cases still seem to be true establishment exits. Establishments with 30-80 percent MCO/outflow ratio make up 7.2 percent of all exiting EIDs. While these cases are less clear than the atomized deaths, where workers are completely dispersed, they still show a pretty clear breakup of the workforce of an establishment and thus we label them chunky deaths as long as the MCO/successor employment ratio is not above 80 percent and where the successor is a new EID. This last case we call again Spin-Off pushed for the same reason as before.

Only about 2.5 percent of exiting EIDs have a MCO/ouflow ratio of more than 80 percent. If the MCO/successor employment ratio is also more than 80 percent and the successor is a new EID these will be classified as ID changes. Again it is reassuring that the number of ID changes (37,600) is very similar to the classification of the new EID. We classify about 36,000 exiting establishments as takeovers/restructuring, if the successor is continuing and the MCO/successor employment ratio is less than 80 percent. The three remaining cells are labeled unclear and make up about 50,000 establishments. Especially for those where the successor is a new establishment it seems impossible to tell whether these are ID changes or Spin-Offs with rapid employment growth.

5.3 The Distribution of EIDs over Entry and Exit Categories

Table 3 Panel A shows the total number of establishments in each of our entry categories. The vast majority (83 percent) of all new EIDs are new establishments (small), with the two second largest groups being the other two new establishment classes, accounting for 6 percent each. The other categories account for far fewer establishments: ID-changes for about 0.8 percent and Spin-offs (pulled) and Spin-offs (pushed) for 1.7 and 1.1 percent respectively. About 0.9 percent are classified as unclear. While thus 95 percent of all new EIDs appear to be truly new establishments (excluding the chunky category), and Spin-Offs and ID-changes appear to be pretty rare, this masks the fact that most of these new establishments are very small. The table therefore also shows total employment in each of these establishment classes (in the year the EID appears). This changes the relative importance of these categories substantially. ID changes and unclear entries now account for nearly 10 percent of employees in new EIDs. Spin-offs combined have about 3 million employees in their first year out of a total of 17 million in new EIDs. New establishments still account for most employees (about 73 percent), but the group of small establishments is now much less important (though still the largest) while the chunky and mid&big groups account for 4 and 3 million employees each. Given the ambiguity of the chunky new establishment category, the group of unambiguous establishment entries is thus significantly reduced when either considering employment weighted number (accounting for only 50 percent of all employment) or when considering only EIDs with more than 3 employees (accounting for only 37 percent of all new EIDs).

Table 4 provides further evidence that the non-new establishment categories are more im-

portant among large new EIDs. Panel A breaks up the entry classifications by employment size in the first year. By definition new establishments (small) only appear in the smallest size class. Among the larger establishments it is apparent that the two new establishment categories become relatively less important as employment increases. It is probably not surprising that there are few truly new establishments that start out very big and those that do would often be new establishments set up by large multi-establishment firms or some kind of outsourcing of parts of an establishment, both of which may show up as Spin-Offs (pulled). Panel B of Table 4 shows the same breakup but with total number of employees in each cell, further confirming that while ID changes, unclear entries, and Spin-Offs are rare, they account for a sizable fraction of employment in new EID, especially among the larger EIDs.

The total number of establishments in each exit category is reported in Table 3 Panel B. The small deaths account for the vast majority of exits, with nearly 83 percent. Among the exiting EID with more than 3 employees, the atomized and chunky death categories are clearly the largest with 290,000 and 240,000 establishments respectively. Establishment deaths that are associated with a Spin-Off occurring, are less frequent, with a total of 86,000 establishments. Exiting EIDs that probably do not correspond to an actual dissolution of the establishments "takeovers and ID changes" make up about 37,000 establishments each. Finally about 0.7 percent of all establishments are classified as unclear. Again these raw numbers overstate the importance of the small death category for employment. The numbers on employment in each of the categories reveal that the small death category, while still the largest, only accounts for about 30 percent of employment in exiting EID. The other two death categories on the other hand are relatively more important for employment, having a share of about 23 percent each. Finally takeovers and ID changes that do not correspond to a true closing of an establishment do represent a sizable fraction of the workforce in exiting EID, representing a combined total of about 9 percent.

Table 5 Panel A shows the distribution of the exit categories over different size classes. By definition the smallest size class consists only of establishments in the small death category. Among the smaller size classes the atomized and chunky death classes clearly dominate, accounting for most of the exits. However, these categories become less important among the larger establishments, where ID changes and takeovers are relatively more important. Furthermore it is interesting that deaths associated with Spin-Offs are quite common among the larger establishments. Panel B shows the total number of employees in each of these size / exit category combination, highlighting again, that while large establishments are rare and rarely exit, they do destroy a lot of jobs when they exit.

5.4 The Development of Establishment Turnover over Time

Figure 1 shows the number of entering EIDs by entry category and year for West Germany (Appendix Table A-1 contains the exact numbers underlying this figure for West and East Germany). On average there are about 120,000 new EIDs per year, with a slight increase to about 130-140,000 after 1990. 1999 (and to a lesser extent the following 2 years) is a clear outlier with a sharp spike in the New Establishment (small) category. In this year

the reporting requirements for the social security system were changed to cover marginally employed workers. While we attempted to correct for this by dropping these employment relationships, the underlying structure of the reporting rules make it impossible to correct for this perfectly which almost certainly explains the spike. Note that this spike is not apparent in any of the other categories.

Apart from this outlier the number of EIDs in the New Establishment (small) category shows essentially no time trend (though some cyclicality, to which we come back below). This is markedly different from all other categories which show fairly strong increases over time. Perhaps most striking is the fact that ID-Changes are more than three times as common towards the end of our sample period compared to the beginning. Similarly there is a very strong increase of both Spin-Off categories. There is also a pronounced increase in the Unclear and Chunky New Establishment categories, while the New Establishment (mid&big) category shows only a moderate increase over time which reverts back to its starting value in the last 2 years.[10]

Figure 2 shows the respective numbers for exiting establishments. As for the entries there is a steady increase in exits across all categories. Overall the number of EID exiting each year increases from around 80,000 in the late 70s to 130,000 in the late 1990s. From 1999 to 2003 the number of exits is extremely high with a peak in 2002 of nearly 240,000. This is likely partly due to the change in the reporting requirements in the social security data mentioned above. While the exits are highest across all categories in these last years, the small deaths have the most striking increase, especially for 2002. [11]

5.5 The Cyclicality of Establishment Turnover

In Figures 1 to 4 recessions (1982, 1993 and 2003) are indicated by vertical bars. While these figures already give a visual impression of the cyclicality (and acyclicality) of the different time series, we assess this more carefully by computing correlation coefficients between the time series of the different entry and exit categories and business cycle indicators. As business cycle indicators we use the growth rate of real gdp as well as the year to year change in the unemployment rate measured in percentage points.[12]

Table 6 displays the correlation between number of establishments and number of employees in each of the seven entry categories with the two business cycle indicators. Since the change in the unemployment rate and GDP growth are quite highly negatively correlated (as one might expect from Okun's law), the patterns emerging from the two measures are pretty similar. Since several categories show strong increases over time, the raw correlation between such categories and the business cycle indicators (which are essentially

[10] For East Germany we find a declining pattern of new EIDs across all categories between 1993-2004. Though the data starts in 1991 we focus on 1993 and later to be sure not to pick up establishments which are simply covered by the social security system for the first time.

[11] For East Germany the pattern also shows a steady increase in exits. It is interesting that due to the increase in exits and decrease in entries during the sample period there is a net increase in establishments in East Germany until around 1999, after which the number of establishments is decreasing.

[12] See appendix Figure B-1

trendless) will be highly affected by the long term trends and is thus not very informative. For this reason in addition to reporting the correlation coefficients for the raw measures in Panel A, we also show correlations of the measures after detrending the category time series using the Hodrick-Prescott filter in Panel B.[13]

ID Changes and Spin-Offs Pulled are not strongly correlated with the business cycle and only the detrended time series show a weak (and statistically insignificant) counter cyclical correlation. For the Spin-Off Pushed category there is no correlation for the raw measure, which has a strong upward trend over our time period, but is very strongly counter-cyclical once the long term trend is taken out (correlation of 0.7 with the change in the UR). Since we think of these as spin-off which are forced by plant closings it makes sense that these are more common during downturns. On the other hand the New Establishment (mid&big) and New Establishment (small) time series appear to follow the business cycle quite closely (both the raw and detrended measures), showing clear and statistically significant correlations of around 0.4 to 0.6 with the business cycle measures. The New Establishment (chunky) and Unclear categories are also pro-cyclical, but with somewhat weaker correlations and generally not statistically significant on conventional levels, except for the Unclear number of establishments.

The fact that only those entry categories which we consider to be relatively unambiguous new establishments are strongly procyclical indicates that our classification corresponds to real economically different events and we certainly find this reassuring. Furthermore the ambiguity of the Unclear and New Establishment (chunky) categories is reflected in the weaker correlation with the business cycle, which points towards our suspicion that these categories correspond to true establishment entries as well as spin-offs and restructuring events.

For the exits in Table 7, there is much less correlation with the business cycle for the raw measures, reflecting the even stronger time trends across all categories. After detrending, Atomized Deaths and Spin-Offs Pushed (which we argued should also be considered true exits) show nearly the same pattern of a very robust positive correlation with the change in the unemployment rate (about 0.7) and a weaker negative correlation with GDP growth. Interestingly the Small Death category is nearly uncorrelated with the business cycle, and thus shows a markedly different pattern than the New Small category. Also quite different from the respective entry categories, both the Chunky Death and the Unclear categories appear to be somewhat procyclical (although only marginally statistically significant), which may indicate that there are relatively few true exits in these categories and instead involve a significant amount of restructuring. The Takeover/Restructuring category is nearly acyclical as well as the ID Change category, which exhibits the same pattern as the corresponding entry category.

[13] We use a smoothing parameter value of 1600, which is commonly used for quarterly data, since we found that the more standard values for annual data take out too much of the cyclical variation. The results are very similar if instead of HP filtering, we simply take out a linear time trend.

5.6 Characteristics of New Establishments

We now turn to how the different entry types compare on some selected characteristics and how they evolve over time. There are two simple descriptive ways to achieve this. On the one hand one can pick a cohort of entering EID and follow them over time. On the other hand one can pick a year and analyze establishments of different ages in that year. The former approach has the problem that the variation with age is confounded by overall time trends, while the latter has the disadvantage that age is possibly confounded by differences of establishments across cohorts. To start, we show results based on the latter approach.

Figure 5 starts by comparing establishment size over the different entry categories as well as over establishment age (we speak of establishment age here even though we really mean the age of the EID, i.e. time since the first appearance of the EID). New establishments small and mid & big are the only two categories that show a fairly strong monotone employment growth over all years although their size at birth is only small or medium compared to the other entry categories. Since we would probably expect new establishments to grow this provides some support for our definition of new establishments. In addition to that the establishment size in the ID-change category is very stable over the first years which fits to our classification scheme as well. The largest establishment sizes can be found in the Spin-Off pulled category. This category also shows a monotone growth during the first years that afterwards decreases. If we think of a Spin-Off as a break up of a small but maybe highly motivated group of workers these results show two things. First Spin-Offs only take place at bigger establishments (predecessors) where there is a chance of workers with different skills to form up and create their own production unit. Second if this forming up is not pushed by the exit of the predecessor the new establishment has a good chance to establish at the market and expand.

The correlation between employment and establishment age may of course be driven by selection. This possibility is particularly important since new establishments have a very high probability of exiting again, so that the increase in average employment may be a simple composition effect. For this reason Table 8 Panel A shows how employment growth varies with establishment age. Here growth is computed on the establishment level (Employment current year minus employment last year divided by employment last year) and then averaged over the establishments. It is clear that the increase in employment in Figure 5 is not just driven by selection and instead all three new establishment categories show strong growth over all the years. Table 8 Panel B shows average wages. New establishments small and mid&big both show wages increasing with age, while the relationship is slightly negative for the other categories.[14]

When it comes to the composition of the workforce the entry types differ in the fraction of high skilled workers as can be seen in Figure 6.The Spin-Off pulled category stands out with a much higher fraction of high skilled workers, of around 10 percent, compared to around 5 percent for the other categories. Again this fits to our before mentioned theory of Spin-Offs. All entry types show no significant change over time in their workfoce.

[14] Schmieder (2010) shows that this cross-sectional relationship between establishment age and wages is very misleading.

5.7 Job Creation and Job Destruction

New establishments are often considered to be important contributors to overall job growth. However, as discussed before, spurious entries and ID Changes can significantly overstate the contribution by new entries. In order to assess the magnitude of this problem Figure 3 shows job creation over time by new EIDs. The solid black line represents the uncorrected measure which corresponds simply to total employment in new EIDs in their first year of appearance. In a typical year, there are about 300,000 - 400,000 jobs in new EIDs, which represents about 25 percent of total job creation in the economy, or about 2 percent of all jobs. It is not completely clear, which of the entry categories should be considered new entries, or corresponding to true job creation. If we apply the most conservative measure and use only the New Small and New (mid&big) category, the job creation number by new establishments is nearly cut in half and new establishments account for only about 13 percent of overall job creation. Furthermore the strong increase over time disappears and job creation by new establishments appears quite stable (though procyclical) in the long run. The Figure also shows corrected measures which are less conservative and for example include the Chunky entries or event the Spin-Offs.

Figure 4 shows the same for job destruction. Again the most conservative correction measure, shows a much smaller contribution of establishment exits to overall job destruction (about 15 rather than 25 percent) and decreases the long term time trend, although there is still a significant increase over time. Unsurprisingly our corrected measures for job creation and job destruction by entries and exits are also closer correlated with the business cycle.

6 Discussion

Every year there is a large number of newly appearing and disappearing establishment identifiers in the data. In this paper we provide a way of classifying these events in order to distinguish true establishment entries and exits from ID changes and restructuring events. We find that clear cut establishment entries and exits account only for roughly half of the employment in entering and exiting EIDs. There is a large number of establishments which come out of Spin-Off events or some sort of firm restructuring. There is also a sizable number of establishment identifiers, which disappear or appear in ways which are not easily classified. Finally there are sizable numbers of pure ID changes, particularly important among larger establishments.

Our rules to identify true entries and exits create time series that closely line up with the business cycle, while the other categories appear relatively acyclical. Across the board there are interesting time patterns which warrant further investigation. For example there has been a strong increase in establishment restructuring events in West Germany, while East Germany experienced a decline over the same time period.

Correcting job creation and destruction measures for spurious ID changes and restructuring events has very sizable effects on the overall numbers. Not correcting for such events overestimates the contribution of entries and exits to job creation and destruction by a factor

of around 2. The bias created by time inconsistent establishment identifiers and firm restructuring events appears to be quite significant and may be even more problematic within particular industries, regions, or establishment size classes. It is hard to know exactly how big this problem is for the interpretation of previous studies which identified establishment turnover solely using the EID entries and exits (sometimes in conjunction with arbitrary size cutoffs), but it seems important to take the potential biases into account.

Fortunately our study indicates that using worker flows will allow for significant improvements of the firm linkages and thus improve the overall data quality of the BHP. The Research Data Center of the IABwill make the crucial variables which all our definitions are based on available to users of the BHP, thus allowing researchers to either replicate our entry and exit categories, or create their own classification system.[15] In addition to classifying entries and exits, these variables should also be useful for other purposes. For example Schmieder, von Wachter and Bender (2010) use the same information on worker flows to distinguish true Mass-Layoffs from Outsourcing events to study earnings losses of displaced workers.

[15] The new entry and exit classification variables will be part of the new BHP 1975-2008 v.1 which will be available in September 2010. For further information on the BHP and data acess see http://fdz.iab.de

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Tables

Table 1: Classifying Entering and Exiting Establishments by Clustered Worker Flows

Panel A: Entries

		Predecessor exits MCI / Predecessor Employment			Predecessor continues MCI / Predecessor Employment			No predecessor MCI=0
	MCI / Inflows	<30%	30-80%	>80%	<30%	30-80%	>80%	
≤3 empl.	-	New Estab (small)	New Estab (small)	New Estab (small)	New Estab (small)	New Estab (small)	New Estab (small)	New Estab (small)
>3 empl.	<30%	New Estab (mid & big)	New Estab (mid & big)	New Estab (mid & big)	New Estab (mid & big)	New Estab (mid & big)	New Estab (mid & big)	New Estab (mid & big)
	30-80%	New Estab (chunky)	New Estab (chunky)	Unclear	New Estab (chunky)	New Estab (chunky)	Unclear	
	>80%	Spin-off pushed	Spin-off pushed	ID Change	Spin-off pulled	Spin-off pulled	Unclear	

Panel B: Exits

		Successor is entrant MCO / Successor Employment			Successor is existing estab. MCO / Successor Employment			No successor MCO=0
	MCO / Outflows	<30%	30-80%	>80%	<30%	30-80%	>80%	
≤3 empl.	-	Small Death	Small Death	Small Death	Small Death	Small Death	Small Death	Small Death
>3 empl.	<30%	Atomized Death	Atomized Death	Spin-off pushed	Atomized Death	Atomized Death	Atomized Death	Atomized Death
	30-80%	Chunky Death	Chunky Death	Spin-off pushed	Chunky Death	Chunky Death	Chunky Death	
	>80%	Unclear	Unclear	ID Change	Take-Over / Restruct.	Take-Over / Restruct.	Unclear	

Notes: MCI stands for Maximum Clustered Inflow: the size of the largest cluster of inflowing current workers. Inflows stands for the total number of workers that arrived since the previous year at a EID, which for a new EID is the same as total current employment. MCO stands for Maximum Clustered Outflows: the size of the largest cluster of outflowing current workers. Outflows are all workers that leave the EID until the next year, which for an exiting EID is the same as the total employment in the last year

Table 2: The Distribution of Clustered Worker Flows among Entering and Exiting Establishments (1975 - 2004)

Panel A: Entries

		Predecessor exits MCI / Predecessor Employment			Predecessor continues MCI / Predecessor Employment			No predecessor MCI=0
	MCI / Inflows	<30%	30-80%	>80%	<30%	30-80%	>80%	
≤3 empl.	-	124,863 2.63	187,893 3.95	199,348 4.19	1,076,374 22.64	181,330 3.81	43,249 0.91	2,137,606 44.96
>3 empl.	<30%	27,949 0.59	19,234 0.40	10,566 0.22	185,437 3.90	18,229 0.38	3,366 0.07	31,017 0.65
	30-80%	26,462 0.56	123,057 2.59	37,752 0.79	101,279 2.13	40,365 0.85	3,230 0.07	
	>80%	10,996 0.23	42,613 0.90	38,881 0.82	54,802 1.15	24,098 0.51	4,214 0.09	

Panel B: Exits

		Successor is entrant			Successor is existing estab.			No successor
		Successor is entrant MCO / Successor Employment			Successor is existing estab. MCO / Successor Employment			No successor MCO=0
	MCO / Outflows	<30%	30-80%	>80%	<30%	30-80%	>80%	
≤3 empl.	-	81,249 1.93	154,767 3.67	214,042 5.08	856,657 20.32	138,923 3.30	35,441 0.84	2,013,410 47.76
>3 empl.	<30%	25,794 0.61	33,476 0.79	22,794 0.54	187,734 4.45	188,902 0.45	2,823 0.07	24,391 0.58
	30-80%	15,407 0.37	122,272 2.90	63,657 1.51	70,763 1.68	28,458 0.67	2,618 0.06	
	>80%	3,158 0.07	23,059 0.55	37,625 0.89	24,277 0.58	12,375 0.29	2,050 0.05	

Notes: The first row in each cell shows the number of establishments, the second row the percentage of the total (among entries and exits). MCI stands for Maximum Clustered Inflow: the size of the largest cluster of inflowing current workers. Inflows stands for all the total number of workers that arrived since the previous year at a EID, which for a new EID is the same as total current employment. MCO stands for Maximum Clustered Outflows: the size of the largest cluster of outflowing current workers. Outflows are all workers that leave the EID until the next year, which for an exiting EID is the same as total employment in the last year.

Table 3: The Distribution of Entering and Exiting Establishment IDs over Entry/Exit Classifications (1975-2004)

Panel A: Entering establishment IDs				
	# Establishments	Percent	# Workers	Percent
New estab (small)	3,950,679	83.10	4,990,187	29.76
New estab(mid & big)	295,800	6.22	3,026,472	18.05
New estab (chunky)	291,163	6.12	3,996,527	23.83
Spin-off (pulled)	78,900	1.66	2,222,568	13.25
Spin-off(pushed)	53,609	1.13	883,627	5.27
ID change	38,881	0.82	711,358	4.24
Unclear	45,196	0.95	939,927	5.60
Total	4,754,228	100	16,770,666	100
Panel B: Exiting establishment IDs				
	# Establishments	Percent	# Workers	Percent
Small death	3,494,502	82.88	4,321,132	30.01
Atomized death	293,127	6.95	3,377,142	23.46
Chunky death	239,519	5.68	3,247,262	22.56
Spin-off(pushed)	86,451	2.05	1,628,907	11.31
Takeover	36,652	0.87	661,479	4.59
ID change	37,625	0.89	681,140	4.73
Unclear	28,267	0.67	479,912	3.33
Total	4,216,143	100	14,396,974	100

Table 4: The Distribution of Establishment Entry Categories by Establishment Size in Year of Entry

Number of Employees	ID - Change	Spin-off pulled	Spin-off / pushed	New estab. (small)	New estab. (mid&big)	New estab. (chunky)	Unclear	Total
Panel A: Number of Establishments								
$\leq$3				3,950,679				3,950,679
4-9	23,920	40,751	32,035		223,767	189,552	27,479	537,504
10-19	8,246	17,609	11,955		45,394	60,659	9,816	153,679
20-49	4,413	12,290	6,706		20,749	30,092	5,059	79,309
50-99	1,283	4,501	1,913		4,257	7,308	1,567	20,829
100-249	754	2,584	817		1,341	2,887	849	9,232
250-499	168	736	142		221	494	252	2,013
500-999	7/	295	3/		48	137	124	710
1000+	2/	134	/		23	34	50	273
Total	38,881	78,900	53,609	3,950,679	295,800	291,163	45,196	4,754,228
Panel B: Number of Workers in Establishment Type								
$\leq$3				4,990,187				4,990,187
4-9	134,527	235,190	186,434		1,191,253	1,075,007	160,023	2,982,434
10-19	108,725	235,982	157,679		601,661	809,100	131,756	2,044,903
20-49	131,382	371,269	200,541		605,412	887,678	150,062	2,346,344
50-99	87,753	310,513	129,741		282,668	493,186	107,708	1,411,569
100-249	111,644	388,131	119,620		194,604	423,171	128,156	1,365,326
250-499	57,311	252,191	48,499		74,517	164,336	87,939	684,793
500-999	49,022	198,914	20,089		30,207	89,934	85,822	473,988
1000+	30,994	230,378	/		/	54,115	88,461	471,122
Total	711,358	2,222,568	883.6//	4,990,187	3.026.4//	3,996,527	939,927	16,770,666

Note: Data confidentiality rules prohibit the publication of table cells with less than 20 observations. For this reason cells with less than 20 observations have been replaced by "/". Furthermore certain digits in the total counts have similarly been replaced by "/" to make it impossible to infer the cell counts indirectly.

Table 5: The Distribution of Establishment Exit Categories by Establishment Size in Year prior to Exit

Number of Employees	ID - Change	Takeover / Restructuring	Spin-off / pushed	Small Death	Atomized Death	Chunky Death	Unclear	Total
Panel A: Number of Establishments								
≤ 3				3,494,502				3,494,502
4-9	23,094	21,589	51,890		205,728	155,387	17,128	474,816
10-19	8,118	8,044	17,449		53,866	50,846	6,480	144,803
20-49	4,211	4,741	10,954		25,770	24,875	3,244	73,795
50-99	1,247	1,416	3,791		5,645	5,700	860	18,659
100-249	701	661	1,882		1,770	2,180	393	7,587
250-499	166	153	364		276	413	108	1,480
500-999	7/	3/	99		6/	86	4/	396
1000+	/	/	22		/	32	/	105
Total	37,625	36,652	86,451	3,494,502	293,127	239,519	28,267	4,216,143
Panel B: Number of Workers in Establishment Type								
≤ 3				4,321,132				4,321,132
4-9	130,837	122,783	297,728		1,121,023	887,946	99,784	2,660,101
10-19	106,760	106,881	235,032		718,318	673,998	84,519	1,925,508
20-49	125,143	141,657	329,951		752,926	729,853	95,700	2,175,230
50-99	85,551	97,192	260,665		379,241	384,408	58,061	1,265,118
100-249	105,547	97,431	277,574		251,065	317,098	57,725	1,106,440
250-499	56,632	50,630	122,586		91,457	136,819	36,885	495,009
500-999	46,526	26,592	65,339		39,727	57,362	27,954	263,500
1000+	24,144	18,313	40,032		23,385	59,778	19,284	184,936
Total	681,140	661,479	1,628,907	4,321,132	3,377,142	3,247,262	479,912	1.44e+07

Note: Data confidentiality rules prohibit the publication of table cells with less than 20 observations. For this reason cells with less than 20 observations have been replaced by "/". Furthermore certain digits in the total counts have similarly been replaced by "/" to make it impossible to infer the cell counts indirectly.

Table 6: The Correlation Between Establishment Entry Categories and Business Cycle Indicators

	# Establishments		# Employees	
	Change in UR	GDP Growth	Change in UR	GDP Growth
Panel A: Entry Variables Not Detrended				
ID Change	-0.098	0.17	-0.11	0.23
	[0.63]	[0.40]	[0.59]	[0.25]
Spin-Off Pulled	0.091	-0.021	-0.021	0.025
	[0.66]	[0.92]	[0.92]	[0.90]
Spin-Off Pushed	0.10	0.037	0.059	0.052
	[0.61]	[0.85]	[0.77]	[0.79]
New Small	-0.44*	0.45*	-0.62*	0.41*
	[0.023]	[0.017]	[0.00071]	[0.028]
New Medium/Big	-0.54*	0.51*	-0.58*	0.55*
	[0.0044]	[0.0057]	[0.0020]	[0.0025]
Chunky	-0.28	0.30	-0.29	0.36
	[0.17]	[0.12]	[0.14]	[0.060]
Unclear	-0.39*	0.36	-0.20	0.27
	[0.046]	[0.059]	[0.32]	[0.16]
Panel B: Entry Variables Detrended (Hodrick-Prescott Filtered)				
ID Change	0.28	-0.037	0.17	0.087
	[0.17]	[0.85]	[0.41]	[0.66]
Spin-Off Pulled	0.34	-0.31	0.22	-0.27
	[0.087]	[0.10]	[0.27]	[0.17]
Spin-Off Pushed	0.70*	-0.39*	0.48*	-0.31
	[0.000063]	[0.039]	[0.013]	[0.10]
New Small	-0.45*	0.38*	-0.64*	0.41*
	[0.021]	[0.043]	[0.00040]	[0.031]
New Medium/Big	-0.63*	0.48*	-0.69*	0.54*
	[0.00062]	[0.0096]	[0.000082]	[0.0028]
Chunky	-0.28	0.27	-0.31	0.35
	[0.16]	[0.16]	[0.12]	[0.064]
Unclear	-0.55*	0.45*	-0.12	0.19
	[0.0036]	[0.016]	[0.54]	[0.33]

Note: The table reports correlation coefficients between the respective variables. The first two columns show the correlation between the number of establishments in each of the establishment categories with the business cycle indicators (in the column headings), the second two columns the correlation between the number of employees in the categories with the business cycle indicators. P-Values are given in brackets.
* indicates that the correlation coefficient is statistically significant on the 5 percent level.

Table 7: The Correlation Between Establishment Exit Categories and Business Cycle Indicators

	# Establishments		# Employees	
	Change in UR	GDP Growth	Change in UR	GDP Growth
Panel A: Exit Variables Not Detrended				
ID Change	-0.11	0.27	-0.078	0.30
	[0.58]	[0.17]	[0.70]	[0.13]
Takeover/Restructuring	-0.17	0.38	-0.17	0.37
	[0.41]	[0.053]	[0.40]	[0.056]
Spin-Off Pushed	0.059	0.15	0.13	0.11
	[0.78]	[0.47]	[0.52]	[0.57]
Small Death	-0.17	0.34	-0.13	0.29
	[0.41]	[0.085]	[0.54]	[0.14]
Atomized Death	0.16	0.11	0.27	0.053
	[0.44]	[0.57]	[0.18]	[0.79]
Chunky Death	-0.22	0.41*	-0.20	0.40*
	[0.27]	[0.036]	[0.32]	[0.036]
Unclear	-0.30	0.40*	-0.18	0.36
	[0.14]	[0.039]	[0.38]	[0.063]
Panel B: Exit Variables Detrended (Hodrick-Prescott Filtered)				
ID Change	0.25	-0.021	0.24	0.053
	[0.23]	[0.92]	[0.23]	[0.79]
Takeover/Restructuring	-0.016	0.26	-0.0090	0.23
	[0.94]	[0.19]	[0.97]	[0.24]
Spin-Off Pushed	0.70*	-0.37	0.66*	-0.33
	[0.000072]	[0.056]	[0.00022]	[0.091]
Small Death	0.13	0.15	0.31	-0.00099
	[0.52]	[0.46]	[0.12]	[1.00]
Atomized Death	0.68*	-0.34	0.65*	-0.32
	[0.00012]	[0.084]	[0.00029]	[0.11]
Chunky Death	-0.14	0.39*	-0.072	0.35
	[0.48]	[0.046]	[0.73]	[0.074]
Unclear	-0.39*	0.37	-0.014	0.23
	[0.048]	[0.058]	[0.94]	[0.25]

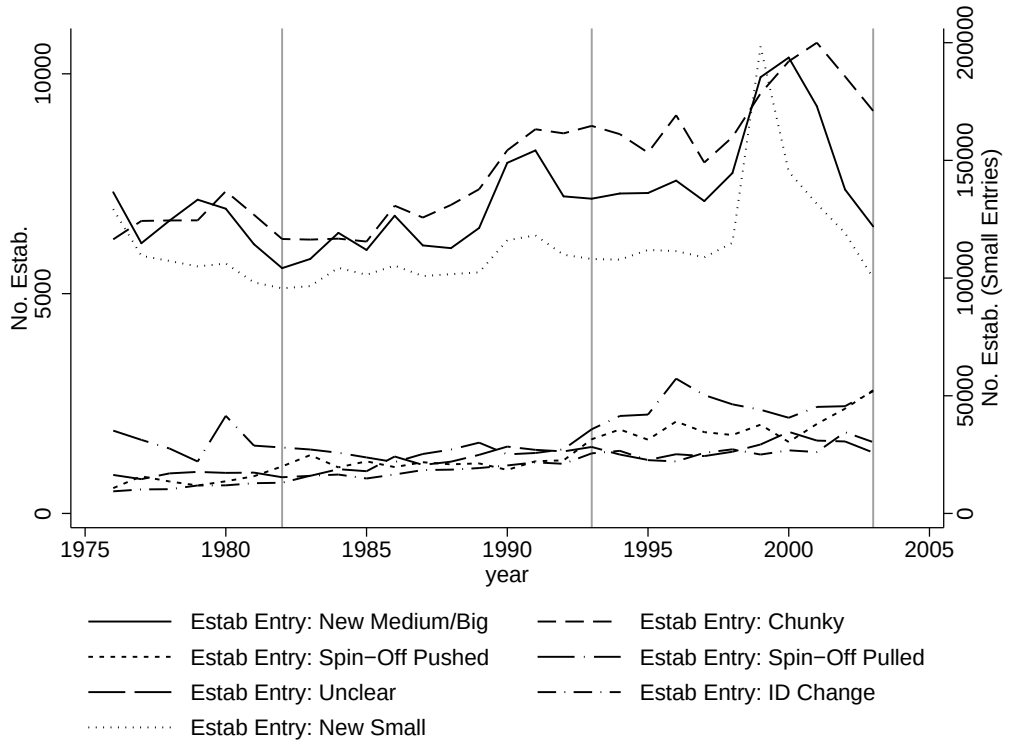
Note: The table reports correlation coefficients between the respective variables. The first two columns show the correlation between the number of establishments in each of the establishment categories with the business cycle indicators (in the column headings), the second two columns the correlation between the number of employees in the categories with the business cycle indicators. P-Values are given in brackets.
* indicates that the correlation coefficient is statistically significant on the 5 percent level.

Table 8: Workforce Characteristics by Entry Category and Establishment Age

	Establishment Age in Years									
	0	1	2	3	4	5	6-10	11-15	16-20	21-25
Panel A: Employment Growth										
ID Change		-0.034	0.008	-0.001	0.025	-0.001	0.006	0.002	-0.001	-0.011
Spin-off / pulled		0.063	0.005	0.013	0.044	0.004	0.007	0.006	0.002	0.002
Spin-off / pushed		0.009	-0.001	-0.014	0.010	-0.005	0.004	-0.013	0.000	0.008
New estab. (small)		0.252	0.122	0.100	0.086	0.080	0.059	0.040	0.033	0.027
New estab. (mid & big)		0.075	0.045	0.049	0.030	0.049	0.027	0.018	0.011	0.020
New estab. (chunky)		0.060	0.033	0.017	0.043	0.030	0.018	0.010	0.011	0.006
Reason Unclear		-0.031	0.026	0.000	0.027	0.024	0.008	0.005	0.011	0.000
Panel B: Daily Wage in Euro										
ID Change	74.6	69.5	69.6	73.9	70.9	69.3	69.5	69.6	69.5	70.4
Spin-off / pulled	92.4	88.2	87.4	89.1	85.1	88.6	85.8	83.3	84.4	85.8
Spin-off / pushed	76.3	70.8	69.1	69.9	70.2	69.6	68.0	68.0	69.4	69.7
New estab. (small)	48.4	46.5	52.8	53.7	54.7	54.7	55.2	55.9	57.6	58.4
New estab. (mid & big)	60.4	59.8	61.5	61.5	62.3	62.4	62.9	64.3	64.1	66.6
New estab. (chunky)	72.9	70.9	70.1	69.9	70.7	69.6	68.2	68.4	70.0	72.8
Reason Unclear	70.8	68.8	70.2	70.4	69.1	70.7	68.7	69.5	68.4	70.9

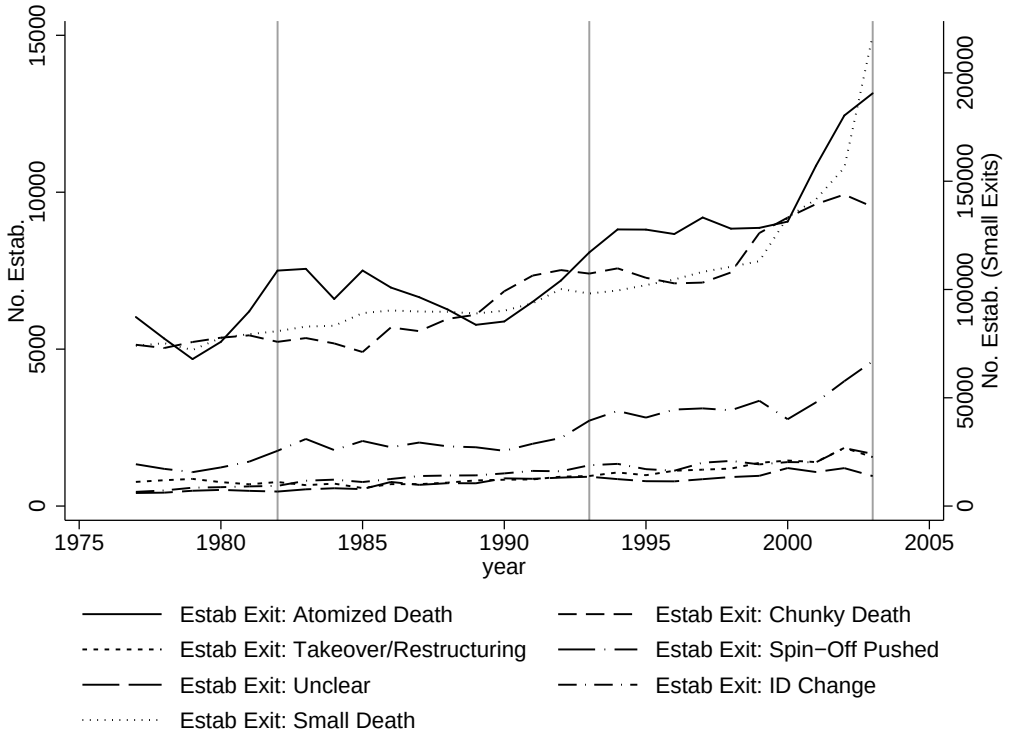
Figures

Figure 1: Number of New Establishments in each Entry Category from 1976 - 2004



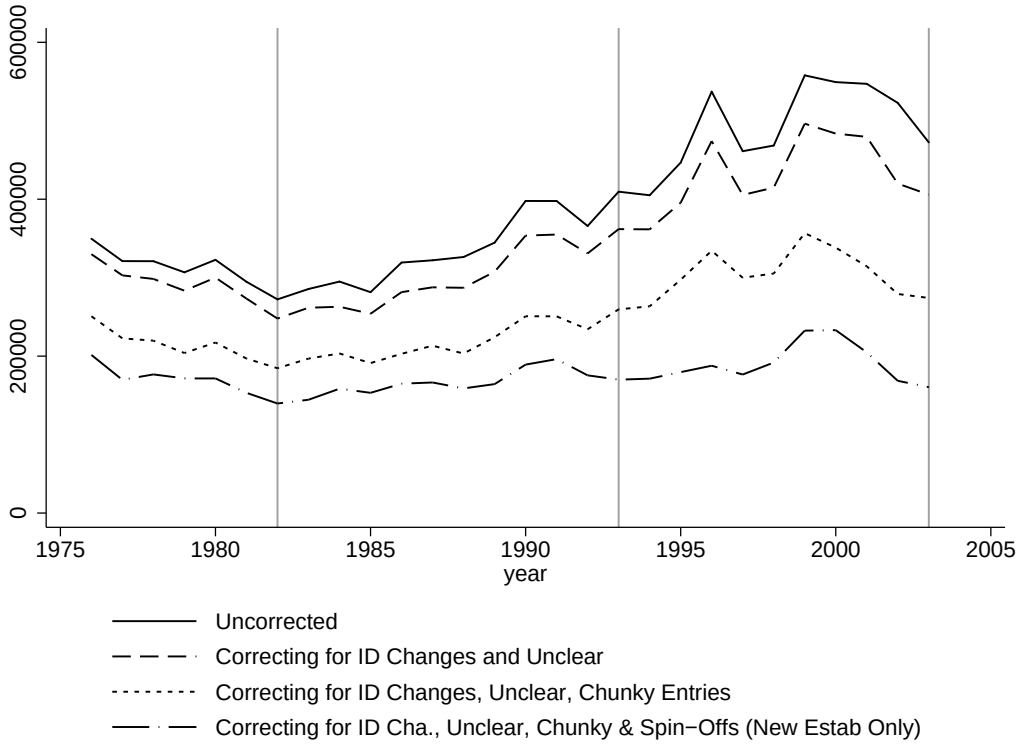
Notes: The figure shows the number of establishments in each of the 7 entry categories by year. Vertical lines indicate recession years. Data: Establishment History Panel.

Figure 2: Number of Exiting Establishments in each Exit Category from 1975 - 2003



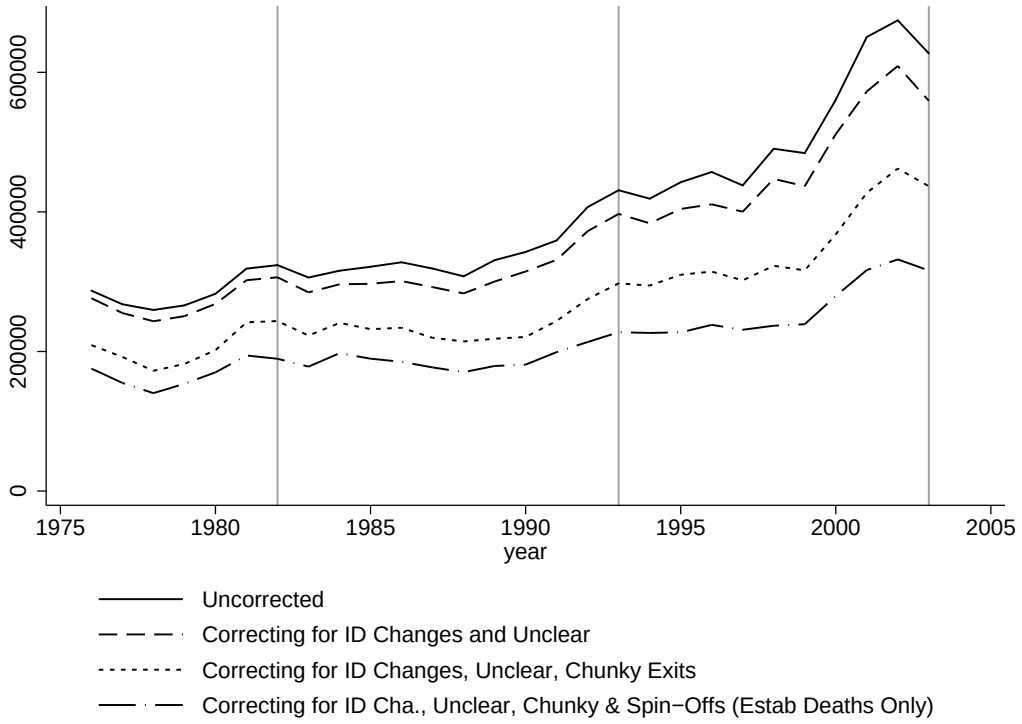
Notes: The figure shows the number of establishments in each of the 7 exit categories by year. Vertical lines indicate recession years. Data: Establishment History Panel.

Figure 3: Correcting Measures of Job Creation by New Establishments for Spurious Entries



Notes: The figure shows corrected and uncorrected measures of job creation by year. Vertical lines indicate recession years. Data: Establishment History Panel.

Figure 4: Correcting Measures of Job Destruction by Exiting Establishments for Spurious Exits



Notes: The figure shows corrected and uncorrected measures of job destruction by year. Vertical lines indicate recession years. Data: Establishment History Panel.

Figure 5: Establishment Size by Entry Category and Establishment Age

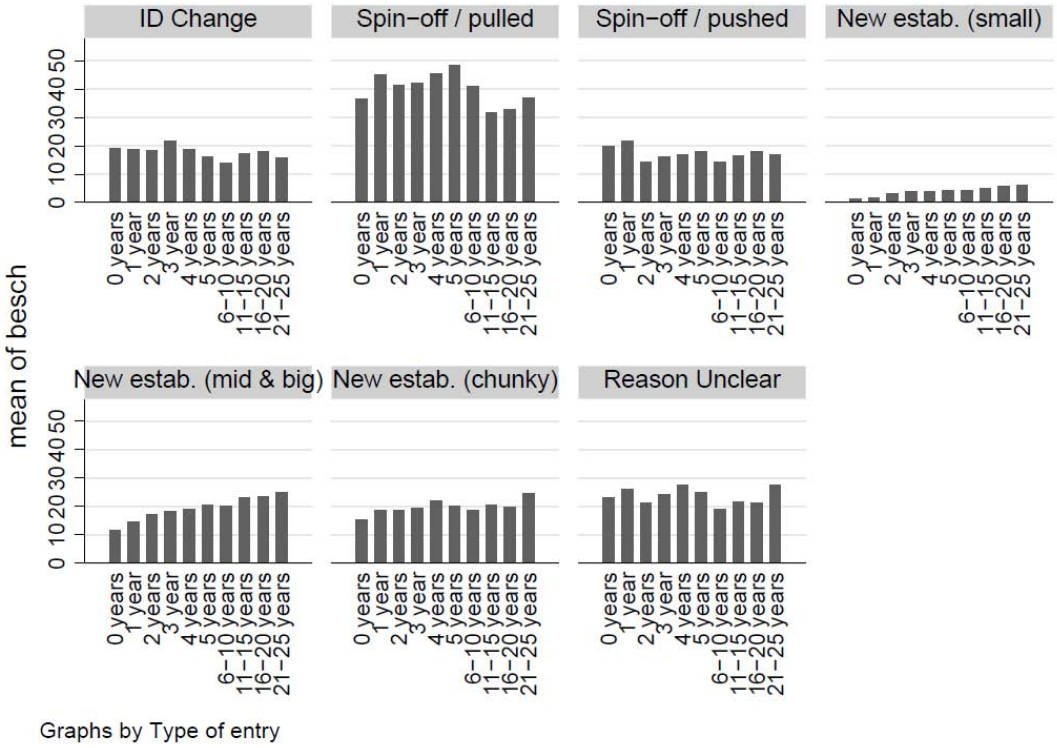
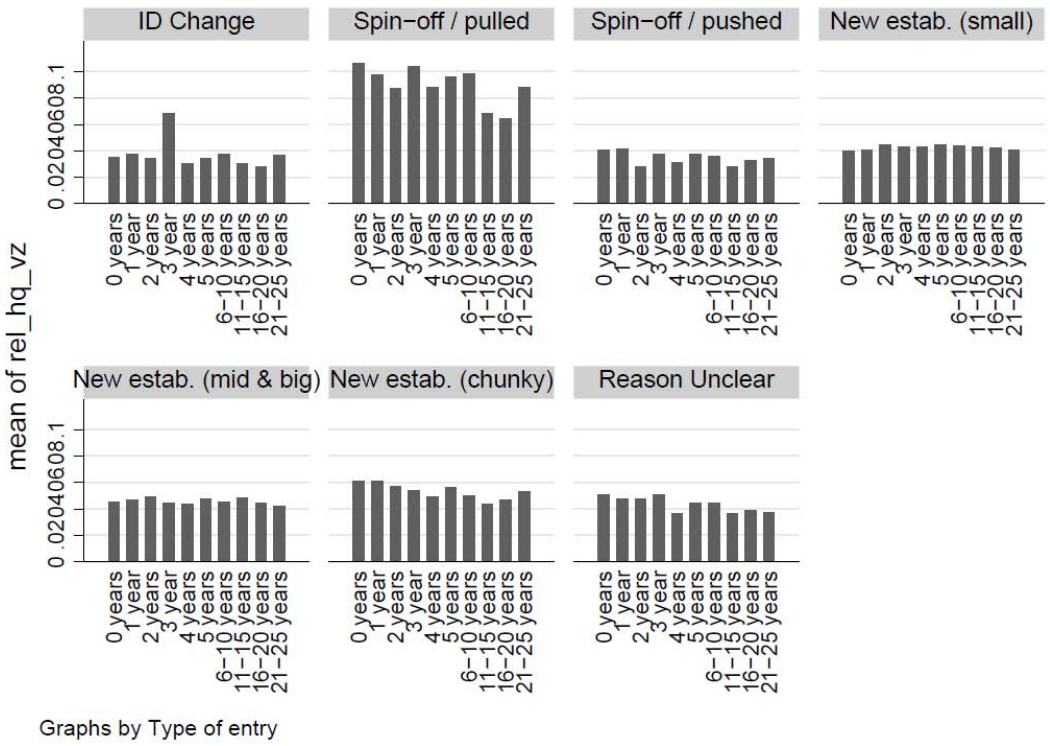


Figure 6: Fraction High Skilled Workers by Entry Category and Establishment Age



A Appendix Tables

Table A-1 : Establishment Entry Categories by Year - Number of Establishments

Panel A: West Germany

	ID - Change	Spin-off pulled	Spin-off / pushed	New estab. (small)	New estab. (mid&big)	New estab. (chunky)	Unclear	Total
1976	503	1,884	577	129,286	7,307	6,235	876	146,668
1977	547	1,674	845	109,455	6,147	6,654	781	126,103
1978	552	1,477	728	107,275	6,661	6,665	912	124,270
1979	637	1,182	637	104,953	7,138	6,667	945	122,159
1980	640	2,221	732	106,188	6,932	7,330	923	124,966
1981	689	1,543	847	98,169	6,124	6,794	929	115,095
1982	699	1,500	1,071	95,663	5,580	6,243	824	111,580
1983	859	1,455	1,328	96,602	5,789	6,230	856	113,119
1984	885	1,381	1,048	104,372	6,383	6,251	1,008	121,328
1985	796	1,274	1,185	101,405	5,994	6,185	961	117,800
1986	887	1,168	1,055	105,311	6,772	7,000	1,295	123,488
1987	987	1,353	1,165	100,861	6,097	6,731	1,105	118,299
1988	997	1,454	1,118	101,671	6,035	7,018	1,178	119,471
1989	1,033	1,611	1,139	102,444	6,494	7,375	1,333	121,429
1990	1,092	1,344	991	116,058	7,975	8,260	1,521	137,241
1991	1,163	1,376	1,188	118,157	8,257	8,739	1,447	140,327
1992	1,129	1,460	1,208	109,933	7,213	8,646	1,411	131,000
1993	1,367	1,915	1,688	108,100	7,160	8,816	1,513	130,559
1994	1,425	2,218	1,910	107,840	7,278	8,628	1,340	130,639
1995	1,213	2,250	1,678	111,946	7,289	8,208	1,217	133,801
1996	1,183	3,067	2,092	111,463	7,571	9,058	1,348	135,782
1997	1,378	2,692	1,850	108,795	7,105	7,983	1,305	131,108
1998	1,459	2,482	1,785	114,966	7,743	8,561	1,404	138,400
1999	1,340	2,359	2,020	198,391	9,924	9,555	1,569	225,158
2000	1,436	2,177	1,626	145,207	10,370	10,284	1,857	172,957
2001	1,396	2,424	2,036	131,542	9,262	10,708	1,658	159,026
2002	1,849	2,440	2,384	119,153	7,369	9,941	1,638	144,774
2003	1,623	2,781	2,803	100,078	6,530	9,158	1,386	124,359
2004	1,844	2,366	2,310	107,494	6,692	8,754	1,692	131,152
Total	31,608	54,528	41,044	3,272,778	207,191	228,677	36,232	3,872,058

Panel B: East Germany

	ID - Change	Spin-off pulled	Spin-off / pushed	New estab. (small)	New estab. (mid&big)	New estab. (chunky)	Unclear	Total
1992	114	3,070	1,124	115,417	32,786	8,454	481	161,446
1993	284	3,878	729	51,233	6,590	5,987	745	69,446
1994	395	2,466	719	41,531	6,035	5,103	728	56,977
1995	441	2,302	764	37,710	5,280	4,716	679	51,892
1996	521	2,317	1,136	31,929	3,896	4,483	618	44,900
1997	544	1,512	921	29,585	3,434	3,759	538	40,293
1998	556	1,104	931	48,786	3,563	3,673	595	59,208
1999	543	807	893	53,505	3,771	3,451	604	63,574
2000	559	828	776	34,633	3,001	3,129	603	43,529
2001	523	870	862	29,213	2,511	2,961	506	37,446
2002	661	743	890	26,520	2,057	2,655	502	34,028
2003	549	1,516	739	24,181	1,962	2,367	460	31,774
2004	612	785	686	23,453	1,736	2,079	452	29,803
Total	6,302	22,198	11,170	547,696	76,622	52,817	7,511	724,316

Table A-3 : Establishment Entry Categories by Year - Number of Workers in Establishments

Panel A: West Germany

	ID - Change	Spin-off pulled	Spin-off / pushed	New estab. (small)	New estab. (mid&big)	New estab. (chunky)	Unclear	Total
1976	6,403	42,624	8,247	162,757	72,400	85,592	14,053	392,076
1977	7,001	43,326	11,655	137,676	59,939	86,255	11,775	357,627
1978	7,921	33,229	11,357	135,952	66,958	84,056	15,301	354,774
1979	11,168	24,982	8,948	134,857	66,874	85,265	12,690	344,784
1980	9,200	37,481	9,725	138,092	64,524	89,162	13,959	362,143
1981	9,316	35,244	11,162	127,391	55,713	81,853	12,930	333,609
1982	12,080	31,912	16,090	121,937	46,210	68,904	13,502	310,635
1983	13,292	33,616	21,938	123,630	49,994	70,408	11,617	324,495
1984	14,644	32,571	14,722	133,322	57,307	64,947	18,103	335,616
1985	12,326	25,455	15,199	128,831	55,053	68,766	16,026	321,656
1986	18,360	26,540	13,978	136,057	59,826	85,260	21,902	361,923
1987	16,515	31,366	18,645	130,509	64,070	79,249	18,806	359,160
1988	16,485	29,984	16,356	132,024	54,305	88,999	23,480	361,633
1989	13,428	44,577	17,561	132,872	58,685	87,902	24,367	379,392
1990	16,831	48,035	15,614	148,459	73,187	107,811	28,393	438,330
1991	18,443	42,995	14,650	153,191	80,299	109,335	25,106	444,019
1992	15,155	45,680	16,218	143,795	65,406	102,556	20,767	409,577
1993	19,693	66,986	27,315	141,979	62,887	109,199	29,667	457,726
1994	20,306	69,184	28,045	142,592	65,342	105,401	24,712	455,582
1995	21,514	91,419	31,324	146,835	70,045	104,450	30,809	496,396
1996	21,938	111,502	41,125	146,381	78,854	147,292	42,776	589,868
1997	29,731	99,108	31,373	140,979	71,982	112,905	28,680	514,758
1998	27,742	93,713	27,018	150,064	78,972	117,366	28,748	523,623
1999	26,200	90,773	40,274	173,692	103,573	149,096	37,289	620,897
2000	27,419	79,612	32,501	163,065	120,933	155,978	42,874	622,382
2001	32,627	82,724	36,252	152,292	101,440	178,760	41,161	625,256
2002	47,372	79,929	42,735	137,507	76,560	154,129	60,298	598,530
2003	39,406	77,663	49,841	129,536	75,292	143,321	30,873	545,932
2004	40,547	89,441	41,456	124,614	70,851	130,249	51,655	548,813
Total	573,063	1,641,671	671,324	4,070,888	2,027,481	3,054,466	752,319	1.28e+07

Panel B: East Germany

	ID - Change	Spin-off pulled	Spin-off / pushed	New estab. (small)	New estab. (mid&big)	New estab. (chunky)	Unclear	Total
1992	1,676	84,826	28,416	177,046	368,820	140,088	7,136	808,008
1993	5,268	97,942	15,839	69,015	73,573	96,985	13,610	372,232
1994	6,995	58,419	14,058	57,836	75,365	88,210	16,480	317,363
1995	8,375	51,591	19,605	52,771	61,554	66,051	14,650	274,597
1996	7,760	68,988	17,010	44,724	45,617	89,310	14,618	288,027
1997	13,958	28,389	12,675	41,232	37,056	46,593	10,503	190,406
1998	8,658	18,842	11,896	65,364	39,076	44,724	10,816	199,376
1999	7,788	11,704	12,280	68,560	39,144	40,464	12,680	192,620
2000	9,886	15,833	10,968	45,348	31,473	38,832	10,228	162,568
2001	11,435	15,339	12,496	38,745	28,003	41,314	15,681	163,013
2002	13,731	15,132	12,657	34,541	22,709	33,743	11,728	144,241
2003	12,081	31,294	10,355	32,948	21,934	31,227	11,749	151,588
2004	14,633	15,561	9,707	29,135	19,393	27,499	10,180	126,108
Total	122,244	513,860	187,962	757,265	863,717	785,040	160,059	3,390,147

Table A-4 : Establishment Exit Categories by Year - Number of Establishments

Panel A: West Germany

	ID - Change	Takeover / Restructuring	Spin-off / pushed	Small Death	Atomized Death	Chunky Death	Unclear	Total
1975	373	807	898	70,092	5,405	4,600	391	82,566
1976	453	771	1,334	74,017	6,025	5,140	417	88,157
1977	498	824	1,186	75,222	5,339	5,036	428	88,533
1978	586	866	1,081	72,065	4,683	5,228	488	84,997
1979	602	763	1,232	77,665	5,232	5,365	516	91,375
1980	628	694	1,416	79,387	6,204	5,441	485	94,255
1981	644	767	1,761	80,768	7,503	5,233	463	97,139
1982	807	667	2,138	82,882	7,559	5,353	534	99,940
1983	842	716	1,785	83,262	6,599	5,183	568	98,955
1984	767	574	2,075	89,099	7,506	4,909	540	105,470
1985	863	700	1,875	90,329	6,963	5,692	769	107,191
1986	958	699	2,025	89,840	6,655	5,574	676	106,427
1987	974	748	1,903	89,702	6,266	5,965	729	106,287
1988	979	818	1,874	88,931	5,776	6,098	726	105,202
1989	1,042	840	1,760	90,206	5,882	6,845	883	107,458
1990	1,121	850	1,986	93,627	6,507	7,344	870	112,305
1991	1,108	936	2,170	100,218	7,187	7,519	908	120,046
1992	1,301	959	2,722	98,146	8,082	7,408	937	119,555
1993	1,345	1,072	3,030	99,534	8,815	7,575	859	122,230
1994	1,176	984	2,820	102,032	8,810	7,274	793	123,889
1995	1,127	1,127	3,075	104,628	8,668	7,097	788	126,510
1996	1,382	1,160	3,113	108,133	9,195	7,121	857	130,961
1997	1,440	1,194	3,053	110,512	8,839	7,444	926	133,408
1998	1,329	1,378	3,355	113,080	8,865	8,700	964	137,671
1999	1,402	1,451	2,768	133,369	9,064	9,192	1,211	158,457
2000	1,395	1,403	3,305	141,628	10,846	9,623	1,085	169,285
2001	1,847	1,855	3,981	156,269	12,445	9,925	1,209	187,531
2002	1,664	1,562	4,613	217,369	13,152	9,534	956	248,850
2003	1,926	1,870	4,095	157,378	11,935	8,687	1,203	187,094
Total	30,579	29,055	68,429	2,969,390	226,007	196,105	22,179	3,541,744

Panel B: East Germany

	ID - Change	Takeover / Restructuring	Spin-off / pushed	Small Death	Atomized Death	Chunky Death	Unclear	Total
1991	106	401	825	18,233	3,809	2,340	290	26,004
1992	263	454	796	22,308	3,101	2,531	451	29,904
1993	362	508	893	23,536	3,698	2,963	496	32,456
1994	401	536	963	24,532	4,219	2,884	449	33,984
1995	440	501	1,293	25,074	4,702	2,869	406	35,285
1996	502	487	1,355	25,339	4,881	2,860	337	35,761
1997	534	514	1,448	26,139	4,840	2,817	390	36,682
1998	525	630	1,365	39,206	4,432	3,139	432	49,729
1999	551	477	1,239	46,739	4,778	2,819	394	56,997
2000	524	483	1,401	41,216	5,142	2,951	352	52,069
2001	664	590	1,396	38,955	4,719	2,839	405	49,568
2002	571	460	1,236	40,470	4,002	2,478	342	49,559
2003	623	548	1,099	38,890	3,745	2,297	411	47,613
Total	6,066	6,589	15,309	410,637	56,068	35,787	5,155	535,611

Table A-6 : Establishment Exit Categories by Year - Number of Workers in Establishments

Panel A: West Germany

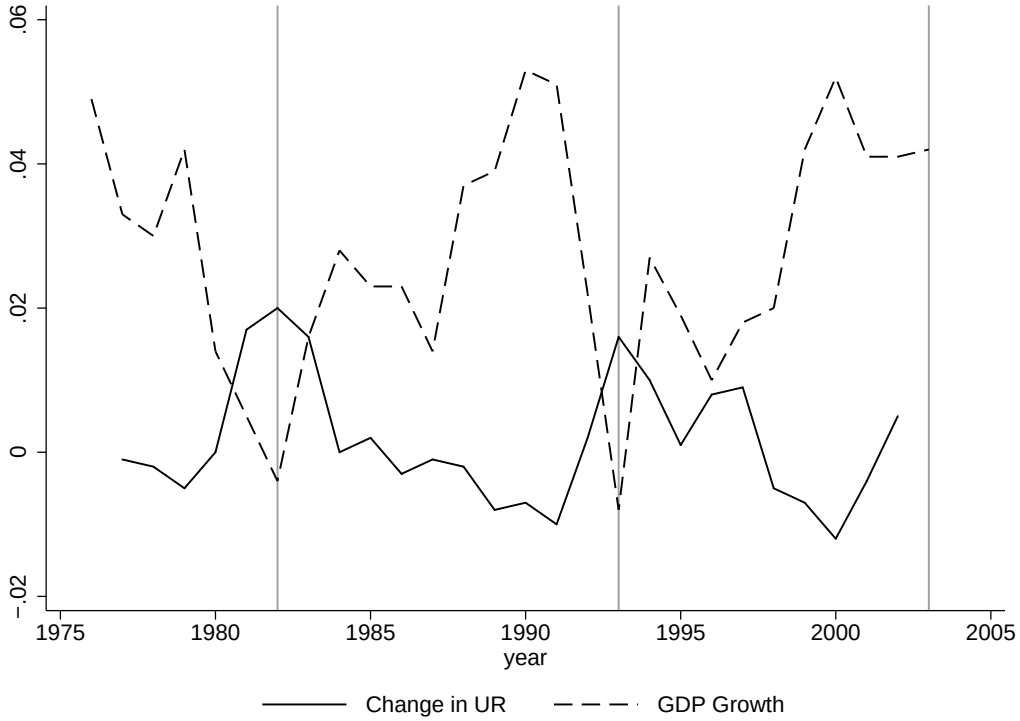
	ID-Change	Takeover / Restructuring	Spin-off / pushed	Small Death	Atomized Death	Chunky Death	Unclear	Total
1975	4,323	14,367	16,213	89,376	69,221	62,744	5,864	262,108
1976	5,516	11,452	22,150	94,327	81,208	67,177	5,334	287,164
1977	6,445	15,658	21,527	94,427	60,562	62,963	6,120	267,702
1978	10,827	15,543	16,528	90,942	49,376	70,965	5,346	259,527
1979	8,766	10,631	17,872	98,735	55,008	68,459	6,640	266,111
1980	8,686	9,189	22,556	101,394	68,756	66,314	5,766	282,661
1981	10,897	15,294	32,161	104,186	90,119	60,403	5,702	318,762
1982	11,494	10,065	43,991	105,728	83,868	62,650	6,011	323,807
1983	13,887	13,388	31,186	106,061	72,259	61,893	7,366	306,040
1984	11,533	8,943	34,507	113,195	84,352	55,308	7,915	315,753
1985	14,337	12,474	29,918	114,989	74,696	64,956	10,090	321,460
1986	15,918	13,129	35,627	113,863	71,384	66,905	11,035	327,861
1987	15,128	12,690	29,703	114,162	63,023	72,690	11,460	318,856
1988	12,372	13,950	30,052	113,454	56,951	68,801	12,170	307,750
1989	16,503	13,195	25,890	115,542	63,692	81,962	14,059	330,843
1990	15,819	14,538	25,146	118,992	62,224	93,707	12,199	342,625
1991	14,316	12,759	31,882	127,342	71,788	87,569	13,461	359,117
1992	19,661	15,216	46,381	126,285	87,295	97,215	14,920	406,973
1993	19,878	17,477	52,471	128,883	98,784	99,537	14,045	431,075
1994	20,676	15,033	52,837	132,260	94,370	89,206	14,632	419,014
1995	20,570	20,831	61,725	134,562	92,855	94,315	17,701	442,559
1996	30,492	21,108	55,285	139,655	98,537	96,340	15,822	457,239
1997	24,511	21,685	49,133	143,042	88,115	98,347	13,162	437,995
1998	26,251	22,649	63,284	146,779	90,130	124,497	16,922	490,512
1999	26,248	25,135	52,002	147,071	92,078	120,617	21,182	484,333
2000	31,189	27,880	60,509	160,267	119,171	143,568	18,060	560,644
2001	47,469	34,849	75,714	175,867	140,823	145,410	30,519	650,651
2002	41,047	34,628	95,664	190,343	141,596	146,929	24,361	674,568
2003	42,181	42,515	78,223	193,138	122,998	122,366	25,715	627,136
Total	546,940	516,271	1,210,137	3,634,867	2,445,239	2,553,813	373,579	1.13e+07

Panel B: East Germany

	ID-Change	Takeover / Restructuring	Spin-off / pushed	Small Death	Atomized Death	Chunky Death	Unclear	Total
1991	1,655	12,611	65,565	24,106	146,752	80,603	7,936	339,228
1992	4,645	11,877	27,045	29,778	50,596	60,413	8,595	192,949
1993	6,366	8,867	25,496	31,889	55,904	49,291	9,002	186,815
1994	7,843	13,940	32,057	34,196	59,088	50,124	6,707	203,955
1995	6,706	7,966	28,305	34,830	67,475	46,851	7,853	199,986
1996	12,118	6,803	28,987	35,685	65,804	39,835	5,143	194,375
1997	7,989	8,273	28,364	36,851	61,926	40,120	5,156	188,679
1998	7,609	9,449	23,799	52,531	51,288	39,312	7,234	191,222
1999	9,922	6,228	22,502	60,616	54,436	33,137	7,818	194,659
2000	11,595	8,955	25,705	54,274	56,336	40,329	5,711	202,905
2001	14,050	8,450	25,233	51,003	53,255	36,421	6,839	195,251
2002	12,780	8,399	22,260	49,027	45,496	31,526	5,925	175,413
2003	15,142	8,868	19,776	50,957	39,497	30,026	5,512	169,778
Total	118,420	120,686	375,094	545,743	807,853	577,988	89,431	2,635,215

B Appendix Figures

Figure B-1 : Business Cycle Indicators 1976 - 2004



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