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CASH CONSTRAINTS AND BUSINESS START-UPS: DEUTSCHMARKS VERSUS DOLLARS

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ABSTRACT

In this paper we analyze microdata to explore differences in the rates at which American and German workers leave their salaried jobs to become self-employed. We document that the rate of self-employment is lower in Germany than in the U.S., and the rate of transition from wage-earning to self-employment is lower as well. We find evidence that German workers face liquidity constraints that are more severe than those of their American counterparts. Further, the difference in transition rates cannot be attributed to observable differences between German and American workers.

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1. Introduction

Self-employment is receiving substantial attention in both the U.S. and Europe. The notion that self-employment is a good thing for the individual and for society has a long history in the U.S.; witness Horatio Alger's stories and their echoes in today's culture. In contrast, as Sullivan and Smeeding [1997, p. 2] note, Europeans have traditionally viewed small businesses not as a source of economic dynamism but rather "as a throwback to an earlier (and gentler) era when small farms and family stores dominated rural and small-town economic life." However, European attitudes are changing. As a recent newspaper article indicated,

> In a historic switch that has both amazed and alarmed financial analysts, investors from Frankfurt to Brussels to Amsterdam have fallen in love with entrepreneurs… Compared with the attraction in the U.S.…the infatuation here is in its early stages. But compared with Europe's past, it is a revolution. (Andrews [1998, p. D1]).

Loutfi [1991, p. 1] suggests two reasons for this change of heart. First, with the faltering of the welfare states in Europe, many believe that "some responsibility should be shifted on to entrepreneurs from a state unable to ensure adequate levels of output and productive employment." Second, a positive attitude toward self-employment may be associated with "disillusionment with central planning and a policy shift towards deregulation." In any case, many Europeans now fear that, unless entrepreneurship increases, "the continent will remain short of jobs and job-creating technology." (Carr [1996]).

There is now an extensive econometric literature on self-employment. Much of the focus has been on two related questions: at a given point in time, what variables determine who is self-employed and who is a wage-earner; and during a given period of

time, who makes a transition from wage-earning to self-employment. Examinations of one or both of these questions using U.S. data include Evans and Jovanovic [1989], Fairlie and Meyer [1996], Holtz-Eakin, Joulfaian, and Rosen [1994], Bruce [1998], and Holtz-Eakin and Dunn [forthcoming]. Studies on European countries include Cowling and Mitchell [1997], Robson [1997] and Taylor [1996] on the United Kingdom; Carrasci [1997] on Spain; Johansson [1998] on Finland; and Harhoff, Stahl, and Waywood [1996], Pfeiffer and Pohlmeier [1992], and Georgellis and Wall [1999] on Germany.[1] A key issue in many of these studies is whether lack of access to capital inhibits the transition to self-employment. This line of research mirrors the concern of many Europeans that their financial institutions are not conducive to the formation of small businesses. "Europe has not had stock markets geared to listing small, risky start-ups." According to these accounts, the problems associated with lack of access to capital are exacerbated by the fact that European tax structures require that new ventures produce "a large cash flow in the early years" (Carr [1996]).

Is it, in fact, harder to become an entrepreneur in Europe than in the U.S.? Making international comparisons on the basis of results from a group of individual country studies is difficult given that each study focuses on somewhat different issues and analyzes different variables. There have, however, been a number of papers explicitly devoted to analyzing data from several countries at a time, with an eye toward explaining, or at least documenting, differences in their self-employment rates. Examples include Aaronson [1991], Loutfi [1991], and Sullivan and Smeeding [1997], who analyze aggregate self-employment rates in various developed economies and how they have evolved over time. An important finding in such work is that "there has not been any obvious worldwide trend in Ψ the extent of self-employment relative to wage employment" (Sullivan and Smeeding [1997, p. 1]). However, as Aaronson notes, the

interpretation of aggregate self-employment trends is difficult—without microdata on individuals' decisions, it is hard to know what to make of changes in rates over time.

There have, in fact, been a few studies that employ microdata in cross national comparisons of self-employment. Schutze [1998] looks at self-employment rates in the U.S. and Canada, taking advantage of the U.S. Current Population Survey and the Canadian Survey of Consumer Finances. Blanchflower and Meyer [1994] compare transition rates to self-employment among the young in the U.S. and Australia, using the U.S. Survey of Income and Program Participation and the Australian Longitudinal Survey. In both papers, a limitation is that the survey questions in the two countries being studied are not necessarily comparable—the surveys were developed by different organizations for different purposes.

In this study, we take advantage of microdata sets for the U.S. and Germany that are from about the same period of time and are based upon very similar survey instruments. The U.S. part of the analysis is based on the familiar Panel Study of Income Dynamics (PSID), while the German part is based on the German Socio-Economic Panel (GSOEP). The GSOEP was modeled after the PSID, and has an almost equivalent design. While there is no "typical" European nation, Germany is an interesting country in this context because it seems particularly concerned with the possible consequences of not having enough entrepreneurs. (An article in the *Economist* called entrepreneurship Germany's "scarcest resource," and noted former Chancellor Helmut Kohl's enthusiasm for new high-tech enterprises (Carr [1996]).) A further advantage of the two data sets is that they are longitudinal, allowing us to analyze individuals' transitions into self-employment. That is, we can look at an individual's decision to move into self-employment as a function of his or her characteristics prior to the transition. As Blanchflower and Meyer [1994, p. 2] note, "Longitudinal analyses…have the advantage of using past values of individuals' characteristics to explain transitions. We can be more confident that past values are a cause rather

than a consequence of being self-employed."

In Section 2 we provide statistical summaries of self-employment in the U.S. and Germany. We compare overall rates in the two countries and how they have changed over time. We also examine how the economic and demographic characteristics of the self-employed and wage-earners differ in the two countries. Section 3 focuses on multivariate analysis of transitions to self-employment. Several major conclusions emerge. First, liquidity constraints are an impediment to becoming self-employed in both countries, but more so in Germany than in the U.S. This is consistent with the popular view that European entrepreneurship is hindered by the lack of institutions for allocating funds to small businesses. Second, differences in the rate of transition into self-employment do not stem from differences in the characteristics of the two populations. Rather, the cultural and economic climates seemingly differ in ways that make Germans less likely to pursue self-employment than their American counterparts with similar observable attributes. We conclude with a summary and suggestions for future research.

2. Self-Employment in Germany and the United States

As noted above, our comparison of German and United States self-employment is based upon two data sets, the GSOEP[2] and the PSID. Since 1968, the PSID has interviewed annually a representative sample of some 5,000 families. (For a more complete discussion of these data, see Hill [1992].) The GSOEP panel was started in the spring 1984. It comprises about 6,000 families that are representative of the German population and include an oversample of "guest workers." For a more complete discussion of the public use version of these data, see Wagner, Burkhauser, and Behringer [1993].

In this section, we use these data to paint a statistical portrait of self-employment in the two countries.[3] Our analyses are based upon individuals who are aged 18 to 60. Because of our

focus on year-to-year transitions from wage-earnings to self-employment, we keep only those observations on individuals who work at least two consecutive years. For the GSOEP we have data from 1988 to 1995, and for the PSID from 1984 to 1991.[4] To begin, in Figure 1 we graph self-employment rates by country and gender. We base our computations on the self-reported employment status of the individuals in each survey. Specifically, in the PSID, individuals were asked "On your main job, are you self-employed, are you employed by someone else, or what?" Those who responded "self-employed only" or "both someone else and self" are classified as self-employed.[5] In the GSOEP, the key question is "What is your current occupational status?" We use those individuals whose response is "self-employed."

Several observations are clear from the figure: 1) Self-employment rates are higher in the United States than in Germany.[6] 2) In both countries, self-employment rates are higher among men than women. 3) While there is some tendency for self-employment rates to increase over time, the trends are neither dramatic nor monotonic. There is not too much to be said about comparative trends, because the data sets overlap only for four years, 1988 through 1991, inclusive.

Previous research has suggested that various demographic and economic variables are correlated with the probability that an individual is self-employed in a given year (see, e.g., Fairlie and Meyer [1996]). Are these correlations the same in the United States and Germany? That is, do the self-employment rates differ because individuals in the two countries have different characteristics? In Table 1, the first column shows the mean values and standard deviations of various personal attributes for wage-earners in the German sample; the second column shows comparable statistics for the self-employed; and the third and fourth columns have the same information for the U.S.

The figures in the table suggest that, on average, self-employed individuals are older than wage-earners in both countries. In both countries, the self-employed are less likely to be "minorities." We put this term in quotations to stress that it refers to quite different population groups in the two countries. In the U.S. it refers to non-whites, and in Germany, it refers to "guest-workers." (There is no ethnicity variable in the GSOEP.) Perhaps a sensible way to interpret this finding is that the self-employed in both countries are less likely to be "outsiders." In both countries, the self-employed are less likely to be female,[7] and relative to wage-earners, the self-employed are more likely to have had some education beyond college.[8] In both countries, the self-employed are more likely to be married, more likely to own their own homes, and have higher earnings. (Earnings figures are reported in the currencies of the respective countries; in 1984, the rate of exchange was 2.85 DM per dollar.)[9]

The PSID and the GSOEP both provide some data on wealth. The PSID asked the amount of wealth in 1984, and reports the dollar value. In the GSOEP, the wealth question was asked in 1988, but all that is reported is the bracket within which the value falls. Still, Table 1 makes clear that the underlying tendency in both data sets is the same—on average the self-employed have higher wealth than wage-earners.[10] In short, the economic and demographic characteristics of the self-employed relative to wage-earners are strikingly similar in the United States and Germany.

So far we have discussed the characteristics of the self-employed in both countries; the next question is what they do. Table 2 shows the occupational and industrial composition of the self-employed and wage-earners in the two countries. The industrial distribution of the self-employed is remarkably similar. The major difference is the higher concentration of the self-employed in manufacturing in Germany, at the expense of fewer in the construction and finance-related sectors. One finds greater differences in occupations. The self-employed in Germany are

more likely to be professional, craft-related, and farmers than their U.S. counterparts, while the U.S. has greater proportions in managerial, sales, and clerical occupations.

3. Transitions to Self-Employment

We now turn from the issue of who *is* self-employed to the distinct but related question of who *becomes* self-employed. In the U.S. data, 2.97 percent (standard error = 0.12 percent) of wage earners made a transition to self-employment from any given year to the next. In Germany, the comparable figure is smaller by almost a third, 1.12 percent (standard error = 0.073 percent). One of the main questions we seek to answer is why the transition rates differ so much.[11] As noted earlier, both popular accounts and the academic literature focus on differences in lack of access to capital. To the extent that capital constraints are present, individuals cannot borrow to finance their entrepreneurial ventures, and must rely upon their own resources. Hence, the magnitude of an individual's own wealth has an impact on the likelihood that he or she becomes self-employed. (For a formalization of this notion, see Evans and Jovanovic [1989].) In this context, one must note that the figures in Table 1 on the wealth positions of the self-employed versus wage earners tell us little about causation. Individuals may be wealthy because they are self-employed, not self-employed because they are wealthy. That is why we will focus on transitions to self-employment, looking at whether the probability that a wage-earner becomes self-employed increases with the level of his or her wealth prior to the transition.[12]

We posit that the probability that an individual transits from wage-earning to self-employment between year t and year t+1 depends on variables dated t. Following the practice in the literature, the variables included are a quadratic in age, "minority" status, gender, earnings, education, marital status, number of children aged 18 and under in the household, home ownership, wealth, and time effects.

In principle, it would be desirable to estimate identical models for Germany and the United States. In practice, however, our empirical models differ because the years for which all of the variables of interest are available do not coincide in the two data sets and because the wealth data differ. With respect to the latter, the U.S. variable is continuous, while the GSOEP contains a set of dichotomous variables. Further, the PSID contains some interesting data on inheritances that the GSOEP does not. These variables might be useful in investigating whether liquidity constraints are present. Specifically, in 1989 the PSID asked whether the individual had ever received an inheritance, and if so when. (A similar question is asked in the GSOEP, but there were not enough positive responses to allow meaningful analysis.) Our U.S. model includes the amount of any inheritance received at the beginning of the transition period, i.e., year *t*.[13] Several investigators have argued that inheritance is particularly useful in this context because it is less likely to be endogenous than is the individual's accumulated wealth. (See Blanchflower and Oswald [1998], Holtz-Eakin, Joulfaian, and Rosen [1994], and Taylor [1998].)

In 1984 the PSID also asked if the individual was *expecting* any inheritances, and if so, in what amount. We include both an indicator variable for whether an inheritance is expected, and a continuous variable with the amount. The presence of both the actual and the expected inheritance provides an alternative way to gauge the importance of liquidity constraints. To see why, note that in the absence of liquidity constraints, the timing of increments to wealth does not matter. Individuals can simply borrow against future receipts. Thus, expected inheritances have the same impact as actual inheritances (or any other source of wealth). However, in the presence of borrowing limitations, the actual *arrival* of an inheritance provides resources to finance a transition, while the *expectation* of an inheritance does not. Thus, the former should raise the probability of becoming self-employed, while the latter should not. The means and standard

deviations of the inheritance and expected inheritance variables appear toward the bottom of Table 1.

It makes sense to estimate the best model we can for each country, given the variables available in the respective data sets. This comes at the cost of making it harder to compare the results. Later in this section we also estimate models with identical specifications and time periods in order to enhance comparability.

3.1 Best Data Set for Each Country

Under the assumption that the error term in the transition process is normally distributed, we can use the conventional probit statistical model.[14] The results are reported in Table 3. The table suggests striking qualitative similarities in the German and U.S. transition processes. In both countries:

(a) The probability of making a transition from wage-earning to self-employment first falls with age and then increases. In Germany, the turning point is age 48, while in the United States the probability begins to rise a bit earlier, age 41.

(b) "Minorities" are less likely to become self-employed, although the effect is statistically insignificant for German guest workers while it is significant for American blacks.

(c) Women are less likely to become self-employed.

(d) Individuals with a higher opportunity cost (measured by earnings) of becoming self-employed are less likely to make a transition, although this coefficient is imprecisely estimated in both equations.

(e) Having education past college increases the likelihood of becoming self-employed.

(f) The point estimate for the effect of children is positive but insignificant.

We turn now to our main object of concern, the impact of initial wealth on the probability of becoming self-employed. First consider the German results. The point estimates on the wealth categories are strictly increasing, suggesting that, as wealth increases, so does the probability of becoming self-employed. Taken as a group, these dichotomous variables are statistically

significant—a chi-square test of whether the four coefficients are jointly different from zero produces a statistic of 47.29, which rejects the null hypothesis at conventional significance levels. Hence, the data are consistent with the notion that Germans who seek to become self-employed face liquidity constraints.

Turning to the U.S. results, the coefficients on a number of variables are relevant to the issue of liquidity constraints. First, the wealth coefficient is positive and exceeds its standard error by more than a factor of three. Just as in the German data, the probability of becoming self-employed increases with wealth. This finding is reinforced by the coefficients on the three inheritance variables—the larger the size of an inheritance received by an individual, the greater the probability that he or she becomes self-employed. (The chi-square test with three degrees of freedom on these variables is 8.69, which is significant at the 0.034 level.) Finally, the notion that liquidity issues are at play is buttressed by the fact that the expected inheritance variables are statistically insignificant. The *expectation* of receiving an inheritance has no impact at all. Rather, the individual requires wealth (or inheritance) in hand.

The results in Table 3 suggest, then, that both German and United States workers who seek to become self-employed face liquidity constraints. A sensible question is whether the constraints are more severe in one country or the other; that is, is the importance of having personal wealth to replace market finance greater in Germany or the United States? A natural way to answer is to compute the elasticity of the probability of making a transition with respect to changes in wealth. Because the probit equation for the United States is linear in wealth, computing the elasticity is straightforward—we increase the wealth of everyone in the sample by a certain amount, use the probit coefficients to find the implied change in the probability of making a transition, and calculate the implied elasticity.[15] This calculation suggests that the elasticity of the probability of becoming self-employed with respect to wealth is 0.0568.

Computing the German elasticity is less straightforward because wealth is a categorical variable in the GSOEP. We again begin by finding the probability of making a transition using actual values of the variables and the coefficients from Table 3 (this time using the first column in each panel). Then we find how the probability changes when we move the individual from his current wealth bracket to the next higher wealth bracket. The change in wealth associated with a movement from one bracket to the next is taken to be the difference between the midpoints of the two brackets.[16] Converting the change in the probability with respect to the change in wealth into an elasticity and taking the average over observations leads to an elasticity of 0.680, more than ten times the U.S. value. Clearly, there is substantial arbitrariness in the computation of the German elasticity. However, an alternative calculation done below confirms the basic message: in Germany, the probability of making a transition to self-employment is substantially more responsive to wealth than in the United States, suggesting that German workers who seek to make the change face greater capital market constraints.

3.2 Uniform Specification

A problem with the comparisons based on Table 3 is that the time periods used to estimate the German and U.S. models are not exactly the same. Even given the inclusion of time effects, this may render comparisons problematic. Further, the wealth variables in the two specifications are quite different. In the U.S. model, wealth is measured continuously and there is information on inheritances. The German wealth variable is categorical and there are no inheritance data. We can achieve better comparability by using only the years in which the samples overlap, by converting the U.S. wealth variable into a set of categorical variables (measured in Deutschmarks), and by deleting the U.S. inheritance information.[17,18] In short, we can obtain more directly comparable results at the cost of reducing the number of observations and decreasing the quality of the U.S. wealth data. Incurring this cost allows us to see whether the United States-

German differences in wealth elasticities noted above are merely artifacts of the differences in specification. Further, it allows us to decompose differences between the U.S. and German transition probabilities.

The results are reported in Table 4. The first thing to note is that for both the German and U.S. equations, the statistically significant coefficients are all of the same sign and generally at least roughly of the same magnitude as their counterparts in Table 3. In particular, the GSOEP coefficients on the wealth categories exhibit the same patterns in both tables. Hence, the results are not sensitive to the time period used in the estimation. Turning now to the U.S. column in Table 4, the coefficient on WEALTH1 is negative, small in absolute value, and statistically indistinguishable from zero. Transition probabilities for this group are basically the same as those in the lowest (omitted) group. But in the WEALTH2 group, the coefficient is positive and statistically significant, and the coefficient thereafter increases with wealth. This is no great surprise, given the fact that when wealth was entered linearly in Table 3 it had a positive coefficient. Still, it is comforting to see that the effect is still present in the smaller sample, and does not depend on the presence of the inheritance variables.

With the results in Table 4, we can make direct comparisons of the impact of wealth on the probability of becoming self-employed. To begin, we compute a “baseline” probability for Germany by setting all the wealth variables equal to zero and the other variables equal to their actual values, multiplying by the corresponding coefficients in the first column, and using the probit transformation. The same procedure employing U.S. data and the coefficients in the second column generates the U.S. baseline. Next, we repeat the exercise for each country, this time setting WEALTH1 equal to 1 and recording the induced change in the probability. Then we set WEALTH1 back to zero and set WEALTH2 equal to 1, allowing us to see how moving from the first to the second wealth category changes the probability, and so on.

The computations, which are reported in Table 5, are quite striking. In Germany, a move from the lowest wealth class to the WEALTH3 class has the cumulative effect of increasing the probability of a transition by more than a factor of 10, from 0.00733 to 0.118. The comparable calculation for the U.S. takes the probability from 0.0277 to 0.0685, an increase of less than a factor of three. And moving into the highest wealth bracket in Germany generates even more dramatic results, increasing the probability by 0.227, as opposed to the U.S. figure of 0.0761. These findings mirror the elasticity calculations done using the coefficients in Table 3 and reinforce the basic conclusion: Transition rates to self-employment increase with wealth in both Germany and the United States, but the sensitivity is much higher in Germany, suggesting that liquidity constraints are more of an issue there.

3.3 Sources of Differences in the Transition Rates

Thus far, we have focused on the effect of wealth upon transition probabilities. However, a glance at either Table 3 or Table 4 suggests that other factors are also at work. This raises the question of whether one can "explain" the large difference between the average probabilities of a German worker and a U.S. worker making a transition to self-employment (0.0112 and 0.0297, respectively). There are two possible sources for the difference. First, Germans may have fewer of the attributes that are characteristic of individuals who make transitions to self-employment in the United States. For example, the German population is older than the U.S. population (see Table 1). Alternatively, it may be that, given the cultural and economic environment in Germany, even if Germans had exactly the same (observable) characteristics as Americans, their transition rate to self-employment would be lower.

The parameter estimates in Table 4 allow us to address this issue. Specifically, we take the U.S. coefficients from the second column and use them to find the transition probability for an individual who has the mean value of each characteristic in the U.S. sample, which turns out to be

0.0288. Next, we use the same set of coefficients to find the transition probability of an individual who has the mean value of each characteristic in the German sample. That is, we compute the transition rate as if the "average German" were acting according to the American model. This probability is 0.0315, which is not very different from the figure using American means. Thus, differences in German and U.S. transition rates are not due to differences in the characteristics of the workers, but to differences in the underlying transition processes as reflected in our parameter estimates. Of course, we could just as well substitute average American characteristics into the German model (i.e., use the coefficients from the first column of Table 4). The equation based on GSOEP data predicts a transition rate of 0.00820 for a person with the average German characteristics and 0.00886 for a person with the average American characteristics. Thus, regardless of which country we use as a baseline, the story is the same.

We have shown that the differences in transition rates are due to differences in the coefficients governing the transition processes, rather than the characteristics of the two populations. What aspects of the economic or cultural environment might account for the dissimilarities? Several possibilities were listed in a recent *Economist* article (see Carr [1996]):

(a) Germany lacks a " 'food chain' for entrepreneurs. In America, venture capital comes with advice about managing a fast-growing company. There are lawyers and consultants who specialize in the field." But a typical German entrepreneur has "to learn everything himself."

(b) "Regulation is time-consuming and expensive" relative to the U.S.

(c) The European culture discourages risk-taking. Bankruptcy is regarded as a disgrace. "This is compounded by the European urge to preserve existing structures."

Unfortunately, it is not clear how one could interpret anecdotal explanations in terms of the differences in coefficients.[19]

3.3 The Role of Occupation and Industry

We excluded occupational and industry variables from the models in Tables 3 and 4 because of endogeneity concerns. Nevertheless, for the sake of completeness, we re-estimated the transition equations including dichotomous variables for occupation and industry. The goal is to see whether the patterns are the same in the United States and Germany, and whether the inclusion of industry and occupation affects the coefficients on the wealth variables.

Table 6 shows partial results when the specifications from Table 3 are augmented with occupation and industry variables. For purposes of comparison with Table 3, we include the coefficients on the wealth variables as well as those on occupation and industry. (Sales is the omitted occupation and services is the omitted industry.) Importantly, the coefficients on the wealth variables are not very different from their counterparts in Table 3Xour conclusions regarding the presence of liquidity constraints do not change when we control for industry and occupation. Except for the construction industry, the sign patterns are the same in the two countries, suggesting that the industrial and occupational environments for self-employment do not appear to differ dramatically between them.

4. Conclusions

Entrepreneurship has been called Europe's scarcest resource, and among Europeans there is widespread concern that lack of self-employment has deleterious effects on their economies. In this paper we have taken advantage of microdata that allow us to explore differences in the rates at which American and German workers leave their salaried jobs to become self-employed. We document that the rate of self-employment is lower in Germany than in the United States, and the rate of transition from wage-earning to self-employment is lower as well. We find evidence that German workers face liquidity constraints that are more severe than those of their American

counterparts. Further, we find that the difference in the transition rates cannot be attributed to observable differences between German and American workers.

This last finding leads to the question of what legal or cultural factors might account for the differences. The answer is not clear. To be sure, there are numerous regulations facing anyone who starts a business in Germany. A German who wants to start a hotel, for example, needs to file a certificate certifying his health status, and in agriculture one's buildings need to satisfy a variety of ecologically-motivated specifications.[20] But the owners of small businesses in America also complain about the regulatory costs imposed by agencies such as the Occupational Safety and Health Administration and the Environmental Protection Agency. A useful topic for future research would be systematic comparison of the regulatory burdens in the two countries.

Another important part of the economic environment is government support for small business. In both countries, policy makers have set up numerous programs to aid small businesses. Interestingly, the result is a hodgepodge in both countries. Between the federal and regional governments in Germany, there are more than 400 programs; in the United States the situation is similar. An additional useful research topic would be to assess the relative efficacy of such programs.

Appendix A

In the text we showed that if one substitutes the mean values of all the Germans' variables into a transition equation estimated using U.S. data, one obtains a predicted probability that does not differ very much from the U.S. probability. The purpose of this appendix is to report the results when we do a similar analysis on a variable by variable basis. As in the text, we begin by substituting the mean values of the American characteristics into the equation based on U.S. data (second column of Table 4), and compute the implied probability of making a transition. Then, we take the ith characteristic, replace its value with the German mean, and recompute the probability. (In cases where several variables represent one characteristic, e.g., education, we change the means of the variables simultaneously) The difference between these two probabilities tells us the change in the American transition rate induced by changing characteristic *i* to its German value. In effect, then, the calculation shows the impact of U.S.-German differences in variable *i* upon the transition rate. The figures are reported in Appendix Table A-1.

In each case, the effects of changing the mean of a U.S. variable to its mean in Germany has only a small impact on the baseline probability, which is 0.0288. To put this finding in context, recall that when we substituted *all* the German means into the probit equation estimated using U.S. data, the expected probability was not very different from the probability generated using U.S. means. The results in Appendix Table A-1 tell us that this finding is not the consequence of some large positive and negative effects offsetting each other. Rather, on a characteristic by characteristic basis, the differences in the U.S. and German means are not big enough to generate substantial differences in the probabilities of making a transition to self-employment.

ENDNOTES

1. A related question of recent interest is the explicit use of policies to move the unemployed into self-employment. Our data do not contain sufficiently large number of observations to examine this issue.

2. Specifically, we use the Syracuse University English Language Public Use File. The GSOEP is a more recent longitudinal data set than the PSID. It was developed at the Universities of Frankfurt and Mannheim in cooperation with the Deutsches Institut für Wirtschaftsforschung, Berlin (DIW), and initially financed by the German National Science Foundation. In 1990 the DIW assumed control of the panel with funding through 1995 from the Bund-Länder-Kommission für Forschungförderung. The National Institute on Aging has provided funding to Syracuse University to translate the documentation and make a public use file of the data available to English-speaking researchers.

3. The summary statistics in this section are generated using the survey sample weights so as to be representative of the populations.

4. From 1990 forward our data include observations from the former East Germany. We tested whether this changed the self-employment process. We could not reject the hypothesis that the coefficients presented below were the same before and after reunification.

5. An alternative approach would be to restrict the focus to the group that answers "self-employed only." This would have the effect, however, of missing those individuals making an initial transition into self-employment (but not yet having left their wage-salary job). As a practical matter, the decision is of little consequence and does not affect our substantive results.

6. The PSID self-employment rates are very similar to those calculated from the Survey of Income and Program Participation over the same period. They are somewhat higher than those in the Current Population Survey (CPS). We suspect that the difference between the PSID and CPS may lie in how the question is asked. As noted above, in the PSID, individuals are asked, "who do you work for" while the CPS figure is based on the response to a "class of worker" question *after* editing and recoding.

7. For detailed analysis of gender differences in self-employment in Germany, see Georgellis and Wall [1999].

8. The United States and German educational systems are, of course, quite different. In the PSID, the education categories are based on the number of years of education. In the GSOEP, individuals with a standard school leaving degree are assigned a minimum of between 9 and 12 years of education. In addition to these years, individuals with a vocational degree are assigned 2 to 3.5 years more of education. Individuals who attended a technical college are assigned an additional four years of education. If an

individual received a vocational college degree or attended a university outside of Germany, then the individual is assigned a total of 18 or 19 years of education. For further details, see Couch [1994].

9. In the PSID, labor earnings include wages and salary from all employment, self-employment, bonuses, overtime, and commissions. In the GSOEP, labor earnings include wages and salary from all employment including self-employment, training, primary and secondary jobs, and income from bonuses, overtime, profit-sharing, and various kinds of holiday pay.

10. This tendency has been documented in several studies of U.S. data. See, for example, Gentry and Hubbard [1998].

11. A *t*-test easily rejects the hypothesis that the transition rates are equal.

12. Even here, of course, there may be problems if individuals accumulate wealth in anticipation of becoming self-employed. In that case, our estimates of the impact of wealth on transitions to self-employment will be biased upward. As noted below, the PSID data contain some information on inheritances received by individuals. To the extent that the amounts of such inheritances are unanticipated, they are not subject to this critique. See Holtz-Eakin, Joulfaian, and Rosen [1994].

13. Individuals were allowed to provide a specific dollar amount for the inheritance or to indicate into which of a series of brackets the amount fell. Since most of the responses were brackets, we enter inheritance as a series of dichotomous variables. Presumably, the responses to the question are based on the nominal value of the inheritance in the year it was received. Given the information in the survey, it is not possible to construct brackets on the basis of real amounts received. To reduce the likelihood of misclassification, we combined several of the brackets together so that the brackets would be larger. To the extent that some misclassifications remain, the measurement error will have the effect of biasing toward zero the effect of inheritance.

14. We correct standard errors for heteroscedasticity and multiple observations for certain individuals using the Huber-White method.

15. More specifically, for each individual in the sample, we compute the probability given the probit coefficients in the second column of Table 3 and the actual values of the right hand side variables. We then increase wealth by $5,000, compute the implied increase in the probability, convert this to an elasticity for the individual, and take the average over the sample.

16. We moved individuals in the highest bracket *down* one bracket and computed the negative impact as our measure.

17. The estimates presented in Table 3 do not use the 1990 and 1991 waves of the PSID because they did not have inheritance data. Given that in this exercise the inheritance data are not brought into play, we can use the 1990 and 1991 waves.

18. To transform the U.S. wealth variable so that it conforms to the German data, we use the 1984 exchange rate to convert the dollar figure into Deutschmarks, and then group the data into the same brackets as in the GSOEP (see Table 1).

19. Information on the impact of each of the right-hand-side variables on the overall difference in transition rates to self-employment is provided in Appendix A.

20. We are grateful to Professor Friedhelm Pfeiffer for providing this information.

Table 1. Summary Statistics[a]

Variable	Germany[b]		United States[c]	
	Wage-Earners (1)	Self-Employed (2)	Wage-Earners (3)	Self-Employed (4)
AGE	44.27	46.75	39.53	45.24
(Age in Years)	(10.16)	(11.00)	(11.86)	(13.16)
MINORITY[d]	0.2039	0.1173	0.08277	0.03290
(=1 if "minority")	(0.4029)	(0.3219)	(0.2755)	(0.1784)
FEMALE	0.1807	0.0903	0.4920	0.3348
(=1 if female)	(0.3848)	(0.2868)	(0.4999)	(0.4720)
EARNINGS[e]	DM 53,710	DM 63,730	$24,080	$33,750
(earnings)	(DM 37,940)	(DM 61,440)	($21,280)	($57,530)
ED_LTHS	0.5617	0.4457	0.1095	0.1008
(=1 if less than high school)	(0.4962)	(0.4972)	(0.3122)	(0.3011)
ED_SOCO	0.1075	0.1752	0.2220	0.2138
(=1 if some college)	(0.3097)	(0.3803)	(0.4156)	(0.4100)
ED_COL	0.0223	0.04707	0.1628	0.1621
(=1 if completed college)	(0.1477)	(0.2119)	(0.3692)	(0.3686)
ED_POSTCOL	0.1109	0.1941	0.1171	0.1779
(=1 if more than college)	(0.3141)	(0.3956)	(0.3216)	(0.3824)
MARRIED	0.7520	0.7604	0.7194	0.8319
(=1 if maried)	(0.4319)	(0.4270)	(0.4493)	(0.3740)
CHILDREN	0.8114	0.7943	0.8594	0.9186
(number of children)	(1.053)	(1.033)	(1.092)	(1.185)
OWN HOME	0.4165	0.5915	0.6747	0.8153
(=1 if homeowner)	(0.4930)	(0.4917)	(0.4685)	(0.3881)
MSA	---	---	0.5317	0.4980
(=1 if live in a metropolitan statistical area)	---	---	(0.4990)	(0.5001)
WEALTH1	0.4388	0.4447	---	---
(=1 if DM 20,000 < wealth < DM 400,000)	(0.4962)	(0.4971)	---	---
WEALTH2	0.05820	0.1493	---	---
(=1 if DM 400,000 < wealth < DM 800,000)	(0.2341)	(0.3565)	---	---
WEALTH3	0.005319	0.0611	---	---
(=1 if DM 800,000 < wealth < DM 1,500,000)	(0.07273)	(0.2395)	---	---

Table 1. (Continued)

Variable	Germany[b] Wage-Earners (1)	Germany[b] Self-Employed (2)	United States[c] Wage-Earners (3)	United States[c] Self-Employed (4)
WEALTH4	0.003046	0.03766	---	---
(=1 if wealth > DM 1,500,000)	(0.05511)	(0.1904)	---	---
WEALTH	---	---	$84,306	$239,400
(wealth in 1984 dollars)	---	---	($209,300)	($564,100)
EXPEC_INH	---	---	0.2668	0.3022
(=1 if, in 1984, expected an inheritance)	---	---	(0.4423)	(0.4593)
AMT_EXPEC_INH[f]	---	---	$1,355,000	$1,254,000
(expected inheritance in 1984)	---	---	($3,410,000)	($3,288,000)
INH1	---	---	0.001696	0.005260
(=1 if 0 < inheritance < $25K)	---	---	(0.04115)	(0.07234)
INH2	---	---	0.004670	0.007289
(=1 if $25K ≤ inheritance < $75K)	---	---	(0.06818)	(0.08508)
INH3	---	---	0.001012	0.003577
(=1 if inheritance ≥ $75K)	---	---	(0.03179)	(0.05971)
Observations	13,263	1,325	21,399	3,694

[a]Figures are weighted means, with standard deviations in parentheses.

[b]German means are from the GSOEP, and taken over the years 1988 to 1995.

[c]United States means are from the PSID, and taken over the years 1984 to 1989.

[d]In the GSOEP, "minority" individuals are guest workers. In the PSID, "minority" individuals are non-whites.

[e]Earnings are measured in Deutschmarks for Germany and dollars for the United States.

[f]Figure includes zeroes for those not expecting an inheritance. The respective means conditional upon here a positive value are 5,055,000 for wage and salary and 4,210,000 for the self-employed.

Table 2. Distribution of Individuals Across Industries and Occupations[a]

	Germany		United States	
	Percent Self-Employed	Percent Wage-Earners	Percent Self-Employed	Percent Wage-Earners
INDUSTRY				
Agriculture	11.89	0.63	9.43	1.27
Energy	0.25	1.69	0.12	1.94
Mining	0.00	0.74	0.54	0.49
Manufacturing	15.41	39.83	5.60	21.57
Construction	9.39	8.61	12.42	4.60
Trade	16.17	6.38	17.59	15.33
Transportation	4.77	6.14	2.15	5.70
Financial/Insurance/Real Estate (F.I.R.E)	4.87	3.57	7.38	5.93
Services	37.19	25.33	32.61	39.27
OCCUPATION				
Professional	26.61	18.31	19.36	23.87
Managerial	5.15	7.22	26.63	12.96
Sales	20.97	4.64	39.86	37.78
Clerical	0.88	11.05	3.86	17.63
Craft	11.90	20.94	4.89	10.61
Operational	7.29	19.97	6.44	10.38
Service	12.86	6.56	9.73	9.27
Farm	14.28	2.74	7.59	3.05
Military	0.00	0.70	0.00	1.15

[a]Each entry shows the percentage of the self-employed or wage-earners in the particular industry or occupation.

Source: GSOEP (for Germany) and PSID (for the United States).

Table 3. Analysis of Transitions from Wage-Earning to Self-Employment[a]

Variable	Germany	United States	Variable	Germany	United States
AGE	-0.09072 (0.02735)	-0.02046 (0.01221)	WEALTH2	0.3593 (0.1526)	--- ---
AGE^2	0.0009426 (0.0003155)	0.0002508 (0.0001439)	WEALTH3	1.182 (0.2896)	--- ---
"MINORITY"	-0.03190 (0.1014)	-0.2452 (0.08482)	WEALTH4	1.638 (0.3069)	--- ---
FEMALE	-0.2691 (0.1103)	-0.1521 (0.04338)	WEALTH (x 10^7)	--- ---	3.14 (0.942)
EARNINGS (x 10^6)	-2.07 (1.93)	-1.27 (1.29)	INH1	--- ---	0.2766 (0.2870)
ED_LTHS	-0.04354 (0.08994)	0.02107 (0.07130)	INH2	--- ---	0.3967 (0.1670)
ED_SOCO	0.1825 (0.1224)	0.05383 (0.05352)	INH3	--- ---	0.5778 (0.3844)
ED_COL	0.1917 (0.2156)	0.02098 (0.06088)	EXPEC_INH	--- ---	0.1379 (0.6678)
ED_POSTCOL	0.3117 (0.1323)	0.1723 (0.06419)	AMT_EXPEC_INH (x 10^9)	--- ---	-0.08148 (0.6103)
MARRIED	-0.1734 (0.09331)	0.08726 (0.05727)	MSA	--- ---	-0.0003732 (0.04061)
CHILDREN	0.04476 (0.03404)	0.03034 (0.01944)	Constant	-0.4477 (0.5550)	-1.359 (0.2320)
OWN HOME	0.06078 (0.09171)	-0.1663 (0.04761)	loglikelihood	-796.6	-2464
WEALTH1	0.03005 (0.09212)	--- ---	Observations	13,587	18,848

[a]Probit estimates of the probability that an individual makes a transition from wage earning in year *t* to self-employment in year *t*+1. German estimates are based on the GSOEP for the years 1988 to 1995. United States estimates are based on the PSID for the years 1984 to 1989. Variables are defined in Table 1. All equations include time effects. Figures in parentheses are standard errors.

Table 4. Analysis of Transitions from Wage-Earning to Self-Employment: Same Years and Same Model[a]

Variable	Germany	United States	Variable	Germany	United States
AGE	-0.1092 (0.03428)	-0.02797 (0.01397)	CHILDREN	0.07979 (0.04404)	0.02381 (0.02293)
AGE^2	0.001177 (0.0003858)	0.000357 (0.000162)	OWN HOME	0.2426 (0.1193)	-0.1426 (0.06397)
"MINORITY"	0.07385 (0.1187)	-0.08741 (0.1014)	WEALTH1	0.04060 (0.1304)	-0.02374 (0.05756)
FEMALE	-0.5294 (0.1777)	-0.1617 (0.05166)	WEALTH2	0.1979 (0.2112)	0.2227 (0.08817)
EARNINGS (x 10^6)	-2.24 (2.73)	-2.21 (1.39)	WEALTH3	1.227 (0.3072)	0.2952 (0.1394)
ED_LTHS	-0.09889 (0.1221)	-0.03527 (0.08880)	WEALTH4	1.716 (0.3676)	0.6558 (0.1602)
ED_SOCO	0.2581 (0.1579)	0.05455 (0.06149)	Constant	-0.1145 (0.6866)	-1.414 (0.2709)
ED_COL	-0.06731 (0.3358)	0.03212 (0.07069)	loglikelihood	-394.8	-1,738
ED_POSTCOL	0.3763 (0.1707)	0.2252 (0.07575)	Observations	7,824	12,895
MARRIED	-0.2933 (0.1265)	0.1721 (0.07319)			

[a]Probit estimates of the probability that an individual makes a transition from wage earning in year *t* to self-employment in year *t*+1. German estimates are based on the GSOEP for the years 1988 to 1991. United States estimates are based on the PSID for the same years. Variables are defined in Table 1. All equations include time effects. Figures in parentheses are robust standard errors.

Table 5. Wealth Class and Change in Probability of Entering Self-Employment[a]

	Germany	United States
Baseline probability	0.00733	0.0277
Change induced by a move:		
to WEALTH1	0.000866	-0.00148
from WEALTH1 to WEALTH2	0.00512	0.0175
from WEALTH2 to WEALTH3	0.105	0.0248
from WEALTH3 to WEALTH4	0.227	0.0761

[a]The baseline probabilities of a transition in the first row are found by computing the expected probabilities using the probit coefficients in Table 4 and substituting the actual values of the right hand side variables, except assuming the WEALTH dichotomous variables are all zero. The second row shows how the respective probabilities change by a move into wealth group 1, the third row by a change from group 1 to 2, and so on.

Table 6. Occupation and Industry Variables in the Transition Equations[a]

Variable	Germany	United States	Variable	Germany	United States
WEALTH1	0.07475	---	*INDUSTRY* (cont.)		
	(0.698)	---			
WEALTH2	0.3713	---	Construction	-0.1638	0.3122
	(0.1867)	---		(0.1873)	(0.09160)
WEALTH3	1.130	---	Mining	---	0.4034
	(0.2846)	---		---	(0.1852)
WEALTH4	1.706	---			
	(0.3766)	---			
WEALTH (x 10^7)	---	2.99	*OCCUPATION*		
	---	(0.937)			
			Professional	-1.030	-0.4314
				(0.1520)	(0.07429)
INDUSTRY			Management	-0.6732	-0.3895
				(0.1924)	(0.07733)
Agriculture	0.4056	0.4730	Clerical	-0.9981	-0.4742
	(0.3482)	(0.1475)		(0.2370)	(0.08176)
Energy	-0.3803	-0.3457	Craft	-0.4194	-0.4756
	(0.3572)	(0.1760)		(0.1498)	(0.08769)
Manufacturing	-0.3434	-0.04287	Operative	-0.3511	-0.3882
	(0.1335)	(0.06420)		(0.1411)	(0.08424)
Trade	0.03215	0.01711	Service	-0.2191	-0.2563
	(0.1542)	(0.06196)		(0.1635)	(0.08443)
Transportation	-0.09104	-0.06312	Farm	-0.7226	-0.3011
	(0.2186)	(0.09433)		(0.3639)	(0.1241)
F.I.R.E.	0.2488	0.1919	Military	-0.6047	-1.223
	(0.2436)	(0.07957)		(0.3956)	(0.3509)

[a]These are the results when the probit models in Table 3 are augmented with dichotomous variables for occupation and industry. We report only the coefficients on those variables and the wealth variables. Figures in parentheses are robust standard errors. Sales is the omitted occupation and services is the omitted industry.

Appendix Table A-1. Analysis of the Difference between German and United States Transition Rates[a]

AGE	0.000158
MINORITY	-0.000874
FEMALE	0.00337
EARNINGS	-0.00266
EDUCATION	-0.00207
MARRIED	-0.000797
CHILDREN	0.00126
OWN HOME	0.00313
WEALTH	-0.000681

[a]See Appendix A for an explanation.

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