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Labor Market Transitions and Self-Employment

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By

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Abstract

The self-employed are a heterogeneous group. Some are self-employed because they are good at it, while others are self-employed because they cannot find a better paying salaried job. Data from the CPS for prime age males show that workers are almost twice as likely to enter self-employment from unemployment as from paid employment. Furthermore, almost 22% of workers exit self-employment within the year with most returning to paid employment. This paper develops a framework for examining transitions between the labor market states of unemployment, paid employment, and self-employment. The self-employed fall into two groups: those who continue to seek paid employment in the wage and salary sector and those whose value from self-employment exceeds the expected value from continued search. The calibrated model is used to examine the effects of business startup costs on labor market transition rates. Doubling startup costs has very little impact on these rates.

Even a fool can have one good idea in a thousand.
Chinese proverb[*]

Introduction:

Entrepreneurs are thought to hold a unique position in our economy. Creating both employment opportunities and encouraging technological progress, they are viewed as the engine of growth. While studying entrepreneurship may provide insight into economic growth and development, entrepreneurs themselves are difficult to study directly—partly because of a lack of data and partly because entrepreneurs are difficult to identify *ex ante*.

New and richer datasets are being developed that address some of the shortcomings of existing datasets. Specifically, Davis et al. (2006) are making progress in merging the employer and nonemployer universes in the Integrated Longitudinal Business Database (ILBD). Efforts are also under way at the U.S. Census Bureau to integrate business and household data in the Longitudinal Employer–Household Dynamics (LEHD) Program. Abowd, Haltiwanger, and Lane (2004) discuss this dataset. The University of Michigan's Panel Study of Entrepreneurial Dynamics (PSED) follows a group of individuals who are considering starting a business and tracks them over time to determine the steps and outcomes of their decisions. Campbell and DeNardi (2007) have recently evaluated the first wave of this panel. These relatively new datasets should provide much needed depth in our understanding of small business creation and growth and shed light on the determinants of entrepreneurial success.

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[*] The Columbia World of Quotations. 1996.

Identifying someone who is self-employed as being an entrepreneur is tricky. Not everyone who starts a business is an entrepreneur. In fact most small businesses do not survive for long.[1] This problem in identifying entrepreneurial talent from a field of wannabes encumbers the study of business formation and growth. Understanding how businesses grow can lead to better-targeted policies aimed at helping small nascent ventures. For venture capitalists and investment bankers this issue is even more pertinent.

The difficulty in identifying individuals who are entrepreneurs stems from two issues. First, there is a great deal of uncertainty surrounding any new business venture. Consequently, some businesses will thrive while others fail independent of entrepreneurial talent. This uncertainty means that it is difficult to identify entrepreneurs within a pool of businesses started at the same time. To the extent that entrepreneurs are more likely to succeed, then tautologically entrepreneurs are those who tend to own businesses that survive. This is not a very illuminating way of thinking about entrepreneurs. One way to narrow the field of business owners to something potentially more akin to entrepreneurs is to evaluate the owner's employment history. If entrepreneurs have some kind of talent that makes them better-suited to starting a business, we would perhaps think that entrepreneurs who fail at one business go on to start another until eventually they succeed. This of course assumes that the entrepreneur possesses some reasonable degree of accuracy surrounding his own innate abilities as an entrepreneur and the necessary capital to implement the business strategy.

[1] Rissman (2006), using the NLSY, finds that over 40 percent of males over the age of 24 who are self-employed in one year are not self-employed the following year.

To further complicate things, some people start businesses not because they have some particular talent or marketable insight, but just the opposite. They start a business as a way to supplement or replace income lost while unemployed or employed at a lower wage than desired. These individuals are not drawn to self-employment because of the income it can generate, but are rather pushed into self-employment because they are unable to find what they would consider to be an adequate paying job in the wage sector. Alba-Ramirez (1994) and Rissman (2003) among others argue that unemployment increases the likelihood of self-employment. Furthermore, monetary returns to self-employment do not appear to be large. Hamilton (2000) finds that nonpecuniary benefits must be large in order to explain the observation that entrepreneurs have lower initial earnings and lower earnings growth than their paid employment peers. These factors make it even more complicated to determine who exactly is an entrepreneur.

Many researchers have noted that entrepreneurs account for a disproportionate amount of wealth in the economy. Entrepreneurs hold a large share of their net worth in the form of equity in their business. Liquidity constraints are thought to play an important role in explaining these observations. Evans and Jovanovic (1989), Quadrini (2000), and Cagetti and DeNardi (2006) have modeled transitions to and from self-employment while focusing on the role of liquidity constraints. In these models wealth is disproportionately accumulated by entrepreneurs who may face a liquidity constraint. The importance of these liquidity constraints is found to be limited in Uusitalo (2001) who shows that capital constraints have only a minor influence on new business startups. Bhidé (2000) estimates startup costs of around $10,000. Hurst and Lusardi (2004) also provide evidence that liquidity constraints to do not bind for most small business owners.

The model analyzed here, which is a variant of the standard two-state search model presented in Ljungqvist and Sargent (1995), is also interested in understanding the transitions between paid employment and self-employment. However, rather than seeking to explain the concentration of wealth by entrepreneurs, the goal is to model the transitions among the three labor market states of unemployment, paid employment, and self-employment.[2] A definition of who is an entrepreneur is a natural outcome of the model. It also provides a way to assess the impact of startup costs in business creation.

Business creation is certainly a complicated process. However, all businesses start first with an idea or concept.[3] Not all ideas are worth pursuing, however. It is assumed that each idea is associated with some random payoff that, once known, continues for the life of the business once the startup cost is incurred. If a paid employee receives a profitable enough entrepreneurial idea, he will leave paid employment and move to self-employment. The likelihood of moving to self-employment is declining in the wage rate earned from paid employment. Exits to wage work from self-employment are decreasing in the profit of the business. There is some threshold level of profitability that, once attained, makes wage work less attractive than continued self-employment. These individuals—the ones who have no reason to continue to search for wage sector employment—are entrepreneurs in the sense that they remain self-employed indefinitely.

The model is calibrated to capture salient features of the US economy. Given assumptions about the underlying parameters, the model is solved to generate transition rates across states. The steady state fraction of paid employment, self-employment, and

[2] Nonparticipation is also permitted.

[3] The model presented here is not meant to be a detailed analysis of how these ideas are generated. One can imagine that past exposure and experience could be important determinants. In order to build a better mousetrap the entrepreneur most understand the shortcomings of the currently produced one. These interesting questions are not explored here.

unemployment are calculated. For reasonable parameters the model does a good job of capturing transitions from unemployment to paid employment and from unemployment to self-employment. It also does well at capturing transitions from paid employment to unemployment and self-employment. However, it overstates transitions from self-employment to unemployment and understates transitions from self-employment to paid employment leaving the retention rate in self-employment close to that observed in the data. The result is that for reasonable parameter values the steady state level of self-employment is too high relative to that observed in the U.S. economy.

The role of business start-up costs is examined in more detail. Specifically, the model is used to determine the effect of increasing business start-up costs on steady state self-employment. The results suggest that start-up costs are not important determinants of the steady state level of self-employment with the calculated transition rates being changed very little by a doubling of business startup costs. The model is introduced in Section I followed by a fuller discussion of paid employment, unemployment, and self-employment respectively. Calibration results are found in Section II and conclusions are in Section III.

Section I: The Model

A worker can be in one of three distinct states: employed in the wage sector, unemployed, or self-employed. A worker who is employed in the wage sector is said to be a paid employee. Paid employment is characterized by a wage w that the worker earns each period he is a paid employee. There is a probability of layoff each period given by q where $q \in (0,1)$. This probability of layoff is fixed and known to the worker.

To keep the model simple, workers are not permitted to search for alternative paid employment while on the job.

Wage sector jobs are obtained through a search process. Search is both costly and time-consuming. It is assumed that only those who are unemployed or self-employed can engage in job search. It costs c each period to search for a wage sector job.[4] The process of search elicits a wage offer with probability $\lambda \in (0,1)$. Wage offers are drawn from a known cumulative distribution function $F(\tilde{w})$ where $w \in [\underline{w}, \overline{w}]$, $\underline{w} > 0$ and $\underline{w} < \overline{w} \leq B$. (A tilde over a lower case letter indicates that it is a random variable. The same lower case letter without the tilde refers to the realization of that random variable.) The worker must decide whether to accept the job offer or not. Rejected offers cannot be recalled.

The process of becoming self-employed is different from that generating paid employment. Self-employment requires the worker to first have an entrepreneurial idea. These ideas occur randomly and without cost. Each period there is a fixed probability ρ of a person receiving an idea where $\rho \in (0,1]$. Ideas occur regardless of whether the worker is employed, unemployed, or self-employed. The attractiveness of this new idea depends upon the worker's current labor market state and income. Ideas are non-transferable and expire after one period. Hence, ideas cannot be stored for later use.[5] The idea is associated with a profit opportunity of π, which is drawn from a cumulative density function given by $G(\tilde{\pi})$, where $\pi \in [\underline{\pi}, \overline{\pi}]$, $\underline{\pi} > 0$ and $\underline{\pi} < \overline{\pi} \leq \Pi$. The

[4] The cost of job search is likely to differ depending upon whether the worker is unemployed or self-employed. For the self-employed, actively looking for wage work takes time away from his or her venture. So the costs of search may be greater for them. On the other hand, searching while self-employed may be more efficient since employment opportunities may be encountered in the normal course of business.

[5] This assumption makes the state space more manageable. Otherwise, the value functions associated with various states would depend upon the best idea received to date.

realization of $\tilde{\pi}$ is drawn before the worker determines whether to start the business or not. Once he knows how profitable it will be, he decides whether to implement his idea. Businesses have a known startup cost of k which does not depend upon past history or the magnitude of the profit associated with the business idea.[6]

Both the idea and the profit it generates is unique to that individual. The opportunity cannot be transferred to another person or firm—just as a job in the wage sector cannot be sold to another worker.[7] The entrepreneurial opportunity is assumed to last for only one period and cannot be stored. However, the opportunity, once taken, generates profit indefinitely, ceasing only when the worker exits self-employment. It is given value only by combining the specific worker with the idea.

The individual observes π but cannot take advantage of it unless he is self-employed. He cannot be working in the wage sector or unemployed while also self-employed.[8] Self-employment is a full time endeavor requiring the worker to exit either unemployment or paid employment. Additionally, an entrepreneur is assumed to be able to take advantage of only one entrepreneurial idea at a time. If another idea arrives that the entrepreneur chooses to pursue, it entails shutting the current operation, foregoing the

[6] This is an obvious abstraction. We can imagine, for example, that costs decline as the number of businesses the worker starts increases. Furthermore, more profitable ventures are likely to be larger in scale and therefore require larger startup costs. These complications have been omitted from the model to keep it as simple and tractable as possible.

[7] By assumption, the businesses permitted in this model do not have a value to anyone other than their owner. This rules out the possibility of a worker selling his business to others to operate. You can imagine the business as one in which the owner is an integral part, conveying value to the venture. An alternative way to think about it is that there is some value of a business that is common to all businesses and the profit that is drawn from the profit distribution is the value added to the business by that specific entrepreneur. Once that entrepreneur separates from the business, the value of the business declines to only the common value.

[8] Obviously, this precludes "moonlighting" as an option available to the worker. Campbell and DeNardi (2007) find that a large proportion of nascent entrepreneurs are employed in the wage and salary sector at the time they are starting their own business. The model presented here assumes that all businesses take one period to implement.

profits it generates, and starting a new one at a cost of k. The self-employed worker can continue to generate entrepreneurial ideas and may continue to search in the wage sector.

There is no uncertainty associated with a specific idea once the profitability of the idea is known. However, these entrepreneurial endeavors randomly fail at a rate $\gamma > 0$, where $\gamma \in (0,1)$. The failure of a small business can occur for many reasons that are not expressly considered here.[9] The key assumption here made for tractability is that events can occur that are outside the entrepreneur's control that influence the success or failure of the enterprise. In this case the event permanently reduces the business's profit to zero, effectively making continued self-employment an unattractive option. The worker then becomes unemployed unless a wage sector job is found. This failure rate makes continued search for paid employment an important option.

While unemployed, each period the individual receives the value of leisure given by ℓ. He must decide whether to optimally search for wage work or, alternatively, wait for an entrepreneurial idea to occur. A person may optimally choose to be a nonparticipant. These are individuals whose expected value of waiting for an acceptable entrepreneurial idea exceeds the expected value of a strategy involving actively searching for a wage sector job. In previous work Rissman (2003) showed that transitions to self-employment depend upon the structure of the unemployment compensation system. As unemployment benefits expire, the tradeoffs among unemployment, self-employment, and wage work change. In the model presented here features of the unemployment compensation system are omitted.

[9] It may be that the likelihood of failure is individual-specific. Some people may intrinsically be better entrepreneurs than other. The likelihood of failure may also have to do with experience. Those having more labor market or entrepreneurial experience may be less likely to fail. Another possibility is that many individuals may be competing in the same market and competition drives some out. For example, a local store may find its profitability limited by the introduction of a Wal-Mart to the area.

The simple model described above generates transitions among the three states of paid employment (PE), unemployment (U), and self-employment (SE).[10] There are six (3x2) possible transitions. A worker can transition from wage work directly to self-employment only if the entrepreneurial idea is lucrative enough after having paid startup costs, appropriately valuing the current job and layoff probability. A worker can transition from unemployment to self-employment, appropriately weighing the potential value of a wage sector job. Transitions from self-employment to employment in the wage sector can occur if the entrepreneur engages in search and receives a high enough wage offer. Transitions from self-employment to unemployment occur only if the current business fails. Transitions from unemployment to paid employment and from paid employment to unemployment are standard in the labor search literature.

One implication of the model is that, as time progresses, a self-employee will tend to have increasing income conditional on his or her remaining either self-employed or employed in wage work. The reason for this is straightforward. Once a business is started, an entrepreneur can either stay employed in that same business, transition to wage work if a good enough wage sector job becomes available, start up an even more profitable business, or become unemployed if the business fails. Given that he remains self-employed, income should be rising over time.

There is some level of profitability beyond which a self-employed person will not actively engage in wage sector job search. This observation offers a natural definition of an entrepreneur: An entrepreneur is a worker who is self-employed whose income from self-employment is sufficiently high so as to make wage sector job search unattractive. According to this definition, entrepreneurs may find themselves back in the wage sector

[10] A fourth state of nonparticipation can easily be incorporated.

or unemployed—but only after the business fails. A richer model would include the possibility of the entrepreneur selling his business and becoming a wage worker. This possibility is precluded in the current model.

Evaluation of Paid Employment

Let $W(w)$ be the optimal value of a worker currently employed in the wage sector at a wage w. The worker receives w for the current period and will continue to receive w indefinitely until either he becomes self-employed or is laid off and becomes unemployed. Layoffs occur at a rate of q each period and imply nothing about the worker's abilities.

To become self-employed, the worker must first have an entrepreneurial idea. These ideas arrive at a rate ρ that is independent of past history and the worker's ability. It takes time and is costly to implement a new idea. It is assumed that the idea cannot be implemented until next period and only after paying the initial startup cost of k. The entrepreneurial payoff π accrues each and every period for which the worker is self-employed, but the startup cost occurs only once at the business's inception. Let $V(\pi)$ be the optimal value of an entrepreneurial idea paying π. The value of the entrepreneurial idea net of startup costs is then $V(\pi)-k$. The future is discounted at a rate given by β. The optimal value of unemployment is given by U.

The value of employment at the wage w can be expressed as: (1.1)

$$W(w) = w + \beta\left\{q\rho E\left[\max_{se',u}\{V(\tilde{\pi})-k, U\}\right] + q(1-\rho)U + (1-q)\rho E\left[\max_{e,se'}\{W(w), V(\tilde{\pi})-k\}\right] + (1-q)(1-\rho)W(w)\right\}.$$

This period the worker receives a wage of w. The following period, which is discounted at a rate β, one of four possible outcomes may occur. First, the worker may be laid off and also receive an entrepreneurial idea. Second, the worker may be laid off but does not receive an entrepreneurial idea. Third, the worker is not laid off but still receives an entrepreneurial idea. Fourth, the worker is laid off and does not receive an entrepreneurial idea.

Each one of these possibilities is addressed in succession. The first term in brackets in equation (1.1) gives the optimal value for the situation in which the worker is laid off but receives an entrepreneurial idea. This situation occurs with probability $q\rho$.[11] Once he receives the idea, the profitability of that idea is drawn. The worker observes the associated profit π and selects the better of two alternatives: unemployment and self-employment. Unemployment has an associated optimal value of U and self-employment has a net optimal value of $V(\pi)-k$. In evaluating the value of wage work the wage worker does not know the actual payoff from the potential self-employment idea but does know the distribution of potential payoffs. He therefore values the possibility of being laid off and receiving an entrepreneurial idea in terms of the expected value of the better alternative, $E\max\left[V(\tilde{\pi})-k,U\right]$.

The second term inside the brackets gives the value to the worker if he is laid off but receives no entrepreneurial idea. This happens with probability $q(1-\rho)$. The worker becomes unemployed, behaving optimally, and receives the value of unemployment given by U.

[11] It is assumed that layoffs and ideas are independent events.

The third term in brackets expresses the decision facing the worker if he is not laid off but still has an entrepreneurial idea. This event occurs with probability $(1-q)\rho$. He weighs the optimal value of maintaining his wage sector job, given by $W(w)$, against the optimal net value of self-employment after startup costs, given by $V(\pi)-k$. In evaluating this option the worker does not know the draw from the profit distribution but instead must evaluate the expected value of the better alternative.[12]

Finally, the last term in brackets gives the outcome that occurs when the worker is neither laid off nor in receipt of an entrepreneurial idea. In this case he remains employed and receives the optimized value of the wage sector job, $W(w)$, with probability $(1-q)(1-\rho)$.

Define $\pi^*_{u,se}$ as the level of profits for which the worker is indifferent between remaining unemployed and becoming self-employed. In other words $\pi^*_{u,se}$ solves:

$$U = V(\pi^*_{u,se}) - k \,. \tag{1.2}$$

It is assumed that the distribution of profits is such that there exists some level of entrepreneurial profit for which the worker prefers self-employment over unemployment. The level of profits required to induce a worker to exit unemployment for self-employment is rising in the cost of starting a business k.

Now define $\pi^*_{e,se}$ as the level of profits for which the worker is indifferent between remaining employed at wage w and becoming self-employed. It solves the following expression:

[12] The decision facing the worker is similar to the decision a worker would face with successful on-the-job search. In that event the worker must choose between continued employment at the current job versus incurring the search cost and moving to a new job.

$$W(w) = V(\pi^{*}_{e,se}) - k\,. \tag{1.3}$$

The level of profitability required to induce a worker to leave his current job in the wage sector to become self-employed rises with the wage currently earned and with the cost of starting a business.

Evaluation of unemployment

The decision facing a worker who is unemployed depends upon whether he opts to search for a wage sector job or not. In most models of job search, it is assumed that the expected value of searching is too high to induce workers to select unemployment without search as the optimal strategy. In this model, the search decision is complicated by the possibility that an unemployed worker can receive an entrepreneurial idea costlessly. In order to induce the unemployed worker to search for a job in the wage sector, either the arrival rate of ideas has to be low enough or the expected value of the entrepreneurial idea has to be low enough to make wage sector search the better alternative for an unemployed worker. If the unemployed worker has no better alternative than to wait for entrepreneurial ideas to arrive, eventually no one would work in the wage sector and wages would adjust upwards. This is clearly not sustainable so the parameters must be set so as to make the worker at least indifferent between searching and not searching.

Unemployment provides the worker with a given base level of income denoted by ℓ. This can be thought of as the value of leisure or the value of leisure combined with the value of the unemployment insurance he receives. If the unemployed worker opts not to search, the following period one of two things can occur: he can either receive an

entrepreneurial idea with a probability of ρ or he can have no idea. If he receives an idea, he must decide whether to pursue it and become self-employed or to remain unemployed until the next idea occurs. In other words, he must select the better of self-employment or unemployment. Of course if he does not receive an entrepreneurial opportunity, he will simply remain unemployed.

The value of searching for a wage sector job from unemployment is a little more complicated. Search entails a cost c and is successful in generating a wage offer with probability λ. One of four possible outcomes can occur. First, the worker receives both a wage offer and an entrepreneurial idea. Second, the worker receives a wage offer but no entrepreneurial idea. Third, the worker's job search does not generate a wage offer, but he does receive an entrepreneurial idea. Fourth, the worker receives neither a job offer nor an entrepreneurial idea.

The expression below gives an expression for the optimal value of unemployment.

(1.4)

$$U = \ell + \max_{search,nosearch}\{-c + \beta\begin{Bmatrix} \lambda\rho E\left[\max_{se',pe',u}\{V(\tilde{\pi})-k, W(\tilde{w}), U\}\right] + \\ \lambda(1-\rho)E\left[\max_{pe',u}\{W(\tilde{w}), U\}\right] + \\ (1-\lambda)\rho E\left[\max_{se',u}\{V(\tilde{\pi})-k, U\}\right] + \\ (1-\lambda)(1-\rho)U \end{Bmatrix}, \beta\begin{Bmatrix} \rho E\left[\max_{se',u}\{V(\tilde{\pi})-k, U\}\right] + \\ (1-\rho)U \end{Bmatrix}\}$$

The worker receives the value of leisure and optimally decides whether to search actively for a wage sector job or not. Unlike the traditional search literature in which the only way to escape unemployment is to search for a job, an unemployed worker can improve his position by waiting for an entrepreneurial idea. The distribution of wage offers is

such that it benefits workers to engage in search. In this model in order for the worker to be rewarded for search from unemployment the distribution of wage offers must be high enough relative to the distribution of profit payouts or the probability of receiving an idea must be low relative to the probability of a wage offer. Furthermore, the cost of search cannot be too high.

While the worker is unemployed, he receives a benefit from leisure valued at ℓ. He also must decide whether to search for a wage sector job or not. The value of not searching depends upon whether he receives an entrepreneurial idea.[13] He receives an idea with probability ρ. Conditional on receiving this idea, he then optimally decides between one of two alternative actions: he can either enter self-employment and receive the profit stream associated with this idea, or he can optimally choose to remain unemployed. The self-employment opportunity has an optimal value of $V(\pi)$ given the realization of the payoff to the idea. However, at the time the worker is making his search decision, this payoff is not realized and the worker weighs the expected value of the self-employment net of startup costs, $E[V(\tilde{\pi})]-k$ against the value of unemployment. There is a probability $(1-\rho)$ that the worker will not receive any entrepreneurial idea and remain unemployed. This option is valued at $(1-\rho)U$.

Now we can address the value of job search to the unemployed worker. This is given by the first term within brackets. The cost of search each period is given by c but is not always successful in generating a wage offer. Wage offers occur with probability λ. There are four possible outcomes: (1) search generates an offer and an entrepreneurial idea becomes available; (2) search generates an offer and no

[13] The value of not searching for a wage sector job is expressed by the last term within brackets.

entrepreneurial idea occurs; (3) search does not generate an offer and the worker receives an entrepreneurial idea; and finally (4) search does not generate an offer and the worker does not receive an entrepreneurial idea.

If a wage offer occurs and an entrepreneurial idea strikes, the worker chooses the best of three alternatives: working in the wage sector, entering self-employment, or remaining unemployed. If search results in a wage offer but no entrepreneurial idea presents itself, the worker optimally weighs the value of the wage offer against the value of remaining unemployed. If search is not successful in generating a wage offer but an entrepreneurial idea occurs, the individual optimally weighs the self-employment opportunity against the value of remaining unemployed. Finally, if neither a wage sector nor self-employment opportunity arises, the worker remains unemployed.

Define the reservation wage $w_{u,e}^{*}$ as the wage offer that would induce the unemployed worker to work in the wage sector. The reservation wage solves the following expression:

$$W(w_{u,e}^{*}) = U \ .$$

As the level of benefits rises, the reservation wage also increases. Combining the expressions for the reservation wage and reservation level of profit gives:

$$W(w_{u,e}^{*}) = V(\pi_{u,se}^{*}) - k \ .$$

The value of self-employment at the reservation profit level must exceed the value of wage work at the reservation wage by the amount of startup costs.

Evaluation of Self-Employment

The value of self-employment depends upon whether the worker continues to search for a wage sector job or not once he is self-employed. Consider the decision the entrepreneur makes when he is already self-employed with entrepreneurial payoff π. There is a probability γ each period that the entrepreneur's business will fail. Once this happens, the business disappears and the worker has the option of returning to unemployment unless another opportunity becomes available. Let $V(\pi)$ be the optimal value of the firm earning π to the worker.

(1.5)

$$V(\pi) = \pi + \max_{search, nosearch} \left\{ -c + \beta \left[\begin{array}{l} \lambda\rho(1-\gamma)E \max_{pe', se, se'} \{W(\tilde{w}), V(\pi), V(\tilde{\pi}) - k\} + \\ \lambda\rho\gamma E \max_{pe', se', u} \{W(\tilde{w}), V(\tilde{\pi}) - k, U\} + \\ (1-\lambda)\rho(1-\gamma)E \max_{se, se'} \{V(\pi), V(\tilde{\pi}) - k\} + \\ (1-\lambda)\rho\gamma E \max_{se', u} \{V(\tilde{\pi}) - k, U\} + \\ \lambda(1-\rho)(1-\gamma)E \max_{pe', se} \{W(\tilde{w}), V(\pi)\} + \\ \lambda(1-\rho)\gamma E \max_{pe', u} \{W(\tilde{w}), U\} + \\ (1-\lambda)(1-\rho)(1-\gamma)V(\pi) + (1-\lambda)(1-\rho)\gamma U \end{array} \right], \beta \left[\begin{array}{l} \rho(1-\gamma)E \max_{se, se'} \{V(\pi), V(\tilde{\pi}) - k\} + \\ \rho\gamma E \max_{se', u} \{V(\tilde{\pi}) - k, U\} + \\ (1-\rho)(1-\gamma)V(\pi) + (1-\rho)\gamma U \end{array} \right] \right\}$$

The entrepreneur receives profit π this period. He must decide optimally whether to search for a wage sector job or not. The value of the search option is found in the first term within brackets. Searching for a wage sector job entails incurring a search cost c this period.[14] The following period which is discounted at a rate β, he optimally weighs his options, which depend upon whether his job search is successful, whether another self-employment opportunity becomes available, and whether his current entrepreneurial

[14] The cost of search is assumed to be independent of the worker's current state. Such an assumption may not be warranted. It is plausible that searching while self-employed is more costly than search from unemployment since it takes time away from the business. This assumption is made in Rissman (2003). Alternatively, it may be the case that search is more efficient while self-employed as being in the business world increases the contact the worker has with other businesses and makes search less time-consuming or alternatively increases the likelihood of any particular search generating an offer.

activity remains profitable. The likelihood of a wage offer and an entrepreneurial idea both occurring is given by $\lambda\rho$. The term $\lambda\rho(1-\gamma)$ is the probability that job search is successful in generating a wage offer, he also has another entrepreneurial opportunity, and the current entrepreneurial activity remains profitable. In this event, the entrepreneur selects the best of three alternatives: He can accept a job in the wage sector; he can continue to work in the current self-employment job receiving $V(\pi)$; or he can pay the startup fee of k and start a new business based upon the new idea. The second term describes the optimal decision of the worker who has generated both a wage offer and has a new entrepreneurial idea, but whose current entrepreneurial endeavor has failed. In this case, he weighs the value of wage work, the new entrepreneurial idea net of start-up costs, and unemployment.

Now suppose that job search does not elicit a job offer but he still receives a new entrepreneurial idea, and his old self-employment opportunity remains profitable. In this event he chooses between remaining self-employed in the current job receiving $V(\pi)$ or paying a startup cost and starting a new firm. If the current self-employment endeavor disappears, he weighs the value of the new opportunity against the value of unemployment.

The next two terms evaluate the decision the worker faces if his wage sector search generates a job offer but no other entrepreneurial opportunity aside from the current one presents itself. In this case the worker weighs the wage sector job against the value of the current self-employment opportunity if that opportunity still exists. And if the current self-employment endeavor becomes bankrupt, the worker optimally weighs the wage sector job against unemployment.

Finally, if search does not generate a job offer and he receives no new entrepreneurial idea, the worker stays at his current self-employment job, earning $V(\pi)$ if the business does not go bankrupt. If it does, he receives the value of unemployment.

The entrepreneur's other option is not to search for a wage sector job. This option is examined in the second term within brackets. In this case, the worker may still receive an entrepreneurial idea with probability ρ. He then selects between two options: He can either remain in the same self-employment position he is currently in and earn $V(\pi)$, or he can pay the startup fee of k and earn the value of the new self-employment opportunity. If no idea presents itself, he continues to remain self-employed at a value of $V(\pi)$.

There is some level of self-employment profit beyond which wage sector search will no longer occur. This result suggests a natural definition for distinguishing between "entrepreneurs" and those who are "interim-preneurs" for lack of a better term. Entrepreneurs are those workers whose earnings from self-employment are so high that they have no incentive given their current profit level to seek work in the wage sector. For them, the value of self -employment exceeds the expected value of searching for employment in the wage sector. Entrepreneurs have a lasting attachment to self-employment so long as the business does not fail and, in this simple model, have no incentive to ever return to wage work. Interim-preneurs are those who are currently self-employed but continue to search for wage sector employment. For these workers, continued search for wage sector employment, if successful, would induce the interim-preneur to transition from self-employment to wage work.

Define π^* as the reservation profit level at which the worker is indifferent between continued wage sector search and remaining self-employed in the current opportunity, i.e. it is the level of profits for which the worker is indifferent between being an entrepreneur and an interim-preneur. For profit levels in excess of π^* the entrepreneur has no incentive to engage in wage sector search. Thus, he will remain self-employed until the business fails. It is possible that the entrepreneur can encounter another business opportunity whose profitability exceeds his current profit level. If this occurs, he will remain self-employed, closing his existing business, but starting a new venture if the increased profit merits it.

Given that the current business has a level of profit π associated with it that exceeds π^*, the entrepreneur will start a new firm if the value of doing so net of costs exceeds the optimal value of staying in the current opportunity. The reservation level of profit $\hat{\pi}(\pi)$ is defined such that:

$$V(\pi) = V(\hat{\pi}(\pi)) - k \text{ for } \pi \geq \pi^*.$$

Since $V(\pi)$ is increasing in π, it follows that $\hat{\pi}(\pi) \geq \pi$.

Section II: Calibration

The model described in the previous section can be calibrated assuming parameter values for k, ρ, ℓ, β, γ, λ, c and distributions $G(\tilde{\pi})$ and $F(\tilde{w})$. Some of these parameters have precedents in the literature whereas others are more difficult to quantify. In the results that follow the unit of time is taken to be a year. Transitions to and from self-employment should be low frequency events.

In order for the calibration exercise to be meaningful, the parameter values are chosen to reflect certain attributes of the data. The March Current Population Survey provides an opportunity to examine transitions between the various labor market states. Since January 1994 the survey asks those who are employed the following question: "Last month, were you employed by government, by a private company, a nonprofit organization, or were you self-employed?" Individuals in the CPS who respond that they are employed by government, a private company, or a nonprofit organization are classified as wage and salary workers. Individuals who respond that they are self-employed are asked: "Is this business incorporated?" Individuals who respond "yes" are classified as wage and salary workers and are treated as employees of their own businesses. The "no" responses are classified as unincorporated self-employed—the measure that typically appears in Bureau of Labor Statistics publications.

It is not clear what the conceptual distinction is between incorporated and unincorporated self-employment. The BLS definition implies that incorporated businesses treat their self-employed owners as wage and salary workers. The model presented above does not make a distinction between incorporated and unincorporated self-employment. In accordance, the descriptive statistics presented below treat self-employment as those who are either self-employed and incorporated or non-incorporated.

Table 1 gives the fraction of males ages 21 to 54 for each year from 1976 to 2006 in unemployment, paid employment, self-employment, and nonparticipation. Farm workers have been excluded from the analysis. Approximately 76% of males are in paid employment over this time period. Self-employment accounts for just under 11% of the population studied. Around 5.5% of the group are unemployed and nonparticipants

account for roughly 8.5%. Table 1 also gives averages by decade. Paid employment rates have varied little. Self-employment rates have declined from 11% to 10% over the past 30 years. Unemployment rates for this population have fallen as well, whereas nonparticipation rates have risen almost 2.5%.[15] Figure 1 exhibits this data in a graphical form.

The CPS provides an opportunity to examine transitions between labor market states from one year to the next. Of those who are interviewed in March of year *t*, some respondents will be asked the same set of questions again in year *t+1*. For those who appear in the March CPS for two consecutive years, we are able to examine transition rates between labor market states.[16]

Table 2 below gives estimates of the average transition rates from 1977 to 2006 among the labor market states of paid employment, self-employment, and unemployment. Nonparticipants have been omitted from the computation for two reasons. First, nonparticipants are likely to be disabled or full time students. The labor supply decisions for them are much more complicated than for the "typical" male. The model discussed above does not formally address these individuals and they should be omitted from the analysis. Second, although the model presented includes the option of nonparticipation, for nonparticipants the only transition possible is directly to self-employment. While some workers may optimally select nonparticipation, the model is

[15] This increase in nonparticipation rates has been noted by many others.

[16] Of course respondents can drop out of the sample from one March to the next. This attrition bias is only important if the attrition rate differs depending upon labor market status. Neumark and Kawaguchi (2004) have studied attrition bias and their effect on estimates of union wage differentials and the male marriage wage premium. They conclude that the advantages of using matched CPS panels to obtain longitudinal estimates are likely to far outweigh the disadvantages from attrition biases.

calibrated to ensure that searching while unemployed is the better alternative for prime age males. Consequently, no one ever chooses nonparticipation as the optimal strategy.

The larger values along the diagonal in Table 2 indicate that once an individual enters a particular state, he tends to stay in that state. For example, a respondent who was interviewed in year *t* and determined to be in paid employment at that time is found to be in paid employment again in year *t*+1 93.5% of the time. Compared with paid employment, the other labor market states are less sticky in the sense that those who enter these other states are more likely to exit than if they were in paid employment. Self-employment has a retention rate of 78.3%. Unemployment is the most transitory state, with 34.2% of those unemployed in one year observed to be unemployed the following year. People enter self-employment from both paid employment and unemployment. Only 3.3% of those employed in one year are found to be self-employed the following year whereas 6.5% of those unemployed in a given year are subsequently found to be self-employed.[17] Although unemployment is an important source of inflows to self-employment, because unemployment accounts for a smaller percentage of the work force most inflows into self-employment come from paid employment.

Assumptions

The model is calibrated to match seven moments. These include the six transition rates found in Table 2 where $i \neq j$.. The seventh moment is the average observed earnings from paid employment in year *t* given that the worker was unemployed in year *t*-

[17] We do not observe a continuous job history between period *t* and period *t*+1. Therefore, it is possible that interim transitions are made that are unobserved. These interim transitions may bias transition rate estimates with the estimates consistently underestimating true transition rates. See Shimer (2005) for a discussion and estimates of monthly transition rates.

1 and is employed in paid employment in year *t.* This is computed to be $23,711.37 in 2004 dollars for males ages 21-54, excluding farm workers and nonparticipants. The objective is to choose parameter values to match as closely as possible deviations of the model's computed transition matrix from the actual observed in the data and the percentage difference in the conditional wage this period given that the worker was unemployed last period.

In the results that follow it is assumed that both wages and profits are generated by a Gamma distribution.[18] The Gamma distribution is a two parameter family of continuous distributions defined over the positive real numbers. It has both a scale parameter and a shape parameter. The exponential, chi-square, and normal distributions are all special cases of the Gamma distribution.

Obtaining estimates of business startup costs is difficult. In his book Bhidé (2000) estimates business startup costs in 2000 of $10,000. This figure is adjusted to $10,946.20 in 2004 dollars.[19] Uusitalo (2001) finds that the role of startup costs is limited in new business formation. Similarly, Hurst and Lusardi (2004) find that the probability of entering entrepreneurship is flat over a large range of the wealth distribution, rising only for the richest workers. In contrast, Cagetti and DeNardi (2006) show that the presence of liquidity constraints can generate this same pattern so the unresponsiveness of entrepreneurship to wealth cannot be taken as evidence that liquidity constraints are unimportant. The model presented above abstracts from liquidity constraints.

[18] Other distributions were also evaluated. These include lognormal and Pareto. Only the results for the Gamma distribution are reported here.
[19] The 2004 figure adjusts for inflation using the GDP chain-type price index.

In keeping with what appears to be acceptable practice in the literature, the discount rate β is set to 0.97. The cost of job search c is parameterized as $c = \alpha * w_m$ where α is a parameter and w_m is the wage from the wage offer distribution such that 5% of all offers generated are lower. Thus, the cost of job search is a fraction of the lowest wage from the wage offer distribution and can be thought of as the cost necessary to obtain any wage offer. The layoff probability, q, is set equal to 0.035 as is estimated by Shimer (2005).

In the model presented above the job finding rate is a constant parameter λ. In reality the job finding rate may be a function of the intensity with which a worker searches, which itself is endogenous. If unemployment is particularly costly, then workers will have an incentive to increase their job search efforts so as to increase their likelihood of obtaining an offer. This is not the focus of the current exercise. Instead, the notion of a job offer employed here is the minimum amount of effort that is likely to generate some job offer. In the results presented here the job offer rate is given as $\lambda = 0.96$. A wage offer is generated 96% of the time by incurring a search cost of $c = \alpha * w_m$.

Typically the value of leisure ℓ is thought to be positive. Initial calibration results were very sensitive to this assumption. The reason for this seems to be that self-employment is a valuable alternative. The cost of unemployment is the foregone earnings it entails. Given reasonable assumptions about the arrival rate of entrepreneurial ideas, the foregone earnings are overwhelmed by the potential value of self-employment. In order to make unemployment less attractive there must be a substantial cost to it. Although ℓ can be interpreted as the value of leisure, it can also be thought of as the loss

in the value of skills incurred each period of unemployment. In the results presented below $\ell = -\$20,000$.

Rissman (2006) estimates that more than 40% of all classified as self-employed in one year are not self-employed the following year. This does not imply that the failure rate is in excess of 40%, however. The model presented above suggests that workers self-employed at one point in time may transition to both unemployment and paid employment. Transitions to paid employment are determined by the optimal search strategy and are only partially determined by business failures. Even if the business does not fail, the worker may continue to search for paid employment and if the wage an offer generates exceeds some threshold, the worker will close his business and move to paid employment. Thus, the failure rate should be less than 40%.

The idea rate is difficult to quantify. However, the CPS provides some information as to its magnitude. According to the model, nonparticipants transition from nonparticipation to self-employment only if they receive an entrepreneurial idea and if that idea generates profit in excess of the level of profit that would induce him to exit unemployment given that he is not currently looking for a job in the paid sector. In the CPS the rate at which nonparticipants become self-employed is 0.035. According to the model, the likelihood of transitioning from nonparticipation to self-employment is given by

$$\Pr(SE_t \mid NP_{t-1}) = \rho G(\pi > \hat{\pi}) = 0.035$$

where $\hat{\pi}$ is the threshold level of profits that would induce someone to exit nonparticipation for self-employment. With $G(\pi > \hat{\pi}) \leq 1$ the parameter ρ, which is the rate at which new ideas are formed, is at least 0.035.

Results

The results of the calibration exercise are found in Tables 3 and 4. In Table 3 the lower half of the table gives the parameters assumed given outside the model. These include the discount rate, value of leisure, wage offer rate, business startup cost, and layoff rate. The other seven parameters are free. These include the idea rate, business failure rate, and the parameters of the wage offer and profit opportunity distributions.

A grid search method was used to minimize the objective function. The objective is to choose parameter values to match as closely as possible seven moments of the data. These moments are taken to be the six transition rates from state *i* to state *j* where $i, j = u, pe, se$ and $i \neq j$. The seventh moment is the average wage observed in year *t* given the worker was unemployed in year *t-1* and is in paid employment in year *t*.[20] In practice this entails minimizing the squared deviations of the moments generated from the model from those observed in the data.

P_{ij}^{A} is the actual transition rate from state $i = u, pe, se$ to state $j = u, pe, se$. These are found previously in Table 2 and reproduced in Table 4. P_{ij}^{*} is the transition rate generated by the model where again $i, j = u, pe, se$. The percentage difference between the actual and expected wage in period *t* given that the worker was unemployed in period *t-1* is also given in Table 4.

The model clearly does a good job of capturing some transition rates better than others. The model predicts a transition rate of 0.5883 from unemployment to paid employment against an observed rate of 0.6030. It also does a good job of capturing transitions from unemployment to self-employment and from paid employment to

[20] This last moment is scaled as a percentage difference from the data.

unemployment. It overpredicts the transition from paid employment to self-employment (0.0601 versus 0.0330) and from self-employment to unemployment (0.0633 versus 0.0190) and underpredicts the transition from self-employment to paid-employment (0.1651 versus 0.2070). However, it closely matches the wage moment with less than a 0.02% difference.

The calibrated idea rate is 0.065. The business failure rate is calibrated to be 18%. Comparing the business failure rate to the job separation rate of 3.5%, self-employment is quite a bit riskier. This translates into higher calibrated transition rates back to unemployment from self-employment than from paid employment. Thus workers are willing to give up a certain level of income in return for a more steady job. Because the cost of unemployment is so high, given the wage and profit distribution assumptions, workers always search from self-employment. Thus, in the economy modeled here, the fraction of those who are self-employed who are entrepreneurs is 0. Only if the tail of the profit distribution is thicker will a person be an entrepreneur. Given the simple assumptions of this model, the tails of the distribution are not pinned down. Further work remains to be done.

The model's projected transition rates can be used to generate steady state levels of unemployment, paid employment, and self-employment. Results are found in Table 5. The model overpredicts the steady state level of self-employment and underpredicts the steady state level of paid employment.

Business startup costs

The model provides a way to evaluate the effect of doubling the cost of starting a business on the steady state levels of unemployment, paid employment, and self-

employment. This can be thought of as a partial equilibrium analysis in that anything that affects the flows of people into labor market states will in a more general framework also affect the distribution of wage offers. In the model presented here the wage offer distribution is assumed to be given. As shown in Cagetti and DeNardi (2006), liquidity constraints can explain the disproportionate wealth accounted for by entrepreneurs. The model presented here does not explicitly consider asset accumulation and consumption. However, it is still possible to determine the effect of doubling business startup costs on the labor market states in equilibrium.

The model is solved assuming the same parameters as calibrated in Table 3 with the exception that business startup costs are doubled. The results of this exercise are found in the last row of Table 5. Increasing startup costs decreases the net value of self-employment. It increases steady state unemployment, increases steady state paid employment, and decreases steady state self-employment. However, the effects are quite small. Doubling startup costs raises equilibrium unemployment by 60 basis points, raises equilibrium paid employment by 27 basis points, and lowers equilibrium self-employment by 86 basis points. It also increases the expected wage given that a person transitions from unemployment to paid employment.

The bottom part of Table 4 looks more closely at the calculated transition matrices. Doubling startup costs tends to raise unemployment because it decreases transitions from unemployment to paid employment and also decreases the transition rate from unemployment to self-employment. Steady state self-employment falls predominantly because doubling startup costs increases transitions from self-employment to unemployment with only a minor increase in flows from self-employment to paid

employment. These relatively minor effects do not mean that liquidity constraints are unimportant. It simply shows that in this model where there are no liquidity constraints business startup costs do not have a large impact on the steady state.

Section III: Conclusions

The model of labor market transitions presented above is fairly good at explaining some of the transitions we observe in the data. However, it fails to match all moments of the data. In particular it tends to overstate equilibrium self-employment and understate equilibrium paid-employment under some common assumptions for parameter values.

One possible reason for the model's failure to match all the moments selected is that the calibration is done while fixing some of the parameters and searching for the best possible values of the other parameters. The estimates obtained are likely associated with a local minimum of the value function. A more thorough search of the parameter space may yield better results. Similarly, the five fixed parameters may be inconsistent with matching the model moments to the data. A less restrictive parameterization may be necessary.

The model seems to provide a close approximation to reality but suggests that a richer model may be better able to capture certain features of the data. One possibility is to permit self-employment to entail learning on the job. Thus, failures would occur earlier in the life of a business and those that survive would have lower failure rates. Furthermore, the model as formulated here has a very simple process for idea generation. In reality, ideas may be born of experience. The more experience a worker has in paid employment, the more exposure he may have to self-employment opportunities. This

would encourage people to work in the wage sector as a means of obtaining entrée into self-employment. It also suggests that life cycle events may be important determinants of labor market transitions.

The model provides a framework for thinking of entrepreneurs as those who have such a high value in self-employment that they do not continue searching for wage work. In fact, according to the strict view of the model entrepreneurs never return to wage work except when their business fails. Ideally, the calibration exercise would provide an estimate of the fraction of self-employed who are entrepreneurs in this sense. However, the calibrated parameters are such that there are no entrepreneurs. This most certainly stems from a high calibrated business failure rate. With almost 20% of all businesses failing each period, the self-employed worker optimally chooses to continue to search for a wage sector job as insurance against business failure. In order to generate entrepreneurs who do not search, a richer model of self-employment needs to be developed.

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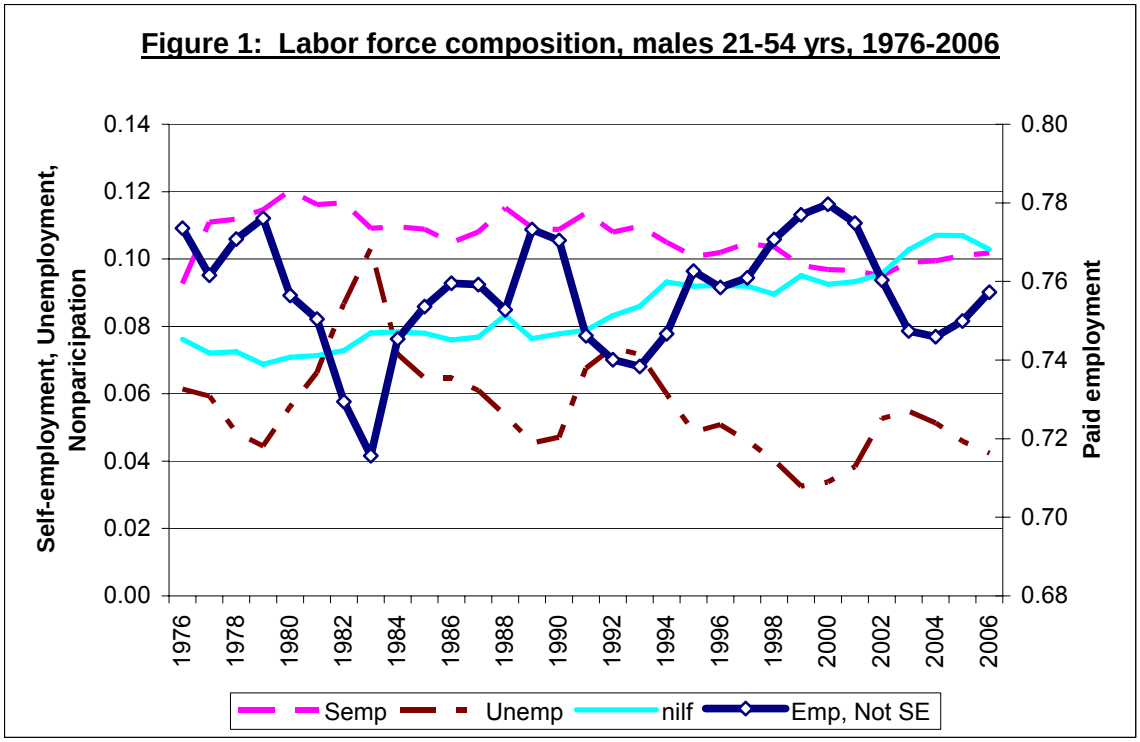
Table 1: Fraction of males ages 21 to 54 by labor market state, excluding farm workers, 1976 to 2006*

Source: March CPS

Year	Paid Employment	Self-Employment	Unemployment	Nonparticipant
1976	0.774	0.093	0.061	0.076
1977	0.762	0.111	0.059	0.072
1978	0.771	0.112	0.048	0.073
1979	0.776	0.115	0.044	0.069
1980	0.756	0.120	0.056	0.071
1981	0.750	0.116	0.066	0.071
1982	0.729	0.117	0.087	0.073
1983	0.716	0.109	0.103	0.078
1984	0.745	0.110	0.072	0.078
1985	0.754	0.109	0.065	0.078
1986	0.760	0.105	0.065	0.076
1987	0.759	0.108	0.061	0.077
1988	0.753	0.115	0.054	0.083
1989	0.773	0.109	0.045	0.076
1990	0.770	0.109	0.047	0.078
1991	0.746	0.114	0.068	0.079
1992	0.740	0.108	0.074	0.083
1993	0.738	0.110	0.072	0.086
1994	0.747	0.105	0.060	0.093
1995	0.763	0.101	0.049	0.092
1996	0.758	0.102	0.051	0.092
1997	0.761	0.105	0.046	0.092
1998	0.771	0.104	0.040	0.090
1999	0.777	0.098	0.033	0.095
2000	0.780	0.097	0.034	0.092
2001	0.775	0.097	0.038	0.093
2002	0.760	0.095	0.053	0.096
2003	0.747	0.099	0.055	0.103
2004	0.746	0.099	0.051	0.107
2005	0.750	0.101	0.046	0.107
2006	0.757	0.102	0.042	0.103
1976-1986	0.754	0.111	0.066	0.074
1987-1996	0.755	0.108	0.058	0.084
1997-2006	0.762	0.100	0.044	0.098

* Paid employment includes those who responded affirmatively to the employment question and are employed by government, a private company, or a nonprofit organization. Those who are self-employed have responded affirmatively to the employment question and also indicate that they are self-employed. No distinction is made between incorporated and unincorporated self-employment. A person is characterized as unemployed if they have been actively seeking work. Those who are nonparticipants include all others.



Source: March CPS, 1976-2006.

Table 2: Transtions between labor market states, nonfarm males ages 21-54, 1977-2006.
Source: March CPS

	Time t+1		
Time t	u	pe	se
u	0.342	0.603	0.065
pe	0.033	0.935	0.033
se	0.019	0.207	0.783

Note: Nonparticipants have been omitted from the calculations.

Table 3: Parameter assumptions for calibration

Definition	*Free*	*Fixed*	*Value*		
Idea rate ρ	x		0.065		
Business failure rate γ	x		0.18		
Shape parameter for wages	x		9.3		
Shape parameter for profits	x		2.1		
Scale parameter for wages	x		1,914		
Scale parameter for profits	x		25,000		
Job search cost c	x		\$470.15=.05*w_{min}		
Discount rate β		x	0.97		
Value of leisure ℓ		x	-\$20,000		
Wage offer rate λ		x	0.96		
Business startup cost k		x	\$10,946		
Layoff rate q		x	0.035		

Table 4: Calibration results

$$P_{ij}^{A} = \begin{array}{c} \\ U_{t-1} \\ PE_{t-1} \\ SE_{t-1} \end{array} \begin{array}{c} \begin{array}{ccc} U_t & PE_t & SE_t \end{array} \\ \begin{bmatrix} 0.3320 & 0.6030 & 0.0650 \\ 0.0330 & 0.9340 & 0.0330 \\ 0.0190 & 0.2070 & 0.7740 \end{bmatrix} \end{array} \quad . \quad P_{ij}^{*} = \begin{array}{c} \\ U_{t-1} \\ PE_{t-1} \\ SE_{t-1} \end{array} \begin{array}{c} \begin{array}{ccc} U_t & PE_t & SE_t \end{array} \\ \begin{bmatrix} 0.3516 & 0.5883 & 0.0602 \\ 0.0309 & 0.9090 & 0.0601 \\ 0.0633 & 0.1651 & 0.7717 \end{bmatrix} \end{array}$$

$$\left[(w_t \mid u_{t-1}, pe_t) - E(w_t \mid u_{t-1}, pe_t)\right]/(w_t \mid u_{t-1}, pe_t) = 0.0002$$

Table 4A: Doubling startup costs

$$P_{ij}^{*} = \begin{array}{c} \\ U_{t-1} \\ PE_{t-1} \\ SE_{t-1} \end{array} \begin{array}{c} \begin{array}{ccc} U_t & PE_t & SE_t \end{array} \\ \begin{bmatrix} 0.3964 & 0.5442 & 0.0594 \\ 0.0309 & 0.9098 & 0.0593 \\ 0.0714 & 0.1664 & 0.7623 \end{bmatrix} \end{array}$$

$$\left[(w_t \mid u_{t-1}, pe_t) - E(w_t \mid u_{t-1}, pe_t)\right]/(w_t \mid u_{t-1}, pe_t) = -0.0173$$

Table 5: Steady state results

	Unemployment	Paid Employment	Self-Employment
Actual	0.0444	0.8227	0.1329
Calibrated	0.0554	0.7362	0.2084
Doubling Startup costs	0.0614	0.7389	0.1998

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