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Thomas Åstebro
HEC Paris

Jing Chen
Department of Economics, Florida International University

Peter Thompson
Department of Economics, Florida International University

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Thomas Åstebro* — *HEC Paris*

Jing Chen** — *Florida International University*

Peter Thompson*** — *Florida International University*

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Recent evidence has shown that entrants into self-employment are disproportionately drawn from the tails of the earnings and ability distributions. This observation is explained by a multi-task model of occupational choice in which frictions in the labor market induces mismatches between firms and workers, and mis-assignment of workers to tasks. The model also yields distinctive predictions relating prior work histories to earnings and to the probability of entry into self-employment. These predictions are tested with the Korean Labor and Income Panel Study, from which we find considerable support for the model.

JEL Classification Codes: J24, L26.

Keywords: Entrepreneurship, self-employment, jack-of-all-trades, skill complementarity.

* HEC Paris, 1 rue de la Liberation, 78351 Jouy-en-Josas Cedex, France. Email: astebro@hec.fr. ** Department of Economics, Florida International University, Miami, FL 33199. Email: jchen002@fiu.edu. *** Department of Economics, Florida International University, Miami, FL 33199. Email: peter.thompson2@fiu.edu.

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1. Introduction

This paper describes a model of occupational choice that blends Lazear's (2005) notion that entrepreneurs must be skilled in a variety of activities with the strong complementarity between skills central to Kremer's (1993) O-ring theory of production. The model is motivated by evidence on earnings of wage-earners and the self-employed. Figure 1, which replicates a figure from Hamilton's (2000) analysis of data from the 1984 Survey of Income and Program Participation (SIPP), plots the distribution of wage income and three measures of self-employment income. The distribution of earnings of the self-employed exhibits greater variance and is more skewed. For all three measures of self-employment income, median earnings of the self-employed were around 35 percent less than median wages, but by about the 75th percentile the rank ordering was reversed. Hamilton's findings are echoed in other samples. Using data from the National Longitudinal Survey of Young Men (NLSY), Evans and Leighton (1989) also conclude that the self-employed earn less than wage earners, and their income distribution is skewed toward low-income earners. The samples used by Hamilton, and Evans and Leighton, are skewed toward low-income earners. Gort and Lee (2007) study earnings in the NSF Scientist and Engineers Statististical Data System (SESTAT), and find that average earnings for the self-employed exceed those for wage earners. Their sample, constructed from surveys of individuals with at least a Bachelor's degree in science or engineering, is

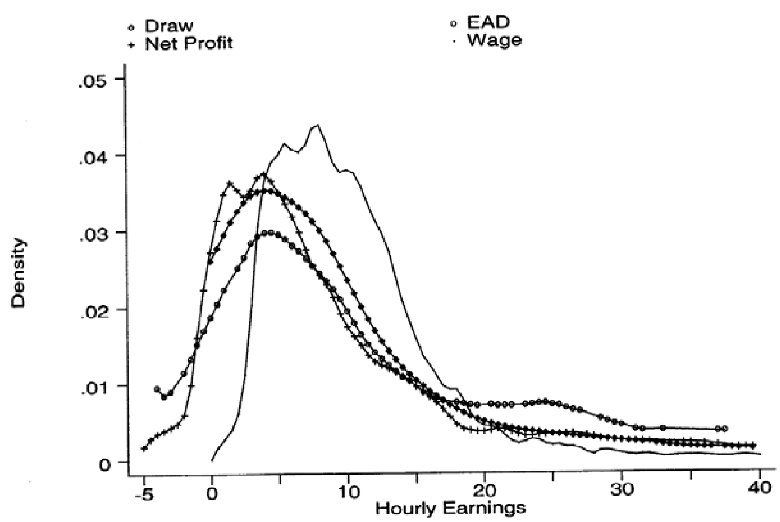

Fig 1. *The density of earnings for wage earners and the self-employed. From Hamilton (2000, Figure 1).*

skewed toward the upper end of the national earnings distribution where, if the patterns observed elsewhere hold generally, we expect self-employment earnings to be greater. Moreover, Gort and Lee still find that earnings among the lower percentiles of wage earners in their sample exceeds self-employment earnings at comparable percentiles.

We still seem to lack a theory of occupational choice that can make sense of this evidence. One candidate explanation is that Figure 1 simply reflects the greater uncertainty inherent in self-employment, and that occupational choice can be explained by a degree of risk aversion that makes everyone indifferent between wage employment and self-employment, or by variations in attitudes to risk that induces selection into self-employment by the least risk averse [cf. Kihlstrom and Laffont (1979)]. But evidence of a significant role for risk aversion is thin. First, the relationship between the mean and variance of earnings is too variable across samples to be consistent with a plausible degree of risk aversion.[1] Second, direct examinations of risk preferences fail to detect significant differences in the expected direction between wage earners and the self-employed [e.g. Brockhaus (1980), Masters and Meier (1988), Miner and Raju (2004), Sarasvathy, Simon and Lave (1998)].[2]

A second candidate explanation is that some individuals are forced into self-employment because unfavorable events limit wage-earning opportunities, while others are attracted into self-employment to pursue novel opportunities [see, for exam-

1. In Hamilton's sample, there is not even consistent evidence that the mean of self-employment income exceeds mean wage income: two of his three measures of self-employment yield a mean less than the average wage. Braguinsky and Ohyama (2007) study SESTAT data and find that, while the mean return to self-employment is strongly positive in skill-concentrated occupations, it is strongly negative in occupations that require only general skills. Rosen and Willen (2002) do establish a consistent mean-variance tradeoff in data from the Panel Study of Income Dynamics (PSID), but they conclude that the degree of risk aversion required to explain occupational choice exceeds conventional estimates by an order of magnitude. In stark contrast, Moskowitz and Vissing-Jørgensen (2002) wonder why entrepreneurial investors are willing to absorb such high risk with almost no gain in mean returns.

2. The distributions depicted in Figure 1 are of course not the conditional distributions faced by individuals; rather, they are the unconditional distributions that confound the risk faced by individuals with variation across individuals in expected returns. That is, the distributions in Figure 1 are not informative about the risk faced by entrepreneurs. However, the empirical results in Hamilton (2000), and in Evans and Leighton (1989), are based on individual panel data sets.

ple, Block and Wagner (2006) and references therein]. The Global Entrepreneurship Monitor [Reynolds *et al.* (2005)] has been especially keen in its data collection to distinguish between what they call 'necessity entrepreneurs' and 'opportunity entrepreneurs'. Necessity entrepreneurs are expected to have unusually low incomes while opportunity entrepreneurs are expected on average to report high incomes.[3]

Alternative explanations depend upon variations in ability. The upper end of the earnings distribution for the self-employed is populated by stars who, as a result of convexity in the returns to ability among the self-employed, earn much more than wage earners at the same percentile [*cf.*, Rosen (1981)].[4] The lower end of the distribution for the self-employed is populated by misfits who do not work well with others [e.g. Min (1984)], and they earn less than wage workers at the same percentile. These are simple ideas but, until recently, surprisingly few models attempt to explain in a single framework the disparate relative performance of the self-employed at both ends of the earnings spectrum.

In an early exception, MacDonald (1988) constructs a model in which self-employment consists of both high-ability experienced business owners and young newly self-employed. The former group is entrepreneurial stars whose self-employment income is greater than their alternative earnings. The latter group joins self-employment because of profit uncertainty, and in general makes low earnings as implied by the free entry condition embedded in the model and the variety of their abilities. Over time, the newly self-employed must learn about their abilities, and the low-ability ones will eventually return to wage employment.

In an early exception, MacDonald (1988) constructs a model in which the newly self-employed must learn over time about their abilities. His model predicts that the self-employed consist of a mix of high-ability experienced business owners and inexperienced, typically low-ability, agents, most of the latter of whom will eventually return to wage employment. However, MacDonald's story seems at odds with at least some of the evidence. Braguinsky and Ohyama (2007), for example, find that the returns to entrepreneurship are *higher* for the young. Hamilton (2000) notes

[3] More empirical work remains to explore these ideas. The GEM identifies the two types of entrepreneurs by asking respondents whether they started a business "to take advantage of a unique market opportunity . . . or because it was the best option available" [Reynolds *et. al* (2005)]. As the latter logically characterizes all decisions to enter self-employment, the question seems only to distinguish between innovative entrepreneurs and the self-employed.

[4] This view of selection into self-employment is consistent with the models of Lucas (1978), Calvo and Wellisz (1980), Evans and Jovanovic (1989), and Holmes and Schmitz (1990).

that the theory also cannot explain why many individuals persist for a long time in self-employment despite low earnings. Moreover, he observes, the earnings profile of the self-employed estimated from cross-sectional data (which of course confounds survivor bias with experience), never rises to exceed the alternative starting wage for an observationally equivalent wage earner.

Ohyama (2007) develops and tests a model in which variation in a unidimensional measure of fixed ability determines occupational choice. Wages are linearly increasing in ability, while self-employment earnings may increase nonlinearly because self-employment earnings depend not only on ability, but also on the match between the requirements of the business and the education of the owner. In equilibrium, if self-employment earnings are strictly convex in ability, self-employment is chosen by the lowest- and highest-ability workers, with wage employment being the domain of those with moderate levels of ability. Ohyama tests his model with data from the SESTAT, from which some intriguing supporting evidence is obtained.[5]

The present paper also explains both the relatively high earnings of entrepreneurial stars and the low earnings of the self-employed elsewhere in the distribution with a model that relies only on variations in fixed ability. In contrast to Ohyama, we use a multiple-task framework in which there is complementarity between skills [*cf.* Kremer's (1993)]. Production in each firm involves a number of distinct tasks, and output depends upon the skill with which each task is carried out. Abilities across tasks are complements in production. Firms may be organized in either of two ways. There are wage firms in which each task is carried out by a different specialist employee, and there are solo enterprises in which a single self-employed agent carries out all tasks himself. This framework naturally induces convexity in the returns to self-employment and, as in Lazear (2005), a role for skill balance in determining who becomes self-employed.

Section 2 induces the static model. In an efficient equilibrium, the workers hired by any given firm have identical ability in the tasks they are hired to undertake, and each worker is employed to undertake the task in which his ability is greatest. However, no individual prefers self-employment to wage work. We introduce frictions in the labor market, whereby workers are not assigned efficiently either to tasks or firms. Individuals who find wage employment with a mismatched firm or in the wrong task will earn a poor wage, and may find self-employment an attractive alter-

[5] In particular, the self-employed do relatively better on average than wage workers only if the business they run is in the same narrow technological area as their graduate education.

native. It is obvious that frictions will in general reduce wages, but we show that this effect is greater in the tails of the ability distributions. As a result, the self-employed tend to be drawn from the tails of the ability distribution.

To explore whether there might be merit to our explanation of the cross-sectional earnings distributions, we develop in Section 3 a dynamic version of the model. Agents may lose jobs involuntarily, resign from their current firm to accept a new offer of employment at another firm, establish their own business, or be unemployed. The dynamic model yields some distinctive predictions. First, the self-employed earn less on average than wage workers. Second, a career history involving spells of unemployment, task switching, or employer switching, are all associated with an increased likelihood of entry into self-employment. Third, task switching and employer switching are predictors of higher earnings among the self-employed, but not among wage workers. We test these predictions in Section 4 using data from the Korean Labor and Income Panel Study (KLIPS), a large panel of individuals spanning the period 1998 to 2004 with characteristic similar to the US Panel Study of Income Dynamics (PSID). Our empirical results lend strong support to the model.

2. The Static Model

The model is developed in four parts. Subsection 2.1 describes the basic technology and shows there is no plausible role for self-employment in the frictionless equilibrium. Subsection 2.2 introduces frictions in the assignments of workers to firms, but not in the assignment of workers to tasks. After some comparative statics results are reported in subsection 2.3, subsection 2.4 shows the effects of imperfect task assignment.

2.1 *Frictionless assignments*

Technology is described by a variation of Kremer's (1993) O-ring production function. Positive output requires completion of exactly n tasks, and the quantity produced depends upon the skill with which each task is carried out. Production may be undertaken in two organizational forms. In a wage firm, each task is carried out by a different worker, each of whom specializes in the task to which he is assigned. In self-employment, all tasks are undertaken by a single person. Other things being equal, a wage firm is therefore n times the size of a firm operated by a self-employed individual.

In a wage firm, revenue is given by

$$y_w = n\alpha + n\prod_{j=1}^{n}\theta_j, \tag{1}$$

where $\theta_j \in [0,1]$ denotes the skill level applied to task j. There are several ways to interpret the production technology. First, the level of skill applied to each task may affect the quantity or quality of production, so greater skill raises revenues in a deterministic fashion. Second, skill may affect the probability of creating a high quality product. That is, with probability $\prod_{j-1}^{n}\theta_j$ the firm produces a high-quality product yielding revenues of $n(\alpha+1)$, and with probability $1-\prod_{j-1}^{n}\theta_j$ the firm produces a low-quality product yielding revenues of $n\alpha$; in this case (1) gives expected revenues for the wage firm. We shall assume risk-neutrality so either interpretation is acceptable for our analysis.

The important feature of (1) is that skills are complements in production. A worker will poor skills relative to his coworkers devalues their work. As is well known [*cf.*, Becker (1973)], skill complementarity induces positive sorting among workers when assignments of workers to firms is frictionless. Consequently, efficient allocations of workers to firms require that (i) all workers employed by a single firm have the same θ, and (ii) each worker specializes in the task for which his ability is greatest. It is then easy to derive the wage schedule, $w(\theta)$, that can sustain the efficient equilibrium allocation in a competitive equilibrium. The first-order condition is given by

$$w'(\theta) = n\theta^{n-1}. \tag{2}$$

Equilibrium wages under perfect sorting are then obtained upon integrating (2), yielding

$$w(\theta) = \alpha + \theta^n, \tag{3}$$

where the zero profit condition determines that the constant of integration is α. The wage for each worker is therefore a convex increasing function of his ability in the task in which he is engaged, with boundary conditions $w(0) = \alpha$ and $w(1) = 1+\alpha$.

Suppose, following Lazear (2005), that agent i may choose self-employment instead of wage employment in task k. In self-employment, i must undertake each task himself. As his firm has only one worker, his earnings should be in the neighborhood of $1/n$ times the revenue that would be earned by a wage firm with the same mix of skills as i. Accordingly, let self-employment earnings be given by

$$\tilde{w}\left(\theta_{i1},\ldots,\theta_{in}\right) = \alpha + A\prod_{j=1}^{n}\theta_{ij} - c, \tag{4}$$

where c is the (annuitized) entry cost.[6] If $A < [>] 1$, there is a penalty [premium] for self-employment.

The existence of self-employment requires a premium in the frictionless model. When assignment of workers to firms is efficient, each worker specializes in his best task and works with other individuals with an identical θ in their best tasks. It then follows that the difference between the wage and self-employment earnings is

$$w - \tilde{w} = \theta_{i(n)}^n - A\prod_{j=1}^n \theta_{ij} + c \tag{5}$$

where $\theta_{i(n)} = \max\{\theta_{i1}, \ldots, \theta_{in}\}$. Clearly, A must be sufficiently greater than one to induce agent i to select self-employment.

A frictionless model with a self-employment premium is not particularly palatable. First, it seems more plausible that $A \leq 1$, because any agent with a given set of abilities is likely to be more productive in any task if he specializes in it.[7] Second, entrants into self-employment are drawn from the upper tail of the ability distribution. This is easily seen upon noting that the conditional probability that i prefers self-employment,

$$\Pr\left\{A\prod_{j=1}^n \theta_{ij} > \theta_{i(n)}^n + c \,\middle|\, \theta_{i(n)}\right\}, \tag{6}$$

is increasing in $\theta_{i(n)}$ as long as each agent's abilities across tasks are not negatively correlated.[8] This in turn implies that median self-employed earnings are greater, per-

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[6] The entry cost is not critical to what follows, but will provide a degree of freedom for some numerical examples that are reported later.

[7] An alternative interpretation is that established firms have learned over time how to be more productive with a given set of abilities.

[8] In general, the probability of self-employment is zero up to some critical value of $\theta_{i(n)}$, and strictly increasing in $\theta_{i(n)}$ thereafter. For example, consider the two-task case and assume that abilities are independent and uniformly distributed on the unit interval. Then (6) can be written as

$$\Pr\left\{\theta_{i(1)} > \left(\theta_{i(2)}^2 + c\right) / A\theta_{i(2)} \,\middle|\, \theta_{i(2)}\right\} = \max\left\{0,\, \theta_{i(2)}^{-1} \int_{A^{-1}\left(\theta_{i(2)} + c/\theta_{i(2)}\right)}^{\theta_{i(2)}} d\theta_{i(1)}\right\}$$

$$= \max\left\{0,\, \frac{(A-1)\theta_{i(2)}^2 - c}{A\theta_{i(2)}^2}\right\}.$$

This equals zero when $\theta_{i(2)} < \sqrt{c(A-1)}$, and is strictly increasing in $\theta_{i(2)}$ for higher values.

haps considerably greater, than the median wage. None of these implications accords well with the evidence.

2.2 *Frictional assignments of workers to firms*

In this subsection, we continue to suppose that each wage worker specializes in his best task, but we drop the assumption that the assignment of workers to firms is without friction. However frictions are introduced, each match generates a surplus that must somehow be divided between the parties involved. There is no strictly preferred way to determine this division and, while it has sometimes been derived from an explicit bargaining game, it has been more common to assume that each party's share of the surplus is given exogenously. Similarly, when frictions are introduced into Kremer's production technology, there is no straightforward way to determine wages. Indeed, Kremer (1993, p. 585) simply notes that "the division of a firm's output among its heterogeneous workers [is] determined by a complex bargaining problem." We shall suppose the following happens.

- Let $q = \prod_{j \neq k} \theta_j$ denote the quality of a firm with a vacancy in task k. The average wage paid to the $n-1$ incumbent employees is $\alpha + Aq^n$.
- If this firm employs agent i to fill its vacancy, and it so happens that $\theta_{ik} = q$, then the wage paid to i is $w(\theta_{ik}, q) \equiv w(\theta_{ik}, \theta_{ik}) = \alpha + A\theta_{ik}^n$.
- If $\theta_{ik} \neq q$, then the wage paid to i is $w(\theta_{ik}, q) = \alpha + Aq^n + nAq^{n-1}(\theta_{ik} - q)$.

The assumed wage is a first-order Taylor's series expansion of the frictionless wage around the point $q = \theta_{ik}$. However, this is not an arbitrary approximation. First, it is easy to show that, conditional on the wage bill for incumbents being given by $(n-1)(\alpha + Aq^n)$, this is the wage function that induces zero profits for a firm of quality q regardless of agent i's ability in task k. That is, the firm is indifferent about the ability of the worker that is hired, and therefore will be willing to hire the first worker that is presented to it. Second, the wage function admits as a special case the competitive equilibrium wage paid in the frictionless assignment model. Third, each worker strictly prefers employment in a firm with $q = \theta_{ik}$. That is, this is a matching problem for workers, and the notion that perfect positive sorting is the ideal outcome for all workers is preserved by the wage function.

These properties are evident in Figure 2. The convex function, $w(\theta_{ik}, \theta_{ik}) \in [\alpha, \alpha + A]$ is the equilibrium wage schedule under frictionless assignment. The linear schedules, $w(\theta_{ik}, q_1)$ and $w(\theta_{ik}, q_2)$, are wages paid as a function of i's ability in task k by firms

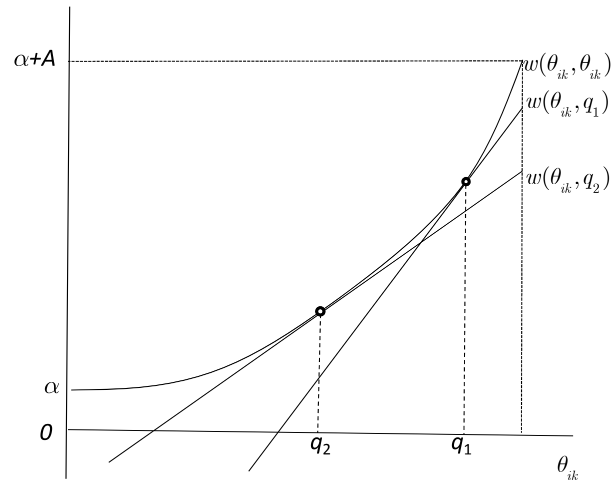

Figure 2. *Wage functions under perfect and imperfect matching.*

with either of two qualities, $q_1 > q_2$. These schedules are tangential to the efficient wage schedule at the points where i's ability matches the firm's quality. Clearly i can never do better in wage employment than by finding a matching firm. Indeed, if the firm that employs i has quality sufficiently greater than i's ability in task k, the offered wage can be negative.[9]

We model frictions in the market in the following manner. Let q and θ_{ik} be random draws on [0,1] from a bivariate distribution with correlation coefficient ρ. A correlation of ρ=1 imposes efficient sorting, while ρ=0 is equivalent to matching at random.[10] For each draw, we calculate the offered wage, $w(\theta_{ik}, q)$. The alternative of self-employment yields earnings, $\tilde{w}(\bullet) = \alpha + A\theta_{ik}\prod_{j\neq k}\theta_{ij} - c$, that depend on i's abilities in the other $n-1$ tasks. In a sample of individuals with ability θ_{ik}, the distribution of self-employment earnings depends on the variance of abilities across tasks, and the efficiency with which these individuals are matched to their best task in wage employment. In this subsection, we shall assume that there is perfect balance in abilities, so self-employment pays $\tilde{w}(\theta_{ik}) = \alpha + A\theta_{ik}^n - c$; in subsection 2.4, we will allow

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[9] Given the alternative of zero earnings in unemployment, any negative wage offer is equivalent to a refusal to hire.

[10] In search models with frictions, it is possible that there is no positive sorting, especially if the opportunity cost of search is sufficiently larger for the more able than for the less able, and if the degree of complementarity is modest [*cf.* Shimer and Smith (2000), Atakan (2006)]. However, we shall only consider various degrees of positive sorting.

for varying degrees of correlated abilities, as well as inefficiencies in the assignment of workers to tasks. Agent i, faced with an offer of $w(\theta_{ik}, q)$ from a firm and potential earnings of $\tilde{w}(\theta_{ik})$ in self-employment, chooses between wage employment, self-employment and unemployment, which pays zero.

Figure 3 illustrates the choices that agents make for two different correlations between firm quality and individual task ability. We set n=2, and employ a sampling algorithm that yields symmetric, unimodal, marginal distributions of ability and firm quality with a mean of 0.5 (see Appendix A). The upper panels plot 2,500 random draws of (θ_{ik}, q). In the left panel, matching is quite efficient, with a correlation coefficient of ρ=0.8. In the right panel, the correlation coefficient is ρ=0.15.

The lower panels plot the earnings implied by these draws, and the employment choices they induce. Each point in the lower scatter plots indicates the wage that is offered by the firm. The upper convex curve is the upper envelope of these offers, and indicates the offers that would be made under perfect matching. The lower convex curve plots earnings from self-employment, given the assumption maintained in this subsection that abilities across tasks for any agent are identical. If the offered wage is positive and exceeds self-employment earnings, the agent chooses wage employment. If self-employment earnings are positive and exceed the offered wage, then self-employment is selected. Otherwise unemployment is the preferred choice.

The left column illustrates that, with sufficiently efficient matching of workers to firms, self-employment and unemployment are almost never preferred to wage employment. A modest fraction of the lowest ability workers choose unemployment (about 0.75 percent of the draws), and an even smaller fraction of agents, generally with low ability as well, choose self-employment (about 0.2 percent). An agent prefers unemployment to wage work only when offered a negative wage, which occurs when a low ability agent is matched with a high-quality firm; this happens infrequently when matching is relatively efficient. Self-employment requires a poor match for agents with sufficient ability to yield positive self-employment earnings; this is a rare phenomenon when matching is relatively efficient.

In contrast, as the right column shows, a significant fraction of agents choose unemployment (approximately 6 percent) and self-employment (approximately 12 percent) when matching is inefficient. Those that select unemployment are, of course, among the least able. Self-employment is not only frequently the choice of relatively low ability, it is also frequently chosen by workers with high ability. Low ability agents (but not the least able) prefer self-employment if they have been matched with a

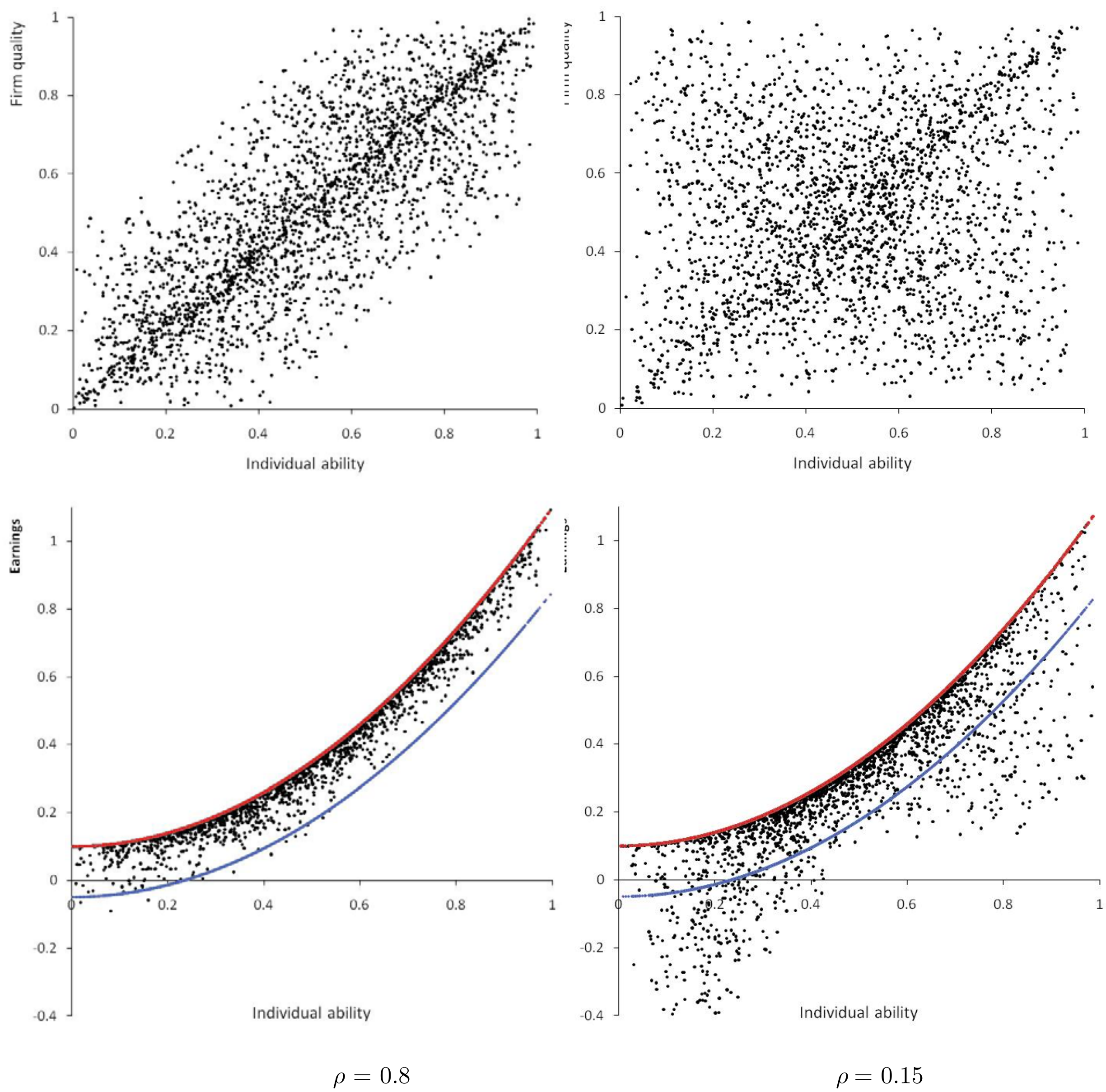

Figure 3. *Earnings and occupational choice; 2,500 draws.*
n=2, A=0.9, c=0.15, α=0.1.

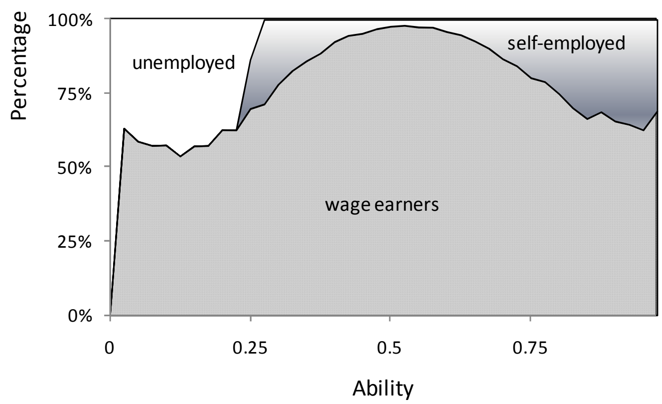

Figure 4. D*istribution of occupational choices by ability; 50,000 draws.* ρ=0.15, n=2, A=0.9, c=0.15, α=0.1.

high-quality firm, while high-ability agents prefer self-employment if they have been matched with a relatively low-quality firm. Because firm quality and individual ability are both constrained to lie in the unit interval, there is a limit to how poor the match can be for agents with intermediate ability. As a result, almost all of these agents prefer wage employment.

Figures 4 provides an alternative depiction of employment choices for the case where matching is relatively poor. Almost all agents of average ability choose wage employment. Agents with ability below about 0.25 divide more or less evenly between unemployment and wage work. The self-employed consist primarily of agents with ability between 0.25 and 0.4, and those with ability above about 0.7.

Figure 5 depicts the distributions of ability by occupational choice. The distribution among the unemployed has positive support only among the least able. The distribution of the abilities of wage workers is unimodal, and centered approximately on the population mean ability, 0.5. In contrast, the distribution of ability among the self-employed is bimodal. Figure 6 plots the corresponding distributions of earnings by occupational choice (unemployment, which pays zero, is omitted). Although the distribution of ability among wage workers is symmetric, the alternative of self-employment induces a positive skew to the wage distribution. The distribution of self-employment earnings, like the distribution of ability among the self-employed, is bimodal. Mean and median self-employment earnings (0.18 and 0.22, respectively) are markedly lower than their wage counterparts (0.30 and 0.32). The earnings of the low-income concentration of self-employed agents are centered on 0.05, which is about one fifth of the population average, and less than the wages of almost all workers. A second concentration of self-employed agents has earnings centered on 0.55, around twice the population average.

Figure 5. *Ability distributions by occupational choice; 50,000 draws.* ρ=0.15, n=2, A=0.9, c=0.15, α=0.1.

Figure 6. *Earnings distributions by occupational choice; 50,000 draws.* ρ=0.15, n=2, A=0.9, c=0.15, α=0.1

2.3 *Comparative statics*

The stylized model produces an exaggerated difference between the distributions of wages and self-employed earnings. In particular, the empirical data do not suggest a bimodal distribution for self-employment earnings. But this is readily muted by increasing the correlation between individual ability and firm quality. For example, Figure 7 plots earnings distributions for ρ=0.65 (in this case, about 3 percent become self-employed while 2 percent choose unemployment). Both distributions are now unimodal, and they bear comparison with the empirical evidence shown in Figure 1.

The remaining comparative statics of our model are straightforward. Figures 8 and 9 illustrate. The effect of an increase in the fixed cost of operating one's own business is illustrated in Figure 8. Unsurprisingly, while it makes self-employment less attractive for everyone, it makes self-employment impossible for the least able. This induces a rightward shift in the income distribution for the self-employed, which may no longer exhibit a larger spread than the wage distribution. Figure 9 illustrates the effect of an increase in technological complexity [captured, as in Kremer (1993), by an increase in the number of tasks, n, involved in production]. This change makes self-employment a more challenging prospect, because it requires that agents have sufficient ability in a greater number of tasks, and it reduces the probability that low-ability agents choose to run their own businesses. Consequently, the model predicts that in high-tech industries, self-employment is a choice only of the more gifted; in such industries, self-employment is rarer, and average self-employment earnings are greater than the average wage. Kremer (1993) shows that his O-ring technology implies that wealthier countries employ more sophisticated technologies. A corollary of the present model, then, is that self-employment will be more prevalent in poorer countries; this corollary is consistent with evidence [Gollin (2008, Table 1)].

The comparative statics are also consistent with the empirical evidence summarized in the introduction. The SIPP sample analyzed in Hamilton (2000) draws from a population consisting of both high-ability and low-ability individuals. While the self-employed in this sample are likely engaged in a wide range of activities, low-cost low-tech activities are almost certain to dominate. When costs and technological sophisticion are moderate, our model produces an income distribution consistent with Hamilton's findings. In contrast, the SESTAT sample used by Gort and Lee (2007) is a sample of highly-educated individuals; the self-employed among them are more likely to be engaged in relatively sophisticated activities. Our model

Figure 7. *Earnings distributions by occupational choice; 50,000 draws.* ρ=0.65, n=2, A=1.0, c=0.15, α=0.1.

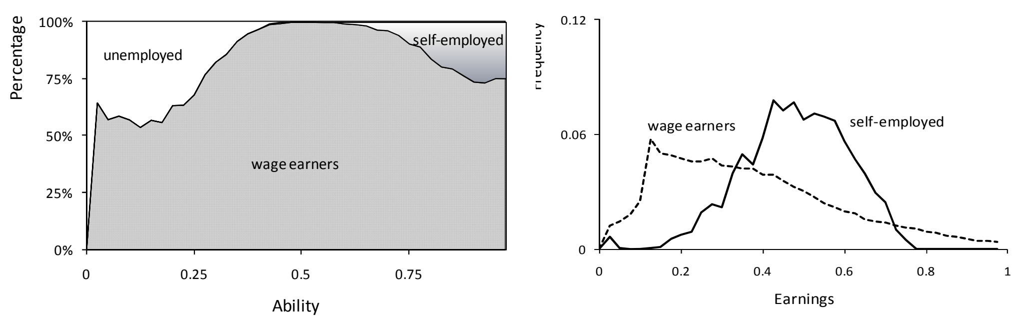

Figure 8. *Occupational choice and earnings; 50,000 draws. An increase in* c *excludes low-ability entrepreneurs.* ρ=0.15, n=2, A=0.9, c=0.25, α=0.1.

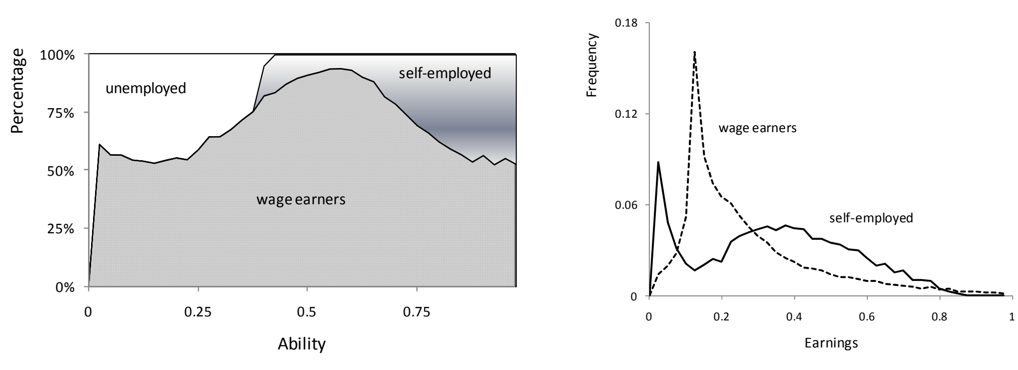

Figure 9. *Occupational choice and earnings; 50,000 draws. An increase in* n *excludes low-ability entrepreneurs.* ρ=0.15, n=3, A=0.9, c=0.25, α=0.1.

predicts,consistent with the results in Gort and Lee, that in such cases mean earnings among the self-employed exceed the average wage.[11]

2.4 *Imperfect task matching and imperfect correlation in abilities*

We have so far imposed the simplifying assumption that all workers are equally able in each task they might undertake. We now relax this assumption. Doing so has two consequences. First, it reduces the returns to self-employment for most agents, the exceptions being those that happen to continue to have balanced skills. Second, workers may not only be mismatched to firms, they may also be mismatched to tasks in wage employment. These two consequences offset each other: the former makes self-employment less attractive, the latter makes wage employment less attractive.[12] However, the main results are not altered by these generalizations: agents with the lowest ability tend to select unemployment; the self-employed are disproportionately drawn from the tails of the distribution; and self-employment earnings exhibit greater variance than wages.

To illustrate these claims, we construct a sample of abilities in two tasks and matches in the following manner. Firm quality and ability in task 1 are drawn as before from a correlated bivariate distribution on [0,1]. If an agent works for a firm, he is employed to undertake task 1. Ability in task 2 is drawn from a triangular distribution with support on $[a(\theta_1), b(\theta_1)]$ for some function $a(\theta_1) \leq b(\theta_1) \in [0,1]$ and mode c. The mode is chosen such that θ_2 has expectation equal to θ_1 whenever this yields $a(\theta_1) < c < b(\theta_1)$. Otherwise, c is set at $a(\theta_1)$ or $b(\theta_1)$, as appropriate. This algorithm allows us to create samples with varied degrees of correlated abilities, and to vary the likelihood of the possibility of mismatches in a plausible way. In particular it allows for the possibility of mismatches when an agent's ability in task 2 is modestly greater

[11] Gort and Lee sample individuals with advanced technical degrees and study, *inter alia*, self-employment earnings. One could alternatively sample on small firms founded in high-tech activities, presumably yielding much the same results.

[12] Noting that the United States has much lower rates of self-employment and small business ownership than other advanced economies, Schmitt and Lane (2009, p.1) suggest that "the United States has something to learn from the experience of other advanced economies, which appear to have had much better luck promoting and sustaining small-business employment." Our model suggests that lower self-employment rates in the US may be driven by more efficient matching in the labor market, perhaps resulting from the US's relatively high rates of labor mobility.

than his ability in task 1, but not when the difference is large. For example, if we set $a(\theta_1) \equiv 0$ and $b(\theta_1) = \theta_1$ (and hence $c = \theta_1$), the correlation between abilities is 0.76; raising $a(\theta_1)$ to $a(\theta_1) = \theta_1 / 3$ increases the correlation to 0.9. In both these cases, $\theta_1 \geq \theta_2$ and task matching is perfect. If we set $a(\theta_1) \equiv 0$ and $b(\theta_1) = 0.2 + 0.8\theta_1$, the correlation is 0.68, and θ_2 may be up to 0.2 greater than θ_1.

Figures 10 and 11 briefly illustrate occupational choices in the two-task case. The figures plot abilities in the two tasks and uses symbols to indicate the resulting employment choices from 2,500 random draws. In Figure 10, employees always work in the task for which they have greater ability. Task 1 therefore denotes each agent's best ability, so all pairs of abilities lie below the principal diagonal. Agents choosing unemployment are those with the lowest ability in both tasks. Self-employment is more frequently the choice of agents with moderately low (0.3–0.4), or high (>0.7), ability in their best task, those with intermediate ability in task 1 (0.4-0.7) almost never choose self-employment. Figure 10 also illustrates the role that skill balance plays in inducing self-employment. Because of the outside option provided by unemployment, balance is somewhat more important among the less able.

Figure 11 introduces inefficiencies in matching workers to tasks. Observations lying above the principal diagonal are those for which agents are better at task 2 than they are at the task 1 (which formed the basis for their offered wage). As expected, the fraction of agents choosing self-employment rises with a reduction in the efficiency of task matching. Unemployment is still chosen only by the least able, and self-employment is still more likely to be chosen by agents with high or low ability. However, compared with Figure 10, a somewhat greater number of agents with intermediate ability choose self-employment, this increase is driven by self-employment choices in cases where ability in task 2 is markedly greater than ability in task 1.

3. Job Hopping, Occupational Choice, and Earnings

Although poor task matching does not alter the predictions of the static model, it has interesting consequences for the dynamics of occupational choice. In this subsection, we develop some simple dynamics to illustrate some relationships we might expect between task-switching, job separations, and entry into self-employment. As in the previous section, we undertake our analysis by means of numerical simulation.

We begin in period 0 with an imperfect matching process that allocates workers to a task and a firm in the same manner as in Section 2. Self-employment is not an option in period 0, so each agent chooses to work for the firm if the offered wage is positive,

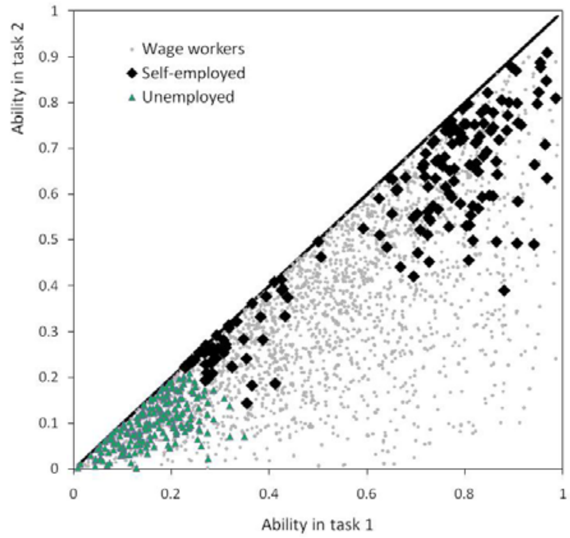

Figure 10. *Task abilities and occupational choice with imperfectly correlated abilities,* I: *Perfect task matching;*
2,500 draws. ρ=0.15, n=2, A=0.9, c=0.15, α=0.1, $a(\theta_1)$=0, $b(\theta_1)$=θ_1.

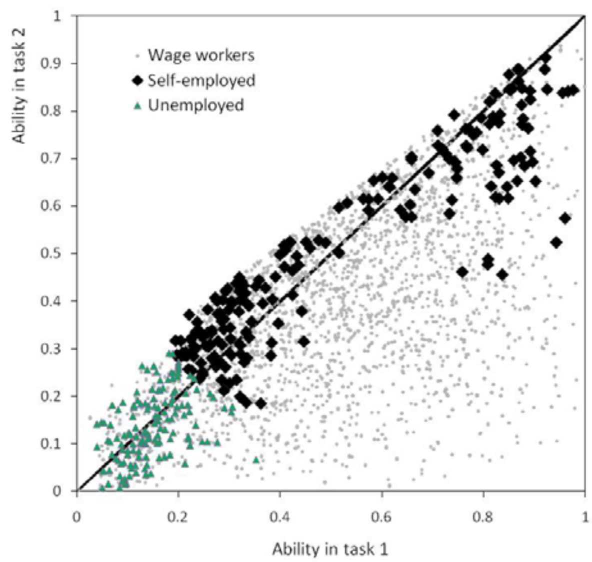

Figure 11. *Task abilities and occupational choice with imperfectly correlated abilities,* II: *Imperfect task matching;*
2,500 draws. ρ=0.15, n=2, A=0.9, c=0.15, α=0.1, $a(\theta_1)$=0, $b(\theta_1)$=0.2+0.8θ_1.

and chooses unemployment otherwise. We then introduce dynamics over ten subsequent periods in the following manner. First, in each period new firms approach each agent. The quality of the new firm is, as in the case of the period zero match, correlated with the agent's ability, although the vacancy is equally likely to be in each of two tasks. Second, in each period an opportunity to enter self-employment arises with probability λ. Third, economically active agents lose their job or business with probability μ. Agents then choose the best option available to them. If an agent is not laid off by his current employer, he chooses the highest paid option among remaining with his current employer in the same task, accepting the new wage offer (and possibly also switching task), or entering self-employment (if the option is available). If the agent has been laid off, he chooses the best option of wage employment with the new firm, self-employment (if the option is available), or unemployment.

The assumption that agents always choose the opportunity that pays the most in the current period is, of course, an assumption of myopia. However, a forward-looking agent would make no changes to his decisions in any period, because new options that arise in the next period are unaffected by the current decision. For example, agents would never choose a negative wage offer in order to remain employed because the probability that a self-employment opportunity presents itself, or that a new wage offer is made, does not depend on unemployment status. Similarly, the risk of involuntary employment loss is assumed to be the same for wage earners and the self-employed.

We simulate the dynamic model over ten periods, using similar baseline values to those used in the static model, and after setting λ=0.25 and μ=0.25. Very similar results were obtained with a wide range of alternative parameter values. Table 1, which reports averages taken over one million agents in period ten of the simulation, compares summary statistics between the self-employed, new entrants to self-employment, wage earners, and the unemployed.

As in the static model, we find in Panel A of Table 1 that the distribution of ability among the self-employed has fatter tails than the corresponding distribution for wage earners. While average ability (measured by the arithmetic mean of abilities in the two tasks) is somewhat lower among the self-employed than among wage workers, 15.7 percent of the self-employed have average ability above 0.66 compared with 14 percent (27 percent) of wage earners. There are also many more self-employed than wage workers with average ability below 0.33 (48 percent compared with 33 percent); among the newly self-employed, the proportion of low-ability individuals is even higher, at 73 percent. Note also that, as in the static model, the unemployed in period ten are drawn from the lower tail of the ability distribution.

The empirical analysis that follows in Section 4 focuses on two distinct comparisons between wage workers and the self-employed. The first analyzes the effect of, *inter alia*, prior labor market experiences on the probability of entry into self-employment; the second analyzes how prior experiences affect earnings of (all) self-employed individuals relative to wage workers. The remainder of our discussion of Table 1 anticipates these two analyses.

Table 1. *Summary statistics, period 10*

	All agents	Self-employed		Wage workers	Unemployed
		all	new		
	(1)	(2)	(3)	(4)	(5)
Panel A. Occupational Choice					
Percentage	100	3.47	**2.29**	91.7	4.86
No. of prior employer switches	4.49	5.66	**6.02**	4.42	5.53
No. prior task switches	1.73	1.66	**1.83**	1.74	1.54
Employer switches w/o task switch	2.76	4.00	**4.19**	2.68	3.99
Average no. of times laid off	2.50	3.11	**3.20**	2.44	3.11
Average no. of periods unemployed	0.50	0.68	**0.64**	0.38	2.76
Average ability	0.42	0.38	**0.40**	0.43	0.19
Fraction with mean ability >.66	13.4	15.7	**15.7**	14.0	0.02
Fraction with mean ability <.33	36.4	48.2	**73.3**	33.4	85.9
Panel B: Earnings					
Average earnings	0.33	**0.17**	0.17	0.35	0.00
Employer switches < mean	0.31	**0.13**	0.13	0.34	0.00
Employer switches > mean	0.35	**0.21**	0.21	0.37	0.00
Task switches < mean	0.33	**0.13**	0.13	0.35	0.00
Task switches > mean	0.33	**0.17**	0.17	0.35	0.00
New entrants from unemployment	–	–	0.04	0.15	–
New entrants from wage employment	–	–	0.19	–	–
New entrants from self-employment	–	–	–	0.32	–

One million draws. ρ=0.60, n=2, A=0.9, c=0.1, α=0.1, $a(\theta_1)$=0, $b(\theta_1)$=0.2+0.8θ_1, λ=0.25, μ=0.25.

Consider first the effect of prior experiences on the probability of entry into self-employment. Panel A of column (3) provides summary data for self-employed agents in period ten who were not self-employed in the previous period. We find that the entrants into self-employment are more likely to have previously been laid off or to have lost a prior business than are wage workers. The former suffered a layoff on average 3.2 times preceding their entry into self-employment in period ten, compared with only 2.4 times for agents who are wage workers in period ten. Entrants into self-employment also experienced spells of unemployment more often, at almost twice the rate of wage workers. Along these dimensions, the newly self-employed have more in common with the unemployed than with wage workers. We also find that the newly self-employed had previously switched employers more frequently than wage workers (see also Figure 12); the former had made such switches six times, compared with 4.4 times for wage workers.[13] This difference is mostly explained by the greater frequency with which the newly self-employed switched employers without switching tasks. However, new entrants into self-employment in period ten also experienced task switches somewhat more frequently than wage workers (1.83 against 1.74).

Panel B of Table 1 summarizes the model's implications for earnings. Anticipating our subsequent empirical analysis, we compare self-employed earnings in column (2) with the corresponding statistics for wage workers. Despite only a modest difference in average ability, average earnings of the self-employed are only half the average wage, reflecting the fact that many agents are effectively pushed into self-employment as a result of bad matches in the labor market. We do not expect this stark difference in earnings to be reflected in the empirical results.[14] However, the model also predicts that individuals entering self-employment directly after a period of unemployment earn far less than incumbent self-employed (0.04 against 0.17), while those entering self-employment after a period of wage work earn slightly more (0.19). Although in our model entry into self employment is driven purely by poor matches, the effect on earnings of the path taken into self-employment is consistent with the literature distinguishing necessity and opportunity entrepreneurship. In contrast, the discount for entering wage work after a period of unemployment, is modest (0.32 against 0.35).

[13] The means have been adjusted to reflect the fact that entrants into self-employment are not at risk for task switching.

[14] In our model, the *only* inducement to enter self-employment is the existence of a poor match between the skills of the worker and the quality of the firm.

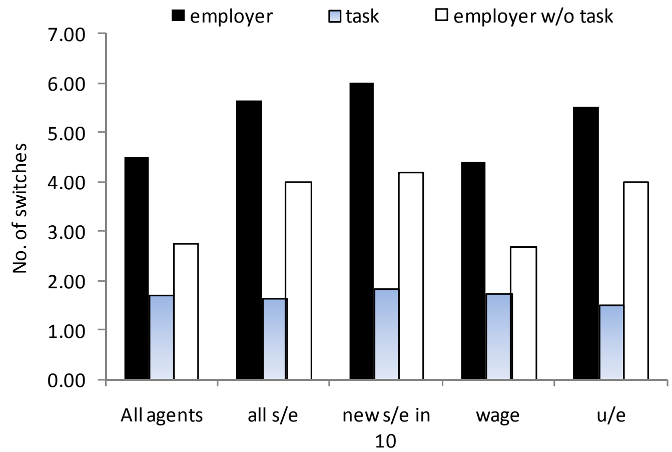

Figure 12. *Means of employer and task switching, by occupational choice.*

The relationship between work experiences and earnings reveal an interesting distinction: among the self-employed, but not among wage workers, there is an earnings premium associated with having a history of switching employers and tasks more frequently (see also Figure 13). Individuals that do not have a history of job hopping but that nonetheless chose self-employment tend to have relatively unbalanced skills; they choose self-employment only because of a persistent sequence of unfavorable wage-earning opportunities and involuntary job losses. In contrast, a work history with above average task switching (which can only be accomplished by switching employers) is associated with a relatively balanced skill set, and this enhances an agent's self-employment earnings. In contrast, skill balance does not induce higher wages.

Figure 14 provides some more details on earnings patterns. There are few dynamics in the evolution of earnings across time periods -- to the contrary, earnings differentials are large and persistent. The two upper lines in the figure plot average earnings among all wage workers and among workers returning in each period to the wage sector after a spell of self-employment. Although average wages for these two groups are similar; the new wage workers consists of two distinct groups: those who voluntarily left self-employment to accept an attractive wage offer, and those who involuntarily lost their business. The former group earns considerably more than the latter. The third group of wage workers consists of entrants to wage work out of unemployment; this group earns much less than other wage workers, earning on average a

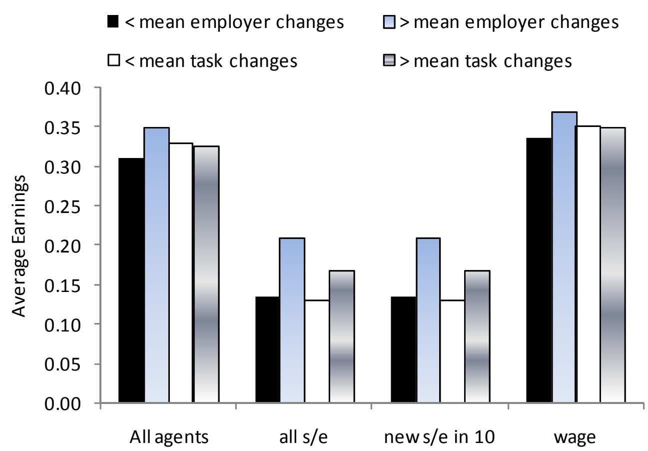

Figure 13. *Effect of switching employers and tasks on earnings, by occupational choice.*

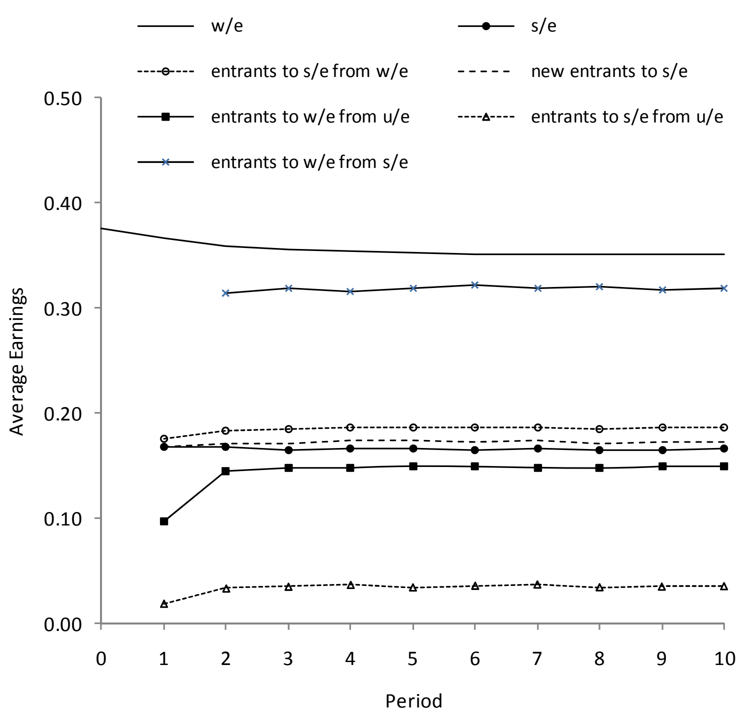

Figure 14. *Average earnings by occupational choice and period.*

wage similar to the earnings of incumbent self-employed workers. The worst performers by far (apart from the unemployed, who earn zero) are newly self-employed agents who entered out of unemployment. Many of these will quickly leave self-employment, choosing to close down their business as soon as a reasonable match with an employer comes along.

4. Empirical Analysis

The model yields a number of testable predictions. First, earnings among the self-employed exhibits greater cross-sectional variance than earnings of wage workers. Second, the self-employed earn less on average than wage workers. Third, a career history involving spells of unemployment, task switching, or employer switching, are all associated with entry into self-employment. Fourth, task switching and employer switching are associated with higher earnings among the self-employed, but not among wage workers. In this section, we test these predictions using panel data on individuals in the Korean labor market.

4.1 *Data*

Our data come from the Korean Labor and Income Panel Study (KLIPS). The sample spans 1998 to 2004, and contains a total of 16,426 respondents, including wage workers, self-employed individuals, unpaid family workers, and those who were unemployed. Fifty percent of the respondents are male, and they were on average observed for 5.5 years in this sample. Overall, 58.7 percent of the sample was aged between 26 and 55, 62.5 percent was married, 28.5 percent had education equivalent to or above college, and nearly fourteen percent was self-employed at least once during this sample period (see Table 2).

4.2 *Key Variables*

This subsection provides a brief description of the key variables used in the regressions.

• *Transition into self-employment from wage sector or unemployment.* In each survey round, the KLIPS asked respondents about their current employment status. Based on their answers, we classified respondents into three groups, *i.e.* wage workers, self-employed workers, and the unemployed. Combining this information across years, we created a dummy variable that records whether or not the respondents made a transition into self-employment from either wage sector or unemployment in the current survey year. For the first survey round, we coded this variable as missing. Two percent of the respondents in the sample reported making at least one transition into self-employment.

• *Previous job changes*. We track the respondents' job changes using four different variables. The KLIPS classifies respondents by occupation codes, and also records whether there was a change of employer from one survey round to the next. We use these data to construct a variable, *jobchange*, that equals one if there was a general job switch involving changing either employer or occupation, or both. Meanwhile, we create three individual dummy variables, which, respectively, record a job change that involves only switching occupation but not employer (*sedo*), switching employer but not occupation (*deso*), or switching both employer and occupation (*dedo*). In each year, we count the total number of job changes in an individual's employment history by summing the values of these dummy variables from 1998 to the current year (creating new variables prefixed with *pn_*). Table 3 provides summary statistics. The average number of job changes prior to the current year is 0.38, of which 0.09 is accounted for by switches involving only changes in occupation, 0.07 involving only changes in employer, and 0.22 involving changes in both.

Table 2. *Summary Statistics*

	Obs.	Percent
Age	81,782	
≤ 25		20.06
26-35		21.62
36-45		21.23
46-55		15.81
56-65		11.35
>65		9.93
Married	81,729	62.54
College Education	81,751	28.52
Employment Status	81,782	
wage worker		34.30
self-employed		13.71
unemployed		47.71
unpaid family worker		4.28

• *Tenure*. Since every employed respondent in the data has a report on the starting date of his job, job tenure is created by counting the number of months from the starting date until the date of the survey.

• *Previous unemployment.* We constructed two variables for unemployment. First, a dummy variable is set to one if the respondent was unemployed in the previous survey year. Second, we created a variable that recorded the length of this unemployment period.

Table 3. *Summary statistics for measures of job change*

	MEAN	STD. DEV
pn_jobchange	0.38	0.64
pn_sedo	0.09	0.30
pn_deso	0.07	0.30
*pn_dedo_*	0.22	0.47

88,397 observations

• *Earnings*. The KLIPS records the monthly wage reported by wage workers, and the annual average profit per month for the self-employed. Earnings data are inflated to KRW in 2000.

• *Household wealth.* Table 4 lists the questions on household assets that were asked in the KLIPS survey. Based on the respondents' answers, we construct two variables that separately record a household's net liquid assets and the value of properties owned.

Table 4. *Household Wealth in KLIPS (units: 10,000 KRW)*

Property
Market value of current housing; market value of additional properties.
Assets
Savings in bank (checking accounts, saving accounts); Stock, bond, trust; Insurance; Kye (private mutual financing loan club); Loans to friends or relatives; Others.
Debts
Debt from bank; Debt from non-bank(e.g., borrowing from company); Borrowing from private sources (e.g., a company bond); Deposited money to be paid back; Received payment in a lump sum and will have to put money in loan club; debts to Kye; Others.

4.3. *Raw Earnings Distributions*

The model predicts that self-employment earnings are more dispersed than wages, and have a significantly lower mean. Prior studies comparing self-employment earnings with wages are consistent with the first prediction, but generally little difference is observed in the mean and median earnings of the two groups. Figure 15, which presents the raw earnings distributions for the two groups in the KLIPS sample, confirms that the Korean earnings exhibit the same patterns. Both earnings distributions are strongly skewed, with self employment earnings exhibiting fatter tails. The two distributions have similar means and similar medians.

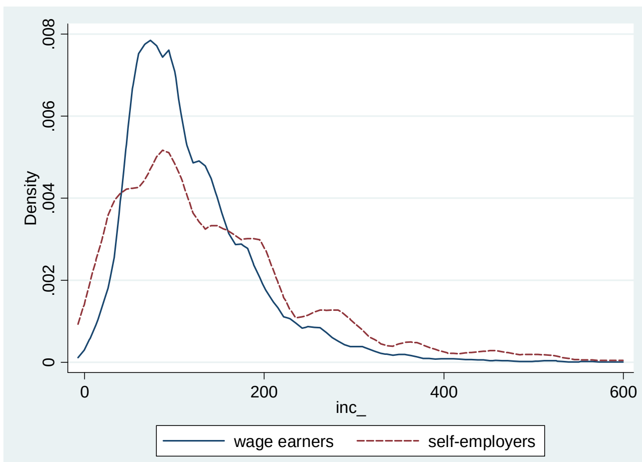

Figure 15. *Monthly Earnings Distributions: Wage Earners vs. Self-Employers.*

4.4. *Entry into Self-Employment*

According to the model, entry into self-employment is associated with periods of prior unemployment and a history of job changes, including switching employers and occupations. We test this prediction with the four measures of employment history we have previously constructed and report the results in Tables 5 and 6.

We start with a simple logit regression including as regressors the number of prior jobs and prior unemployment, controlling for year and industry. The estimated coefficients on both variables are positive and significant, which is consistent with the intuition that self-employment becomes an alternative occupational choice when job matching turns out to be unsuccessful. In the next three columns, we progressively add controls for demographic characteristics (column 2), household wealth (column

3), and job tenure (column 4). The positive correlations between entry into self-employment and prior unemployment or job experience remain the same. We also do not observe any significant changes in the magnitudes of the marginal effects. In column (5), we replace the dummy variable for prior unemployment with the length of the unemployment spell. This substitution has little impact on the results.

In Table 6, we decompose general job changes into their three component types, and look at their impacts on transition into self-employment individually. As before, column (1) reports the result from the baseline logit regression with controls only for year and industry. We find that all three types of job change are positively related to entry into self-employment, and the results are significant at the conventional one percent level. These results are also robust to the addition of various controls.

4.5. *Self-Employment Earnings and Wages*

The last prediction of the model is that a history of job change generates an earnings premium in self-employment but not in the wage sector. We test this implication by running three OLS regressions on the natural logarithm of income, for observations which reported working in either the wage sector or being self-employed for the current period. In order to distinguish the effects of job-hopping on earnings between these two sectors, we allow the coefficients on our four measures of job-hopping to be different for the self-employed and for wage earners.

The results are presented in Table 7. Without controlling for observed individual heterogeneity, column (1) shows that one additional job change in an individual's employment history is associated with an 8.4 percent increase in self-employment earnings, but a 15.6 percent *reduction* in the wage. Adding further controls, in column (2), has little impact on the results: the corresponding effects are in this case an 8.3 percent increase in self-employment earnings and an 8.6 percent reduction in the wage. Column (3) reports the results after decomposing job hopping into its three components. A one unit increase in the number of within-employer changes in occupation raises self-employment earnings by 16.0 percent, while a one-unit within-occupation increase in the number of changes of employer raises earnings by 14.0 percent. The corresponding effects on the wage are either insignificant or modestly negative. A one unit increase in the number of times an individual simultaneously switches occupation and employer reduces earnings for both groups. However, in this case the negative effect on self-employment earnings is small (a 2.9 percent reduction), while the effect on the wage is much larger (a 17.5 percent reduction). In summary, the large and persistent premium to job hopping in the self-employment sector relative to the wage sector offers strong support for the model.

Table 5. *Entry into Self-Employment and Prior Job Hopping* [1]

	Dep Var = 1 if a transition into self-employment was made in the current period				
	Logit Regressions				
	(1)	(2)	(3)	(4)	(5)
No. of Prev. Job Changes	0.293	0.336	0.339	0.299	0.300
	(5.51)	(6.29)	(6.32)	(5.16)	(5.18)
Prev. Unemployed=1	2.242	2.274	2.263	2.252	
	(2.83)	(2.86)	(2.85)	(2.84)	
Length of Prev. Unemployment					1.007
					(1.78)
Male=1		0.307	0.303	0.305	0.304
		(3.55)	(3.5)	(3.52)	(3.52)
Age		0.004	0.004	0.006	0.006
		(1.09)	(1.1)	(1.54)	(1.53)
Married=1		0.222	0.229	0.231	0.23
		(2.27)	(2.33)	(2.35)	(2.34)
Metropolitan=1		-0.164	-0.165	-0.169	-0.167
		(-2.19)	(-2.19)	(-2.25)	(-2.22)
Years of Edu.		0.008	0.008	0.009	0.009
		(0.24)	(0.22)	(0.26)	(0.25)
Prev. Liquid Assets			0.000	0.000	0.000
			(-0.23)	(-0.18)	(-0.18)
Prev. Properties			0.000	0.000	0.000
			(0.29)	(0.41)	(0.43)
Prev. Tenure				-0.001	-0.001
				(-1.89)	(-1.87)
AV. Log Likelihood	-0.104	-0.113	-0.114	-0.114	-0.114
No. of Obs.	35,628	31,712	31,368	31,338	31,338

Z-scores in parentheses. Additional controls include 7 year and 16 industry dummies.

Table 6. *Entry into Self-Employment and Prior Job Hopping* [2]

	Dep Var: se_=1 if a transition into self-employment was made in the current period			
	Logit Regressions			
	(1)	(2)	(3)	(4)
No. of Prev. Job Changes Involving	0.46	0.44	0.448	0.457
Only Occupation	(4.87)	(4.72)	(4.72)	(4.80)
No. of Prev. Job changes Involving	0.27	0.29	0.300	0.24
Only Employer	(3.46)	(3.7)	(3.72)	(2.84)
No. of Prev. Job changes Involving	0.262	0.335	0.339	0.267
Both Employer and Occupation	(3.78)	(4.78)	(4.83)	(3.49)
Male=1		0.312	0.308	0.312
		(3.6)	(3.55)	(3.6)
Age		0.004	0.004	0.006
		(1.0)	(1.02)	(1.55)
Married=1		0.206	0.213	0.208
		(2.09)	(2.15)	(2.1)
Metropolitan=1		-0.157	-0.158	-0.160
		(-2.09)	(-2.1)	(-2.14)
Years of Education		0.004	0.004	0.004
		(0.11)	(0.11)	(0.10)
Prev. Liquid Assets			0.000	0.000
			(-0.21)	(-0.12)
Prev. Properties			0.000	0.000
			(0.24)	(0.36)
Prev. Tenure				-0.001
				(-2.4)
AV. Log Likelihood	-0.104	-0.113	-0.114	-0.114
No. of Obs.	35,628	31,712	31,368	31,338

Z-scores are in parentheses. Additional controls include 7 year and 16 industry dummies. The variable previous unemployment is not included, due to perfect prediction of failure.

Table 7. *Self-Employment Earnings and Prior Job Hopping*

		Dep Var: ln of earnings in the current period		
		OLS Regressions		
		(1)	(2)	(3)
No. of Prev. Job Changes: Self employed		0.084	0.083	
		(8.32)	(9.4)	
Wage worker		-0.156	-0.086	
		(-23.78)	(-14.03)	
No. of Prev. Job Changes Involving Only Occupation:	Self employed			0.160
				(9.82)
	Wage worker			0.011
				(1.03)
No. of Prev. Job Changes Involving Only Employer:	Self employed			0.140
				(8.26)
	Wage worker			-0.030
				(-3.04)
No. of Prev. Job Changes Involving Both Employer and Occupation	Self employed			-0.029
				(-2.18)
	Wage worker			-0.175
				(-22.24)
Prev. Unemployed=1		-0.243	-0.191	-0.167
		(-0.83)	(-0.78)	(-0.69)
Male=1			0.434	0.427
			(51.93)	(51.47)
Age			-0.009	-0.009
			(-21.02)	(-22.02)
Married=1			0.274	0.261
			(30.66)	(29.42)
Metropolitan=1			0.021	0.022
			(2.92)	(3.17)
Years of Education			0.136	0.134
			(41.47)	(41.18)
Prev. Liquid Assets			0.000	0.000
			(-0.16)	(-0.33)
Prev. Properties			0.000	0.000
			(22.53)	(22.6)
Prev. Tenure			0.001	0.001
			(17.06)	(11.57)
Adj R-squared		0.134	0.393	0.403
No. of Obs.		25,196	24,894	24,894

t-statistics are in parentheses. Additional controls include 7 year and 16 industry dummies.

5. Conclusions

The empirical literature of entrepreneurship has repeatedly revealed that self-employment earnings exhibit greater variation than wage earnings, but do not offer higher average earnings in compensation. This paper rationalizes these observations with a model of labor market friction in which the production technology combines features of Lazear's (2005) multi-task theory of entrepreneurship and the complementarity of task abilities from Kremer's (1993) O-ring theory of production. The model generates a number of predictions consistent either with prior evidence or the results of our own empirical work.

In the cross-section, self-employment earnings are skewed toward low-income earners, even though the self-employed tend to be drawn from both ends of the ability distribution. However, self-employment becomes rarer as the technological complexity of an industry increases and a greater fraction of the self-employed are drawn from the upper tail of the distribution; ultimately, in sufficiently complex industries, self-employment is the domain only of the gifted. In contrast, self-employment is more common when labor markets do not work efficiently, either because firms are poorly matched to workers or workers are poorly matched to tasks. It follows that self-employment is more common in poorer countries. These results accord with existing evidence. For example, Hamilton (2000) was among the first to establish the greater variance of earnings and abilities among the self-employed; Gort and Lee (2007) show that self-employment among scientists and engineers is concentrated among the more able; and Gollin (2008) records the much greater prevalence of self-employment in low-income countries.

The model also predicts testable relationships between work histories, the odds of becoming self-employed, and earnings. First, individuals with a history of changing occupations and employers, or a history with spells of unemployment, are more likely to enter self-employment. Second, a history of occupation and employer switching is associated with higher earnings for the self-employed but not for wage workers. Third, entrants into self-employment from unemployment fare much worse than other entrants. These dynamic predictions are also consistent with prior empirical evidence: the relationship between variety and entry into self-employment has previously been studied by, *inter alia*, Lazear (2005), Wagner (2006), and Åstebro and Thompson (2007), while the negative consequences of a history of unemployment has been documented in Amit, Muller and Cockburn (1995), Alba-Ramirez (1994), and Andersson and Wadensjo (2007). We also tested these predictions ourselves using the Korean Labor and Income Panel Study. We found that occupation and employer switches, and past unemployment, are strong predictors of entry into self-employment. We also found that past occupation changes and employer changes each raise the earnings of the self-employed while reducing the earnings of wage workers.

Because our model is specifically about how (unobserved) ability induces observable behaviors, we are less concerned about controlling for ability than is customary in work on occupational choice. However, some of the tests of our model may be confounded with unobserved variations in attitudes toward self-employment. As Hamilton (2000) and others have previously noted, many individuals enter into self-employment in part for non-pecuniary reasons. One such reason is that some individuals have a taste for variety in their work experiences, which induces them to choose wage work in different occupations or with different employers before undertaking the varied activities demanded by running a business. Our findings that variety raises entry into self-employment is consistant with the this alternative theory. However, the taste for variety model associates variety with lower earnings in both wage work and self-employment [cf. Åstebro and Thompson (2007)]. While we find variety induces lower earnings among wage workers, the reverse is true for the self-employed.

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Appendix A. Sampling from a bivariate distribution on [0,1]

Pairs of correlated random variables, (x, y), were generated in the following manner.

1. Draw a value of u uniformly from the interval $[0, \overline{u}]$.

2. Draw (x, y) uniformly from the rectangle (shaded in Figure A1) whose corners are given by the coordinates $(0, u)$, $(u, 0)$, $(1, 1-u)$, and $(1-u, 1)$.

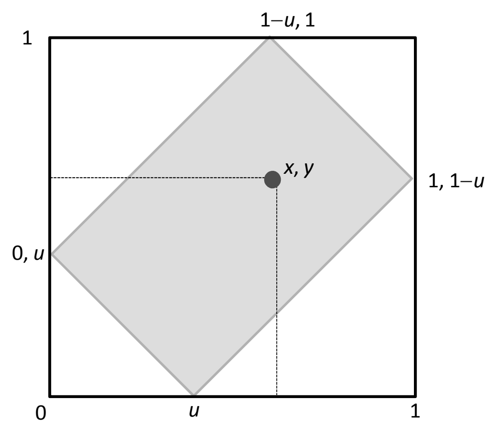

Figure A1

By varying $\overline{u}$ in the unit interval, one can construct samples of (x, y) with any degree of positive correlation. The marginal distributions, which are symmetric and unimodal with mean 0.5, are similar for a wide range of correlations (see Figure A2).

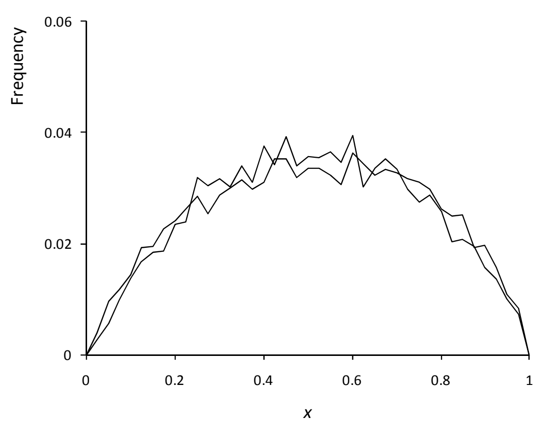

Figure A2. *Empirical marginal distributions for* ρ*=0.2 and* ρ*=0.8; 10,000 draws.*