

# Slipping the Surly Bonds: The Value of Autonomy in Self-Employment

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February 22, 2010

## Abstract

This paper models the tradeoff between increased autonomy from self-employment and the generally higher income that traditional employment offers. While the demand for autonomy is a purely psychological construct, the economic tradeoffs involved in its achievement are eminently amenable to quantification and analytical modeling characteristic of economic analysis. We use this setup to offer a multifactor utility formulation formalizing the notion of an explicit, autonomy-based preference for self-employment. We propose that such a formulation as a theoretically-defensible alternative to the classic (and also psychologically-based) overconfidence hypothesis in explaining why self-employment is chosen despite evidence that newly self-employed individuals earn less than comparable individuals who continue their current employment. Our model, founded on utility maximization by a rational individual, demonstrates not only that newly self-employed individuals are willing to accept lower earnings outcomes in exchange for psychic benefits from self-employment, but also that the structure of their optimal launch-timing decision *guarantees* that they will quit at a time such that their income will (at least initially) be reduced. We conclude with implications for the design of empirical instruments to quantify the relative importance of autonomy and income.

## 1 INTRODUCTION AND MOTIVATION

This paper models the tradeoff between increased autonomy from self-employment and the generally higher income that traditional employment offers. Many new businesses fail shortly after inception (Baldwin, 1995; Dunne *et al.*, 1988) and entrepreneurship is a career choice that does not, on average, offer improved financial remuneration compared to alternatives. Hamilton (2000) has shown that, except for the highest 25% of entrepreneurial incomes, remaining in a wage-producing

job (or moving back to it) makes more economic sense than starting a new business. Thus, utility-maximizing individuals who switch from employment to self-employment must be gaining *something* in exchange for the income they forgo: the usual explanation is "autonomy."

The entrepreneurship literature has produced several empirical papers showing autonomy (also referred to as independence or freedom) to be an important motivator for choosing to be self-employed (among them are Blais and Toulouse 1990, Birley and Westhead 1994, Carter *et al.* 2003, Feldman and Bolino 2000, Gatewood *et al.* 1995, Kolvereid 1996, Shane *et al.* 2001, and Shane *et al.* 2003). Unfortunately, rather than offering an explanation, some of this empirical evidence provided leads organically to further questions of construct validity, since explaining the fact that people want to start their own business in order to be autonomous because they value autonomy is somewhat tautological (van Gelderen and Jansen 2006, Shane *et al.* 2003). We hope to resolve this circularity using our model of the value of autonomy to distinguish cause from effect.

While this desire for autonomy is a psychological construct, the economic tradeoffs involved in its achievement are eminently amenable to quantification and analytical modeling characteristic of economic analysis. We use this setup to explain why individuals move to self-employment despite the economic disadvantages of doing so without assuming they are inherently irrational or making a decision error. Our model, founded on utility maximization by a rational individual, demonstrates that not only are newly self-employed individuals willing to accept lower earnings outcomes in exchange for psychic benefits from self-employment, the structure of their optimal launch-timing decision *guarantees* that they will quit at a time such that their income will initially be reduced. An immediate increase in income upon self-employment would thus imply either that the individual had gotten spectacularly lucky in an unforeseeable way or that the launch had been delayed beyond the proper time due to her decision error (Croson, 2007).

Indeed, empirical evidence to date has shown only that autonomy is somewhat valued by entrepreneurs – that is, that it enters as an argument into their decision process, via which it can be compared against other desirable aspects of their (self-)employment situation – but not how much it is valued. Using data from 23 OECD countries, Benz and Frey (2008) showed that the self-employed are significantly more satisfied with their jobs than employed individuals, and documented that such higher job satisfaction is attributable mainly to the more interesting jobs and greater autonomy that self-employment entails. Along similar lines, Chirkov *et al.* (2003) showed that, across diverse cultures and social practices, autonomy is associated with well-being.

A related empirical regularity – and a corresponding theoretical gap – in the entrepreneurship literature is that prospective entrepreneurs appear to be willing to make tradeoffs between income and autonomy but evidence is lacking on whether these tradeoffs are necessary (or even commonly considered in the decision process). For example, using a sample of 167 semi-structured interviews with nascent entrepreneurs, van Gelderen and Jansen (2006) found that autonomy-based motives can be divided into two main categories. The first category includes "decisional freedom," wherein

interviewees report valuing autonomy because it allows them to be in charge and responsible for outcomes. We may say that these nascent entrepreneurs value autonomy *per se* – autonomy *qua* autonomy, as an end in itself. The second category of motives show autonomy as instrumental to achieving a particular goal – for example, to avoid an unpleasant boss, to act in a self-congruent manner consistent with one’s beliefs, or to pursue an outside opportunity that could not be pursued within the confines of the firm (e.g., Hellman, 2007). We may thus say that the class of entrepreneurs reporting this second category of motives values autonomy not directly (as an end in itself) but indirectly (as a means to an end). Such a categorization (and the data underlying it), however, is sharply limited in its ability to analyze the nature of the tradeoff between income and autonomy faced by a prospective entrepreneur, as it includes only interviewees who have already decided to implement this tradeoff in favor of autonomy.

Autonomy may not be the only motivator for self-employment, however. Köllinger and Roessler (2009) advance an "efficient sorting" rationale, arguing that individuals entering entrepreneurship are gaining economic reward rather than being psychologically motivated – and that market forces relating to the efficient allocation of "leaders" and "followers" give potential entrepreneurs incentives to move toward self-employment independently from of any psychological preference they may have. The flexibility gained from self-employment may also produce economic as well as psychological benefits; Lombard (2001), for example, estimated a positive association between a women’s demand for flexibility and the probability of being self-employed, with the association strongest for women with young children. Also, Budig (2006) showed that, over the period 1978-98, women either worked less than 15 hours per week at their business and reported choosing self-employment to juggle work and family commitments, or worked more than 41 hours and reported choosing self-employment to advance their careers.

Individuals clearly do have preferences for nonmonetary aspects of their jobs and, in the employment relationship as well as in entrepreneurship, are willing to give up some income for an improvement in their nonmonetary job aspects – whether autonomy or otherwise. Thus, we believe it is important to include both economic and psychological motivations in the rational decision process of potential entrepreneurs. Benz and Frey (2007) use self-employment as an important form of independence and show that self-employed individuals derive higher satisfaction from work than people employed in organizations, irrespective of income gained or hours worked. Indeed, several studies in psychology and organizational psychology have found the self-employed differ from the organizationally employed with respect to career anchors and that self-employed are more likely to have autonomy, independence and entrepreneurial creativity anchors (Danziger and Valency 2006, Feldman and Bolino 2000, Yarnell 1998). Prottas (2008) examined whether reported job autonomy provides more value or benefit to the self-employed than it does to employees. Consistently, self-employed individuals have been found to report greater job autonomy (Hundley 2001, Thompson *et al.* 1992) and that the desire for greater autonomy was an important motive in their pursuing self-employment (Feldman and Bolino 2000). Also, Hackman and Oldham (1975) suggested that job that provide autonomy are more intrinsically motivating (for most individuals) than those which

are not. Relatedly, the desire to achieve choice over task and career has been predicated to be one of the intrinsic needs individuals seek to satisfy through their employment choices (King 2004, Quigley and Tymon 2006).

Moreover, some studies have found that job autonomy is positively related to desirable attitudes (such as job satisfaction, and life satisfaction) and negatively related to undesirable attitudes (such as turnover intentions) (Kinicki *et al.* 2002).

In addition, the entrepreneurship literature on self-employment choice (*e.g.*, Kawaguchi 2002) provides several well-documented reasons an entrepreneurially-oriented employee might experience enough dissatisfaction with a job in a traditional hierarchical organization that she would accept lower wages to be rid of them: resentment of monitoring, personality conflict with co-workers or supervisors, adherence to a fixed schedule, lack of connection between effort and reward, etc. Many of these potential value drivers are rooted in the organizational economics literature, and while the evidence is quite substantial that a large enough aggregate change in one aspect of job design (*e.g.*, improving undesirable aspects of employment) can make up for a small loss in another (*e.g.*, a lower wage), what is missing is a formal analysis of potentially self-employed individuals' willingness to trade one for the other.

What, then, is the causal link between the motivation of autonomy-seeking and the action of the move to self-employment? Leaving organizational employment for self-employment allows the autonomy seeker to "slip the surly bonds" of the twin duty of *obedience* and *loyalty* inherent in any formal employment relationship (Simon, 1951; Masten, 1988). The duty of obedience spells out not only what needs to be done but how it must be done – presumably, tailored to the personal preferences of the manager as well as the economic benefit of the firm. The self-employed individual, free of this constraint, may even perform the exact same actions but at different times or in different manners, forms, or styles.<sup>1</sup> The duty of loyalty – a responsibility to place the employer's benefit ahead of one's own – is replaced by the familiar benefit of full ownership of one's own effort (Holmstrom and Tirole, 1989). By substituting self-employment for organizational employment, the autonomy seeker directly creates autonomy and, by relaxing these constraints on her behavior, becomes economically, as well as psychologically, better off.

Analyzing the success of these utility-motivated job-quitters, however, Shane (2008) notes statistical evidence showing that those who start businesses because they "don't like working for other people...don't do very well...(t)heir businesses tend to make less money, grow more slowly...than those of people who start with the goal of making high profits" (Shane 2008, p. 121). At the same time as acknowledging that potential entrepreneurs may chafe under an employment relationship, the entrepreneurship literature simultaneously places great weight on entrepreneurial *overconfi-*

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<sup>1</sup>Hundley (2001), however, found that the self-employed job satisfaction advantage is relatively small or nonexistent among managers and members of established professions – occupations where organizational workers have relatively high autonomy and skill utilization.

*dence* (Cooper *et al.* 1988; Busenitz and Barney, 1997; Köllinger *et al.*, 2007) as a reason why entrepreneurs seem to earn systematically lower amounts of income after venture launch (as noted in Shane 2008, pp. 101-02, synthesizing an observational literature dating back several decades). We feel that a multifactor utility formulation formalizing the notion of an explicit, autonomy-based preference for self-employment would serve as a much needed theoretically-defensible alternative to the classic (and also psychologically-based) overconfidence hypothesis. Such a multifactor utility model would also provide a direct link to self-determination theory (Ryan & Deci, 1985; 2000), a well-established psychological theory of motivation. SDT posits simply that autonomy (among other constructs) leads to well-being, and that individuals' quest for increased well-being determines their actions; the parallels to the economic analysis of utility and the link to decision theory are thus straightforward. Using quantitative instruments borrowed from psychology to evaluate newly self-employed people's motivations for making the switch would also shed light on the link between autonomy and new business creation and, in future empirical studies, potentially differentiate the autonomy-seeking explanation from alternative explanations of entrepreneurial entry such as overoptimism, necessity, and purely economic incentives.

## **2 MODEL STRUCTURE**

To model the employee's decision process, we follow the basic model setup introduced in Croson (2006b). Consider an employee, working in a traditional employment situation that offers a relatively low level of autonomy, who is considering the pursuit of a self-employment opportunity. She knows that the self-employment opportunity offers no fixed wage, but both (a) a superior return on invested capital than passive investment opportunities which are available to the general public and (b) the opportunity for maximum autonomy, which she values. She faces the question, "How long should I work as an employee to accumulate capital for investment in my future self-employment, and when should I quit?"

## 2.1 Modeling Lifetime Utility Incorporating Value for Autonomy

Consider the initially-employed individual with lifetime utility function  $U(x|\delta, \theta_e, \theta_s, T, w_e, r, n, a)$  defined by

$$U(x) = \underbrace{\int_{t=0}^x \delta^t u(\theta_e)}_{\text{NPV of utility from employment}} + \underbrace{\int_{t=x}^T \delta^t u(\theta_s)}_{\text{NPV of utility from self-employment}} \quad (1)$$

$$\underbrace{\hspace{15em}}_{\text{NPV of utility from (self-)employment}}$$

$$+ \delta^T V \left( \underbrace{e^{a(t-x)} \int_{t=0}^x e^{rt} (w_e - n)}_{\text{NPV of compounded net earnings}} \quad \underbrace{- \int_{t=x}^T e^{at} (n)}_{\text{NPV of net consumption while self-employed}} \right) \quad (2)$$

$$\underbrace{\hspace{15em}}_{\text{Total wealth at retirement}}$$

$$\underbrace{\hspace{15em}}_{\text{NPV of utility value of total wealth at retirement}}$$

where

$x$  represents the time between 0 and  $T$  at which she transitions from employment to self-employment;

$\delta$  represents the individual's pure rate of time preference at which she discounts future utility;

$u(\cdot)$  represents her instantaneous utility function (contrasted with  $U(\cdot)$ , which is her overall discounted utility accumulated during her lifetime)

$\theta_e$  represents the per-period nonmonetary utility of employment (positive, negative, or neutral);

$\theta_s$  represents the corresponding per-period nonmonetary utility from self-employment, incorporating its superior autonomy or other desirable attributes;

$T$  represents the individual's future retirement date (after which no wages are earned and at which time capital accumulation is evaluated to determine the terminal wealth level);

$V(\cdot)$  represents the individual's utility of final wealth (which is a component, but not the entirety, of  $U(\cdot)$ , as described in the Motivation section);

$w_e$  represents the per-period wage rate in effect while the (future self-employed) individual is governed by the traditional employment relationship from time 0 to  $x$ ;

$r$  represents the rate of return on the her accumulated equity while employed;

$n$  represents the individual's "nut" – essential expenses such as food, clothing, and shelter which must be paid before disposable income can be saved; and finally

$a$  represents the rate of return on her equity while self-employed.

Given these definitions, the overall utility equation [1]+[2] can be interpreted as a statement of accumulation of both non-monetary utility derived from job conditions and monetary utility derived from wealth, based on the individual's decision of when to transition from employment to self-employment. From the beginning (time 0) until time  $x$ , when the employee quits, she receives a wage of  $w_e$  at the low-autonomy job and earns a rate of  $r$  on any accumulated capital. From time  $x$  until her retirement at time  $T$ , the individual works in the high-autonomy self-employment opportunity and receives no wage, but her capital accumulates at rate  $a > r$ . The autonomy of each job is indexed by  $\theta \in [0, 1]$ , where  $\theta = 0$  is the lowest (worst) possible level of autonomy and  $\theta = 1$  is the highest (best) possible level of autonomy, with the assumption that  $\theta_s > \theta_e$ . The individual's overall utility is thus the sum of three factors:

1. the net present value of the utility achieved during employment, from time 0 until time  $x$ , when the employee quits;
2. the net present value of the utility achieved during self-employment, from time  $x$  until time  $T$ , when the now self-employed individual retires;
3. the utility value of the wealth accumulated from time 0 to time  $T$ , which can be further subdivided into the wealth accumulated from time 0 to time  $x$  and the wealth accumulated from time  $x$  until time  $T$ .

Recall the empirical findings, cited earlier, that self-employed individuals in practice report nonmonetary utility from self-employment but also earn lower wages in self-employment than they do while working for others. The simplest possible way to incorporate a tradeoff between job (un-)desirability and salary that can handle both (a) the benefits from a high-paying but limited-autonomy job and (b) the inherent desire for self-employment is to model the *required wage premium*: the amount that an employee would require to prefer the inherently less-desirable low-autonomy job over a benchmark, normally-desirable job (a technique known as the "compensating differential" in the labor economics literature, *cf.* Kawaguchi (2002), following Rosen (1986) who credits the fundamental idea to Smith (1776)).

Using this method, a (possibly fictitious) normally-desirable job available in the outside labor market, offering a normal level of autonomy and paying a wage of  $w = \underline{w}$ , becomes the benchmark employment alternative to the low-autonomy job paying  $w_u > \underline{w}$ . Given that the employee, all else equal, would prefer the highly autonomous job to the less-highly autonomous job but also prefers more money to less, we can define a required wage premium  $p > 0$  such that at wages  $w_u < \underline{w} + p$  she prefers to exit the low-autonomy job in favor of self-employment. At a higher wage  $w_u \geq \underline{w} + p = \underline{w} + p + s$ , she will accept the wage premium to remain in the undesirable job, where  $s > 0$  represents the surplus she receives, over and above the wage premium required to keep her in the unpleasant job. Note that when  $w_u = \underline{w}_u = \underline{w} + p$ ,  $s = 0$  and the wage premium has exactly compensated for the inherent undesirability of the job (due to its lower autonomy); the two jobs are now of exactly equal worth to the employee when the wage premium is taken into consideration.

The interesting case, to which the remainder of this paper's analysis will be devoted, arises when  $w_u > \underline{w}_u \equiv \underline{w} + p$ . The low-autonomy job is now superior to self-employment at first, and remains so until a critical level of capital accumulation has been reached. The future self-employed individual will stay at the low-autonomy job (presumably dreaming all the while of the psychic utility of future self-employment) because of its high wages – until she quits to transition to self-employment.

Alternatively, this extra utility from autonomy may be modeled as a psychic utility bonus  $p$  which is earned by upgrading from the low-autonomy job to a higher-autonomy one. The individual receiving such a psychic bonus will behave "as if" she is receiving an extra payment of  $p$  in every period she does not need to perform the low-autonomy job. In particular, after striking out into self-employment, she gives up not  $W$  but  $W - p$ , since she receives a "virtual income" of  $p$  by virtue of having captured the benefits of increased autonomy. Unfortunately for the prospective self-employed individual, these psychic bonuses cannot be reinvested in the business (or deposited in interest-bearing accounts.) While they are "real" in the sense that they do indeed increase her happiness, and therefore influence her decision, they do not compound and thus cannot be treated as exactly the same as actual cash wage payments  $W$ .<sup>2</sup>

It is particularly interesting to consider the interpretations of  $\frac{dU(\cdot)}{d\theta}$  and  $\frac{dU(\cdot)}{dw}$  – the total derivatives of lifetime utility with respect to the level of autonomy and the wage rate, respectively. The ratio  $R = \frac{\frac{dU(\cdot)}{d\theta}}{\frac{dU(\cdot)}{dw}}$  between them represents the relative marginal importance, evaluated at the current levels of each, of these two drivers of utility – in effect, the individual's willingness to pay for an

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<sup>2</sup>This theory thus strongly predicts that a potential future entrepreneur will be *more* disposed towards particularly unpleasant employment situations which pay a wage premium, as she gets a future benefit from capital accumulation (namely, an eventual higher return from capital saved.) Since the extra capital generated accelerates her conversion to self-employment, a potential entrepreneur (who anticipates that she will eventually become self-employed) is more willing than her non-entrepreneurial counterpart to make short-term utility sacrifices in favor of faster capital accumulation. In addition to a personal preference for autonomy, such a potential entrepreneur possesses an option (venture launch) that a typical employee lacks; the wage premium from the undesirable but high-paying job increases this option's value, as shown in Croson (2009).



increase in autonomy (denominated in monetary units.) These key drivers will be revisited in the section on empirical implications.

### 3 THE INDIVIDUAL'S QUIT DECISION IN A NORMAL JOB

The Croson (2006b) model offers an extensive mathematical analysis of the question of *when* an individual should quit her job to begin the self-employment opportunity, assuming that the employer chooses a constant wage  $w$  and the employee has no particular preference for any particular job or type of job (except that she prefers more income to less).<sup>3</sup> In that model, the individual works as an employee for a certain period of time to build up capital for her self-employment venture; she quits when she has accumulated enough capital that the total earnings from self-employment (in which she earns a superior return on capital but receives no wage) will exceed the total earnings from her employment and returns from her saved-up capital. As an employee, she earns  $w > 0$  as her wage and  $rk$  as her return on capital accumulation, where  $k$  is the amount of capital she invests; self-employed, she earns 0 as her wage but  $ak$  as her return on capital, where  $a > r > 0$ . Since, at the instant of quitting, the individual's gross income from self-employment matches her gross income from employment for the first time (i.e.,  $w + rk = ak$ ), this critical level of  $k$  accumulation required to trigger conversion to self-employment is  $k^* = \frac{w}{a-r}$ . Croson [2006b] explicitly considers a potential entrepreneur who does not save 100% of her wages, but instead spends  $n > 0$  on day-to-day living expenses while working as an employee. If she spends  $n \leq w$  per period on essential expenses (her "nut"), while saving the rest for her future venture, the amount of capital accumulated at any given time is determined by the first-order homogeneous ordinary differential equation  $\frac{\partial k}{\partial t} = (w - n) + rk$  with initial condition  $k(0) = 0$  yielding the expression

$$k(t) = \frac{w - n}{r} (e^{rt} - 1). \quad (3)$$

Solving for  $t$  such that  $\frac{w-n}{r} (e^{rt} - 1) = \frac{w}{a-r}$  (which is, as above, the condition that the individual has saved enough capital that the return to the self-employed use of this capital is sufficient to replace both her wages and her investment returns) yields the optimal quitting time  $t^*$ :

$$t^* = \frac{1}{r} \ln \left( 1 + \frac{rw}{(a-r)(w-n)} \right). \quad (4)$$

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<sup>3</sup>We adopt the Croson (2006a, 2006b) notation and terminology, with the exception that we model the decisions of an "individual" rather than an "entrepreneur" since self-employment is an endogenous outcome, rather than an assumption, of our model. This distinction will become particularly important when discussing empirical implications.

This key equation reduces to the original Croson (2006a) timing of  $t^* = \frac{1}{r} \ln \frac{a}{a-r}$  when  $n = 0$ .

### 3.1 THE INDIVIDUAL'S QUIT DECISION IN AN UNDESIRABLE JOB

The above analysis explicitly omits any preference of the employee for a particular type of job (whether as employee or self-employed.) The above analysis must thus be augmented with the two-factor utility model in [1] incorporating the individual's explicit preferences for both autonomy and income so that it can

1. determine the rate of accumulation of capital while the employee is still in the low-autonomy (e.g., traditional employment) job,
2. determine the correct decision rule for the employee about when to quit (incorporating her preferences for the autonomy offered by each job type), and
3. calculate the amount of capital that will have been accumulated (and from which future income stems, once conversion to self-employment occurs) once the individual decides to quit, so that the model can accurately characterize her post-conversion income stream.

### 3.2 Methodology Note: Distinguishing Between Financial and Utility Flows

It is important to exercise care in distinguishing between financial flows and non-financial utility flows. In accounting for the accumulated capital of the individual once she has entered self-employment, we must model the income from self-employment as  $ak$  rather than  $ak + p$ , because the extra "income"  $p$  is a utility flow (not a cash flow). As such, it is by definition consumed during the current period and does not increase the amount of capital available for the next period. Similarly, when accounting for the capital accumulated *before* quitting, it is important to model the income from the low-autonomy job as  $w + rk$  rather than  $w + rk - p$ ; the former is the net *financial* flow to the individual whereas the latter is the net *utility* flow.

When accounting for the quitting decision, however, it is equally important to *include* this relevant difference between employment and self-employment. The individual, who presumably wishes to maximize her overall happiness and not merely her overall income, includes the psychic bonus in modeling future utility flows when deciding when to quit, despite the fact that this psychic bonus does not accrue to her capital account.

### 3.3 Capital Accumulation and Utility in the Low-Autonomy Job

The individual employed in the low-autonomy job at time  $t = 0$  starts with capital  $k(t) = k(0) = 0$  and accumulates a financial flow of  $f_t = W - n + rk(t)$  in each period, which can be rewritten as  $f_t^c = \underline{w} + p + s - n + rk(t)$ . She accumulates a net utility flow of  $u_t^c = \underline{w} + s - n + rk(t)$ , since the psychic premium  $p$  is "eaten" by the requirement of staying at the restrictive job.

Before the option to quit is exercised, her capital stock at time  $t$  is thus the solution to the first-order homogeneous differential equation  $\frac{\partial k}{\partial t} = \underline{w} + p + s - n + rk(t)$  with initial condition  $k(0) = 0$ , yielding

$$k(t) = \frac{(e^{rt} - 1)}{r}(\underline{w} + p + s - n) \quad (5)$$

### 3.4 Capital Accumulation Levels Characterizing the Individual's Quit Decision

The amount of net utility that the individual receives while working under the employment relation is  $u_t^c = \underline{w} + s - n + rk(t)$  and the amount of net utility that she will receive after transitioning to self-employment is  $u_t^e = ak(t) - n$ . Since  $a > r$ , the amount of  $k$  accumulated will eventually grow large enough that  $(a - r)k(t) > \underline{w} + s$  and thus that  $u_t^e > u_t^c$ , at which point the individual will quit and transition to self-employment. The minimum level of  $k$  required such that  $u_t^e = u_t^c$  is thus

$$k^*(t) = \frac{\underline{w} + s}{(a - r)} \quad (6)$$

### 3.5 Timing of the Individual's Quit Decision from the Low-Autonomy Job

We can now calculate the length of time until the individual chooses to quit the low-autonomy job. Since  $k(t) = \frac{(e^{rt} - 1)}{r}(\underline{w} + p + s - n)$  and, at the time of quitting,  $k(t) = \frac{\underline{w} + s}{(a - r)}$ , equating the two allows us to find the unique level of capital accumulated at the time  $t$  at which  $u_t^e = u_t^c$ , which is the necessary first-order condition that implicitly and simultaneously identifies both the optimal quit time  $t^*$  and the amount of capital  $k(t^*)$  accumulated at the optimal quitting point. Since these two quantities coincide, we conclude that  $k(t^*) = k^*(t) = \frac{\underline{w} + s}{(a - r)}$  and can thus solve [5] to calculate the optimal quitting time  $t_u^*$  that maximizes the total utility of the individual, which is

$$t_u^* = \frac{1}{r} \ln\left(\frac{a}{(a - r)} - \frac{r(p - n)}{(a - r)(\underline{w} + p + s - n)}\right) \quad (7)$$

### 3.6 Maximizing Future Wealth Without Regard to Job Preference

In contrast, solving for the optimal quitting time to optimize the individual's wealth (counting only the *monetary* returns from the two alternative forms of employment, completely independent of her job preference for autonomy), rather than equating  $u_t^e = u_t^c$ , equates the two levels of  $\frac{\partial k}{\partial t}$  before and after the quit time; for  $t < t_1$ ,

$$\frac{\partial k}{\partial t} | t < t_1 = \underline{w} + p + s - n + rk(t) \quad (8)$$

and for  $t > t_1$ ,

$$\frac{\partial k}{\partial t} | t > t_1 = -n + ak(t). \quad (9)$$

Having accumulated capital of  $k_1$ , the individual who now quits at time  $t_1$  in favor of self-employment thus changes her accumulation rate from  $\frac{\partial k}{\partial t} = \underline{w} + p + s - n + rk(t)$  to  $\frac{\partial k}{\partial t} = -n + ak(t)$ , but starts with initial wealth

$$k(t_1) = k_1 \equiv \frac{(e^{rt_1} - 1)}{r} (\underline{w} + p + s - n). \quad (10)$$

The post-quitting capital accumulation process thus has the property that  $\frac{\partial k | t \geq t_1}{\partial t} = -n + ak(t)$  with initial condition  $k(t_1) = k_1$ , yielding

$$k(t | t \geq t_1) = e^{a(t-t_1)} k_1 - \frac{n(e^{a(t-t_1)} - 1)}{a}. \quad (11)$$

Note that this is the simple difference of two streams of payments: the first term represents the "income stream" from the initial investment of  $k_1$  compounding at rate  $a$ , while the second represents the "cost drag" effect of making a payment of  $n$  in each period to cover the individual's living expenses. Since by [5] we know that  $k(t_1) = k_1 \equiv \frac{(e^{rt_1} - 1)}{r} (\underline{w} + p + s - n)$  for *any* time  $t_1$  when the individual might quit (and not merely at the optimal time  $t_1 = t^*$ ), the post-quitting capital  $k(t | t \geq t_1)$ , a function of  $k_1$ , can be rewritten as an explicit function of the chosen quit time  $t_1$ :

$$k(t \mid t \geq t_1) = e^{a(t-t_1)} \frac{(e^{rt_1} - 1)}{r} (\underline{w} + p + s - n) - \frac{n(e^{a(t-t_1)} - 1)}{a} \quad (12)$$

Having thus (somewhat torturously) derived the individual's post-quitting wealth as a direct (rather than implicit) function of their quit time, it is now possible to directly characterize her wealth at any time  $t \geq t_1$  based on the chosen quit time  $t_1$ . Differentiating [12] with respect to  $t_1$  (the quit time) and solving the first-order condition to find the optimal  $t_k^*$  that maximizes the individual's wealth at any time  $t \geq t_1$  yields

$$t_k^* = \frac{1}{r} \ln \left( 1 + \frac{rW}{(a-r)(W-n)} \right), \text{ where } W = \underline{w} + p + s \quad (13)$$

Since  $t_k^*$  represents the optimal quitting time to maximize financial wealth and  $t_u^*$  represents the optimal quitting time to maximize overall utility, the net acceleration in quit time due to job dissatisfaction is thus

$$t_k^* - t_u^* = \frac{1}{r} \ln \left( \frac{a + \frac{nr}{\underline{w} + p + s - n}}{(a-r)} \right) t_u^* - \frac{1}{r} \ln \left( \frac{a}{(a-r)} - \frac{r(p-n)}{(a-r)(\underline{w} + p + s - n)} \right) \quad (14)$$

$$= \frac{1}{r} \ln \left[ \frac{nr + aS}{(n-p)r + aS} \right] \quad (15)$$

where the net savings per period  $S = W - n = (\underline{w} + p + s - n)$ .

## 4 CONTRASTING UTILITY- AND WEALTH-MAXIMIZING QUIT TIMES

**Proposition 1** *The individual quits unambiguously earlier when including the net utility of staying in the low-autonomy job than when focusing purely on financial returns. Mathematically,  $t_k^* - t_u^* > 0$ .*

**Proof.** The result of [14] can be rewritten as  $\frac{\ln[nr+aS] - \ln[(n-p)r+aS]}{r}$ . Since  $\ln(\cdot)$  is monotonically increasing, it immediately follows that the numerator (and, by extension, the entire expression) will have the same sign as  $p$  when  $r > 0$ . Since  $r > 0$  by assumption,  $t_k^* - t_u^* > 0$  if  $p > 0$ .

Since  $t_k^* - t_u^*$  has the same sign as  $p$  (the psychic benefit from transitioning to self-employment), we can also characterize potential "reluctant entrepreneurs" who *love* their jobs and/or who *dread*

self-employment – perhaps because of its requirements for autonomy. We concluded that individuals who value the autonomy from self-employment will leave earlier than if they were solely concerned with long-term wealth maximization. Conversely, reluctant entrepreneurs (who prefer staying in their jobs but who are eventually lured into self-employment with the promise of financial rewards, given that  $k(a - r)$  eventually exceeds  $w + p$ ) would have a negative  $p$ , indicating that they would stay in the "pleasant, low-autonomy" employment situation longer than they would if they were concerned solely with long-term wealth maximization, as expected. ■

**Proposition 2** *Increasing job dissatisfaction accelerates quit time, as long as the job requires a wage premium. Mathematically,  $t_k^* - t_u^*$  is increasing in  $p$  when  $p > 0$ .*

**Proof.** Since  $t_k^* - t_u^* = \frac{\ln[nr+aS] - \ln[(n-p)r+aS]}{r}$  as above, differentiating this additive form of [14] with respect to  $p$ , the degree of unpleasantness of the job, yields

$$\frac{\partial(t_k^* - t_u^*)}{\partial p} = \frac{\partial}{\partial p} \frac{\ln\left[\frac{nr+aS}{(n-p)r+aS}\right]}{r} = \frac{1}{r} \left[ \frac{\partial}{\partial p} \frac{1}{r} \ln[nr + aS] - \frac{\partial}{\partial p} \ln[(n-p)r + aS] \right] \quad (16)$$

$$= \frac{1}{r} \left[ \frac{a \frac{\partial S}{\partial p}}{nr + aS} - \frac{-r + a \frac{\partial S}{\partial p}}{(n-p)r + aS} \right] = \frac{1}{r} \left[ \frac{a}{nr + aS} - \frac{a-r}{(n-p)r + aS} \right] \quad (17)$$

Since  $a > r$ , a simple sufficient condition for [17] to be positive (and thus for  $\frac{\partial(t_k^* - t_u^*)}{\partial p} > 0$ , which was to be proved) is that  $p > 0$  – that is, that the job requires a positive compensating wage premium. ■

#### 4.1 Implications for Individuals' Final Wealth Accumulation Levels

Since  $t_k^*$  maximizes time  $T$  wealth, it follows (from the definition of a unique maximizer) that any choice of  $x$  other than  $t_k^*$  will produce less wealth. In particular, choosing to begin self-employment early (at  $t_u^* < t_k^*$ ) will benefit the individual in the short run (her utility will be increased as she starts collecting the psychic benefit  $p$  earlier and for longer over the course of her career) but cost her in the long run, as her long-term wealth will be unambiguously decreased.

Furthermore, a choice of  $x = t_u^*$  rather than a choice of  $x = t_k^*$  will produce lower levels of income from self-employment (and thus increases in wealth accumulation) at any and all times between  $t_u^*$  and  $T$ . This implies that the utility-maximizing individuals' self-employment net income  $ak - n$  will be lower compared to the alternative of remaining employed, both (a) at the time  $t_u^*$  she quits and (b) at any comparable time  $t > t_u^*$  after she quits, given that her income would be maximized if

she remained employed between  $t_u^*$  and  $t_k^*$ . This is a formal theoretical basis for the previously cited empirical observations that nearly every newly self-employed person earns less in self-employment than they would if they continued with their previous employment (Hamilton, 2000; Kawaguchi, 2002; Shane, 2008, p. 101-02). In fact, the mathematics of optimal quitting *guarantees* that choosing  $x = t_u^*$  will result in a lower marginal income  $ak(t_u^*)$  than would be realized if she waited until  $t_k^*$ , which in turn results in exactly the same marginal income as continuing in the job (as shown in Croson, 2006b and [4], above). Thus, the marginal income from staying in the job *must* exceed that garnered from self-employment beginning at  $t_u^*$  – and the downward effect on the individual’s accumulated wealth from this forgone income must continue not only until  $t_k^*$  but forever afterwards, as less capital will be available to produce future income.

In summary, the individual who quits at time  $t_u^* < t_k^*$  will end up with less wealth overall, but be happier in the conduct of her career. Although these two effects point in opposite directions, the net benefit to the individual is unambiguously positive since  $U(t_u^*) > U(t_k^*)$  – again, based on the idea that  $t_u^*$  maximizes the overall lifetime utility  $U(x)$  whereas  $t_k^*$  maximizes wealth at time  $T$ , which is only one component of  $U(x)$ .

## 5 INTERPRETATION OF MODEL RESULTS

This paper has focused on the analysis of a utility-maximization model of the individual’s quit decision in the presence of an explicit preference for self-employment. Adding a utility component incorporating an explicit preference for the autonomy resulting from self-employment (or, by extension, the cessation of any other aspect of an explicitly unpleasant job) improves over simpler economic models wherein the individual values only money, enabling a mathematical analysis of the tradeoff between monetary and nonmonetary aspects of career choice. This analysis shows that utility-maximizing individuals will leave employment in an lower-autonomy job sooner than in a normal (benchmark) job, but the reasons are quite different depending on whether the job itself carries both a utility burden and a wage premium or whether the individual simply receives a pure utility benefit from the autonomy of self-employment.

In the case of an actively unpleasant job that pays a wage premium, the individual’s decision to leave earlier stems from two reasons: (a) she is willing to accept a lower income given that, in becoming self-employed, she is able to shed the utility burden of the unpleasant job, and (b) because the unpleasant job must pay a wage premium to induce any employee to take it, the individual’s savings rate is substantially higher (more than proportionate to the wage differential) and thus capital is accumulated much faster, leading to a shorter time before the individual’s target capital accumulation is reached. More unpleasant jobs are intrinsically less desirable but also pay larger wage premia, indicating that a future entrepreneur (who rationally looks forward to their future self-employment) may use these unpleasant jobs as a springboard to well-capitalized self-employment

– in effect making an *investment* decision: a sacrifice of present job satisfaction in the interest of future wealth.

In the case of a pure utility preference for self-employment (for example, that generated from increased autonomy), the individual leaves employment earlier for two different reasons: (a) she is willing to accept a lower income from self-employment given that her income is effectively "supplemented" by the psychic bonus, and (b) this lower income can be achieved with a lower level of accumulation of financial capital, requiring less time spent working for wages before the transition to self-employment becomes optimal from a utility-maximization standpoint. Such an earlier quit time, however, compromises the long-term wealth accumulation that the individual can achieve over her lifetime; she in effect makes a *consumption* decision: a sacrifice of future wealth in the interest of present job satisfaction.

Regardless of whether this preference is due to a premium wage that increases the speed of capital accumulation or a pure utility preference for self-employment, the effects of this preference point unambiguously towards an earlier conversion to self-employment.

## 6 PROSPECTS FOR IMPROVING EMPIRICAL METHODOLOGY

Traditional measures of the motivations for self-employment contain surprisingly few (and indirect) measures of the value of autonomy, especially given its prominent place in the putative drivers of choice to become self-employed. This criticism may seem surprising given the emphasis (e.g., Blais and Tolouse, 1990; Kolvereid, 1996) on measuring the strength of the already self-employed's preferences for independence. But autonomy's value, although presumably positive, cannot be quantified (and separated from other motivations for self-employment) without also observing what is forgone to achieve it; only its *presence* in the individual's utility function – and not its *importance*, relative to the other arguments therein – can be detected by asking *ex post* whether it contributed to the decision to convert to self-employment.

We certainly expect that the empirical constructs of independence (as developed in, for example, Blais and Tolouse, 1990; Kolvereid, 1996; van Gelderen and Jansen, 2006) ought also be positively related to the future self-employment choices of current employees, even though this decision to convert to self-employment will not yet have occurred at the moment that their independence was measured. Kolvereid (1996), for example, carefully constructs a *post hoc* measure of individuals' desire for independence using self-employed individuals' responses about their wishes to control their own time, have their own approach to work, be their own boss, choose their coworkers, and be able to lead. We do not dispute that it would stand to reason that a similar construct would have predictive value if applied to the still-employed.



Extreme care must be taken, however, in studying these traits in a population entirely composed of the self-employed to avoid a classic problem of sampling on the dependent variable – especially given that these studies explicitly measure the level of desire for autonomy only in those who have already chosen self-employment, rather than prospectively predicting the population proportion of those who would choose such a switch. Presumably those with very low levels of value for autonomy have been inadvertently omitted from the sample simply because they did not choose to become nascent entrepreneurs. Simply focusing on the first and second moments of the distribution, we can see that the omission of the censored left-hand-tail values of the distribution implies both that the estimates of mean values will clearly be skewed upward and the variance of the overall population will be underestimated – both factors lending an unwarranted statistical significance to the parameters estimated. Fortunately, by measuring the distribution of the value of autonomy (even in a post-decision sample of the self-employed) it should be possible to reconstruct the implied distribution on the population by extrapolating it from the censored sample of presumably high-autonomy-valuing individuals, evaluating the fit of this censored distribution with the right-hand tails of various statistical distributions, and extrapolating the missing data on the distribution’s left-hand side that contained the values less than the cutoff that created the self-employed individuals. Only once this full distribution has been characterized can the proper predictive power of such studies be fully realized.

Stronger empirical measurements, however, will be required to explicitly measure the *value* of this autonomy. Large longitudinal surveys such as the Panel Study of Entrepreneurial Dynamics (PSED) and the Global Entrepreneurship Monitor (GEM) currently fail to provide data capable of capturing and measuring the importance of autonomy in self-employment decisions. The GEM survey, for example, is able to distinguish individuals who start businesses to pursue an opportunity from those who do so because of necessity (the lack of better employment alternatives). This preliminary distinction allows the separation of those individuals for whom self-employment is not really a choice as much as a default option from those who are presumably choosing among two or more alternatives with an objective in mind. The GEM survey then proceeds to question nascent opportunity entrepreneurs on whether independence, as opposed to monetary considerations, were the most important motivator of their decisions. Although this information enables researchers to say whether independence is important for people prospectively involved in starting a business (nascent entrepreneurs, who have committed resources and are actively pursuing a new business opportunity), such a question of whether autonomy is the "first and foremost" motivator is insufficient to allow a quantification of its importance not the assessment of the trade-off between income and autonomy. Once again, the data show only that autonomy is important and, perhaps, which people rank its influence on their overall decision higher than monetary considerations – a question of rank-ordering two elements of the decision.

A simple calculus-based analogy shows why such data cannot capture either the price or value of autonomy modeled above. The current GEM question asks respondents to compare the ordinal magnitude of two integrals (the *cumulative* effect of income, and the cumulative effect of indepen-

dence, each aggregated from zero to their current values) rather than calculating the cardinal ratio of two differentials (the relative *marginal* importance of income and independence, evaluated at their current values.) The use of the comparison of the value of integrals, measured by the GEM survey, stresses the rank order of the importance of various drivers of the decision; in our model, the use of the ratio  $R$  of derivatives stresses, in contrast, the separability of the value of substituting self-employment from the traditional employment relationship into monetary and nonmonetary aspects and, thus, the ability to calculate an implicit price  $P$  of autonomy as the ratio of salary forgone to the amount of autonomy gained. An addition to the GEM survey – perhaps an extension to question 2(g)(i) – would thus greatly improve the testability of all theories of tradeoffs between monetary and nonmonetary rewards.

## 7 Conclusions

We have offered a multifactor utility formulation formalizing the notion of an explicit, autonomy-based preference for self-employment. We propose that such a formulation as a theoretically-defensible alternative to the classic (and also psychologically-based) overconfidence hypothesis in explaining why self-employment is chosen despite evidence that newly self-employed individuals earn less than comparable individuals who continue their current employment. Such a multifactor model also provides a direct link to self-determination theory (Ryan & Deci, 1985; 2000.) SDT posits simply that autonomy (among other constructs) leads to well-being, and that individuals' quest for increased well-being determines their actions; the parallels to the economic analysis of utility and the link to decision theory are thus straightforward. Using quantitative instruments borrowed from psychology to evaluate newly self-employed people's motivations for making the switch would also shed light on the link between autonomy and new business creation and, in future empirical studies, potentially differentiate the autonomy-seeking explanation from alternative explanations of entrepreneurial entry such as overoptimism, necessity, and purely economic incentives.

## 8 Extension: The market for autonomy and a new theory of self-employment

An intriguing extension of the analysis of individual's willingness to pay for autonomy is to analyze the *price* of autonomy as a mechanism for clearing a market for autonomy as a scarce and desirable commodity to be consumed. In microeconomic theory, individuals choose to allocate their budget to consumption such that, for each pair of goods consumed, the quantities of each are chosen such that the marginal rate of substitution between them (represented by  $R$ , the calculated ratio of the two derivatives derived from the individual's relative preference for each) is equal to the price ratio

(represented by the hypothetical  $P$ , the price of autonomy in terms of forgone income offered by the individuals' employment alternatives.) We have characterized the movement to self-employment as a willingness to trade income for autonomy. This begs the question: given that prospective self-employed individuals are willing to pay for additional autonomy, why can't they simply do so without leaving their jobs?

Autonomy is not traded on a market in any traditional sense. Its price isn't quoted; it can't be easily transferred from one owner to another; its location may not even be apparent to those who seek it. No liquid spot market for it exists. This missing market for autonomy implies that the only way to acquire autonomy is to produce it personally – a condition termed *autarky* (absence of trade) by trade scholars. We know from nineteenth-century political economy that lack of trade leads to inefficiency in production, as comparative advantages cannot be realized. As a result of the non-tradeability of autonomy, we should not be overly surprised if some individuals in an economy have excess demand for it whereas others have excess supply, and that its apparent value to its holders is less than the apparent value to those who desire it. In this sense each individual is a potential producer of autonomy, some of whom are much more efficient at making it than others. Rather than the production of autonomy becoming the specialty of those most efficient in doing so (following the principle of comparative advantage and division of labor), the division of labor will be limited by the extent of the market; it will be necessary even for some inefficient producers of autonomy to make some if they value it highly enough, given that they cannot purchase it. Although the individuals who divert resources into the production of autonomy are made better off thereby, such induced vertical integration into the production of this intangible and nontradeable good by inefficient producers thereof is socially destructive, as it diverts resources away from other productive uses and the private value captured by the autonomy producers does not repay the social opportunity cost of these diverted resources. The amount of resources each individual chooses to devote to the production of autonomy thus depends critically – and perhaps solely, if their relative productivity does not vary across the population – on their private value for it. This dependence on the individuals' private value for autonomy underscores why it is important to examine the psychological basis that underlies this private value: in the market for autonomy, demand drives supply and not *vice versa*.

Even though autonomy cannot be priced and traded via a traditional market mechanism, a synthetic market for autonomy may arise via contracts (explicit or implicit) between employer and employee. An employment relationship that offers more flexibility but less remuneration, when compared to a benchmark relationship offering a standard level of each, can be thought of as an implicit purchase of autonomy by the employee; similarly, an employment relationship that offers less flexibility but higher remuneration can be thought of as an implicit sale thereof. Self-employment can thus be characterized as the result of wanting to purchase more autonomy than is available from the employer as a particular supplier; since the demand exceeds the potential supply, this "purchase," if consummated, must take place *outside* the employment relationship. Some transitions to self-employment will thus be the observable realization of these failed transactions, rather

than falling into the traditional categories of opportunity recognition, necessity, overconfidence, or pure preference for the outcome. This mismatch of the supply and demand of autonomy within a dyadic employer-employee relationship, coupled with the inability to trade it via market exchange, may thus form the basis for an entirely new categorization of the genesis of self-employment as a response to a missing market characterized by persistent excess demand. Examining this missing market is an extremely promising area for future research.

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