Asset Accumulation and Short Term Employment

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Abstract

This paper investigates the search and consumption behavior of workers as they move between readily available low wage employment and uncertain search for a high wage job. Analytic results derived from our model include: (1) voluntary planned quits occur in a cyclical pattern, (2) consumption while searching falls over time until either a good job is found or assets run out and the worker accepts a low wage job, (3) consumption during low wage employment is less than earnings, and (4) the durations of job search and employment as well as the pattern of consumption are related to turnover costs and wages. Empirical evidence from the 1995 Canadian out of Employment Panel (COEP) broadly supports these relationships. In these data, there exists a high incidence of displaced workers taking temporary low wage jobs. Examining the income, consumption and savings patterns of workers in different regimes, we find that these accord with the theoretical predictions.

1   Introduction

A growing literature documents the propensity of workers who lose jobs to move to temporary employment, to have subsequent separations, and to move into part-time or otherwise unsatisfactory employment. For example, Farber (1999) shows that displaced workers commonly take up temporary jobs and "involuntary" part-time jobs, and Boheim and Taylor (2002) show that jobs that follow an unemployment spell have shorter average durations than other jobs. Farber further shows that the probability of temporary or part-time work falls with time since displacement, suggesting that these arrangements are part of a transitional process back to desirable employment.

Similar patterns emerge from a recent Canadian survey of job losers. Table 1 documents outcomes of displaced workers sampled in the 1995 Canadian Out of Employment Panel (COEP). (Details about the data are provided below.) The sample is limited to workers who lost a "good" job - one in which they had been employed full time for over a year without absence, and further, to workers who had no expectation of recall. Table 1 illustrates that six to ten months after the loss of a good job, 33.3% of such workers are still in the spell of unemployment that began with that job loss, while 37.6% are in the first spell of employment subsequent to that job loss. The remaining 29.1% of workers are either in a subsequent unemployment spell or a subsequent employment spell and thus have had some temporary employment. Of course, some of those in their first spell of employment may also be in a temporary job.

The data allow us to look at this in two ways. First, of those in the first spell of employment subsequent to a job loss, 29.3% do not expect to be in that job for a full year. Second, a substantially overlapping 24.9% consider this job to be not as good as the job they lost. Thus, in total, more than a third of workers who lose a permanent (long tenure) job take some temporary work in the first three quarters after displacement. This is work that they either quickly leave or do not expect to remain in.

While evidence of substantial temporary employment after job loss has mounted, the reasons for this phenomenon are not well understood. One possibility is that credit constrained job losers use short term, "bad" jobs to finance further search, an idea not readily incorporated into the standard search models that inform much thinking about unemployment. In particular, employment in such models is permanent (unless there is a subsequent shock). Job seekers are assumed to have risk neutral preferences and hence maximize the expected utility of the present discounted value of income less costs. This specification implies that the pattern of consumption is either indeterminate or completely

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insured. It also generates a stationary reservation wage strategy. A wage offer rejected today will not be acceptable in the future and any accepted job opportunity will always be preferred to further search. (See Mortensen, 1986). As a result, the transition rate from unemployment into employment does not vary with the duration of search or with differences in wealth. In addition, workers only leave a job if they find a better opportunity (through on-the-job search) or if the employment relationship changes in some way so that the payoff to continued work becomes less productive than the return to search.

For risk averse job seekers without insurance, this characterization does not apply. In this case, the optimal pattern of consumption becomes well defined. Individuals with higher assets consume more. In addition, the job acceptance decision also depends on the individual's asset levels although further restrictions on the degree of risk aversion are needed to characterize this relationship. Job seekers with decreasing absolute risk aversion become pickier as assets increase (the reservation wage declines with asset holdings). As a result, rich individuals search longer and hence tend to match with higher paying jobs (Danforth, 1979). In addition, as risk averse job seekers consume from assets and become less picky, they may on occasion want to recall previously rejected offers (Hall, Lippman and McCall, 1979). Employment, however, is again permanent - as with risk neutral job search - so that unless something changes for the worker, there are no job-to-unemployment transitions.

This paper develops a model in which credit constraints can give rise to employment-to-unemployment turnover. Lacking the ability to borrow or insure, risk averse individuals become willing to accept readily available, low wage "bad" jobs in order to accumulate assets which subsequently fund search for high wage "good" jobs. If the ensuing search for high wage employment proves unsuccessful and assets become depleted, these individuals then take up bad jobs again and repeat the cycle. Bad jobs act as a floor or safety net for those who are unsuccessful at job search and do not have the ability to borrow. As a result, temporary employment in bad jobs generates quits without shocks to productivity or in the job search process. The pattern of asset accumulation and consumption follows accordingly. For the model developed below, workers in a bad job save a constant fraction of their wage. At some point they have accumulated sufficient assets to quit the bad job and start search for a good job. During this search period, assets decline over time until either a good job is found or the worker exhausts all assets and returns to another low paying job.

Job seekers would prefer borrowing against future income to fund consumption during search rather than using low wage work to build assets. Credit constraints prevent such

behavior and hence take on a central role in the determination of income distribution. Rather than limit human capital investment as often discussed in the literature, here they restrict the extent of search and thereby the flow of workers into desirable high wage jobs.

The next section develops the model. Section 3 subsequently presents an analysis of the effects of changes in turnover costs and wages. This analysis reveals that turnover costs play a key role in determining asset accumulation as well as the durations of employment and job search. In particular, rising turnover costs lead to a longer employment spells in low wage jobs. While in these bad jobs, individuals save a higher level of assets but at a slower rate. When they do search, workers are more cautious. They run down assets at a slower rate by consuming less and thereby searching longer.

Section 4 returns to the COEP data to investigate a particular implication of the model. The model predicts that workers in temporary jobs should have high savings rates and low average propensities to consume when compared to those back in a "good" job. This seems counter-intuitive: "permanent income" models suggest that those with temporarily low incomes should have high average propensities to consume. However, this predition of our model is exactly what an analysis of the Canadian data reveals. The expenditures (measured as a fraction of pre-displacement expenditure levels) of workers in temporary, unsatisfactory employment is markedly different from those of workers who report being back in "good" jobs. The distribution of proportional expenditure changes among workers in temporary, unsatisfactory employment is actually quite similar to the distribution of unemployed (searching) individuals. However, temporary workers have higher incomes than searchers and thus, consistent with the model, they have higher savings rates. Parametric and nonparametric tests confirm the statistical significance of these differences. Section 5 concludes and offers some directions for future research.

2   The Model

Suppose workers can at any time accept a low paying job at a wage $w_L > 0$. Such jobs are always available. Individuals who forgo the low wage sector (and only these workers) can search for higher paying employment with the associated wage $w_H > w_L$. When looking for a job, a job seeker receives a high wage offer with probability α. The key feature here is that low wage jobs are easier to find than high wage jobs. The flow payments during unemployed search from sources such as unemployment insurance are normalized to zero.

While employed and during the job search process, a worker chooses consumption to maximize expected lifetime utility. Let $u(\cdot)$ represent the worker's risk averse preferences

in each period. $u(\cdot)$ is continuous, differentiable and bounded above with the standard Inada properties so that $u'(\cdot) > 0$, $u''(\cdot) < 0$, $u(0) = 0$, $u'(0) = \infty$, and $u'(\infty) = 0$

Time is continuous and infinite. Suppose that at time t a worker has assets $A_t \geq 0$. A worker entering the market for the first time does so with assets $A_0 \geq 0$. Job seekers earn interest on these assets at rate r which also equals the individual's rate of time preference. Although accepting a low wage job is costless, it is not costless to embark on search. Entrants into the market who decide to search immediately as well as low wage workers who quit employment in order to search pay a turnover cost $K > 0$.

Turnover costs have a number of compatible interpretations. For transitions from low wage employment, the most immediate corresponds to an upfront search cost as well as an exit cost borne by the worker. In the context presented here, a search or exit cost of this sort is equivalent to an entry fee in the low wage sector properly adjusted in present value terms.[1] An alternative view is that these costs represent (round trip) transportation costs between spatially distinct sectors, the low wage - full employment and the high wage with search unemployment sectors. This perspective highlights the similarities of this model with that of Harris and Todaro (1970). Here, however, the economy explicitly accounts for the dynamic flows between sectors. Of course, the act of changing sectors need not be explicitly spatial but nonetheless involve a transportation cost.

Consider first the "partial" problem of a job seeker (an individual in the job search process) with assets A_D which are at this point given. $A_D \geq 0$ may differ from initial assets A_0 if the worker initially participates in the low wage sector. While looking for high wage employment, the worker's problem is to choose the maximum duration of search T (given a job is not found), a consumption path, c_t for $t \in [0, T]$, and the asset level desired at the end of the search period, $A_T \geq 0$. These decisions are made bearing in mind the opportunities of low wage employment, represented here by the value of low wage employment, $V(A)$.

As high paid jobs last forever, a worker with assets A_t in a high wage job will optimally consume $rA_t + w_H$ indefinitely. The corresponding value of high wage employment is therefore $u(rA_t + w_H)/r$. As a result, the searching worker's problem can be written as[2]

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[1] As discussed below, a worker with sufficiently high assets will initially search. In this case, there is no exit from (or entry into) the low wage sector to generate the cost K. As the focus here is on flows between job search and low wage employment, this fault in the interpretation of K is of minor concern.

[2] The objective function can be viewed as the limit of a related discrete time problem. Given a time

$$W(A_D) = \max_{c_t,T,A_T} \int_0^T u(c_t)e^{-(r+\alpha)t}dt + \frac{\alpha}{r}\int_0^T u(rA_s + w_H)e^{-(r+\alpha)s}ds + e^{-(r+\alpha)T}V(A_T)$$

subject to

$$A_D - \int_0^T c_t e^{-rt}dt - e^{-rT}A_T \geq 0 \qquad (Budget\ Constraint)$$

and

$$e^{-rT}A_T \geq 0 \qquad\qquad\qquad (Credit\ Constraint)$$

where

$$A_s = e^{rs}\left[A_D - \int_0^s c_v e^{-rv}dv\right] \geq 0 \qquad s \in [0,T]$$

Characterizing the value of working in low wage jobs, $V(A)$, completes the specification of the worker's decision problem. Workers in low wage employment have the option of turning at some time to high wage job search at a cost K or remaining indefinitely in low wage employment with no intention of further search. A worker in low wage employment with initial assets A_0 chooses a duration of employment D, a consumption pattern, ς_τ for $\tau \in [0,D]$, and a terminal level of assets $A_D \geq 0$. If the worker turns to high wage job search $(D < \infty)$, terminal assets fund the turnover cost K and the subsequent consumption while searching.

The worker's problem is thus expressed by[3]:

$$V(A_0) = \max_{\varsigma_\tau,D,A_D} \int_0^D u(\varsigma_\tau)e^{-r\tau}d\tau + e^{-rD}W(A_D)$$

period of length $dt > 0$, the worker receives the expected payoff

$$W(A) = u(c_0)dt + \sum_{t=1}^T \left(\frac{1-\alpha dt}{1+rdt}\right)^t u(c_t)dt + \frac{\alpha dt}{1-\alpha dt}\sum_{t=1}^T \left(\frac{1-\alpha dt}{1+rdt}\right)^t u(rA_t + w_H)/r$$

$$+ \frac{1}{1-\alpha dt}\left(\frac{1-\alpha dt}{1+rdt}\right)^T V(A_T)$$

Letting $dt \to 0$ yields the continuous time objective function.

[3]There are also implicit nonnegativity constraints on the choice variables. As discusssed below, these are potentially binding only for the duration of low wage employment $(D \geq 0)$.

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subject to

$$A_0 + \int_0^D (w_L - \varsigma_\tau)e^{-r\tau}d\tau - e^{-rD}A_D - e^{-rD}K = 0 \qquad (\textit{Budget Constraint})$$

and

$$e^{-rD}(A_D - K) \geq 0 \qquad\qquad\qquad\qquad (\textit{Credit Constraint})$$

Substituting in for $W(A_D)$ as well as for A_D in the budget constraint yields the following problem

$$V(A_0) = \max_{\varsigma_\tau, c_t, D, T, A_T} \int_0^D u(\varsigma_\tau)e^{-r\tau}d\tau + e^{-rD}\left\{ \int_0^T u(c_t)e^{-(r+\alpha)t}dt \right.$$
$$\left. + \frac{\alpha}{r}\int_0^T u(rA_s + w_H)e^{-(r+\alpha)s}ds + e^{-(r+\alpha)T}V(A_T) \right\}$$

subject to

$$A_0 + \int_0^D (w_L - \varsigma_\tau)e^{-r\tau}d\tau - e^{-rD}\int_0^T c_t e^{-rt}dt - e^{-rD}K - e^{-r(D+T)}A_T \geq 0$$

and

$$e^{-r(D+T)}A_T \geq 0$$

where now

$$A_s = e^{rs}\left\{ e^{rD}A_0 + e^{rD}\int_0^D (w_L - \varsigma_v)e^{-rv}dv - \int_0^s c_v e^{-rv}dv - K \right\} \geq 0 \quad s \in [0, T]$$

2.1   Consumption Behavior

Associate Lagrange multipliers μ_1 and μ_2 with the budget and credit constraints respectively. The first order conditions for consumption while working in a low wage job (ς_τ)

are[4]

$$e^{-r\tau}\left\{u'(\varsigma_\tau) - \alpha \int_0^T u'(rA_s + w_H)e^{-\alpha s}ds - \mu_1\right\} = 0 \quad \tau \in [0, D]$$

These equations imply that the individual will choose constant consumption over this period.[5] Denoting $\bar{\varsigma} = \varsigma_\tau$ for all $\tau \in [0, D]$ and rearranging terms, the first order conditions reduce to a single equation

$$u'(\bar{\varsigma}) - \alpha \int_0^T u'(rA_s + w_H)e^{-\alpha s}ds - \mu_1 = 0 \tag{1}$$

For consumption during high wage job search (c_t), the first order conditions are

$$e^{-r(D+t)}\left\{u'(c_t)e^{-\alpha t} - \alpha \int_t^T u'(rA_s + w_H)e^{-\alpha s}ds - \mu_1\right\} = 0 \quad t \in [0, T] \tag{2}$$

From equation (1) and equation (2) for $t = 0$, consumption at the beginning of search equals consumption during low wage employment (if low wage employment is taken on) which in turn is less than or equal to the low wage plus initial asset income: $c_0 = \bar{\varsigma} \leq rA_0 + w_L$. It can also be established from (2) that consumption during search c_t is strictly positive for all t and decreasing over time. As search proceeds, consumption falls until either a high wage job is found or search terminates with corresponding consumption c_T. If the worker chooses to cycle back and forth between low wage employment and high wage job search, this consumption pattern implies that a jump in consumption occurs

---

[4]The asset equation for A_s implies that

$$\partial A_s/\partial \varsigma_\tau = -e^{r(D+s-\tau)} \qquad s \in [0,T] \qquad \tau \in [0, D]$$

$$\partial A_s/\partial c_t = \begin{cases} -e^{r(s-t)} & s \geq t \\ 0 & s < t \end{cases} \qquad 0 \leq s, t \leq T$$

$$\partial A_s/\partial D = e^{rs}\left[re^{rD}A_0 + re^{rD}\int_0^D (w_L - \varsigma_v)e^{-rv}dv + w_L - \varsigma_D\right]$$

$$\partial A_s/\partial T = \partial A_s/\partial A_T = 0$$

[5]In the adopted notation here, the indices t, τ and s do not necessarily correspond to chronological time. For consumption during low wage employment, τ does at first match real time but for consumption while searching, c_t, this index differs from the date by D. Of course, if cycles of work and employment occur, the index further differs by a multiple of $T + D$.

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when low wage temporary employment begins anew but not when the worker quits low wage employment.

The jump at the end of search can be intuitively understood by considering the marginal value of using assets to finance an added unit of consumption today. When searching, the opportunity cost of consuming a little more today is having to give up search sooner. Toward the end of search, this means not being able to finance the search tomorrow. On the other hand, when working at a low wage, the opportunity cost of a little more consumption is getting back to future search a bit later. The discounting of postponed search creates a wedge that generates the jump. At the other extreme of quitting low wage employment, there is no such delay. The marginal value and therefore the level of consumption in the two states are equal.

Consumption during search can be characterized further. Provided that search occurs, that is $T > 0$, equation (2) generates the differential equation

$$\dot{c}_t = \frac{\alpha \left[u'(c_t) - u'(rA_t + w_H) \right]}{u''(c_t)} \tag{3}$$

while the asset equation gives a second differential equation in assets and consumption

$$\dot{A}_t = rA_t - c_t \tag{4}$$

Figure 1 illustrates the associated phase diagram along with the equations for $\dot{A}_t = 0$ and $\dot{c}_t = 0$. Since these stationary lines are parallel at a distance of w_H from each other, there are no stationary points in this system. Moreover, it is straightforward to establish that the optimal solution lies between these two lines:

$$rA_t < c_t < rA_t + w_H.$$

As a result, for any terminal point (c_T, A_T), there is a unique path and any stable path has decreasing assets and consumption over time.

2.2 Search and Employment Duration

As $\varsigma_\tau = \bar{\varsigma}$ for all τ, the first order condition for the duration of low wage employment (D)

$$
e^{-rD} \left\{ u(\varsigma_D) - r \int_0^T u(c_t) e^{-(r+\alpha)t} dt - \alpha \int_0^T u(rA_s + w_H) e^{-(r+\alpha)s} ds \right.
$$

$$
-re^{-(r+\alpha)T} V(A_T) + \alpha \int_0^T u'(rA_s + w_H)(\partial A_s/\partial D) e^{-(r+\alpha)s} ds
$$

$$
+\mu_1 \left[w_L - \varsigma_D + r \int_0^T c_t e^{-rt} dt + rK + re^{-rT} A_T \right] - \mu_2 r e^{-rT} A_T \left. \right\} = 0
$$

simplifies to

$$
u(\bar{\varsigma}) - rV(A_0) + (rA_0 + w_L - \bar{\varsigma})\alpha \int_t^T u'(rA_s + w_H) e^{-\alpha s} ds \tag{5}
$$

$$
+\mu_1(rA_0 + w_L - \bar{\varsigma}) \ = \ 0
$$

The remaining first order conditions for duration of high wage search (T) and asset holdings at this time (A_T) are given by:

$$
e^{-r(D+T)} \left\{ u(c_T) e^{-\alpha T} + \frac{\alpha}{r} u(rA_T + w_H) e^{-\alpha T} - (r + \alpha) e^{-\alpha T} V(A_T) \right. \tag{6}
$$

$$
-\mu_1(c_T - rA_T) - \mu_2 rA_T \left. \right\} \ = \ 0
$$

$$
e^{-r(D+T)} \left\{ e^{-\alpha T} V'(A_T) - \mu_1 + \mu_2 \right\} = 0 \tag{7}
$$

while the Kuhn Tucker conditions for the two constraints are

$$
\mu_1 \left\{ A_0 + \int_0^D (w_L - \varsigma_\tau) e^{-r\tau} d\tau - e^{-rD} \int_0^T c_t e^{-rt} dt - e^{-rD} K - e^{-r(D+T)} A_T \right\} = 0 \tag{8}
$$

$$
\mu_2 e^{-r(D+T)} A_T = 0 \tag{9}
$$

The primary interest here are consumer choices of $\bar{\varsigma}, c_t$ for $t \in [0, T], D, T$, and A_T in which workers move back and forth between low wage employment and job search

until finding a permanent high wage job. Of course, such a choice along with multipliers (μ_1, μ_2) must solve equations (1)-(9) for assets $A_0 = A_T$. However, not all solutions to these necessary (but not sufficient) conditions are optimal choices. More specifically, note that $D = \infty$ along with $\varsigma_t = \bar{\varsigma} = rA_0 + w_L$ is always a solution for an arbitrary level of initial assets $A_0 \geq 0$. In this case, c_t, T, A_T are undetermined as search does not occur. Therefore to establish existence of the type of solution of interest, we find conditions which rule out this solution and other alternatives.

The following claim establishes sufficient conditions on wages and turnover costs under which the $D = \infty$ solution to the first order conditions is suboptimal. Wages in the good jobs must be sufficiently high to make search attractive while the turnover costs must be sufficiently small so that the worker is willing to participate in high wage job search.

Claim 1 *If*

$$\frac{\alpha}{r} \left(u(rA_0 + w_H) - u(rA_0 + w_L) \right) - u'(rA_0 + w_L)w_L > 0,$$

then a worker will at some point switch to high wage job search $(D < \infty)$ given sufficiently small but strictly positive K.

<u>Proof</u>: See Appendix

On the other hand, there may be no transition from high wage search into low wage employment. If search is very attractive, it may be optimal to search indefinitely, $T = \infty$. In this case, the job seeker runs down assets (recall that $c_t > rA_t$) so that consumption becomes arbitrarily small as time proceeds.[6] This action is ruled out when wages in good jobs are not "too attractive."

Claim 2 *If $\frac{\alpha}{r+\alpha}u(w_H) < u(w_L)$, then $T < \infty$.*

<u>Proof</u>: See Appendix

While Claim 1 establishes conditions for not remaining permanently in low wage employment with assets A_0, it does not demonstrate that a worker with these assets will necessarily take on and then later quit a low wage job. Given A_0, a worker may forgo low wage employment altogether and search immediately. Indeed, for some initial asset levels, low wage employment (accompanied by asset accumulation) is undesirable. Upon

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[6]Letting the $u(0)$ normalization (currently equal to zero) decrease will lower the attractiveness of search when assets are low thereby easing the conditions under which cycles exist.

entering the market, it may be optimal to set $D = 0$.[7] Of course, following a period of high wage job search, setting $D = 0$ is wasteful. A worker who discontinues high wage search to move into low wage employment with assets A_T will not then set $D = 0$ when solving $V(A_T)$. Acting in this way involves paying an avoidable turnover cost K.[8]

To assess what happens after pursuing of a good job, suppose a worker concludes search with assets A_T. In general, given A_T it may be optimal to set $D = \infty$. If, however, the condition in Claim 1 holds at A_T, then the worker will take on low wage employment for a only finite, strictly positive duration after which the worker will search yet again. This pattern suggests that temporary low wage employment cycles could emerge if the condition in Claim 1 holds over a range of assets. Claim 3 goes even further. It shows that if the condition holds more generally, then at the end of unsuccessful search, an individual will have exhausted the assets in which case the credit constraint binds.

Claim 3 *If*

$$\frac{\alpha}{r}\left(u(rA + w_H) - u(rA + w_L)\right) - u'(rA + w_L)w_L > 0 \quad \forall\ A \in [0, A_0]$$

then $A_T = 0$

Proof: See Appendix

When the conditions in Claims 2 and 3 simultaneously hold, the (repeated) pattern of low wage employment followed by high wage job search emerges. Moreover, since these two conditions are not exclusive (examples are easy to find), cycles can emerge. Regardless of initial assets, workers will (with some probability) search until assets are used up. At this point, Claim 1 establishes that they will not take a low wage job permanently. Claim 2 establishes they will not search with zero assets. Instead they will take on low wage employment for a finite period after which they search. If unsuccessful, this search will terminate with zero assets at which point the process begins anew.[9] In other words, the solution to $V(0)$ is such that workers cycle indefinitely between low wage

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[7]For assets less than K this is not feasible since the subsequent search does not occur: $T = 0$. For A_0 greater than some critical value this will indeed be a solution. More specifically, if workers begin with different endowments, A_0, those with high levels of initial assets will immediately search for high wages and only take up low wage jobs when high wage search is unsuccessful. On the other hand, workers with low endowments will accumulate assets before search ($D > 0$).

[8]Likewise $T = 0$ is not part of an optimal plan as this strategy also involves paying a transition fee without any possible payoff from search.

[9]For completeness, erratic patterns in which the choices of D and T vary can also be dismissed.

employment and high wage job search until they ultimately find a high wage job, thereby establishing the central result of this section

This cyclical pattern of employment can be illustrated from the value functions. As depicted in Figure 2, the value of high wage search, $W(A)$, is strictly increasing and concave in assets A whereas the value of low wage employment, $V(A)$, is everywhere increasing but linear over the range of assets involving savings. (Derivations are shown in the proof of Claim 3 in the Appendix.) In Figure 2, starting from assets $A = 0$, a cycle begins with the accumulation to A_D assets and the corresponding progression up along $V(A)$. Upon reaching A_D, the individual becomes indifferent between low wage employment and moving to search: $V(A_D) = W(A_D - K)$. Here, a smooth pasting-type condition holds in which the value functions have the same slope, $V'(A_D) = W'(A_D - K)$.

As search proceeds assets decline from this point. The individual moves down along $W(A)$ until assets are exhausted at which point the individual switches: $V(0) = W(0)$. With a binding credit constraint, the marginal return to an additional asset is strictly greater under search than in low wage employment but the fixed cost K deters the individual from working a very short period. Instead the process repeats itself until a high wage job is ultimately found.

When the credit constraint does not bind ($A_T > 0$), the solution is less involved. After any period job search, the worker abandons the high wage market preferring (permanent) low wage employment. This switch occurs at a point of indifference which smoothly links $W(A)$ and $V(A)$ through a tangency condition. Specifically, if $D = \infty$ after an initial period of search, $W(A_T) = V(A_T)$ and $W'(A_T) = V'(A_T)$.

3 Theoretical Analysis

3.1 Turnover Costs

How does consumption and the duration of job search respond to a change in turnover costs? Do they begin search with higher assets? What are the consequences for unemployment? Since asset accumulation and job quits occur only in the case where workers who terminate job search do so when the credit constraint binds ($A_T = 0$), when considering these effects it is sufficient to concentrate on the case in which initial and terminal assets are zero.

As shown in the Appendix, in this cycle consumption during low wage employment increases with turnover costs implying that the initial level of consumption during search

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also rises:

$$\partial c_0/\partial K = \partial\bar{\varsigma}/\partial K > 0.$$

On the other hand, consumption at the end of high wage job search declines with turnover costs: $\partial c_T/\partial K < 0$.

These results, in turn, determine the changes in employment and search durations. Since the job search phase diagram for c_t and A_t is independent of turnover costs, an increased initial consumption c_0 along with decreased terminal consumption c_T implies that the new solution is on lower path but with larger first period consumption. Given higher initial consumption, it follows that assets rise at the outset of high wage search: $\partial A_d/\partial K > 0$.

On the lower trajectory, consumption for a given asset level falls:

$$\partial c(A_t)/\partial K < 0.$$

With more assets being consumed at a slower rate, the duration of search necessarily rises[10]: $\partial T/\partial K > 0$. As consumption during low wage employment rises, the rate of asset accumulation declines. However, at the termination of the low wage job at time D, the worker starts high wage job search with higher consumption - recall that c_0 has increased. From the phase diagram, the worker must arrive with higher assets, A_D. To accumulate a larger asset level with a slower accumulation rate requires that the duration of low wage employment increases: $\partial D/\partial K > 0$.

Increased turnover costs diminishes a worker's willingness to engage in search.[11] As search becomes more distant, low wage workers who are accumulating assets in order to eventually seek high wage employment become less willing to sacrifice today for more remote rewards. Low wage workers stay longer and consume more in low wage jobs. When they do switch to job search, they arrive prepared to search longer to offset the possibility of future turnover costs. They do so by arriving with higher assets and by consuming less given asset levels.

---

[10]Consumption as a function of the length or duration of search is in general ambiguous: $\partial c_t/\partial K \gtreqless 0$. For low levels of t this derivative is clearly positive as $\partial c_{t=0}/\partial K > 0$ but depending on risk aversion, the decline in consumption may be more rapid under higher turnover costs so that this derivative becomes negative.

[11]If turnover costs are zero, workers would work at bad jobs and then search for infinesimally short periods. For $K = 0$, a "chattering" solution between employment and search results.

3.2 Wages

The individual's response to wages is less transparent, with results primarily available for initial and terminal consumption. It is straightforward to establish that a pay rise in bad jobs increases consumption during low wage employment. Likewise, consumption at the end of high wage job search rises with low wages:

$$\partial c_0/\partial w_L = \partial \bar{\varsigma}/\partial w_L > 0; \quad \partial c_T/\partial w_L > 0$$

(See the Appendix for details.) As low wage pay w_L does not affect the phase diagram, the new consumption path is a higher trajectory accompanied by a higher initial value. Consumption given assets rises $\partial c(A_t)/\partial w_L > 0$; however, although c_0 has risen it is not possible to graphically determine whether assets at $t = 0$ are higher. Given a small rise in initial consumption on the new path, the duration of search will fall. For a sufficiently large rise we get the opposite effect. Given this ambiguity, it is not possible to tell (at this point) the effects on employment or search duration as well as asset accumulation.[12] Although increased consumption reflects higher income from bad jobs, it is unclear how individuals alter the allocation of time between work and search.

The individual's response to changes in the high wage is less revealing. As pay in good jobs improves, initial as well as terminal consumption both decrease:

$$\partial c_0/\partial w_H = \partial \bar{\varsigma}/\partial w_H < 0; \quad \partial c_T/\partial w_H < 0$$

With more attractive good jobs, low wage workers save at a higher rate in order to facilitate search. Now, however, the phase diagram shifts with w_H changes. For a given the terminal condition, there is higher consumption at each asset level - the consumption paths rotate upward. As such, little can be inferred regarding consumption while searching. Workers consume less toward the end of search activity (when assets are low) reflecting the greater return to search. Consumption at the outset of search is also lower although the way in which consumption given relatively high assets responds is undetermined. Likewise, the steeper path is balanced by a fall in initial and terminal consumption so working out the duration of search and the initial asset level can not be done diagrammatically.

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[12] Analytically, these effects depend on the solution of differential equation solution for c_t. Given the structure of this differential equation, the outcome is likely to depend on third derivatives for $u(c_t)$.

4 Empirical Analysis

The model developed in the previous section has many implications, some of which were drawn out and some of which remain to be fully developed (see the concluding section for some discussion). The possibilities for empirical work are also numerous. In the introduction to this paper, data from the a survey of job seekers, the 1995 Canadian Out-of-Employment Panel Survey, was used to motivate the subsequent development of the model. In particular, Table 1 documents the prevalence of short term or unsatisfactory employment among workers who had previously enjoyed stable employment. The COEP data is unique among labor market surveys in that in contains measures of consumption and savings. This paper concludes with an empirical examination of the model's predictions regarding consumption and savings. Additional empirical analysis - including structural estimation of the model - is left for future work.

The model developed in Section 2 makes predictions about consumption and savings behavior across individuals in different states: unemployed job search, working in a temporary job to fund further search, and reemployed in a "good" (high-wage) job. In particular, the following inequalities are implied:

$$c_T < c_0 < w_L < w_H < c_g$$

where c_T is the terminal level of consumption at which search ceases and the level of consumption during temporary employment; c_0 is the initial level of consumption in a spell of search; c_g is the level of consumption in a good job; and w_L and w_H are the wages in "bad" and "good" jobs respectively.

Turning to savings, the model predicts saving among those in temporary jobs, dissaving among the unemployed, and neither saving nor dis-saving among those in good jobs. This last prediction of course follows from the fact the model abstracts from life-cycle savings motives and because the good job is an absorbing state (and hence workers in the good job have no precautionary motive). Nevertheless, the related predictions of low consumption and high savings among holders of temporary (low wage) jobs seem central to the model and provide a sharp contrast with "permanent income" model, which predict dissaving among workers temporarily in low wage jobs. Thus these are interesting features to look for in the data.

4.1　Data and Sample

The COEP surveys were developed by Human Resources Development Canada in an attempt to understand the consequences of a series of legislative changes made to the Canadian UI system. The individuals in the COEP survey are a representative sample of those who experienced a job separation in particular windows of time. Additional details can be found in Browning and Crossley (2001a). The analysis in the current paper focuses on the 1995 survey, in which there were two telephone interviews, conducted in approximately the 3rd and 5th quarter after job loss. The full 1995 dataset has 3898 respondents in the first cohort (separations between January and March 1995) and 3996 respondents in the second cohort (separations between April and June 1995). However, the COEP sampled all kinds of job separations and the flow out of employment is very heterogeneous. The analysis in this paper focuses on a restricted sample of workers who were permanently displaced from a full-time job which they had held for at least one year.

Initially, the 6% of respondents who reported continuing employment in a second job across the job loss and the 1.5% of respondents under twenty or over sixty-five years of age were discarded. Next, involuntary separations (laid off or fired/dismissed) were selected which reduced the sample by a further 32%. A large fraction (62%) of the lay-offs in the COEP data reported that, at the time of the layoff, they had an expectation of recall to the firm that was laying them off. Many also reported that they had a specific recall date. In order to focus on 'permanent' lay-offs, respondents who reported such an *ex ante* expectation of recall (with or without a recall date) were dropped.[13] The final sample restriction was to select respondents who were displaced from a stable, full-time employment. About half of the remaining sample had tenure of less than 52 weeks in the lost job, and these were dropped. So were the approximately 15% of the sample that had been displaced from a part-time job. This left the sample of 790 "displaced workers" which forms the basis of the current analysis. About 16% of these withdrew from the labor force after job loss. Since the model developed above is about search, it offers no predictions for this group. These are not analyzed in what follows.

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[13]Throughout the paper we use the terms "permanent layoff" and "displacement" interchangably. Some of the literature uses a tighter definition of "displaced workers," limiting the term to those laid off as part of a plant closing or other large event.

4.2 Consumption and Savings after Job Loss

Figure 3 displays distributions of proportional changes in (household) expenditures (consumption) from before the job loss to the first interview. Analyzing this transformation (rather than expenditure levels) removes heterogeneity across households in pre-displacement expenditure levels. Because we take these workers to have been displaced from "good" jobs, we are effectively normalizing by the level of expenditures in the good job (c_g).

The sample is split into four groups: those in their first spell of unemployment after a displacement (UE-1), those in a subsequent spell of unemployment (UE-2), and two groups of employed who consider their job worse (E-1) or at least as good (E-2) as the previous job. For each group, a "box and whiskers" plot is used to summarize the entire distribution . The box in each case represents the inter-quartile range (from the 25th to the 75th percentile) and the "whiskers" above and below the box indicate the 10th and 90th percentile of the distribution. The median is represented by the horizontal line across the box (in some cases the median is the same as the 25th or 75th percentile in which case there is no line). Extreme observations are represented by dots above and below the box and whiskers (see for example, McGill, Tukey and Larsen, 1978). The most striking feature of Figure 3 is that the those in jobs that they report are "worse" than the job they lost exhibit a distribution of proportional expenditure losses which is distinctly different from those who rate their jobs the same or better. Moreover, those in "worse" jobs have proportional changes similar to those who are unemployed. Table 2 reports pairwise t-tests of equality of means and pairwise Kruskal-Wallis (rank) tests of equality between the distributions presented in Figure 3. These indicate that the statistical significance of the patterns seen in the figure. That groups UE-1, UE-2 and E-1 have the same distribution cannot be rejected at standard significance levels, but group E-2 has significantly higher values.

As well as consumption we also consider income. Figure 4 suggests that changes the changes in consumption are not simply a reflection of changes in income. While the those in bad jobs have larger income losses than those in good jobs, they have a smaller median income loss than the unemployed. Table 3 confirms (with t-tests and rank tests) that the distribution of income changes among those in "worse" jobs is statistically different both from the distribution of expenditure changes among the other employed groups (in jobs rated the same or better) and from those in their first spell of unemployment.

Figure 5 and Table 4 report on the savings rates of individuals in the four groups

defined above.[14] Here we see a striking and statistically significant difference between those in "worse" jobs and the unemployed: a higher saving rate. In fact, those in "worse" jobs seem to be saving at the same rate as those in good jobs, despite the fact that the former are in straightened circumstances - with considerable earnings losses.

5 Conclusions

Examining job search and consumption behavior in an economy with high and low wage jobs, this paper demonstrates that individuals may work in "bad" jobs to accumulate assets which subsequently fund search for good jobs. Workers, of course, prefer high wage employment but to secure one of these good jobs they must first engage in uncertain search. To finance consumption during this search, job seekers eat into assets - debt financing is not available. To some extent workers without assets can overcome the credit constraint by accepting low paying jobs. Such employment is readily available but hinders the ability to search for high pay work. Low wage jobs therefore become temporary positions that fund subsequent job search. If the ensuing search is unsuccessful, workers repeat their asset accumulation in low wage employment. As a result, voluntary planned quits occur in a cyclical pattern that provides an explanation for a series of short job durations (at low wages) followed by employment at high wages.

Although a fundamental contribution of the paper is to demonstrate a mechanism for endogenous quits, the cyclical migration between sectors also provides insights into Harris-Todaro (1970) economies. Workers trade off the benefits of immediately available low wage work against the those of unemployment while looking for good jobs. Here, however, there are explicit flows between sectors as workers move in and out of low wage employment. Wages and the costs of moving across sectors determine the size of these flows. Low turnover costs generate rapid movements between high wage job search and low wage employment.

Job turnover crucially relies on a financial market imperfection, the no-debt constraint. The credit constraint thus has new implications for the distribution of income. In the literature, it has been shown that borrowing constraints can affect the distribution

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[14]The expenditure information in the COEP is collected by a series of recall questions. An analysis of the responses, reported in Browning and Crossley (2002), determined that these questions suffered from an underreporting of expenditures - relative to income - and that this underreporting was largely independent of the level of expenditure. A corresponding adjustment is made in the calculation of the savings rates displayed in Figure 3. Note, however, that this proportional adjustment makes no difference to the *pattern* of savings rates across the four groups.

of income by restricting human capital investment choices. Here, capital market imperfections have further implications for the distribution of income as they alter job flows. Without constraints, workers are of course better off ex ante although ex post some will be unlucky and be resigned to low wage employment with debts.

The turnover generated by the model provides an explanation for the propensity of recent job losers to take temporary work - as reported by Farber (1997) and demonstrated here in Canadian data. These episodes of temporary work detract from time spent searching for a "good" job, and hence provide a partial explanation for the persistence of earnings losses after displacement that have been documented by Jacobson, Lalonde and Sullivan (1993) and others.

The model has a number of other potentially testable implications. For example, it suggests a relationship between assets at job loss and the duration of initial search, as been recently investigated in Stancanelli (1999) and in Bloemen and Stancanelli, (2001). Given the scope of the current paper, further investigation of these predictions is left for future work, as is structural estimation of the model.

The empirical section of the current paper instead focuses on a particular strength of the Canadian data - the collection of consumption data from displaced workers. In the model, consumption while searching falls over time until either a good job is found or assets run out and the worker accepts a low wage job. Consumption during employment at low wages is less than earnings and equal to consumption at the beginning of job search. Searchers dis-save while temporary workers accumulate assets with which to resume search. This prediction of high savings and low consumption by workers in temporary jobs is borne out by the data. Normalized as a fraction of pre-job-loss consumption (to remove heterogeneity), the consumption levels of temporary workers are starkly different from those back in "good" jobs and very similar to current searchers. Their savings behavior is quite different however, and indeed their savings rates are as high or higher than those back in "good" jobs (and much higher than the unemployed).

Browning and Crossley (2001b) suggest that it may be difficult to detect credit constraints and precautionary behavior in nondurable consumption, which households may do rather a good job of smoothing. Instead they suggest that credit constraints and precautionary behavior may have a bigger effect on decisions - such as employment, human capital investment and fertility - which are typically treated as conditioning variables in consumption studies. This paper provides an example of this idea, with credit constraints causing employment to be manipulated to smooth consumption during a period of job search.

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APPENDIX:

Proof of Claims 1-3

<u>Claim 1</u>: For any fixed $\bar{D}$ where $0 < \bar{D} < \infty$, define

$$
\begin{aligned}
V_{\bar{D}}(A_0; T) &= \max_{\varsigma_t, c_t} \int_0^{\bar{D}} u(\varsigma_t) e^{-rt} dt + e^{-r\bar{D}} \left\{ \int_0^T u(c_t) e^{-(r+\alpha)t} dt \right. \\
&\quad \left. + \frac{\alpha}{r} \int_0^T u(rA_s + w_H) e^{-(r+\alpha)s} ds + e^{-(r+\alpha)T} u(rA_0 + w_L)/r \right\}
\end{aligned}
$$

subject to

$$
(i) \qquad A_0 + \int_0^{\bar{D}} (w_L - \varsigma_t) e^{-rt} dt - e^{-r\bar{D}} \int_0^T c_t e^{-rt} dt - e^{-r(\bar{D}+T)} A_0 \geq 0
$$

and

$$
(ii) \qquad e^{-r(\bar{D}+T)} A_T \geq 0
$$

for $K = 0$. This is the basic decision problem but with exogenous $D, T, A_T = A_0$ and permanent low wage employment after job search - $V(A_T) = u(rA_0 + w_L)/r$. As such the same first order conditions (1) and (2) continue to apply along with the budget constraint.

To establish that it is optimal to search when K is small, it is sufficient to establish that

$$
\Delta \equiv V_{\bar{D}}(A_0; T) - u(rA_0 + w_L)/r > 0
$$

for some $T > 0$. Evaluated at $T = 0$, $V_{\bar{D}}(A_0; T)_{|T=0} = u(rA_0 + w_L)/r$ and hence $\Delta = 0$. Moreover, differentiation of $V_{\bar{D}}(A_0; T)$ and the budget constraint evaluated at the optimal choices for ς_t, c_t gives

$$
\begin{aligned}
d\Delta &= e^{-rD-(r+\alpha)T} \left[-u'(c_T)(c_T - rA_0) + u(c_T) + \frac{\alpha}{r} u(rA_0 + w_H) \right. \\
&\quad \left. - \frac{r+\alpha}{r} u(rA_0 + w_L) \right] dT
\end{aligned}
$$

As $T \to 0$, $c_T \to \bar{\varsigma} = rA_0 + w_L$. Therefore

$$\lim_{T \to 0} \frac{d\Delta}{dT} = e^{-rD} \left[\frac{\alpha}{r} \left(u(rA_0 + w_H) - u(rA_0 + w_L) \right) - u'(rA_0 + w_L)w_L \right] > 0$$

Therefore, $\Delta > 0$ for some $T > 0$ given the assumed condition. QED

<u>Claim 2</u>: Since $c_t > rA_t$, if search is finitely long then $\lim_{t \to \infty} A_T = 0$. Given $A_t = 0$, consumption equals zero during search: $c_t = 0$. For search not to be too attractive, it is sufficient to establish that at some point the worker must strictly prefer low wage employment over search with zero consumption. If the worker chooses to never move into low wage employment so that $T \to \infty$, the expected lifetime utility of having zero assets is given by

$$\frac{\alpha}{r} \int_0^T u(w_H) e^{-(r+\alpha)t} dt = \frac{\alpha}{r(r+\alpha)} u(w_H)$$

A worker with zero assets can always work indefinitely at a low wage job with payoff: $u(w_L)/r$. Given these options, the result follows. QED

<u>Claim 3</u>: To prove this claim, we establish four intermediate results. Recall that the assumptions in Claims 1 and 2 ensure that $0 < T < \infty$ and $D < \infty$.

Lemma 4 $V'(A_0) = u'(c_0)$

<u>Proof</u>: This is a familiar envelope result. Total differentiation of $V(A_0)$ gives

$$V'(A_0)dA_0 = \frac{1 - e^{-rD}}{r}\left[u'(\bar{\varsigma}) - \alpha \int_0^T u'(rA_S + w_H)e^{-\alpha s}ds\right]d\bar{\varsigma}$$

$$+ e^{-rD}\int_0^T \left\{u'(c_t)e^{-\alpha t} - \alpha \int_t^T u'(rA_s + w_H)e^{-\alpha s}ds\right\}dc_t e^{-rt}dt$$

$$+ e^{-rD}\left\{u(\bar{\varsigma}) - r\int_0^T u(c_t)e^{-(r+\alpha)t}dt - \alpha \int_0^T u(rA_s + w_H)e^{-(r+\alpha)s}ds\right.$$

$$\left. - re^{(r+\alpha)T}V(A_T) + \alpha e^{rD}\left[rA_0 + w_L - \bar{\varsigma}\right]\int_0^T u'(rA_s + w_H)e^{-\alpha s}ds\right\}dD$$

$$+ e^{-rD-(r+\alpha)T}\left[u(c_T) + \frac{\alpha}{r}u(rA_T + w_H) - (r+\alpha)V(A_T)\right]dT$$

$$+ e^{-rD-(r+\alpha)T}V'(A_T)dA_T + \alpha \int_0^T u'(rA_s + w_H)e^{-\alpha s}dsdA_0$$

Plugging in the first order conditions gives

$$V'(A_0)dA_0 = \mu_1 \left\{\frac{1 - e^{-rD}}{r}d\bar{\varsigma} + e^{-rD}\int_0^T dc_t e^{-rt}dt + e^{-r(D+T)}\left[c_T - A_T\right]dT\right.$$

$$- e^{-rD}\left[w_L - \bar{\varsigma} + r\int_0^T c_t e^{-rt}dt + re^{-rT}A_T + rK\right]dD + e^{-r(D+T)}dA_T\right\}$$

$$+ \mu_2 e^{-r(D+T)}dA_T + \alpha \int_0^T u'(rA_s + w_H)e^{-\alpha s}ds\, dA_0$$

Likewise, differentiation of the budget constraint gives

$$dA_0 = \frac{1 - e^{-rD}}{r}d\bar{\varsigma} + e^{-rD}\int_0^T dc_t e^{-rt}dt + e^{-r(D+T)}\left[c_T - A_T\right]dT$$

$$-e^{-rD}\left[w_L - \bar{\varsigma} + r\int_0^T c_t e^{-rt}dt + re^{-rT}A_T + rK\right]dD + e^{-r(D+T)}dA_T$$

Combining gives

$$V'(A_0)dA_0 = \left\{\mu_1 + \alpha\int_0^T u'(rA_s + w_H)e^{-\alpha s}ds\right\}dA_0$$
$$+\mu_2 e^{-r(D+T)}dA_T + e^{-rD-(r+\alpha)T}dV(A_T)$$

From the Kuhn Tucker condition in (9), it is straightforward to demonstrate that $\mu_2 e^{-r(D+T)}dA_T = 0$ and hence

$$V'(A_0) = \mu_1 + \alpha\int_0^T u'(rA_S + w_H)e^{-\alpha s}ds = u'(c_0)$$

from equation (1). QED

Lemma 5 *If $A_T > 0$, then $V''(A_T) < 0$*

Proof: $A_T > 0$ implies that $\mu_2 = 0$ and therefore from the first order conditions

$$e^{-\alpha T}V'(A_T) = \mu_1 = e^{-\alpha T}u'(c_T).$$

Differentiation gives

$$V''(A_T) = u''(c_T)\frac{dc_T}{dA_T}.$$

Likewise differentiation of the first order condition

$$(r + \alpha)V(A_T) = u(c_T) + \frac{\alpha}{r}u(rA_T + w_H) + u'(c_T)(rA_T - c_T)$$

gives

$$(r + \alpha)V'(A_T) = \alpha u'(rA_T + w_H) + ru'(c_T) + u''(c_T)(rA_T - c_T)\frac{dc_T}{dA_T}.$$

Combining yields the desired result:

$$V''(A_T) = \frac{\alpha\left[u'(c_T) - u'(rA_T + w_H)\right]}{rA_T - c_T} < 0.$$

QED

Lemma 6 *If $D > 0$, then $V''(A_0) = 0$*

Proof: If $D > 0$, then $\bar{\varsigma}$ is well defined and satisfies

$$rV(A_0) = u(\bar{\varsigma}) + u'(\bar{\varsigma})(rA_0 + w_L - \bar{\varsigma}).$$

Therefore,

$$rV'(A_0) = ru'(\bar{\varsigma}) + u''(\bar{\varsigma})(rA_0 + w_L - \bar{\varsigma})\frac{d\bar{\varsigma}}{dA_0}$$

From Lemma 4 and the result that $\bar{\varsigma} = c_0$, it follows that $d\bar{\varsigma}/dA_0 = 0$. Further, Lemma 4 yields

$$V''(A_0) = u''(\bar{\varsigma})\frac{d\bar{\varsigma}}{dA_0} = 0$$

QED

Lemma 7 *Given $A_0 > 0$, $A_T < A_0$.*

Proof:
Case 1: $D = 0$. As $0 < T < \infty$ and $c_t > rA_t$, $A_T < A_0$ follows immediately.
Case 2: $D > 0$. Suppose $A_T \geq A_0$. Define assets at the end of low wage employment by

$$A_D = e^{rD}A_0 + \frac{e^{rD} - 1}{r}(w_L - \bar{\varsigma}).$$

Notice that $A_D > A_T$ by the logic used in Case 1. Individuals with assets $A \in [A_0, A_D)$ choose positive low wage employment, $D > 0$, and hence from Lemma 6, $V''(A) = 0$. As a result

$$V'(A) = V'(\tilde{A}) \ \forall \ A, \tilde{A} \in [A_0, A_D).$$

Since $0 < T < \infty$, $c_0 > c_t$. Moreover, $A_T > 0$ implies $\mu_2 = 0$ so that $V'(A_T) = u'(c_T)$. From Lemma 1, we therefore get the contradiction that

$$V'(A_T) = u'(c_T) > u'(c_0) = V'(A_0).$$

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QED

These lemmas are now used to establish the claim. Suppose $A_T > 0$. By Lemma 5, $V''(A_T) < 0$. By Lemma 7, $A_T < A_0$. From Lemma 6 and Claim 1, $V''(A_T) = 0$, a contradiction. QED

Comparative Static Calculations

For the analysis here let $A_0 = A_T = 0$. These asset levels although optimal can be treated as exogenous in which case equations (7) and (9) become unused. At this point it is useful to define V, the value of starting (and completing) a cycle of low wage work followed by search for high wage employment where initial and terminal assets equal zero ($A_0 = 0$ and $A_T = 0$) :

$$V = \frac{1 - e^{-rD}}{r} u(\bar{\varsigma}) + \quad e^{-rD} \left\{ \int_0^T u(c_t) e^{-(r+\alpha)t} dt \right. \tag{10}$$
$$\left. + \frac{\alpha}{r} \int_0^T u(rA_s + w_H) e^{-(r+\alpha)s} ds + e^{-(r+\alpha)T} V \right\}$$

where the choice variables, $\bar{\varsigma}, c_t, T$ and D equal their optimal values as defined by the first order conditions (1), (2), (5), (6) and (8).

Rearranging the equations produces separate equations for $\bar{\varsigma}$ and c_T as functions of V and exogenous parameters

$$rV - u(\bar{\varsigma}) - u'(\bar{\varsigma}) [w_L - \bar{\varsigma}] = 0 \tag{11}$$

$$u(c_T) + \frac{\alpha}{r} u(w_H) - (r + \alpha)V - u'(c_T)c_T = 0 \tag{12}$$

As shown in Lemma 4 (as part of the proof to Claim 3),

$$\mu_1 + \alpha \int_0^T u'(rA_S + w_H + w_F) e^{-\alpha s} ds = u'(\bar{\varsigma})$$

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Differentiation reveals that after some manipulation:

$$[1 - e^{-rD-(r+\alpha)T}]dV = -e^{-rD}u'(\bar{\varsigma}) \cdot dK + \frac{1 - e^{-rD}}{r}u'(\bar{\varsigma}) \cdot dw_L$$

$$+e^{-rD}\frac{\alpha}{r}\int_0^T u'(rA_s + w_H)e^{-(r+\alpha)s}ds \cdot dw_H$$

From (11),

$$rdV - u''(\bar{\varsigma})[w_L - \bar{\varsigma}] \cdot d\bar{\varsigma} - u'(\bar{\varsigma}) \cdot dw_L = 0$$

Plugging in for rdV gives

$$d\bar{\varsigma} = \frac{1}{[1 - e^{-rD-(r+\alpha)T}]u''(\bar{\varsigma})[w_L - \bar{\varsigma}]}\left\{-re^{-rD}u'(\bar{\varsigma}) \cdot dK\right.$$

$$\left. -e^{-rD}(1 - e^{-(r+\alpha)T})u'(\bar{\varsigma}) \cdot dw_L + e^{-rD}\alpha\int_0^T u'(rA_s + w_H)e^{-(r+\alpha)s}ds \cdot dw_H\right\}$$

Likewise, from (12),

$$\frac{\alpha}{r}u'(w_H) \cdot dw_H - (r + \alpha) \cdot dV - u''(c_T)c_T \cdot dc_T = 0.$$

Again plugging in for dV gives

$$dc_T = \frac{-(r + \alpha)}{r[1 - e^{-rD-(r+\alpha)T}]u''(c_T)c_T}\left\{re^{-rD}u'(\bar{\varsigma}) \cdot dK\right.$$

$$-(1 - e^{-rD})u'(\bar{\varsigma}) \cdot dw_L + \alpha\left[\frac{(1 - e^{-rD})}{r + \alpha}u'(w_H)+\right.$$

$$\left.\left. +e^{-rD}\int_0^T [u'(w_H) - u'(rA_s + w_H)]e^{-(r+\alpha)s}ds\right] \cdot dw_H\right\}$$

Figures and Tables

Table 1: First Interview Employment Status (3rd Quarter after Job Loss)		
1. First Spell of Unemployment (UE-1)	33.3%	
2. Subsequent Spell of Unemployed (UE-2)	18.2%	
3. First Spell of Post-displacement Employment	37.6%	
4. Subsequent Spell of Post-displacement Employment	10.9%	
Of 3 :		
(A) Not Expecting Job to Last 1 Year	11.0%	(29.3%)
(B) Expecting Job to Last 1 Year	26.6%	(70.8%)
(i) Current Job Worse Than Job Displaced From	9.4%	(24.9%)
(ii) The Same or More Satisfied with Current Job	28.2%	(75.1%)
	———	
Total Temporary Work: 2.+4.+3.(A)	40.1%	
Total Temporary Work: 2.+4.+3.(i)	38.5%	

	UE-2	E-1	E-2
	subsequent spell	less satisfied	same or more satisfied
UE-1	1.94 (0.05) 1.773 (0.183)	0.881 (0.38) 0.889 (0.343)	5.03 (< 0.001) 22.98 (< 0.001)
UE-2	-	0.764 (0.45) 0.058 (0.809)	2.26 (0.025) 7.20 (0.007)
E-1	-	-	2.90 (0.004) 5.27 (0.02)

Table 2: Pair-wise Rank- and t- tests of Common Expenditure Change Distribution

Notes. The boxes give
difference in means: t-stat p-value
KW rank test: $\chi^2(1)$ p-value

Table 3: Pair-wise Rank- and t-tests of Common Income Change Distribution			
	UE-2	E-1	E-2
	subsequent spell	less satisfied	same or more satisfied
UE-1	1.14 (0.26) 2.207 (0.14)	2.77 (0.006) 6.91 (0.009)	9.29 (< 0.001) 79.3 (< 0.001)
UE-2	-	1.45 (0.149) 1.13 (0.287)	6.36 (< 0.001) 32.9 (< 0.001)
E-1	-	-	4.25 (< 0.001) 22.94 (< 0.001)

	UE-2	E-1	E-2
	subsequent spell	less satisfied	same or more satisfied
UE-1	0.068 (0.95) 0.040 (0.842)	2.43 (0.016) 7.74 (0.054)	1.31 (0.19) 23.21 (< 0.001)
UE-2	-	2.17 (0.031) 4.990 (0.026)	1.00 (0.32) 12.68 (< 0.001)
E-1	-	-	0.46 (0.64) 0.507 (0.476)

Table 4: Pair-wise Rank- and t-tests of Common Savings Rate Distribution
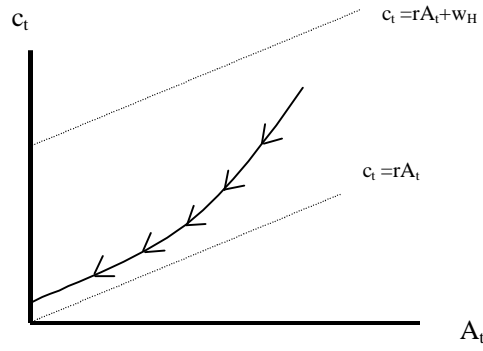
Figure 1: Consumption During Search

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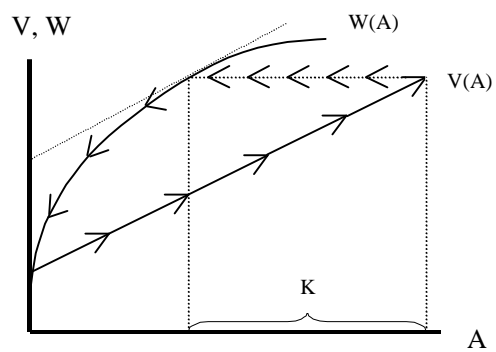
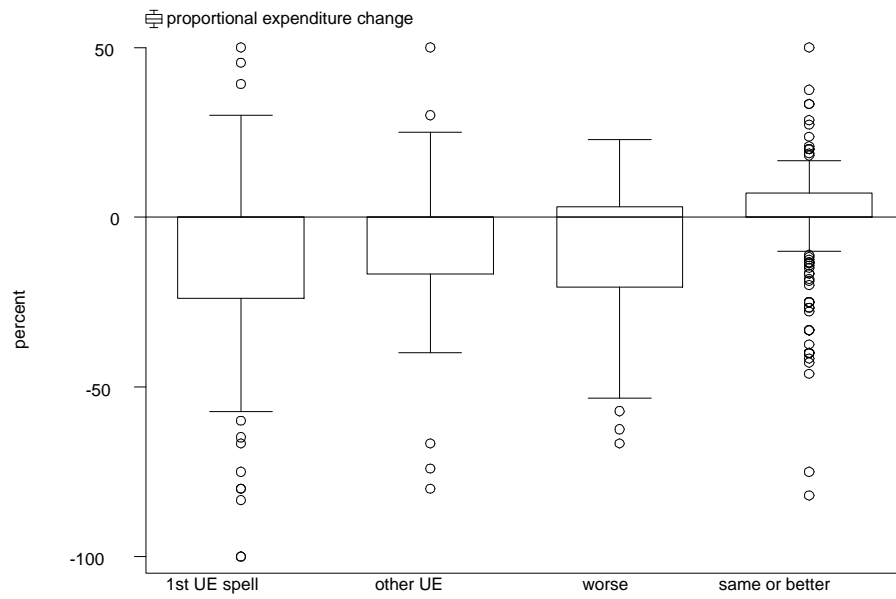Figure 2: The Cyclical Pattern of Quits
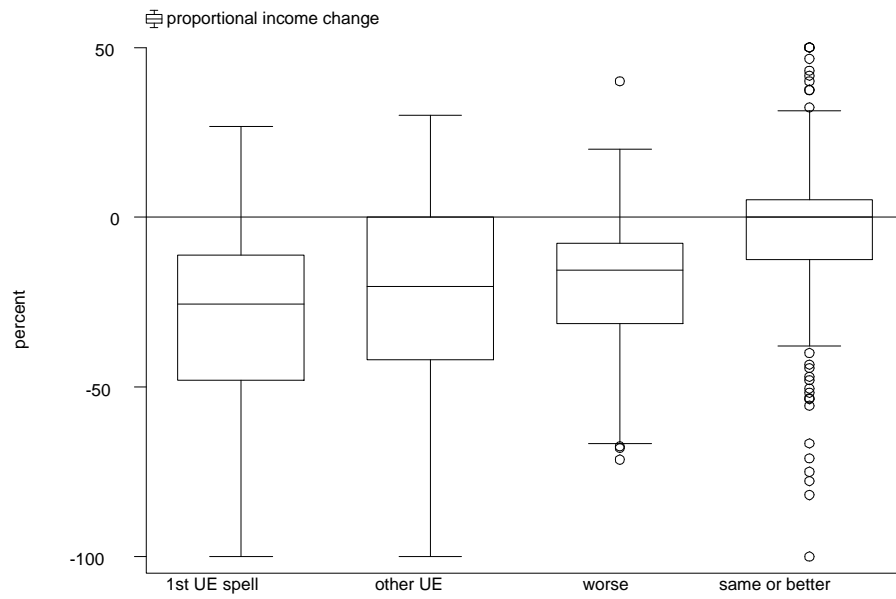
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Figure 3: Proportional Expenditure Changes
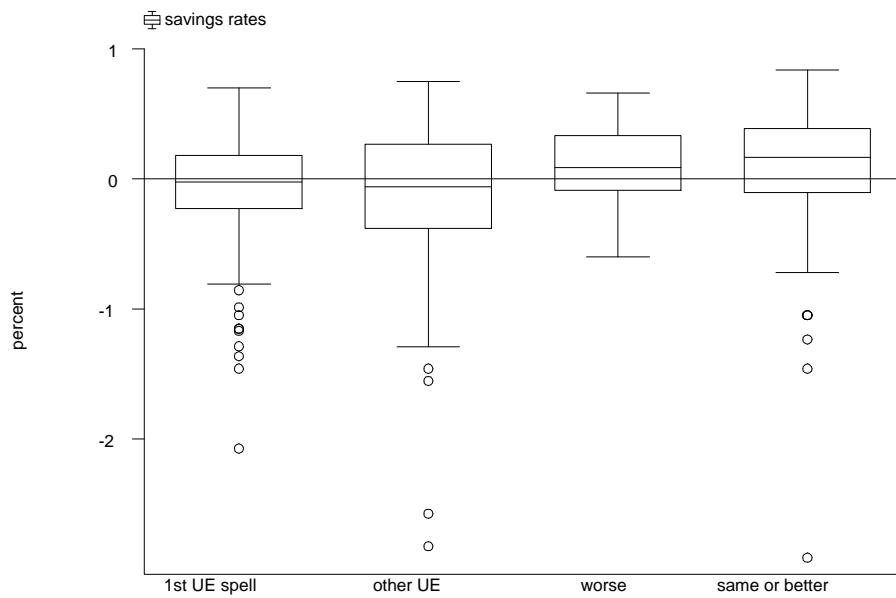
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Figure 4: Proportional Income Changes

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Figure 5: Savings Rates