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Entrepreneurship, Savings and Credit Constraints

Preliminary

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Maryland, September 2009

The model

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Building blocks

- Model of entrepreneurship with credit constraints (Evans and Jovanovic (*JPE*, 1989))
- Intertemporal saving and consumption (Deaton (*Econometrica*, 1991))
- Human capital accumulation (Keane and Wolpin (*JPE*, 1997))
- Investment under uncertainty

In sum

- Households maximizes expected utility over a finite horizon
- *Occupational choice:* Each period choosing between entrepreneurship and wage work
- *Saving Decision:* Dividing resources between consumption, savings and transition costs

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The individual's problem

$$\max_{c_t>0,\ i_{t+1}\in\{w,e\}} E_t\left(\sum_{\tau=t}^{T}(1+\delta)^{t-\tau}u(c_\tau)\right),\ t=0,1,...,T$$

$$a_{t+1}=(1+r)(a_t+y_t-c_t-\phi_t)$$

$$a_t\geq 0,\quad \forall\ t$$

- Discrete Time: 1 period = 1 year
- Finite time horizon:
  - Age in first period is 25.
  - Agents retire exogenously at age 65 and live on retirement until they die (using empirical mortality rates)
- Fixed cost at entry (wage -> entrepreneurship), i.e. $\phi_t=\phi^{entry}$
- Liquid wealth can never fall below zero $a_t\geq 0,\quad \forall\ t$

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Wage income

$$
\begin{aligned}
y_{w,t} &= \omega H_{w,t} \varepsilon_{w,t} \\
&\text{where} \\
H_{w,t} &= \exp\left(\beta_{w1} x_{w,t} + \beta_{w2} x_{w,t}^2 + \beta_{e1} x_{e,t} + \beta_{e2} x_{e,t}^2\right) \\
\ln\left(\varepsilon_{w,t}\right) &\sim N\left(-\frac{1}{2}\sigma_w^2, \sigma_w^2\right) \text{ such that } E\left(\varepsilon_{w,t}\right) = 1.
\end{aligned}
$$

- Human capital, $H_{w,t}$ (Occupational specific):
  - Function of work experience, $x_{w,t}$ and entrepreneurial experience, $x_{e,t}$: .
- $\varepsilon_{w,t}$: Uncertainty in wage income
  - *observed after occupational choice*, but before savings decision

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Profits

$$\begin{aligned} y_{e,t} &= \theta H_{e,t} \left(k_t^*\right)^{\alpha} \varepsilon_{e,t} - r k_t^* \\ &\text{where} \\ H_{e,t} &= \exp\left(\gamma_{w1} x_{w,t} + \gamma_{w2} x_{w,t}^2 + \gamma_{e1} x_{e,t} + \gamma_{e2} x_{e,t}^2\right) \\ \ln\left(\varepsilon_{e,t}\right) &\sim N\left(-\frac{1}{2}\sigma_e^2, \sigma_e^2\right) \text{ such that } E\left(\varepsilon_{e,t}\right) = 1. \end{aligned}$$

- k_t^* is chosen to maximize *expected* profits in the next period

$$k_t^* = \arg \max_{k_t \leq \lambda a_t} E_t \left(H_{e,t} k_t^{\alpha} \varepsilon_t^e - r k_t\right)$$

  - If credit constrained, entrepreneurial earnings depend on individual wealth ($k_t^* = \lambda a_t$)
- $\varepsilon_{e,t}$: Uncertainty in production
  - observed *after* occupational choice and investment decision

Solution Method
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- Starting point: Carroll's Method of Endogenous Gridpoints
  - Treats consumption as continuous, but avoid solving continuous optimization problem.
  - I implement this for mixed discrete and continuous choices
- Idea:
  1. Conditional on next period occupation, the consumption-savings choice is solved using Carroll's method of endogenous gridpoints
  2. Given the optimal consumption decision for each occupational choice, $c_t\left(m_t, d_{t+1} = we\right)$ and $c_t\left(m_t, d_{t+1} = e\right)$,
  3. I then compute value functions associated with each occupation $\left(v_t\left(m_t, d_{t+1} = we\right)\right.$ and $\left.v_t\left(m_t, d_{t+1} = e\right)\right)$
  4. I then derive the threshold value of cash on hand, m^*, that solves $v_t\left(m_t, d_{t+1} = we\right) = v_t\left(m_t, d_{t+1} = e\right)$
  5. For $m < m^*$, we have $d_t = we$, $c_t = c_t^{we}$ and $V_t = v_t^{we}$ and vice versa.

This is very robust and very precise!

Savings and Credit Constraints, Age = 25

Basic model, with Credit Constraints

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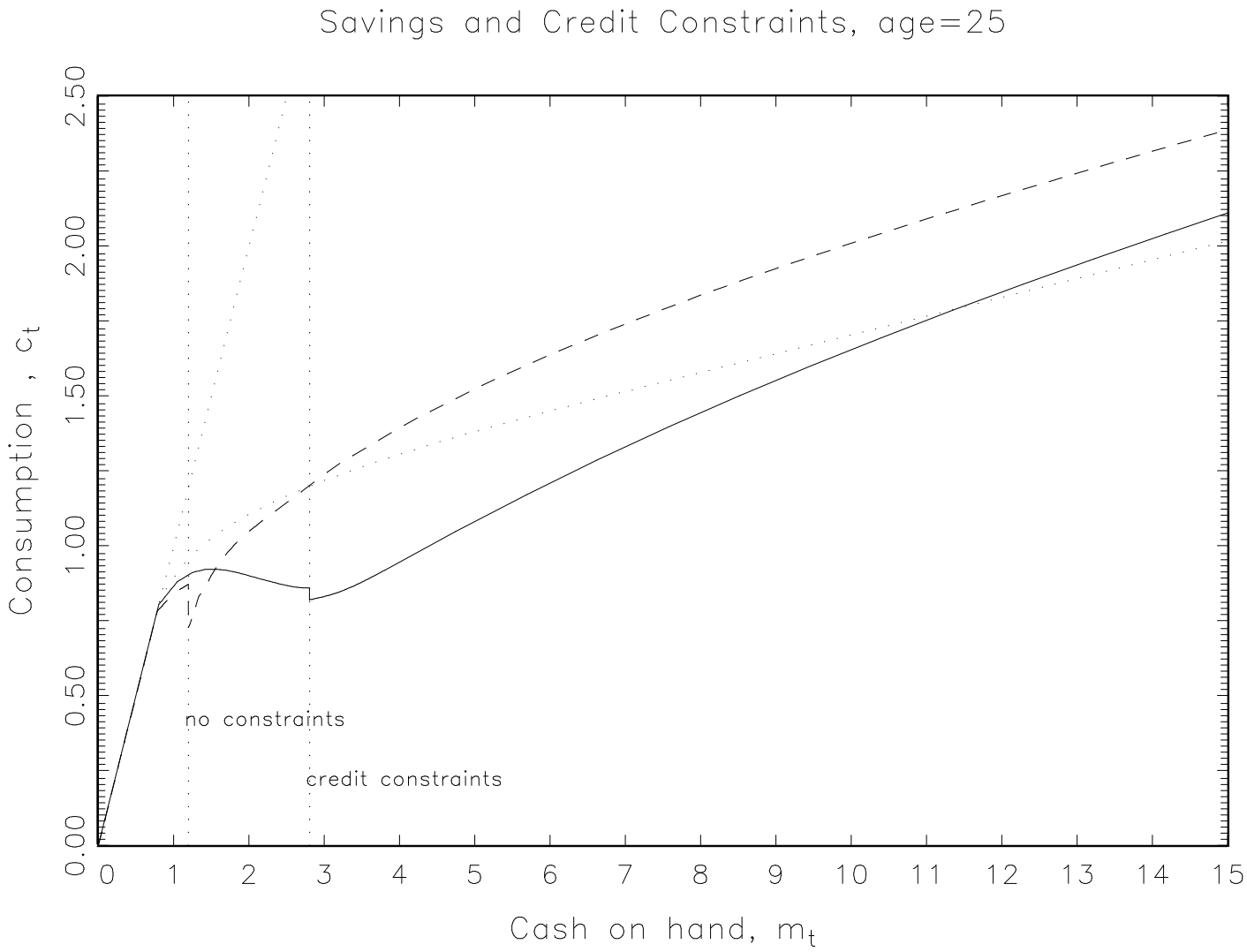

Savings and Credit Constraints, Age = 60

Basic model, with Credit Constraints

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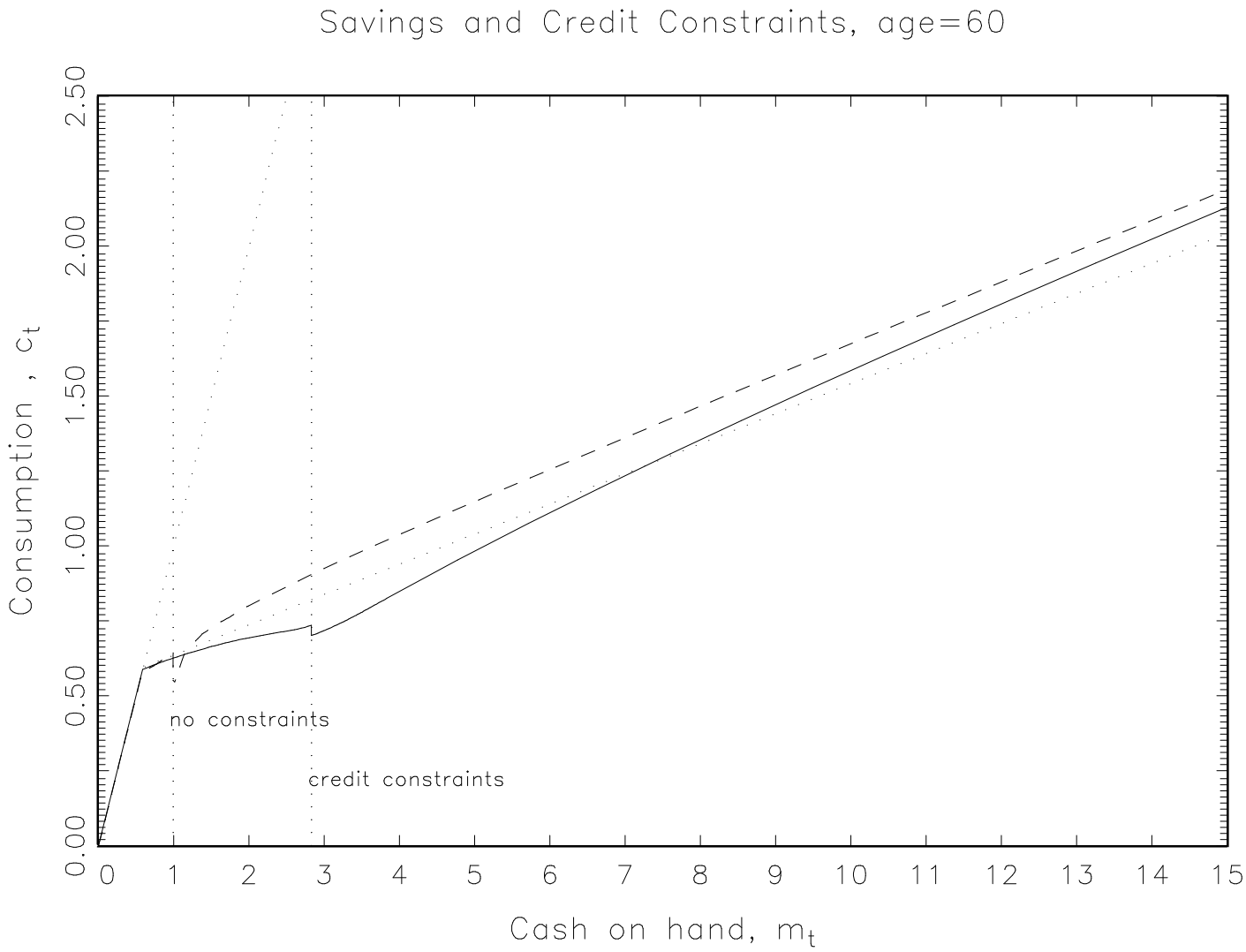

Savings and Credit Constraints, Age = 64

Basic model, with Credit Constraints

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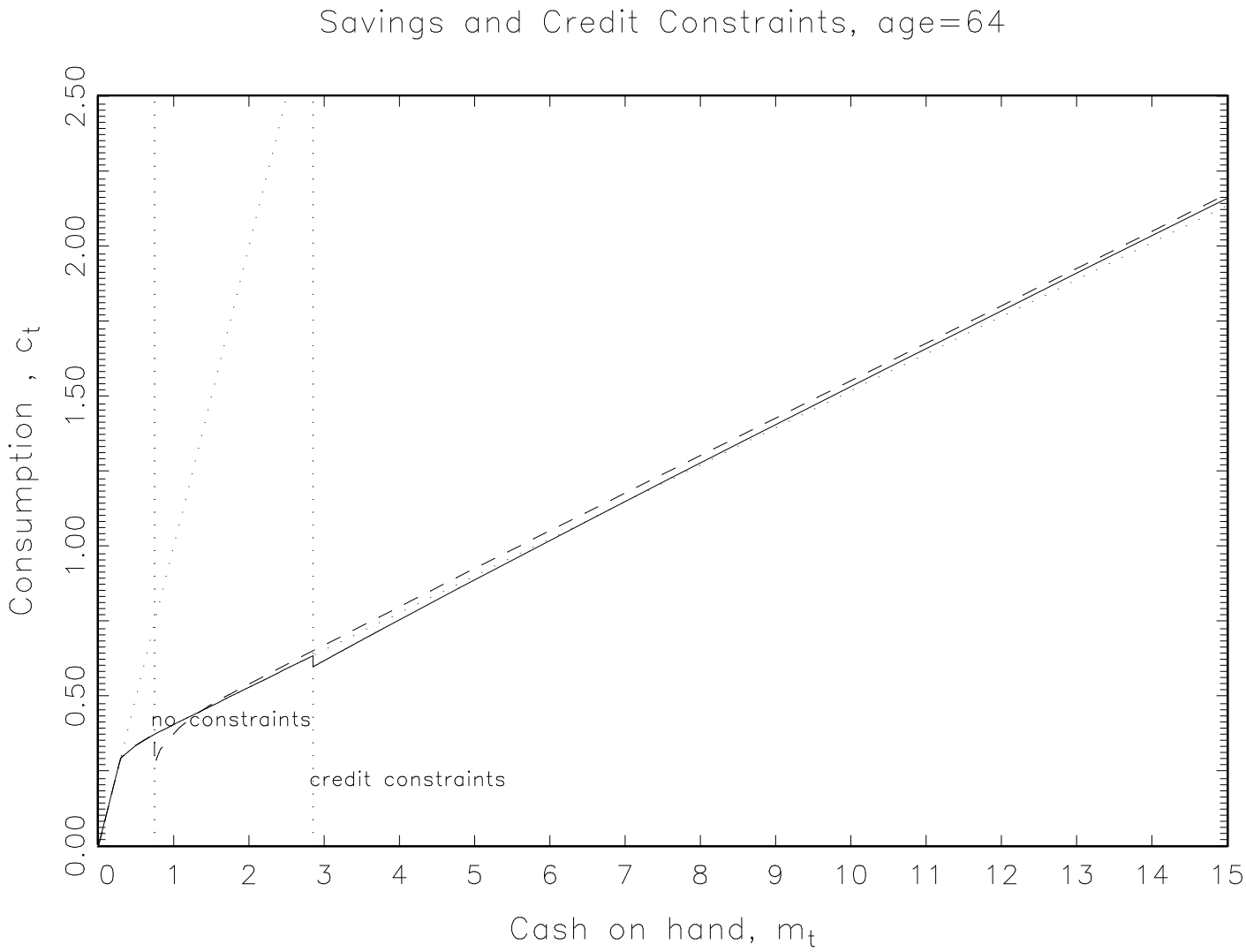

Basic Model - Credit Constraints and Entry Cost, Age = 25

Policy Functions

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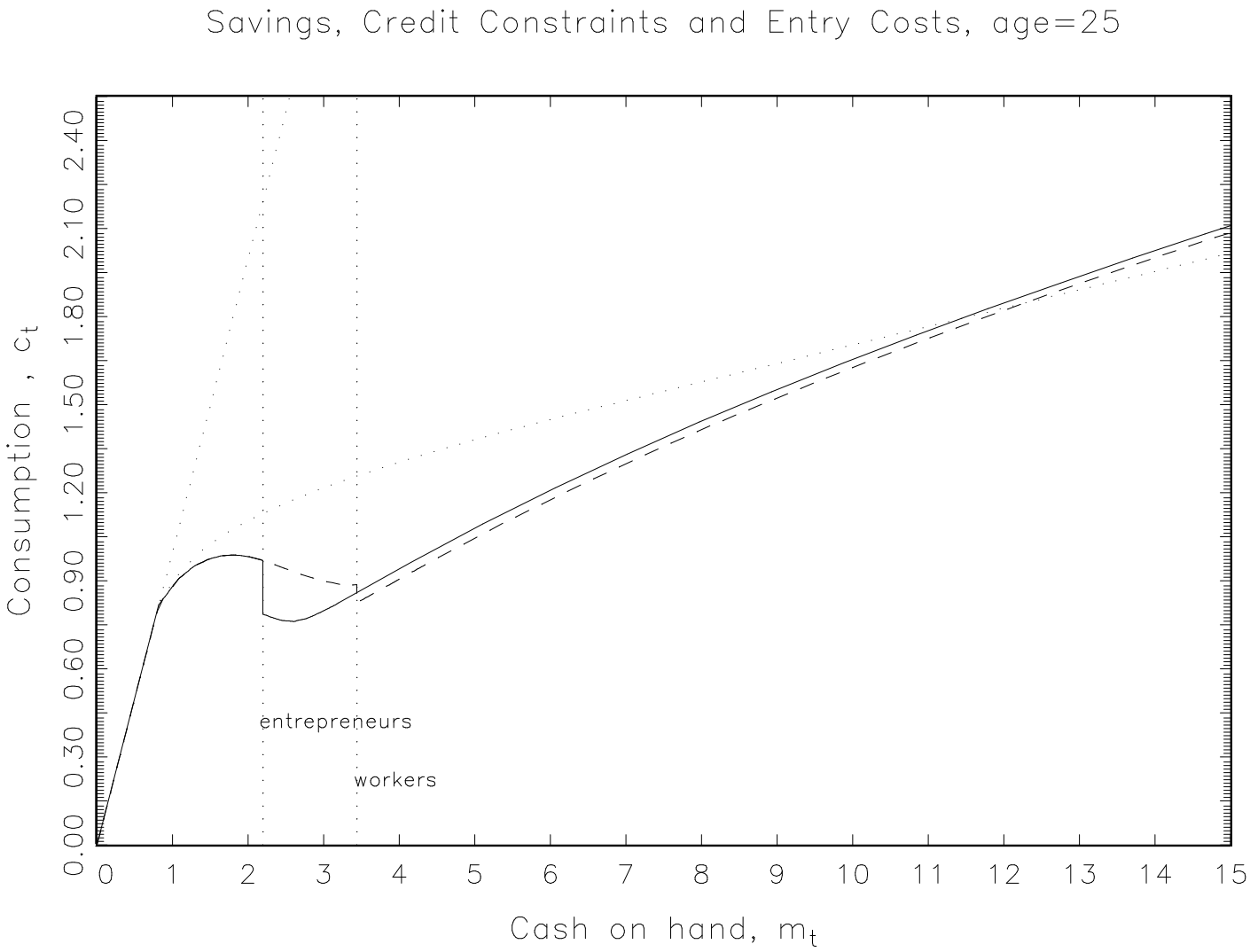

Basic Model - Credit Constraints and Entry Cost, Age = 60

Policy Functions

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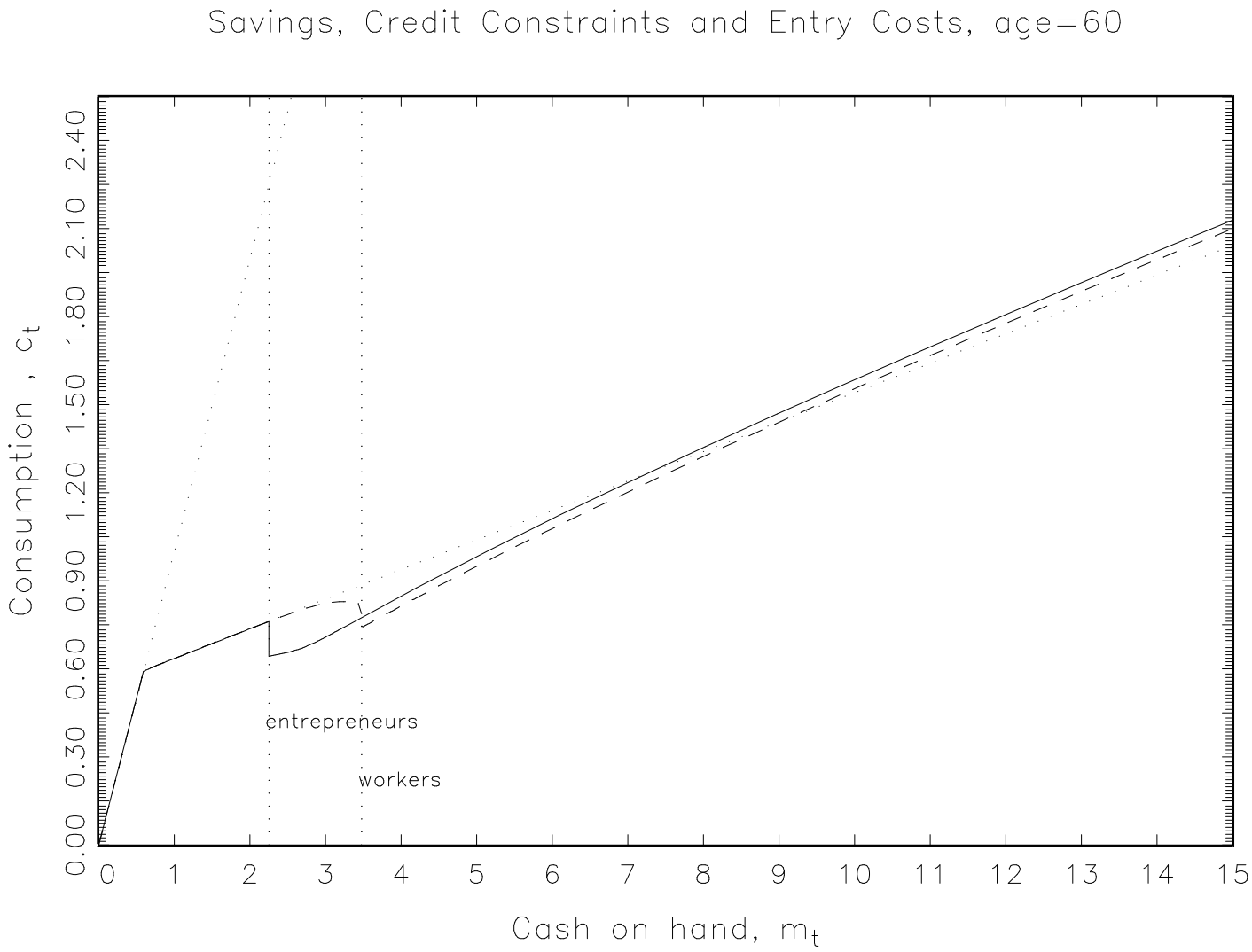

Basic Model - Credit Constraints and Entry Cost, Age = 64

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