Government Transaction, Inflation, and Unemployment

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Introduction

- Berensten, Menzio and Wright (2011)
- Labor Search (Mortensen and Pisarides 1994) +Monetary Search (Kiyotaki and Wright 1993)
- US: Positive-Sloped Phillips Curve
- Empirical Studies: Beyer and Farmer (2007); Haug and King (2009).
- Karanassou, Sala, and Snower (2003), Franz (2005), and Schreiber and Wolters (2007): the Phillips curve is negatively sloped in European countries.

Government Transaction

- Friedman (1977): In the modern world, governments are themselves producers of servers sold on the market: from postal services to a wide range of other items...
- The size of Gov't affect prices and allocation?
- Government size or Government Transaction v.s Unemployment and Inflation ?
- Some evidences

Literature Review

- **Lagos and Wright 2005 (LW)+ Mortensen and Pisarides 1994 (MP):** Berensten, Menzio, and Wright (2011); Lucy Q. Liu (2009)
- **LW+RBC Labor:** Rocheteau, Rupert, and Wright (2007); Dong (2010)
- **MP+New Keynesian:** Gertler, Sala, and Trigari (2008); Gertler and Trigari (2009); Trigari (2009)
- **Shi Model (Large Household):** Shi (1998); Wang and Shi (2006)

Literature Review II

- Li and Wright (1998)
- government agents behave in an exogenous way regarding which objects they accept in trade and at what price
- Government agents' transaction policy affects the set of equilibria.

Model Structure

- Li and Wright (1998)+BMW
- agents: firms f, households h, and government agents g
- $h \in [0, 1]$, the measure of g is ψ; f is arbitrarily large
- Each period consists of three subperiods.
- People go through three rounds of trades in one period
- subperiod: Labor mkt (MP mkt), Goods mkt (KW mkt), Arrow-Debreu mkt (AD mkt)

Some Notations

- Value Functions:
  MP: $U_e^j(z)$
  KW: $V_e^j(z)$
  AD: $W_e^j(z)$.
  where $j \in \{h, f\}$; $e \in \{0, 1\}$ and $z \in [0, \infty)$ is the real balance.
- In the MP market, $e = 1$ if an agent is matched and $e = 0$ otherwise.

Some Notations in AD

- $z = m/p$,
- m is the dollars an agent bring to the AD market
- p is the current price level
- ρ: the reciprocal of the inflation rate in AD .

Government

- M: in the form of lump-sum transfers πM in the AD market
  π: the growth rate of money ($=$ inflation rate).
  $\hat{M} = (1+\pi)M$: the evolution of the money stock
  w^g: wages for bureaucrats
  b: UI benefits
  T: lump-sum taxes
- Gov't:

$$\psi \lambda_{g,b} \rho d^b + \psi w^g + bu = T + \frac{\pi M}{p} + \psi \lambda_{g,s} \rho d^s, \qquad (1)$$

where $\lambda_{g,b}$ and $\lambda_{g,s}$ are the probabilities to complete a trade.

Household: AD

$$W_e^h(z) = \max_{x,\hat{z}}\{x + (1-e)l + \beta U_e^h(\hat{z})\}$$

$$\text{s.t. } x + \hat{z} = ew + (1-e)b + F - T + z,$$

FOC: $\beta\frac{\partial U_e^h(\hat{z})}{\partial \hat{z}} = 1$,
Envelope Condition: $\frac{\partial W_e^h(\hat{z})}{\partial \hat{z}} = 1$。

Household: KW

$$V_e^h(z) = \alpha_h\{\upsilon(q) + W_e^h[\rho(z-d)]\}$$
$$+ \alpha_h^p\{\upsilon(q^s) + W_e^h[\rho(z-d^s)]\} + (1-\alpha_h-\alpha_h^p)W_e^h(\rho z).$$

(q, d):terms of trade between h and f.

(q^s, d^s):terms of trade between h and g

$\upsilon(q)$: utility from trade in KW;

α_h: probability of a buyer to meet firms

α_h^p: probability of a buyer to meet government agents

Household: MP

$$U_1^h(z) = \delta V_0^h + (1-\delta)V_1^h,$$
$$U_0^h(z) = \lambda_h V_1^h + (1-\lambda_h)V_0^h,$$

δ: job destruction rate

λ_h:job creation rate

If match function is $N(u,v)$, $\lambda_h = N(u,v)/u$, v is the vacancy

Firm:MP

MP:

$$U_1^f(z) = \delta V_0^f + (1-\delta)V_1^f,$$
$$U_0^f(z) = \lambda_f V_1^f + (1-\lambda_f)V_0^f.$$

$$\lambda_f = N(u,v)/v$$

Firm:KW mkt

KW:

$$
\begin{aligned}
V_0^f &= 0 \\
V_1^f &= \alpha_f W_1^f[y - c(q), \rho d] + \alpha_f^p W_1^f[y - c(q^b), \rho d^b] \\
&\quad + (1 - \alpha_f - \alpha_f^p) W_e^h(y, 0).
\end{aligned}
$$

y: output in a match

$c(q) = q$:transformation cost

Firm: AD mkt

$e = 1$,

$$W_1^f(x, z) = x + z - w + \beta U_1^f.$$

$e = 0$:

$$W_0^f = \max\{k, \beta U_0^f\}.$$

Equilibrium

- Goods mkt: Nash bargaining $--> (q, d) = (g^{-1}(\rho z), z)$
- Labor mkt: Nash bargaining $-->$
  $w = \frac{\eta[\beta(1-\delta)](b+l)+(1-\eta)[\beta(1-\delta-\lambda_h)]R}{1-\beta(1-\delta)+\eta\beta\lambda_h}$
- Steady state condition: $(1-u)\delta = N(u, v)$
- $\alpha_h = \frac{S}{B+S+G} = \frac{1-u}{2-u+\psi}, \quad \alpha_h^p = \frac{G}{B+S+G} = \frac{\psi}{2-u+\psi}$
- $\alpha_f = \frac{B}{B+S+G} = \frac{1}{2-u+\psi}, \quad \alpha_f^p = \frac{G}{B+S+G} = \frac{\psi}{2-u+\psi}$

LW curve: From Household's Problem

$q^s = q, d^s = d$:

$$i = \frac{1-u+\psi}{2-u+\psi}(\frac{v'(q)}{g'(q)} - 1),$$

Define: $i = \frac{1}{\beta\rho} - 1$。
q^stoo small :

$$i = \frac{1-u}{2-u+\psi}\frac{v'(q)}{g'(q)} - \frac{1-u+\psi}{2-u+\psi}$$

MP curve: From Firms' Problem

$q^b = q, d^b = d$:

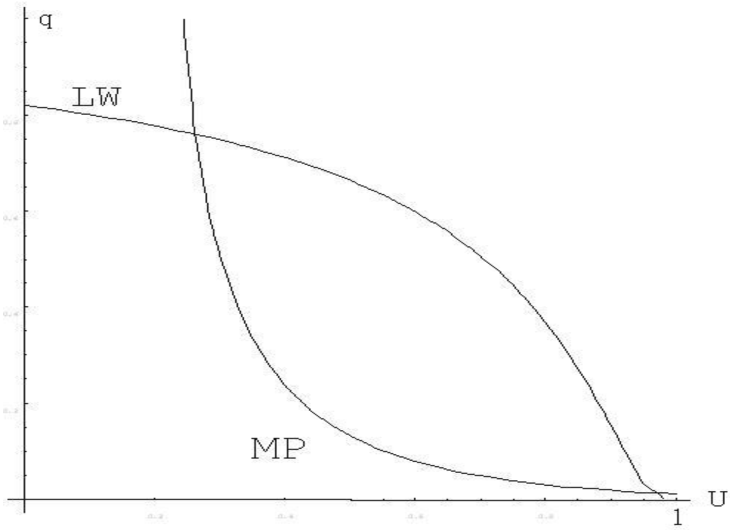
$$k = \frac{\eta \frac{N(u,v)}{v}\{y - b - l + \frac{1+\psi}{2-u+\psi}[g(q) - q]}{r + \delta + (1-\delta)\frac{N(u,v)}{u}}。$$

$q^b \neq q$:

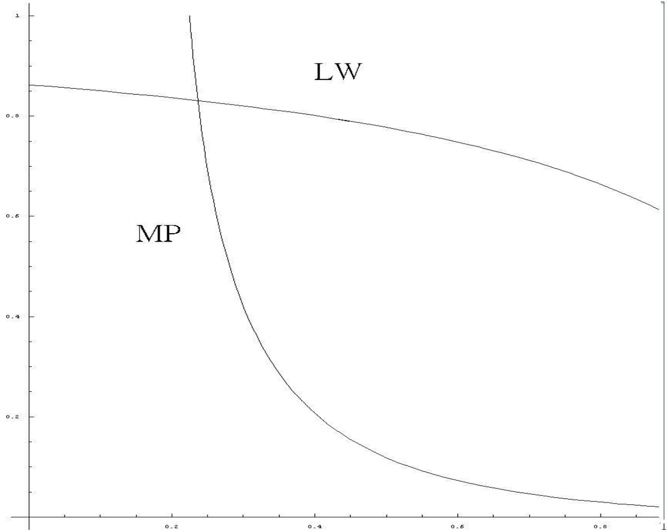
Consider government agents make a take-it-or-leave-it offers to firms, $\rho d^b = q^b$:

$$k = \frac{\eta \frac{N(u,v)}{v}\{y - b - l + \frac{1}{2-u+\psi}[g(q) - q]\}}{r + \delta + (1-\delta)\frac{N(u,v)}{u}}。$$

Without government agents



With government agents



Results

- LW curve:

  As $q^s = q$, $\quad \psi \uparrow \quad \Longrightarrow \quad$ LW shifts to the right

  As q^s small enough, $\quad \psi \uparrow \quad \Longrightarrow \quad$ LW shifts to the left

- MP curve:

  if $q^b = q$, $\quad \psi \uparrow$ MP shifts to the left

  if $\rho d^b = q^b$, $\quad \psi \uparrow \quad \Longrightarrow \quad$ MP shifts to the right

A Quantitative Example

- $v(q) = Aq^{1-q}/(1-a), \quad N(u,v) = Zu^{1-\sigma}v^{\sigma}$
- $b = w/2$
- Hagedorn and Manovskii (2008): $(b+l)/y = 0.95$

Calibrations

Table: Key parameter values

Parameter	Description	Value
β	discount factor	0.992
l	value of leisure	0.504
A	KW utility weight	1.08
a	KW utility elasticity	0.179
δ	job destruction rate	0.05
k	vacancy posting cost (10^{-4})	8.44
Z	MP matching efficiency	0.364
σ	MP matching v elasticity	0.28
η	MP firm bargaining share	0.28
θ	KW firm bargaining share	0.275

Case I: $q^s = q^b = q$

Table: u

	$\psi = 0$	$\psi = 0.1$	$\psi = 0.2$
$i = 0.068$	0.052	0.048	0.046
$i = 0.071$	0.053	0.050	0.047
$i = 0.074$	0.055	0.051	0.048

Case I: $q^s = q^b = q$

Table: q

	$\psi = 0$	$\psi = 0.1$	$\psi = 0.2$
$i = 0.068$	0.099	0.110	0.12
$i = 0.071$	0.091	0.101	0.110
$i = 0.074$	0.082	0.092	0.101

Case II: $q^s \neq q$, $\rho d^b = q^b$

Table: u

	$\psi = 0$	$\psi = 0.1$	$\psi = 0.2$
$i = 0.068$	0.052	0.083	0.099
$i = 0.071$	0.053	0.084	0.100
$i = 0.074$	0.055	0.085	0.101

Case II: $q^s \neq q$, $\rho d^b = q^b$

Table: q

	$\psi = 0$	$\psi = 0.1$	$\psi = 0.2$
$i = 0.068$	0.099	0.051	0.071
$i = 0.071$	0.091	0.203	0.006
$i = 0.074$	0.082	0.019	0.0057

Conclusion

- The presence of government agents changes the set of equilibria.
- The size of government matters for the slope of Phillips curve.