Explicit Gains from Trade and Macroeconomic Analysis

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Toulouse School of Economics

Introduction

- We want to propose a simple (textbook?) macroeconomic mechanism/model.
- Not about some *new* facts, but new mechanism.
- Why?
  - Hard to beat mainstream macro on the quantitative side.
  - But hard to tell mainstream macro mechanisms to
    - Professionals
    - Undergrads
    - Non-economist friends

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- Two key ingredients in our modelling: some market incompleteness and some specialization in production.
- We show in a constructive way why we need those ingredients
- One key concept: Gains from Trade (replacing *AD* with *gains from trade*)
- That model allows to revisit a large set of macroeconomic issues (not a modest statement)
  - The role of expectations (news, revisions, sentiments, optimism, changes in uncertainty...)
  - The size of the fiscal multiplier
  - The existence of non inflationary boom-bust cycles and monetary policy
  - The paradox of Thrift
- We address those issues through the lens of changes in gains from trade between agents

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Roadmap

1. Framework
2. Perception Driven Fluctuations (Exuberance, News, etc)
3. An Explicit Dynamic Example
4. Contingent Claims and Ex Ante Markets
5. Positive Policy Analysis : Monetary Policy
6. Evidence of Labour Market Segmentation and Imperfect Insurance
7. Positive Policy Analysis : Fiscal Policy

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- Two-agents/two-sector economy

1. Framework

Setup

- Houses and Tomatoes
- Carpenters and Farmers

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- Carpenters and Farmers

1. Framework

Preferences

- $U^i(C_i, 1 - L_i)$

1. Framework

Preferences

- $\widetilde{V}^i(K_i; S)$

1. Framework

Preferences

- $E[\widetilde{V}^i(K_i; S)|\Omega]$

1. Framework

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- $E[\widetilde{V}^i(K_i; S_1, S_2)|\{\Omega_1, \Omega_2\}]$

1. Framework

Preferences

- $E[\widetilde{V}^i(K_i; S_1, S_2)|\{\Omega_1, \Omega_2\}]$
- $S = \{\text{predetermined endo. variables, exog. variables}\}$
- $\Omega = (\Omega_1, \Omega_2) =$ Information that agents perceive as relevant for predicting S:
- Ω_1 : exog. info (assumed to be a scalar)
- Ω_2 : endog. variables that agents may use to predict future state variables (current prices, ...)
- $V^i(K_i; \Omega) = E[\widetilde{V}^i(K_i; S_1, S_2)|\Omega]$
- V concave in K_i *and* $\frac{\partial^2 V^i(K_i;\Omega)}{\partial K_i \partial \Omega_1} > 0$

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1. Framework

Preferences

- $U^i(C_i, 1 - L_i) + V^i(K_i; \Omega)$

1. Framework

Expectations

- Note that all agents share the information Ω

1. Framework

Technology

- $C = F^C(L_1^C, L_2^C, K^C)$ and $K = F^I(L_1^I, L_2^I, K^I)$.

- $C = F^C(L_1^C, L_2^C)$ and $K = F^I(L_1^I, L_2^I)$.

- integrated labor markets: $C = F^C(L_1^C + L_2^C)$ and $K = F^I(L_1^I + L_2^I)$.
- (very) segmented labor markets: $C = F^C(L_1)$ and $K = F^I(L_2)$.

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- (very) segmented labor markets: $C = F^C(L_1)$ and $K = F^I(L_2)$.

1. Framework

Decision Problems

- Assume competitive behavior.
- The consumption good is the numéraire.
- Individual i:

$$\max_{C_i, K_i, L_i} U(C_i, 1 - L_i) + V(K_i; \Omega)$$

subject to

$$C_i + pK_i = w_i L_i$$

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- Consumption good representative firm:

$$\max C - \sum_i w_i L_i^c$$

subject to

$$C = F^C(L_1^C, L_2^C)$$

- Investment good representative firm:

$$\max PK - \sum_i w_i l_i^I$$

subject to

$$K = F^I(L_1^I, L_2^I)$$

1. Framework

Walrasian Equilibrium

- The equilibrium is given by, for $i = 1, 2$:

$$
\begin{aligned}
\frac{U_2^i(C_i, 1 - L_i)}{U_1^i(C_i, 1 - L_i)} &= w_i \\
\frac{V_1^i(K_i; \Omega)}{U_1^i(C_i, 1 - L_i)} &= P \\
C_i + pK_i &= w_i L_i \\
F_i^C(L_1^C, L_2^C) &= w_i \\
PF_i^I(L_1^I, L_2^I) &= w_i \\
n_i L_i &= L_i^C + L_i^I \\
C_1 + C_2 &= F^C(L_1^C, L_2^C) \\
K_1 + K_2 &= F^K(L_1^K, L_2^K)
\end{aligned}
$$

- We perform comparative statics of this competitive equilibrium w.r.t. Ω_1

1. Framework

An overlapping generation model example

- Agents work, consume and save when young, consume when old.
- They are either C-workers (type 1) or K-workers (type 2)
- $\frac{(C_t^{yi})^{1-\sigma_1}}{1-\sigma_1} + \nu(1 - L_t^i) + \frac{(C_{t+1}^{oi})^{1-\sigma_2}}{1-\sigma_2}$.
- $C_t = A_t K_t + L_t^1$, $K_{t+1} = L_t^2$

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1. Framework

An overlapping generation model example: Surprises

- If A_t is $AR(1)$ in log, innovation with variance s^2
- $\Omega_{1t} = A_t$ and

$$
\begin{aligned}
V(K^i_{t+1}, \Omega_{1t}) &= E_t \left\{ \frac{(A_{t+1} K^i_{t+1})^{1-\sigma_2}}{1-\sigma_2} \middle| \Omega_{1t} \right\} \\
&= E_t \left\{ \frac{(\Omega^{\rho}_{1t} e^{\varepsilon_{t+1}} K^i_{t+1})^{1-\sigma_2}}{1-\sigma_2} \right\} \\
&= \left(1+s^2\right)^{-\frac{1}{2}\sigma_2(1-\sigma_2)} \frac{(\Omega^{\rho}_{1t} K^i_{t+1})^{1-\sigma_2}}{1-\sigma_2}
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An overlapping generation model example: News

- In period t agents receive a perfect signal of A_{t+1}.
- $\Omega_{1t} = A_{t+1}$ and

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$$V(K_{t+1}^i, \Omega_{1t}) = \frac{(\Omega_{1t} K_{t+1}^i)^{1-\sigma_2}}{1-\sigma_2}$$

- A_{t+1} is *iid*, log-normally distributed with variance s^2_{t+1}
- Assume $\Omega_{1t} = \text{var}(A_{t+1})$
- Then

$$V(K^i_{t+1}, \Omega_{1t}) = (1 + \Omega_{1t})^{-\frac{1}{2}\sigma_2(1-\sigma_2)} \frac{(K^i_{t+1})^{1-\sigma_2}}{1-\sigma_2}$$

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2. Perception Driven Fluctuations (Exuberance, News, etc)

The Question

- Under which conditions does an increase in the perceived marginal value of capital ($d\Omega_1 > 0$) create a boom?

2. Perception Driven Fluctuations (Exuberance, News, etc)

Definitions

Definition 1 : aggregate positive co-movement *: aggregate consumption, aggregate investment and aggregate employment all strictly move in the same direction.*

Definition 2 : individual positive co-movement*: consumption, investment and employment levels for all individuals strictly move in the same direction.*

2. Perception Driven Fluctuations (Exuberance, News, etc)

Warlasian equilibrium puts little restrictions on allocations

Proposition 1 : *Following a change in perceptions,*

- *Aggregate positive co-movement are possible,*
- *Individual co-movement are not possible.*

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The representative agent case

Corollary 1 : *With a representative agent, positive aggregate co-movement are not possible.*

2. Perception Driven Fluctuations (Exuberance, News, etc)

The importance of labor market segmentation

- What does matter for aggregate positive co-movements?
- Preference heterogeneity or labor market segmentation?

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The importance of labor market segmentation

Proposition 2 :

- *If labour markets are fully integrated, aggregate positive co-movement are not possible.*
- *If preferences are identical and labour markets not fully integrated, aggregate positive co-movement are possible.*

2. Perception Driven Fluctuations (Exuberance, News, etc)

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2. Perception Driven Fluctuations (Exuberance, News, etc)

Mechanism

- Assume labor market are fully integrated.
- The economy-wide allocations are simply the replication of individual choices (no meaningful trade)
- $d\Omega_1 > 0$: capital is more valuable: all agents shift labor from the C sector to the K sector.
- C moves down, L and K move up.
- (unless income effect is strong, then C moves up, L and K move down).

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2. Perception Driven Fluctuations (Exuberance, News, etc)

Mechanism

- Assume full specialization
- Positive co-movement in C and I because of the intra-temporal gains from trade induced by the labour market segmentation.
- $d\Omega_1 > 0$: : capital is more valuable: C-workers want to buy K from K-workers.
- With upward sloping labour supply curve, K-workers will respond by favoring a greater trade flow between the two types of workers.
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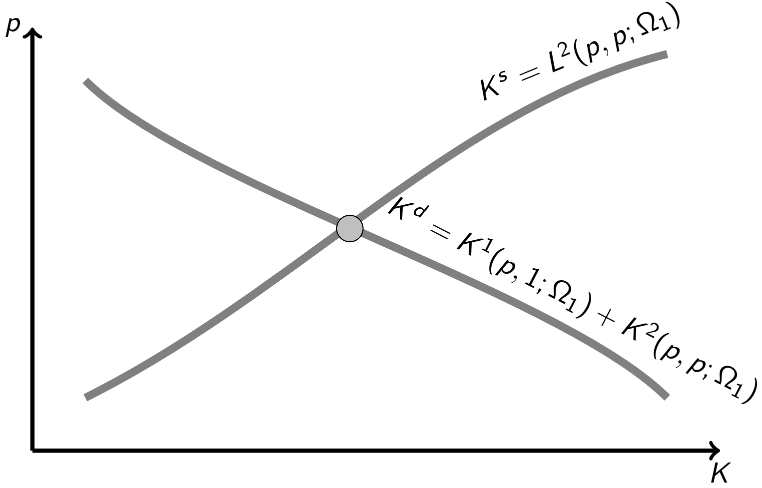
Sufficient conditions for (perception driven) aggregate co-movements



Roadmap

1. Framework
2. Perception Driven Fluctuations (Exuberance, News, etc)
3. An Explicit Dynamic Example
4. Contingent Claims and Ex Ante Markets
5. Positive Policy Analysis : Monetary Policy
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Proposition 3B : *When agents are allowed to trade contingent claims written on the realization of Ω_1, then positive co-movement is not possible if*

1. *labor is homogeneous*
2. *or if labor specialized and the preferences $U(C, 1-L)$ are separable.*

- The market incompleteness that is needed is the impossibility to insure against changes in perceptions

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Normative issues

- Assume the Planner shares the same perceptions Ω_1
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- This suggests that in our setup without ex ante markets, consumption is too volatile and investment not enough.
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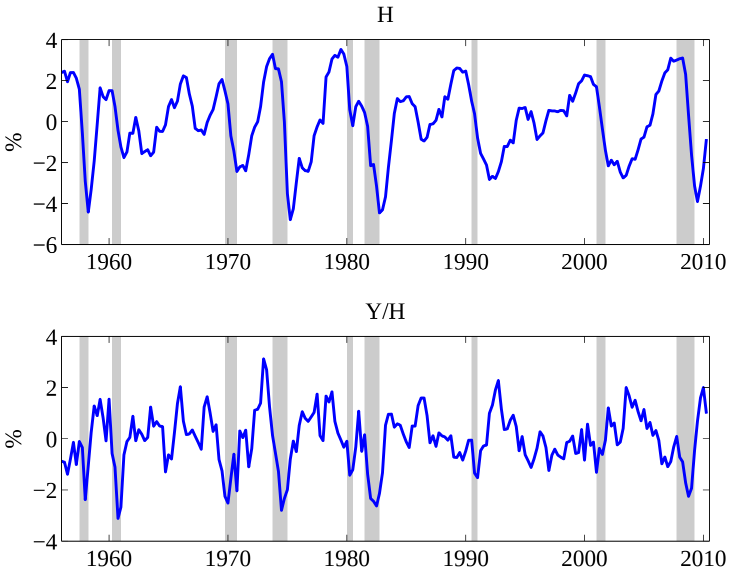
5. Positive Policy Analysis: Monetary Policy

Some Observations of the Three Last US Cycles



5. Positive Policy Analysis: Monetary Policy

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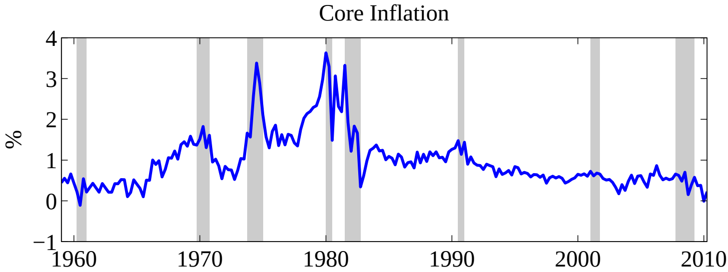

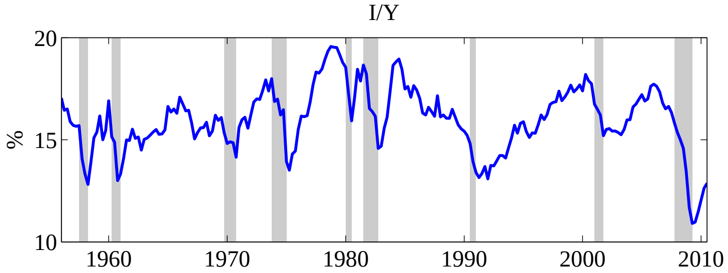

5. Positive Policy Analysis: Monetary Policy

Main Idea

- Conventional wisdom in sticky prices models (New Keynesian Gali-Woodford type): accommodate supply shocks, smooth demand shocks (I'll be more specific on the next slides)
- Let's introduce gains from trade and see that things are quite different.

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5. Positive Policy Analysis: Monetary Policy

The basic model

- Let's start with the textbook New Keynesian model.
- $c_t = \left(\int_0^1 c_{jt}^{\frac{\varepsilon-1}{\varepsilon}} dj \right)^{\frac{\varepsilon}{\varepsilon-1}}$
- $\sum \beta^t \left(\ln(c_t) + \Phi(1 - \ell_{Ct}) \right).$
- Monopoly $j : C_{jt} = A_t L_{jt}$
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- This basic model collapses to a Phillips curve and a dynamic IS equation + Taylor rule

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- Absent of an active Taylor Rule, inflation.
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The basic model

- Textbook prescription: to keep stable inflation, monetary authorities need to strongly counteract demand shock but need to accommodate supply shocks.
- If the economy goes into recession due to a fall in demand – as opposed to a reduction in supply capacity – this should put substantial downward pressure on prices.
- Let's contrast those results with the one of a gains-from-trade model.

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The gains-from-trade model

- Add a mass 1 of agents (type 2)
- Type 2 individuals produce some capital good (full depreciation): $K_{t+1} = L_{2t}$.
- Preferences: $\ln\left(C_{2t} + \frac{\psi_2}{2}(1 - L_{2t})^2\right)$.
- Capital market is flex-price and competitive.
- Production of consumption good: $C_{jt} = \Theta_t K_{jt} + L_{1jt}$
- If then mass of type 2 individuals is 0, then there is no capital supply and the model is the previous one.

Go to the appendix for details

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- The log linear approximation of the model is

$$\begin{cases} \widetilde{y}_t &= -\zeta\left(\widehat{\imath}_t - E_t\widehat{\pi}_{t+1} - \widehat{\rho}_t{}^n\right) + E_t\widetilde{y}_{t+1} \\ \widehat{\pi}_t &= \beta E_t\widehat{\pi}_{t+1} + \lambda\zeta^{-1}\widetilde{y}_t \\ + & \text{Taylor rule} \end{cases}$$

- Natural or non-inflationary level of output $\widehat{y}_t{}^n = \phi_2 A_t + \phi_1 E_t\left[\widehat{\Omega}_{t+1}\right]$ where $\widehat{\Omega}_{t+1} = \widehat{\Theta}_{t+1} - \widehat{A}_{t+1}$

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5. Positive Policy Analysis: Monetary Policy

A new new Phillips curve

$$\widehat{\pi}_t = \beta E_t \widehat{\pi}_{t+1} + \lambda \zeta^{-1} \left(\widehat{y}_t - \phi_2 A_t - \phi_1 E_t \left[\widehat{\Omega}_{t+1} \right] \right)$$

- Consider believes that Ω_{t+1} will be high.
- Agents of type 1 to want to by capital as it return is expected to be high.
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- This would look like a demand shock.
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A useful framework

- We think it is a useful model to think of the last episodes of expansions and recessions.
- Productivity is not procyclical
- Inflation barely moves
- Suggest that booms and busts are mainly driven by expectations on investment return.

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Roadmap

1. Framework
2. Perception Driven Fluctuations (Exuberance, News, etc)
3. An Explicit Dynamic Example
4. Contingent Claims and Ex Ante Markets
5. Positive Policy Analysis : Monetary Policy
6. Evidence of Labour Market Segmentation and Imperfect Insurance
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Main idea

- Importance of sluggish sectoral reallocation of labor and imperfect risk sharing in our approach
- If not, perceived changes in the value of capital would cause reallocations, not changes in the depth of gains to trade.
- Under full risk sharing and labor mobility, the beginning of period t sector of employment of an individual should not influence, *ceteris paribus*, the growth of her wage income or consumption between, say, t and $t + n$.
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- Importance of sluggish sectoral reallocation of labor and imperfect risk sharing in our approach
- If not, perceived changes in the value of capital would cause reallocations, not changes in the depth of gains to trade.
- Under full risk sharing and labor mobility, the beginning of period t sector of employment of an individual should not influence, *ceteris paribus*, the growth of her wage income or consumption between, say, t and $t + n$.
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6. Evidence of Labour Market Segmentation and Imperfect Insurance

Results

$$\Delta X_{it} = \text{time dummies} + \alpha_1 \Delta Emp_{j(i)t} + \text{age dummies} + \text{sector dummies} + \epsilon_{it}$$

- $\alpha_1 = .5$ for individual income
- $\alpha_1 = .2$ for household (food) consumption

Go to the appendix for details

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Roadmap

1. Framework
2. Perception Driven Fluctuations (Exuberance, News, etc)
3. An Explicit Dynamic Example
4. Contingent Claims and Ex Ante Markets
5. Positive Policy Analysis : Monetary Policy
6. Evidence of Labour Market Segmentation and Imperfect Insurance
7. Positive Policy Analysis : Fiscal Policy

7. Positive Policy Analysis: Fiscal Policy

Gains from trade as a foundation for multipliers

- Typical story for multipliers in keynesian-cross-like-models:
  - Initial increase in demand for one good,
  - This increase in demand is met by an increase in production of that good, and therefore by an increase in income of those producing that good
  - Those agents then in turn increase demand for some goods, etc...
- This is not (at all) the mechanism we find in sticky prices models of the business cycle.
- Let us show that multipliers can be understood as the consequence of changes in the scope for gains to trade between agents.

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Gains from trade as a foundation for multipliers

- Multipliers can be understood as the consequence of changes in the scope for gains to trade between agents.
- The Government taxes both type of workers and spends on both consumption and investment good
- The Government can therefore "force" trade $\rightsquigarrow$ multiplier larger than one
- Intuition
  - Tax only the C-workers
  - Spend only of K-goods
  - Under the conditions of the first section, multiplier > 1

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7. Positive Policy Analysis: Fiscal Policy

An Example

- We keep the same two periods environment:
  $\ln C^i + \phi(1 - l^i) + \ln K^i$, $C = L_1$, $K = L_2$, P the relative price of capital.
- Fiscal policy: spend α on K (amount spent $\frac{\alpha}{P}$), $1 - \alpha$ on C
- Fiscal policy: tax β on type 2 agent, $1 - \beta$ on type 1.
- In equilibrium:
  - $GDP = \frac{4}{\phi}$ without spending
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Explicit Gains from Trade and Macroeconomic Analysis

Paul Beaudry & Franck Portier

University of British Columbia – NBER & Toulouse School of Economics – CEPR

ESSIM 2012 – Tarragona

Roadmap

- The Gains from Trade New Keynesian Model in More Details

A New Keynesian model with explicit gains from trade

Preferences

- n_C consumption good workers and n_X investment good workers

$$
\begin{aligned}
c_{Ct} &= \left(\int_0^1 c_{Cjt}^{\frac{\varepsilon-1}{\varepsilon}}\, dj\right)^{\frac{\varepsilon}{\varepsilon-1}}, \\
c_{Xt} &= \left(\int_0^1 c_{Xjt}^{\frac{\varepsilon-1}{\varepsilon}}\, dj\right)^{\frac{\varepsilon}{\varepsilon-1}}.
\end{aligned}
$$

- Consumption workers : $\sum \beta^t \left(\ln(c_{ct}) + \Phi(1 - \ell_{Ct})\right)$
- Investment workers are myopic : $U\left(c_{Xt} - \Psi \frac{\ell_{Xt}^{1+\gamma}}{1+\gamma}\right)$

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- Monopoly j : $C_{jt} = \Theta_t K_{jt} + A_t L_{Ct}$
- Competitive firms: $X_t = BL_{Xt}$ (X = investment)
- $K_{t+1} = (1 - \delta)K_t + X_t$

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- A monopoly for each variety of the consumption good
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Price setting

- Each consumption firm may reset its price with probability $1 - \theta$, $\theta \in [0, 1]$.
- Flexible prices in the investment good sector.

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Monetary authorities

- The central bank sets the nominal interest rate following a Taylor rule.

A New Keynesian model with explicit gains from trade

Consumption worker

- The representative consumption worker maximizes expected utility $E_0 \left[\sum_{t=0}^{\infty} \beta^t \left(\ln c_{Ct} + \Phi(1 - \ell_{Ct}) \right) \right]$ subject to the budget constraint:

$$P_t c_{Ct} + R_t k_{t+1} + Q_t b_t \leq ((1-\delta) R_t + Z_t) k_t + W_{Ct} \ell_{Ct} + t_{Ct} + B_{t-1},$$

with

$$\begin{aligned} P_t c_{Ct} &= \int_0^1 P_{jt} c_{Cjt} dj, \\ c_{Ct} &= \left(\int_0^1 c_{Cjt}^{\frac{\varepsilon-1}{\varepsilon}} dj \right)^{\frac{\varepsilon}{\varepsilon-1}}, \\ P_t &= \left(\int_0^1 P_{jt}^{1-\varepsilon} dj \right)^{\frac{1}{1-\varepsilon}}, \end{aligned}$$

A New Keynesian model with explicit gains from trade

Consumption worker

- FOC are

$$
\begin{aligned}
c_{Cjt} &= \left(\frac{P_{jt}}{P_t}\right)^{-\varepsilon} c_{Ct}, \\
c_{Ct} &= \Phi^{-1} \frac{W_{Ct}}{P_t}, \\
Q_t &= \beta E_t \left[\frac{c_{Ct}}{c_{Ct+1}} \frac{P_t}{P_{t+1}}\right], \\
R_t &= \beta E_t \left[\frac{c_{Ct}}{c_{Ct+1}} \frac{P_t}{P_{t+1}} \left((1-\delta) R_{t+1} + Z_{t+1}\right)\right].
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Investment worker

- The representative investment worker maximizes utility $U\left(c_{Xt} - \Psi \frac{\ell_{Xt}^{1+\gamma}}{1+\gamma}\right)$ subject to the budget constraint:

$$P_t c_{Xt} \leq W_{Xt} \ell_{Xt}$$

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Investment good firms

- Firms are competitive, and maximize profits $R_t X_t - W_{It} L_{It}$ subject to the technological constraint $X_t = BL_{It}$.
- The first order condition is: $W_{Xt} = BR_t$

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A New Keynesian model with explicit gains from trade

Consumption good firms - Flexible prices ($\theta = 0$)

- firm j maximizes profit $P_{jt}C_{jt} - Z_t K_{jt} - W_{Ct}L_{Ct}$ subject to:
- technological constraint $C_{jt} = \Theta_t K_{jt} + A_t L_{Cjt}$
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Consumption good firms - Sticky prices ($\theta > 0$)

- the firm maximizes expected discounted sum of profits and optimal pricing behavior is given by

$$\sum_{k=0}^{\infty} \theta^k E_t \left[Q_{t,t+k} \overline{C}_{t,t+k} \left(P_t^{\star} - \mathcal{M}\mathcal{N}_{t+k,t} \right) \right] = 0,$$

- $Q_{t,t+k} = \beta^k (c_{Ct+k}/c_{Ct})(P_t/P_{t+k})$ is the nominal stochastic discount factor,
- $\overline{C}_{t,t+k}$ is the production of a firm that last reset its price in period t
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Flex price allocations

- C-worker consumption: $C_{Ct} = n_C(\mathcal{M}\Phi)^{-1}A_t$
- Investment price:

$$\frac{R_t}{P_t} = \beta E_t \left[\left(\frac{C_{ct}}{C_{ct+1}} \right) \left((1-\delta)\frac{R_{t+1}}{P_{t+1}} + \mathcal{M}^{-1}\Theta_{t+1} \right) \right]$$

- Solving forward:

$$\frac{R_t}{P_t} = A_t \mathcal{M}^{-1} \sum_{j=1}^{\infty} \beta^j (1-\delta)^{j-1} E_t \left[\frac{\Theta_{t+j}}{A_{t+j}} \right].$$

- Once the real price of investment is obtained, the rest of the model can be recursively solved as all the other variables are statically related to the real price of investment.

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$$\frac{R_t}{P_t} = \beta E_t \left[\left(\frac{C_{ct}}{C_{ct+1}} \right) \left((1-\delta)\frac{R_{t+1}}{P_{t+1}} + \mathcal{M}^{-1}\Theta_{t+1} \right) \right]$$

- Solving forward:

$$\frac{R_t}{P_t} = A_t \mathcal{M}^{-1} \sum_{j=1}^{\infty} \beta^j (1-\delta)^{j-1} E_t \left[\frac{\Theta_{t+j}}{A_{t+j}} \right].$$

- Once the real price of investment is obtained, the rest of the model can be recursively solved as all the other variables are statically related to the real price of investment.

A New Keynesian model with explicit gains from trade

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A New Keynesian model with explicit gains from trade

Flex price allocations - Log-linear approximation

- Investment price:

$$\widehat{r}_t = \widehat{A}_t + ((1-\beta(1-\delta))\sum_{j=0}^{\infty}(\beta(1-\delta))^j E_t\left[\widehat{\Theta}_{t+i+1} - \widehat{A}_{t+i+1}\right].$$

- Aggregate demand:

$$\widehat{c}_t = \chi \widehat{c}_{Ct} + (1-\chi)\widehat{c}_{Xt},$$
$$\widehat{y}_t = s_c \widehat{c}_t + (1-s_c)(\widehat{r}_t + \widehat{x}_t).$$

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Flex price allocations - Log-linear approximation

$$
\begin{cases}
\gamma\widehat{y}_t^{\,n} & = & \beta\gamma(1-\delta)E_t\widehat{y}_{t+1}^{\,n} \\
 & & +(1-s_c\chi)(1+\gamma)(1-\beta(1-\delta))E_t\left[\widehat{\Theta}_{t+1}-\widehat{A}_{t+1}\right], \\
 & & -\beta(1-\delta)(\gamma+1-s_c\chi)E_t\widehat{A}_{t+1}, \\
\widehat{\rho}_t^{\,n} & = & \widehat{\imath}_t - E_t\widehat{\pi}_{t+1} = E_t\widehat{A}_{t+1}-\widehat{A}_t, \\
+ & & \text{Taylor rule,}
\end{cases}
$$

A New Keynesian model with explicit gains from trade

Flex price allocations - Properties

- Solve forward natural output:

$$\widehat{y}_t^{\,n} = \sum_{j=0}^{\infty} \phi_1(j) E_t \left[\widehat{\Theta}_{t+1+j} - \widehat{A}_{t+1+j}\right] + \sum_{j=0}^{\infty} \phi_2(j) E_t \left[A_{t+j} - \beta(1-\delta)\widehat{A}_{t+1+j}\right],$$

- $\phi_1(j) = (1 - s_c\chi)\left(\frac{1+\gamma}{\gamma}\right)(1 - \beta(1-\delta))(\beta(1-\delta))^j$
- $\phi_2(j) = \left(\frac{1+\gamma-s_c\chi}{\gamma}\right)(\beta(1-\delta))^j$.
- We have, $\forall\ j \geq 0$, $\frac{\partial \widehat{y}_t^{\,n}}{\partial \widehat{A}_t} > 0$, $\frac{\partial \widehat{y}_t^{\,n}}{\partial \widehat{A}_{t+1}} < 0$, $\frac{\partial \widehat{y}_t^{\,n}}{\partial \widehat{\Theta}_{t+1}} = 0$ and $\frac{\partial \widehat{y}_t^{\,n}}{\partial \widehat{\Theta}_{t+1}} > 0$.

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A New Keynesian model with explicit gains from trade

Fix price allocations

- With Calvo pricing, (consumption price) inflation Π_t :

$$\Pi_t^{1-\varepsilon} = \theta + (1-\theta)\left(\frac{P_t^\star}{P_{t-1}}\right),$$

- With a log-linear approximation

$$\widehat{\pi}_t = \beta E_t \widehat{\pi}_{t+1} + \lambda \widehat{mc}_t,$$

- and we obtain

$$\begin{cases} \widetilde{y}_t & = & -\zeta\left(\widehat{\imath}_t - E_t\widehat{\pi}_{t+1} - \widehat{\rho}_t^{\,n}\right) + E_t\widetilde{y}_{t+1}, \\ \widehat{\pi}_t & = & \beta E_t\widehat{\pi}_{t+1} + \lambda\zeta^{-1}\widetilde{y}_t, \\ + & & \text{Taylor rule.} \end{cases}$$

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A New Keynesian model with explicit gains from trade

Fix price allocations

- The Phillips curve can be written as

$$\widehat{\pi}_t = \beta E_t \widehat{\pi}_{t+1} + \lambda \zeta^{-1} \left(\widetilde{y}_t - \sum_{j=0}^{\infty} \phi_1(j) E_t \left[\widehat{\Theta}_{t+1+j} - \widehat{A}_{t+1+j} \right] \right. \tag{1}$$

$$\left. - \sum_{j=0}^{\infty} \phi_2(j) E_t \left[\widehat{A}_{t+j} - \beta(1-\delta) \widehat{A}_{t+1+j} \right] \right). \tag{2}$$

- With full depreciation:
  - natural output:

$$\widehat{y}_t^{\,n} = \phi_2(0) A_t + \phi_1(0) E_t \left[\widehat{\Theta}_{t+1} - \widehat{A}_{t+1} \right],$$

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A New Keynesian model with explicit gains from trade

Obtaining the simple NK model

- No investment workers ($n_X = 0$) $\rightsquigarrow$, no investment is produced ($X_t = 0$) $\rightsquigarrow$ no capital is used in the production of consumption varieties.
- In the flexible price allocations, labor is constant, so that natural output is given by $\widehat{y}_t{}^n = \widehat{A}_t$ and the natural real interest rate $\widehat{\rho}_t^n = E_t \widehat{A}_{t+1} - \widehat{A}_t$.
- The model solution is then given by the standard three equations:

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Roadmap

- Evidence of Labour Market Segmentation and Imperfect Insurance in More Details

Evidence of Labour Market Segmentation and Imperfect Insurance

Data

- Data from the PSID over the period 1968-2007 (yearly until 1997, bi-annual since).
- We observe for the family head and for every family-year
  - sector of activity at the beginning of the period
  - labour income
  - food consumption
  - age, education
- We also observe employment and wage bill at the sectoral level (using NIPA)

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Evidence of Labour Market Segmentation and Imperfect Insurance

Specification

- We estimate:

$$\Delta X_{it} = \text{time dummies} + \alpha_1 \Delta Emp_{j(i)t} + \text{age dummies} + \text{sector dummies} + \epsilon_{it}$$

- X is first labor income, then consumption.
- $j(i)$ is the sector in which i was employed at the beginning of the period.
- Δ is taken over 2 years, or 1 year after 1997
- Other controls: highest level of educational attainment, and interactions between age-time, education-age, education-time.
- If labour markets were completely integrated, and given we are controlling for common time effects then individual level outcomes should not be systematically related to aggregate outcomes for any particular sectors.

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Evidence of Labour Market Segmentation and Imperfect Insurance

Table 1: Effect of Sectoral Growth on Individual Income

	2-year	2-year	2-year	2-year	2-year	1-year	1-year	1-year
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Δ Emp	.542		.468					
	(.209)		(.244)					
Δ W-bill		.525						
		(.175)						
Δ Emp-10				.450	.563			
				(.143)	(.131)			
Δ Emp						.535	.579	
						(.170)	(.193)	
Δ Emp-10								.471
								(.059)
Obs.	49338	49338	45469	45430	23173	68863	63677	61224
R^2	.028	.028	.028	.027	.026	.017	.018	.018

Evidence of Labour Market Segmentation and Imperfect Insurance

Table 1: Effect of Sectoral Growth on Individual Income

- Compare two individuals that were initially attached to two different sectors,
- assume one of the two sector grew by an extra 1% over two years,
- the individual initially attached to that sector saw his labour income grow by an additional .5% compared to the other individual.

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- assume one of the two sector grew by an extra 1% over two years,
- the individual initially attached to that sector saw his labour income grow by an additional .5% compared to the other individual.

Evidence of Labour Market Segmentation and Imperfect Insurance

Table 2: Effect of Sectoral Growth on Household Consumption (Food)

	2-year	2-year	2-year	2-year	2-year	1-year	1-year	1-year
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Δ Emp	.268		.267					
	(.092)		(.104)					
Δ W-bill		.236						
		(.078)						
Δ Emp-10				.143	.112			
				(.052)	(.053)			
Δ Emp						.200	.274	
						(.118)	(.129)	
Δ Emp-10								.208
								(.077)
Obs.	67758	67758	63686	52270	26898	89008	83942	65503
R^2	.014	.014	.013	.016	.015	.005	.005	.006

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Roadmap

- Positive Policy Analysis: Fiscal Policy in More Details

Positive Policy Analysis: Fiscal Policy

Framework

- We again use the simple model ($U^i(C_i, 1 - L_i)$ and $V^i(K_i; \Omega_1, \bar{K})$, two sectors)
- We abstract for Ricardian issues, and look at balanced-budget policies of the type

$$G^C + G^K = T_1 + T_2$$

- Under what conditions (if any) can a temporary increase in government spending can create a multiplier effect?
- It is helpful to begin by focusing on government expenditures that are directed only at one sector.

$$G^K = T_1 + T_2$$

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Positive Policy Analysis: Fiscal Policy

Two questions

- Given a policy (G^K, T_1) (T_2 is then obtained from the govt BC), two questions can be asked:

Question 1 : **amplification effect**: *Can an increase government purchases of capital good cause private agents to buy more capital goods?*

Question 2 : **spillover effect**: *Can an increase in government purchases of capital good cause private agent to consume more consumption goods?*

Positive Policy Analysis: Fiscal Policy

Two propositions

Proposition 4 : *If the preferences of agents are identical and their labour is perfectly substitutable (i.e., a representative agent setup) , then an increase in government purchase of capital goods cannot lead to either an increase private purchase of either capital good (no amplification effect) or consumption goods (no spillover effect). Hence government purchase of investment goods cannot in this case create positive aggregate co-movement.*

- When there is no explicit gains from trade between individuals (ie a representative agent setup), an increase in public spending tends to crowd-out private expenditures

Positive Policy Analysis: Fiscal Policy

Two propositions

Proposition 5 : *If the conditions of Proposition 3 are met, and both agents are taxed, then an increase in government purchase of capital goods will lead to an increase in private purchases of consumption goods (a spillover effect), and create positive aggregate co-movement. However, it will not increase the private purchase of capital goods (no amplification effect).*

- If agents differ in their sector of employment, then the government purchase of capital goods transfers income to capital goods producers which will generally lead them to buy more consumptions goods.
- The government action is changing the gains from trade between the different types of workers.
- It is favoring trade from the producer of consumption goods – who need income to pay taxes– toward the producers of capital goods – which have increase net revenues.

Positive Policy Analysis: Fiscal Policy

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Positive Policy Analysis: Fiscal Policy

Two propositions

- An increase in government purchases of capital shifts out the aggregate demand for capital, increasing the aggregate quantity purchased and increasing the price of capital.
- Individual demand curves for capital tend to shift in because of the tax increases.
- No amplification effect as the equilibrium price of capital increase and agents have downward sloping demand curves.
- Agents in the capital sector are getting higher income which leads them to want to consume more. This is were the gains from trade arise.
- The producers of consumption goods are willing to trade with the producers of capital goods as the added income for them can be used to pay taxes.

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- Could it be the case that the income effect on the producers of capital is great enough to lead such producers to actually substantially increasing their purchase of capital and create amplification?
- It can happen, but not under the conditions of Proposition 3 (aggregate capital demand is downward sloping).

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