The International Propagation of News Shocks

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1. Motivation

• Long lasting interest in Macroeconomics for changes in expectations in explaining business cycles (Pigou,Keynes, Learning, Sunspots,...)

• Newest embodiement: News shocks:

data : Beaudry & Portier [2006, Aer; 2005, Jjie], Haertel & Lucke [2007],

models : [Beaudry & Portier [2004, Jme; 2007, Jet], Christiano, Rostagno & Motto [2005], Jaimovich & Rebelo [2006,2007], Den Haan & Kaltenbrunner [2006], Beaudry, Portier & Collard [2007], Karel Mertens [2007]

• Technological News Shocks: Short run demand shock, Long run supply shock

• A source of international fluctuations? : this paper.

1.1. Business cycle comovements

• Y, C, I, H are positively correlated with each other within developed countries, at business cycle frequencies $\rightsquigarrow$ National Business Cycle (NBC)

• Y, C, I, H are pairwise positively correlated among developed countries, at business cycle frequencies $\rightsquigarrow$ International Business Cycle (IBC)

• Which combination(s) of impulses and propagation mechanisms can help understand these business cycle co-movements?

1.2. The effects of technological shocks

- The international RBC literature faces huge difficulties to account for international comovements.

- Local technology shocks imply reallocation of mobile inputs $\rightsquigarrow$ negative comovements unless almost perfectly correlated shocks.

- "Demand" shocks might help. Wen [2006, Jecd]

1.3. The nature of technological shocks

- The usual assumption is that technology shocks are surprises.

- Beaudry & Portier [2006, Aer] show that (permanent) technology improvements diffuse slowly over time, and are forecastable to a large extent.

- In the short–run, these news shock stimulate the demand for investment goods, and might not trigger reallocation.

Outline of the Talk

1. Motivation

2. The Propagation of News Shocks : Facts

3. NBC and IBC in a canonical model

4. A Two-Country Pigou Model

2. The Propagation of News Shocks: Facts

2.1. Conditional moments

• If technological change diffuses slowly over time, 'forward' variables may react faster than usual indicators of technology.

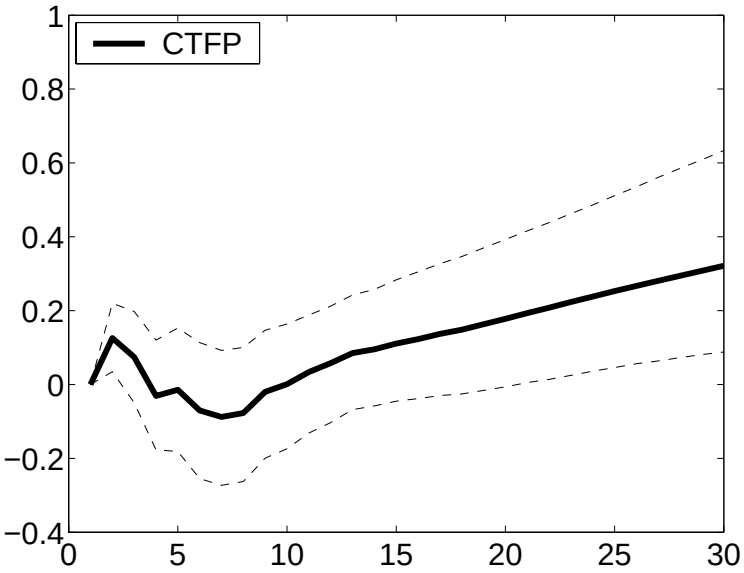
• We identify news shock using TFP (corrected for utilization) and stock market capitalization (SP)

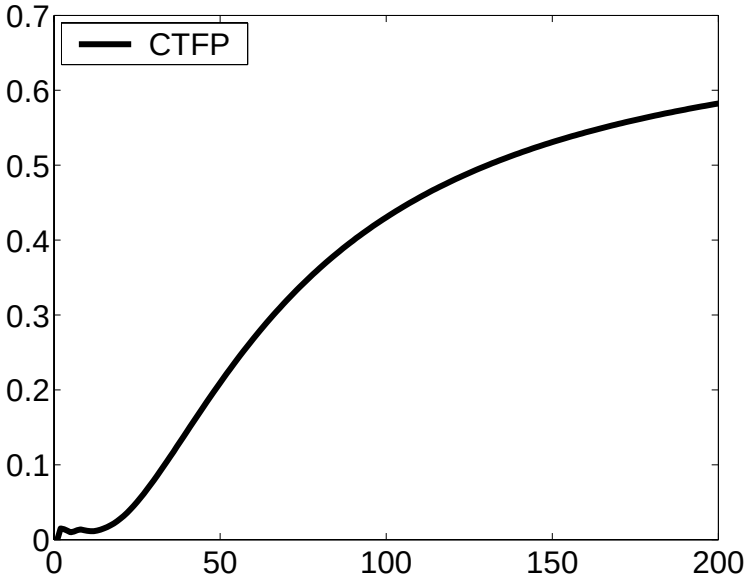
- BP 2006: $\begin{pmatrix} \Delta TFP_{i,t} \\ \Delta SP_{i,t} \end{pmatrix} = A(L) \begin{pmatrix} \varepsilon_{1,t} \\ \varepsilon_{2,t} \end{pmatrix}$ with $A(0) = \begin{pmatrix} 0 & \times \\ \times & \times \end{pmatrix}$.

  - The news shock $\varepsilon_{1,t}$ has no impact on TFP in country i;

  - The shock $\varepsilon_{2,t}$ is unrestricted.

Response to a news shock, USA





- Here $\begin{pmatrix} \Delta TFP_{i,t} \\ \Delta SP_{i,t} \\ X_{j,t} \end{pmatrix} = \tilde{A}(L) \begin{pmatrix} \varepsilon_{1,t} \\ \varepsilon_{2,t} \\ \varepsilon_{3,t} \end{pmatrix}$ with $\tilde{A}(0) = \begin{pmatrix} 0 & \times & \times \\ \times & \times & \times \\ 0 & 0 & \times \end{pmatrix}$.

  - The news shock $\varepsilon_{1,t}$ has no impact on TFP in country i;

  - The shock $\varepsilon_{2,t}$ is unrestricted.

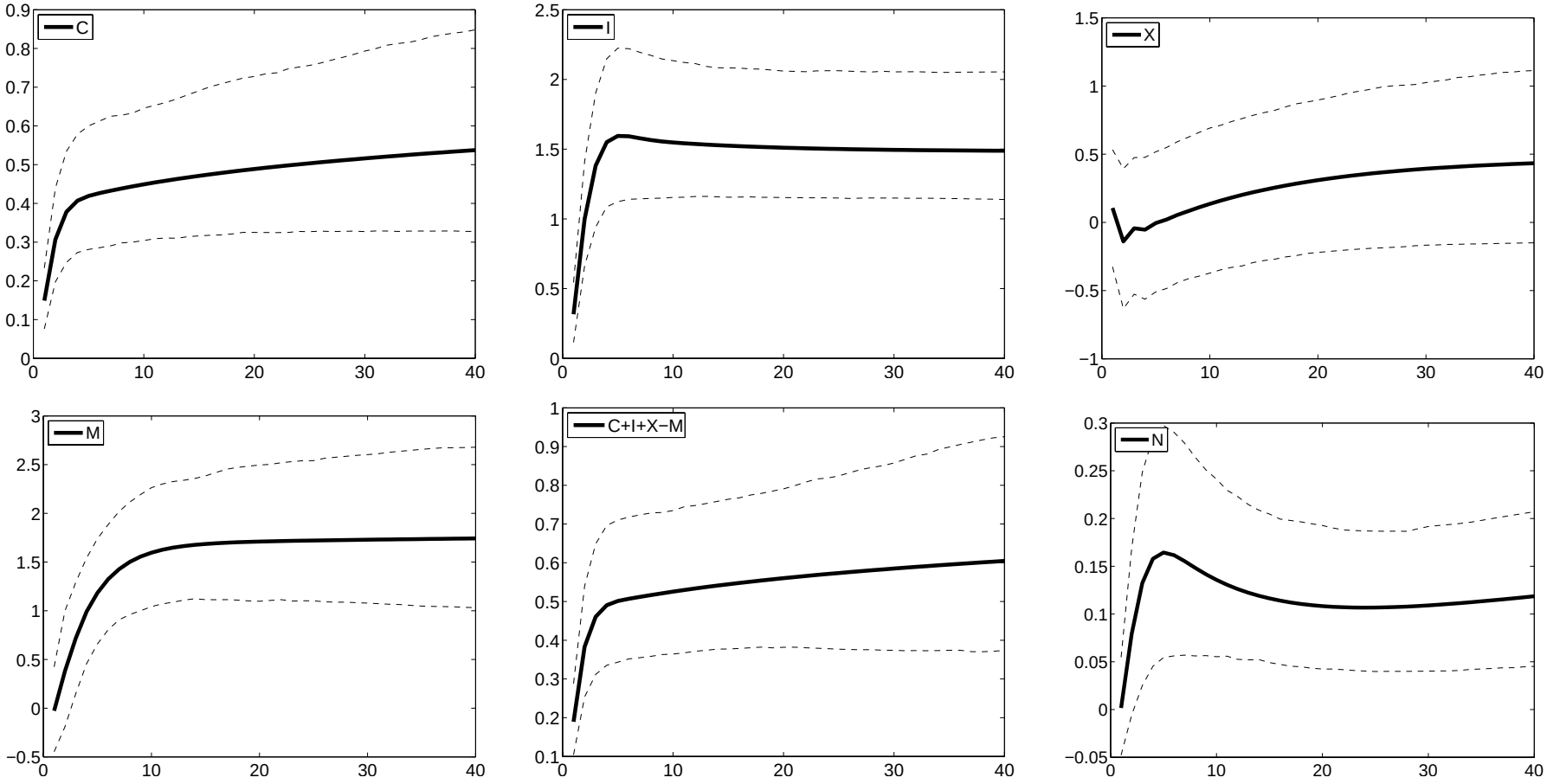
  - The third shock $\varepsilon_{3,t}$ is a $X_{j,t}$ specific shock.

- The other country is chosen to be close and small.

2.2. US news shocks and their propagation

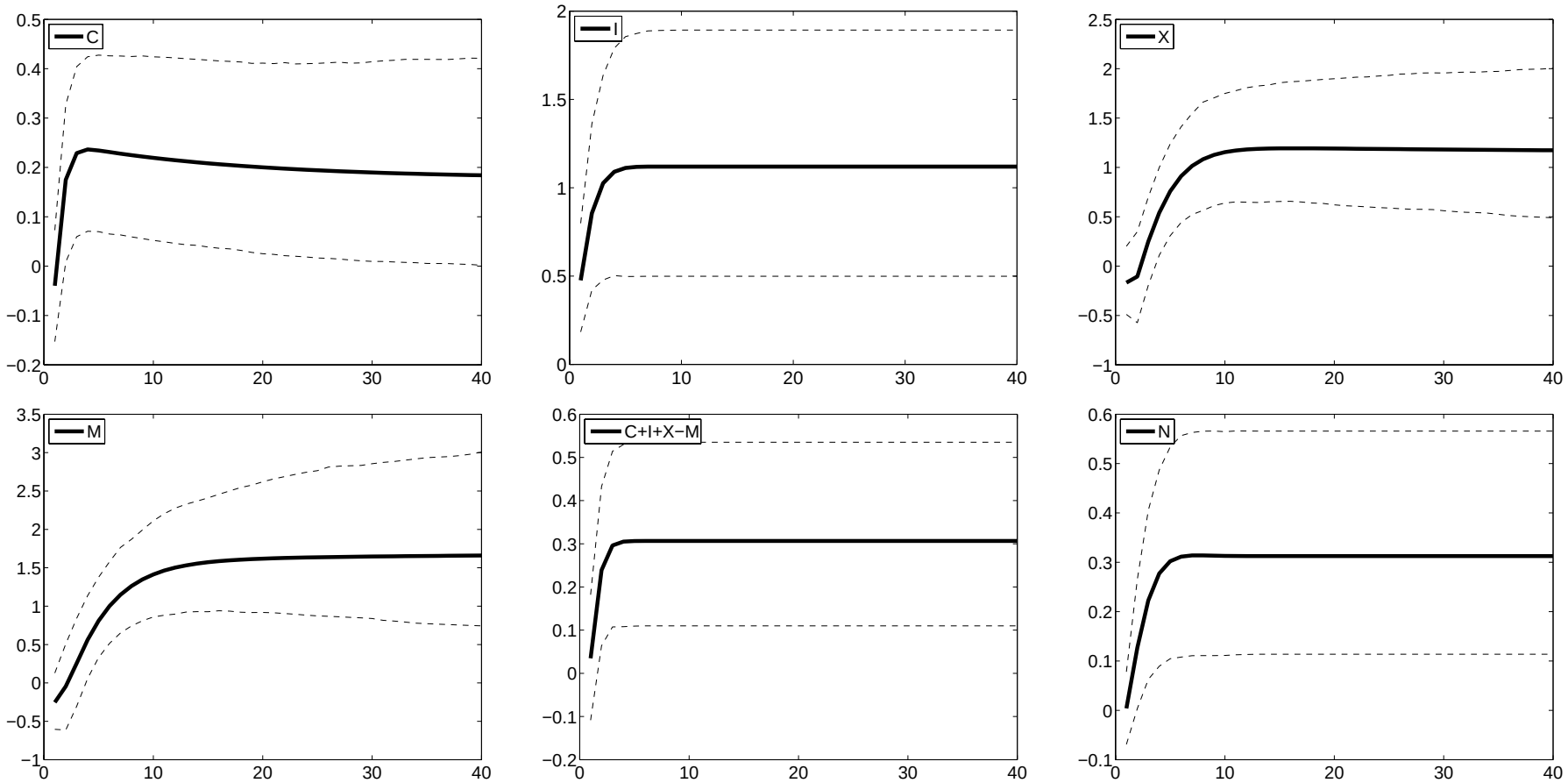
- A news shock triggers an expansion in the US...

Response to a news shock, USA



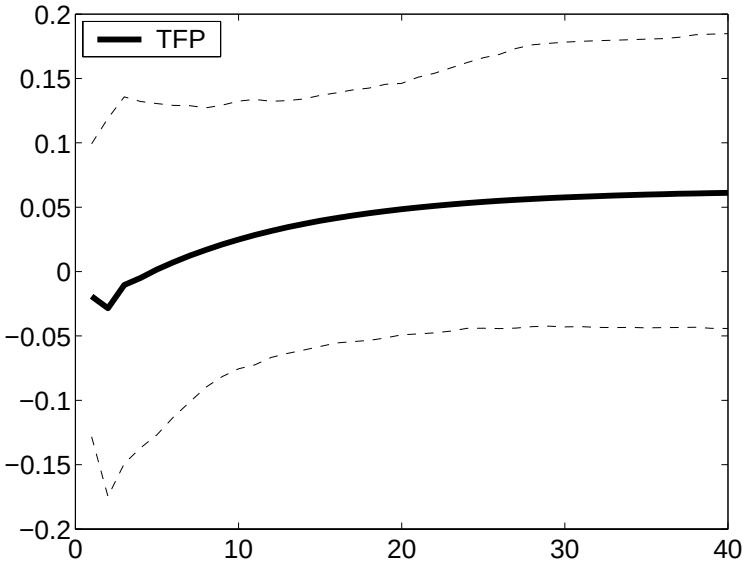
- ...as well as in Canada.

Response of Canadian aggregates to a news on US TFP



- The shock we have identified *is not* a Canadian TFP shock.

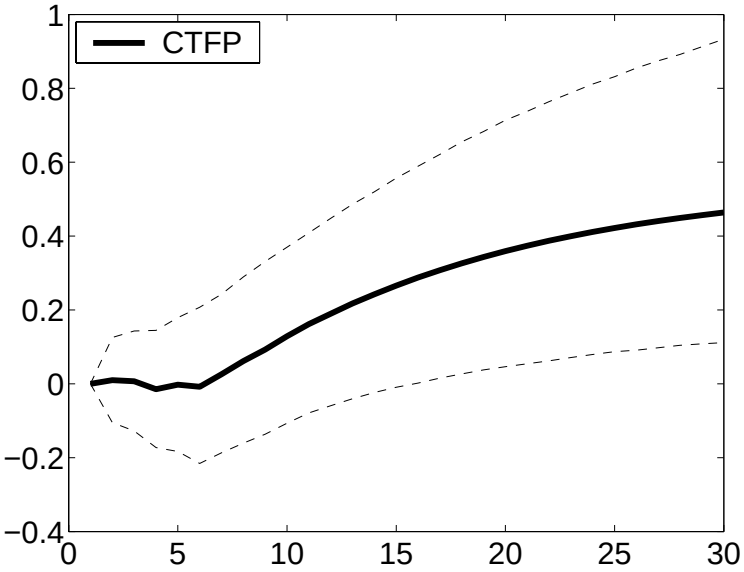
Response of Canadian TFP to a News on U.S. TFP

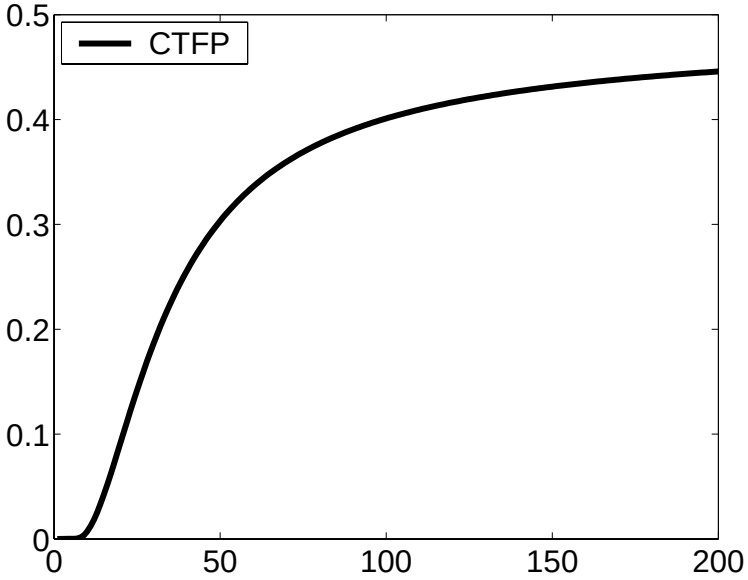


2.3. German news shocks and their propagation

- German data are from Haertel & Lucke [2006].
- Same qualitative results.

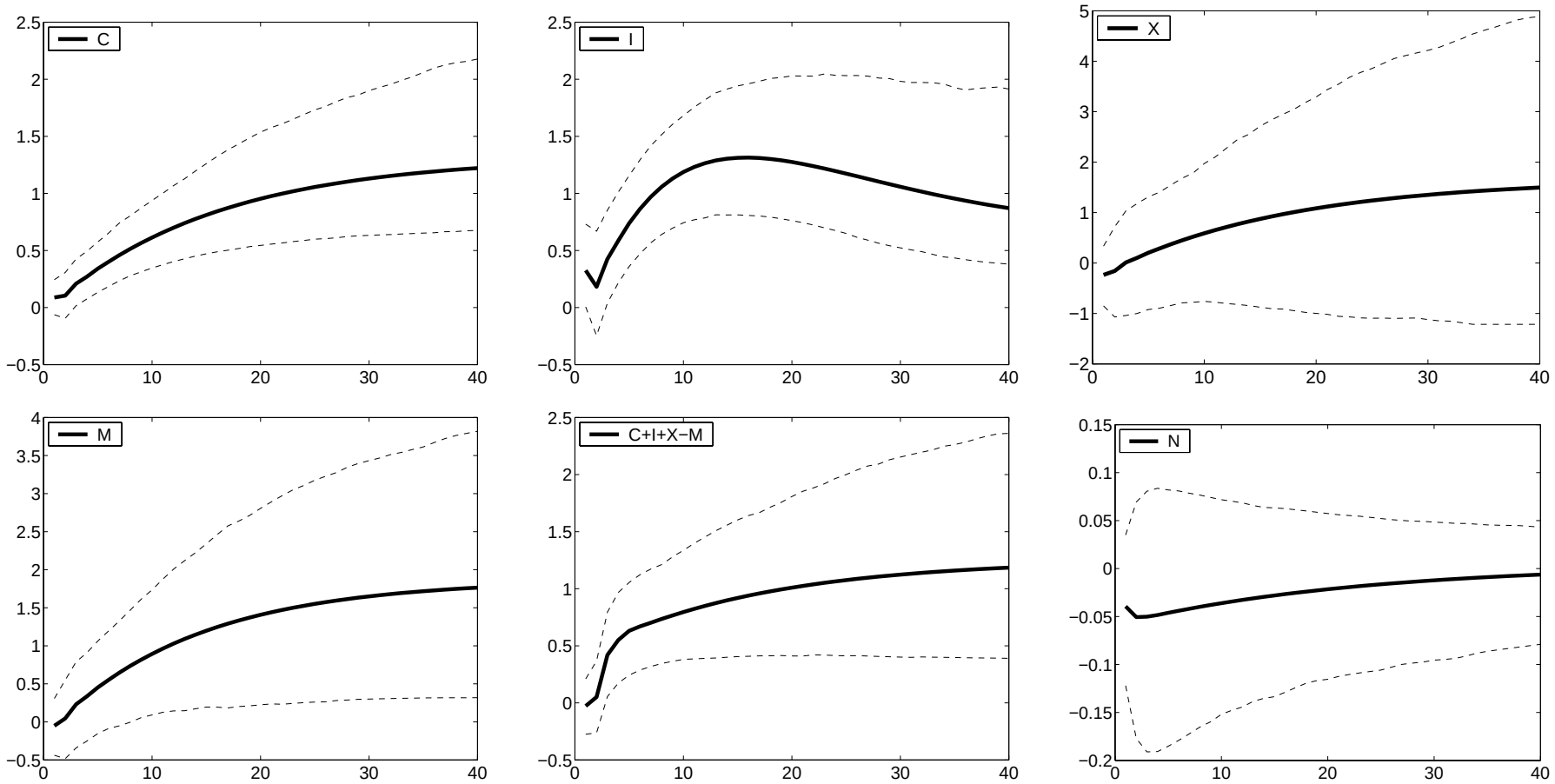
Response to a news shock, Germany





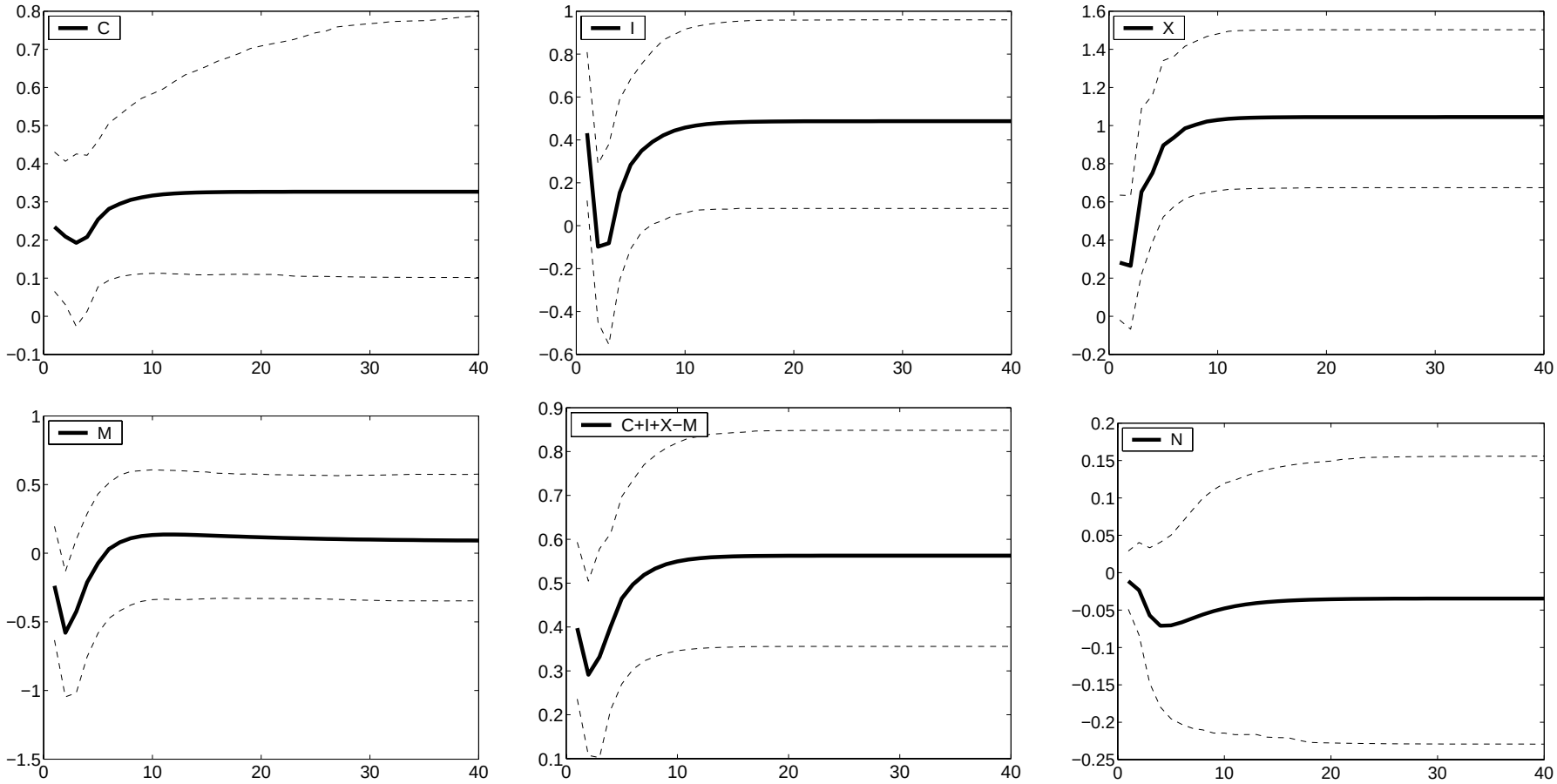
- Again a news shock triggers an expansion in Germany...

Response to a news shock, Germany



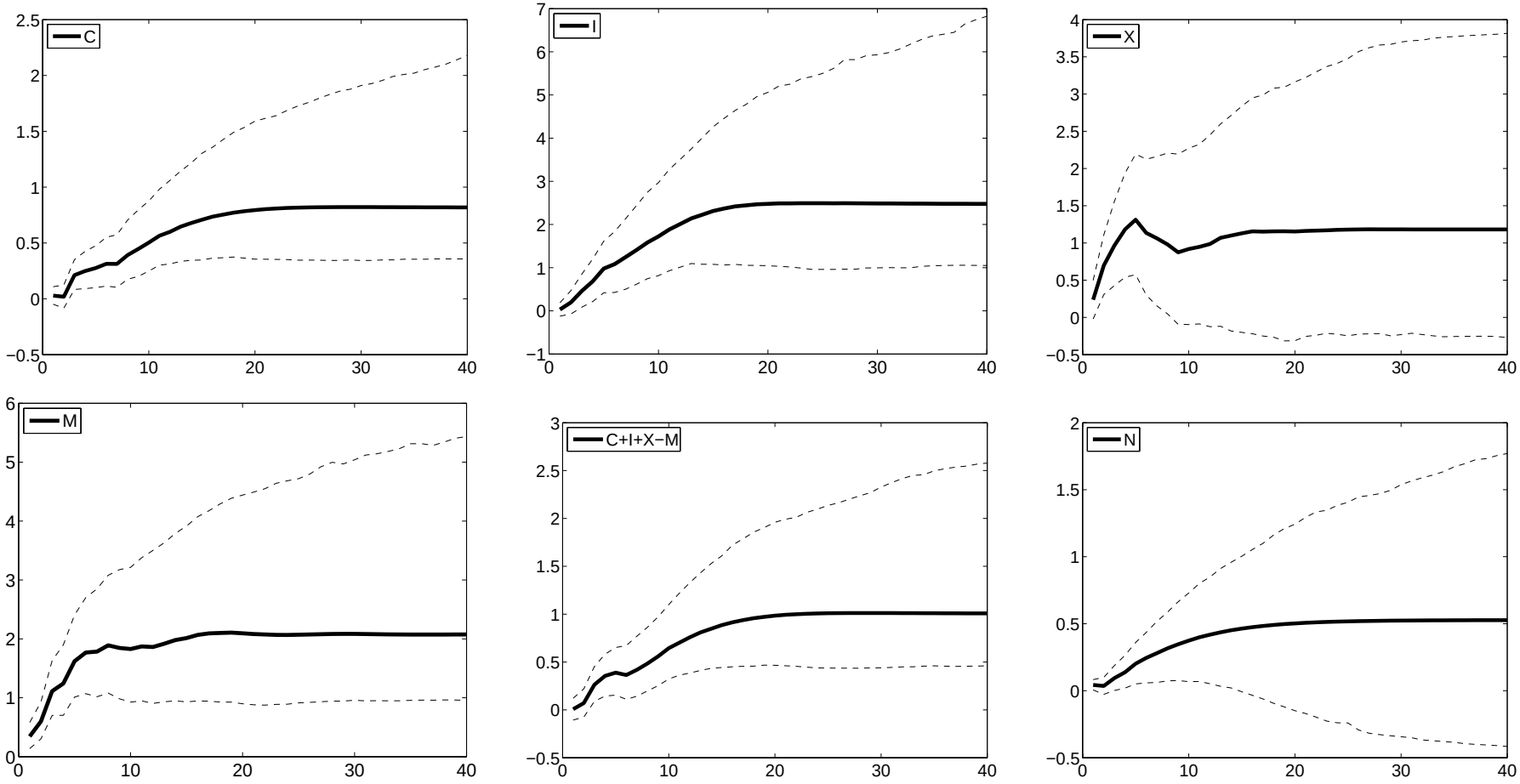
- ... as well as in Autria,

Response of Austrian aggregates to a German News Shock



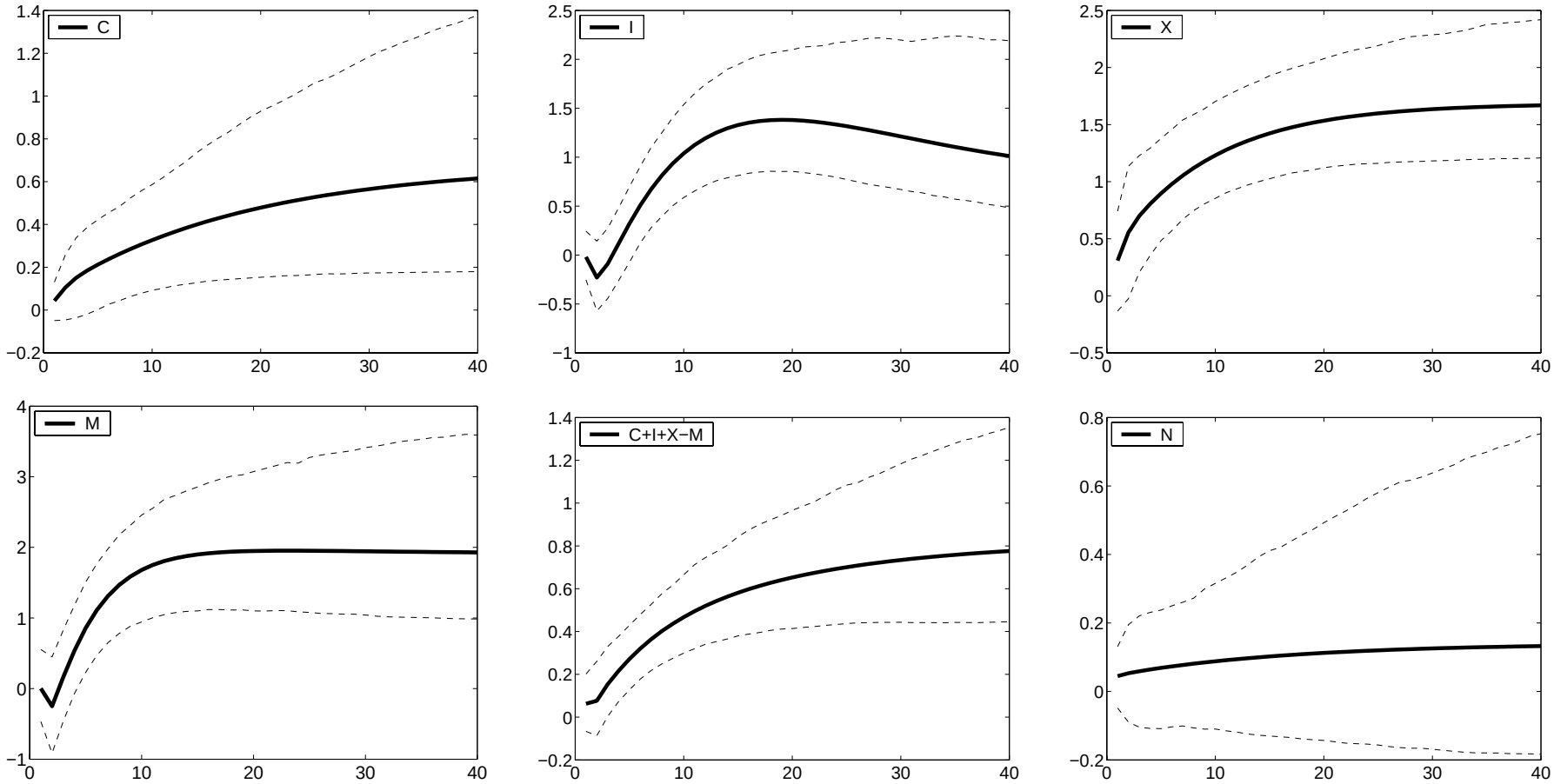
- ... in France,

Response of French aggregates to a News on German TFP



- ... and in Italy.

Response of Italian aggregates to a News on German TFP



2.4. What have we learned?

• Conditional on news to future TFP, main macro aggregates display strong comovements across countries.

• We now try to account for these findings.

3. NBC and IBC in a canonical model

- Here we show that in a canonical model, news shocks are a IBC driving force...

- but they cannot produce NBC.

3.1. The model

• A 2-country, 1-good economy. The economy is hit by technology shocks $\theta_{A,t}$ and $\theta_{B,t}$. Capital quantity and location are predetermined.

• Choose $\left\{C_{j,t},\, H_{j,t},\, I_{j,t},\, K_{j,t+1}\right\}_{j=A,B}$ in order to

$$\max E_0 \sum_{t=0}^{+\infty} \beta^t \left[U\left(C_{A,t}, 1-H_{A,t}\right) + U\left(C_{B,t}, 1-H_{B,t}\right)\right]$$

subject to

$$\begin{cases} K_{A,t+1} \leq (1-\delta)\, K_{A,t} + I_{A,t} \\ K_{B,t+1} \leq (1-\delta)\, K_{B,t} + I_{B,t} \\ C_{A,t} + C_{B,t} + I_{A,t} + I_{B,t} \leq \underbrace{F\left(K_{A,t}, H_{A,t}; \theta_{A,t}\right)}_{Y_{A,t}} + \underbrace{F\left(K_{B,t}, H_{B,t}; \theta_{B,t}\right)}_{Y_{B,t}} \\ K_{A,0} = K_{B,0} \quad \text{given} \end{cases} .$$

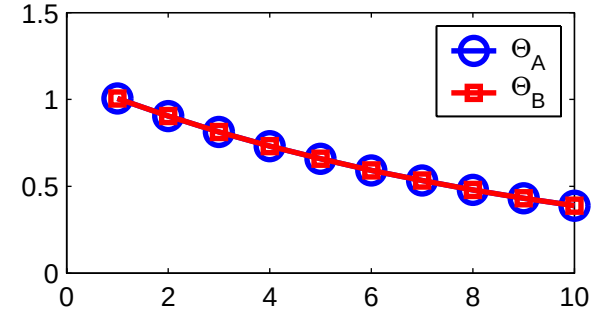
• We make the further simplifying assumption that preferences are separable in consumption and leisure ($U_{12} = 0$).

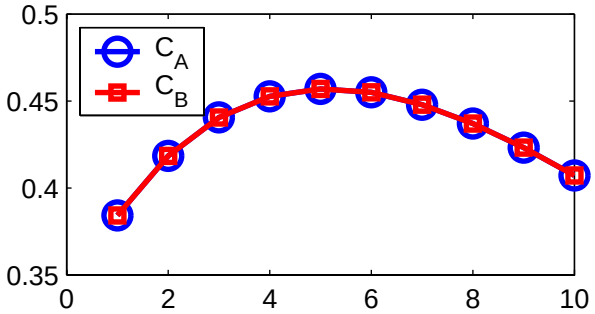
3.2. Some Propositions

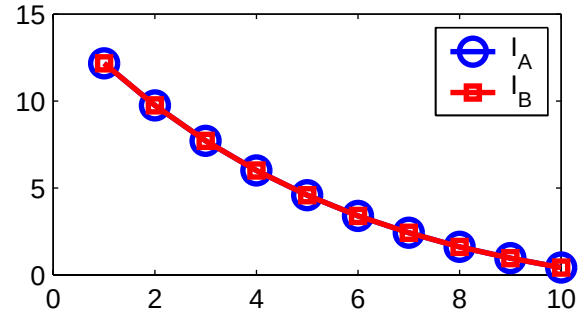
• Some propositions can be proved, that show the respective role of local/global/surprises/news in creating NBC and IBC.

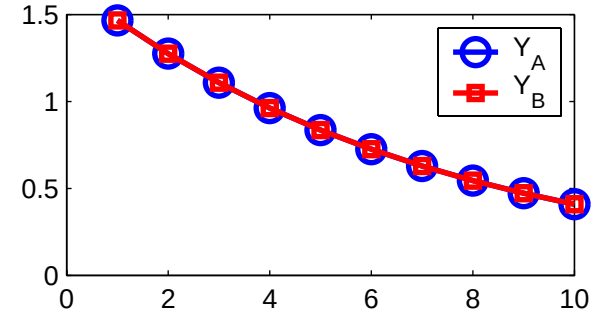
Result 1 *In response to global surprises ($\theta_{A,t} = \theta_{B,t} \forall t$), equilibrium allocations are symmetrical. The model displays IBC.*
Under functional and parameters restrictions, the model also displays NBC.

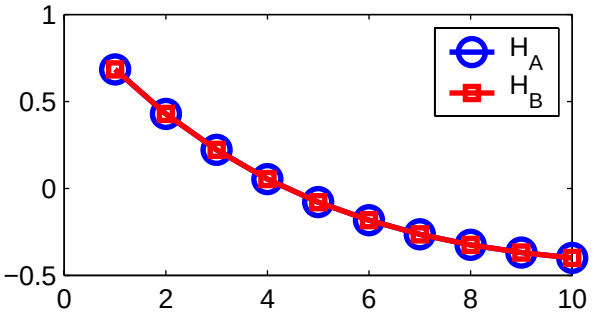
World Technological Surprise









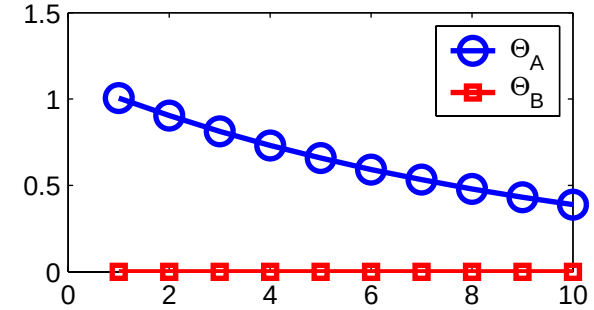


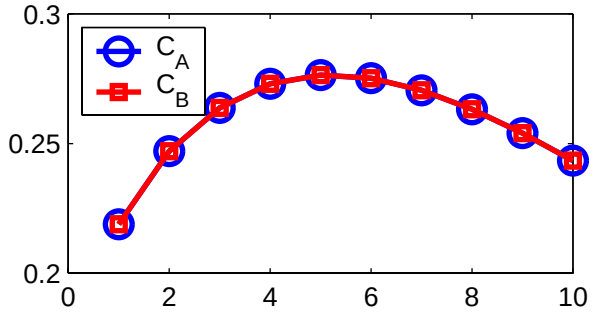
Result 2 *If technology shocks are local and surprises ($d\theta_{A,t} > 0$, $d\theta_{B,t} = 0$ for some t), then hours worked are not perfectly correlated across countries.*

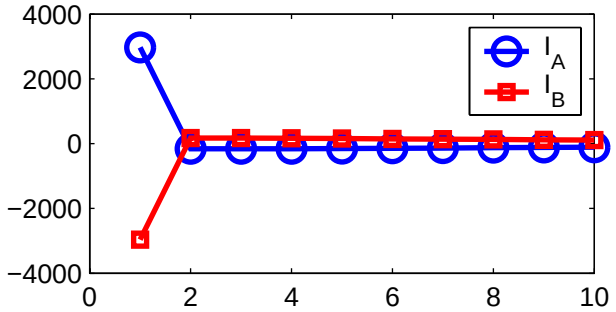
For realistic settings, hours and investments are negatively correlated.

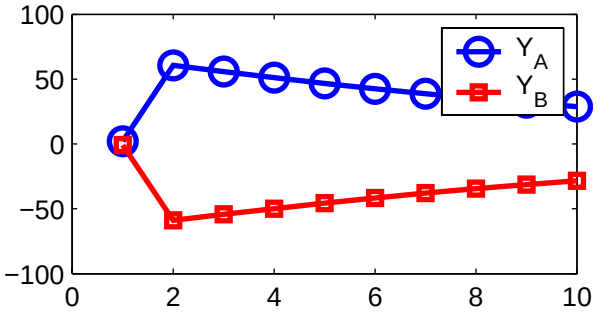
There is therefore no IBC and no NBC in the foreign country.

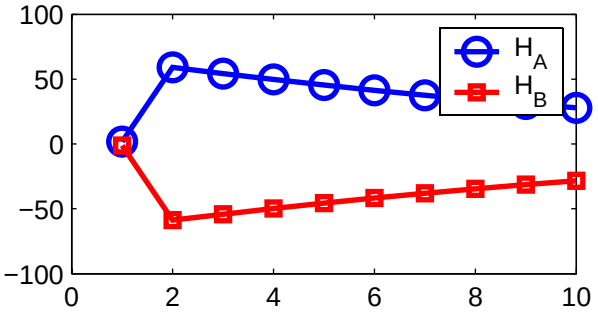
Local Technological Surprise





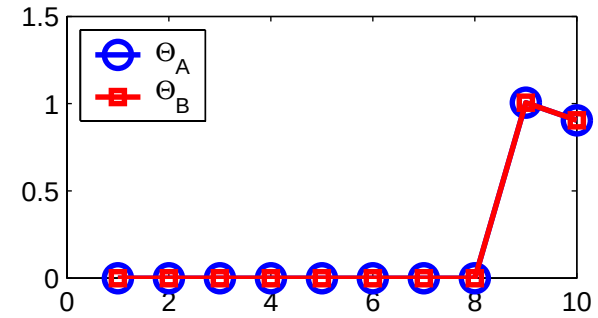


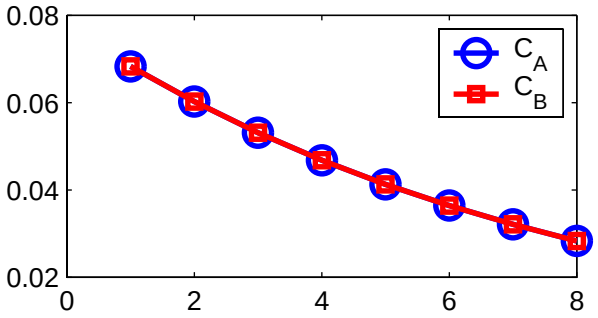


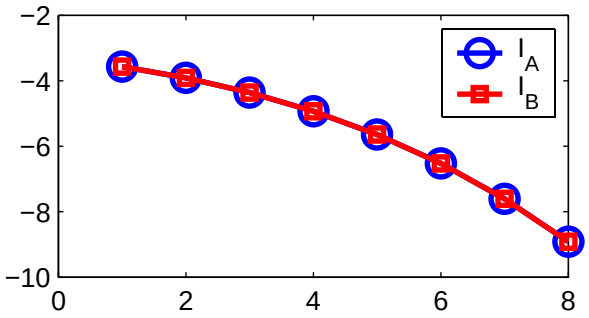


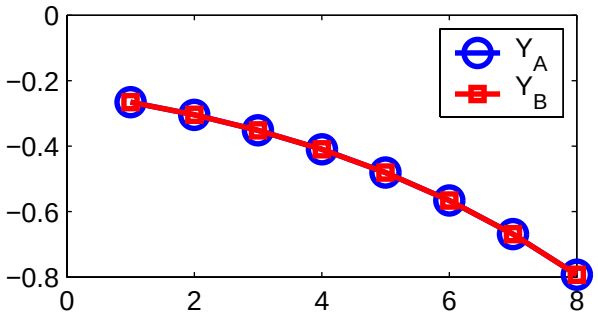
Result 3 *If technology shocks are announced/forecastable N periods in advance, then allocations are symmetrical in the $N-1$ first periods of the interim period, for both world and local news $\Rightarrow$ IBC.*
In the interim period, consumption and hours always move in opposite directions $\Rightarrow$ no NBC.

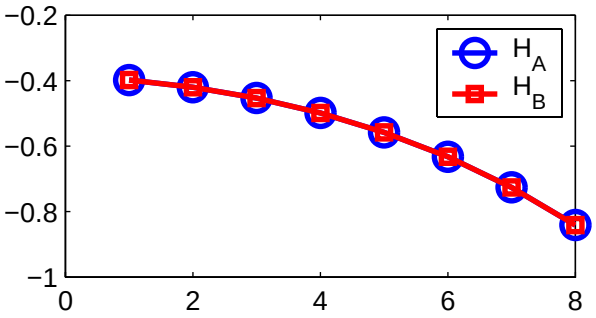
(World) Technological News



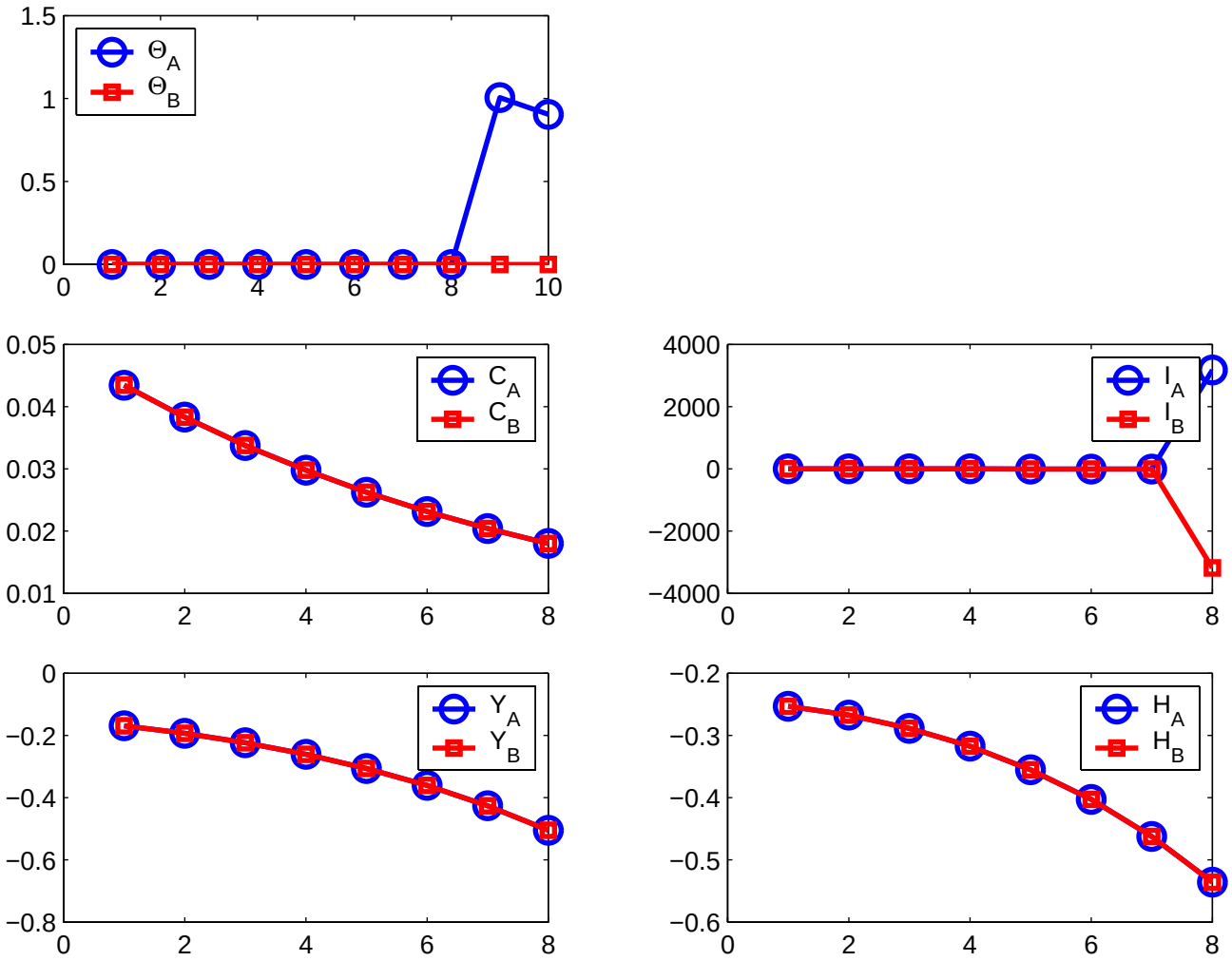








(Local) Technological News



3.3. What have we learned?

- News act as a demand shock, that bunch together economies, *even though* they are about local technological improvements

- But standard models cannot display NBC and IBC.

- We need an extended model.

4. A Two-Country Pigou Model

- We build on Beaudry & Portier [2004, jme] "Pigou model"

- Building blocks are :

1. Two sectors for final use goods in each country: local consumption good and one local investment good (structure);

2. two sectors of intermediate goods in each country: consumption-oriented and investment oriented;

3. capital and labor are complementary in the consumption-oriented intermediate good (capital=structures);

4. there are static gains to trade (Armington aggregators for consumption and investment);

5. labor is the only variable factor in the production of the investment-oriented intermediate good.

4.1. Model

Final goods:

$$C_{A,t} = \left[b Z_{AA,t}^{\nu_C} + (1-b) Z_{BA,t}^{\nu_C} \right]^{\frac{1}{\nu_C}}$$

$$I_{A,t} = \left[b X_{AA,t}^{\nu_I} + (1-b) X_{BA,t}^{\nu_I} \right]^{\frac{1}{\nu_I}}$$

$$K_{A,t+1} = (1-\delta) K_{A,t} + I_{A,t}$$

Intermediate goods:

$$Z_{A,t} = \left[a \left(\Theta_{A,t} \overline{H}_{A,Z}^{1-\varphi} H_{A,t}^{\varphi} \right)^{\nu} + (1-a) K_{A,t}^{\nu} \right]^{\frac{1}{\nu}}$$

$$X_{A,t} = \widetilde{\Theta}_{A,t} \overline{K}_{A}^{1-\alpha_X-\beta_X} \overline{H}_{A,X}^{\beta_X} \widetilde{H}_{A,t}^{\alpha_X}$$

Preferences:

$$\mathcal{U}_A = \left[\ln c_{A,t} - \chi \left(h_{A,t} + \widetilde{h}_{A,t} + \overline{h}_A \right) \right]$$

The country B economy is symmetric to country A one.

- No particular trick in the calibration except that we assume a lot of complementarity in the Armington aggregators (elasticity $= 1/4$)

- Steady technological growth in the investment good sector

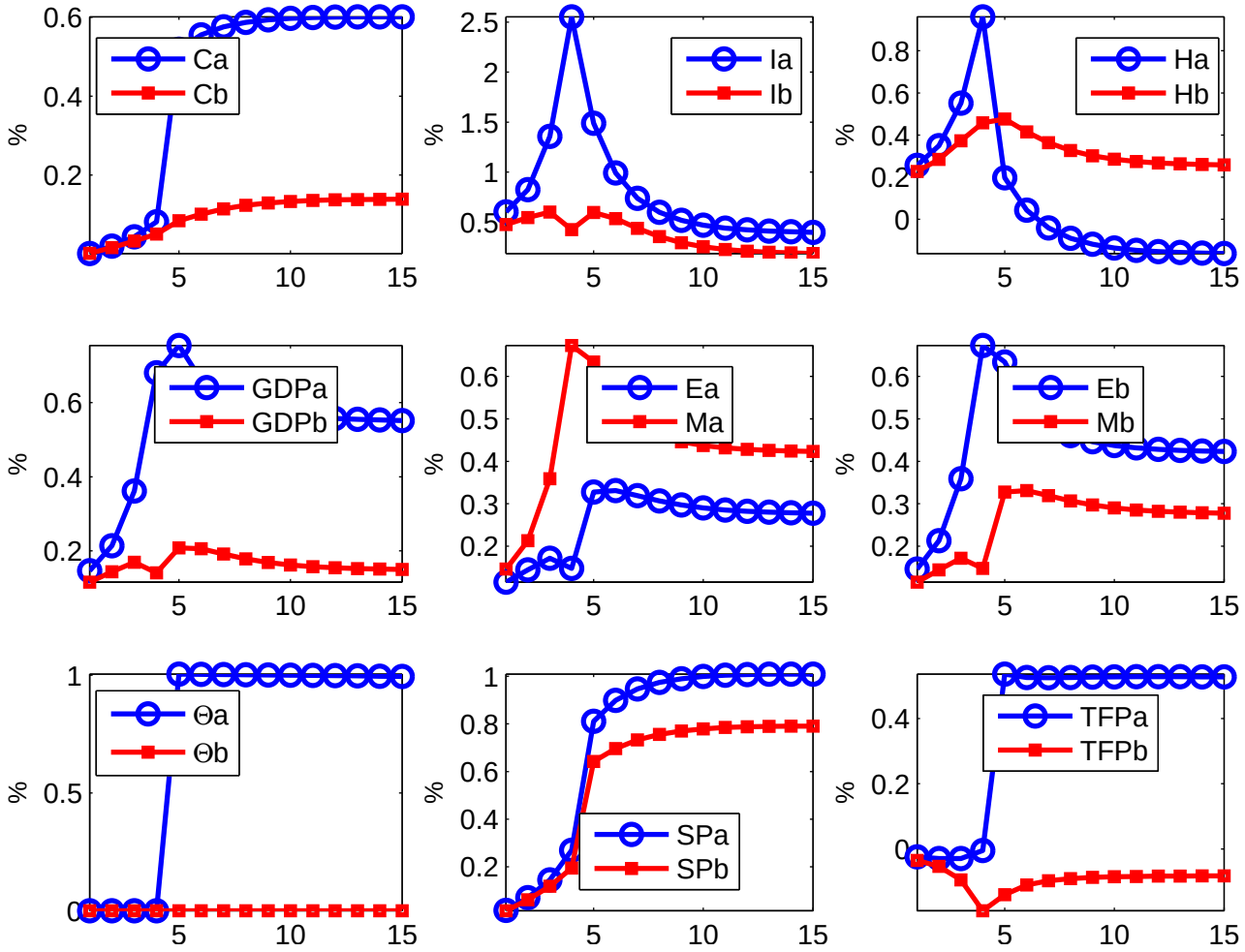
- Shocks in the consumption good sector:

$$\begin{aligned}
\Theta_{A,t} &= \left(\Theta_{A,t-1}\right)^{\rho} e^{\varepsilon_{A,t}} \\
\Theta_{B,t} &= \left(\Theta_{B,t-1}\right)^{\rho} e^{\varepsilon_{B,t}} \\
\varepsilon_{A,t} &= \varepsilon^0_{A,t} + \varepsilon^1_{A,t-1} + \varepsilon^2_{A,t-2} + \varepsilon^3_{A,t-3} + \varepsilon^4_{A,t-4} \\
\varepsilon_{B,t} &= \varepsilon^0_{B,t} + \varepsilon^1_{B,t-1} + \varepsilon^2_{B,t-2} + \varepsilon^3_{B,t-3} + \varepsilon^4_{B,t-4}
\end{aligned}$$

Two-country Pigou Model Parameters Values

N_a, N_b	:	1
a	:	.06
b	:	.99
ϕ	:	.6
ν	:	-3.78
ν_C, ν_I	:	-3
α_X	:	.97
β_X	:	0
χ	:	.1225
δ	:	.05
β	:	.999
Θ	:	1
$\widetilde{\Theta}$	:	3

4.2. Result: Local Technological News to Θ_A

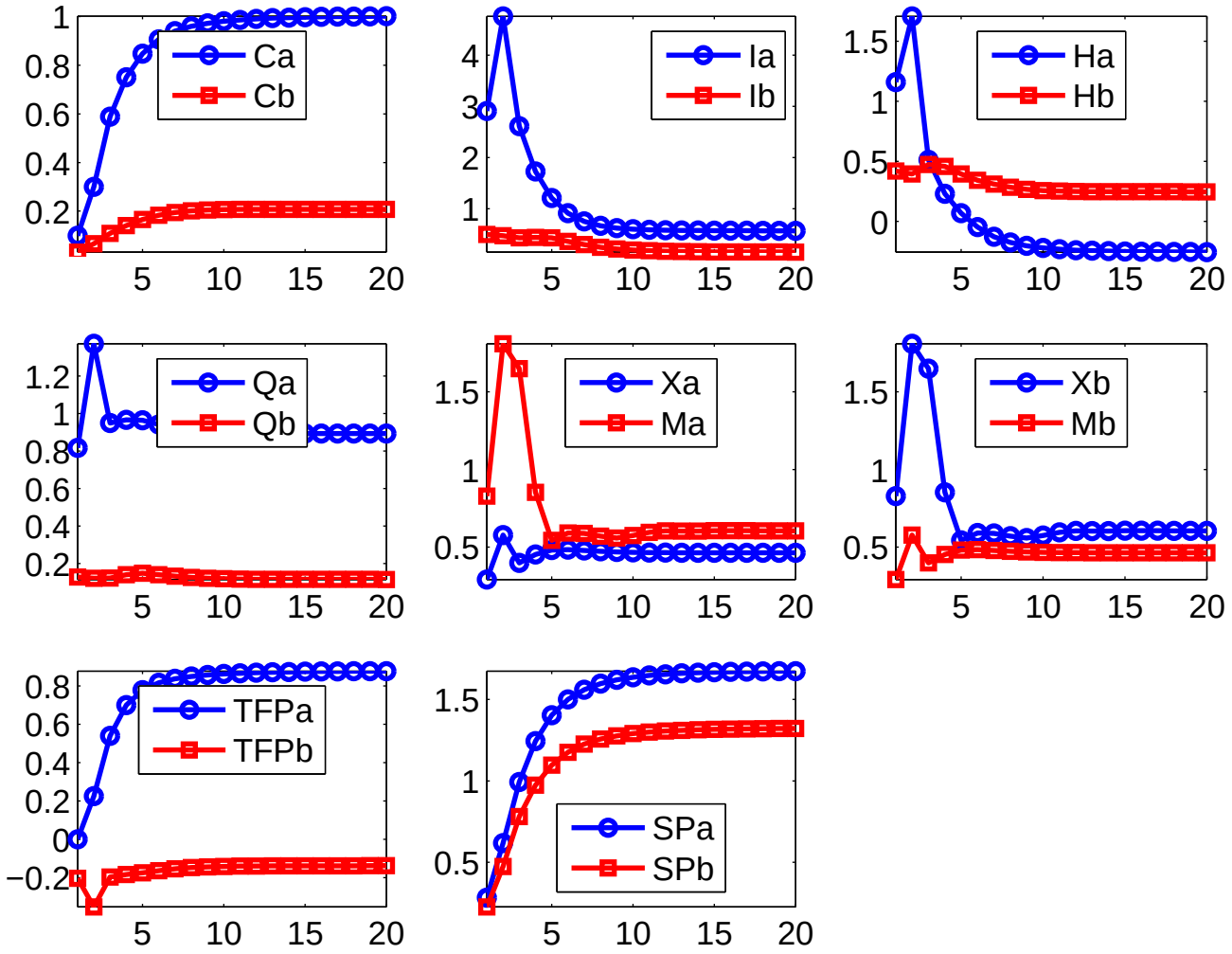


4.3. Result: Identified Technological News to Θ_A (simulated VAR)

- Here we simulate the economy with only shocks in country A (B is "small")

- We then estimate our VAR on model simulated data (repeated 1000 times)

Response of A and B aggregates to a News on country A TFP



5. To Sum Up

- News shocks are observed to create NBC and IBC.

- We have proposed an (almost standard) model that can account for these facts.