



Macroeconomic Interdependence and the International Role of the Dollar

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Starting Point

Some currencies have two international roles.

- for invoicing trade transactions with partners
- as a vehicle currency, in third-party transactions, not involving the issuing country.

Paper considers the consequences of these two dimensions, focusing on macro interdependence.

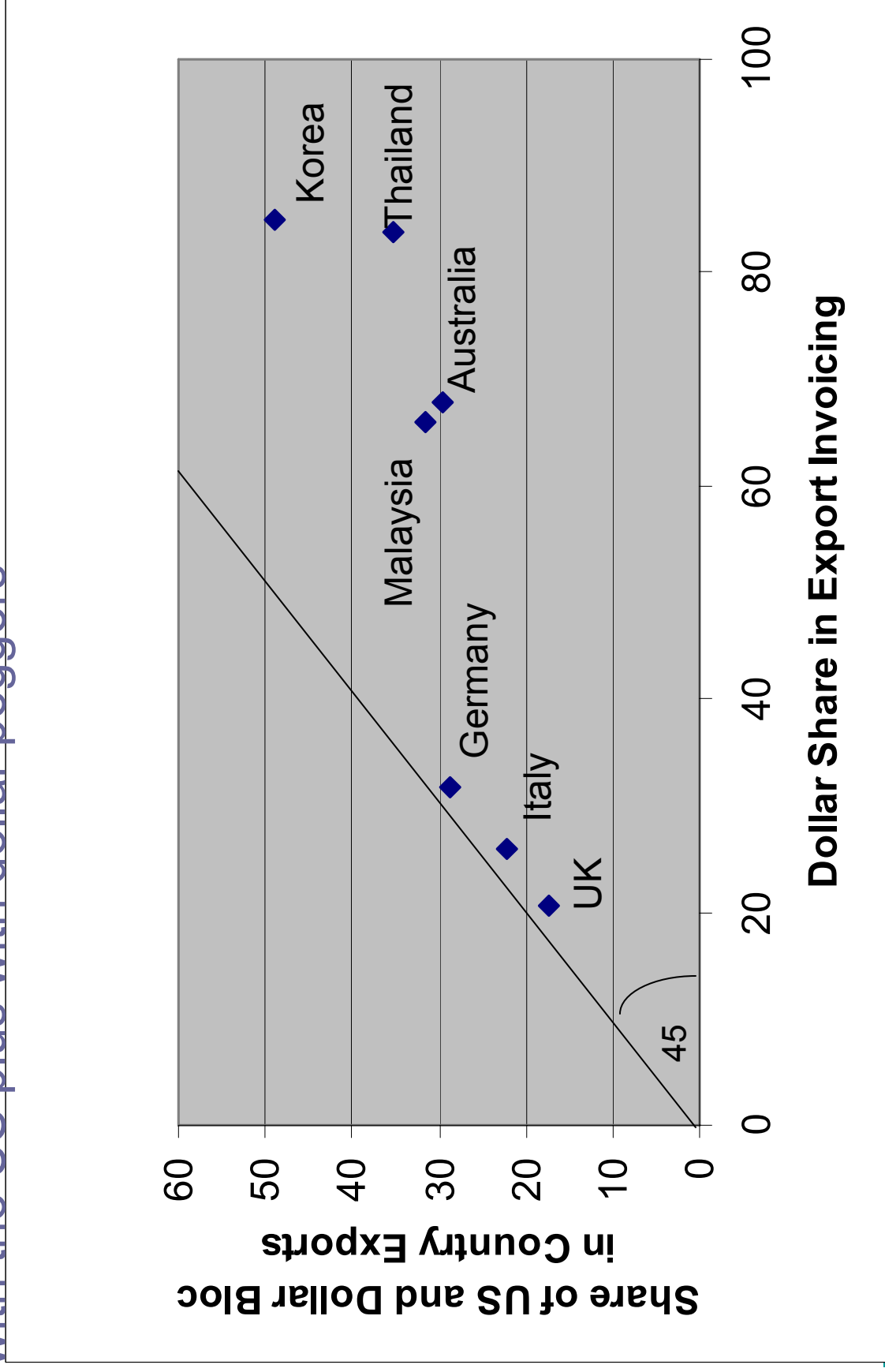
Timely focus, relevant for discussions of

- *de jure* or *de facto* currency blocs
- macro interdependence and monetary policy
- stability of “status” of vehicle currency role of \$, €

Evidence on vehicle currencies

- Two dimensions to the international role of the dollar
 - trade flows to and from US are invoiced in dollars (>95%)
 - trade flows between non-U.S. countries are invoiced in dollars to a sizable extent.

International Role of Dollar goes beyond both country trade with the US plus with dollar peggers



Source: Goldberg and Tille (2005), Dillon and Goldberg (2007)

Modeling macroeconomic interdependence

- With sticky prices, pass-through / invoicing assumptions drive transmission of shocks
- Usually a two-country setup with transmission through bilateral trade. Assumption on pass through varies
 - Symmetric (LCP or PCP)
 - Obstfeld & Rogoff QJE 2002, Devereux & Engel ReStud 2003,
 - Asymmetric (and partial)
 - Corsetti & Pesenti JME 2005, Devereux, Shi & Xu JIE forthcoming.
 - Yield distinct optimal monetary policies
- Our contribution: The center affects the periphery even in absence of direct bilateral trade, as long as the center currency is used in intra-periphery trade.

Our Main Results

Beyond the standard channel (trade flows between center and periphery), vehicle currency use:

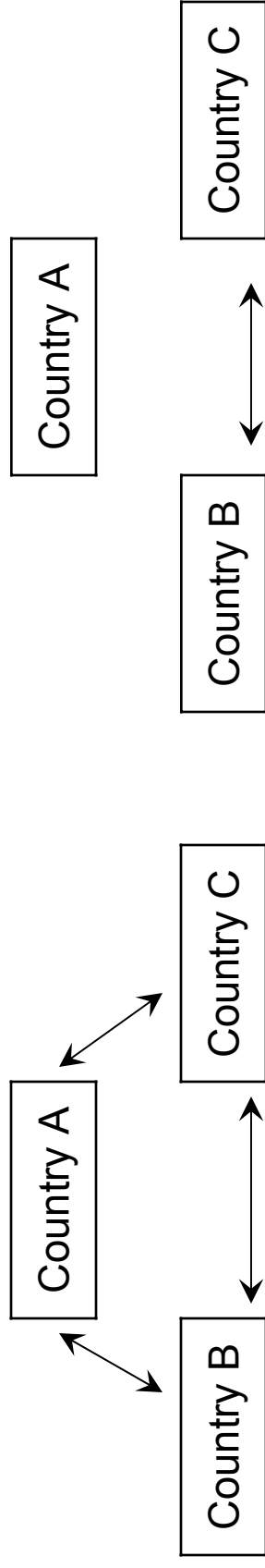
- Exposes periphery to center's monetary policy.
- Reduces periphery monetary policy effectiveness.
- Creates externalities from center's monetary policy
 - center-periphery exchange rates affect intra-periphery trade.
 - can be inefficient, leading to sizable welfare losses.
 - opportunity for gains from coordinating monetary policy between center and periphery.

Structure of the simple model

- Three countries:
 - Center, country *A* (United States).
 - Periphery, country *B* (Thailand) and *C* (Korea).
- The size of the world is set to one. Unit continuum of differentiated brands available for consumption (CES).
 - Center produces half the brands (i.e. its size is $1/2$).
 - Each periphery country produces a quarter of the brands (the size of each periphery country is $1/4$).

Consumption exhibits home bias

- Imported and domestic consumption.
- α captures the home bias between center and periphery
 - $\alpha = 0.5$: Center and periphery fully integrated in trade
 - $\alpha = 1$: Center and periphery are split



$\alpha = 0.5$

$\alpha = 1$

Allocation of consumption (simple version)

- Driven by relative prices, with elasticity of substitution:
 - 1 between baskets produced in different countries.
 - $\lambda > 1$ between brands produced in a given country.

Productivity and pricing

- Production linear in labor with stochastic productivity.
- Monopolistic competition.
- If prices are flexible (i.e. can be adjusted after the productivity shocks), the law of one price holds.

Money demand, labor supply, exchange rate

- Static model, prices set before the realization of shocks.
- Representative agent in country i maximizes:

$$U_i = E[\ln(C_i) + \chi \ln(M_i / P_i) - \kappa H_i] \quad i = A, B, C$$

- Agents hold domestic currency. Cash holdings and labor supply are chosen once the shocks are known.
- Exchange rates are simply the ratio of money supplies:

$$S_B = M_A / M_B \quad S_C = M_A / M_C$$

Interdependence and 5 Invoicing Possibilities

- PCP-SYM: all trade flows invoiced in the producer currency, full exchange rate pass-through.
- LCP-SYM: all trade flows invoiced in the local consumer currency, no exchange rate pass-through.
- **DOL-** : All flows with the center are invoiced in dollars.
1st dimension of the role of the dollar
 - **DOL-PCP**: Intra-periphery flows: PCP.
 - **DOL-LCP**: Intra-periphery flows: LCP.
 - **DOL-DOL**: Intra-periphery flows invoiced in dollars.
2nd dimension of the role of the dollar

Focus on Impact of monetary policy under DOL-

- Center's consumption and output are insulated from monetary policy in the periphery.
- DOL-PCP and DOL-LCP: periphery consumption and output are affected by the center (focus on $m_B = m_C$ for brevity)

$$c_B = y_B = (1 - \alpha)m_A + \alpha m_B$$

- DOL-DOL: The center has an even larger impact!

$$c_B = y_B = \left(1 - \alpha + \frac{\alpha}{2}\right)m_A + \left(\alpha - \frac{\alpha}{2}\right)m_B$$

Notation depicts log linearization around steady state values

Intuition

- Under DOL-PCP or LCP a monetary expansion in the U.S. depreciates the dollar, and boosts US exports to Asia, with no contraction in Asian exports to the U.S.
- Under DOL-DOL the depreciation of the dollar also makes Korean goods cheaper in Thailand, and Thai goods cheaper in Korea.
- Intra-Asia trade is boosted by the dollar depreciation.

Welfare

- The best a policy can do is deliver the flex price outcome.
 - A 10 percent productivity shock lowers the price of goods produced in a country by 10 percent.
- Welfare driven by the volatility of productivity differences (center-periphery as well as within periphery).
- Can explore differences in optimal monetary policy when
 - **Decentralized (Nash)**: set to meet domestic goals
 - **Cooperative**: each monetary authority sets its policy rule to maximize the *worldwide* average welfare.

Monetary Policy Results with Vehicle Currency

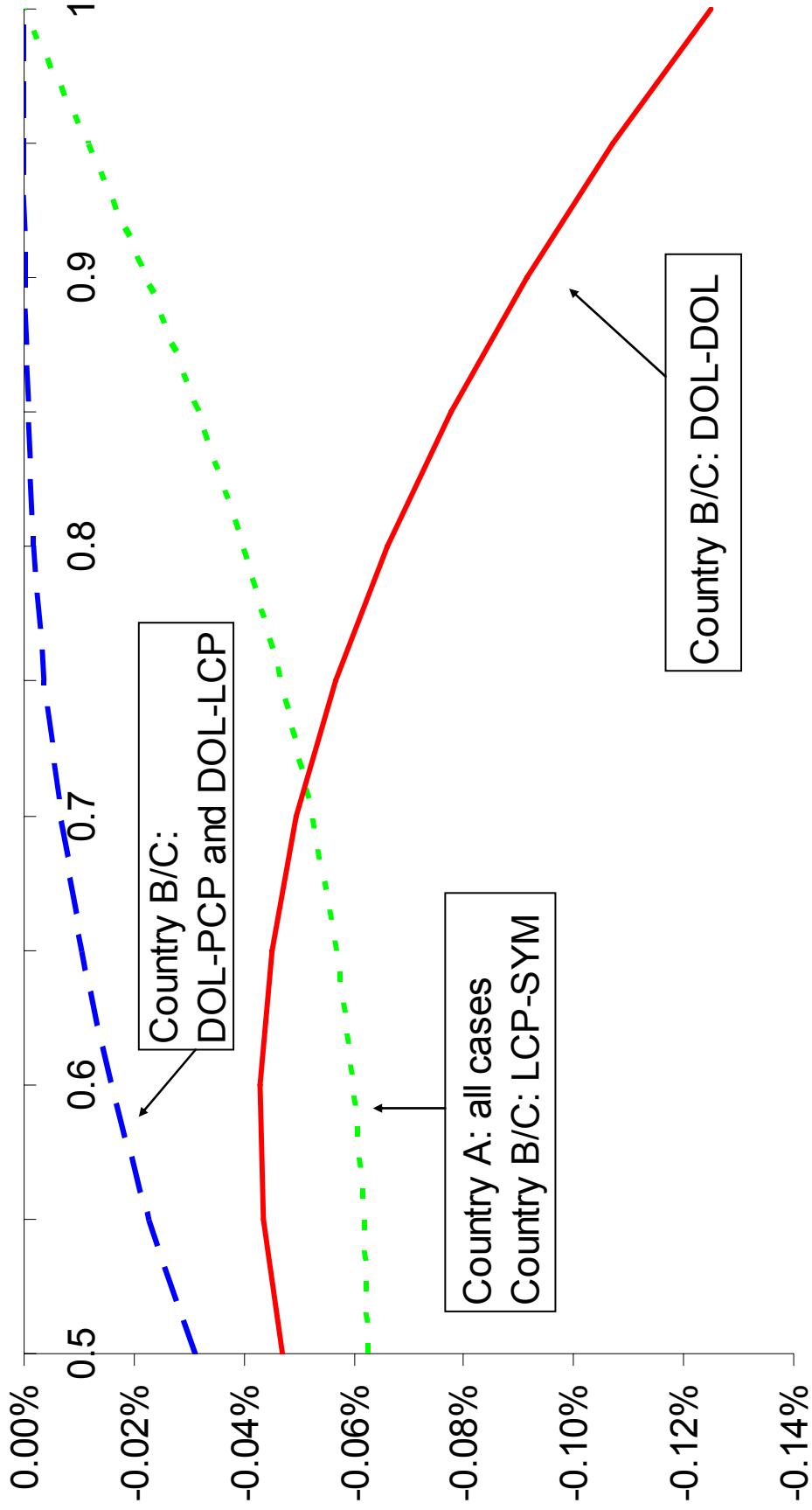
Decentralized and Cooperative Rules same for Periphery

- Periphery are better off than the center under DOL-LCP/PCP.
 - Benefit from moving exchange rates on center-periphery trade.
- The periphery can be worse off under DOL-DOL.
 - Suffer from having exchange rate volatility on intra-periphery trade.

Center Policy differs across Decentralized vs. Cooperative

- DOL-LCP/PCP: Under cooperation, center reacts more to its own shocks to induce more efficient center-periphery trade. Welfare difference is relatively small.
- DOL-DOL: Center reacts less to its own shocks even if center and periphery are disconnected, with goal of reducing inefficiency in intra-periphery trade. Welfare difference is large.

**Figure 5: Welfare under decentralized monetary policy
Shocks are equally volatile in country B and C**

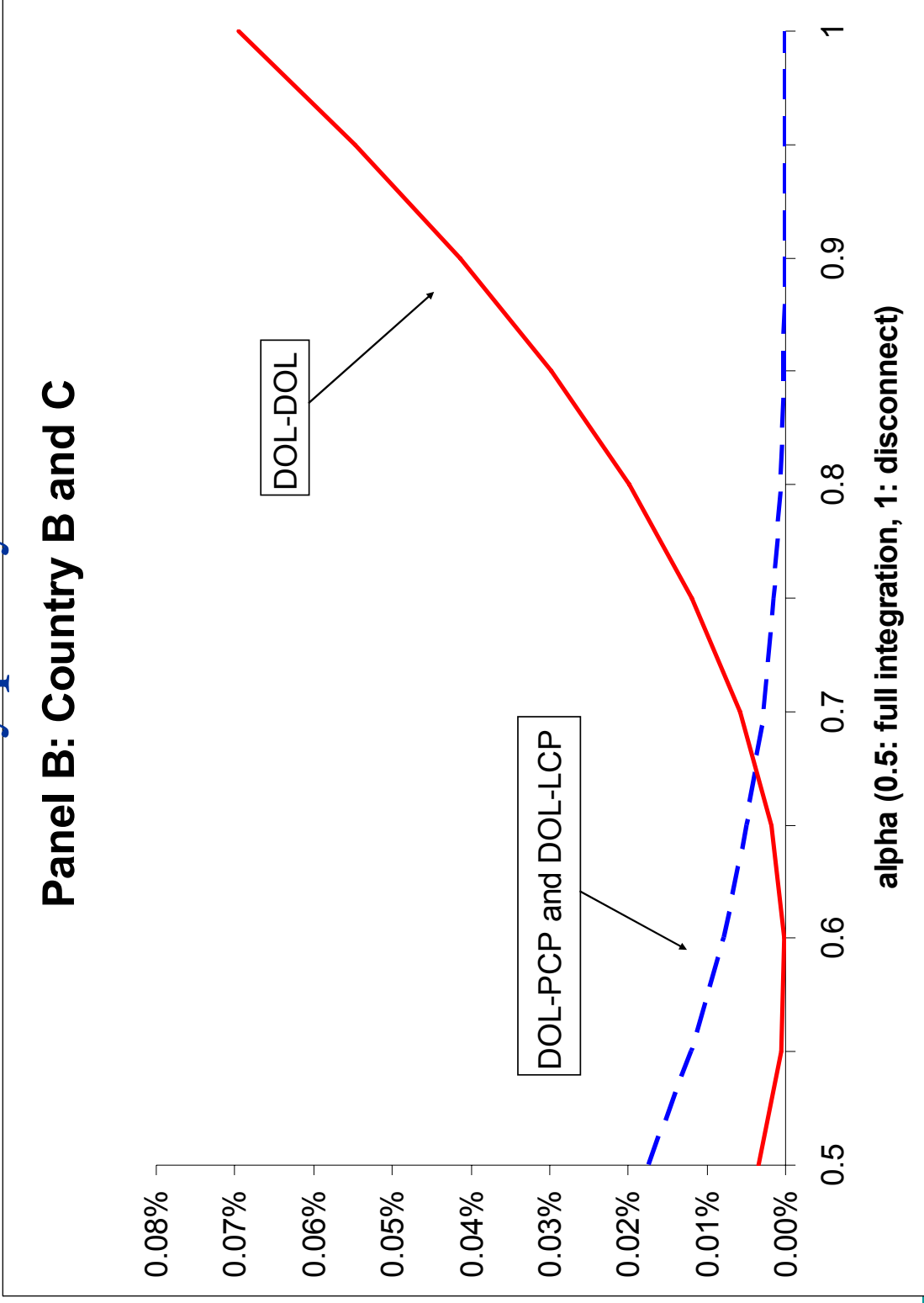


alpha (0.5: full integration, 1: disconnect)

welfare metrics: size of deviation from the flexible price allocation, % of consumption.

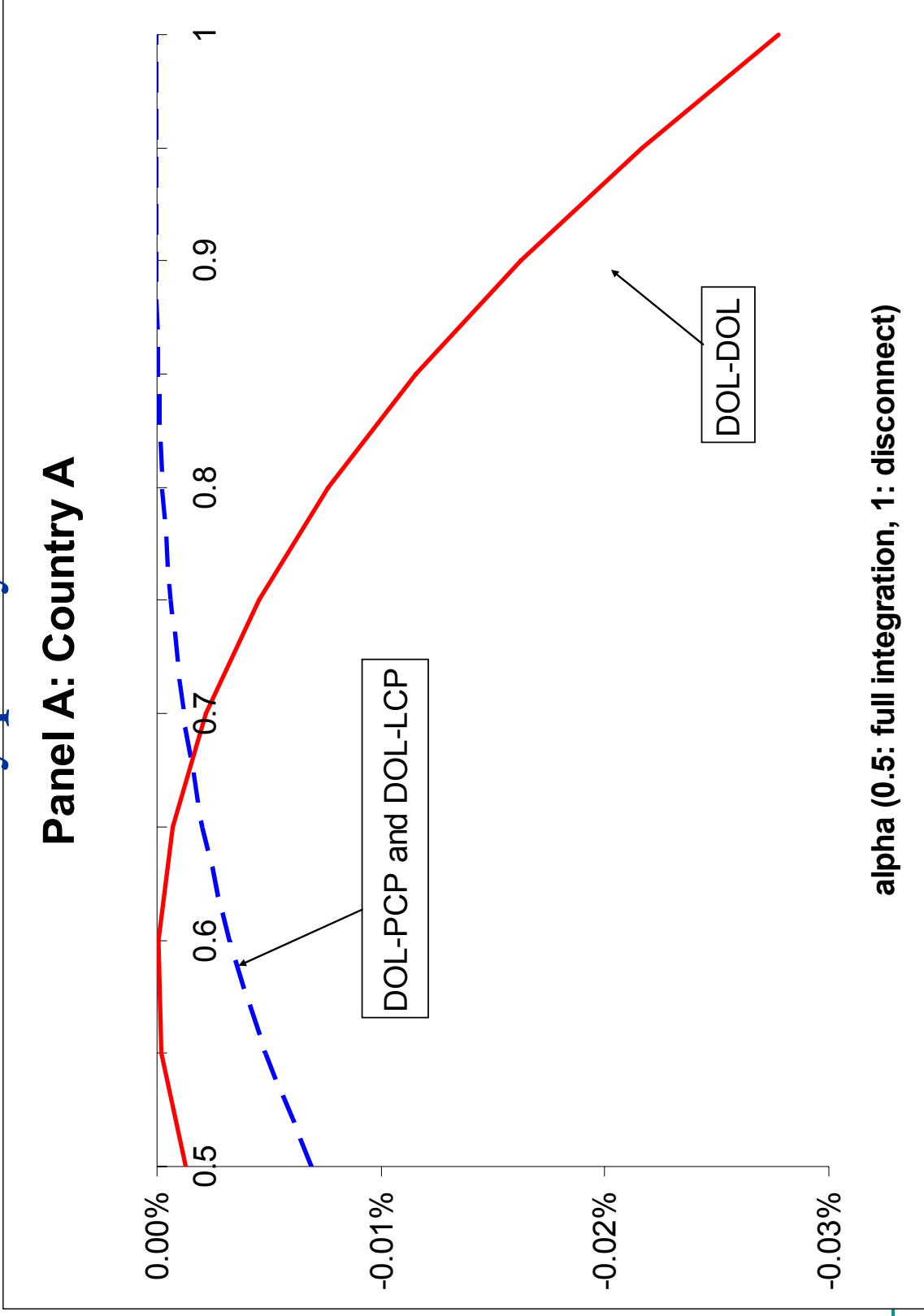
Ex ante welfare anticipates distribution of productivity shocks in center and periphery

What are the gains from cooperative relative to decentralized monetary policy?



Idea is that cooperative policy has center reducing distortions in periphery

What are the gains from cooperative relative to decentralized monetary policy?



Cooperation costly to the center when its policies target intra-periphery distortions¹⁸

Conclusions

- The international role of the dollar affects global interdependence through its two dimensions.
 - Second dimension has received little attention.
- A simple center periphery model shows:
 - The center has a disproportionately large impact
 - When a vehicle currency is used, the effectiveness of periphery policies is reduced.
 - Cooperative policy generates global gains, but at cost to the center
- Absent cooperation, can explore which potential shocks in the center and periphery might lead countries to abandon use of a vehicle currency, reducing its reach.

The euro is limited in vehicle currency role

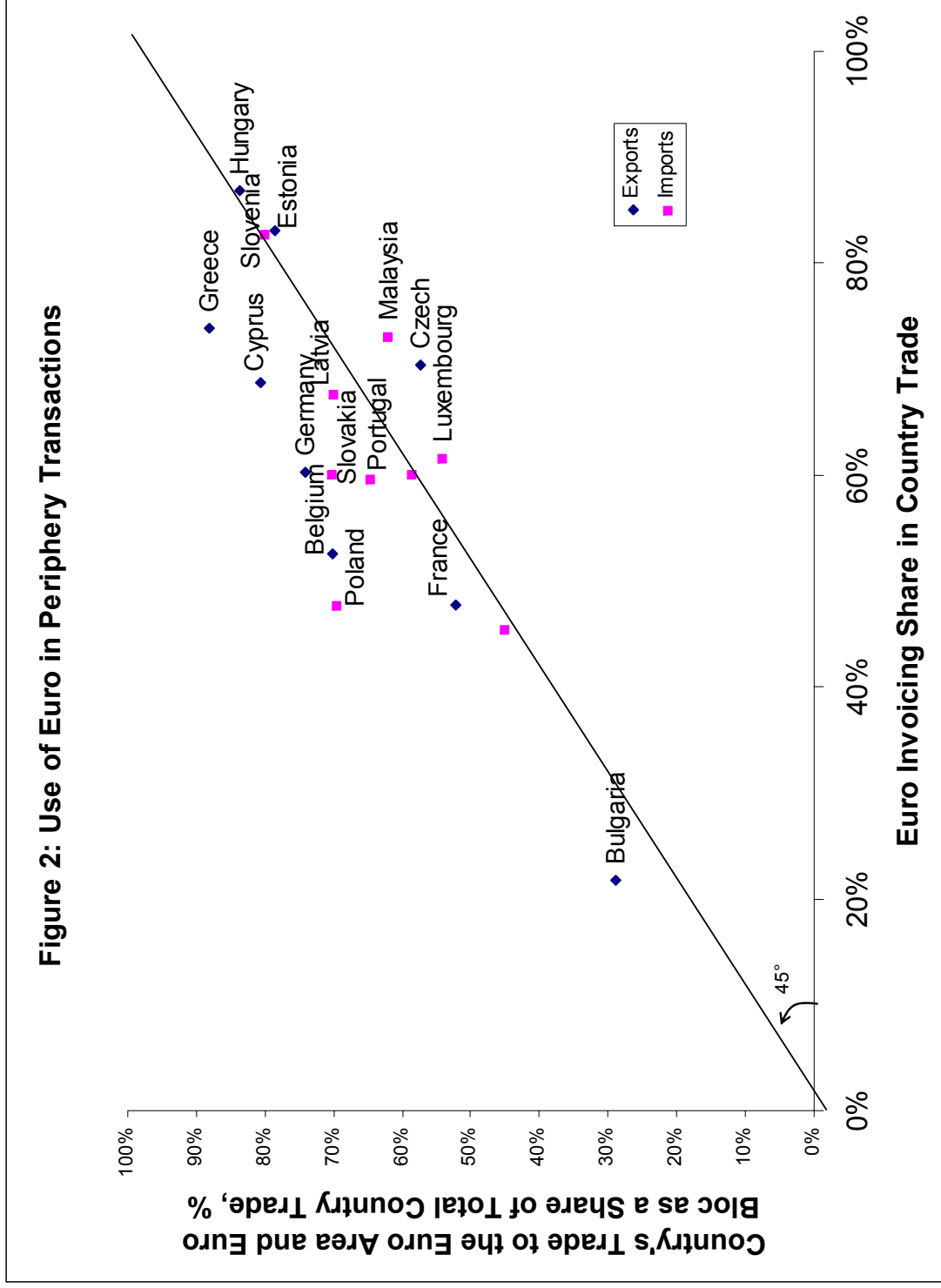
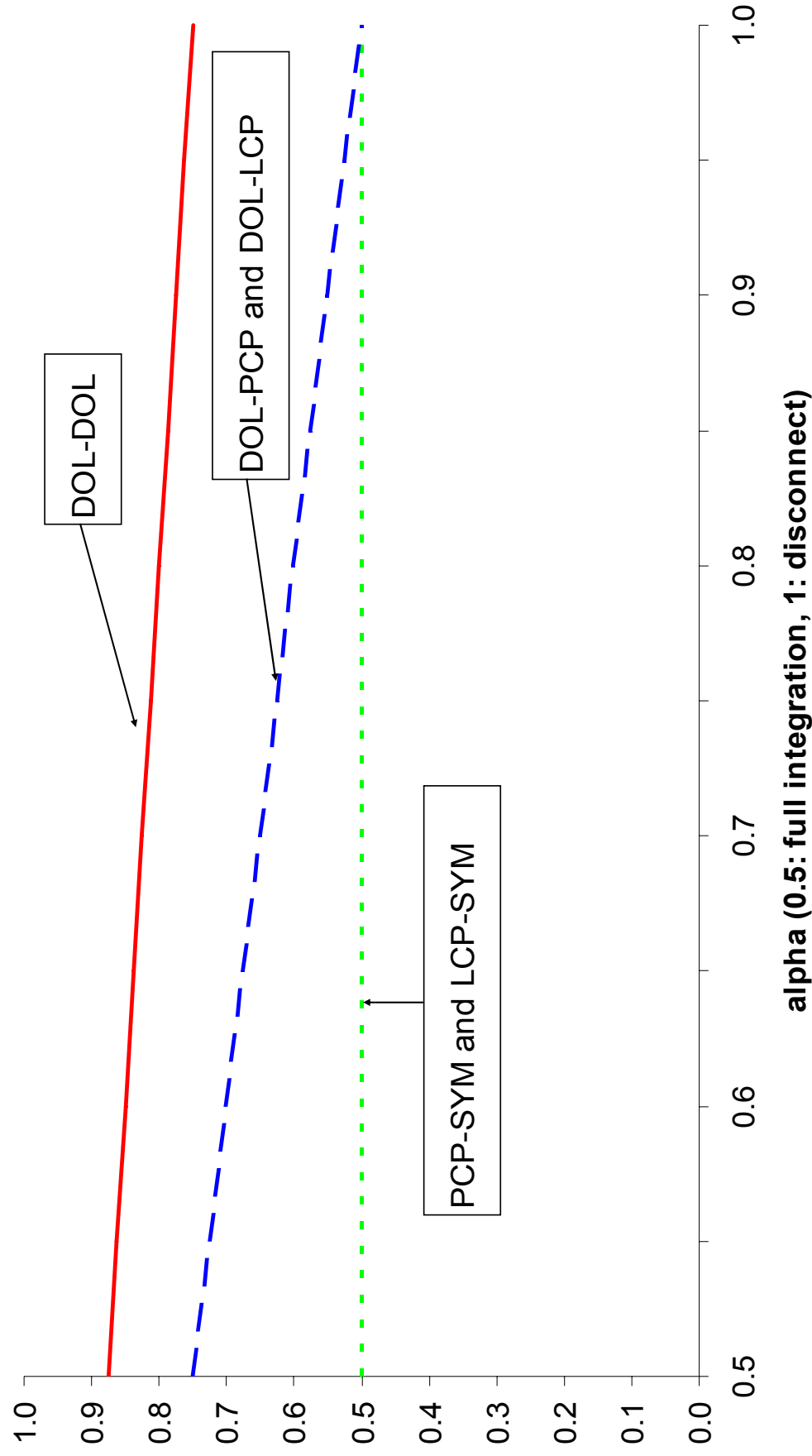


Figure 4: World consumption change following a unit expansion of monetary policy in country A

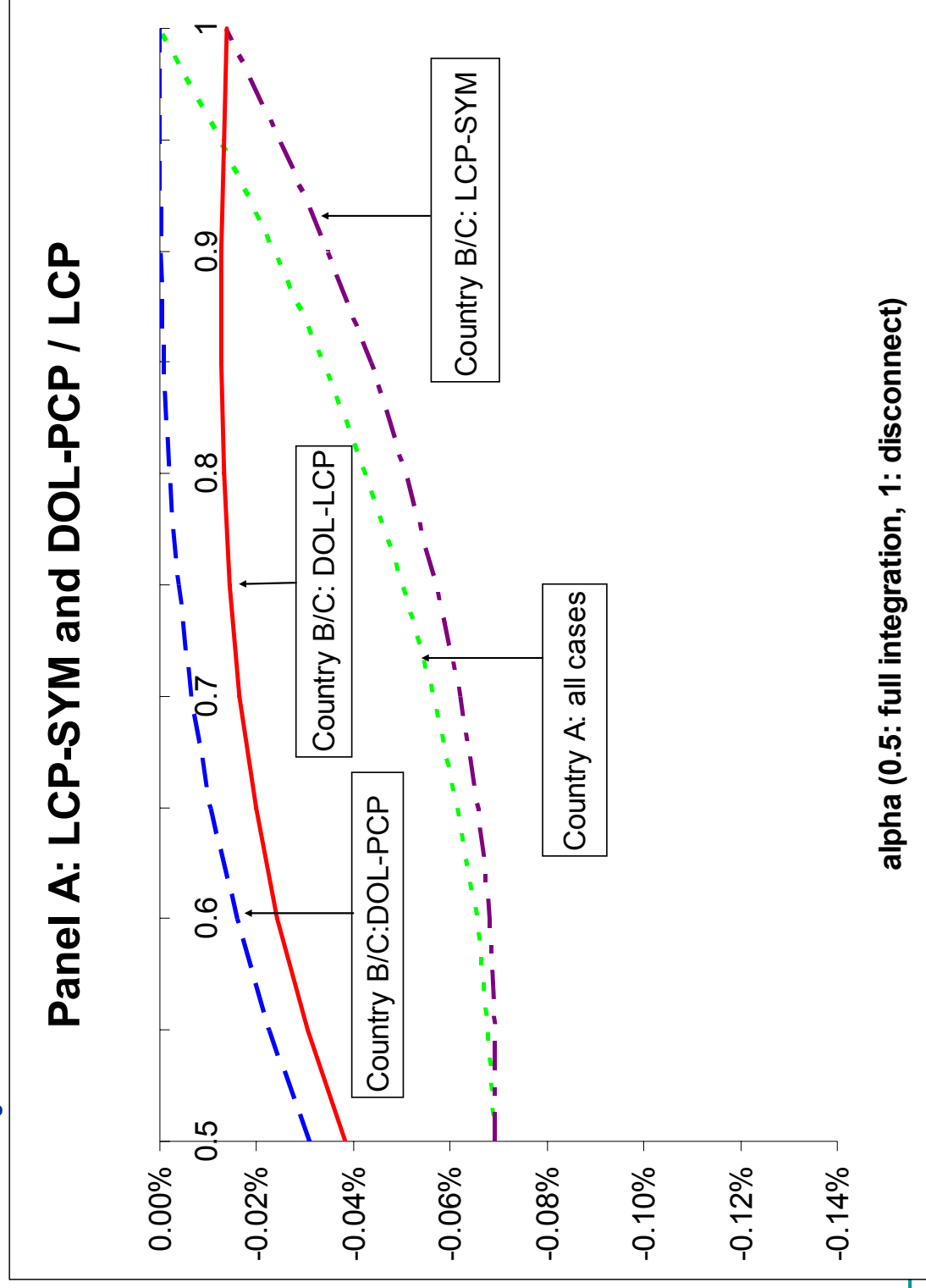


The extent of consumption stimulus to the world depends on the size of the center, plus the part of the periphery pricing in the center currency

Optimal sticky prices

- Each firm set its price in advance to maximize expected discounted profits.
- The optimal price in currency r is driven by the expected supply of currency r and expected productivity
- Under sticky prices, *ex post* realizations of productivity shocks do not show up in prices. Output is demand driven.
- Lowering the preset price requires stabilizing the expected ratio between money supply and productivity.

Cooperation is more costly for Country A when country B and C face shocks of different volatility.



The second dimension (highest for countries outside of Europe)

	Dollar invoicing share in exports	Share of exports sold to The US	Other "Dollar Bloc"
United States	99.8		
Korea	84.9	20.8	28.2
Malaysia	66.0	18.2	13.4
Thailand	83.9	17.8	17.5
Australia	67.9	9.6	20.0
Germany	31.6	17.9	10.8
Italy	20.5	9.8	7.5
United Kingdom	26.0	15.5	6.7

Source: Goldberg and Tille (2005), Dillon and Goldberg (2007)