Have Global Value Chains Contributed to Global Imbalances?

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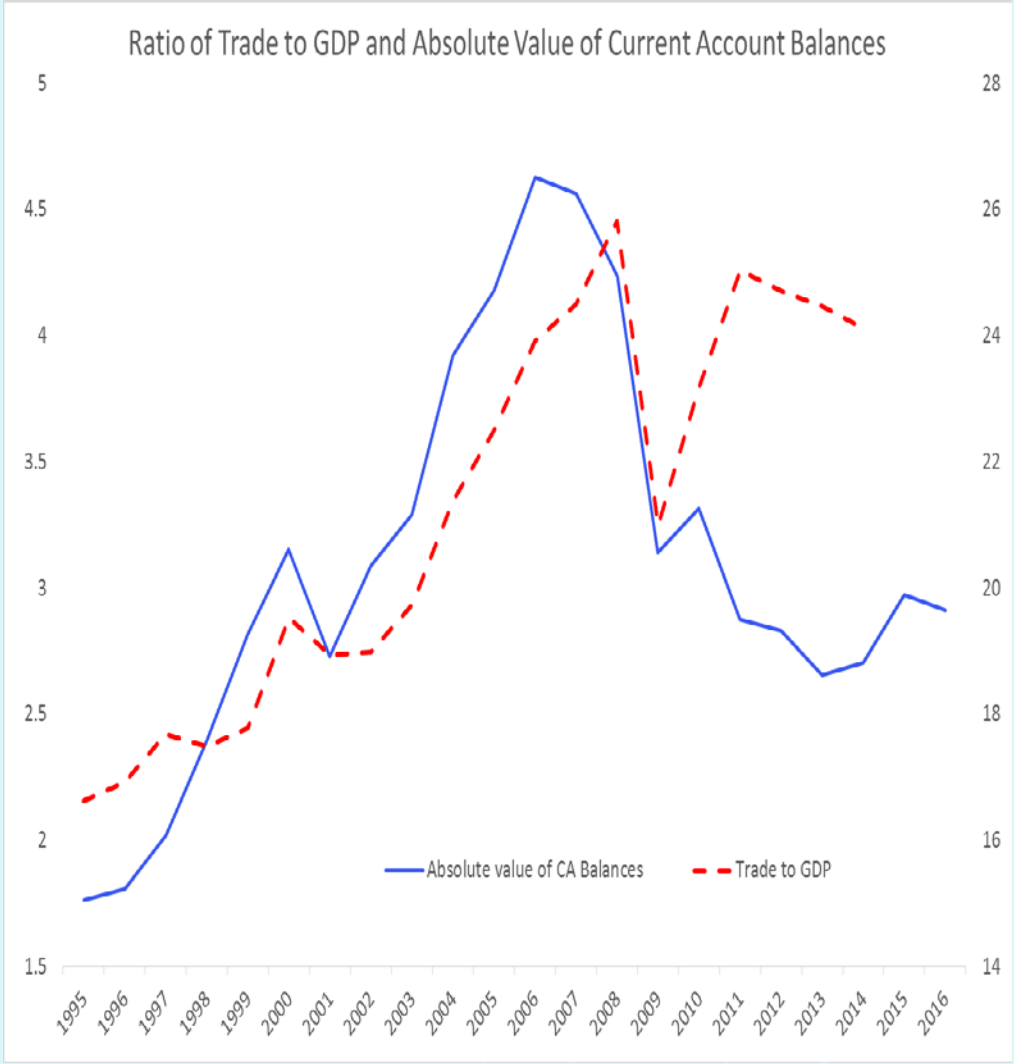
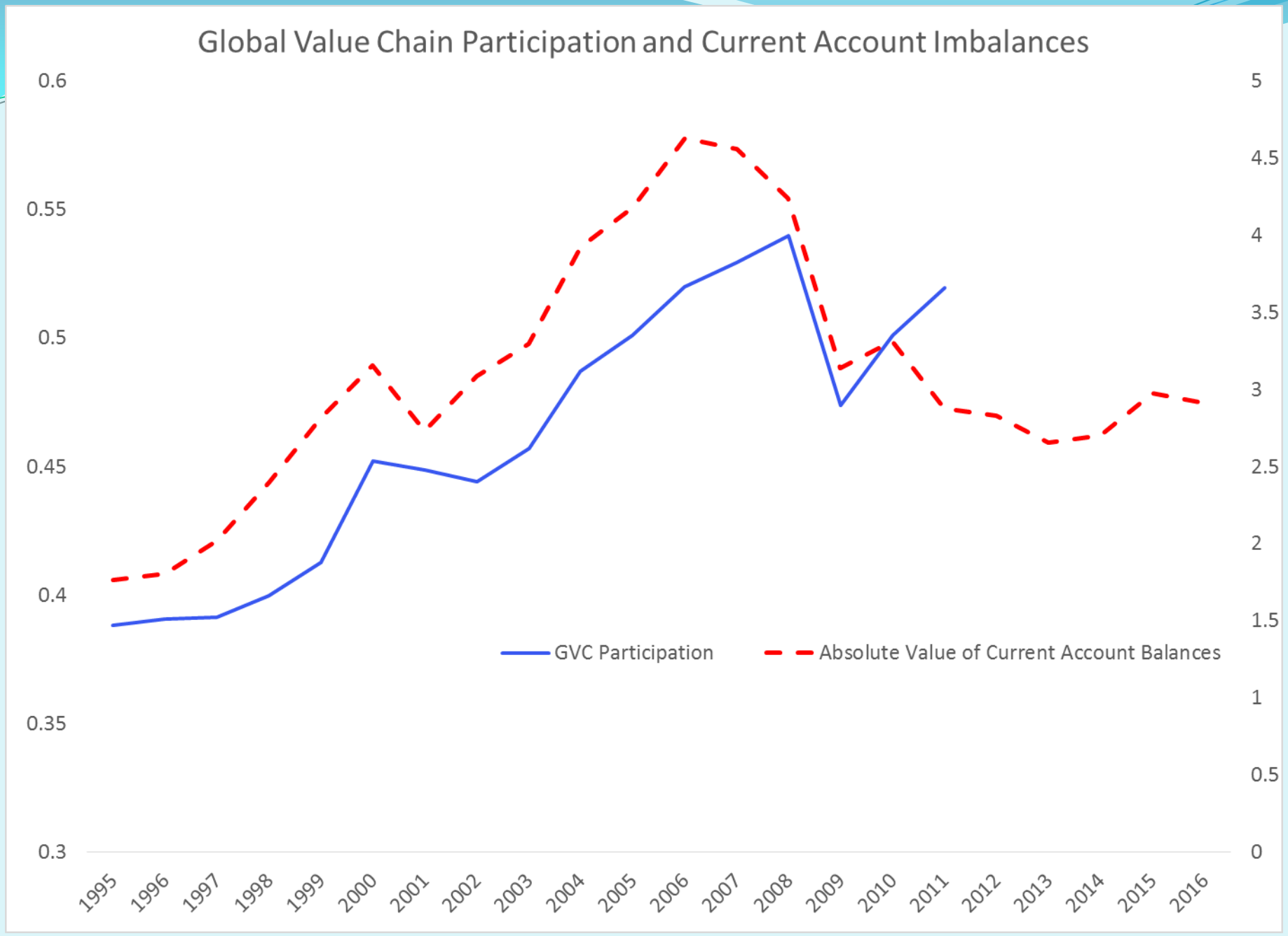
Global Trade and Imbalances

- Global current account imbalances rose sharply before crisis
- Global trade relative to GDP also jumped
- Are they connected to each other?
- Are they connected to the rise of global value chains (GVCs)?




Global Value Chain Participation and Current Account Imbalances
0.6
0.55
0.5
0.45
0.4
0.35
0.3
5
4.5
4
3.5
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GVC Participation
Absolute Value of Current Account Balances
1995
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2016

What Explains Recent Rise of GVCs?

- Reduction in costs for transportation and communication
- Acceleration in technical progress that allows standardization of production
- Trade liberalization

Why might GVCs be connected to current account imbalances?

- GGT: Participation in GVCs should have a positive effect on a country's current account balance because the process involves adding value to imports and exporting the product

- This argument is problematic if participation is widespread. Changes in current account balances must be offsetting. Not all countries add value to imports. The ones at the start of the chain export intermediates that are used in countries that are further "downstream."

- Data suggest that participation is in fact quite widespread.

Why might GVCs be connected to current account imbalances?

- Position in the chain might affect a country's current account balance. Countries that are more downstream may benefit more from adding value to imports.

- Riad et. al. find that trade involving production chains in a downstream country may be less responsive to changes in exchange rates because currency appreciation will reduce costs of imports even as exports become more expensive. Adjustment to exchange rate changes takes place mainly outside the supply chain.

- Does not necessarily create imbalances, but could slow adjustment to imbalance.

Two Ways to Characterize GVC Participation

- From the import perspective: amount of foreign value-added embodied in intermediate inputs imported from a source country that is embedded in a country's exports

- From the export perspective: amount of value-added embodied in a country's exports that is embedded in another country's exports

Characterizing GVCs

- Calculated using data from World Input-Output tables, which can be expressed in matrix form as:

(1) $Y = AY + F$

- with c countries and n industries, Y is nc x 1 vector of gross output, A is an nc x nc matrix of input-output coefficients, and F is an nc x 1 vector of final demand. Inverting:

(2) $Y = (I - A)^{-1} F = BF$

- B is nc x nc Leontief matrix that gives the amount of gross output in each country required for a one-unit increase in output for final demand in another country

Foreign Value Added from Source Countries to Home Country's Exports

- The amount of foreign value added from a source country that is embedded in the exports of the destination county is:

(3) $FV_{rs} = V_s B_{sr} E_{r*}$

- Total foreign value added in a country's exports is calculated by summing across all source countries:

(4) $FV_r = \Sigma_{s \neq r} V_s B_{rs} E_{r*}$

Home Country's Value Added to Destination Countries' Exports

- Value-added embodied as intermediate inputs in other countries exports is calculated for each country as the amount of value added from country r embedded in exports of country s by industry. Total calculated by summing across countries:

(5) $IV_r = \Sigma_{s \neq r} V_r B_{sr} E_{s*}$

- The two measures are equal when aggregated across countries.

GVC Participation and Position

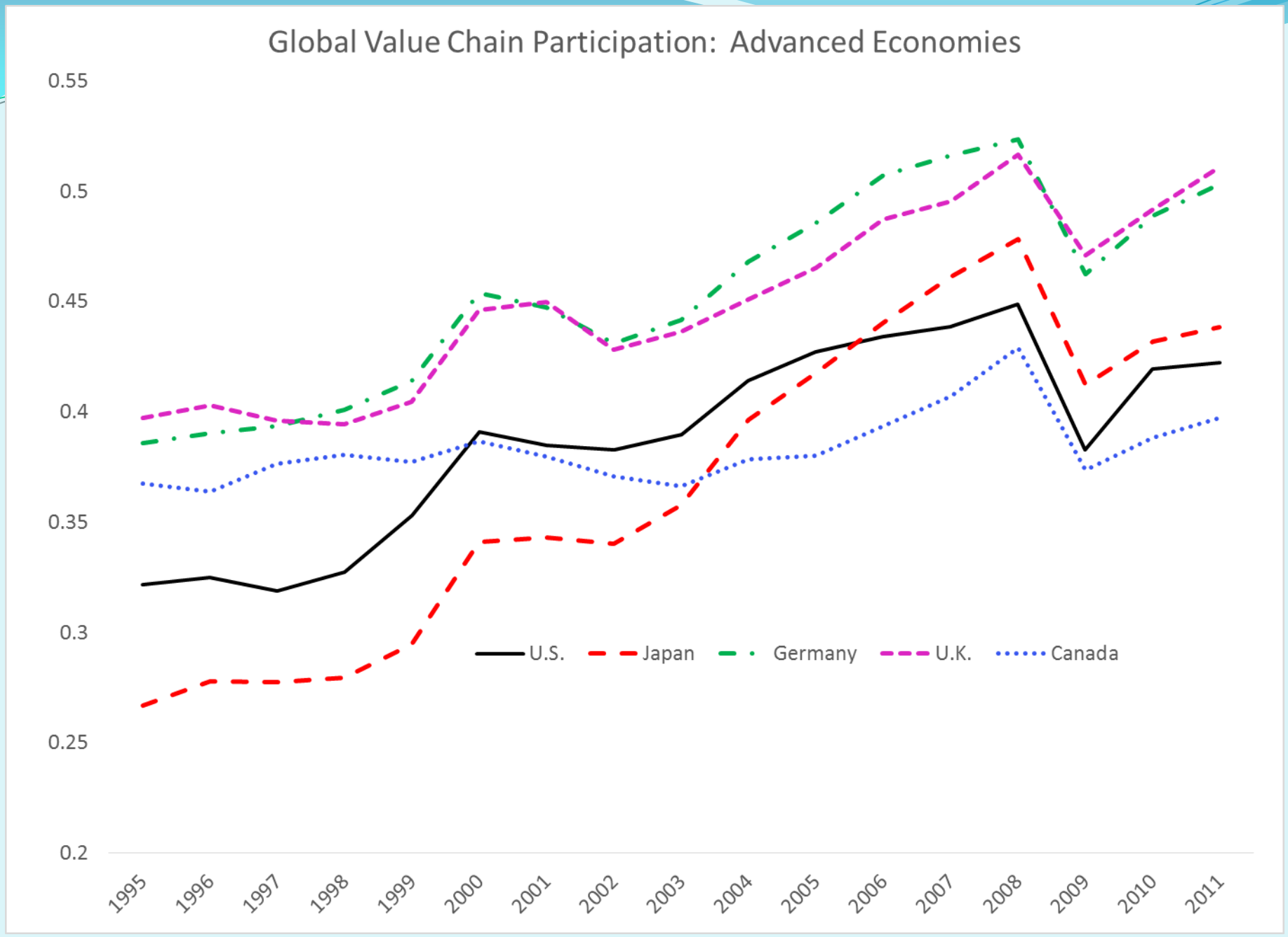
- GVC Participation is defined as the sum of FV and IV as a percent of a country's total exports:

(6) GVC Participation = (IV + FV) / E

- GVC Position is defined as the log ratio of IV to FV

(7) GVC Position = ln(1 + IV/E) – ln(1 + FV/E)

- The larger the position index, the further upstream the country


Global Value Chain Participation: Advanced Economies
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U.S.
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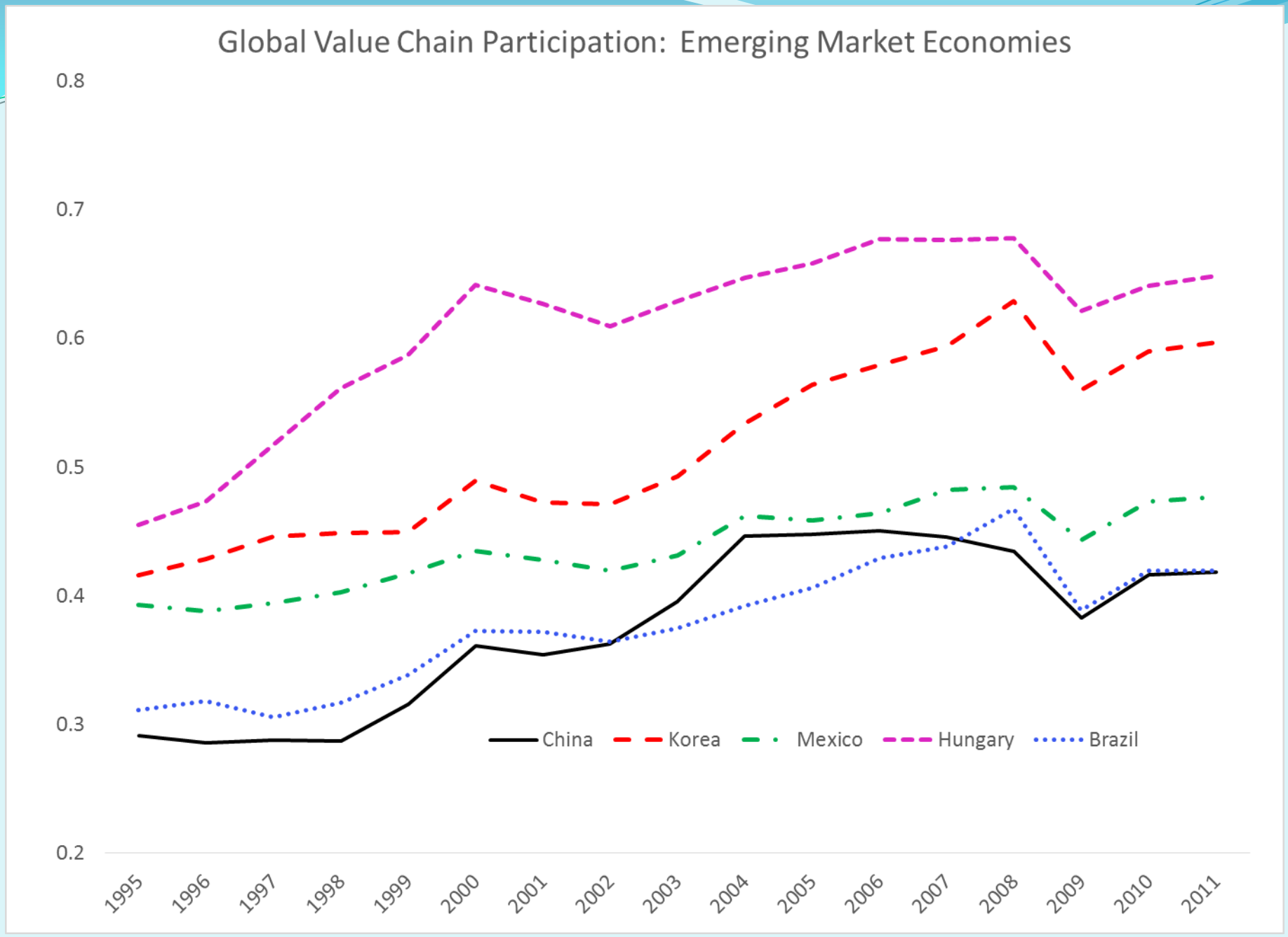
Global Value Chain Participation: Emerging Market Economies
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China
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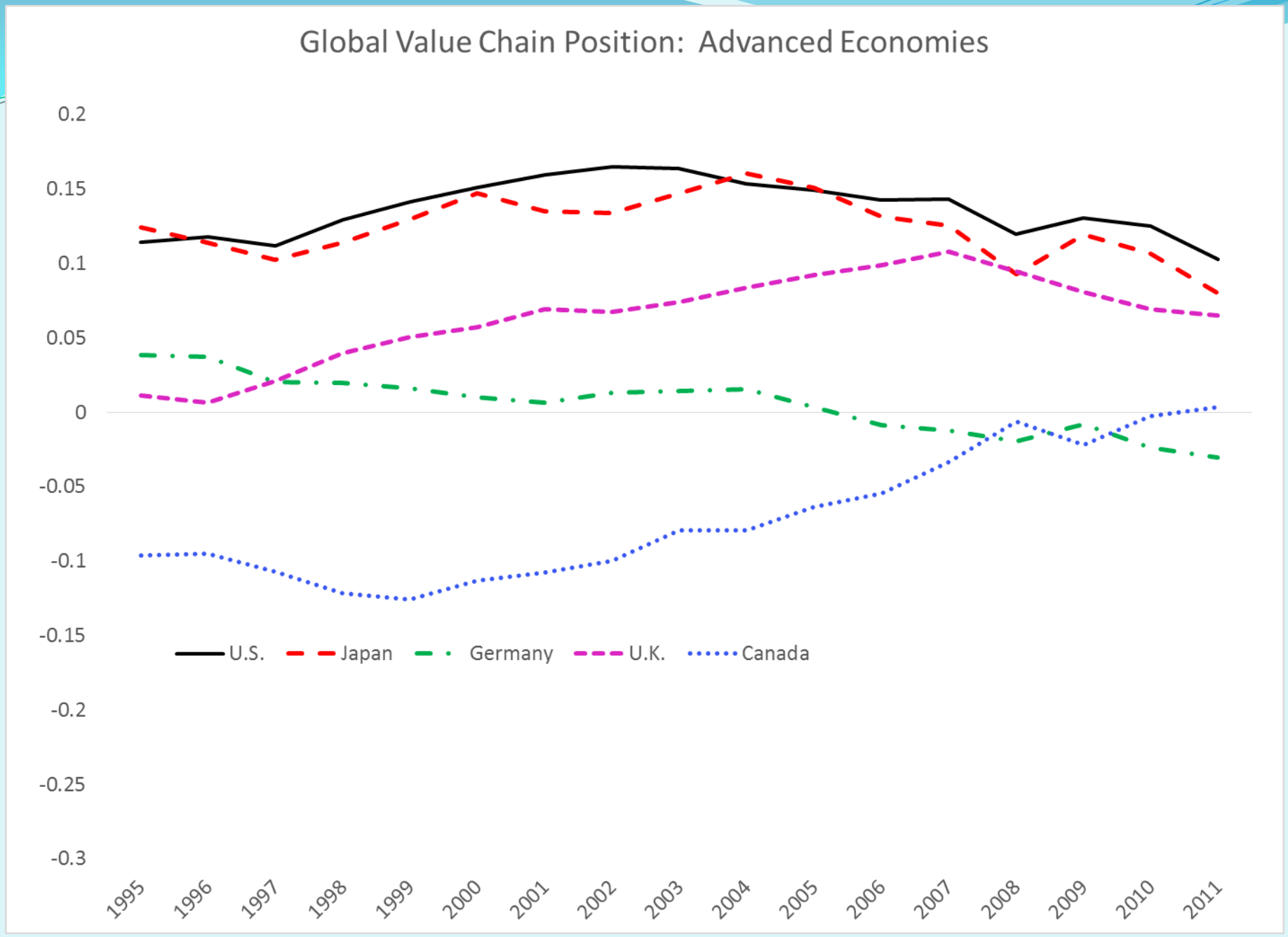
Global Value Chain Position: Advanced Economies
0.2
0.15
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0.05
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-0.05
-0.1
-0.15
-0.2
-0.25
-0.3
U.S.
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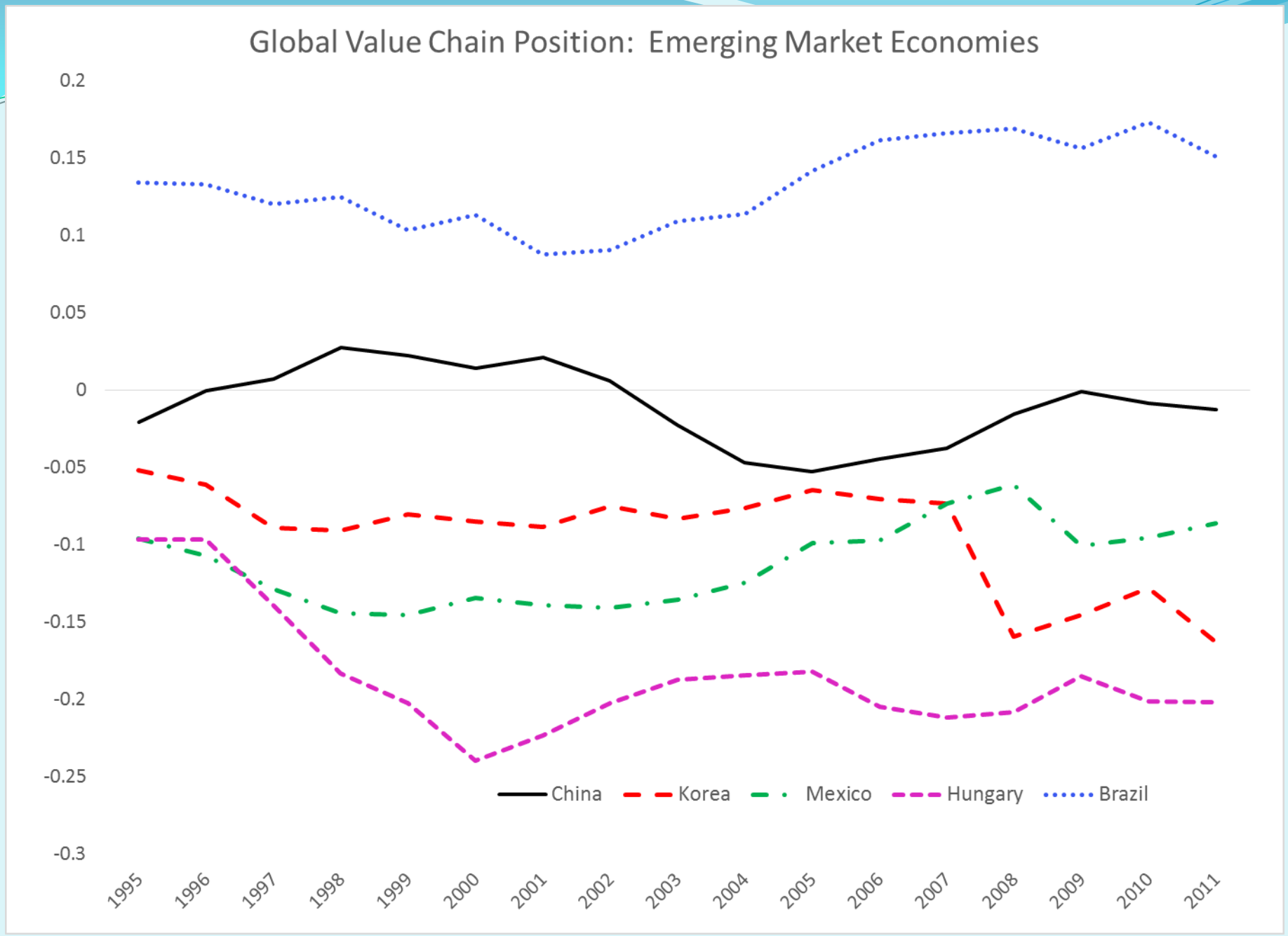
Global Value Chain Position: Emerging Market Economies
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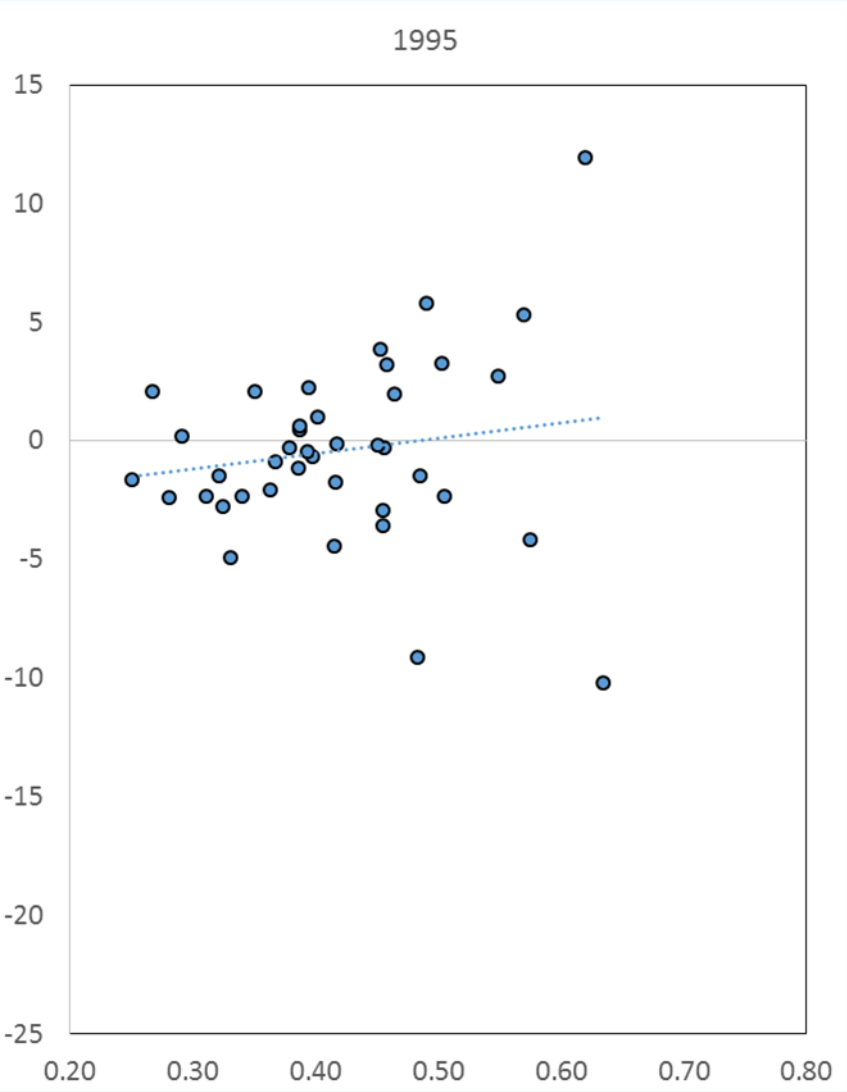
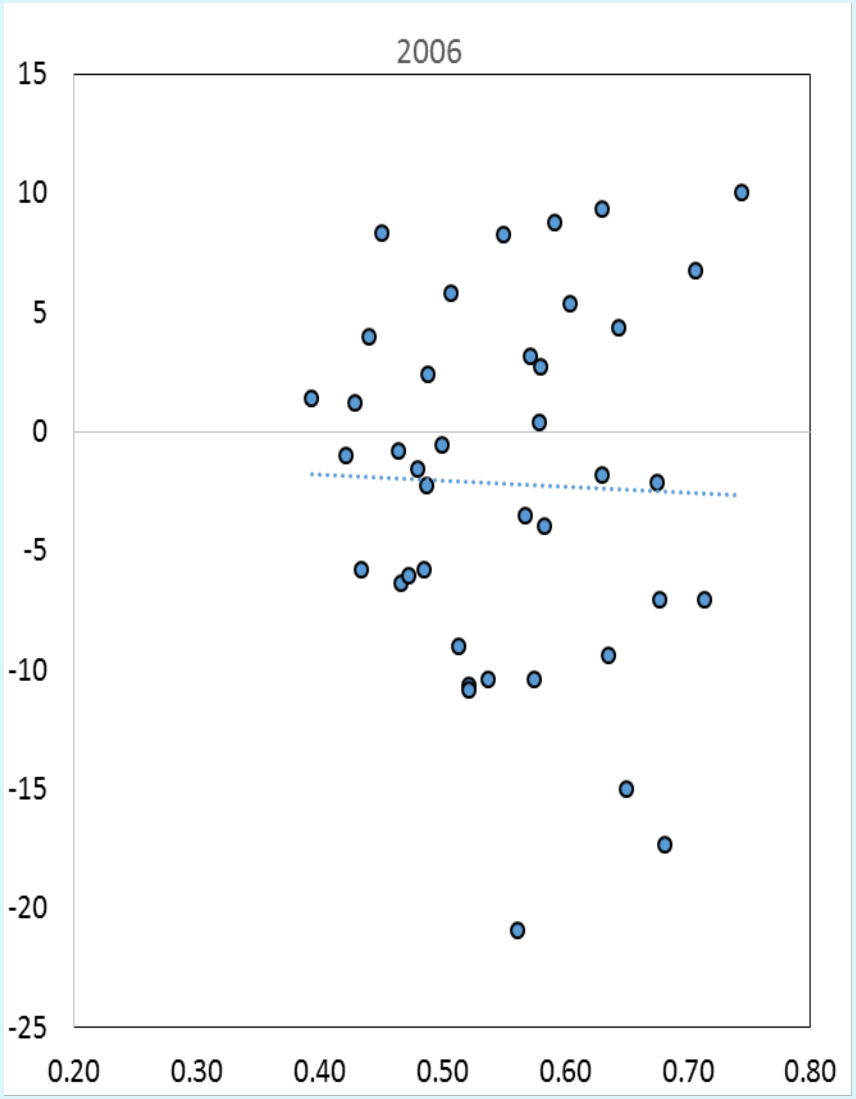
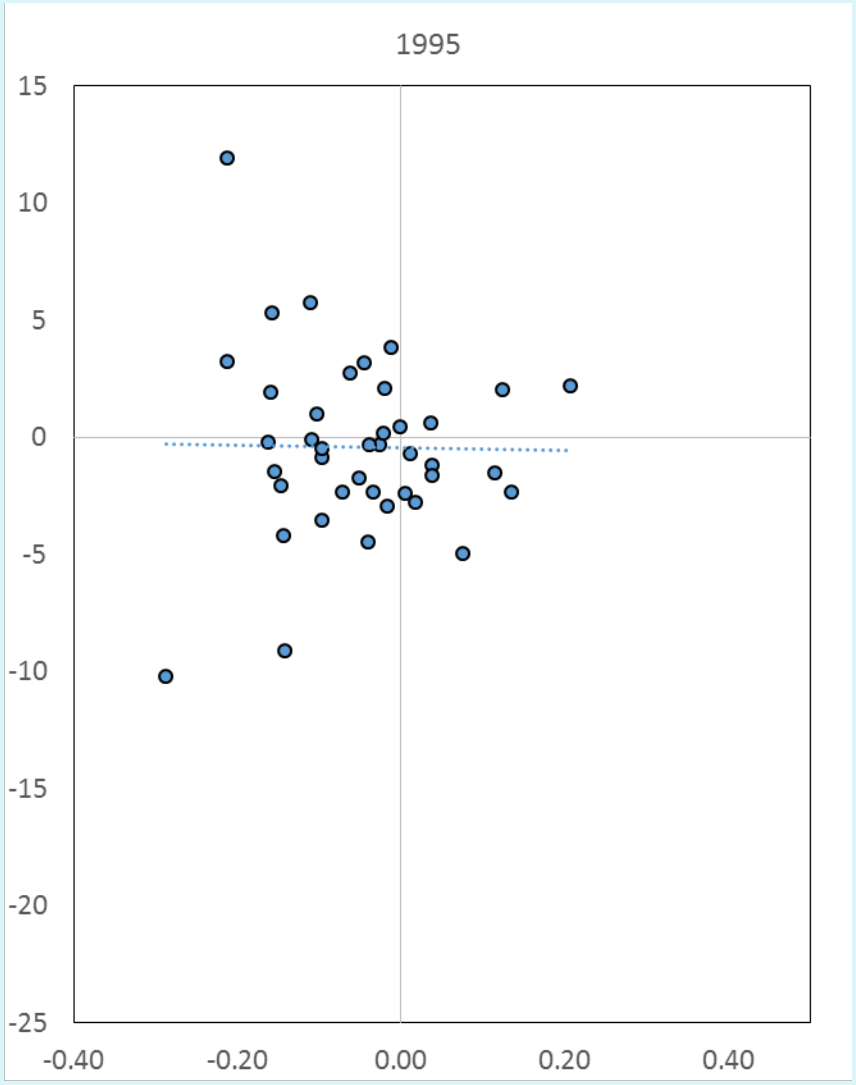
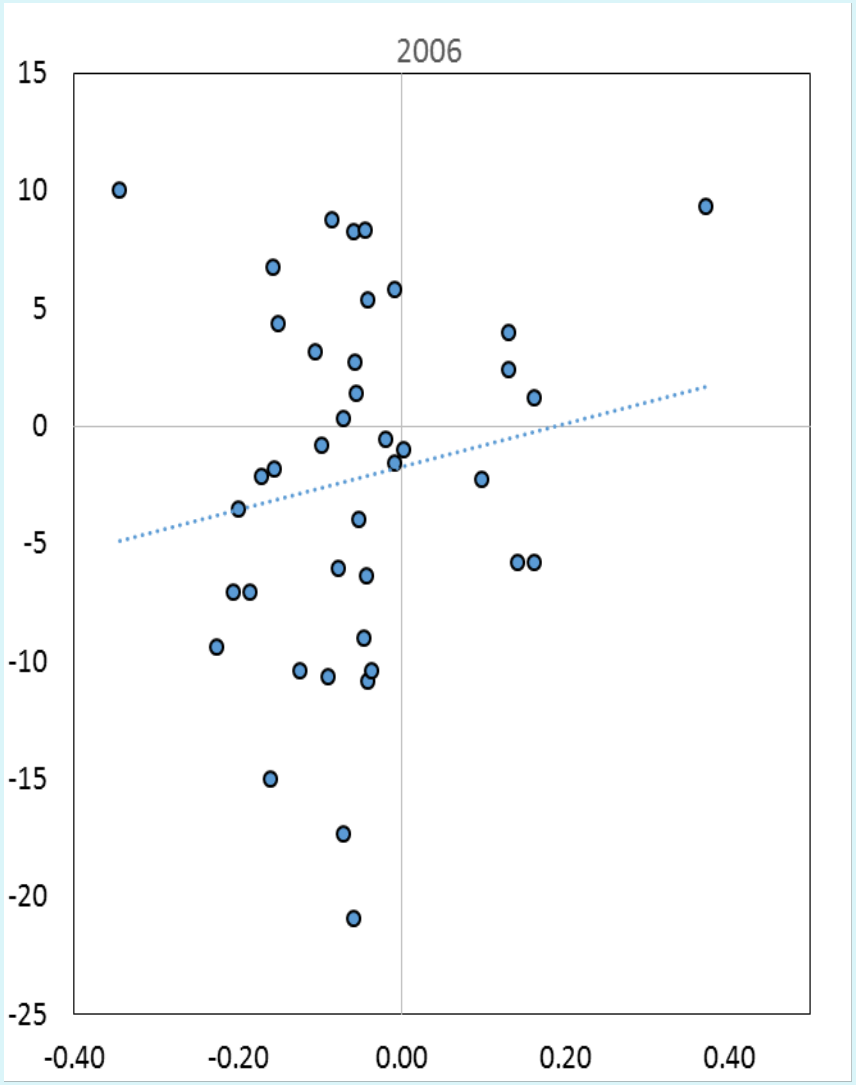
GVC Participation and Current Account Balances





GVC Position and Current Account Balances





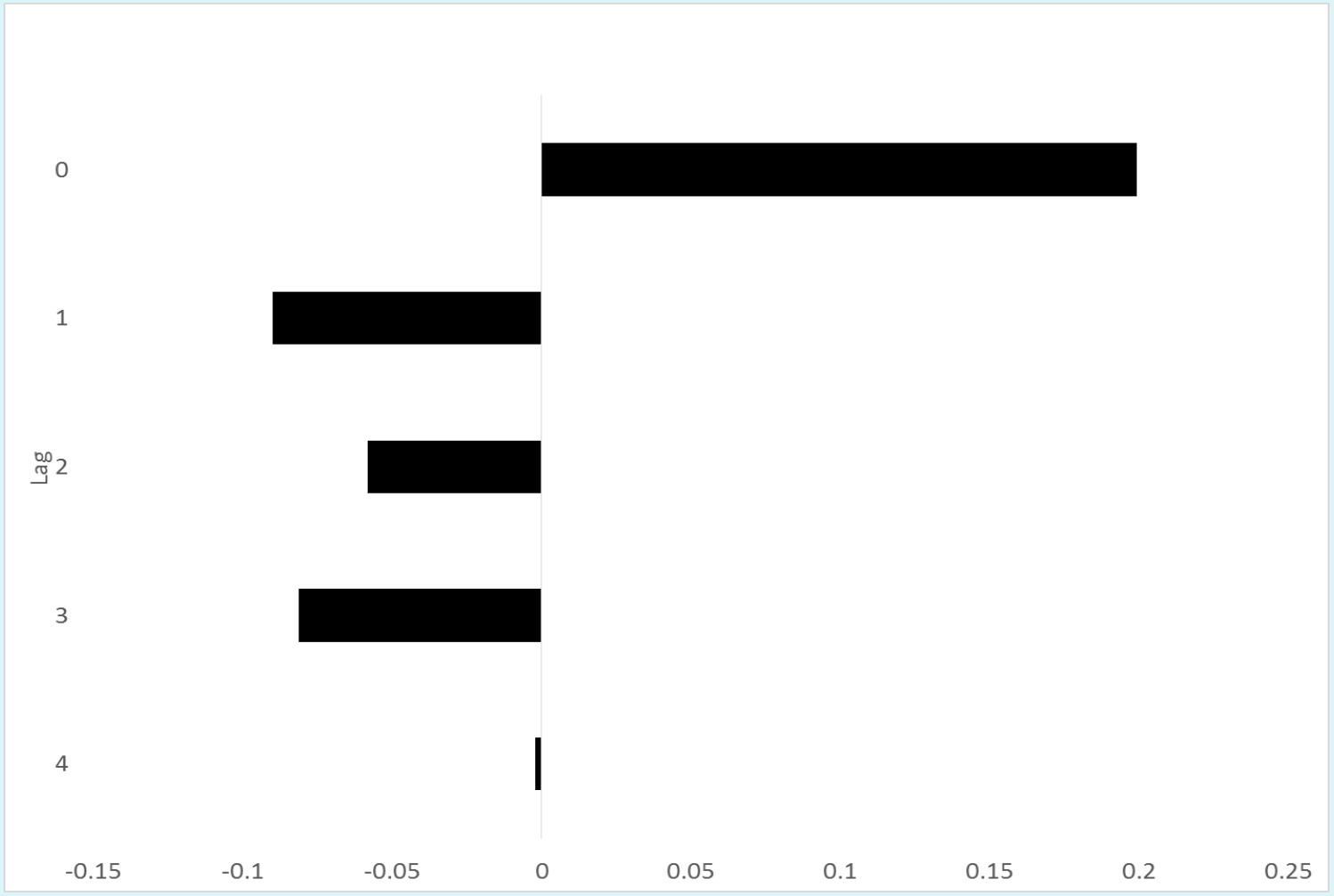
Relationship Between GVCs and Current Account Balances

- GGT find positive relationship between both GVC participation and position and current account balances
- Two issues:
  - Problematic to assume that widespread participation will affect all countries in the same direction.
  - Position (IV-FV)/E is likely to be arithmetically contemporaneously correlated with current account balances. IV is a subset of exports and FV is a subset of imports. The difference between the two is a subset of the trade balance.

How to address these issues?

- Interacting the two variables solves the first problem
- Position can be either positive or negative, and interacting them allows the effect to be stronger for a country with a higher level of participation
- Lagging the variables may solve the second problem

Correlogram Between GVC Position*Participation and Current Account Balance



Panel Regressions

- Dependent variable: change in current account balance
- Control variables:
  - Difference in trading partner GDP growth and domestic GDP growth (positive)
  - Percent change in real effective change rate (negative)
- Explanatory variable: GVC Position*Participation, current and lagged values
- 36 countries for which REER data are available are included
- All explanatory variables weighted by country's trade share

Panel Regression Results

Dependent Variable: Current Account Balance[+]	Coefficients	
	(1)	(2)
Relative GDP[#]	.33***	.41***
REER[#]	-.15***	-.11**
GVC pos.*GVC part. [+] L = 0	.52***	
GVC pos.*GVC part. [+] L = 1	.03	-.05
GVC pos.*GVC part. [+] L = 2	-.22**	-.30***
GVC pos.*GVC part. [+] L = 3	-.14	-.29**
Sum of GVC coefficients	.20	-.64***
R^2	.12	.08
Observations	468	468
# Percent change. + First difference. ***p<.01, **p<.05, *p<.1		

What are the implications?

- The results suggest that countries that participate in GVCs have higher current account balances the more downstream they are in the production process
- Consistent with notion that GVC participation increases current account balances for countries that primarily add value to imports and export product
- Since current account balances are zero-sum for the whole world, implication is that countries further upstream must show declines in their balances
- Suggests a connection to global imbalances. But how important is it?

How important is the effect on Global Imbalances?

- Short answer: not very important in aggregate
- Average participation index is 0.5 and average trade share is .44.
- Average change in GVC position is .015.
- Multiplying by -.64 (sum of coefficients in regression with just lagged terms), average change in current account balance from changes in position is 0.2 percentage points

Estimated Effect of GVCs on Current Account Balance (Billions of US$)

	1999-2006	2007-2011
China	8.5	-19.4
Germany	1.2	12.1
United Kingdom	-9.6	-5.5
Japan	-10.8	1.4
Korea	3.1	22.8
Russia	-6.9	-11.4
Taiwan	4.3	6.5
United States	-20.5	4.9
Sum of changes	-20.3	-18.7
Sum of abs. value of changes	112.0	215.6
Absolute Value as % of Global GDP	.36	.37

Estimated Effect of GVCs on Current Account Balance (Billions of US$) Adjusted

	1999-2006	2007-2011
China	8.5	-19.4
Germany	-1.2	12.1
United Kingdom	9.6	5.5
Japan	-10.8	1.4
Korea	3.1	22.8
Russia	-6.9	-11.4
Taiwan	4.3	6.5
United States	20.5	-4.9
Sum of changes	35.3	-35.4
% of Global GDP	.07	-.07

Summary and Conclusions

- Increases in global imbalances in the pre-crisis period were accompanied by a large increase in the ratio of trade to GDP and a concurrent expansion of global value chains that was widespread across countries

- Different countries play different roles in such chains, with those further “upstream” exporting intermediate products that are assembled and shipped on for either further processing or final demand by “downstream” countries

Summary and Conclusions

- A country's overall position in its GVCs appears to have a significant effect on changes in its current account balance, with countries that are downstream seeing a positive effect and countries that are upstream a negative effect

- However, over the period studied the effects on global imbalances appear to be small and in some cases the changes appear to have contributed to a reduction in imbalances