



TOWARDS A RETURN OF INDUSTRIAL POLICY?
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TRADE CONCENTRATION AND CRISIS SPILLOVER: THE CASE STUDY OF THAILAND

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Introduction:

Transmission of the Subprime Crisis



- The subprime crisis has been transmitted worldwide due to strong financial and economic linkages between the United States and the rest of the world.
- The trade linkage is the most important transmission channel of the subprime crisis to Thailand and other East Asian countries.
- Both direct and indirect trade linkages play an important role as transmission channels of the crisis.

Introduction:

Transmission of the Subprime Crisis



- Trade concentration is considered to be one of the important factors to amplify the effect of crisis transmission.
- Da Costa Neto and Romeu (2011) finds that export concentration significantly amplifies trade collapse during the Subprime crisis.

Introduction:

Trade Concentration in Thailand


- Hesse (2008) shows that Thailand has a decline in export concentration over the past forty years and become one of the diversified economies in the region.
- However, the major exporting products might share the similar export destinations and backward and forward linkages.
- Many of the Thai manufacturing exports are intermediate goods which might share G3 markets as final destination (*indirect effect*).

Research Question



- “Is trade concentration with the presence of indirect trade effect a transmission channel of the Subprime crisis to Thailand?”

Literature Review

- 
- The importance of trade diversification
 - Transmission channels of financial crises
 - Trade diversification and crisis spillover

Literature Review: The importance of trade diversification



□ Theoretical Studies

- Helpman (1991), Matsuyama (1992) and Amin Guitierrez de Pineres and Ferrantino (2000) suggest that export diversification promotes economic growth via innovation stimulation, knowledge spillover and learning-by-doing process.
- Krugman (1979), Coe and Helpman (1993), Van Meijl (1997), Das (2002) and Agosin (2007) show that technological spillovers and transfers are induced from export diversification via a study of new products or techniques.

Literature Review: The importance of trade diversification

□ Empirical Studies

- Al-Marhubi (2000), Lederman and Maloney (2007) and Herzer and Nowak-Lehmann (2006) find the evidences support the diversification-led growth.
- Imbs and Wacziarg (2003), Cabellero and Cowan (2006), Klinger and Lederman (2006) and Hesse (2008) illustrate that countries benefit from diversification when their incomes are low and move to be specialized economies at the higher income level

Literature Review: Transmission channels of financial crises

- There are three important transmission channels in literatures: i) financial linkages, ii) trade linkages and iii) contagion effect.
- Trade linkages (*Eichengreen et al. (1997) and Glick and Rose (1999), Kali and Reyes (2005)*) and contagion effect (*Wyplosz (1999), Masson (1999) and Gong et al. (2004)*) are two important transmission channels according to empirical studies

Literature Review: Trade diversification and crisis spillovers

- Among the explanation for the importance of trade channels are the high trade exposure and trade concentration.
- Still, there are limited literatures that test the hypothesis empirically.
- Rose and Spiegel (2010) shows that destination concentration plays no role in crisis transmission during the Subprime crisis.
- Da Costa Neto and Romeu (2011) shows that export concentration significantly increases the degree of trade collapse during the Subprime crisis.

Methodology



- The level of concentration in Thailand using HHI
- Indirect trade linkages using trade matrix
- Backward and forward linkages
- The assessment of the impact from crisis spillover on the Thai economy using the modified GTAP model

Results: Concentration



- We employ the standard Herfindahl index to identify the level of trade concentration, which are:
 - destination concentration (244 destinations)
 - export concentration (99 exporting sectors at the level of 2-digit HS)

Results: Destination Concentration

Destination and export concentration of Thailand during 2005-2009

Year	Destination HHI	Export HHI
2005	0.0852	0.0666
2006	0.0860	0.0636
2007	0.0854	0.0568
2008	0.0781	0.0522
2009	0.0752	0.0523
Average	0.0820	0.0583

➡ **Low destination concentration + declining trend**

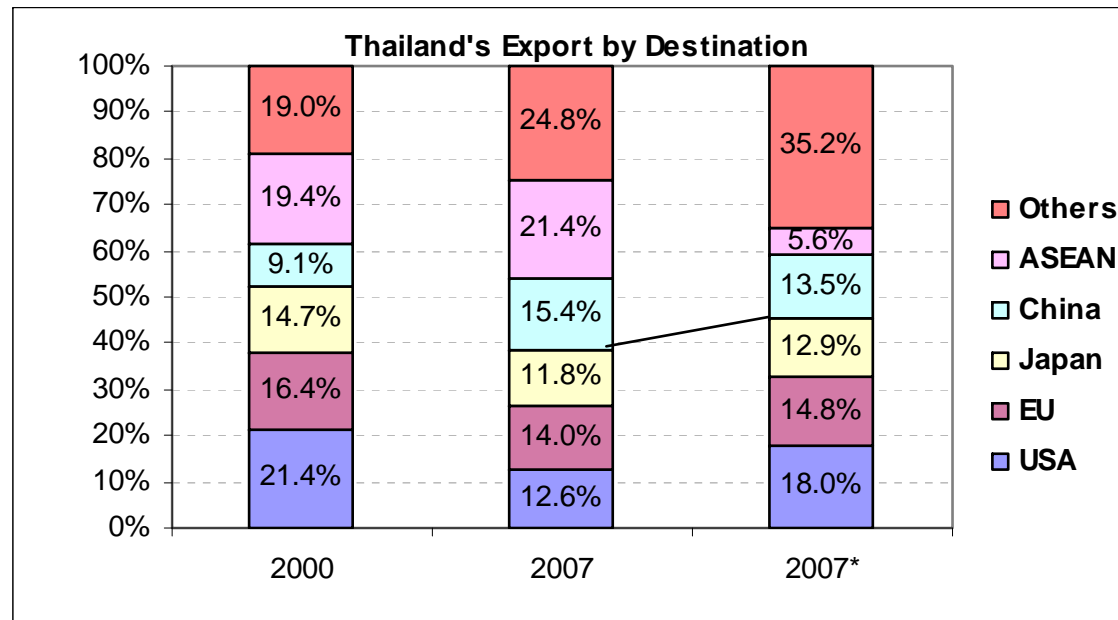
Results: Destination Concentration



- We construct “trade matrix” to calculate both direct and indirect trade linkages.
- The total indirect import in one country must equal to sum of all re-exports from all other countries.

Results: Destination Concentration

Total trade exposure to the G3 economies



Thailand still have high destination
concentration on G3 markets when indirect trade
linkages are taken into account.

Results: Destination Concentration



- Conclusion: Destination concentration
 - ▣ Low destination concentration when considering only “direct trade linkages”.
 - ▣ Still high destination concentration on G3 markets when “indirect trade linkages” are included.
 - ▣ Thailand still have high trade exposure on G3 economies.

Results: Export Concentration

Destination and export concentration of Thailand during 2005-2009

Year	Destination HHI	Export HHI
2005	0.0852	0.0666
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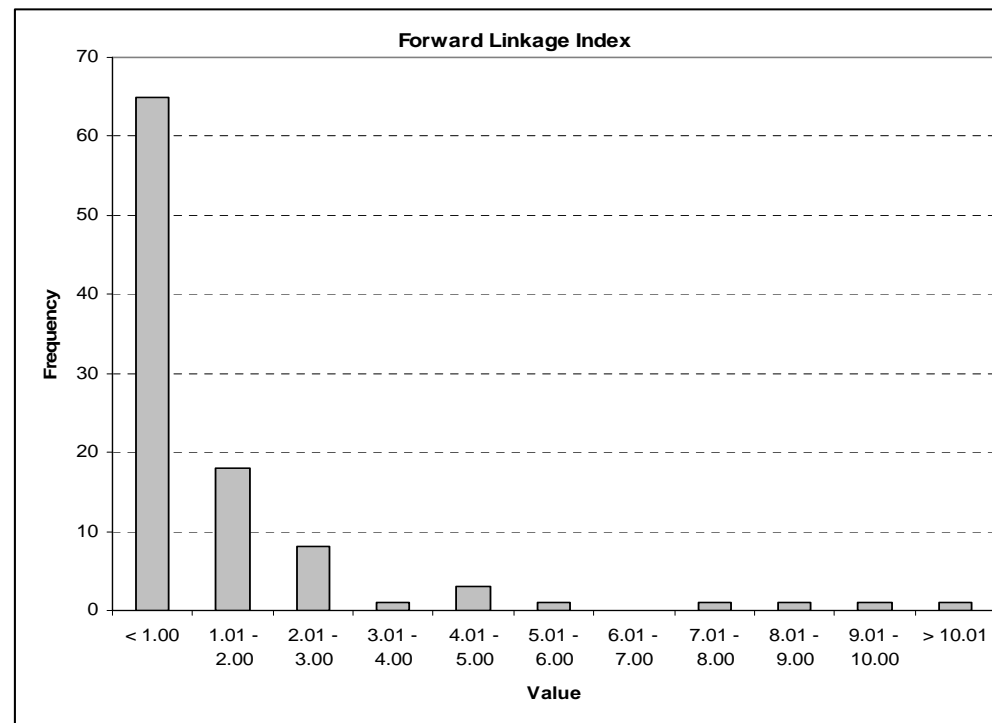
Results: Export Concentration



- We calculate the forward linkage index of each industry to consider how the effect from one industry is transmitted to another industry.
- The industry with high forward linkage index experiences high accumulative effect passed on from other industries.
- A calculation of the forward linkage index follows Rasmussen (1956), where the index also captures indirect effect from changes in final demands.

Results: Export Concentration

Concentration of forward linkage index



➡ **High concentration on upstream industries: commerce, chemical industry, petroleum and natural gas and television and communication production**

Results: Export Concentration



- Conclusion: Export concentration
 - ▣ Low export concentration
 - ▣ High concentration on upstream industries (a small number of industries with a extraordinarily high value).
 - ▣ The effect of financial crises is accumulated in those upstream industries.

Model Simulation

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- Our analysis will extensively use data from the Global Trade Analysis Project (GTAP)
- The results shown should clearly portray the transmission behavior given production activity is part of the global supply chain.
 1. Separation of 'direct effect' and 'indirect effect'.
 - Direct effect* = outcome from a decrease in G3 demands for finished goods produced in Thailand
 - Indirect effect* = outcome from indirect-trade linkages from reduce in intermediate goods
 - Multiplier effect* = outcome from income-multiplier effects in other economies
 2. Focus only results from income effects of the external shocks.

Model Simulation

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- In our exercise, we examined a case study of Thailand and measured impacts from the external shocks from G3 countries.
- Regrouped all listed countries in the GTAP into 16 regions
 - ▣ Australia and New Zealand, China, Japan, other East Asian entities, Thailand, other Southeast Asian entities, South Asia, the United States, North America, Latin America, the European Union, the United Kingdom, other Europeans, the Middle East and North Africa, Sub-Saharan Africa, and remaining countries.
- Regrouped GTAP's 57 producing sectors into 5 aggregate sectors
 - ▣ Agricultural sector, natural resources, food, manufacturing, and services.
- For benchmark simulation, we used economic projections based on the IMF (2009).

Results: Macroeconomic Variables

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Variables	Total Effects	Direct Effects	Indirect Effects	
			Indirect-trade linkages	Multiplier effects
GDP	-7.77%	-4.33%	-3.44%	
Export	-8.34%	-3.66%	-4.24%	-0.44%
Import	-11.21%	-4.46%	-6.38%	-0.37%
Gross output (inc. intermediate)	-6.42%	-1.16%	-5.26%	
Private consumption	-7.77%	-4.33%	-3.44%	
Unskilled workers	-5.82%	-0.83%	-4.99%	
Skilled workers	-6.27%	-0.55%	-5.72%	
Capital	-6.73%	-0.93%	-5.80%	

- After decomposing effects, Thailand's international trade will be affected mainly through *indirect* linkages.
- A larger part of the indirect effect comes from a decrease in demand for intermediate goods (e.g., not from the income effect in other countries).

Results: Export and Production

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Effects on export growth by major sectors

Sectors	Total Effects	Direct Effects	Indirect Effects	
			Indirect-trade linkages	Multiplier effects
Agriculture	-4.60%	-0.89%	-3.38%	-0.33%
Natural resources	-9.04%	-2.14%	-6.55%	-0.35%
Food	-6.20%	-3.14%	-2.23%	-0.83%
Manufacturing	-8.54%	-3.70%	-4.48%	-0.36%
Services	-9.14%	-4.23%	-4.33%	-0.58%
Total	-8.34%	-3.66%	-4.24%	-0.44%

Effects on production activities by major sectors

Sectors	Total Effects	Direct Effects	Indirect Effects
Agriculture	-2.86%	-0.10%	-2.76%
Natural resources	-4.58%	-0.16%	-4.42%
Food	-5.50%	-1.51%	-3.99%
Manufacturing	-6.97%	-1.82%	-5.15%
Services	-6.42%	-0.46%	-5.96%
Total	-6.42%	-1.16%	-5.26%

Results: Export and Production

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- Indirect channels will likely be ample in sectors used for intermediate production activities.
 - ▣ These sectors are agriculture and natural resources.
- Direct transmission occurs in products imported for final consumption (food).
- Decrease in all activities derives from indirect linkages.
 - ▣ Confirm that most of the production activities in Thailand are hindered by the G3 economies through indirect-trade linkages.

Conclusion



- ❑ Thailand has trade diversification on both markets and exporting sectors.
- ❑ However, the country still has high destination concentration when indirect trade linkages are included.
- ❑ Also, the impact from the crisis is concentrated on a small number of upstream industries.
- ❑ Hence, Thailand is still vulnerable to financial crises via trade concentration.

Conclusion



- The evidence from the modified GTAP model confirms our findings.
 - ▣ The indirect trade linkages bring about greater impact on Thai exports and imports than the direct ones.
 - ▣ On the sectoral levels, the subprime crisis has had the greatest effects on exports in the service sector and the natural-resources sector. Both of them have high forward linkage indexes.

Limitation and Further Study



- To identify the impact of trade diversification on crisis alleviation, the study should include more country samples.

Appendix



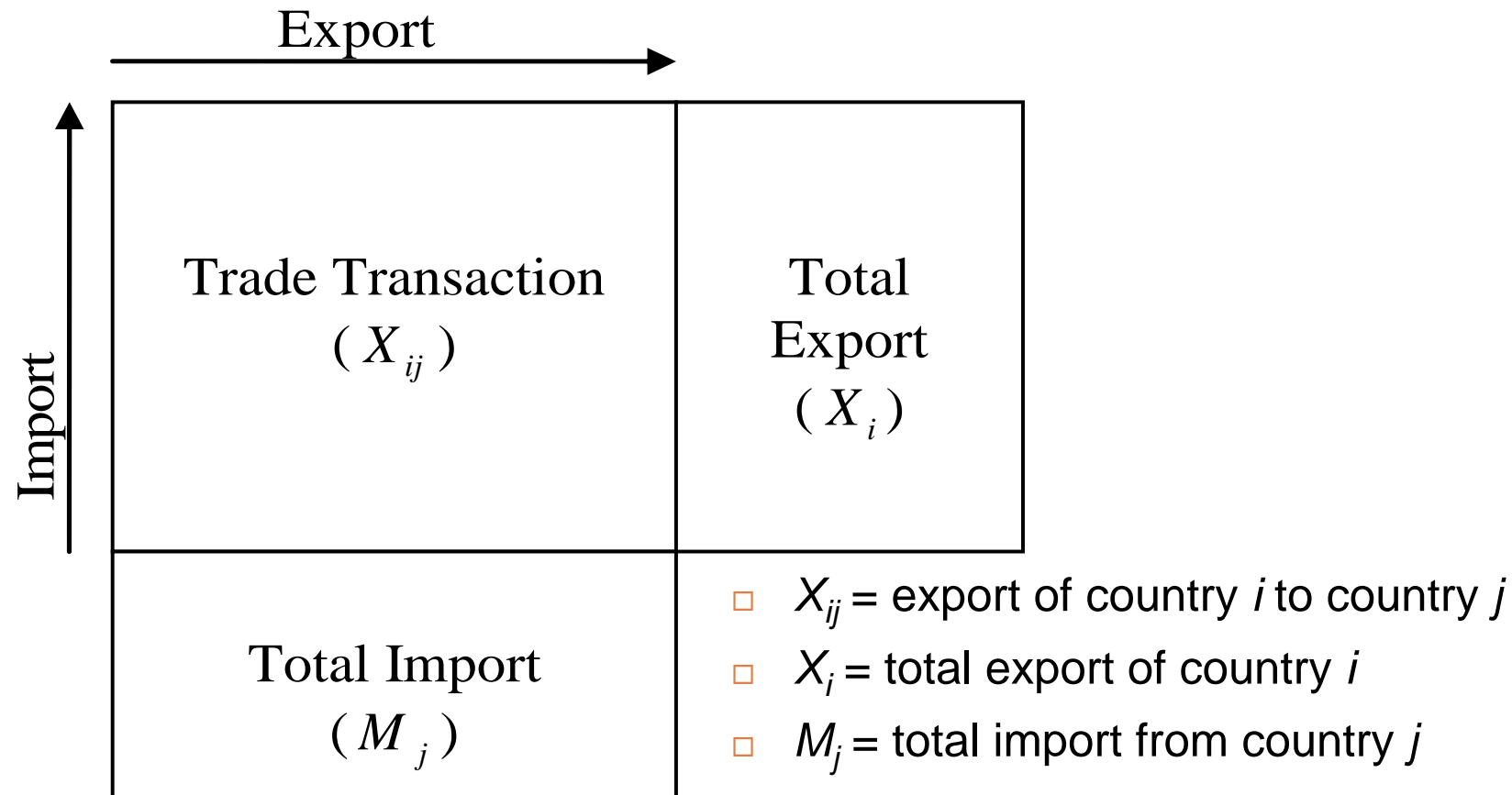
Trade matrix calculation

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- In order to arrive at the solution, we have constructed the 'international trade matrix'.
- This matrix contains international trade transactions of the world.
- Each element of the matrix represents bilateral trade transactions of each trading partner.
- All data were obtained from the UN Comtrade for 2007 trade transactions.

Trade matrix structure

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Final consumption matrix

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- This matrix contains the ratio of domestic final use to the total products available in the country.

$$A = \begin{bmatrix} a_{11} & 0 & 0 & 0 \\ 0 & a_{ii} & 0 & 0 \\ 0 & 0 & \ddots & 0 \\ 0 & 0 & 0 & a_{mm} \end{bmatrix}$$

- a_{ij} is the proportion of domestic final use to total demands of the country (final use plus export demands), data obtained from the GTAP.

World equilibrium condition

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- In world equilibrium, total world exports must equal to total world imports:

$$\sum M_j = \sum X_i$$

- and,
 - ▣ Total linkages = Direct linkages + Indirect linkages
 - ▣ $e_j = d_j + i_j$

World equilibrium condition

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- In equilibrium, for each country, its total indirect import must equal to sum of all re-exports from all other countries.

$$i_j = \sum_i e_j (1 - a_{ii}) x_{ij}$$

$$e_j - d_j = \sum_i e_j (1 - a_{ii}) x_{ij}$$

- where, x_{ij} is X_{ij}/X_i , or an export share of a country i that send to j

World equilibrium condition

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- In matrix terms, we can write:

$$E - D = E(I-A)X$$

$$E - D = EQ \text{ where } Q = (I-A)X$$

$$E - EQ = D$$

$$E(I - Q) = D$$

- Then,

$$E = D(I - Q)^{-1}$$

World equilibrium condition

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□ or

$$E = D(1 + Q + Q^2 + Q^3 + \dots)$$

$$E = D + DQ + DQ^2 + DQ^3 + \dots$$

□ where

D is direct linkages

DQ is the linkages from first round re-export

DQ^2 is the linkages from second round re-export

so on...

Forward linkages

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- The input-output table of Thailand was obtained from the National Economic and Social Development Board (NESDB), regrouped to 100 sectors.
- In this study, we will calculate the Forward Linkage Index (*FLI*) from the input-output analysis and explore its concentration level.
- A calculation of the forward linkage index follows standard approach suggested by Rasmussen (1956).

Forward linkages

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- From the input-output identity:

$$X = AX + F$$

where,

X = vector of gross output,

F = vector of final demands,

A = matrix of input-output coefficients a_{ij} (a ratio of intermediate use of i by sector j to the amount of total output in sector j)

Forward linkages

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- Rewrite,

$$X = (I - A)^{-1} . F$$

- $(I - A)^{-1}$ is called the 'Leontief Inverse Matrix'
- Its element at row i and column j represents total amount of product from sector i need to be used in order to satisfy a unit of demand in sector j .
- FLI suggested by Rasmussen (1956) is a row sum of the Leontief Inverse Matrix.
- Large figure of FLI implies a high level of sector's forward linkage to overall activity.