THE TWIN CRISES:

THE CAUSES OF BANKING AND BALANCE-OF-PAYMENTS PROBLEMS

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(BRIEF) LITERATURE REVIEW

OLD Literature

Theme :
Inconsistency between the fiscal and monetary policies

Paul Krugman:

"Crises occur because a country finance its fiscal deficit by printing money to the extent that excessive credit growth leads to the eventual collapse of the fixed exchange rate regime."

New Literature

Theme:
The self-fulfilling expectations and herding behavior

Guillemo Calvo:

" If investors deem you unworthy, nofunds will be forthcoming and, thus, unworthy you will be"

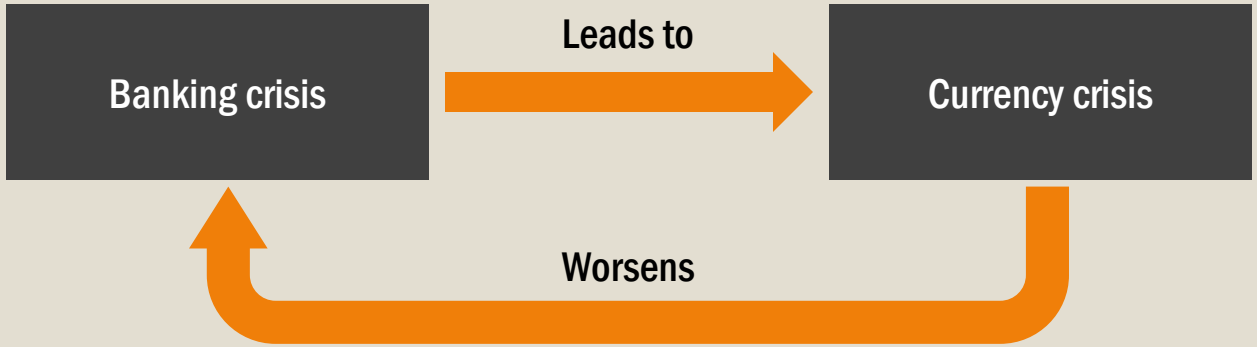
PURPOSE OF THE PAPER

Analyze the links between banking and currency crisis

KEY FINDINGS(1)

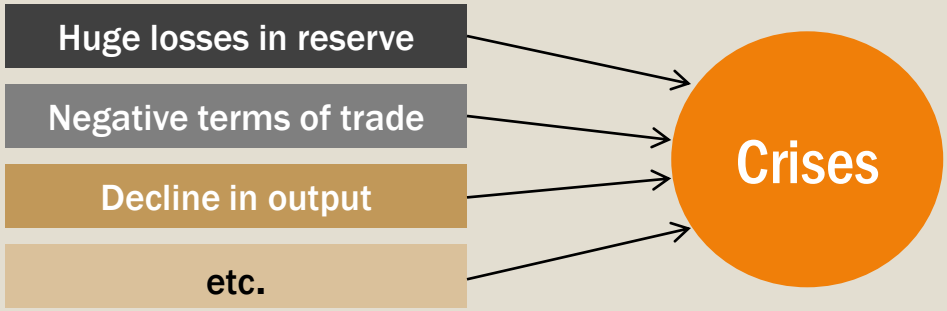
1. Banking and currency crises are closely linked in the aftermath of financial liberalization.

2. The vicious cycle of twin crises

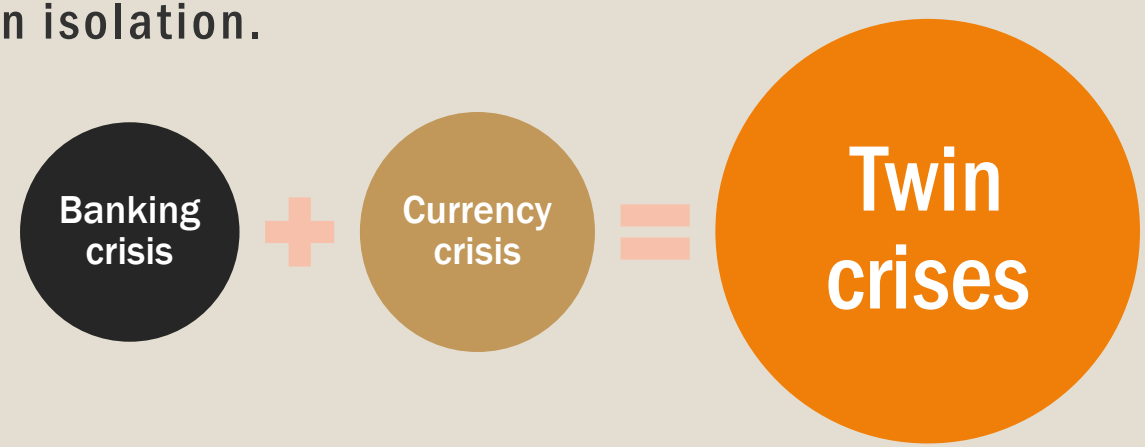


KEY FINDINGS(2)

3. Crises are typically preceded by a multitude of weak and deteriorating economic fundamentals.



4. Twin crises are far more severe than crises occurred in isolation.



AGENDA

1. The Links Between Banking And Currency Crises
   - 1.1) Theory : The 3 Models
   - 1.2) Empirical Evidence
     - Probabilities Of Crises
     - The Severity Of The Crises
2. The Macroeconomic Background Of The Crises
3. The Anatomy Of Crises
   - 3.1) Methodology : The 4 Sets Of Judgments
   - 3.2) The Early Signals Of Crises
   - 3.3) The Fragility On The Eve Of Crises
4. Concluding Remarks

THE LINKS BETWEEN BANKING AND CURRENCY CRISES

1

THEORY : MODEL 1

Model #1:

James Stoker's

Start with external shocks

Foreign interest rate increases + Fixed exchange rate regime

Capital outflows

Central banks' intervention

Sell foreign currencies → Loss of reserves

Buy domestic currencies → Money supply decreases and interest rate rises

→ Credit Crunch + Increased bankruptcies → Financial crisis

THEORY : MODEL 2

Model #2:

Velasco's

Financial institutions face troubles

↓

Central banks print money to BAIL OUT troubled financial institutions

↓

Excessive money creation

↓

Domestic interest rate decreases

Fixed exchange rate regime

↓

Capital outflows

↓

Central banks' intervention

→

Currency crash

THEORY : MODEL 3

Model #3:

Common causes

Financial liberalization

Inadequate regulation & lack of supervision + Implicit deposit insurance

Excessive borrowing from abroad

Lending boom

Asset bubbles

Asset market crash

Currency attack

Currency crisis → Banking crisis

EMPIRICAL EVIDENCE

INDICES OF FINANCIAL CRISES (1)

Balance-of-Payment Crisis or Currency Crisis

Facing currency crisis , central banks will

- Implement contractionary monetary policy → i ↑
- Intervene foreign exchange market → foreign reserves ↓

Index

Weighted average of exchange rate changes and reserve changes

Banking Crisis

Beginning	Marked by two types of events • Bank runs, leading to closure/ merging/ takeover by a public sector of one or more financial institutions • No bank runs but closure/ merging/ takeover/ bailout from government of an important financial institution
Peak	Period of heaviest government intervention / bank closures

FREQUENCY OF CRISIS OVER TIME

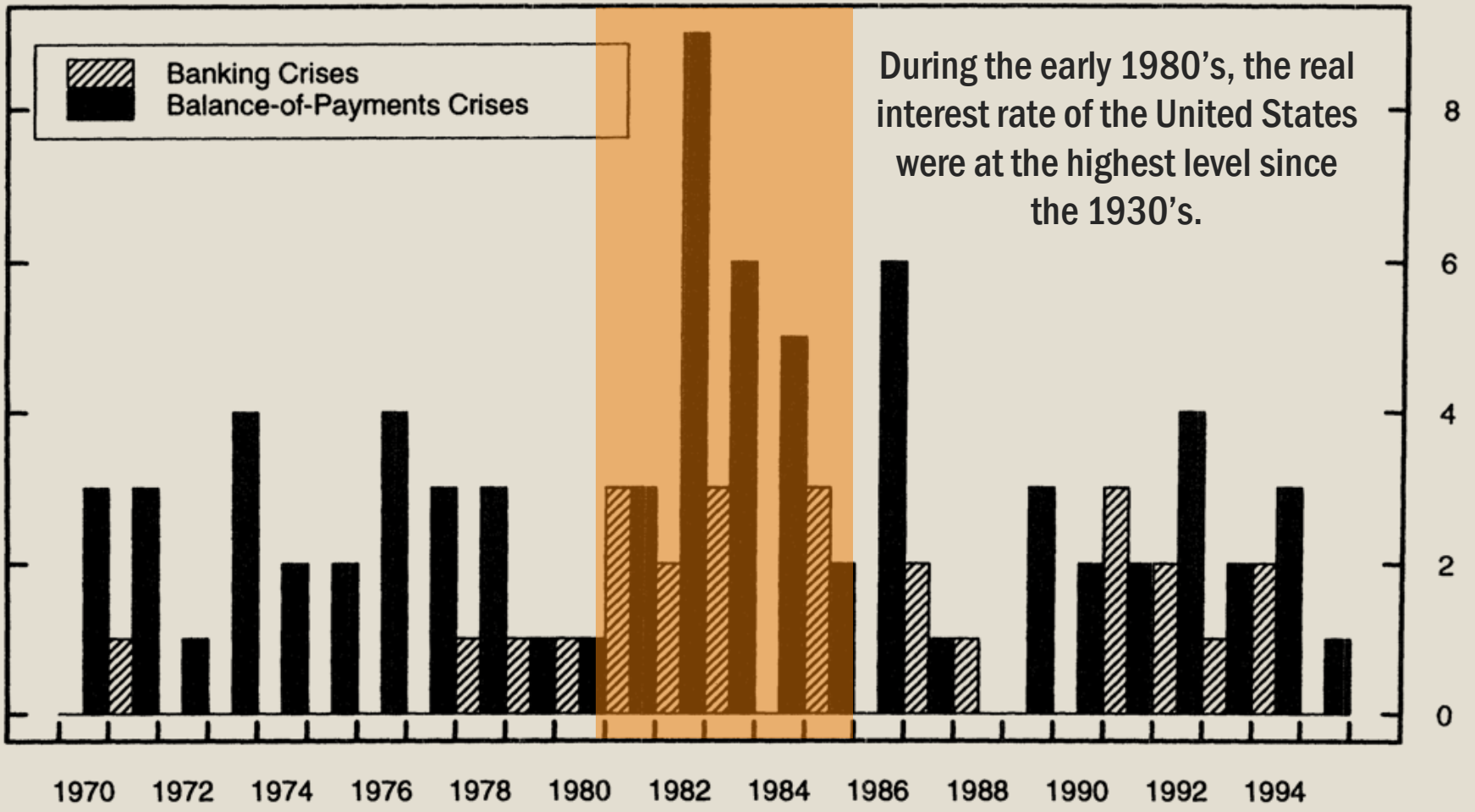
	Number of crises					
	1970–1995		1970–1979		1980–1995	
Type of crisis	Total	Average per year	Total	Average per year	Total	Average per year
Balance-of-payments	76	2.92	26	2.60	50	3.13
Twin	19	0.73	1	0.10	18	1.13
Single	57	2.19	25	2.50	32	2.00
Banking	26	1.00	3	0.30	23	1.44

- Samples: 20 countries from 1970s – mid 1990s but before Asian Financial Crisis
- Twin crises is defined as the currency crisis which follows the beginning of the banking crisis within 48 months.

Results:

- There were 26 banking crises and 76 currency crises. 19 of 76 currency crises were twin crises.
- There were only 3 banking crises before liberalization. The number increased sharply after liberalization.
- This implies that financial liberalization makes financial market becomes more sophisticated and at the same time more vulnerable.

IMPACTS OF FOREIGN INTEREST RATE



PROBABILITIES OF CRISES

Probabilities of currency crisis

Type	Value (in percent)
Unconditional	29
Conditional on the beginning of a banking crisis	46
Conditional on the peak of a banking crisis	22

Probabilities of banking crisis

Type	Value (in percent)
Unconditional	10
Beginning of a banking crisis conditional on a balance-of-payments crisis	8
Beginning of a banking crisis conditional on financial liberalization	14
Peak of a banking crisis conditional on a balance-of-payments crisis	16

From this observation, we can conclude that

Financial liberalization → Beginning of banking crisis → Currency crisis → Peak of banking crisis

THE SEVERITY OF THE CRISES

	Banking crises		Balance-of-payments crises	
Severity measure	Twin	Single	Twin	Single
Cost of bailout (Percent of GDP)	13.3	> 5.1*	NA	NA
Loss of reserves (Percent)	NA	NA	25.4	> 8.3*
Real depreciation (Percent)	NA	NA	25.7	= 26.6
Composite index	NA	NA	25.6	17.5

Important notices

- Bailout costs are significantly larger in the twin crises than for banking crises alone
- Losses of reserves are substantially greater in the twin crises than for currency crises alone.
- However, real depreciation in both cases are comparable in terms of magnitude.

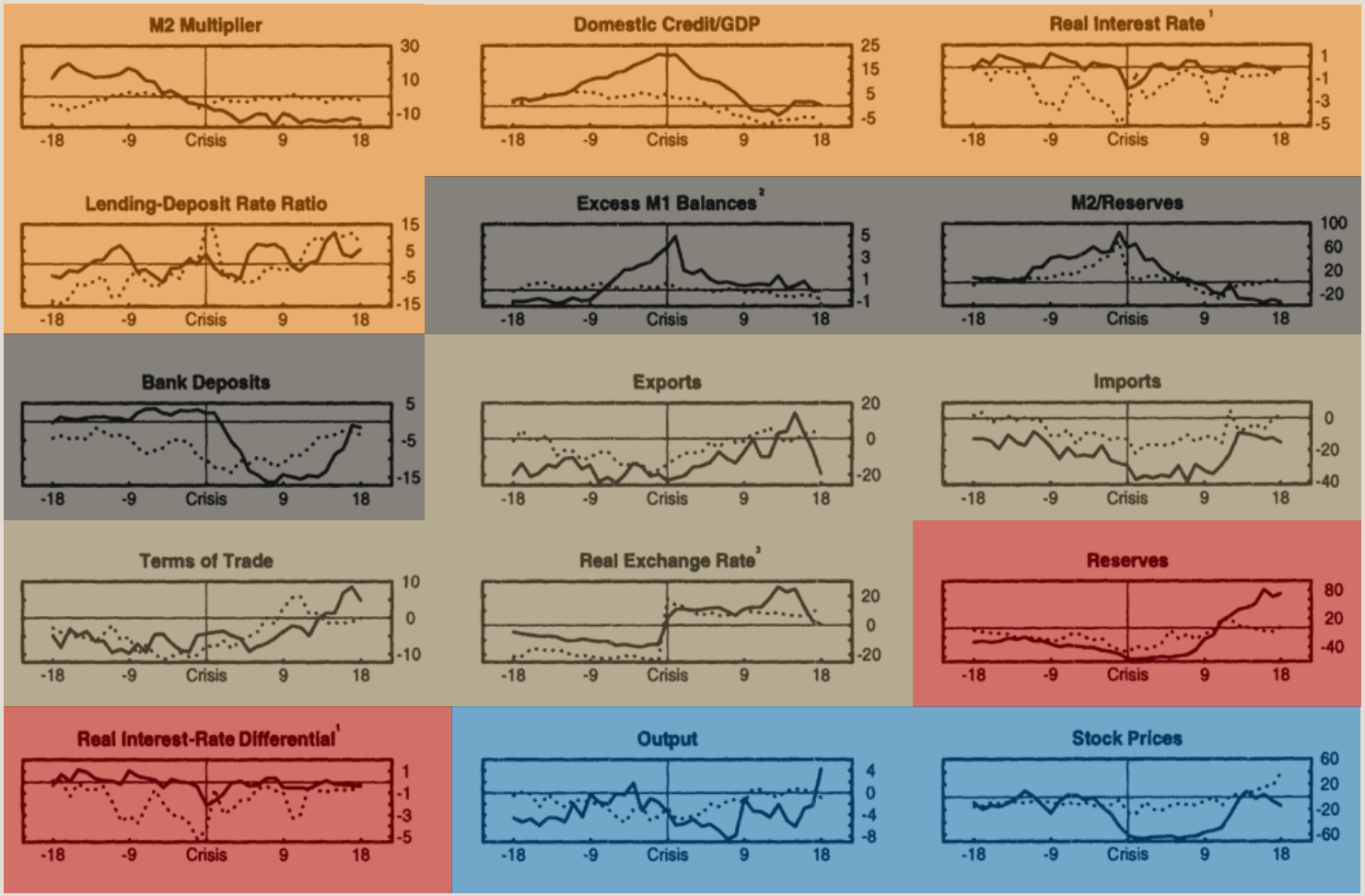
Conclusion

- Twin crises are more severe than crises occurred in isolation.

THE MACROECONOMIC BACKGROUND OF THE CRISES

2

THE 16 VARIABLES

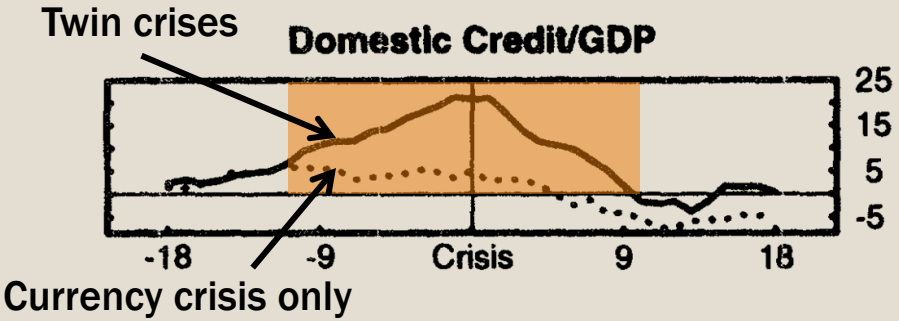


16 macroeconomic & financial variables are categorized into 6 categories.

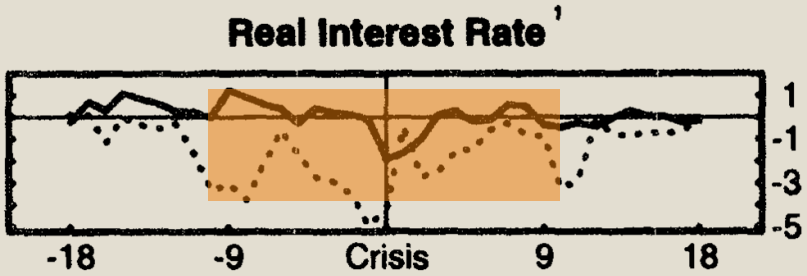
- Financial liberalization
- Other financial indicators
- Current account
- Capital account
- Real sector

Fiscal variable (fiscal deficit / GDP)

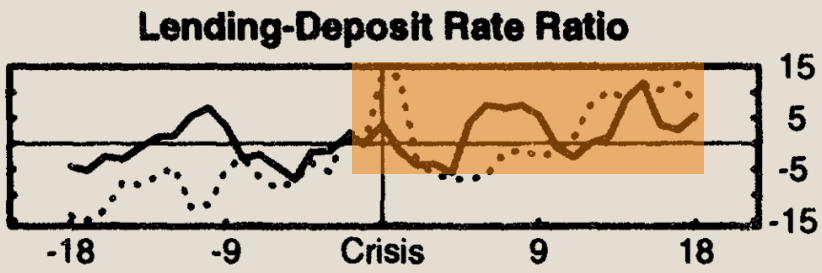
FINANCIAL LIBERALIZATION



- Accelerates markedly as the crisis approaches
- Credit boom

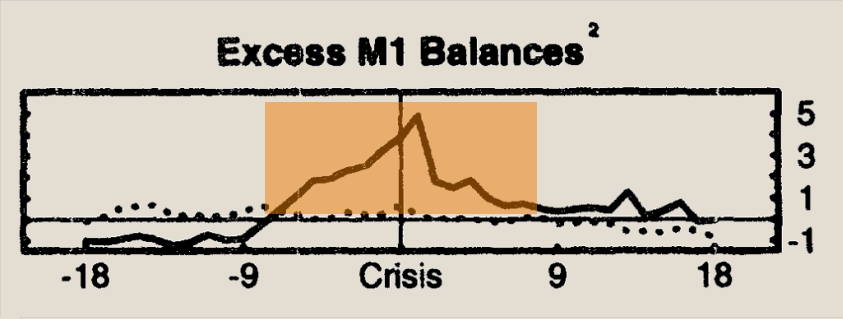


- 1% - 2% higher than normal period
- May reflect credit risk or tight monetary policy

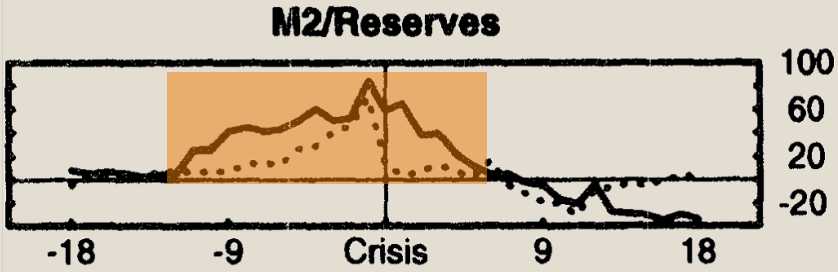


- The ratio rises about 6 months after the crises
- Around peak period of banking crisis, banks become increasingly unwilling to lend

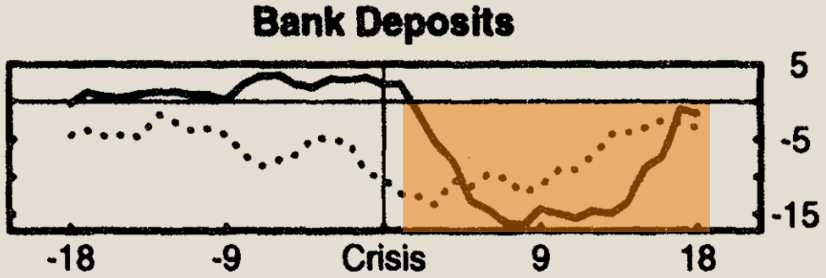
OTHER FINANCIAL INDICATORS



- Excess supply of M1 reflects excess liquidity
- Incompatible with pegged exchange rate system, so currency crisis emerges

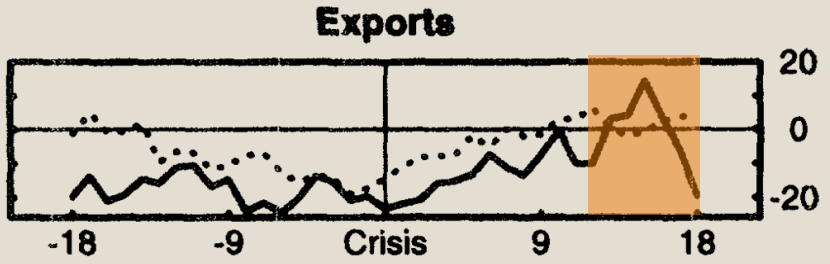


- Expansion of M2 accompanied by the deterioration in foreign reserves
- Increases by 70% in the time of crises

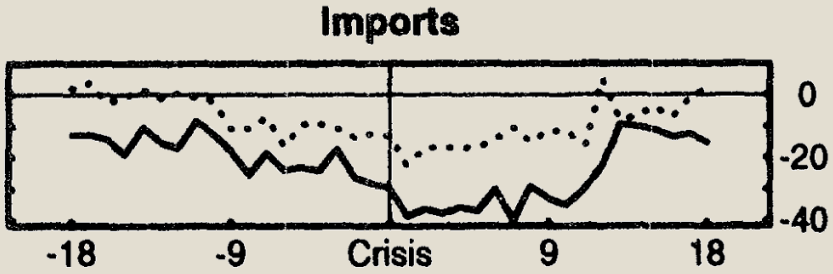


- Increases before the crisis – coincides with the increase in M2
- Declines harshly after the crisis due to bank runs or capital flight

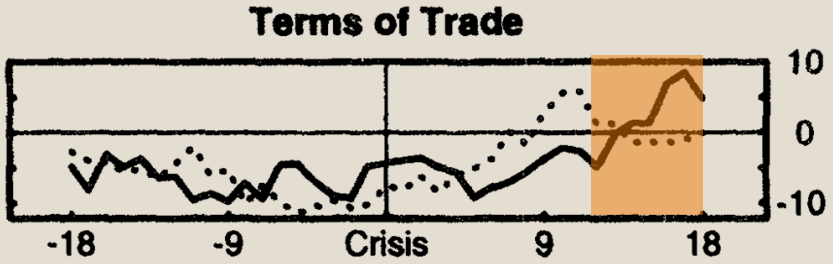
CURRENT ACCOUNT(1)



- Before and during the crises: very poor due to overvaluation
- After the crises: increases substantially due to devaluation

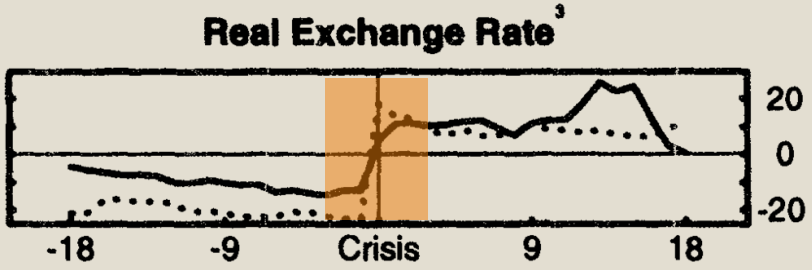


- Decline in import growth before and after the crises
- May be due to the slowdown in economic activity



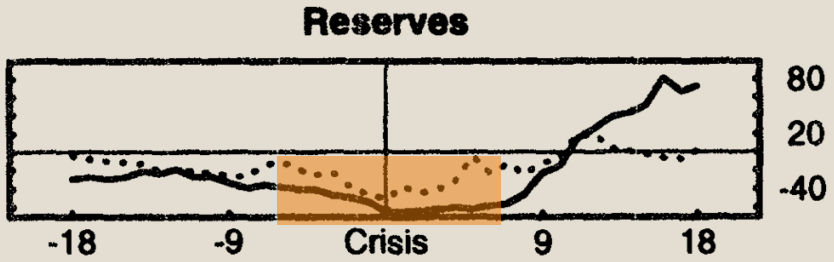
- Below normal period for many months before the crises
- Improves and even goes beyond the normal period after the crises

CURRENT ACCOUNT(2)



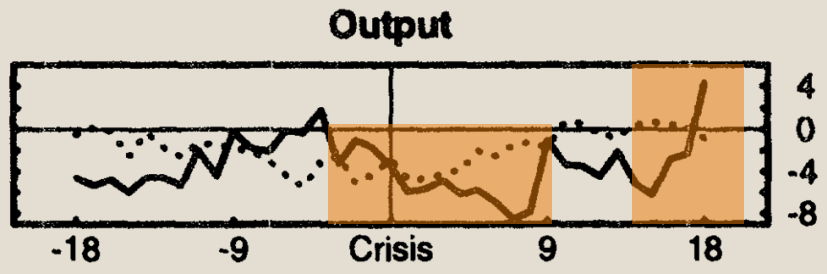
- Before the crisis: overvalued
- In the time of crises, central banks decide to devalue and float the currencies

CAPITAL ACCOUNT

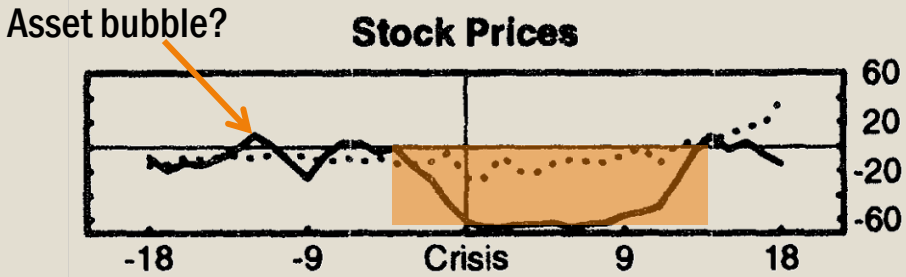


- Falls substantially in the month prior to both banking and currency crises
- After the devaluation, reserves start to increase again

REAL SECTOR & FISCAL VARIABLE



- Before the crisis, output still grows due to economic boom
- As the crisis approaches, output drops drastically
- Effect in twin crises is far more severe



- The clash is more severe in the case of twin crises
- The collapse is also apparent in other asset markets like real estate

Fiscal deficit/GDP ratio

- Higher than normal period

THE ANATOMY OF CRISES

3

METHODOLOGY(1)

- 4 sets of judgments

1. What is classified as a crisis
2. List of variables that are potentially leading indicators
3. What is a reasonable period of time between the signals and crises
4. What is the threshold or cutoff that separates normal situation and the crises

3. Define a reasonable period of time

- For currency crisis – 24 months before the beginning of the crisis
- For banking crisis – 12 months before and after the beginning of the crisis

- Why do we use different period of time?
  Because of different timing of peaks of both crises

4. Define a signal

- Choosing the right threshold is like selecting the size of the rejection region in hypothesis testing
- It involves a trade-off

METHODOLOGY(2)

Select a threshold for the decline in equity returns

1) Set at -15% → May catch all crises but also include false alarms or the decline in equity without crises → Type I error

2) Set at -40% → Reduce type I error but may miss many crises that are less severe → Type II error

Method:
Perform a broad range of critical regions for each and every indicators
Then, calculate noise-to-signal ratio

Noise-to-signal ratio

$$= \frac{B}{B+D} / \frac{A}{A+C}$$

Choose the threshold with lowest noise-to-signal ratio

	Crisis occurs in the following 24 months	No crisis occurs in the following 24 months
Indicator issues a signal	*A*	*B*
Indicator does not issue a signal	*C*	*D*

THRESHOLD VALUES FOR SIGNALING CRISES

Examples:

Indicators	Threshold values and the location of the critical region: Balance-of-payment crises	Threshold values and the location of the critical region: Banking crises
Financial sector		
Financial liberalization		
M2 multiplier	>0.86	>0.90
Domestic credit/GDP	>0.90	>0.95
Real interest rate	>0.88	>0.80
Lending-deposit rate ratio	>0.80	>0.87
Other		
Excess M1 balances	>0.94	>0.91
M2/reserves	>0.87	>0.90
Bank deposits	<0.10	<0.16

THE EARLY SIGNALS OF CRISES(1)

	Percent of crises accurately called					
	Balance-of-payment crises					
Indicators	Total	Single	Twin	Before financial liberalization	After financial liberalization	Banking crises
Financial sector	67	67	67	67	68	65
Financial liberalization	74	72	78	64	77	71
M2 multiplier	76	75	78	74	77	73
Domestic credit/GDP	61	59	67	56	65	50
Real interest rate	89	86	94	78	91	100
Lending-deposit rate ratio	71	70	73	50	73	57
Other	57	58	53	57	56	57
Excess M1 balances	37	43	22	52	26	32
M2/reserves	81	79	89	74	86	75
Bank deposits	51	52	47	44	56	67
External sector	72	71	74	72	72	82
Current account	68	67	70	70	66	75
Exports	85	83	89	78	89	88
Terms of trade	75	72	83	73	77	96
Real exchange rate	59	57	67	58	60	58
Imports	52	57	39	73	40	60
Capital account	81	80	83	74	83	96
Reserves	75	74	79	70	78	92
Real interest-rate differential	86	86	88	78	89	100
Real sector	69	69	70	61	72	85
Output	74	73	77	68	76	89
Stock prices	64	65	63	53	68	81
Fiscal sector	28	27	29	21	31	44

THE EARLY SIGNALS OF CRISES(2)

Ranking	Currency crisis		Banking crisis		Twin crises	
	Categories	%	Categories	%	Categories	%
1	Capital account	81	Capital account	96	Capital account	83
2	Financial liberalization	74	Real sector	85	Financial liberalization	78
3	Current account	68	Current account	75	Current account	70
4	Real sector	69	Financial liberalization	71	Real sector (same % as current account)	70
5	Other financial indicator	57	Other financial indicator	57	Other financial indicator	53
6	Fiscal sector	28	Fiscal sector	44	Fiscal sector	29

THE FRAGILITY ON THE EVE OF CRISES(1)

Number of indicators signaling a crisis (in percent)		Number of crises (in percent)					
		Balance-of-payments crises					
		Total	Single	Twin	Before financial liberalization	After financial liberalization	Banking crises
80–100	13-16 out of 16	26.7	28.6	21.1	40.0	17.8	30.8
60–79	9-12 out of 16	45.3	41.1	57.9	23.3	60.0	53.8
40–59	6-10 out of 16	20.0	21.4	15.8	20.0	20.0	11.5
20–39	3-5 out of 16	6.7	8.9	0.0	13.3	2.2	3.9
Less than 20	0-2 out of 16	1.3	0.0	5.3	3.3	0.0	0.0

- This table shows the proportion of the indicators that were signaling during 24 months preceding the crises.
- For both banking and currency crises, multiple economic problems were simultaneously building.

Results:

- How to read?
  For example, in about 30 percent of the currency crises, 13 or more indicators were sending signals.
- In the case of the twin crises, economies appear to have more widespread problems as many economic indicators signal. In about 60 percent of the twin crises, 9 to 12 indicators were sending signals.

THE FRAGILITY ON THE EVE OF CRISES(2)

- The result suggests that the majority of crises have a multitude of weak economic fundamentals at their core.
- Self-fulfilling, speculative attacks and herding behavior may have some roles but most crises seem to be caused primarily by fragility of the economy.

CONCLUDING REMARKS

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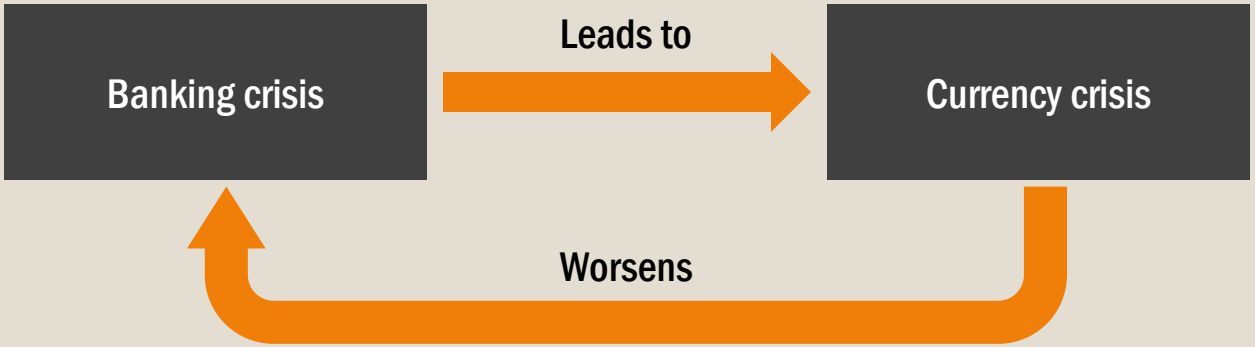
CONCLUDING REMARKS(1)

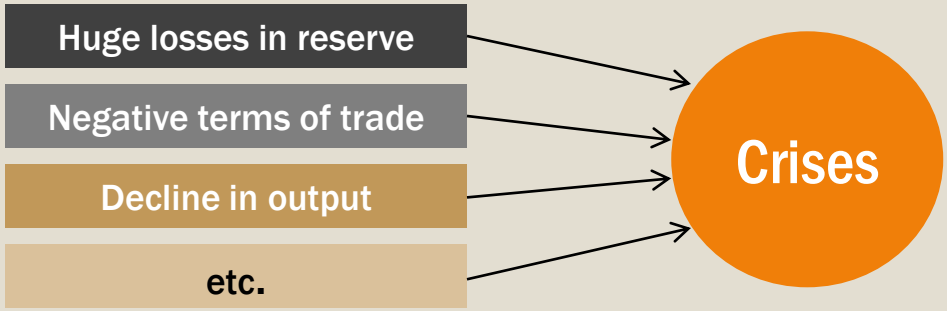
1. Banking and currency crises are closely linked in the aftermath of financial liberalization.

2. The vicious cycle of twin crises



CONCLUDING REMARKS(2)

3. Crises are typically preceded by a multitude of weak and deteriorating economic fundamentals.



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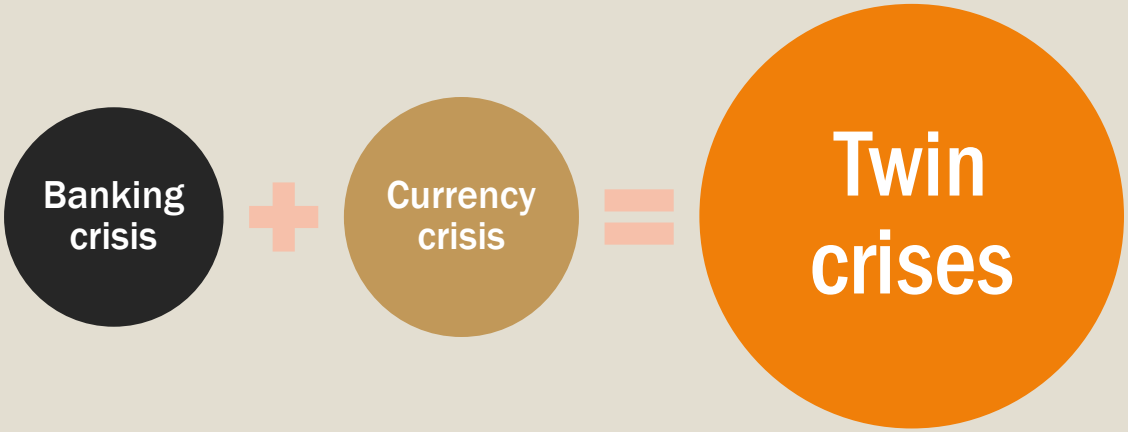

CONCLUDING REMARKS(3)

5. Roots of meltdown in many cases were systematic banking problems, including weak regulation and poor banking supervision. Hence, central banks need to set up strong bank regulation and supervision. This will allow the countries to sail smoothly through the process of financial liberalization.

Q&A