

USES OF MIRROR DATA

estimation of Foreign Assets and Liabilities of Households*

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* The views expressed in this presentation are those of the authors and not necessarily of the BIS, BdP or OENB.

3 TOP motivations

1. Delimitation, complexity and importance of the household sector

Group of persons...

- ✓ Who share the same living accommodation
- ✓ Who pool some, or all, of their income and wealth and consume certain goods and services collectively

[SNA §4.147]

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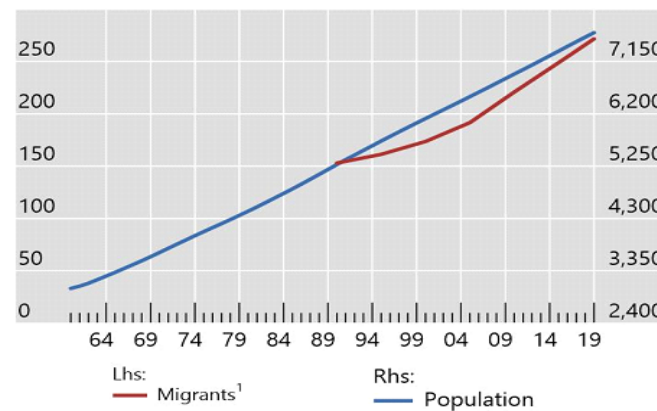
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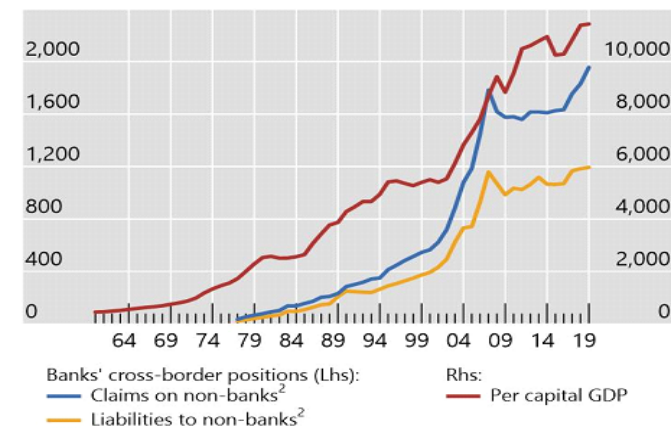
[SNA §4.147]

World population, stock of migrants, GDP *per capita* and cross-border claims/liabilities [1990-2019]

World population and migrant stock, in million



GDP *per capita*, bank claims and bank liabilities, in US dollars



¹ At mid-year. ² Per capital outstanding amounts; As of end-December. ³ GDP at current price.

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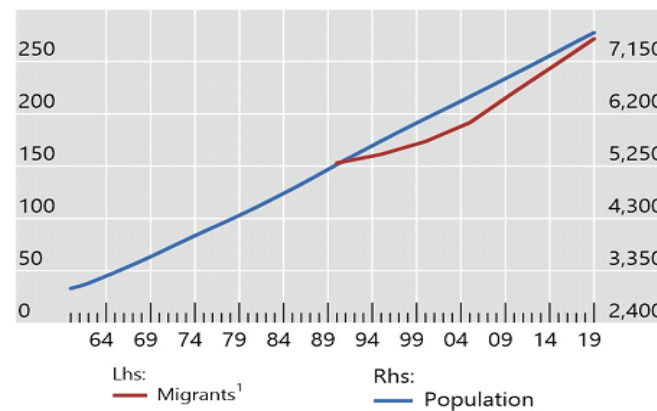
[SNA §4.147]

The measurement of the households' sector implies the consistency between:

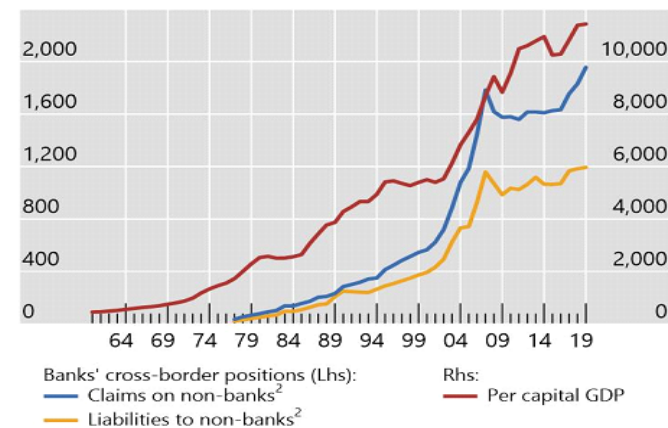


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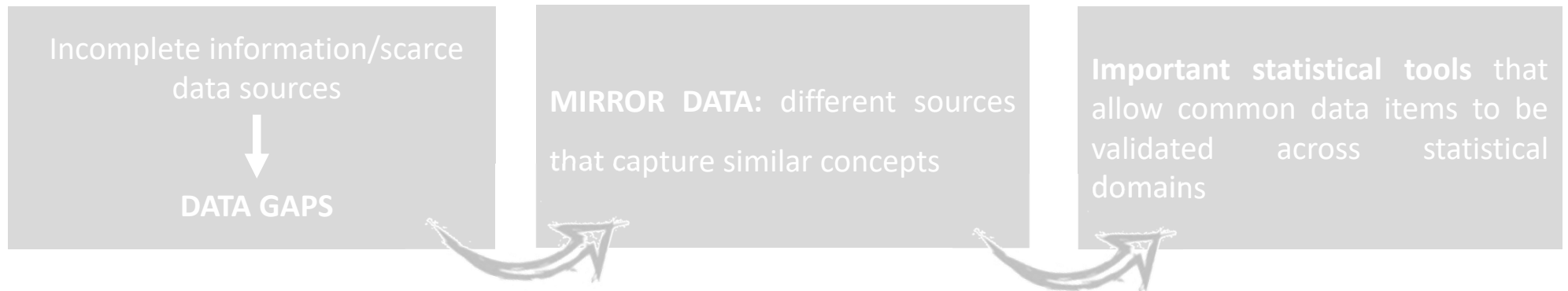
3 TOP motivations

2. Mirror data can be used to measure this sector



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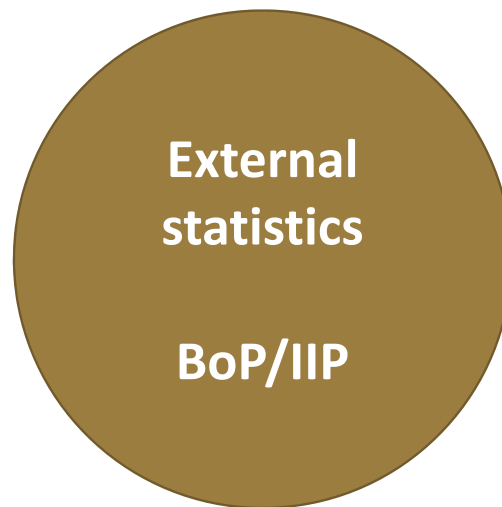
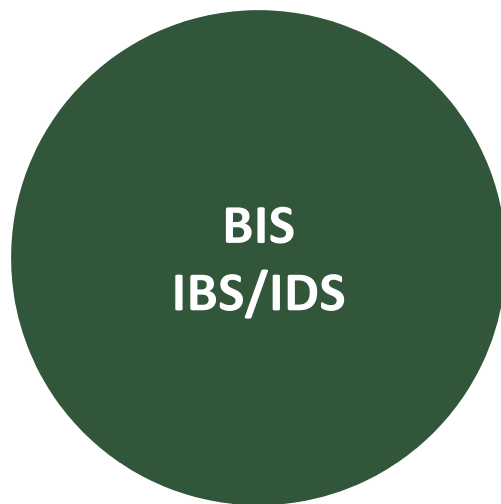
PROMOTES:



3 TOP motivations

3. Relevance to other domains of Households' foreign assets and liabilities

Correspond to an **important portion** of many **external operations** both **on the non-financial** and **financial items**



WHY THIS PAPER?

- 1. Estimate stocks that can improve the coverage of other statistical domains: International Investment Position and Rest of the World Sector – National accounts**
- 2. Provide guidance on derivation of households' assets/liabilities (loans & deposits) on a country basis for more than 200 countries**
- 3. Exploit mirror relationship between bank & counterparty sector, using aggregated data (published) or granular data (unpublished)**

WHY BIS - Locational Banking Statistics?

1. Estimation of stocks

- **Consistency** with the International Investment Position
- **Granular** data with country location of both reporting banks and counterpart
- Breakdown available by **counterparty sector, instrument and currency**

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2. Derivation of households' Loans and deposits

- **3 methods to estimate cross-border assets/liabilities** depending on the available data
- **Mirror data:**

Banks' deposit liabilities to households = Assets of households with banks

Bank's loan claims on households = Borrowing/liabilities of households to banks

We will present **3** alternative
estimation methods

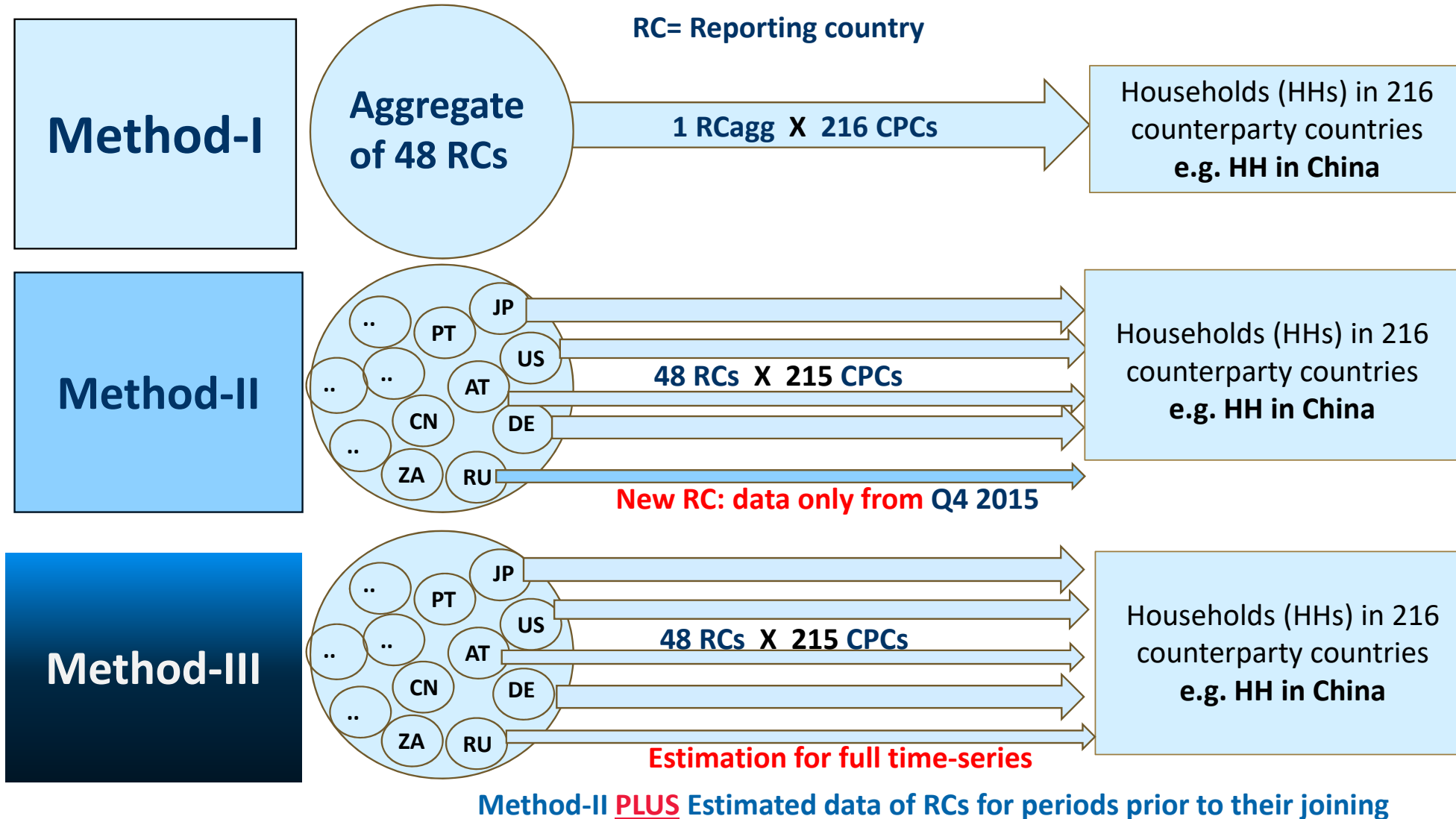


Method-I

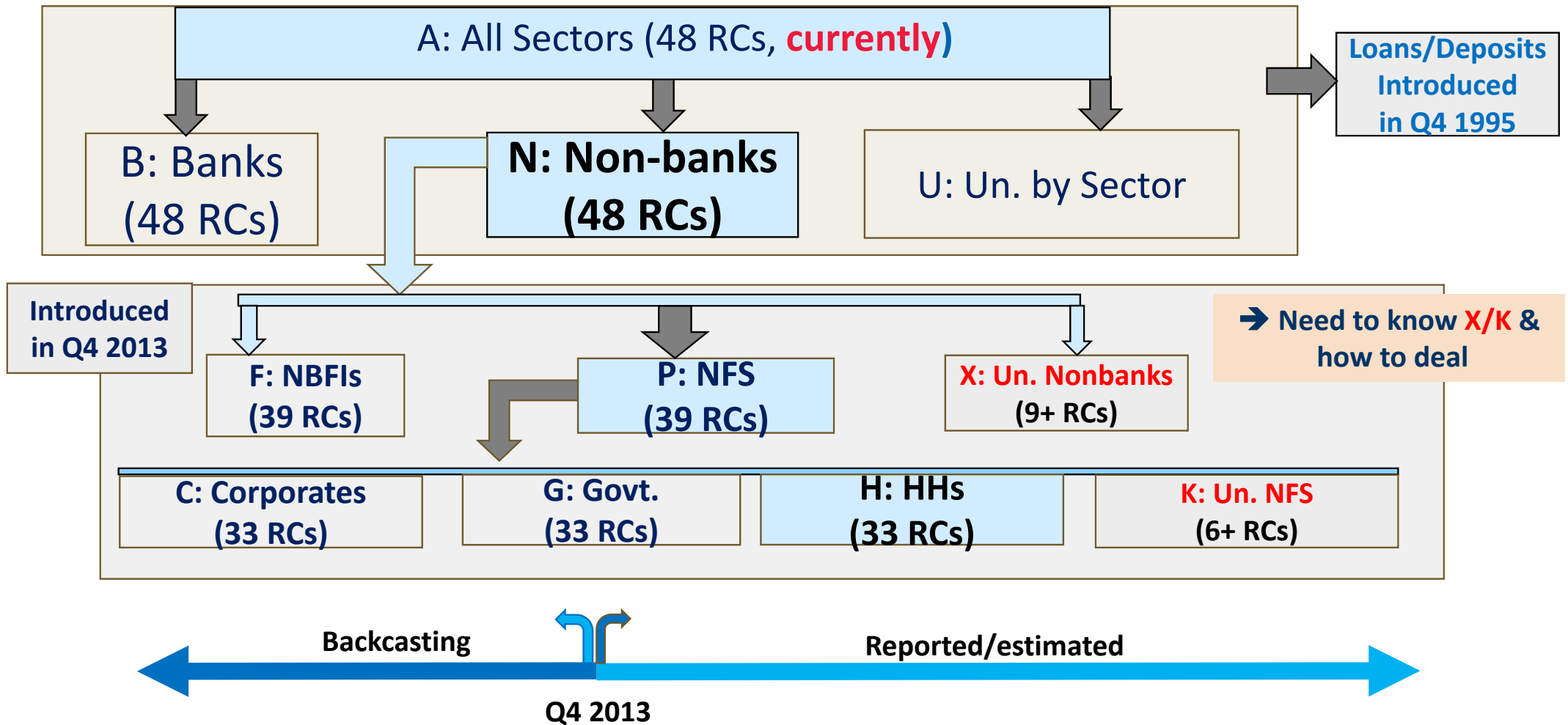
Method-II

Method-III

Methodology: 3 Estimation Methods – What and Why?

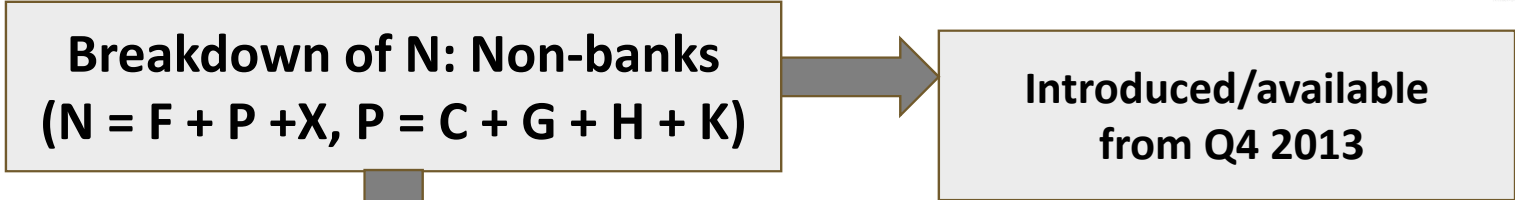


Estimation based on Data Knowledge Level 1 (→ Method-I)



Source: Guidelines to the BIS Locational Banking Statistics (LBS)

Estimation based on Data Knowledge Level 2 (→ Method-II)



1. Of 48 RCs, who provides which breakdowns and from when? **Backcasting depends**
2. What is their profile vis-à-vis HHs or other sectors in other country?



Sub-sectors	Q4 2006	...	...	Q3 2013	Q4 2013	Q1 2014	.....	Q4 2015	...	...	Q4 2017	.. ..	Q4 2020
N: Non-bank, total	40 RCs			44	44	44		46 (CN/RU)			48		48
F and P (+X)					18	20 (=18+2)		31(=20+11)			38 (=31+7)		39
C,G and H (+K)					15	16 (=15+1)		26(=16+10)			32 (=26+6)		33

Note: 8 reporting countries joined the reporting system between Q4 2006 and Q4 2017

Estimation based on Data Knowledge Level 3 (→ Method-III)

Breakdown of N: Non-banks
($N = F + P + X$, $P = C + G + H + K$)

Issue raised by Patrick McGuire during BIS internal presentation: **Number of reporting countries changed over time** and some of them have large positions and may not be representative for period before they joined. For example, CN/RU vis-à-vis HK before they joined in Q4 2015.

Question: Is it possible to have estimates, even if not perfect, for all 48 countries since Q4 2006?

We estimate N: Non-bank (total) of 8 countries for periods before they joined and apply Method-II. Estimates comprising values for all 48 countries

Method-III = Method-II + Estimated non-reported data of **8 newly joined countries** since Q4 2006

Method – I: Published data on the BIS Website (Table A.6)

- The Table shows aggregated data of all reporting countries vis-à-vis non-bank subsectors in China

Sectors	Q4 2020, Amount outstanding in USD bn	
	Loan claims	Deposit liabilities
N: Non-banks, total (48)	265.8	291.1
F: NBFIs	30.3	33.0
P: NFS	193.0	241.0
X: Non-banks, unallocated	42.5	17.1
C: NFCs	46.6	25.2
G: GG	5.8	13.8
H: Households	15.3	18.2
K: Unallocated NFS	125.2	183.8

- Large unallocated amounts in **X and K** are more than 50% of non-bank total BUT most users don't pay attention to these!
- Share (%) of unallocated is larger in earlier quarters. Published data would be misleading unless users take proper care of gradual increase in coverage and related issues.

Method – I: Estimation – Step 1

- We proportionally allocated X to sectors F(NBFIs) & P (Non-Financials), using reported share.
- This gives estimated values for F(NBFIs) & P (Non-Financials)

As of end-2020

Amount outstanding, in USD billion

Sectors	Loan claims		Deposit liabilities	
	Published	Estimated	Published	Estimated
N: Non-banks, total (48)	265.8	265.8	291.1	291.1
F: NBFIs	30.3	36.1	33.0	35.0
P: NFS	193.0	229.8	241.0	256.0
X: Non-banks, unallocated	42.5	-	17.1	-

STEP
1

Method – I: Estimation - Step 2

- Unallocated K **derived** = difference between estimated P and sum of its reported subsectors C, G & H
- Proportionally allocate derived-K to C, G and H, using reported share, to get estimated C, G and H

Sectors	Loan claims		Deposit liabilities	
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X: Non-banks, unallocated	42.5	-	17.1	-
C: NFCs	46.6	158.0	25.2	112.9
G: GG	5.8	19.8	13.8	61.8
H: Households	15.3	52.0	18.2	81.4
K: Unallocated NFS	125.2		183.8	
K^{est}: derived from estimated P	161.9		198.8	

STEP 2 (highlighted in a purple box)

Arrows indicate the flow of data: Purple arrows point from the 'Estimated' values of P: NFS (229.8) to the 'Estimated' values of C: NFCs (158.0) and H: Households (52.0). Green arrows point from the 'Published' values of C: NFCs (46.6) and H: Households (15.3) to the 'Estimated' values of C: NFCs (158.0) and H: Households (52.0).

Method – I: Estimation – Step 3

Loan claims: All reporting countries vis-à-vis China (\$bn)

Quarter	N: NBk	F: NBFi	P: NFS	X: Nbk, U	C: NFCs	G: GOV	H: HHs	K: NFS, Un
2006-Q4	23.0							
...	...							
...	...							
...	...							
...	...							
2012-Q4	154.3							
2013-Q1	156.7							
2013-Q2	188.0							
2013-Q3	207.3							
2013-Q4	242.7	15.7	226.9	0.0	205.9	18.3	2.7	0.0
2014-Q1	272.5	15.0	257.5	0.0	233.6	20.8	3.0	0.0
2014-Q2	301.2	18.2	283.0	0.0	261.8	17.6	3.6	0.0
2014-Q3	296.6	20.3	276.3	0.0	248.3	24.4	3.7	0.0
...	...	..	..	0.0	...	...	...	0.0
...	...	..	..	0.0	...	...	...	0.0
...	...	..	..	0.0	...	...	...	0.0
2019-Q3	270.6	31.1	239.5	0.0	185.0	10.5	44.1	0.0
2019-Q4	276.0	31.8	244.2	0.0	185.1	11.6	47.6	0.0
2020-Q1	266.4	30.3	236.1	0.0	179.1	13.6	43.5	0.0
2020-Q2	272.4	31.5	240.8	0.0	183.0	12.6	45.2	0.0
2020-Q3	272.9	30.3	242.6	0.0	179.3	15.1	48.2	0.0
2020-Q4	265.8	36.1	229.8	0.0	158.0	19.8	52.0	0.0

Step 3:
Backward estimation

Step 1: For each quarter

Step 2: For each quarter

- Repeat Step 1 and 2 for each quarter until the first reported quarter Q4 2013.
- For quarters prior to Q4 2013, we estimate using weighted average of subsectors to Sector N

We not only get estimates for HH but also for other subsectors

Method –II/-III: Basis assumption ..in Estimation

BASIC ASSUMPTION

→ Exposure of banks in a reporting country, say **RC1**, vis-à-vis Households in country **XX** follows a pattern **that is different** from the banks in reporting country **RC2**

For example:

Claims and liabilities of banks in the *Japan vis-à-vis Households in Germany has a specific profile different from that of banks in Austria or Portugal.*

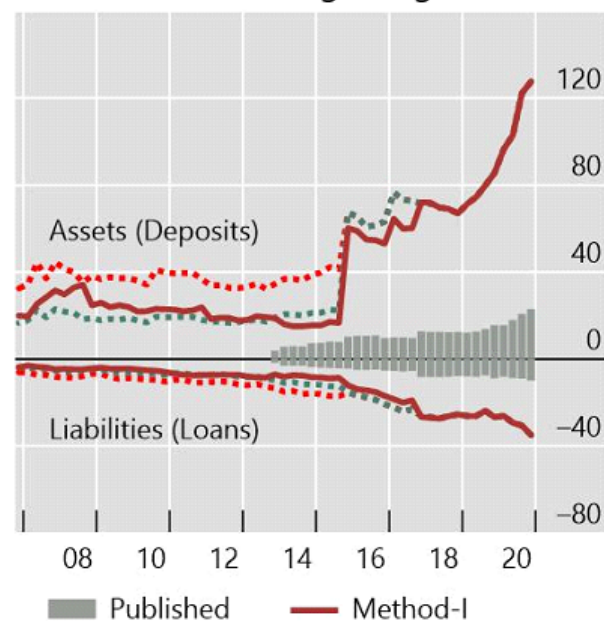
Published and 3 estimates for households: Sample of countries

Households' foreign assets and liabilities¹

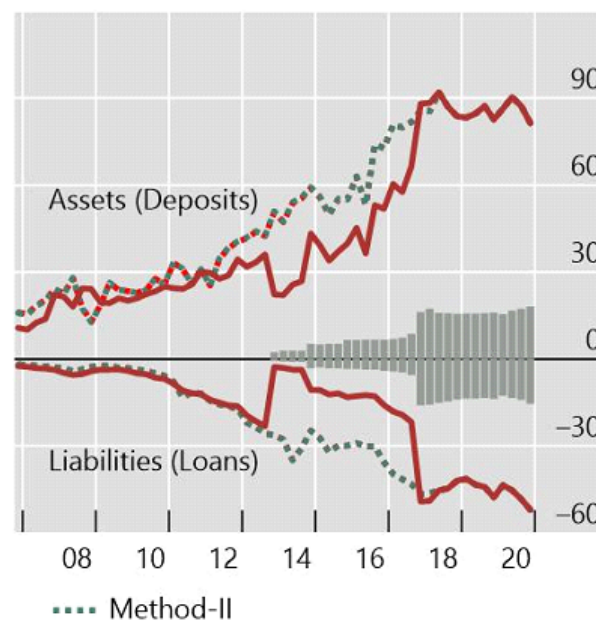
Amounts outstanding, in billions of US dollars

Graph 6

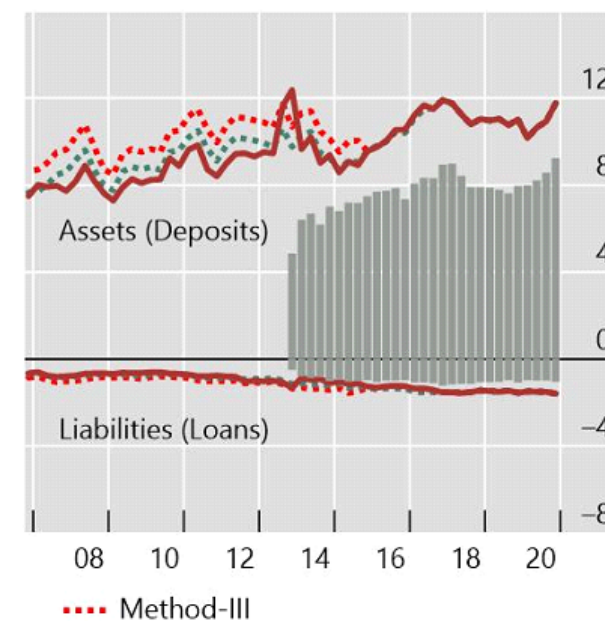
Households in Hong Kong SAR



Households in China²



Households in South Africa



¹ [Method-I](#) estimates using published aggregates; [Method-II](#) uses non-published bilateral data; [Method-III](#)=Figures from [Method-II](#) plus estimated amounts for new reporting countries prior to their joining. ² [Visibly no impact](#) due to new reporting countries ([Method-III](#)).

Sources: BIS locational banking statistics (by residence); Authors' estimate.

SIMPLE BUT ROBUST METHODOLOGY – fill in data gaps/backward estimation

- The effectiveness of these exercises depends on the availability of granular information

[Public data]

Method-I - exploits published data
from the BIS website

[Non-public data]

Method-II – estimates using bilateral data
Method-III - exploratory in nature providing
estimated figures for the complete reporting
population of banks in 48 countries, since Q4 2006

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SOME ISSUES

- Availability of the data **only from Q4 2013 and time lag**
- **Reporting is voluntary** - coverage but not yet complete
- **Analysis/interpretation** of published data needs proper care (of gaps/metadata)

THE RESULTS ARE RELEVANT



- Mirror data analysis ensures **consistency** and enhances **statistical coverage and quality standards**
- **Back data estimations** to a **more comprehensive and complete time-series** information

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CAN BE APPLIED TO OTHER STATISTICAL DOMAINS



- These **methods** are also **applicable** for other **non-bank sectors**
- And **can be used** for the **compilation of external statistics** and **rest of world sector accounts**, and **may be possible to extend** for other **flows**

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Similar to the BIS estimated data for “Credit to the non-financial sector” on the BIS website...

We recommend the BIS to adopt this method to disseminated estimated data not only for households' sector but also for other non-financial sectors (NBFIs, NFCs and GG).

USES OF MIRROR DATA
Examples from the BIS international banking
statistics and other external statistics

THANK YOU

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