

Disentangling the Supply and Demand Factors of Household Credit in Malaysia: Evidence from the Credit Register

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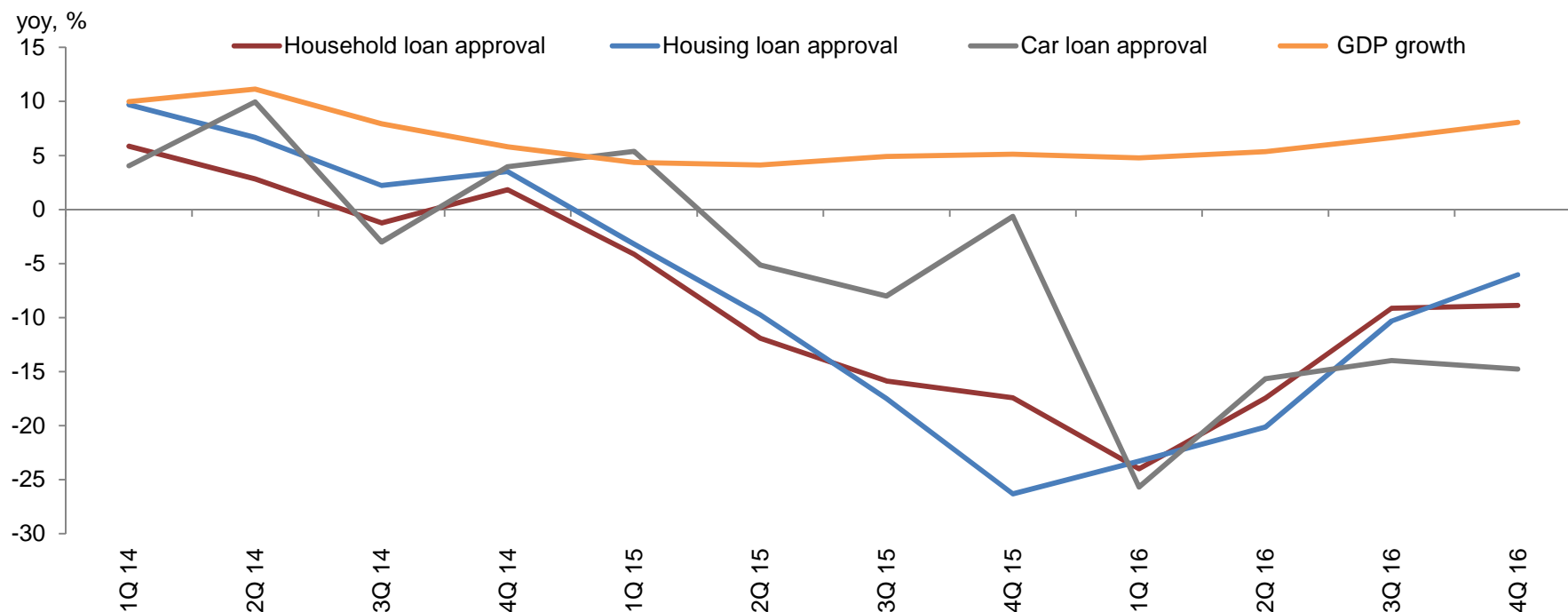
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Disentangling the demand and supply factors of credit is an inherently difficult task

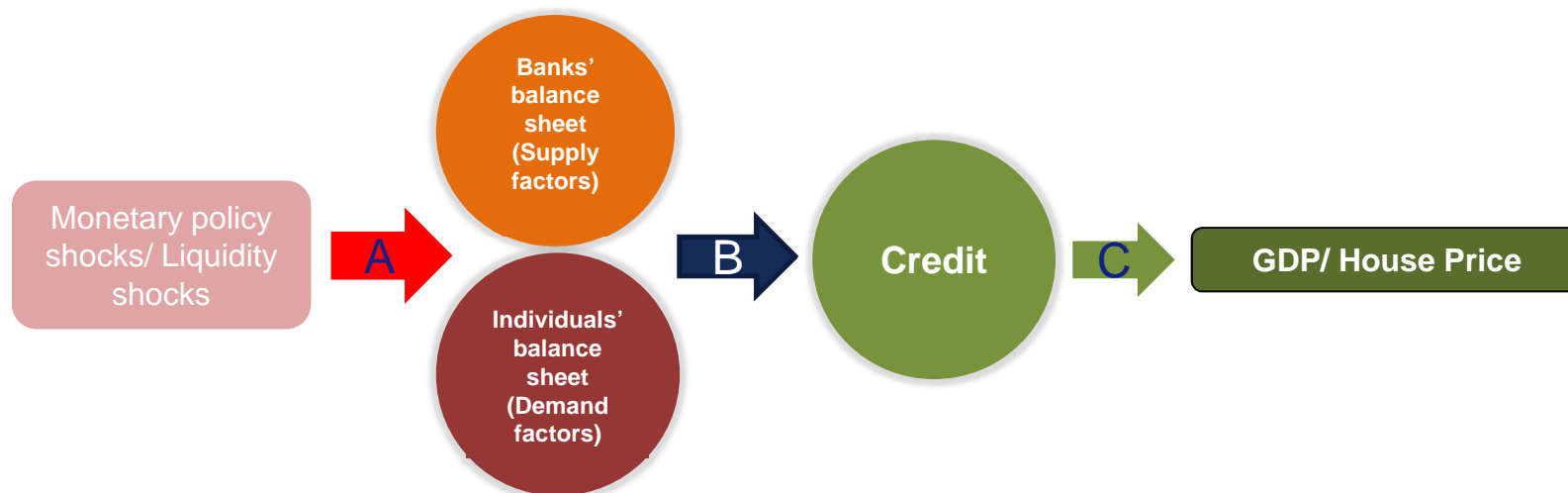
- Moderation in loan approval could be attributed to either demand or supply factors. Separating the two factors is essential to inform appropriate policy responses
- However, to disentangle the two factors using macro data is an empirical challenge
- Using a novel micro-level dataset, this paper traces how supply and demand factors affect household loan approval in Malaysia during the 2014-2016 period

Household Loan Approval Growth vs GDP growth



Source: Author's estimate. Approximately 66% of total household loan approval are housing and car loans.

Quantifying the role of banks' balance sheet is essential to link the financial sector to real activity



Two main contributions of this paper

1. Create a novel borrower-bank pair dataset that links the loan application information to individuals' income and banks' balance sheet
2. Among the first few papers to quantify and assess the relative role of supply and demand factors of credit for an emerging country in Asia

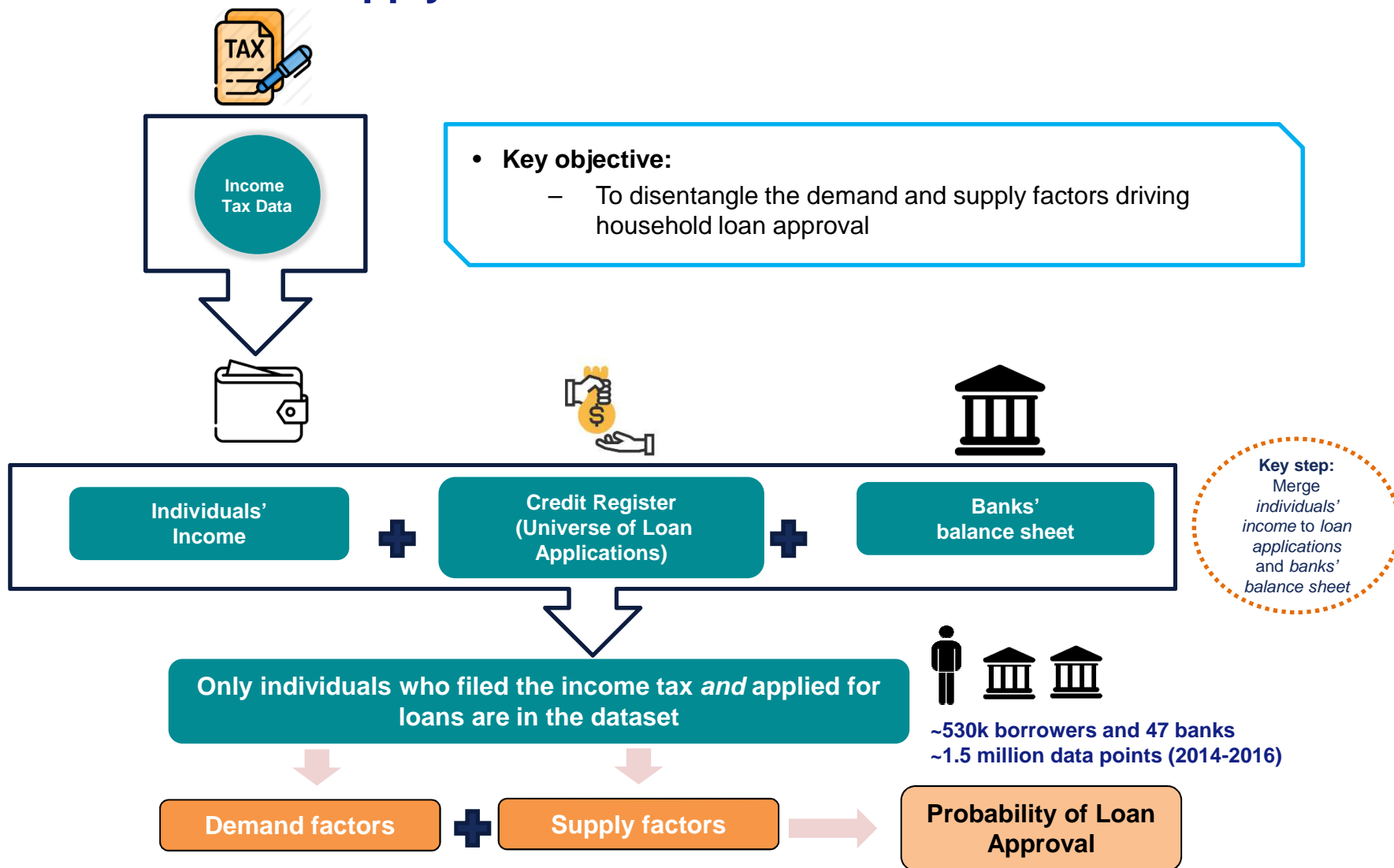
*Kashyap (1993); Kashyap and Stein (2000); Khwaja and Mian (2008)

**Jimenez et al (2017) ; Schepens et al (2018)

***Favara et al (2014); Mian and Sufi (2017)



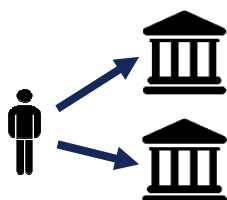
First contribution: create a database of matched borrower – bank pair to isolate the supply and demand factors



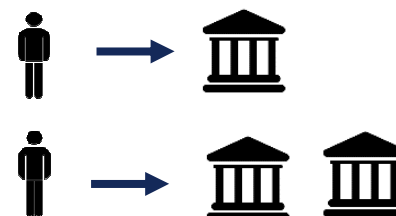
Source: Author's illustration.

Second contribution: use two identification strategies to isolate supply from demand

Equation 1: Use only individuals who applied to multiple banks (85% of borrowers)



Equation 2: Use all borrowers



$$Prob(\text{Loan Approval})_{i,j,t} = \beta_i + \beta_1 S_{j,t=1} + \beta_2 X_{i,j,t} + \beta_3 Z_t + \varepsilon_{i,j,t}$$

- β_i refers to individual–time fixed effect that absorbs all individual-specific demand factors.
- $S_{j,t=1}$ refers to the vector of banks' supply factors at $t=1$.
- $X_{i,j,t}$ refers to the vector of controls.
- **Since the comparison is across banks for the same individual, only heterogeneity in banks' balance sheet will affect the probability of loan approval.**
- Coefficient of interest is β_1 . This is the effect from the supply factors.

$$Prob(\text{Loan Approval})_{i,j,t} = \beta_{ILAM,t} + \beta_0 D_{i,t} + \beta_1 S_{j,t=1} + \beta_2 X_{i,j,t} + \beta_3 Z_t + \varepsilon_{i,j,t}$$

- $\beta_{ILAM,t}$ refers to the occupation-location-age-marital-time fixed effect.
- $D_{i,t}$ refers to the individual-specific demand factor at t .
- **Under this method we can compare the relative strength of demand (β_0) and supply factors (β_1) for the same group of individuals.**
- Coefficient of interest is β_0 vs β_1 .

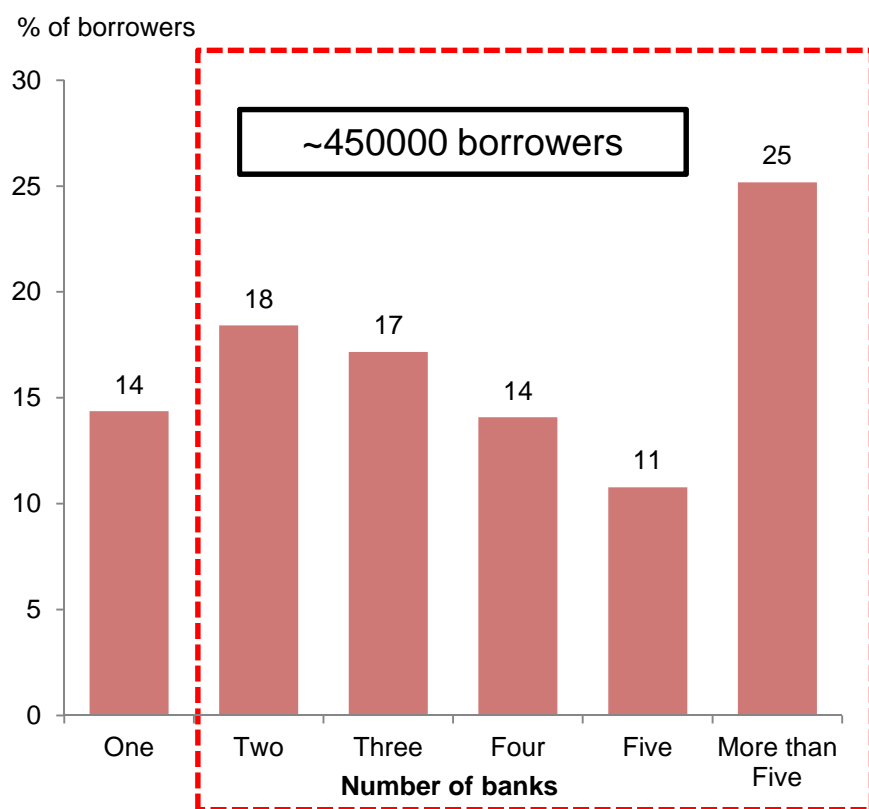
Notes: Demand factor is proxied using borrowers' monthly gross income. Supply factors are proxied using banks' capital ratio, funding ratio and liquidity ratio. Capital ratio is the ratio of tier 1 capital over risk-weighted assets. Funding ratio is the ratio of deposit over total liabilities. Liquidity ratio is the ratio of liquid assets over total assets. Banks' size is the log of total assets. Only commercial and Islamic banks are included in the sample.



Summary statistics: compared to the general population, the income of the borrowers in our dataset is relatively higher

Most of the borrowers in the sample (~85%) applied to multiple banks...

Applications submitted by borrowers to multiple banks for housing and car loans



Source: Author's estimate. There are a total of 47 banks and 530000 borrowers in the sample.

...and these individuals are relatively well off in the population (~3 times the wages in the population)

Variables	Mean	S.D.
Banks' Characteristics		
Funding ratio (%)	75	13.5
Capital ratio (%)	13.7	5.6
Liquidity ratio (%)	11.6	9.7
Size	10.5	1.2
Borrowers' Characteristics		
Monthly income (RM)	9016.1	15030.1
Application amount (RM, thousand)	246.9	340.6
Collateral value for housing loan only (RM, thousand)	2438	10500
Number of banks applied	4.2	2.8
Age	38.3	9.6
Status of loan applications	<u>% accepted</u>	<u>% rejected</u>
	83%	17%
Sex	<u>Male</u>	<u>Female</u>
	63%	37%
Marital status	<u>Married</u>	<u>Single</u>
	40%	60%

*Note: Table 1 shows the summary statistics for the borrower-bank pair dataset. There are 530000 borrowers and 47 banks. Only individuals who paid income tax and applied for loan will appear in the dataset. We also restrict our borrowers to residents only. Only new loan applications are considered.

Results: Supply factors matter more than demand in household credit

First main finding: Banks' balance sheet matters for household lending in Malaysia

- Banks with a higher funding ratio, higher capital ratio and lower liquidity ratio are more likely to approve a housing or car loan application
 - Funding ratio has the strongest effect

Table 2: Effect of demand and supply factors on the status of loan applications (using the sample of individuals who applied to multiple banks (Equation 1))

Dependent variable	Status of Loan Applications (1 if accepted, 0 otherwise)	
	[Column 1: Housing Loan]	[Column 2: Car Loan]
Standardised Capital Ratio	0.037*** [0.006]	0.052*** [0.004]
Standardised Funding Ratio	0.060*** [0.004]	0.072*** [0.003]
Standardised Liquidity Ratio	-0.004 [0.005]	-0.049*** [0.005]
Constant	0.662*** [0.017]	0.770*** [0.012]
Loan Characteristics Controls		
Loan Application Amount (Value)	Yes	Yes
Collateral Value	Yes	No
Bank Characteristics Controls		
Size of Bank	Yes	Yes
Bank Market Share	Yes	Yes
Time fixed effect	Yes	Yes
Loan Type	Housing	Car
Observations	247,069	354,598

Robust standard errors in brackets, *** p<0.01, ** p<0.05, * p<0.1

Second main finding: Supply factors have greater effect on household loan approval than demand

- The effect from income is smaller than the impact of banks' funding ratio and capital ratio, especially the former (i.e. $\beta_0 < \beta_1$)

Table 3: Effect of demand and supply factors on the status of loan applications (using all individuals (Equation 2))

Dependent variable	Status of Loan Applications (1 if accepted, 0 otherwise)	
	[Column 1: Housing Loan]	[Column 2: Car Loan]
Standardised Monthly Income	0.029*** [0.004]	0.025*** [0.003]
Standardised Capital Ratio	0.025*** [0.001]	0.056*** [0.001]
Standardised Funding Ratio	0.051*** [0.001]	0.064*** [0.001]
Standardised Liquidity Ratio	-0.014*** [0.001]	-0.045*** [0.001]
Constant	0.683*** [0.005]	0.847*** [0.004]
Loan Characteristics Controls		
Loan Application Amount (Value)	Yes	Yes
Collateral Value	Yes	No
Bank Characteristics Controls		
Size of Bank	Yes	Yes
Bank Market Share	Yes	Yes
Time fixed effect	Yes	Yes
Loan Type	Housing	Car
Observations	263,058	399,573

Robust standard errors in brackets, *** p<0.01, ** p<0.05, * p<0.1



Limitations of findings

- **Potential sample selection issue**

- Only individuals who filed the income tax *and* applied for loans will be in the dataset. Many banks also pre-filter the loan applications by income before registering the applicants in the credit registry
 - The group of individuals in our dataset may consist of those with relatively high income in the population

- **Limited demand indicators in the dataset**

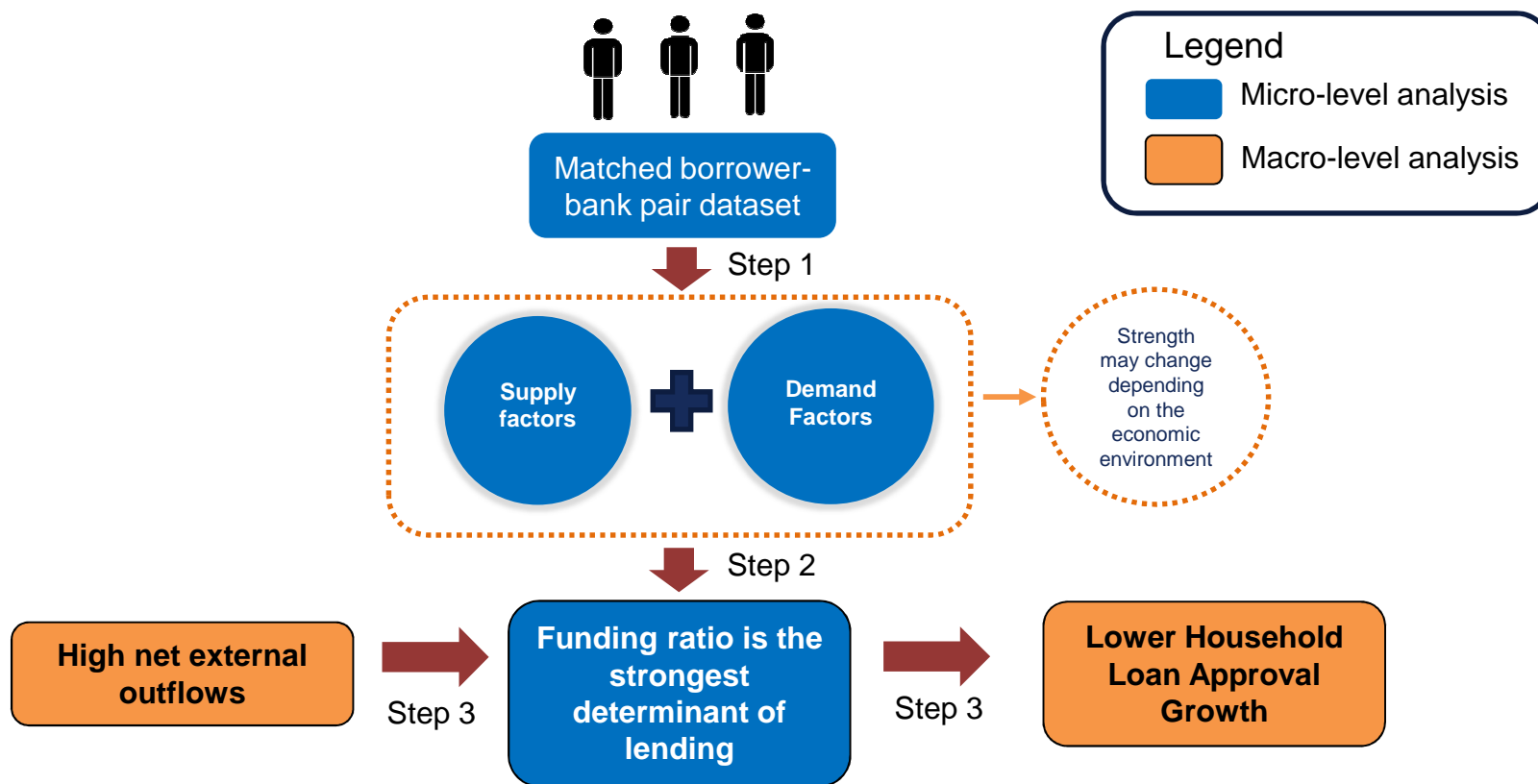
- Supply indicators are richer than the demand
- In addition we do not observe the price of loan (i.e., interest rate) offered to the applicants, which limit our analysis to only the quantity of loans
- Information not captured by the dataset includes the risk profile of the borrowers (for example credit score and debt-service ratio) in the dataset, individuals' wealth and individuals' assets. Only income, age, location, occupation sector and marital status are available

- **Short time series in the dataset**

- Analysis is constrained to 3 years (2014-2016)
- The role of demand and supply factors may change depending on the economic environment. Our time period is too short to investigate this hypothesis



Conclusion : We find that supply factors affect household loan approval more than demand. The declining funding ratio due to high net external outflows can potentially explain the moderation of household loan approval growth in 2014-2016



Source: Author's illustration.