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THE TRANSMISSION OF EUROZONE MONETARY TIGHTENING TO MORTGAGE RATES:

HOW DOES MALTA DIFFER?

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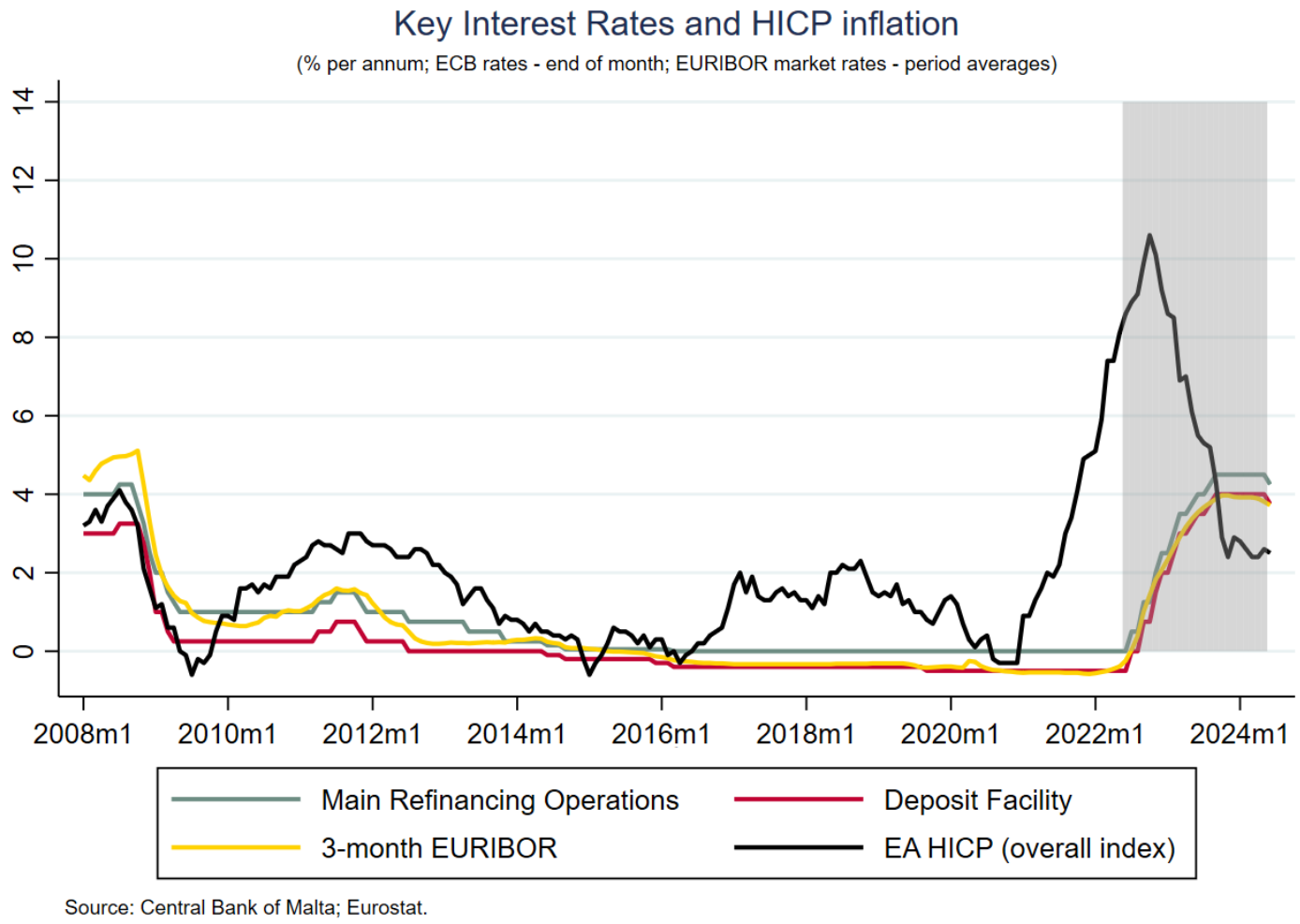
The views expressed in the presentation are the authors' own and should not be interpreted as reflecting the views of the Central Bank of Malta.

Presentation Outline

- ❑ Introduction & Motivation
- ❑ Data & Descriptives
- ❑ Empirical approach
- ❑ Results
- ❑ Robustness checks
- ❑ Summary & concluding remarks

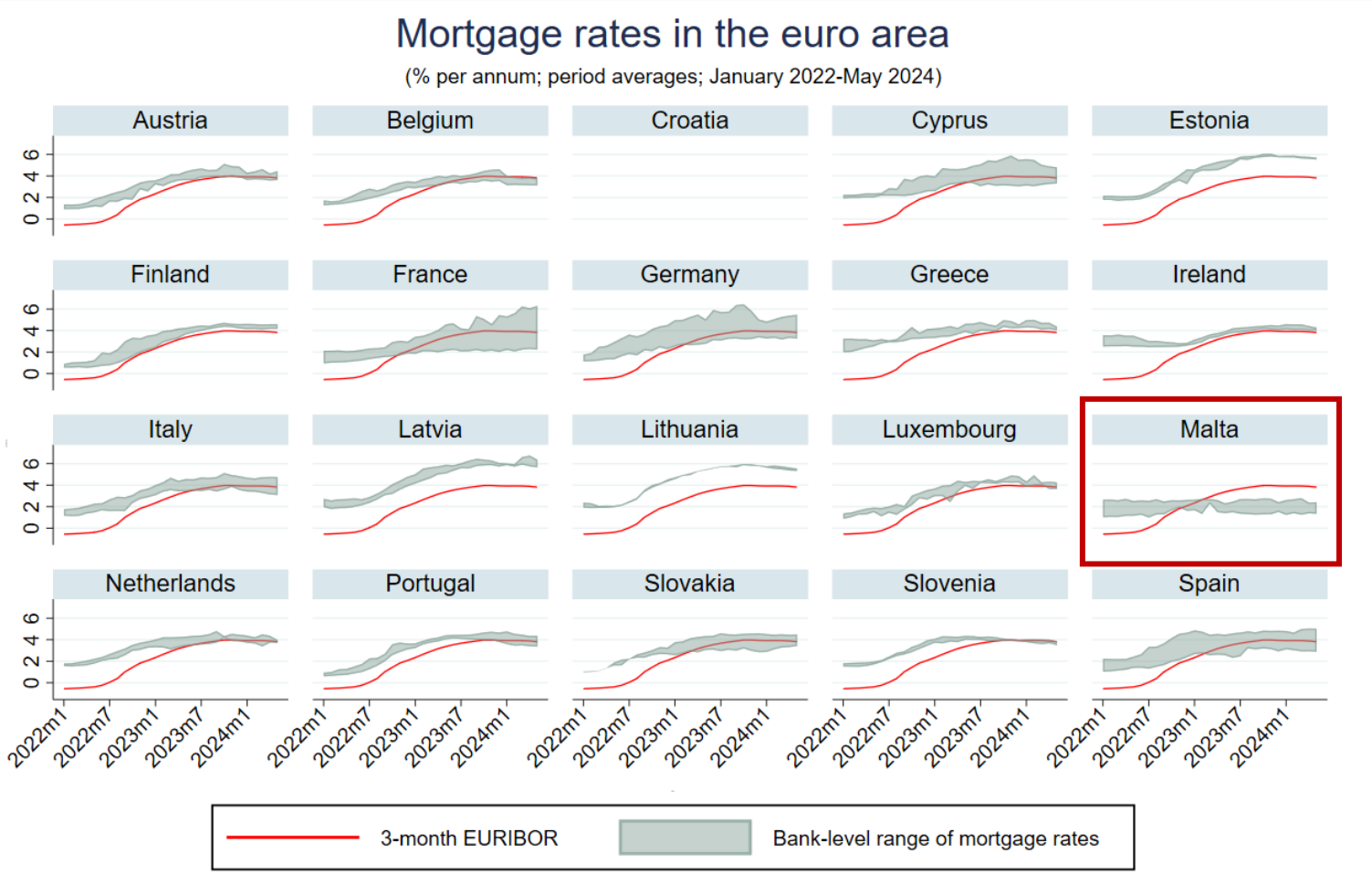
Euro area inflation and the recent hiking cycle of policy rates



Source: Central Bank of Malta; Eurostat.

- Monetary policy stance has generally been highly accommodative since 2008.
- Economic recovery post COVID-19 pandemic and Russian invasion of Ukraine raised inflation substantially.
- Hiking cycle of interest rates started in July 2022 and continued until September 2023, when the DFR peaked at 4.0%.
- Policy rates remained stable until May 2024, before being cut by 50 basis points in June 2024.

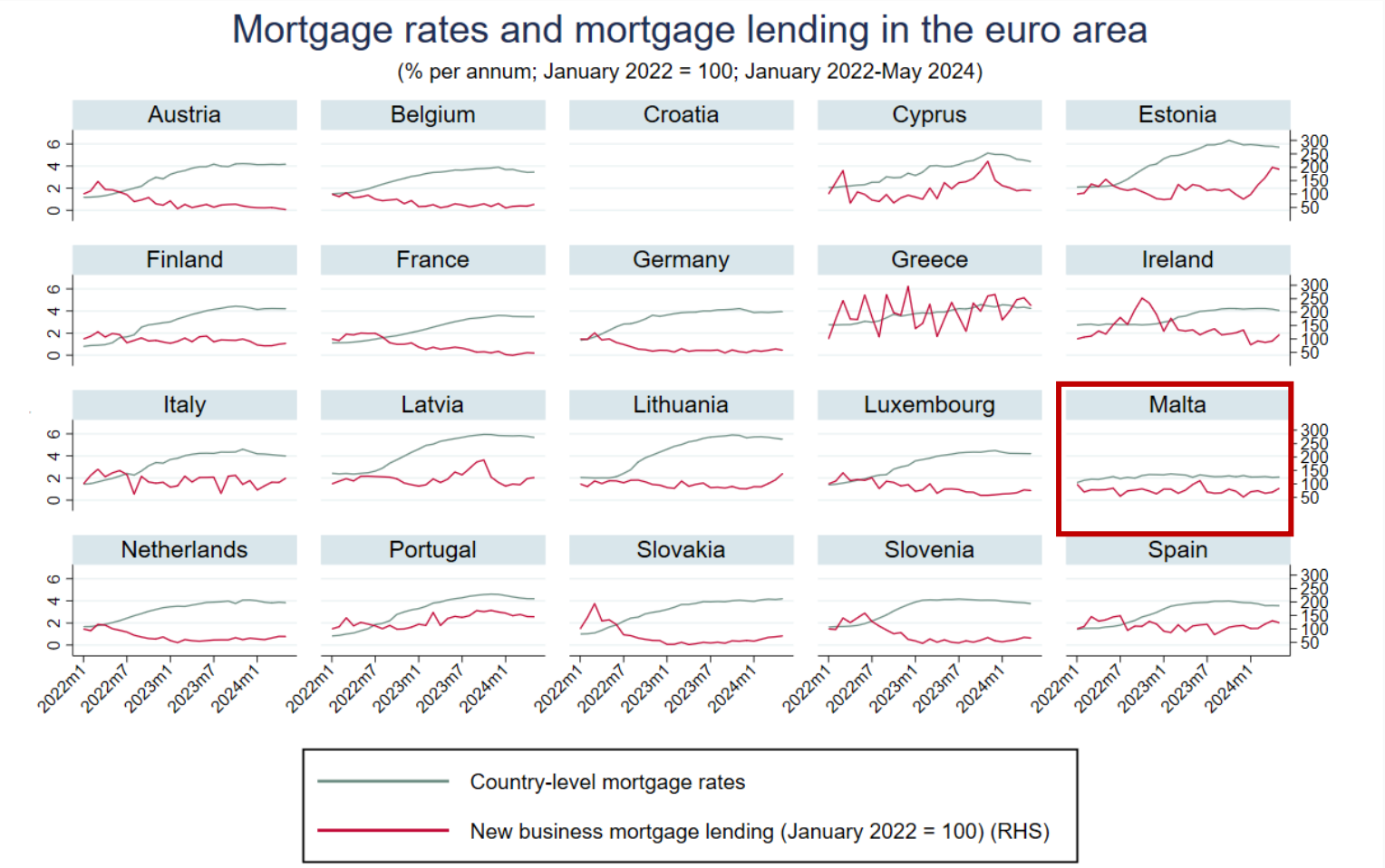
Development of mortgage rates in the euro area…



Source: Mortgage rates - authors' calculations using I-MIR database following a data cleaning process; 3-month EURIBOR - Central Bank of Malta.
Note. Mortgage rates reflect the interest rate component of a mortgage, thereby excluding other related charges included in APRC measurement.
Mortgage rates shown are those applied to 'new business' volumes and represent a weighted average of mortgages with different fixation periods.

- Mortgage rates increased in most EA countries in response to the tightening of monetary policy.
- **Malta a clear exception** with relatively stable mortgage rates offered by Maltese banks.
- Substantial heterogeneity across countries and across banks within countries and over time.

…their implications for mortgage lending



Source: Country-level mortgage rates - ECB SDW; New business mortgage lending - authors' calculations using I-MIR database.
Note. Mortgage rates reflect the interest rate component of a mortgage, thereby excluding other related charges included in APRC measurement.
Mortgage rates shown are those applied to 'new business' volumes and represent a weighted average of mortgages with different fixation periods.

- Most countries experienced a contraction in lending.
- **Malta a clear exception** with relatively stable mortgage credit supplied by Maltese banks.

The paper in one slide

Two questions…

1. What **bank-specific characteristics** can explain cross-bank heterogeneities in the **transmission of monetary policy** onto **mortgage rates** during the **latest tightening cycle** in the EA?
2. To what extent **can such bank-specific features explain Malta's *'outlier'*** position in terms of its pass-through onto mortgage rates, vis-à-vis the EA?

… Main results

1. Banks' **liquidity** and **deposit rates** are identified as the main drivers of the recent heterogeneity in the transmission of policy rates to mortgage rates among EA banks.
2. Accounting for Maltese banks' liquidity and deposit rates **explains ~40% of the gap in the pass-through** of policy rates onto mortgage rates between EA and Maltese banks.

Data

Confidential Bank-level information on:

1. (*New business*) **Mortgage rates** from *Individual MFI interest rates* (**I-MIR** database) for banks in 19 EA countries.

2. **Balance sheet items** from *Individual MFI balance sheet items* (**I-BSI** database).
   - Used to obtain indicators for individual banks' **liquidity** *(ratio)*, **capital** *(ratio)*, **deposit ratio, deposit rate, size/market share, holdings of EA government bonds, initial mortgage rates levels**, and **share of mortgage loans in total assets**.

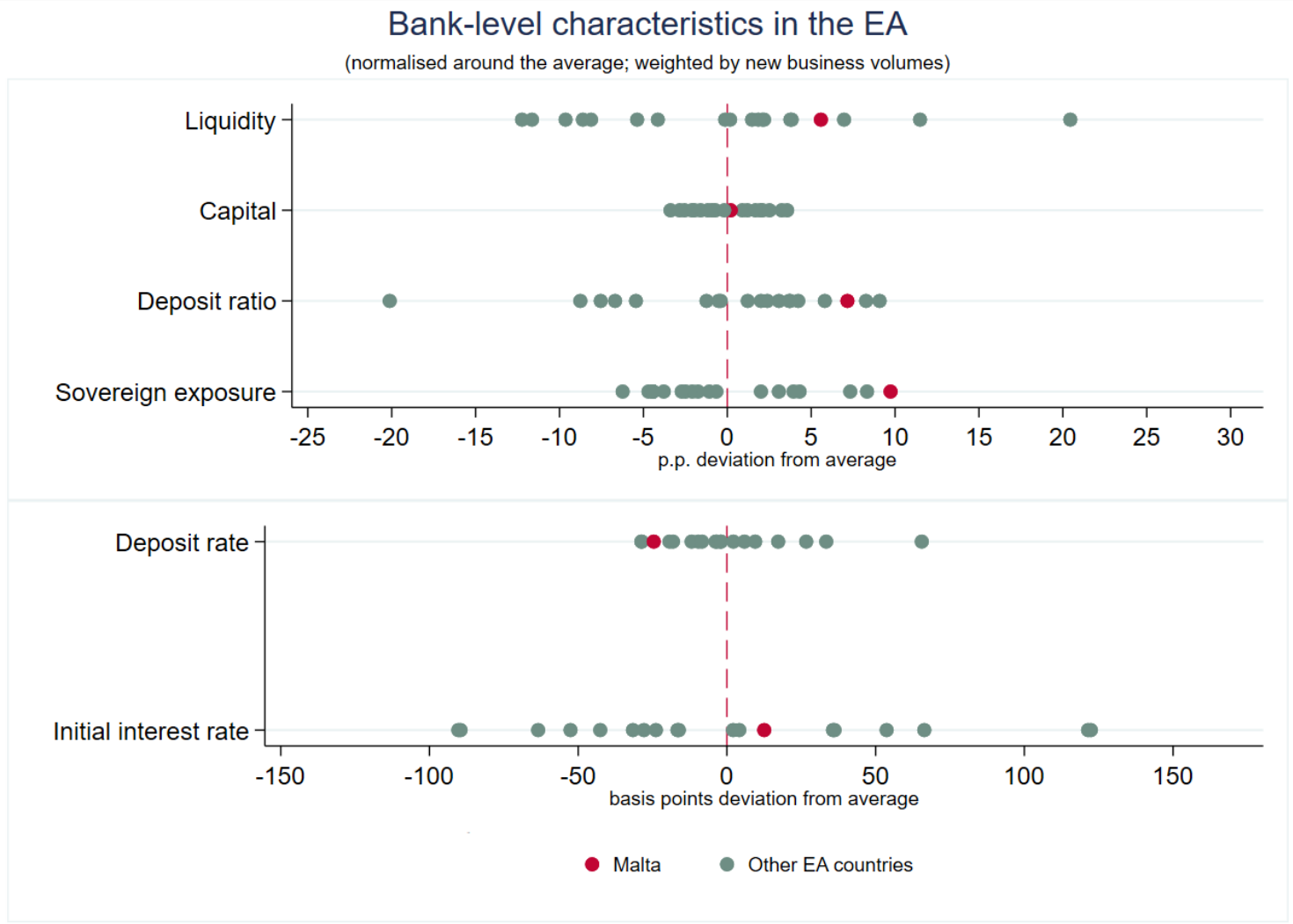
Following the data cleaning phase, our sample contains **145 banks** operating in EA and it is used throughout the analyses.

- Countries with most banks: **Germany (34)**, **France (15), Spain (14), Italy (11)**.
- Countries with fewest banks: **Cyprus (3), Latvia (3), Lithuania (3), Slovakia (3)**.
- **Malta: 4 banks**.
- Our sample closely trace the evolution of aggregate mortgage rates in their respective country.

Summarizing:

Panel dataset of **145 banks** having ***interest rate*** and ***balance sheet*** data covering the period **July 2022 – May 2024**.

Banks' characteristics in EA vs MT



Maltese banks have **above EA average** :

- Liquidity
- Capital
- Deposit ratio
- Holdings of EA government bonds
- Mortgage rates charged in January 2022

Maltese banks have **below EA average** :

- (Weighted average) deposit rate

Empirical approach (1)

We closely follow Holton and D'Acri (2015, 2018), focusing on the period **July 2022 – May 2024** for EA banks:

$$\Delta ir_{i,t} = \mu_i + \sum_{j=1}^{n} \alpha_j \, \Delta ir_{i,t-j} + \sum_{j=0}^{n} \beta_j \, \Delta mr_{t-j} + \theta \; ir_{i,t-1} + \delta \; mr_{t-1} + X_{k,t-1}\boldsymbol{\gamma} + \varphi Fixation_{i,t} + \epsilon_{i,t} \qquad \textbf{(1)}$$

- $\boldsymbol{ir_{i,t}}$ denotes the mortgage rate charged on *new business* by bank i in month t;
- $\boldsymbol{mr_{t-j}}$ is the 3-month EURIBOR in month $t-j$ as an indicator of the monetary policy stance;
- $\boldsymbol{X}$ is a set of macro controls for each country k comprising (i) unemployment rate (captures the *risk channel*); (ii) market concentration; and (iii) the respective first differences of HICP inflation, unemployment rate and 10-year government bond yields.
- $\boldsymbol{Fixation_{i,t}}$ is the share of *new business* mortgage loans issued with a fixation period of less than 1 year by bank i in month t (*proxy for fixed vs variable lending*);
- $\boldsymbol{\mu_i}$ represents bank fixed effects.

Regressions are **weighted by the average '*new business*' mortgage volumes** given out by each bank i over the estimation sample.

We use panel OLS with bank fixed effects and heteroscedasticity-consistent standard errors.

Main results (1) – pass through in EA vs MT

Table 1. REGRESSION RESULTS - *pass-through estimates*

Dependent variable: $\Delta ir_{i,t}$	(1) EA pass-through	(2) EA vs MT pass-through
$(\alpha_1)\ \Delta ir_{i,t-1}$	0.034	0.034
	(0.050)	(0.050)
$(\beta_0)\ \Delta mr_t$	0.218 ***	0.219 ***
	(0.070)	(0.070)
$(\beta_0^{MT})\ \Delta mr_t \cdot MT$		-0.480 **
		(0.220)
$(\beta_1)\ \Delta mr_{t-1}$	0.169 ***	0.167 ***
	(0.044)	(0.044)
$(\beta_1^{MT})\ \Delta mr_{t-1} \cdot MT$		0.459
		(0.448)
$(\theta)\ ir_{i,t-1}$	-0.155 ***	-0.155 ***
	(0.011)	(0.011)
$(\theta^{MT})\ ir_{i,t-1} \cdot MT$		-0.207 ***
		(0.030)
$(\delta)\ mr_{t-1}$	0.071 ***	0.071 ***
	(0.009)	(0.009)
$(\delta^{MT})\ mr_{t-1} \cdot MT$		-0.034
		(0.029)
N	3,294	3,294
Number of banks	145	145
R-squared	0.319	0.320
Bank FE	✓	✓
Controls	✓	✓

*** $p < 0.01$ ** $p < 0.05$ * $p<0.1$

Notes. Heteroscedasticity-robust standard errors in parentheses.

- Among the controls, we find important roles for:
  - Changes in government bond yields (+)
  - Changes in inflation (+)
  - Level of unemployment rate (+)
  - Market concentration (+)
  - Share of loans with an interest rate fixation period < 1 year (+)

Pass-through estimates for EA			Pass-through estimates for MT	
(2-months) PT: $\beta_0 + \beta_1$	**0.386**	***	(2-months) PT: $\beta_0 + \beta_0^{MT} + \beta_1 + \beta_1^{MT}$	0.365
Overall PT: $-\frac{\delta}{\theta}$	**0.459**	***	Overall PT: $-\frac{\delta+\delta^{MT}}{\theta+\theta^{MT}}$	0.103

*** $p < 0.01$ ** $p < 0.05$ * $p<0.1$

Note. Figures marked in red represent pass-through estimates that are statistically different from 0.

Empirical approach (2)

Equation (1) augmented by bank-specific characteristics:

$$\Delta ir_{i,t} = \mu_i + \sum_{j=1}^{n} \alpha_j \, \Delta ir_{i,t-j} + \sum_{j=0}^{n} \left(\beta_j + \beta_j^{Z} Z_{i,t-1}\right) \Delta mr_{t-j} + \theta \, ir_{i,t-1} + \delta \, mr_{t-1} + X_{k,t-1}\boldsymbol{\gamma} + \varphi Fixation_{i,t} + \omega Z_{i,t-1} + \epsilon_{i,t} \quad \textbf{(2)}$$

Key points:

- Bank characteristics assumed to influence the pass-through in the short run only.
- Each bank characteristic $Z_{i,t-1}$ is normalised with respect to the average over the whole sample (similar to Gambacorta, 2004). This allows for interpreting the β_js as '**average effects**'.
- Bank characteristics are first introduced **separately** and then **jointly** in a separate exercise.

Main results (2) – role of bank characteristics in the EA (1)

Table 2. REGRESSION RESULTS - *role of bank-specific characteristics (1)*

	LIQUIDITY	CAPITAL	DEPOSIT FUNDING		SIZE/ MARKET SHARE	SOVEREIGN EXPOSURE	INITIAL CONDITIONS	RELEVANCE OF MORTGAGE MARKET TO BANK
Dependent variable: $\Delta ir_{i,t}$	*Cash, holdings with MFIs, holdings of debt securities*	*Capital ratio*	*Deposit ratio*	*(Weighted average) Deposit rate*	*Loans market share*	*EA Government bond holdings*	*Initial interest rate*	*Share of mortgage loans in assets*
(α_1) $\Delta ir_{i,t-1}$	0.037	0.036	0.036	0.020	0.032	0.034	0.034	0.035
	(0.049)	(0.050)	(0.050)	(0.049)	(0.049)	(0.050)	(0.050)	(0.050)
(β_0) Δmr_t	0.216 ***	0.180 **	0.211 ***	0.059	0.213 ***	0.164 **	0.224 ***	0.211 ***
	(0.071)	(0.072)	(0.070)	(0.080)	(0.060)	(0.072)	(0.070)	(0.070)
(β_0^Z) $\Delta mr_t \cdot Z_{i,t-1}$	-0.011 ***	-0.040 ***	0.007	-0.472 ***	0.000	-0.029 ***	0.049	0.387 *
	(0.003)	(0.013)	(0.004)	(0.144)	(0.002)	(0.006)	(0.066)	(0.205)
(β_1) Δmr_{t-1}	0.166 ***	0.189 ***	0.177 ***	0.323 ***	0.196 ***	0.217 ***	0.165 ***	0.174 ***
	(0.045)	(0.057)	(0.045)	(0.068)	(0.046)	(0.048)	(0.043)	(0.044)
(β_1^Z) $\Delta mr_{t-1} \cdot Z_{i,t-1}$	0.001	0.025	-0.004	0.710 ***	-0.001	0.027 ***	-0.017	-0.237
	(0.003)	(0.017)	(0.004)	(0.203)	(0.002)	(0.008)	(0.082)	(0.183)
(θ) $ir_{i,t-1}$	-0.171 ***	-0.161 ***	-0.161 ***	-0.163 ***	-0.154 ***	-0.159 ***	-0.156 ***	-0.158 ***
	(0.011)	(0.013)	(0.012)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)
(δ) mr_{t-1}	0.078 ***	0.074 ***	0.073 ***	0.078 ***	0.071 ***	0.073 ***	0.072 ***	0.072 ***
	(0.009)	(0.010)	(0.009)	(0.011)	(0.009)	(0.009)	(0.009)	(0.009)
N	3,294	3,294	3,294	3,294	3,294	3,294	3,294	3,294
Number of banks	145	145	145	145	145	145	145	145
R-squared	0.328	0.323	0.322	0.333	0.320	0.324	0.319	0.321
Bank FE + controls	✓	✓	✓	✓	✓	✓	✓	✓
Pass-through for bank with $\bar{Z}$ (2 months): $\beta_0 + \beta_1$	0.382 ***	0.369 ***	0.388 ***	0.382 ***	0.410 ***	0.381 ***	0.389 ***	0.385 ***
Role of bank-specific characteristic Z: $\beta_0^Z + \beta_1^Z$	-0.009 ***	-0.016	0.003	0.238 ***	-0.001	-0.002	0.032	0.150

*** $p < 0.01$ ** $p < 0.05$ * $p < 0.1$

Notes. Heteroscedasticity-robust standard errors in parentheses.

Main results (2) – role of bank characteristics in the EA (2)

Table 2. REGRESSION RESULTS - *role of bank-specific characteristics (1)*

	LIQUIDITY	DEPOSIT FUNDING
Dependent variable: $\Delta ir_{i,t}$	*Cash, holdings with MFIs, holdings of debt securities*	*(Weighted average) Deposit rate*
(α_1) $\Delta ir_{i,t-1}$	0.037	0.020
	(0.049)	(0.049)
(β_0) Δmr_t	0.216 ***	0.059
	(0.071)	(0.080)
(β_0^Z) $\Delta mr_t \cdot Z_{i,t-1}$	-0.011 ***	-0.472 ***
	(0.003)	(0.144)
(β_1) Δmr_{t-1}	0.166 ***	0.323 ***
	(0.045)	(0.068)
(β_1^Z) $\Delta mr_{t-1} \cdot Z_{i,t-1}$	0.001	0.710 ***
	(0.003)	(0.203)
(θ) $ir_{i,t-1}$	-0.171 ***	-0.163 ***
	(0.011)	(0.011)
(δ) mr_{t-1}	0.078 ***	0.078 ***
	(0.009)	(0.011)
N	3,294	3,294
Number of banks	145	145
R-squared	0.328	0.333
Bank FE + controls	✓	✓
Pass-through for bank with $\overline{Z}$ (2 months): $\beta_0 + \beta_1$	0.382 ***	0.382 ***
Role of bank-specific characteristic Z: $\beta_0^Z + \beta_1^Z$	-0.009 ***	0.238 ***

*** $p < 0.01$ ** $p < 0.05$ * $p < 0.1$

Notes. Heteroscedasticity-robust standard errors in parentheses.

Interpretation:

- The pass-through of a bank having 1 p.p. higher liquidity than the average bank in the EA is 0.9 basis points (bp) lower than the average bank.
- The pass-through of a bank whose deposit rate is 100 bp higher than the average bank in the EA is 23.8 bp higher than the average bank.

Main results (3) – role of bank characteristics in the EA (3)

Bank-specific characteristics are next introduced **jointly**, allowing them to affect bank lending behaviour simultaneously.

Table 3. REGRESSION RESULTS – *joint role of bank-specific characteristics*

$\beta_0 + \beta_1$	Pass-through for bank with $\bar{Z}$ (2 months)	**0.373**	***
	Role of…		
$\beta_0^Z + \beta_1^Z$	Bank **liquidity** (*ratio*)	**-0.012**	***
	Bank **capital** *(ratio)*	**-0.011**	
	Deposit ratio	**0.003**	
	Deposit rate	**0.262**	***
	Bank **size/market share**	**0.000**	
	Sovereign exposure	**0.008**	
	Initial mortgage rate	**0.014**	
	Bank **share of mortgages in assets**	**-0.116**	

*** $p < 0.01$ ** $p < 0.05$ * $p<0.1$

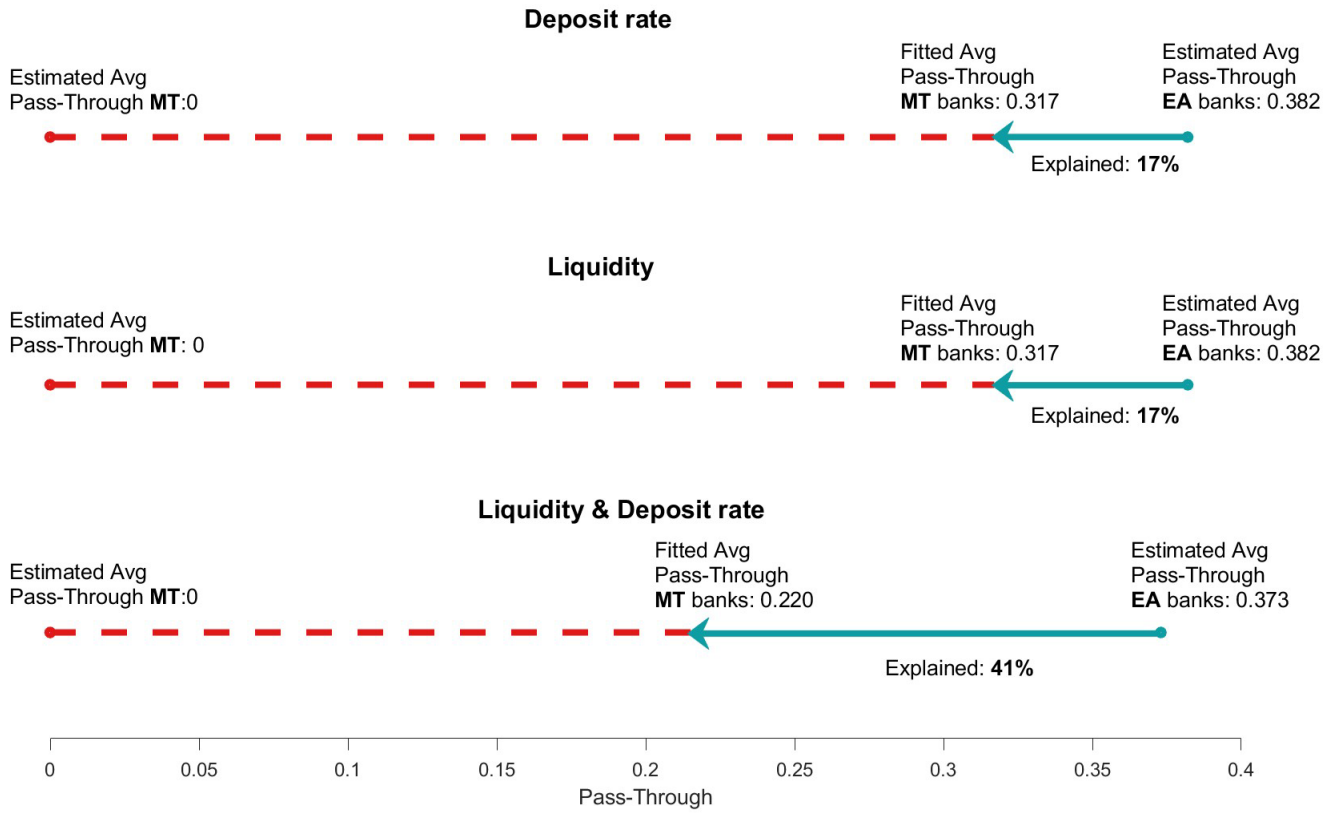
- Statistically significant roles for bank **liquidity** and **deposit rate** in determining pass-through heterogeneities in the EA:

↑ liquidity ↓ mortgage rate pass-through

↑ deposit rate ↑ mortgage rate pass-through

- Results obtained when characteristics are considered separately remain robust when considered jointly.
- Results robust to lag structure.
- Role of respective macro controls also robust (*not shown*).

Can Maltese banks' liquidity and deposit rates justify Malta's pass - through?



<u>Assuming Maltese banks behave as any EA bank</u>:

- The relatively low **cost of deposits** for Maltese banks individually explains **17%** of the difference vis-à-vis the pass-through of the average bank in the EA.
- Maltese banks' relatively high **liquidity** levels contribute also for **17%** of the discrepancy between Malta's pass-through and that averaged in the EA.
- Jointly, the **high liquidity levels** and the **low cost of deposits** can justify **41%** of the difference between MT and EA average pass-through onto mortgage rates.
- The remaining **59%** remains **unexplained** by **liquidity**, **deposit rate** or other characteristics that are not found to explain pass-through heterogeneities in the EA during the latest tightening cycle.

Robustness exercise

Alternative short-run formulation: we estimate a model with the **spread $\Delta S_{i,t}$** between mortgage rates and the 3-month EURIBOR as the dependent variable following Gropp et al. (2014):

$$\Delta S_{i,t} = \mu_i + \alpha \Delta S_{i,t-1} + X_{k,t-1}\boldsymbol{\gamma} + \varphi Fixation_{i,t} + \omega Z_{i,t-1} + \epsilon_t$$

Key points:

- We focus on the characteristics significant with the ECM: $Z_{i,t-1}$ = {Bank **liquidity** (*ratio*), **Deposit rate**}.
- First introduced **separately** and then **jointly**.
- Liquidity and deposit rates **are significant, with magnitudes close** to those found in the ECM.

Robustness exercise (2) – role of bank characteristics in the EA

Table 4. ROBUSTNESS RESULTS - *role of bank liquidity and deposit rate*

	LIQUIDITY	DEPOSIT FUNDING
Dependent variable: $\Delta S_{i,t}$	*Cash, holdings with MFIs, holdings of debt securities*	*(Weighted average) Deposit rate*
(α) $\Delta S_{i,t-1}$	0.136 ***	0.096 *
	(0.050)	(0.049)
(ω) $Z_{i,t-1}$	-0.010 ***	0.180 ***
	(0.003)	(0.036)
Intercept	-1.364 **	-1.301 **
	(0.670)	(0.521)
N	3,294	3,294
Number of banks	145	145
R-squared	0.060	0.119
Bank FE	✓	✓

*** $p < 0.01$ ** $p < 0.05$ * $p < 0.1$

Notes. Heteroscedasticity-robust standard errors in parentheses.

Table 5.ROBUSTNESS RESULTS - *joint role of bank liquidity and deposit rate*

		Dependent variable : $\Delta S_{i,t}$
(α) $\Delta S_{i,t-1}$		0.087 *
		(0.048)
(ω) $Z_{i,t-1}$	*Liquidity*	-0.008 ***
		(0.003)
	Deposit Rate	0.172 ***
		(0.033)
Intercept		-1.605 ***
		(0.453)
N		3,294
Number of banks		145
R-squared		0.128
Bank FE		✓

*** $p < 0.01$ ** $p < 0.05$ * $p < 0.1$

Notes. Heteroscedasticity-robust standard errors in parentheses.

Other Robustness checks

1. The importance (or lack of) of the respective bank characteristics (*liquidity, size/market share, sovereign exposure*) is robust to different proxies.

2. Analysis replicated on the period starting January 2022 and ending May 2024.
   - Important roles again found for bank **liquidity** *(-ve)* and **deposit rate** *(+ve)*.

3. Results robust to **lag structure** (i.e., when allowing for a contemporaneous pass-through only [Δmr_t] or allowing for Δmr_t, Δmr_{t-1} and Δmr_{t-2}) and **exclusion of Maltese banks** from regressions.

4. Role of respective characteristics is robust even when not normalised around the sample average.

5. The joint importance of bank **liquidity** and **deposit rate** to pass-through in the EA is robust to an estimation without weighting.

Conclusions

Main takeaways:

1. Used individual bank-level data to analyse the bank-specific characteristics that have contributed to heterogeneities in the pass-through onto mortgage rates across banks in the EA during the latest tightening cycle of monetary policy.
2. Significant (robust) roles for bank **liquidity** and **deposit rates** to explain pass-through heterogeneities among EA banks.
3. The observed features of Maltese banks in relation to these characteristics **explain approximately 40%** of the discrepancy between Malta's pass-through and the EA average.

Final remarks and potential for future work:

1. Analysis relied on the role of characteristics at EA level to shed insights for Malta's behaviour => Maltese banks' interest rate setting behaviour with respect to their characteristics assumed to be identical to EA banks.
2. No consideration of potential non-linearities in the relationship between bank characteristics and interest rate setting in this work. (e.g. 3-way interactions, quadratic terms).
3. Further work needed on the behaviour of banks vis-à-vis interest rates charged on other lending activities (e.g. to NFCs) and those offered on deposits.

Thank You

Reserve Slides

Related literature

Related literature on banks' characteristics and interest rate setting/pass-through using bank-level information:

- Gambacorta (2008); Holton and d'Acri (2015, 2018); Altavilla et al. (2020); Albertazzi et al. (2021)…

The reaction of lending rates to monetary policy: the role of bank characteristics

	Typical sign	**(Some) Relevant Literature**
Capital	-	De Graeve et al. (2007); Gambacorta (2008); Albertazzi et al. (2021)
Liquidity	-	Kashyap & Stein (2000); Gambacorta (2008)
Deposit funding	-	Sorensen & Werner (2006); Albertazzi et al. (2021)
Market concentration	+	Weth (2002)
Sovereign debt exposure	-	Altavilla et al. (2020); Holton & d'Acri (2018)
Bank size/market share	-	Holton & d'Acri (2018)

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Appendix – Variables considered (1)

1. **Liquidity:** sum of cash, loans to MFIs (incl. holdings with the Eurosystem) and holdings of debt securities, relative to bank main assets *(I-BSI)*.

Liquidity robustness 1: sum of cash, loans to MFIs (incl. holdings with the Eurosystem), holdings of debt securities, reverse REPOS, MMF and non-MMF shares, relative to bank main assets *(I-BSI)*.

Liquidity robustness 2: total bank loans (except loans to MFIs), relative to bank main assets *(I-BSI)*.

2. **Capital**: ratio of bank capital to bank main assets *(I-BSI)*.

3. **Deposit ratio**: sum of M3 and non-M3 deposits from HHs and NFCs in the EA, extra-EA deposits, and intra-group deposit funding, relative to bank main assets *(I-BSI)*.

4. **Deposit rate**: a weighted average of the deposit rate on *new business* volumes of *time* and *demand* deposits by HHs and NFCs in the EA *(I-MIR; I-BSI)*.

Appendix – Variables considered (2)

5. **Size/market share**: bank's outstanding amount of mortgage loans, relative to the amount of mortgage loans of the bank with the largest mortgage volumes in the country *(I-BSI)*.

Size/market share robustness 1: bank's main assets, relative to the main assets of the bank with the largest volume of main assets in the country *(I-BSI)*.

6. **Sovereign exposure**: holdings of EA government bonds, relative to bank main assets *(I-BSI)*.

Sovereign exposure robustness 1: holdings of domestic government bonds, relative to bank main assets *(I-BSI)*.

7. **Initial conditions**: the *new business* mortgage rate charged by bank in January 2022 *(I-MIR)*.

8. **Relevance of mortgage market to bank**: the outstanding amount of mortgage loans, relative to bank main assets *(I-BSI)*.

Appendix – Data cleaning

1. Exclude banks which have the I-BSI data but not the I-MIR data [cannot be used in regressions].
2. Do not consider banks which drop out of the sample before May 2024 (i.e. last month considered in our analysis).
3. Identify a spike and consider an outlier if more than 66% of the spike is reversed in the following month.
4. Replace outlier interest rate data points with a missing value.
5. Drop banks with very volatile interest rates.
6. Drop banks having at least 25% of their “interest rate” time series made up of missing values.
7. Drop banks having at least 3 consecutive NaNs.
8. Drop bank branches (due to regulatory concerns).
9. Drop MDGs in case the individual banks reported within an MDG are also reported on a “stand-alone” basis.
10. Drop banks whose total assets/liabilities drop by more than 30% between January 2022 and May 2024 (due to concerns with the calculation of ratios).
11. Drop banks having very volatile assets/liabilities.
12. Drop banks having the share of the corresponding lending in their main assets below the 5^{th} percentile.

Main results (1) – pass through in EA vs MT

- Among the controls, we find important roles for:
  - Changes in government bond yields (+)
  - Changes in inflation (+)
  - Level of unemployment rate (+)
  - Market concentration (+)
  - Share of loans with an interest rate fixation period < 1 year (+)

Pass-through estimates for EA			Pass-through estimates for MT	
(2-months) PT: $\beta_0 + \beta_1$	**0.386**	***	(2-months) PT: $\beta_0 + \beta_0^{MT} + \beta_1 + \beta_1^{MT}$	0.365
Overall PT: $-\frac{\delta}{\theta}$	**0.459**	***	Overall PT: $-\frac{\delta+\delta^{MT}}{\theta+\theta^{MT}}$	0.103

*** $p < 0.01$ ** $p < 0.05$ * $p<0.1$

Note. Figures marked in red represent pass-through estimates that are statistically different from 0.

Table 1. REGRESSION RESULTS - *pass-through estimates*

Dependent variable: $\Delta ir_{i,t}$	(1) EA pass-through	(2) EA vs MT pass-through
$(\alpha_1)\ \Delta ir_{i,t-1}$	0.034	0.034
	(0.050)	(0.050)
$(\beta_0)\ \Delta mr_t$	0.218 ***	0.219 ***
	(0.070)	(0.070)
$(\beta_0^{MT})\ \Delta mr_t \cdot MT$		-0.480 **
		(0.220)
$(\beta_1)\ \Delta mr_{t-1}$	0.169 ***	0.167 ***
	(0.044)	(0.044)
$(\beta_1^{MT})\ \Delta mr_{t-1} \cdot MT$		0.459
		(0.448)
$(\theta)\ ir_{i,t-1}$	-0.155 ***	-0.155 ***
	(0.011)	(0.011)
$(\theta^{MT})\ ir_{i,t-1} \cdot MT$		-0.207 ***
		(0.030)
$(\delta)\ mr_{t-1}$	0.071 ***	0.071 ***
	(0.009)	(0.009)
$(\delta^{MT})\ mr_{t-1} \cdot MT$		-0.034
		(0.029)
$\Delta GBY_{k,t-1}$	0.053 **	0.053 **
	(0.026)	(0.026)
$\Delta Infl_{k,t-1}$	0.022 **	0.022 **
	(0.008)	(0.008)
$\Delta Unemp_{k,t-1}$	0.026	0.026
	(0.034)	(0.034)
$Unemp_{k,t-1}$	0.055 ***	0.055 ***
	(0.014)	(0.014)
$Mktconc_{k,t-1}$	0.020 ***	0.020 ***
	(0.006)	(0.006)
$Fixation_{i,t}$	0.002 ***	0.002 ***
	(0.000)	(0.000)
Intercept	-1.121 ***	-1.116 ***
	(0.303)	(0.303)
N	3,294	3,294
Number of banks	145	145
R-squared	0.319	0.320
Bank FE	✓	✓

*** $p < 0.01$ ** $p < 0.05$ * $p<0.1$

Notes. Heteroscedasticity-robust standard errors in parentheses.

Main results (2) – role of bank characteristics in the EA (1)

Table 2. REGRESSION RESULTS - *role of bank-specific characteristics (1)*

	LIQUIDITY	CAPITAL	DEPOSIT FUNDING		SIZE/ MARKET SHARE	SOVEREIGN EXPOSURE	INITIAL CONDITIONS	RELEVANCE OF MORTGAGE MARKET TO BANK
Dependent variable: Δir_{it}	*Cash, holdings with MFIs, holdings of debt securities*	*Capital ratio*	*Deposit ratio*	*(Weighted average) Deposit rate*	*Loans market share*	*EA Government bond holdings*	*Initial interest rate*	*Share of mortgage loans in assets*
(α_1) $\Delta ir_{i,t-1}$	0.037	0.036	0.036	0.020	0.032	0.034	0.034	0.035
	(0.049)	(0.050)	(0.050)	(0.049)	(0.049)	(0.050)	(0.050)	(0.050)
(β_0) Δmr_t	0.216 ***	0.180 **	0.211 ***	0.059	0.213 ***	0.164 **	0.224 ***	0.211 ***
	(0.071)	(0.072)	(0.070)	(0.080)	(0.060)	(0.072)	(0.070)	(0.070)
(β_0^Z) $\Delta mr_t \cdot Z_{i,t-1}$	-0.011 ***	-0.040 ***	0.007	-0.472 ***	0.000	-0.029 ***	0.049	0.387 *
	(0.003)	(0.013)	(0.004)	(0.144)	(0.002)	(0.006)	(0.066)	(0.205)
(β_1) Δmr_{t-1}	0.166 ***	0.189 ***	0.177 ***	0.323 ***	0.196 ***	0.217 ***	0.165 ***	0.174 ***
	(0.045)	(0.057)	(0.045)	(0.068)	(0.046)	(0.048)	(0.043)	(0.044)
(β_1^Z) $\Delta mr_{t-1} \cdot Z_{i,t-1}$	0.001	0.025	-0.004	0.710 ***	-0.001	0.027 ***	-0.017	-0.237
	(0.003)	(0.017)	(0.004)	(0.203)	(0.002)	(0.008)	(0.082)	(0.183)
(θ) $ir_{i,t-1}$	-0.171 ***	-0.161 ***	-0.161 ***	-0.163 ***	-0.154 ***	-0.159 ***	-0.156 ***	-0.158 ***
	(0.011)	(0.013)	(0.012)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)
(δ) mr_{t-1}	0.078 ***	0.074 ***	0.073 ***	0.078 ***	0.071 ***	0.073 ***	0.072 ***	0.072 ***
	(0.009)	(0.010)	(0.009)	(0.011)	(0.009)	(0.009)	(0.009)	(0.009)
$\Delta GBY_{k,t-1}$	0.052 **	0.053 **	0.053 **	0.051 *	0.053 **	0.052 **	0.053 **	0.053 **
	(0.025)	(0.026)	(0.026)	(0.026)	(0.026)	(0.026)	(0.026)	(0.026)
$\Delta Infl_{k,t-1}$	0.020 **	0.022 ***	0.021 **	0.021 **	0.021 **	0.024 ***	0.021 **	0.022 **
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.009)	(0.009)	(0.009)
$\Delta Unemp_{k,t-1}$	0.019	0.023	0.028	0.017	0.026	0.024	0.024	0.026
	(0.033)	(0.032)	(0.035)	(0.033)	(0.034)	(0.035)	(0.033)	(0.034)
$Unemp_{k,t-1}$	0.066 ***	0.059 ***	0.059 ***	0.071 ***	0.053 ***	0.060 ***	0.054 ***	0.058 ***
	(0.014)	(0.015)	(0.016)	(0.014)	(0.014)	(0.015)	(0.014)	(0.015)
$Mktconc_{k,t-1}$	0.019 ***	0.020 ***	0.022 ***	0.018 ***	0.021 ***	0.022 ***	0.020 ***	0.021 ***
	(0.005)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.005)	(0.006)
$Fixation_{i,t}$	0.002 ***	0.002 ***	0.002 ***	0.002 ***	0.002 ***	0.002 ***	0.002 ***	0.002 ***
	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)
(ω) $Z_{i,t-1}$	0.000	-0.001	0.002	-0.085 ***	0.002	-0.001	-	0.186
	(0.002)	(0.009)	(0.003)	(0.021)	(0.003)	(0.006)	-	(0.304)
Intercept	-1.076 ***	-1.094 ***	-1.236 ***	-1.075 ***	-1.215 ***	-1.223 ***	-1.090 ***	-1.192 ***
	(0.276)	(0.310)	(0.320)	(0.306)	(0.298)	(0.337)	(0.262)	(0.312)
N	3,294	3,294	3,294	3,294	3,294	3,294	3,294	3,294
Number of banks	145	145	145	145	145	145	145	145
R-squared	0.328	0.323	0.322	0.333	0.320	0.324	0.319	0.321
Bank FE	✓	✓	✓	✓	✓	✓	✓	✓
Pass-through for bank with $\overline{Z}$ (2 months): $\beta_0 + \beta_1$	0.382 ***	0.369 ***	0.388 ***	0.382 ***	0.410 ***	0.381 ***	0.389 ***	0.385 ***
Role of bank-specific characteristic Z: $\beta_0^Z + \beta_1^Z$	-0.009 ***	-0.016	0.003	0.238 ***	-0.001	-0.002	0.032	0.150

*** $p < 0.01$ ** $p < 0.05$ * $p < 0.1$

Notes. Heteroscedasticity-robust standard errors in parentheses.

Can Maltese banks' liquidity and deposit rates justify Malta's pass - through?

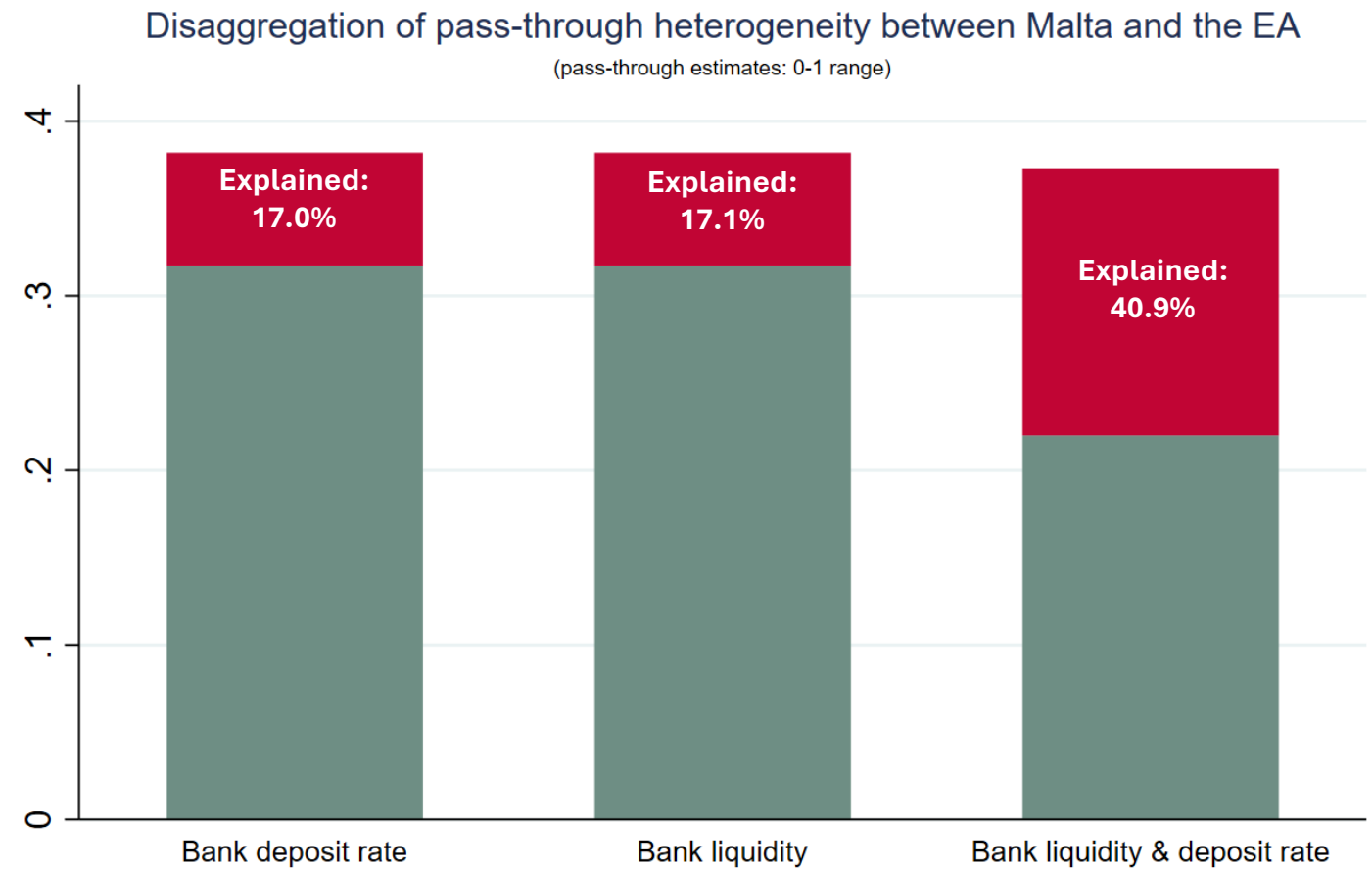
The estimated difference between the *(weighted)* average pass-through in the **EA** and **MT** can be disaggregated between a part that can be explained by Maltese banks' level of the characteristics and a part that cannot be justified by such characteristics:

$$EA_{est}^{PT} - MT_{est}^{PT} = \underbrace{\left(EA_{est}^{PT} - \widehat{MT}_{Z,fit}^{PT}\right)}_{\text{Can be explained by } Z} - \underbrace{\left(MT_{est}^{PT} - \widehat{MT}_{Z,fit}^{PT}\right)}_{\text{Cannot be explained by } Z}$$

Where $\boldsymbol{EA_{est}^{PT}}$ is the estimated (average) EA pass-through; $\boldsymbol{MT_{est}^{PT}}$ is Malta's estimated pass-through; and $\boldsymbol{\widehat{MT}_{Z,fit}^{PT}}$ is Malta's 'fitted' pass-through given its banks' level of characteristic Z and the effect of Z on the pass-through as estimated from EA bank-level data.

Underlying assumption: Maltese banks' behaviour in relation to their respective characteristics, Z, is identical to that in the EA, once we control for Maltese banks' (different) levels of the respective characteristics.

Can Maltese banks' liquidity and deposit rates justify Malta's pass - through?



Note. The top edge of each bar shaded in red represents the pass-through of the EA bank having the average characteristic, while the top edge of each bar shaded in teal represents Malta's 'fitted' pass-through given the value of its respective bank characteristic. As such, the area shaded in red represents the discrepancy in the pass-through that can be explained by the respective bank characteristic, while the area shaded in teal depicts the unexplained part.

- The relatively low **cost of deposits** for Maltese banks individually explains **17.0%** of the difference vis-à-vis the pass-through of the average bank in the EA.
- Maltese banks' relatively high **liquidity** levels contribute **17.1%** of the discrepancy between Malta's pass-through and that averaged in the EA.
- Jointly, having **high liquidity** and a **low cost of deposits** can justify **40.9%** of the difference relative to the EA average pass-through onto mortgage rates.
- The remaining **59.1%** remains unexplained by **liquidity**, **deposit rate** or other characteristics that are not found to explain pass-through heterogeneities in the EA during the latest tightening cycle.