Stages of Development of Payments Systems: Leapfrogging across Countries and MENA's Place in the World

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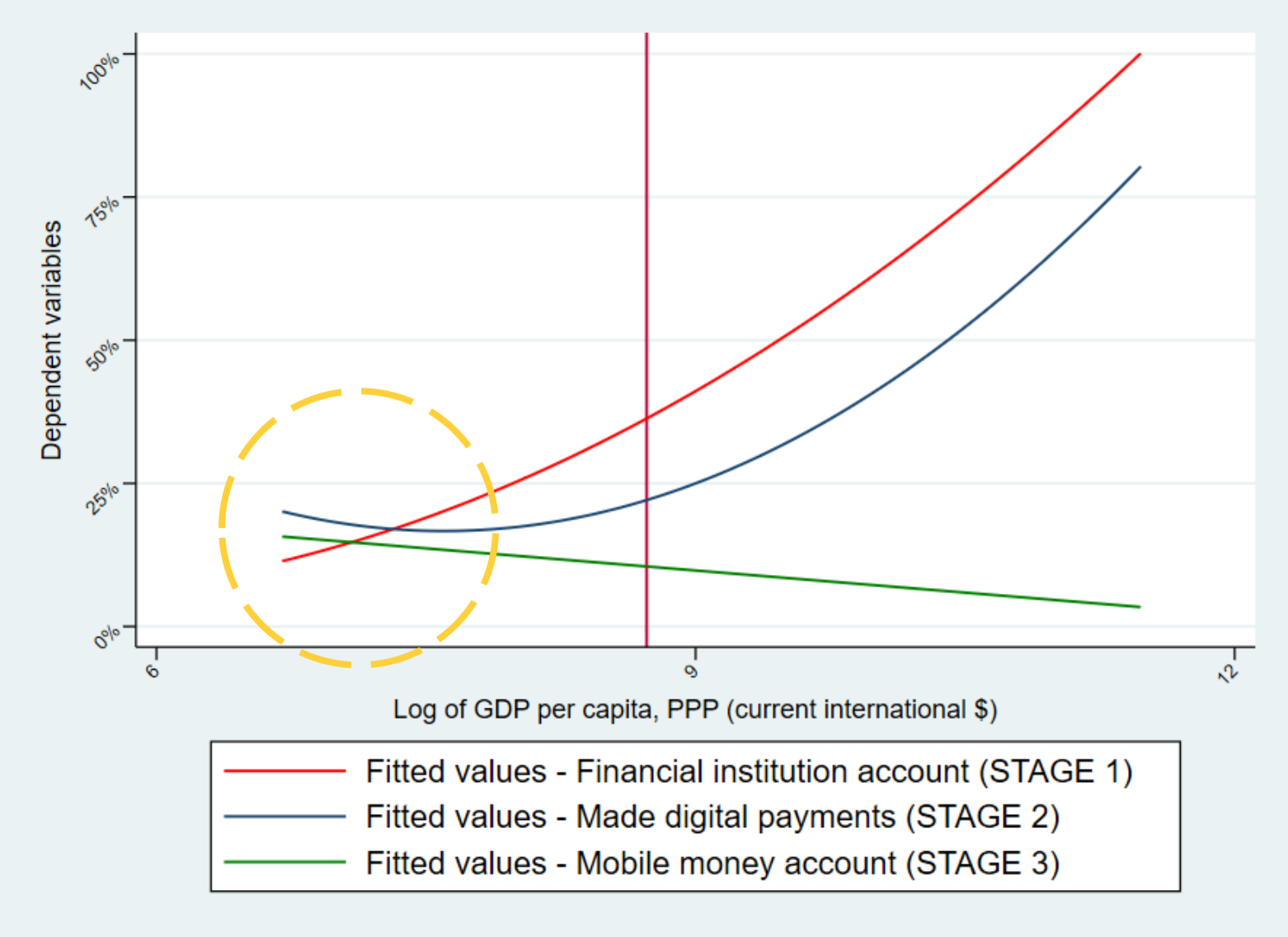
Outline of the presentation

- Context – where this research is coming from
- Technology adoption and leapfrogging
- Innovation stages in the case of payment systems
- Empirical framework
- Findings
- Discussion

Before we start



Context of the paper

- Research program led by the WB Office of the Chief Economist in MENA
  - How is digital technology adoption in the MENA region?
  - Are there conditions or bottlenecks that may thwart the upside of digital?
  - How is MENA's performance compared to the rest of the world?
- This working paper with Daniel Lederman was one of the background papers
  - **Key question is to identify MENA's adoption of digital financial services, relative to levels of development → are there opportunities of leapfrogging?**

Overview of digital technology pillars and impact

- Digital technologies as general-purpose technologies (Cusolito et al 2021)
  - Usable across sectors and diffuse widely in the economy
  - Enables new modes of production and consumption
  - Thrive on economies of scale and network externalities

- Countries tend to adopt digital technologies at different speeds
  - In MENA, slow technology adoption has been associated with lower economic growth relative to other regions (Arezki et al 2019)

- Countries' digital transformation require core foundational elements for the digital economy (World Bank 2020)
  - Skilled workforce; quality connectivity; digital financial services; regulatory framework

Empirical definition of leapfrogging

- Leapfrog as an alternative to the “catch-up” theory

- Concept used many times, but lacks a consistent approach in research
  - “Leapfrogging occurs when a nation bypasses traditional stages of development to either jump directly to the latest technologies (stage-skipping) or explore an alternative path of technological development involving emerging technologies with new benefits and new opportunities (path-creating). “ (CSIS 2020)

- We attempt an empirical definition. Assuming two paradigms, we propose the definitions:

STAGE 1 (legacy): $Y_{c,t}^{1} = C + \beta_1 * \log(GDPpc_{c,t}) + v_t + \varepsilon$

STAGE 2 (new): $Y_{c,t}^{2} = C + \beta_2 * \log(GDPpc_{c,t}) + v_t + \varepsilon$

$\hat{Y}_{c,t}^{2} > \hat{Y}_{c,t}^{1} \Rightarrow$ relative leapfrogging

$\beta_2 < 0 \Rightarrow$ absolute leapfrogging

Let's apply this framework to digital payment

- We assume simple stages of innovation in payment systems:

STAGE 1	**Traditional bank-based payment systems**, measured by incidence of access to bank accounts
STAGE 2	**Digitalization of banking systems**, measured by the use of debit/credit cards and online banking
STAGE 3	**Prepaid mobile money accounts**, measured by incidence of access to mobile money accounts
STAGE 4	**Decentralized payments** native to specific devices but linked to prepaid accounts (ex: Apple pay or Alipay)
STAGE 5	**Decentralized digital currencies** native to specific private or local applications or systems (ex: cryptocurrencies)

Data and empirical framework

- Three dependent variables Y^1, Y^2, Y^3 from World Bank Findex 2017:
  - Y^1: Having an account in a financial institution (bank; % of adult population)
  - Y^2: Using digital payments (debit/credit cards, online banking, internet payment, also mobile money…; % of adult population)
  - Y^3: Having an account with a mobile money provider (% of adult population)

- Some precisions about the data:
  - Comprehensive dataset but relatively old, pre-COVID
  - Pooled cross-section with two years (2014 and 2017)
  - Less data on Stage 3 (mobile money) -> reduced sample to make comparisons

- Simple but effective empirical strategy:

$$Y_{c,t}^{i} = C + \beta_i * \log\left(GDPpc_{c,t}\right) + v_t + \varepsilon$$

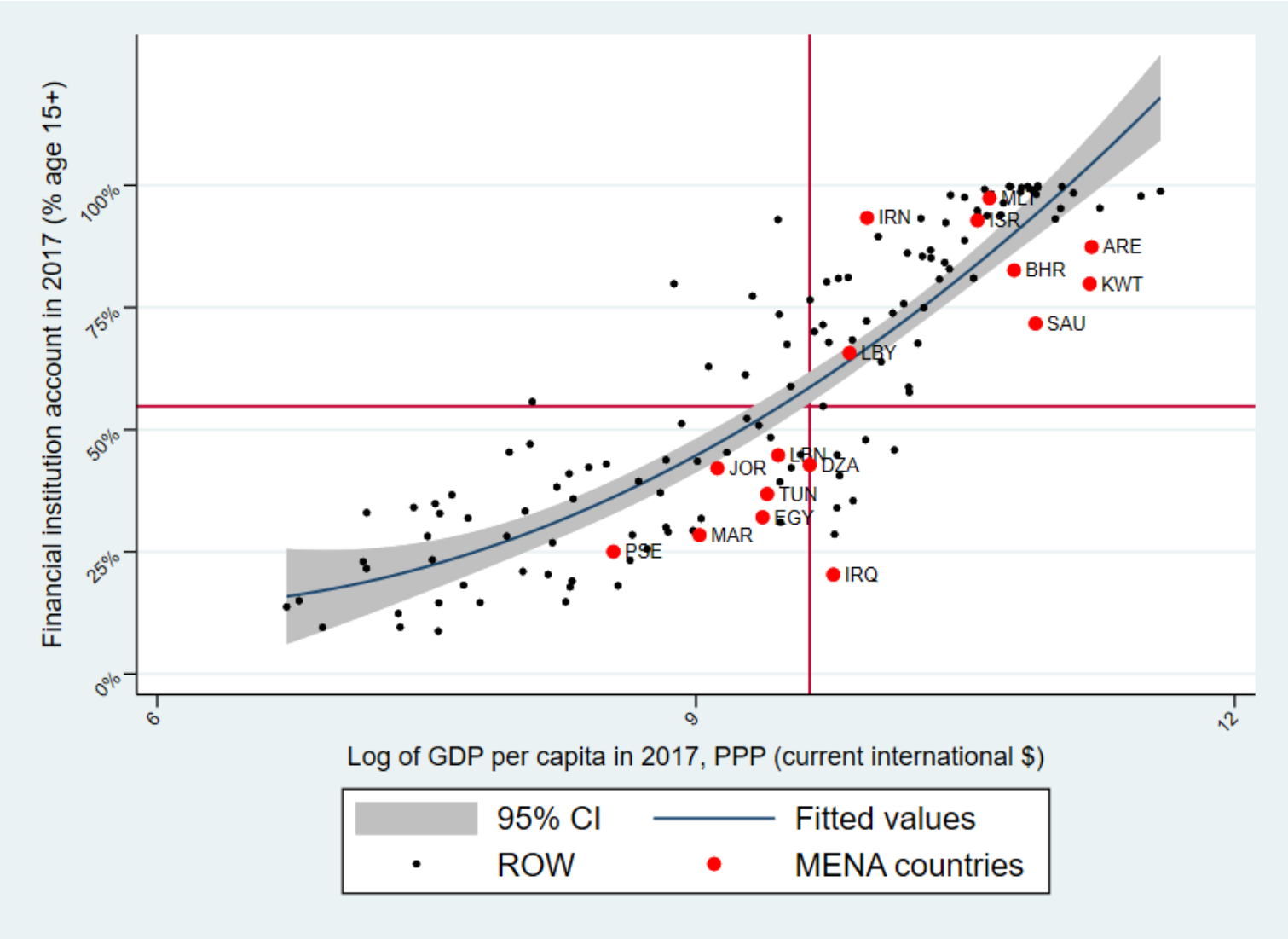
Regression results

- Evidence of absolute leapfrogging in mobile money
- Consistent underperformance of the MENA region
- Relative leapfrogging in both digital payments and mobile money

VARIABLES	STAGE 1 bankaccount (quadratic)	STAGE 2 digitalpayment (quadratic)	STAGE 3 mobilemoney (log-linear)
log_gdppc	-0.243	-0.662***	**-0.0255****
	(0.177)	(0.166)	**(0.00999)**
log_gdppc_2	0.0240**	0.0436***	
	(0.0101)	(0.00944)	
MENA	**-0.0886***	**-0.0731***	**-0.0265**
	(0.0466)	(0.0438)	(0.0366)
Constant	0.649	2.638***	0.285***
	(0.774)	(0.727)	(0.0872)
Observations	149	149	149
R^2	0.594	0.440	0.161
Adjusted R^2	0.583	0.424	0.144
Min. of log_gdppc		6.70	
Predicted value at minimum	**0.105****	**0.197*****	**0.157*****
20^{th} percentile of log_gdppc		7.64	
Predicted value at 20^{th} perc.	0.200***	0.163***	0.133***

Standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1)
Time fixed effects are controlled with a dummy variable

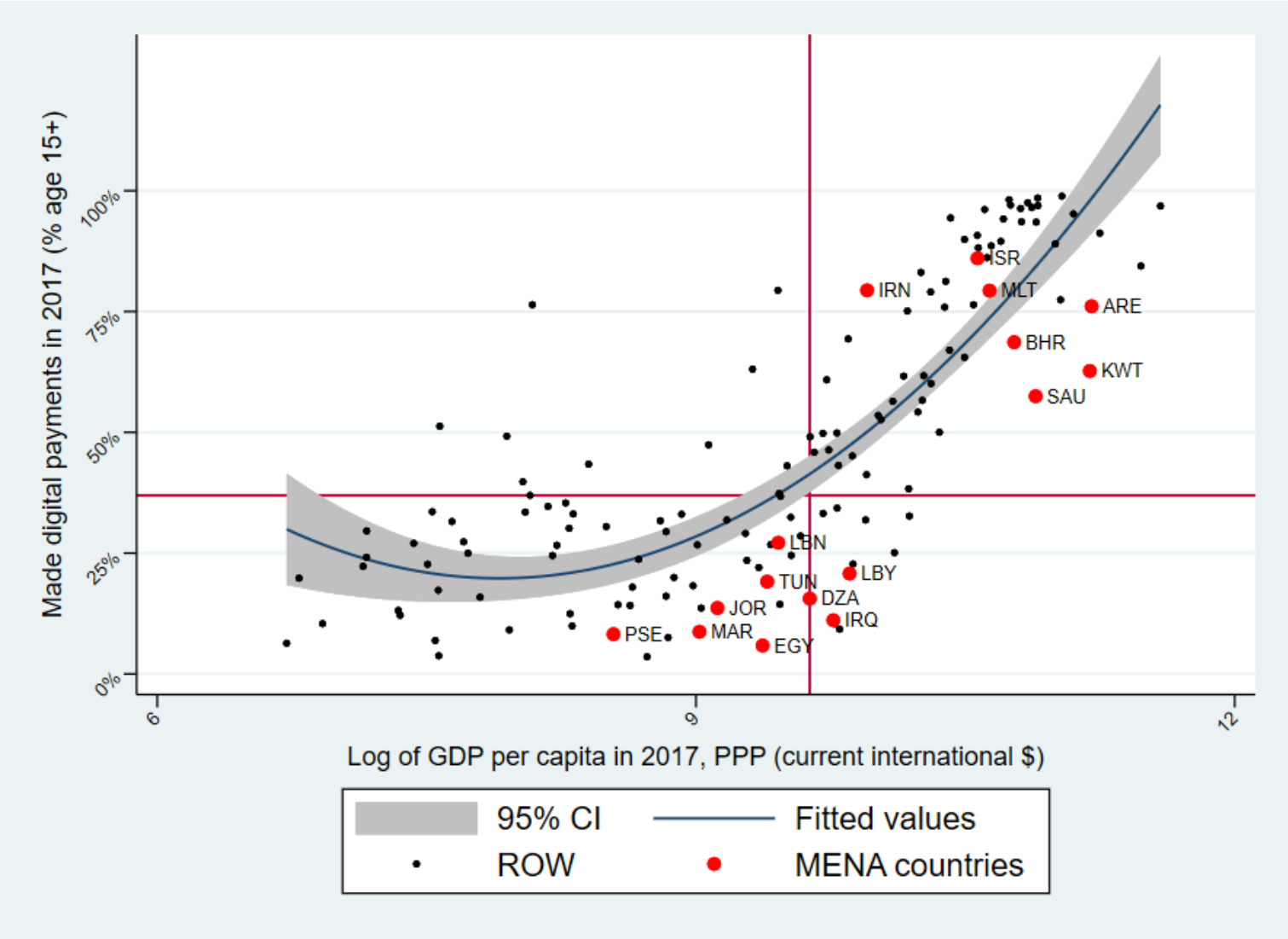
Visual analysis



Bank accounts

- Almost all MENA countries underperform relative to their level of development
- Only Iran, Malta and Israel have high rates of banking access

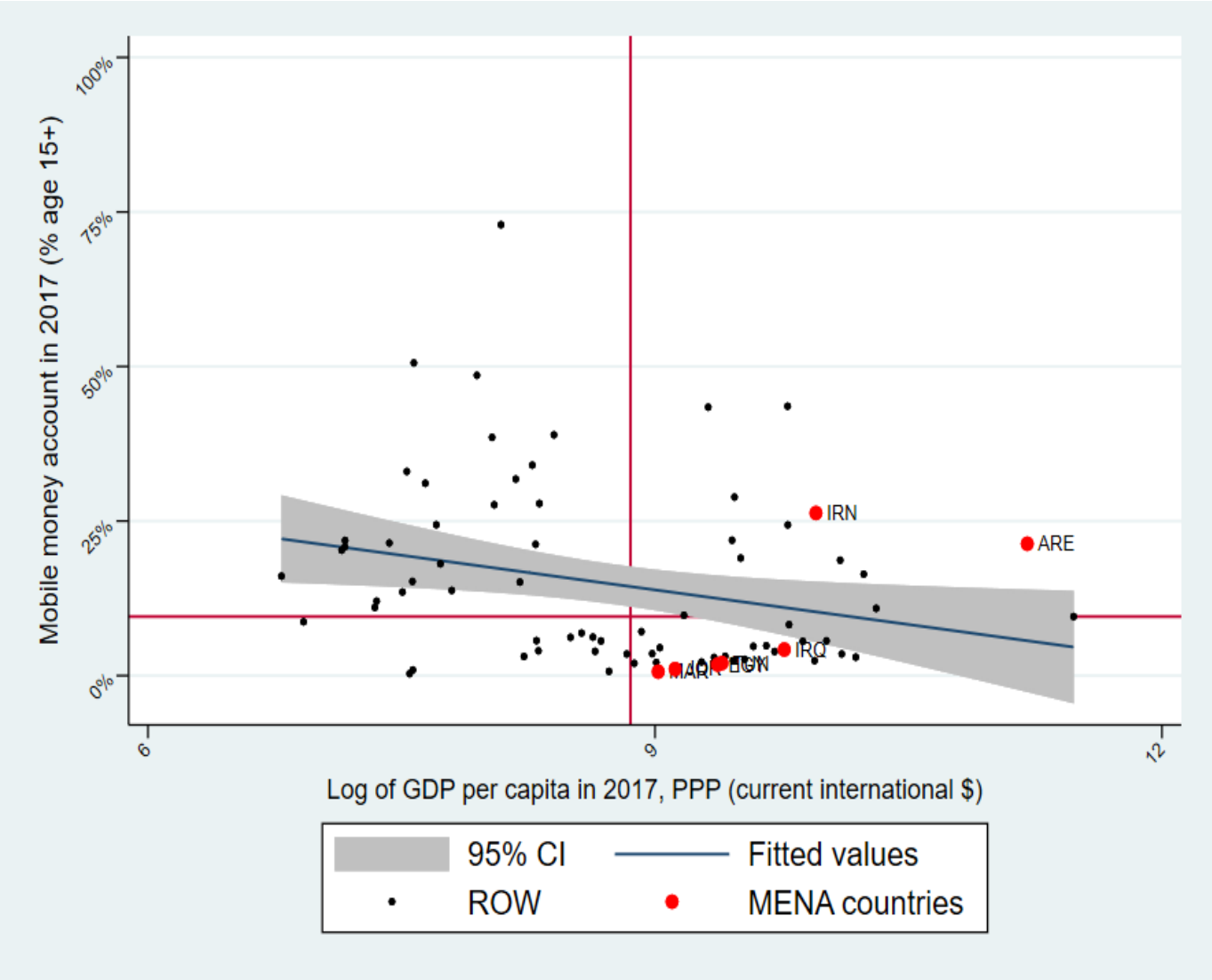
Visual analysis (cont'd)



Digital payments

- Same groups of countries
- Iran, Malta and Israel are the only MENA countries with high use of digital payments

Visual analysis (end)

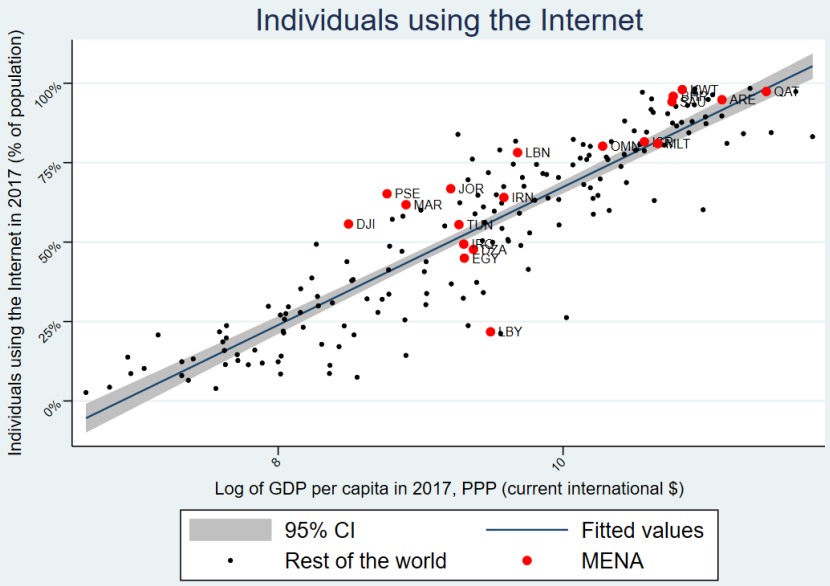


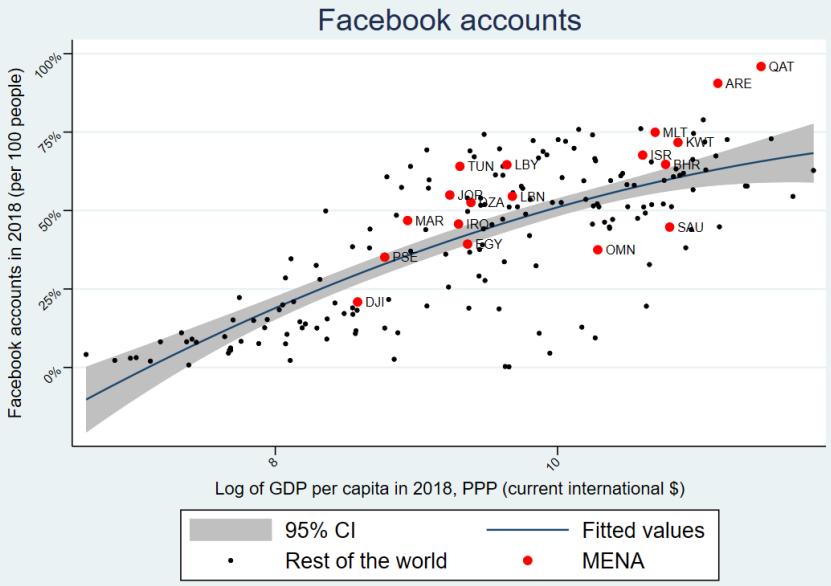
Mobile money

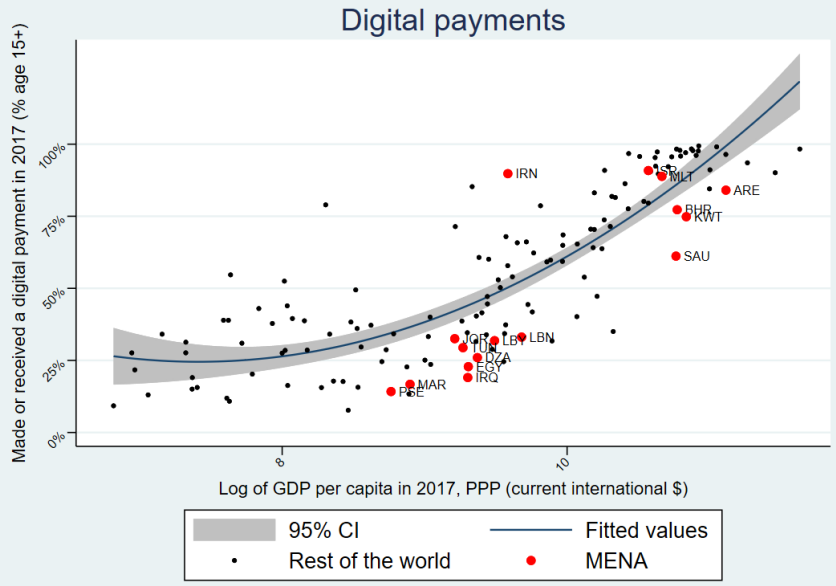
- Smaller sample, but similar results
- Iran and the United Arab Emirates are the high performers (MLT and ISR not in the sample)
- Higher uptake at lower levels of development

MENA's digital paradox

- One can wonder about the drivers of this underperformance, but:
  - MENA has high levels of internet usage
  - Internet users are highly connected to social networks
  - Why are they not adopting digital payments?







Drivers of leapfrogging

- Unfortunately, this WP aims to identify MENA's performance and does not look into the drivers of technology adoption and leapfrogging

- Some considerations:
  - Digital finance may arise to compensate for the lack of a formal financial system
  - A formal financial system can also enable digital finance innovation
  - In MENA, neither of these appear to be true

- More research is needed to test additional data sources, identification strategies, adoption of digital services

Conclusion

- The paper proposes a simple empirical strategy to identify absolute and relative leapfrogging applied to digital financial services

- While there is evidence of leapfrogging to digital finance globally, the MENA region exhibits a consistent underperformance
  - This outlines the existence of a digital paradox:
    - Internet users outperform on use of social networks (non-productive use-case)
    - But they underperform on use of digital payments (productive use-case)

- In MENA, there appear to be a set of factors not related to technology adoption that prevent access to financial services in general, and thus may also slow down digital transformation

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