

Mobile Money: Innovations in Finance and Pandemic Lessons from Ebola for Covid-19 and Beyond

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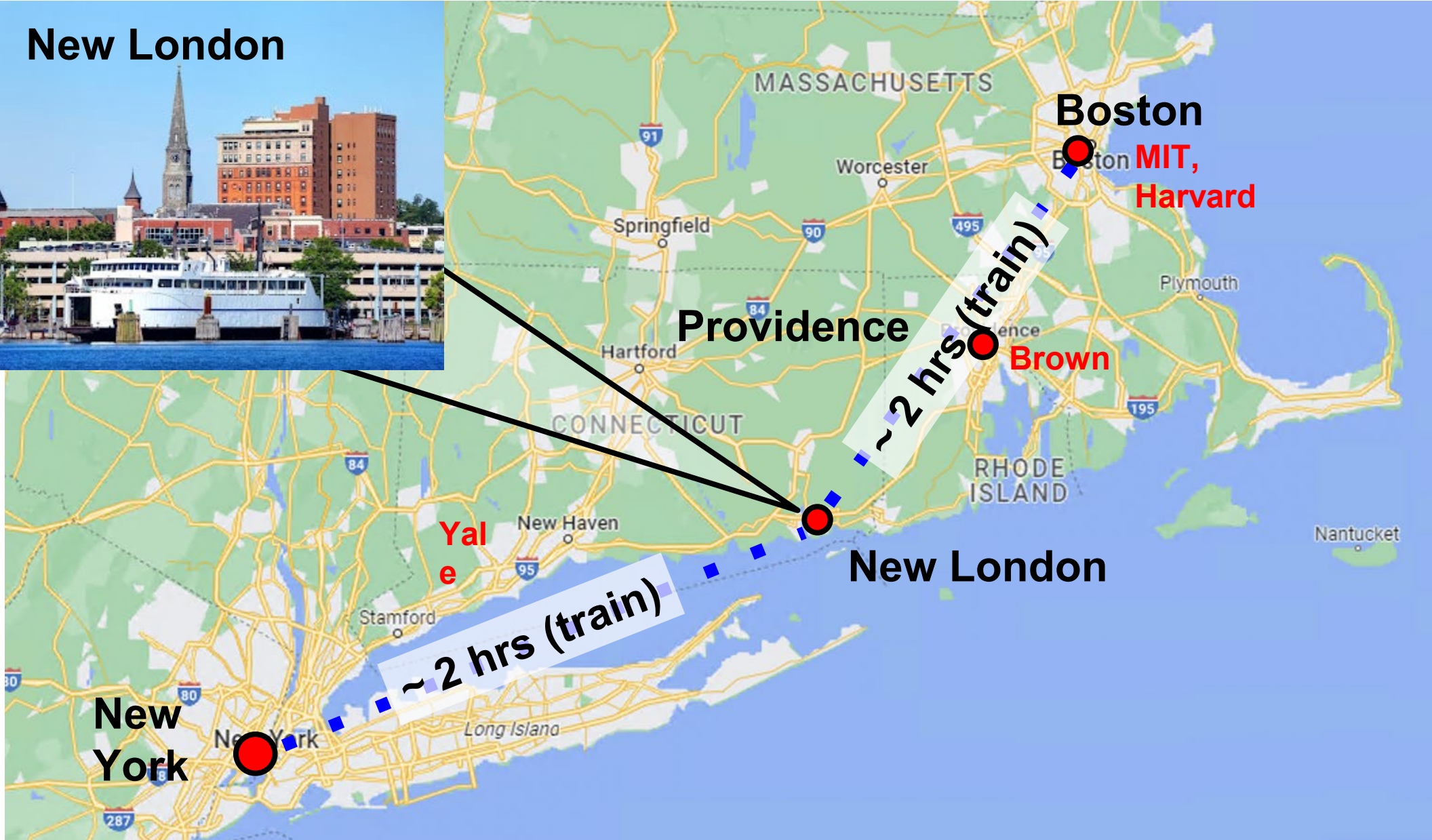
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Presented at The University of Tokyo
October 25, 2023



Connecticut College, New London, CT

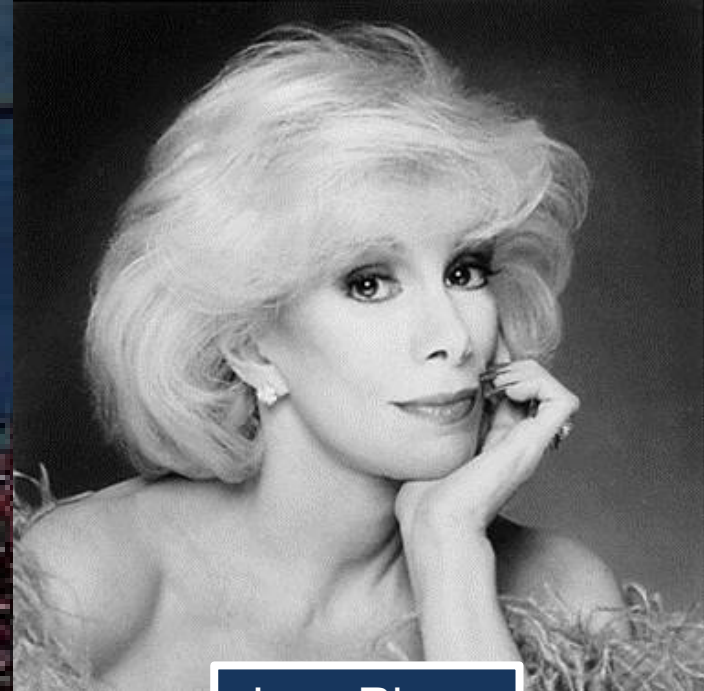


Connecticut College

An aerial photograph of the Connecticut College campus, showing several large, multi-story brick buildings with gabled roofs and a central courtyard. The campus is surrounded by lush green trees and a large body of water, likely the Thames River, is visible in the background under a blue sky with light clouds.

- ❖ **Founded in 1911**
- ❖ **750 Acres located on the bank of river Thames**
- ❖ **~2000 Students, 250 Faculty**
- ❖ **Economics and Psychology are the largest departments**

Notable Alumni



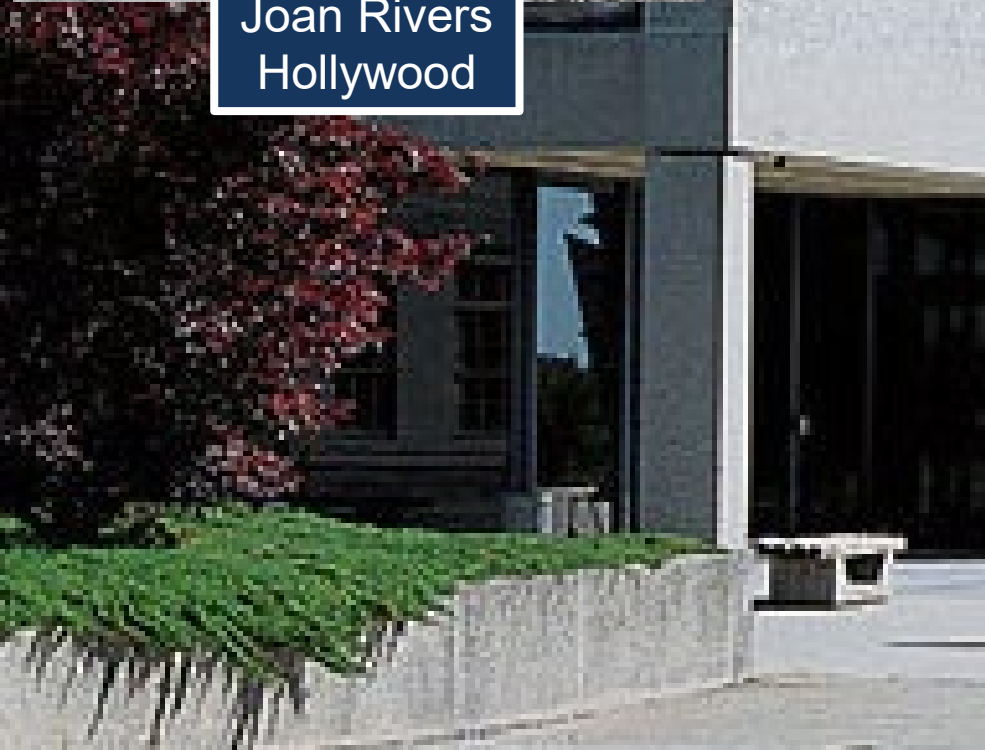
Joan Rivers
Hollywood



THE WHITE HOUSE
Sean Spicer
White House Press Secretary



Tim Armstrong
CEO of AOL, Google VP



Introduction

❖ **Mobile Money (MM)**

- **Cash to digital**
- **How does it work**

❖ **Financial Access**

- **No bank account required**
- **Vast agents network**

Introduction

- ❖ **Innovation in Digital Finance**
 - Interactions with traditional finance
 - User profile
- ❖ **Household financial decision making**
 - Costs of financial literacy
 - Innovative methods of financial education (Mukerji & Devlin 2023)

Introduction

❖ **Role of government**

- **Disease mitigation using MM vs using cash**
- **Policies - positive and negative**
- **Our contribution dataset of policies**

Government Policies

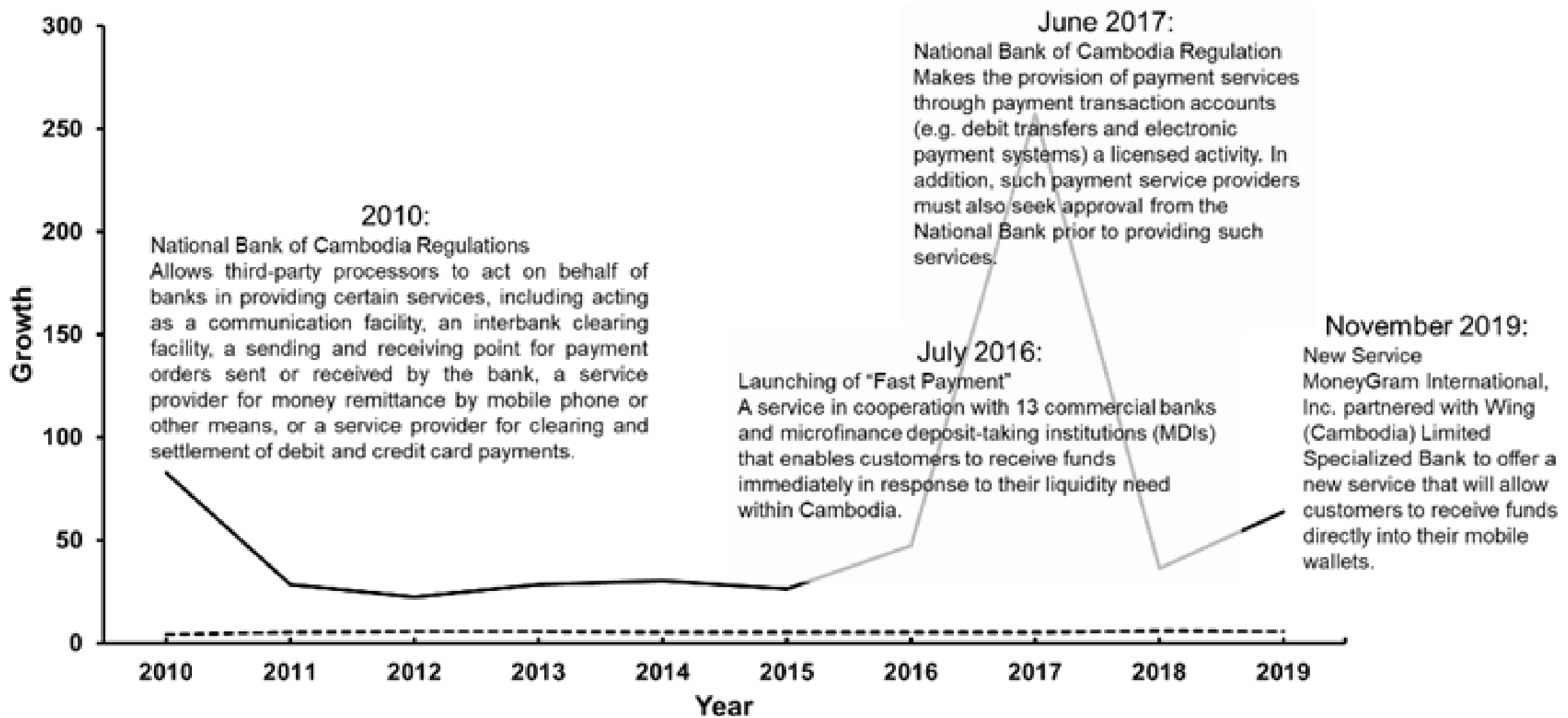
- ❖ **Examples of negative policies**
 - Report source of money in MM account
 - Identification required before cash withdrawal
 - Shut down MM and social media for “national security”
 - Limit on value of transactions due to local currency devaluation

Government Policies

❖ **Examples of positive policies**

- **Use in case of Ebola to pay frontline workers**
- **Pay government welfare support through MM**
- **Reduce fee on MM transactions**
- **Support MM providers financially**
- **Allow cross border transaction permission**
- **Allow MM to provide services without tie ups with banks**
- **Increase daily limits on transactions**
- **Clarify regulations**

Policy Example: Cambodia



Literature Review

❖ Policy

- Regulation (IMF 2019, Central Banks)
- Interoperability (Muthiora et al. 2020)
- Direct use in disease mitigation and welfare distribution (Bazarbash et al. 2020; Itai Agur et al. 2020)
- Profit support (Naghavi 2019)
- Sharing experience (IMF 2019)

Literature Review

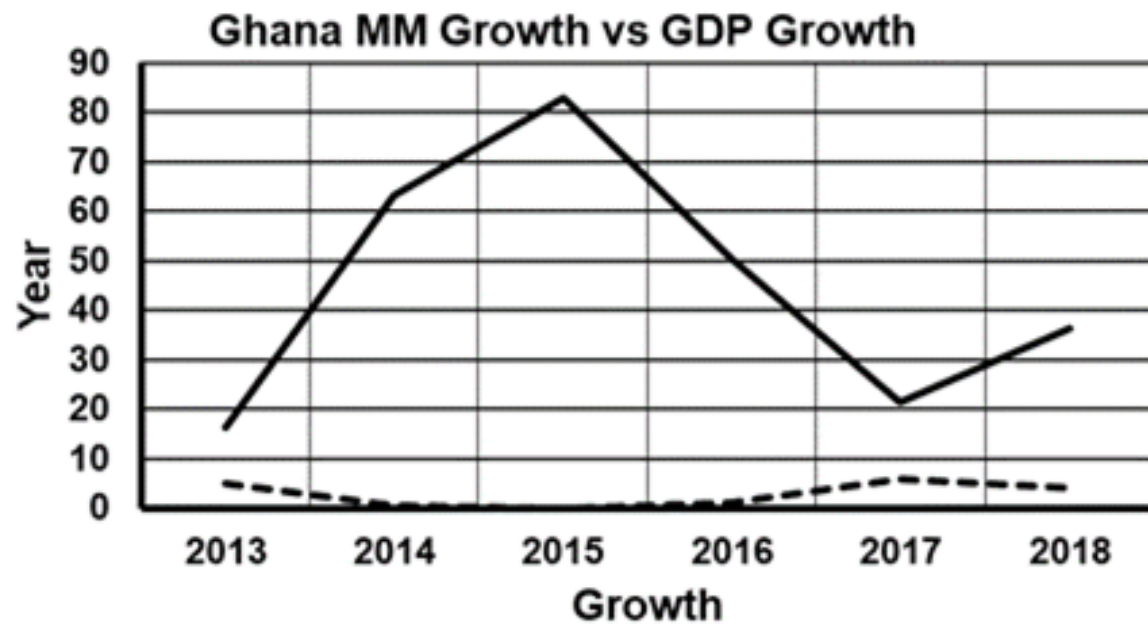
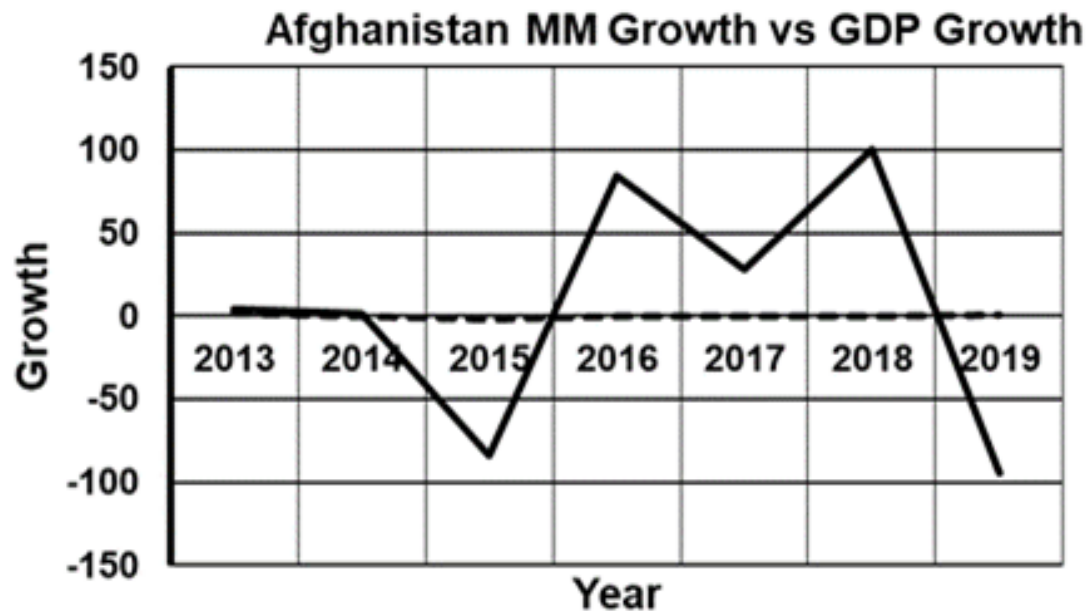
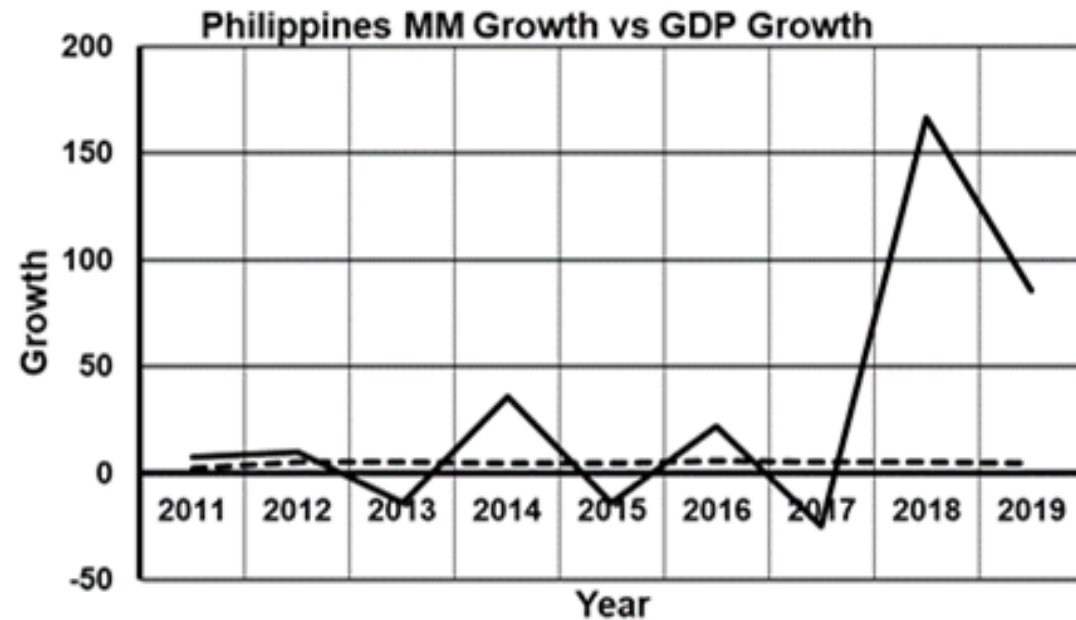
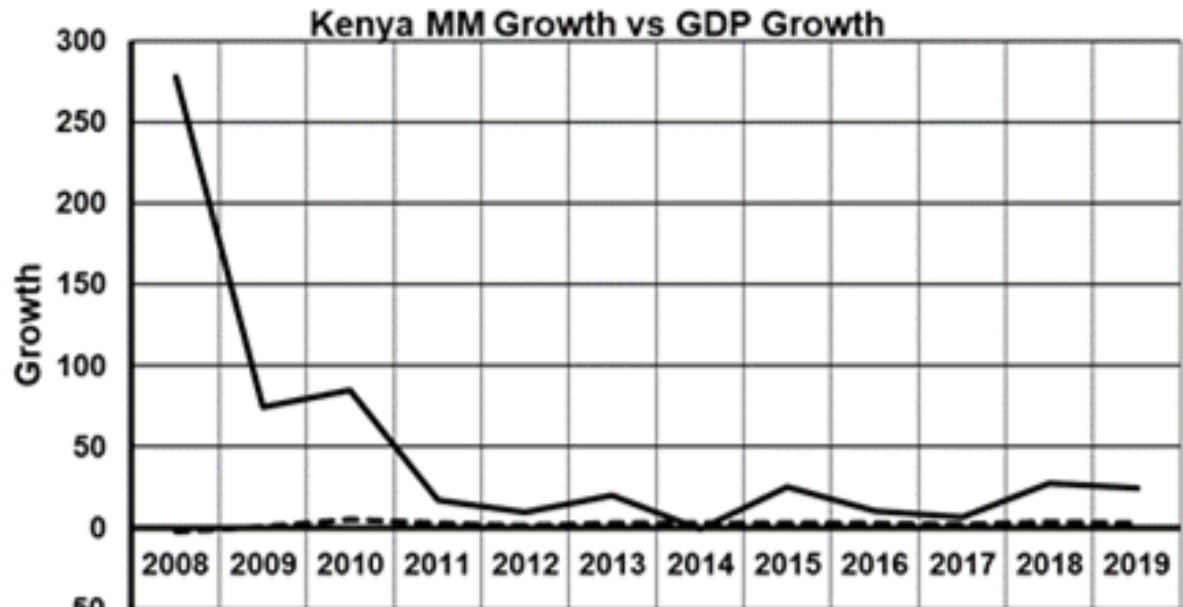
- ❖ **Across-country experience**
 - Success E.g. Kenya (Wexler 2020)
 - Struggles E.g. Jordan, Afghanistan (Max Nichols et al. 2019)
 - Characteristics of users (Mbiti and Weil, 2013)

Literature Review

- ❖ **Banks versus MM: Competition Vs. Complementarity**
 - **Ease of use of MM (Mobile Money Note 2019)**
 - **Characteristics of users (Mbiti and Weil, 2013)**
 - **Use of detailed consumer spending data use for credit allocation (Wexler, 2020; Naghavi, 2019; Adrian & Mancini-Griffoli, 2021)**

Interesting Trends

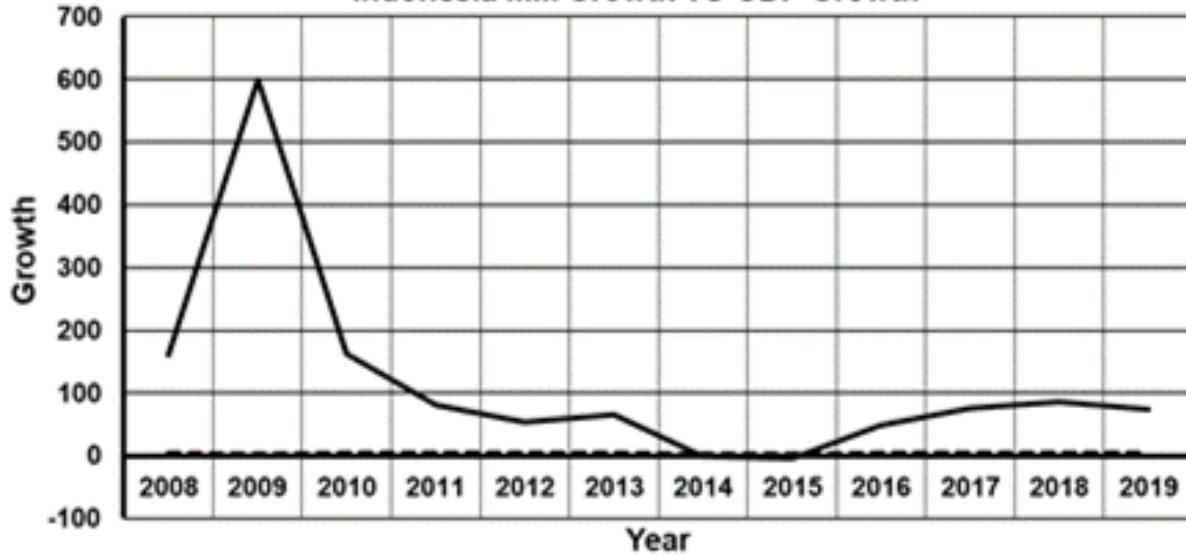
MM Growth 14
pc GDP Growth



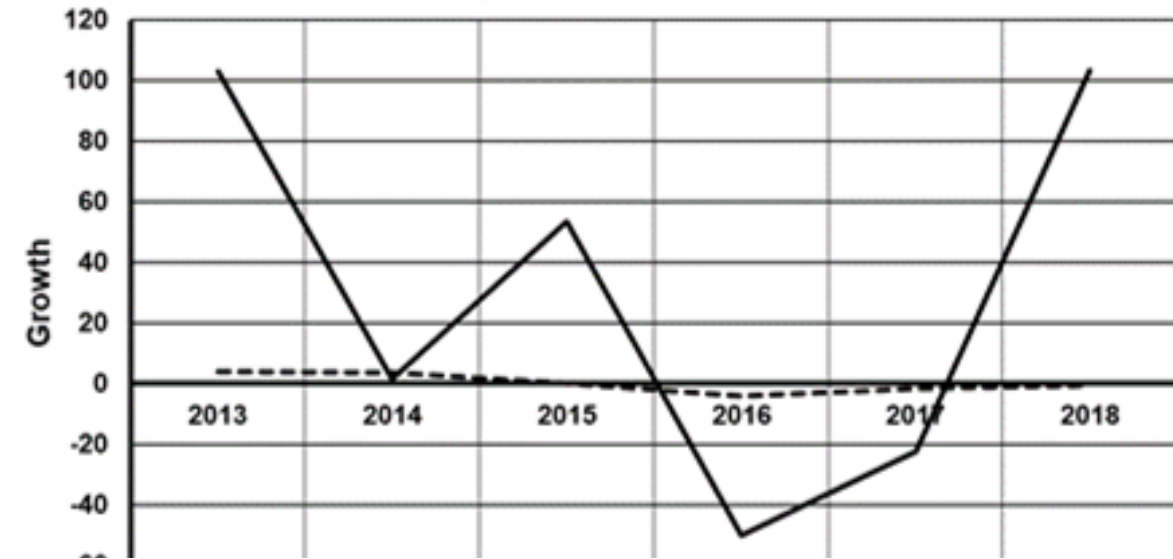
Interesting Trends

———— MM Growth 15
- - - - pc GDP Growth

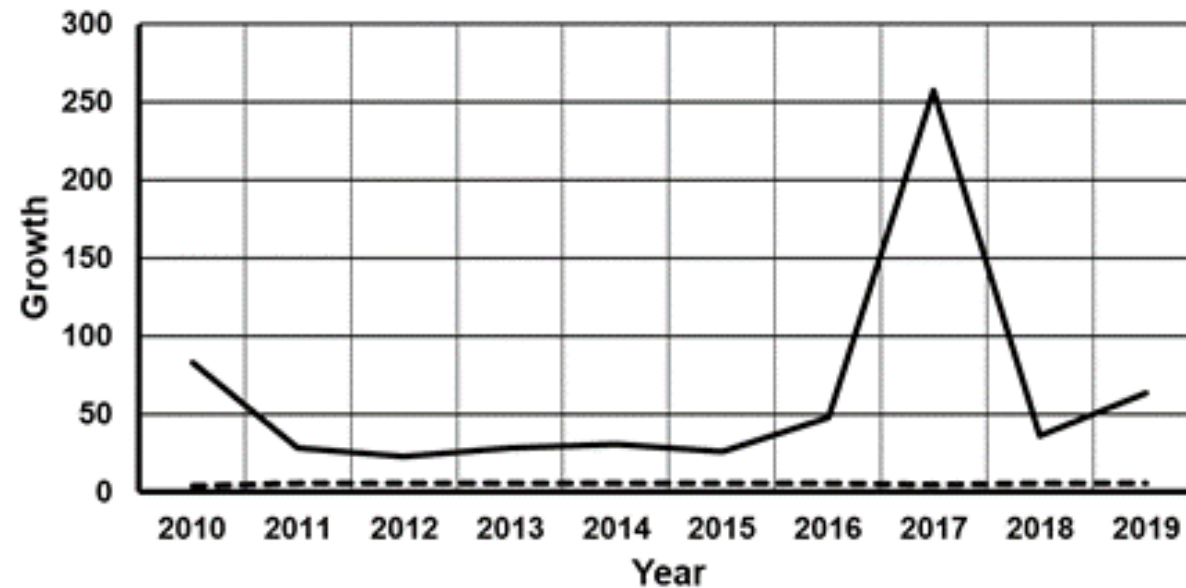
Indonesia MM Growth VS GDP Growth



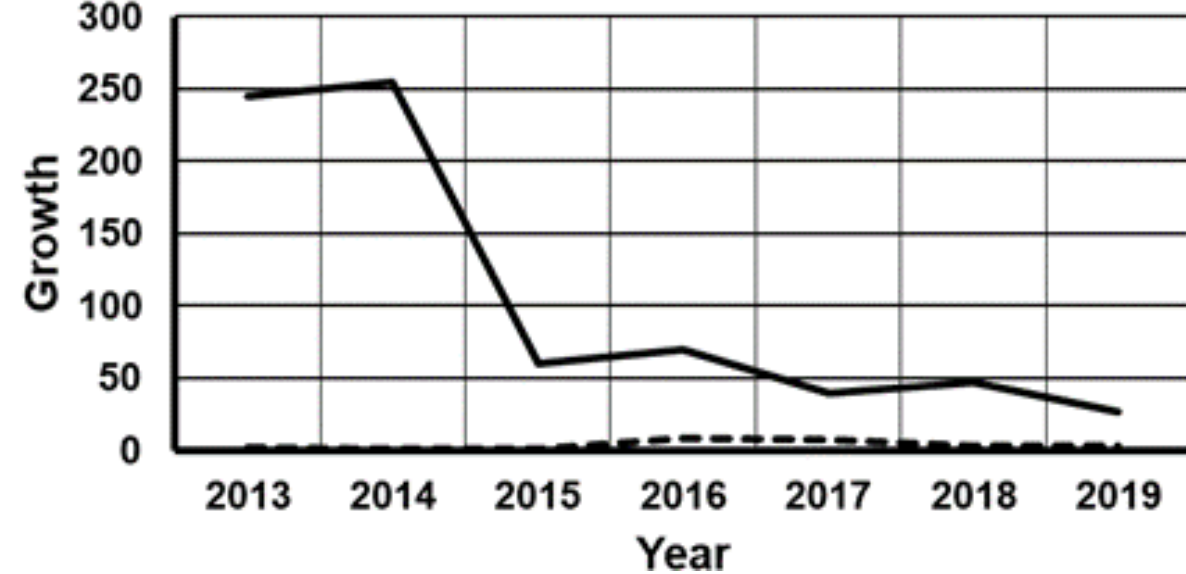
Nigeria MM Growth vs GDP Growth



Cambodia MM Growth vs GDP Growth

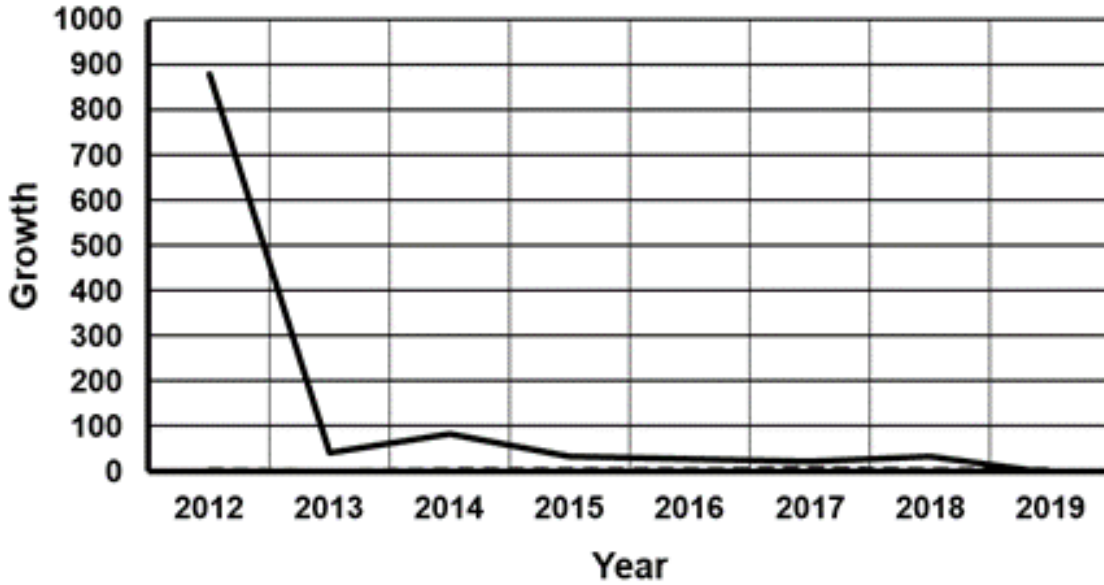


Guinea MM Growth vs GDP Growth

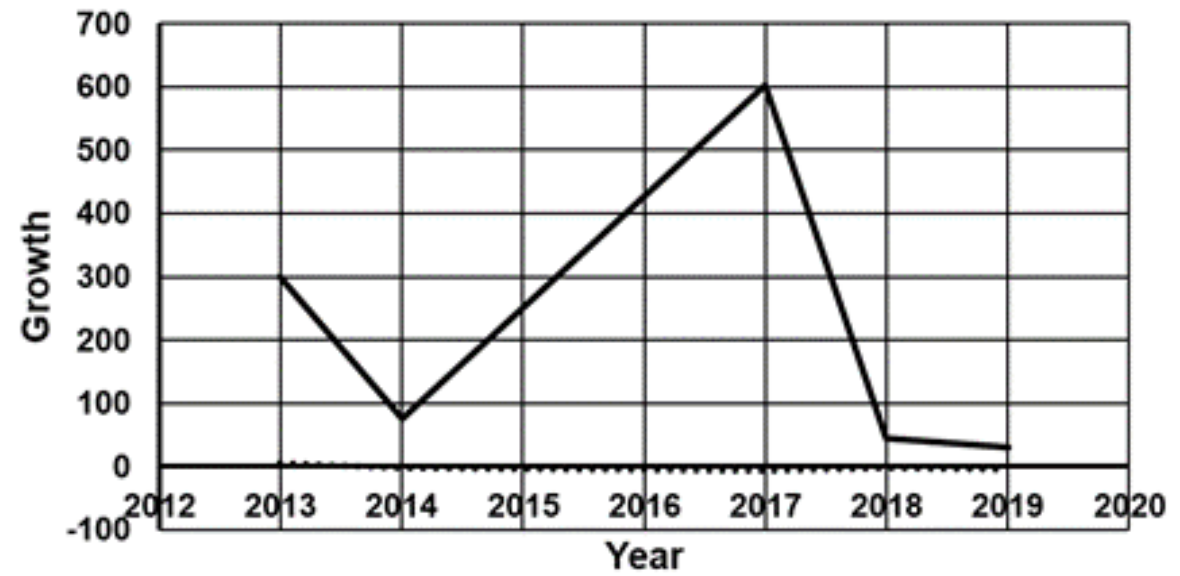


Interesting Trends

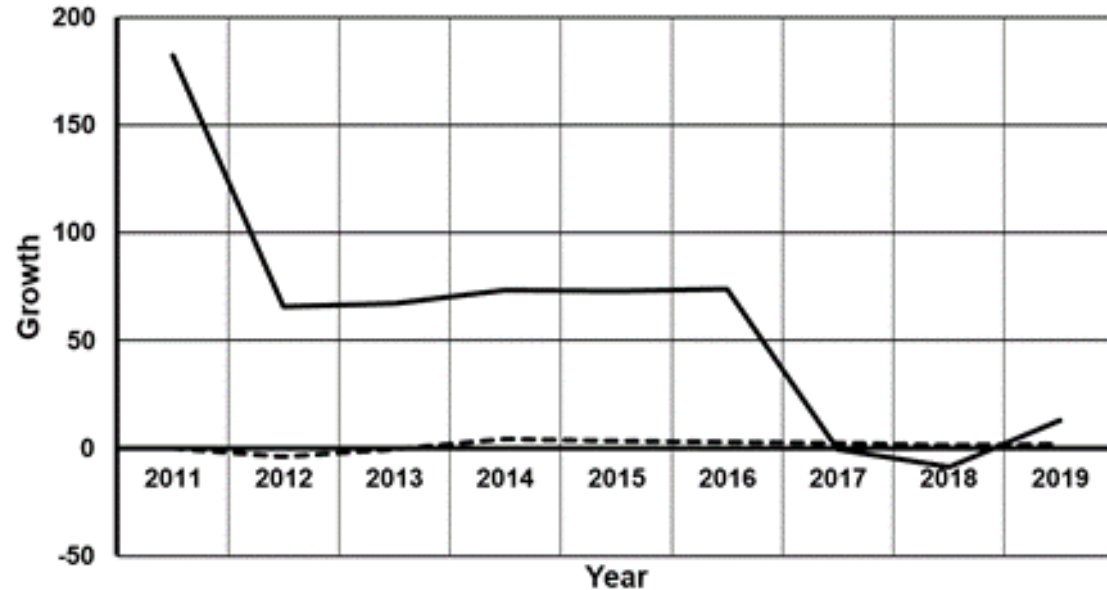
Senegal MM Growth vs GDP Growth



Liberia MM Growth vs GDP Growth

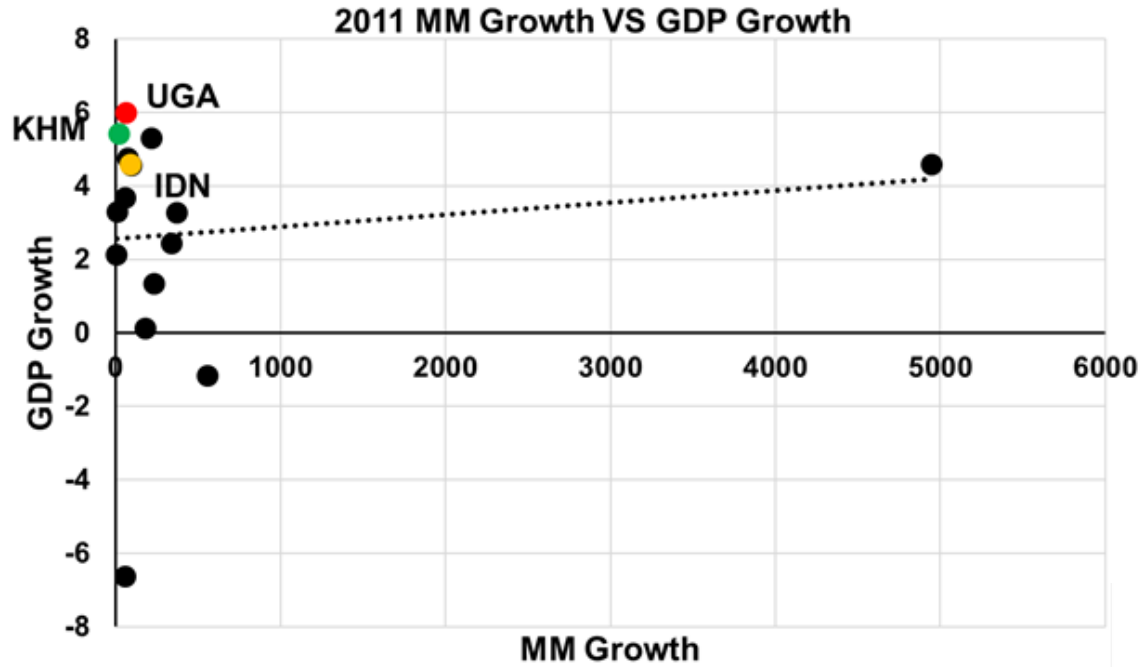


Mali MM Growth vs GDP Growth



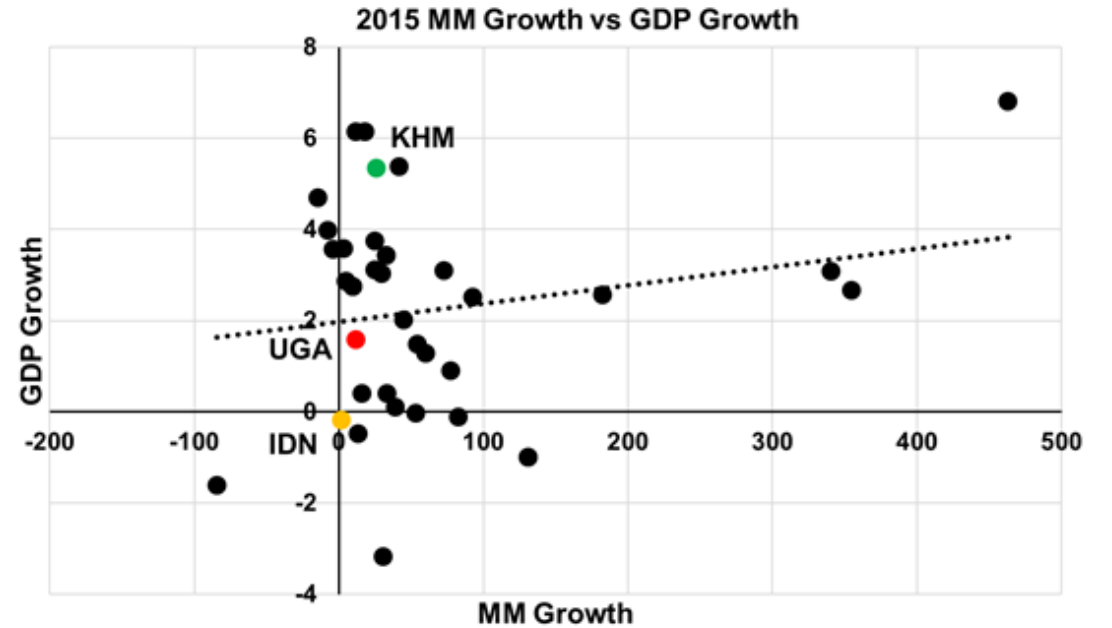
— MM Growth
- - - pc GDP Growth

Interesting Trends



- Côte d'Ivoire
- Cameroon
- Indonesia
- Kenya
- Cambodia
- Madagascar
- Mali
- Malaysia
- Namibia
- Philippines
- Rwanda
- Tanzania
- Uganda
- Zambia

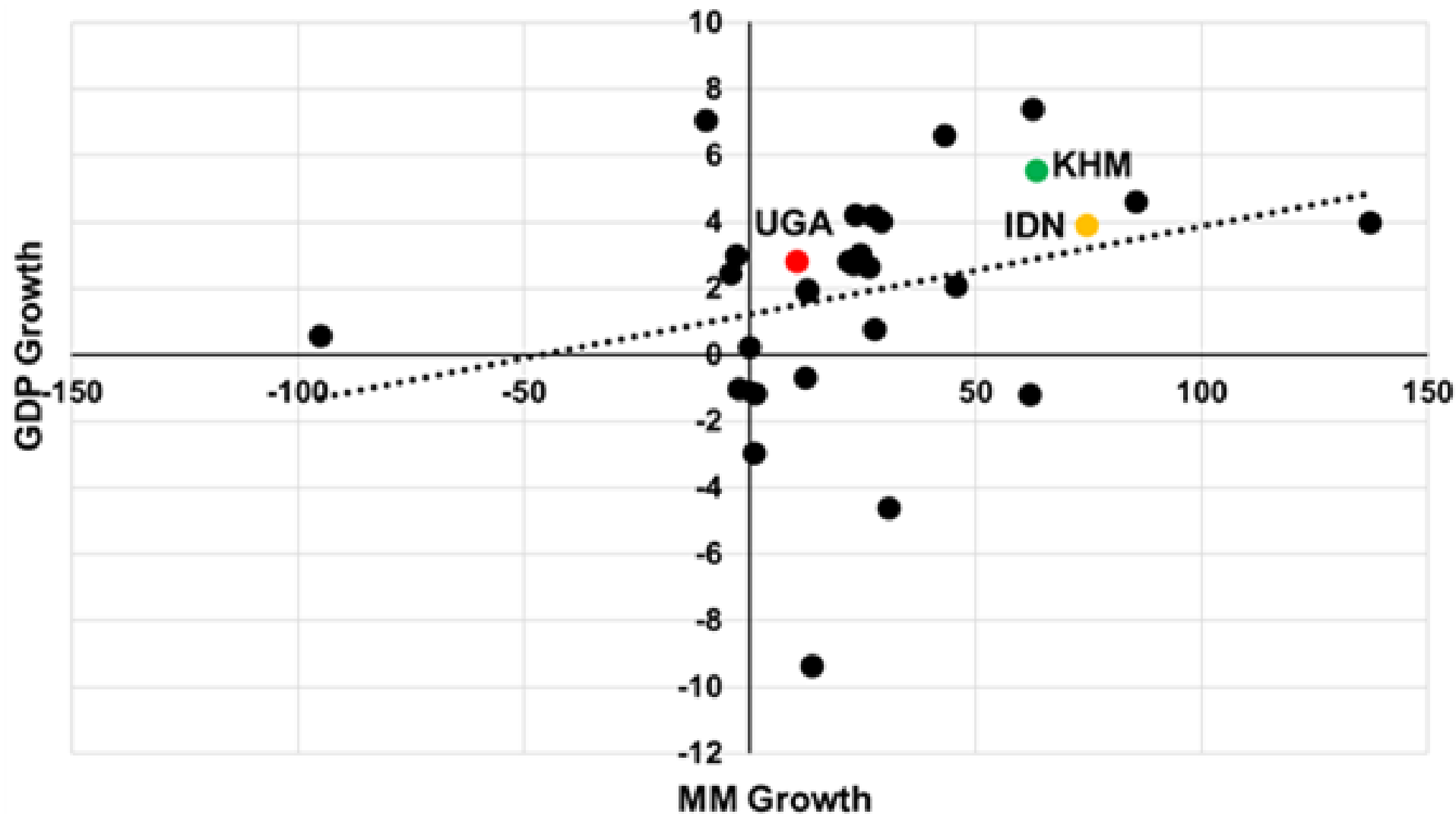
- Afghanistan
- Armenia
- Benin
- Burkina Faso
- Bangladesh
- Botswana
- Côte d'Ivoire
- Cameroon
- Ghana
- Guinea
- Guyana
- Indonesia
- India
- Kenya
- Cambodia
- Madagascar
- Mexico
- Mali
- Mozambique
- Namibia
- Niger
- Nigeria
- Pakistan
- Philippines
- Rwanda
- Senegal
- Eswatini
- Chad
- Togo
- Tonga
- Tanzania
- Uganda
- Samoa
- Zambia
- Zimbabwe



Interesting Trends

2019 MM Growth vs. pcGDP Growth

| | |
|---------------|-------------|
| Afghanistan | Mexico |
| Armenia | Mali |
| Benin | Mozambique |
| Burkina Faso | Namibia |
| Bangladesh | Niger |
| Botswana | Pakistan |
| Côte d'Ivoire | Philippines |
| Guinea | Rwanda |
| Guinea-Bissau | Senegal |
| Guyana | Chad |
| Indonesia | Togo |
| India | Uganda |
| Kenya | Samoa |
| Cambodia | Zambia |
| Liberia | Zimbabwe |



Data

- ❖ **36 countries – 2008-2019 – Mobile Money growth**
- ❖ **5 countries with Ebola outbreaks: Guinea-Bissau, Senegal, Liberia, Nigeria and Mali**
- ❖ **Secondary data: Economic growth, Financial development, Incidence of Ebola infection, Informal and Fragile economies**
- ❖ **Primary data: policies positive, negative and neutral**

Economic Growth

- ❖ **Relationship between PCGDP growth and MM accounts growth expected to be positive**
 - Fixed proportion of output is transacted in MM then while pcgdp might grow MM accounts need not
 - If transactions imply a growing infrastructure where merchants are able to accept MM as payment then growing pcgdp could lead to MM account growth
 - Increasing adoption can grow MM account without needing pcgdp growth. But it helps

Financial Development

- ❖ **Relationship between financial development and MM accounts growth expected to be ?**
 - **The competitive versus complimentary relation between them**
 - **Populations already comfortable with online banking will easily adopt MM**
 - **Will banking decline as a result?**
 - **Will lower discrimination lead to better credit allocation so relation is positive**

Ebola

- ❖ **Relationship between Ebola and MM accounts growth expected to be positive**
 - **Fear of disease spread will lead to adoption**
 - **Government use during Ebola will lead to adoption**

Informal Economy

- ❖ **Relationship between informal economy and MM accounts growth expected to be positive**
 - Informal economy does not pay taxes, is not included in formal GDP calculations
 - Workers paid in cash and not protected with benefits
 - Creates a demand for a way to enter formal financial sector through MM

Fragile Economy

- ❖ **Relationship between fragile economy and MM accounts growth expected to be ?**
 - **Fragile economy has issues such as conflict, poor policies, poor institutions**
 - **Conflict could create refugees with lack of proper documentation**
 - **or mass migration with demand for means of sending remittances**
 - **Poor policies and institutions can create a distrust of formal finance, which could discourage MM**

Estimation Strategy

❖ Panel regression with fixed effects

$$Y_{it} = \alpha + X_{it}\beta + \gamma E_{it} + \eta Policy_{it} + \phi Policy_{-it} + c_i + \delta_t + \varepsilon_{it}$$

Estimation Strategy

❖ Fixed Versus Random Effects

- Hausman test indicates fixed effects: units are large to be random, fixed country characteristics are likely related to X 's
- Robust Standard errors
- Country fixed effects
- Include year dummies
- Potential next steps look for lagged impact of policy
- Multicollinearity between policy and Ebola

Results without policy

| Variables/Models | FI | FII | FIII | FIV | FV |
|--|----------------------------------|--------------------------------|--------------------|--------------------------------|---------------------------------|
| PGDP growth | 20.36 (1.41) | 19.53 (1.42) | 32.62 (1.26) | 48.44* (1.22) | -8.07 (-0.85) |
| Private Credit to GDP Ratio | 11.43*** (3.14) | - | | 7.76** (2.21) | 11.63** (2.45) |
| Commercial Banks | - | 69.97* (1.75) | 16.10 (1.04) | - | 19.67 (0.50) |
| Informal Economy | 3.28 (0.13) | 7.80 (0.31) | - | - | -31.74 (-1.30) |
| FSI | - | - | 19.15 (0.83) | 34.03 (1.30) | 41.71 (1.32) |
| Ebola (0,1) | -30.84 -0.23) | -61.09 (-0.44) | -169.31 (-1.08) | -228.24 (-1.19) | -129.68 (-1.14) |
| Observations | 300 | 300 | 300 | 300 | 300 |
| Adjusted R sqr | 0.092 | 0.102 | -0.117 | -0.106 | -0.085 |

Results without Ebola

| Variables/Models | FI | FII | FIII | FIV | FV |
|------------------------------------|-----------------------------------|-------------------|------------------------------------|------------------------------------|------------------------------------|
| PGDP growth | -1.55 (-0.18) | 0.77 (0.04) | -15.17 (-1.50) | -15.65 (-1.40) | -4.54 (-0.38) |
| Private Credit to GDP Ratio | 8.75*** (3.88) | - | - | 4.00 (1.03) | 163.74*** (14.48) |
| Commercial Banks | - | 109.44 (1.17) | 21.64 (0.51) | - | 36.38 (0.78) |
| Informal Economy | -32.27** (-2.57) | -26.33 (-0.87) | - | - | 58.17*** (5.20) |
| FSI | - | - | -2.79 (-0.27) | -2.81 (-0.43) | 42.90 (1.87) |
| Policy -1 | 79.99 (1.43) | 15.53 (0.08) | -202.25** (-2.19) | -160.12** (-2.21) | 52.97 (0.51) |
| Policy +1 | 49.98 (1.07) | -44.85 (-0.57) | -40.45 (-0.39) | 50.14 (0.71) | 23.63 (0.99) |
| Observations | 300 | 300 | 300 | 300 | 300 |
| Adjusted R sqr | 0.96 | 0.90 | -0.80 | -0.15 | 0.60 |

Results including only policy

| Variables/Models | FI |
|-------------------------|------------------------------|
| Policy -1 | -122.87** (-1.75) |
| Policy +1 | -17.82 (-0.31) |
| Observations | 300 |
| Adjusted R sqr | 0.90 |

Results including all variables

| Variables/Models | FI | FII | FIII | FIV | FV |
|------------------------------------|-----------------------------|------------------------------|-----------------------------|------------------------------|-------------------------------|
| PGDP growth | 6.61* (2.04) | 15.56** (2.33) | 7.86 (0.78) | 2.39 (0.26) | 27.09*** (12.72) |
| Private Credit to GDP Ratio | 8.54*** (4.87) | - | - | 2.57 (0.68) | 115.07*** (24.00) |
| Commercial Banks | - | 143.83*** (2.95) | 49.94 (1.03) | - | -5.52 (-0.52) |
| Informal Economy | -22.75*** (-3.22) | -20.42* (-1.84) | - | - | 42.78*** (10.85) |
| FSI | - | - | 19.84* (1.78) | 11.56 (1.37) | 30.24*** (12.20) |
| Ebola (0,1) | -381.45** (-2.43) | -589.77** (-2.36) | -686.01** (-2.77) | -477.95*** (-2.82) | -424.01*** (-29.96) |
| Policy -1 | 61.48** (2.65) | 18.58 (0.46) | -200.61** (-2.72) | -150.31** (-2.42) | -140.65*** (-5.461) |
| Policy +1 | 19.51 (0.70) | -81.66 (-1.43) | -93.71 (-1.32) | 8.32 (0.16) | -15.72* (-2.34) |
| Observations | 300 | 300 | 300 | 300 | 300 |
| Adjusted R sqr | 0.98 | 0.94 | -0.19 | 0.18 | 0.98 |

Conclusions

- ❖ **Positive relationship with**
 - Economic growth
 - Financial development
 - Fragile economy
 - Informal economy
- ❖ **Negative relationship with**
 - Ebola incidence
 - Policies
- ❖ **Surprising results**
 - Negative relationships with policies and Ebola
 - Insignificant relationship with banking



Thank You!

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