An assessment of Mobile Money in Bangladesh and the impact of Mobile Money on Poverty

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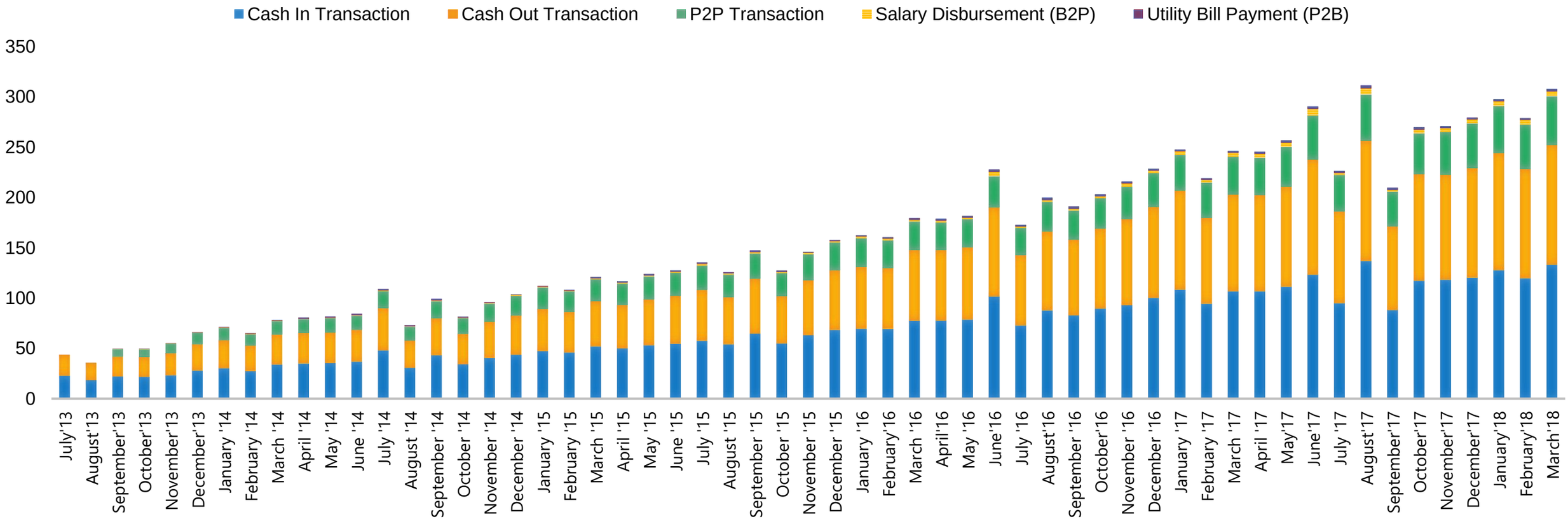
Mobile Financial Services in Bangladesh*

No of Banks	Customers	No of Agents
18	66.7 Million	800+ Thousands

Transaction Amount**	Cash In & out Trx**	Avg. Daily Transaction**
BDT 301.7 Billion	BDT 234 Billion	BDT 10.5 Billion

* As on Sept'18
** For The Month of Sept'18

Transaction Volume by Type of Transactions



Cash out
38%

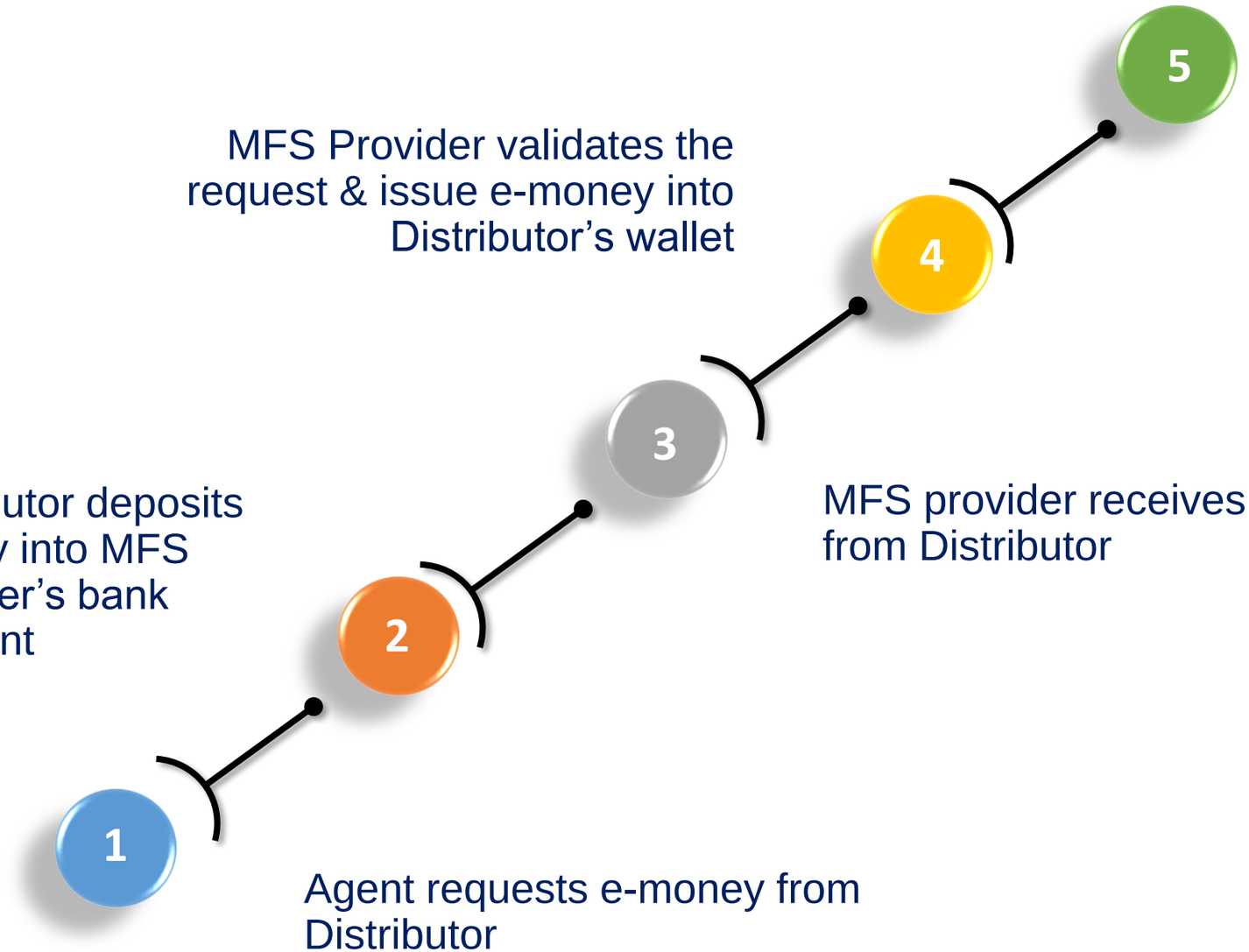
Cash in
42%

P2P
15%

Salary
1%

Utility
1%

Money Issue



Distributor’s Sales Officer (DSO) receives e-money from Distributor to give to Agent

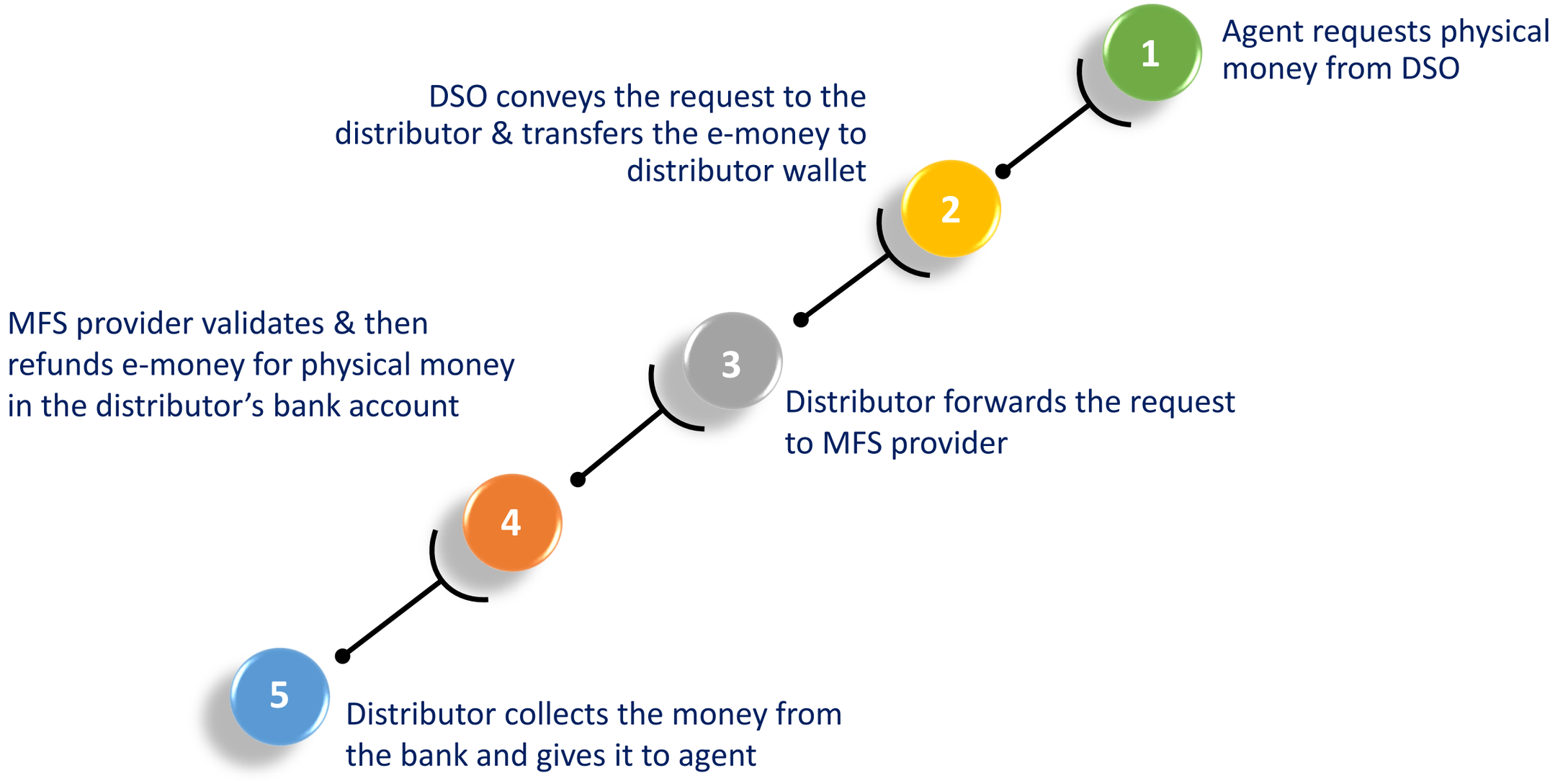
MFS Provider validates the request & issue e-money into Distributor’s wallet

MFS provider receives request from Distributor

Distributor deposits money into MFS provider’s bank Account

Agent requests e-money from Distributor

Money Refund



Presentation Outline

Regulatory Framework

- Permissible Financial Services
- Ownership
- Balance of electronic & physical money

Literature Review

- Research Objective
- Empirical Studies on Mobile Money

Data

- Poverty & District Data from HIES & Population and Housing Census
- MFS Transaction Data from bKash

Analysis & Findings

- Inflow-Outflow Map of Bangladesh
- OLS with exogenous change in agent density
- IV regression on bKash transaction

Regulatory Framework

Permitted Financial Services

- Disbursement of Inward Foreign Remittances
- Cash in/Cash out at Bank, ATM & Agent outlets
- P2B Payments (bills, savings deposit, MFIs, Insurance)
- B2P Payments (salary, dividend, refund)
- Online & e-Commerce payments
- Loan disbursements to borrowers and Vendor Payments
- G2P Payments (pension, old age allowance, subsidy, etc)
- P2G Payments (tax, fee, levy, toll charge, etc)
- P2P Payments (MFS account to MFS or Bank Account)
- Other payments approved by Bangladesh Bank

Permissible Model for MFS

- Led by scheduled commercial bank (minimum 51% equity ownership)
- Parent Bank may create it as a subsidiary & may take partners from NGOs, Fintech companies, investment companies except Mobile Network Operators

Virtual Balance (e-Money) and Physical Cash Balance

- Aggregate of virtual balances in all MFS accounts of an MFS provider must at the end of the day be in agreement with or be less than the total real cash balances in nominated trust cum settlement accounts of the MFS provider with scheduled commercial bank(s) and invested amount in Government Securities.

Transaction Limits

Maximum (Amount/Number)	Per Day	Per Month
▪ **Cash in**	▪ BDT 15,000	▪ BDT 100,000
	▪ 2 Transactions	▪ 20 Transactions
▪ **Cash out**	▪ BDT 10,000	▪ BDT 50,000
	▪ 2 Transactions	▪ 10 Transactions
▪ **Person to Person**	▪ BDT 10,000	▪ BDT 25,000
	▪ No Limit	▪ No Limit

Research Objective

Does Mobile Money help reduce poverty?

What is the marginal impact of Mobile Money on Poverty?

Is this impact uniform across all districts?

Which districts are the money senders & which districts are receivers?

Literature Review

Study	Data	Method	Claimed Result
Jack and Suri (2014)	Kenya	**Panel Difference-in-Difference Regression**	
Dependent Variable: **DD/IV:** log annual per capita consumption for a household at a particular location and time.	Panel data. Household panel survey. 2 Period panel survey of 2282 Households.	**Random intervention:** a negative income shock. **Controlling for:** M-money dummy equal to 1 for an M-Pesa user in the household in survey and 0 otherwise; a dummy for negative shock to income in last 6 months; household fixed effects; location-by-time dummies; rural-by-time dummies; and household characteristics.	For Kenyans with access to mobile money, total consumption is unaffected by negative income shocks, while the consumption of non-users drops by 7% (significant at a 10% level). The effect is more evident for the bottom three quintiles of the income distribution. Same result for the impact of health shocks on total consumption; but food consumption is equally well-smoothed by users and non-users.
		The shock dummy and M-Pesa dummy are crossed to test if M-Pesa users are better able to smooth risk	
		Instrumental Variables	
		Controlling for: as above	
		Instruments for M-Pesa user in the household at the time of the survey and for its interaction with the income shock: distance to the closest agent, the number of agents within 5 km of the household, and the interactions of each with the shock	The IV regressions reinforce the conclusions: improved access to agents improves a household's ability to smooth risk. The agent roll-out proved statistically to be uncorrelated with observables including self-reported wealth (though using only partial correlates, see LHS); in principle instrumenting could help to control for endogeneity

Literature Review

Study	Data	Method	Claimed Result
Jack and Suri (2016)	Kenya	**Panel OLS Regressions**	
Dependent Variables: **OLS:** i) the log of average consumption per person in a household ii) the change in this variable iii) the level of household poverty rates	Panel data. Household panel survey conducted across 118 locations for 1608 households.	**Controlling for**: the change in agent density between 2008 and 2010; location fixed effects; a dummy for gender of the household head in household level regressions (or for the individual in individual level regressions); and household (individual) characteristics.	Prior agent density (proxies access to M-Pesa) increased per capita consumption levels (in 2014) and reduced the level of poverty for two measures of poverty (in 2014). Effects are stronger for female-headed households for the levels of consumption and of extreme poverty.
		• The gender dummy and the change in agent density are crossed to estimate the marginal effect of an increase in agent density for females.	Consumption growth for male-headed households was negative; that of female-headed households was positive and statistically significant. (The result is robust to interactions between changes in agent density and other observable household characteristics.)
		• The change in agent density is crossed with household (or individual) characteristics to rule out cases where the gender effect was in fact driven by these other characteristics	

Literature Review

Study	Data	Method	Claimed Result
Riley (2018)	Tanzania	**Panel Difference-in-Difference Regression**	
Dependent Variable: **DD/IV:** log of consumption per capita.	Panel data. Tanzania National Panel household panel survey (NPS) for 2008–9, 2010–11 and 2012–13, covers 3265 households in 26 districts	**Random intervention:** a negative income shock **Controlling for:** M-money dummy equal to 1 for households that used mobile money services and 0 otherwise; a dummy for aggregate shock; household fixed effects, location-by-time dummies, a dummy for the proportion of mobile money users in a village; and household characteristics	This study examines potential beneficial spillover effects of mobile money to the village community (which includes non-users) following an aggregate (covariate) shock. Effect of shock on consumption The rainfall (or other) shock causes a drop in consumption of 6–11% for all households without mobile money use.
	Treatment groups are villages where mobile money is available.	**Instrumental Variables:**	Effect on consumption without shock
	Shocks: self-reported aggregate income shocks e.g., droughts or floods; or a constructed measure of rainfall deviations (> 1 standard deviation) from a 40 year mean, expressed as an absolute value.	Instruments for mobile money and for its interaction with the income shock: distance to and cost of reaching the nearest mobile money agent, and the interactions of each with the shock	For villages where at least one person uses mobile money, average village consumption is 4–10% higher (1% significance level and robust to the inclusion of fixed effects): signals positive spillover effects of mobile money to non-users in the village;

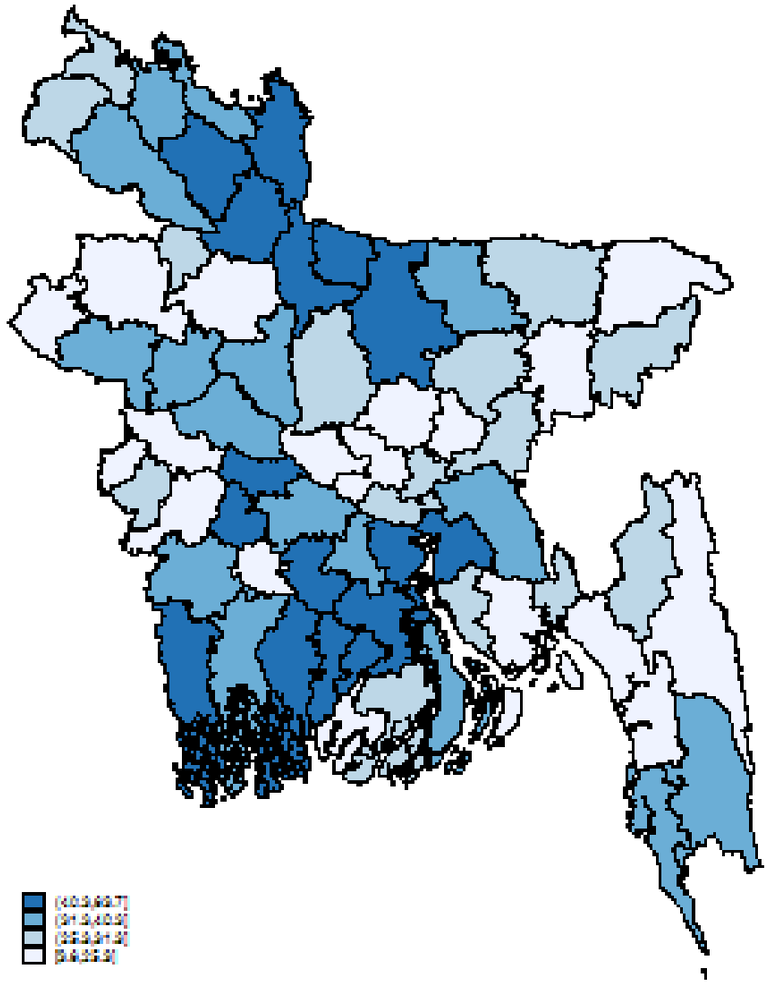
Literature Review

Study	Data	Method	Claimed Result
Aker et al. (2016)	Niger	**Randomized Controlled Trials (RCT)**	
Dependent Variable: **OLS:** various outcomes of interest (costs, uses of the cash transfer, food security and assets) of individual or household in village.	Cross-section Household survey of 1152 recipients in 96 intervention villages: baseline in May 2010, follow-ups in Dec.2010 and May 2011	**Random intervention:** treated participants received cash transfer through mobile payments. Controlling for: indicator variables for participation in the M-money transfer program, and for whether a mobile phone was received; geographic fixed effects at the commune level; vector of household baseline covariates; presence of a seed distribution program at the village level.	Transactions costs reduced, especially travelling and queuing time. Increased intra-household bargaining power for women. Increased diet diversity; better nutrition for children; women more likely to cultivate and market cash crops; fewer depleted durable and non-durable assets. No evidence of 'leakage'.
	Treatment groups are villages where mobile money is available.		
	Shocks: self-reported aggregate income shocks e.g., droughts or floods; or a constructed measure of rainfall deviations (> 1 standard deviation) from a 40 year mean, expressed as an absolute value.		

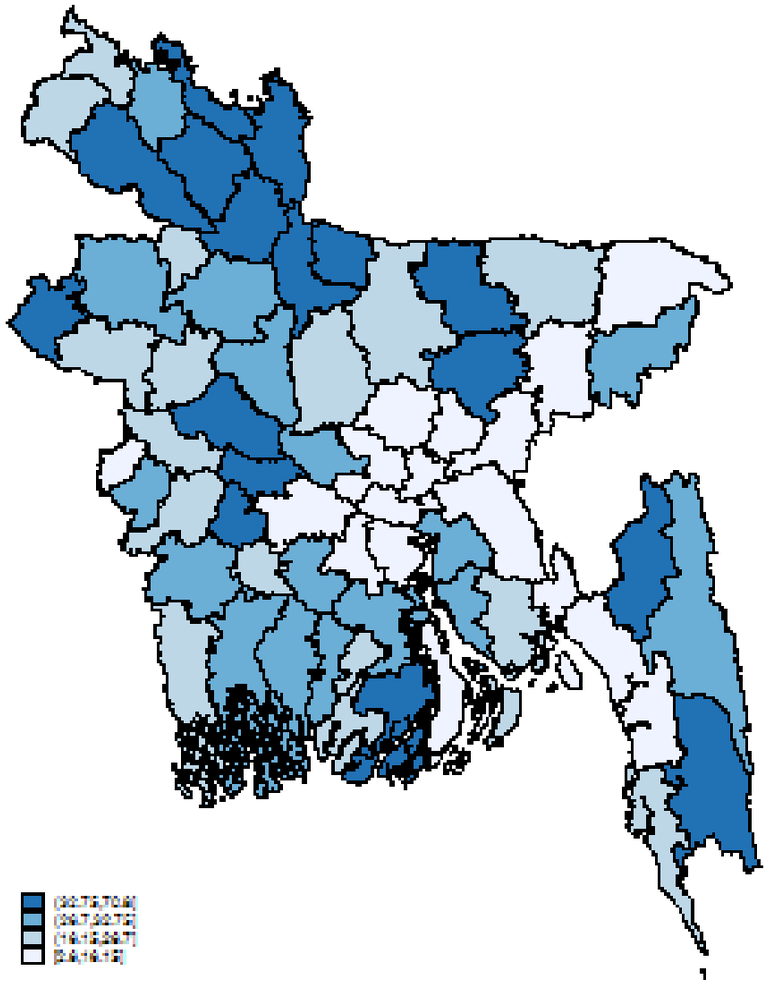
Data: Descriptive Statistics

Variable	Obs	Mean	Std. Dev	Min	Max
Poverty_2010 (%)	64	32.26	12.06	3.60	63.70
Poverty_2016 (%)	64	27.45	15.31	2.60	70.80
Inflow_15 (BDT billions)	64	7.63	10.09	0.81	80.31
Outflow_15 (BDT billions)	64	8.09	23.37	0.67	178.96
Rural Population (%)	64	82.16	10.24	22.85	91.19
Primary employment Agriculture (%)	64	57.02	15.46	4.20	74.92
Primary Education (%)	64	32.86	5.70	20.92	45.98
Secondary Education (%)	64	11.31	3.11	5.24	23.32
Literacy_2011	64	48.08	8.94	32.77	72.99
Agent Density_2011	63	3.16	6.67	0.00	52.00
Agents Density_2013	63	61.56	122.36	1.00	975.00
Agent Density Change	63	58.38	115.81	1.00	923.00
Population_2011 (millions)	64	2.25	1.75	0.39	12.10
Area (sq. km)	64	2,245.81	1,168.24	720.00	6,116.00
Population Density	64	1,164.63	1,082.37	87.49	8,261.86

Data: Poverty Map

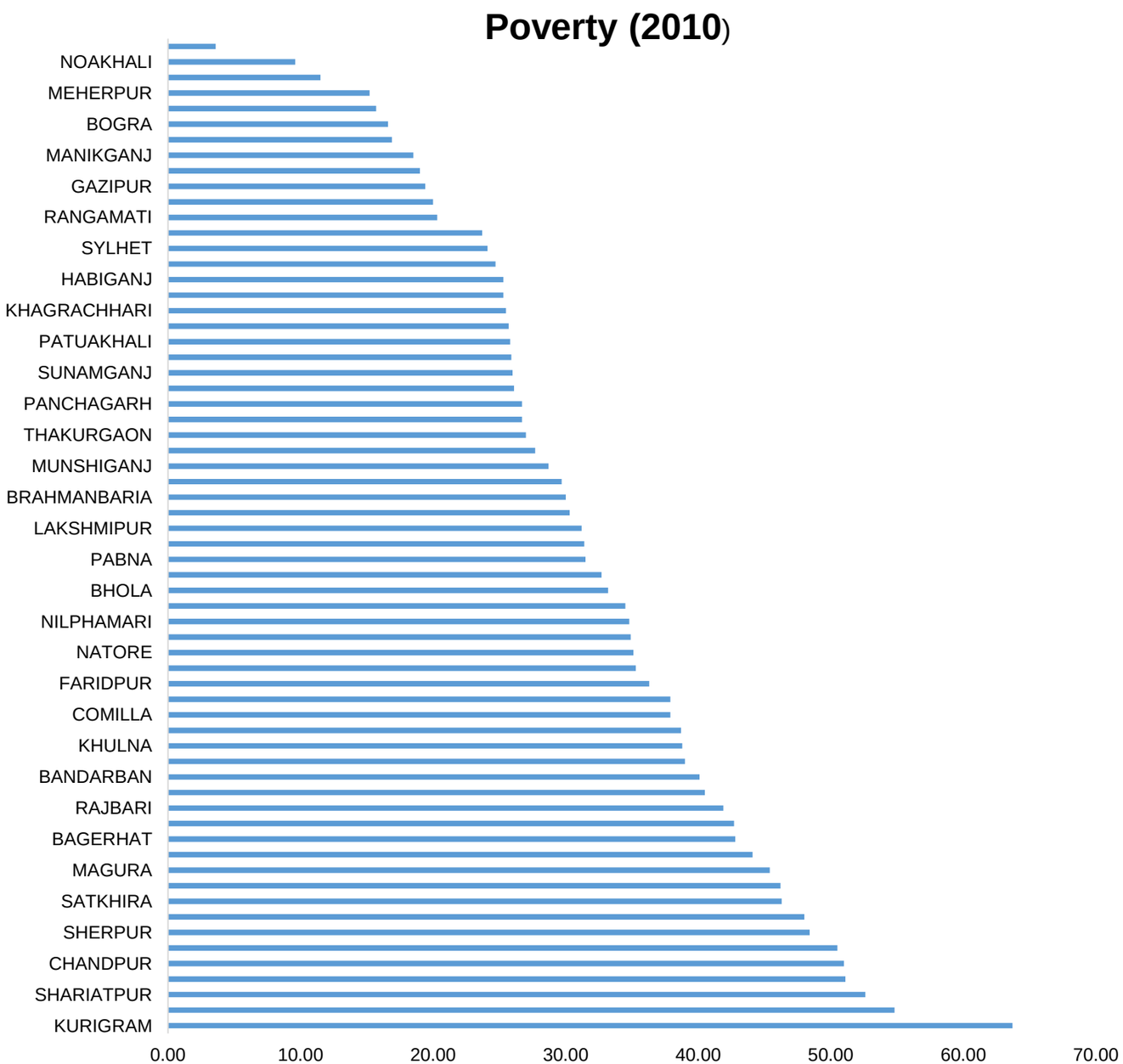


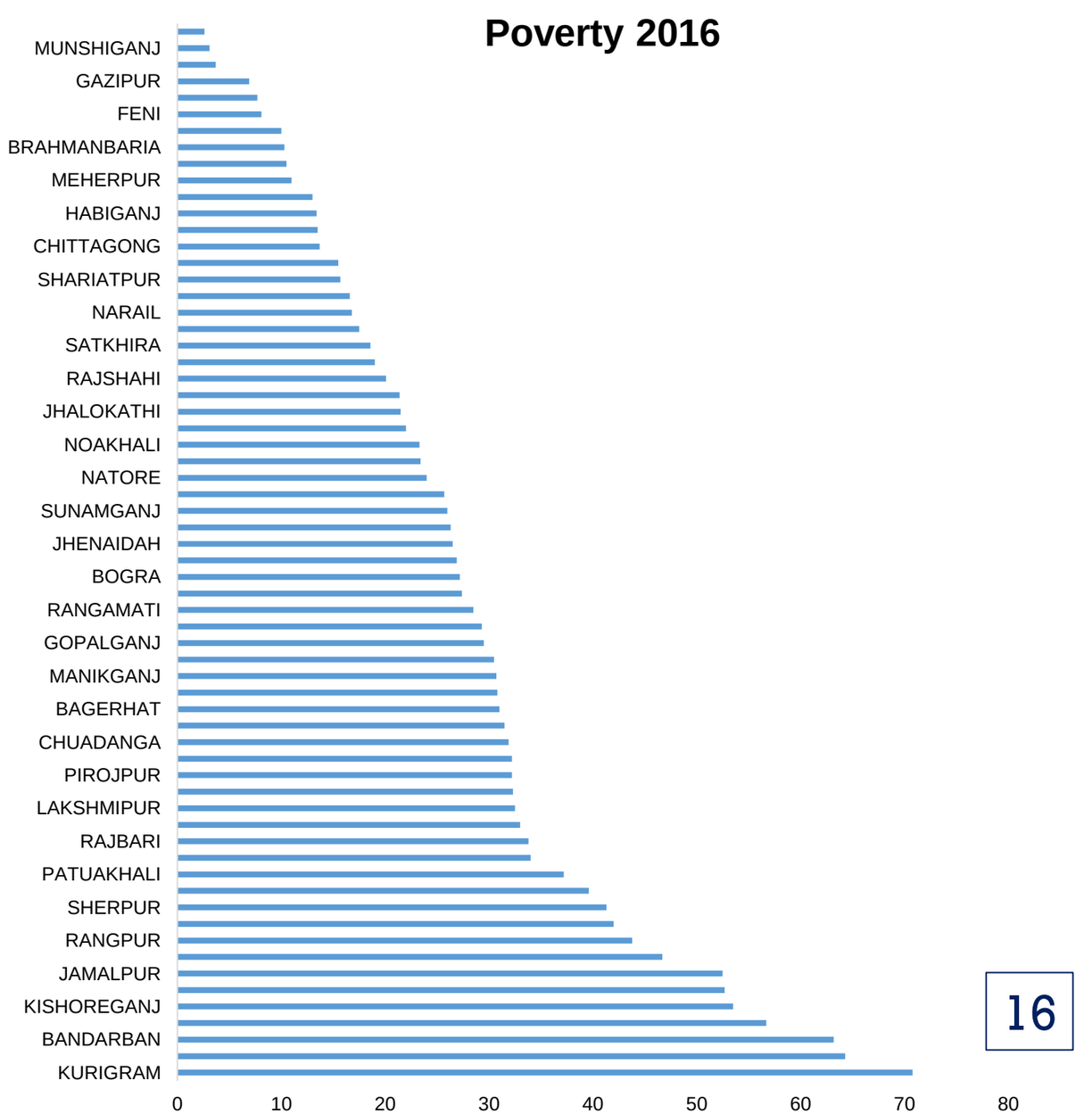
Poverty 2010



Poverty 2016

Data: Poverty Distribution





Methodology: Identification of an Exogenous Variable

Change in Agent Density from 2011 to 2013

- During the early days of bKash the expansion of agent network was a supply-side matter rather than being driven by the demand side or the socio-economic conditions of the districts.
- The agent density change has been for the period of 2011 to 2013 and not afterwards, because the company started getting partners like Bill and Melinda gates foundation who gave specific targets to grow agent networks and transactions in certain identified poor zillas and upazillas.
- In early 2014 BFIU Master Circular was published. By this time the market had already been quite regulated and competitive
- bKash Transaction data pose the risk of endogeneity as they are driven by the economy of the location

Change in Agent Density				
	Coefficient	**SE**	**t**	**P>|t|**
Primary Education	0.0850433	0.7924798	0.11	0.915
Secondary Education	0.455356	1.927679	0.24	0.814
Literacy	0.4857261	0.561141	0.87	0.39
Without toilet, open defecation	0.2879963	0.576501	0.5	0.619
Standard errors are clustered at the district level; *** p<0.01, ** p<0.05, * p<0.1 Each cell reports coefficients and standard errors from a separate regression. Control for District Density & Rural Population maintained in each regression.				

Methodology: Model Specification

$$Poverty\_2016 = \alpha + \beta 1(Poverty\_2010) + \beta 2(\Delta\ agent\ density) + \beta 3(density) + \Phi(\Delta\ \ agent\ density\#quartiles) + €$$

$$Poverty\_2016 = \alpha + \beta 1(Poverty\_2010) + \beta 2(\Delta\ agent\ density) + \beta 3(density) + \Phi(\Delta\ \ agent\ density\#quartiles) + \Upsilon(district\ control\ variables) + €$$

$$Poverty\_2016 = \alpha + \beta 1(Poverty\_2010) + \beta 2(bKash = \Delta\ agent\ density) + \beta 3(density) + \Phi(bKash\#quartiles) + \Upsilon(district\ control\ variables) + €$$

Findings: Estimating the effect of change in exogenous agent density on poverty

***OLS with Robust Standard Errors including additional controls**

				Number of obs	=	63
				F (11, 51)	=	7.44
				Prob > F	=	0.000
				R-Squared	=	0.4762
				Root MSE	=	12.064
poverty_16	Coef.	Robust Std. Error	t	P > t	[95% Conf.	Interval]
poverty_10	0.8276	0.2953	2.800	0.007	0.2347	1.4206
D agent density	-0.0611	0.0451	-1.350	0.181	-0.1517	0.0294
D agent density#qtile						
2	-0.15989	0.05799	-2.760	0.00800	-0.27631	-0.04346
3	-0.17354	0.14254	-1.220	0.22900	-0.45969	0.11261
4	-0.37306	0.14583	-2.560	0.01400	-0.66582	-0.08030
5	-0.29337	0.16238	-1.810	0.07700	-0.61937	0.03262
Population Density	0.006006	0.005460	1.100	0.276	-0.004955	0.016967
Literacy_D	0.5582841	3.6700550	0.150	0.880	-6.8096600	7.9262280
Secondary_D	-0.67356	3.504894	-0.19	0.848	-7.709928	6.362809
Agriculture_D	7.809841	3.888477	2.01	0.05	0.0033977	15.61628
Primary_D	9.089833	9.78645	0.93	0.357	-10.55728	28.73695
Constant	2.202377	7.990298	0.28	0.784	-13.83882	18.24357

Findings: Marginal Impact of change in exogenous agent density on poverty

OLS with robust standard errors		
	Model 1 (without additional control)	**Model 2 (with additional control)**
Poverty_10	1.015512**** (-3.73)	0.827631*** (-2.8)
∆ agent density	-0.3197238*** (-2.82)	-0.2657252** (-2.27)
∆ agent density at Qtile 1	-0.0428264 (-1.07)	-0.0611117 (-1.35)
∆ agent density at Qtile 2	-0.2107327** (-2.35)	-0.220997** (-2.23)
∆ agent density at Qtile 3	-0.2988907* (-1.80)	-0.23465 (-1.43)
∆ agent density at Qtile 4	-0.5626934*** (-3.44)	-0.4341733** (-2.58)
∆ agent density at Qtile 5	-0.4594101*** (-2.46)	-0.3544843* (-1.9)

*Standard errors are clustered at the district level; *** p<0.01, ** p<0.05, * p<0.1*
t-statistics are given in the brackets

- On average, for one percent change in exogenous agent density, poverty reduced by 0.27 percentage points nationally having a p-value of 0.028
- The coefficients at quintile 1 and 3 are not statistically significant.
- The marginal impact of one percent change in agent density for districts at quintile 4 (the second most poor districts) is 0.43 percentage point reduction in poverty being statistically significant at 5% confidence level with a p-value of 0.013
- The marginal impact of one percent change in agent density for districts at quintile 5 (the poorest districts in the country) is 0.35 percentage point reduction in poverty, which is statistically significant at 10 % confidence level having a p-value of 0.063

Findings: Estimating the effect of change in bKash Transaction on poverty

Instrumental Variable Regression

2-Step GMM estimation			Number of obs	=	63
			F (11, 51)	=	6.53
Total (centered) SS	=	14,170.4	Prob > F	=	0.000
Total (uncentered) SS	=	62,992.8	Centered R-Squared	=	0.4186
Residual SS	=	8,238.8	Uncentered R-Squared	=	0.8692
			Root MSE	=	11.440

poverty_16	Coef.	Robust Std. Error	z	P > |z|	[95% Conf.	Interval]
poverty_10	0.5009	0.2045	2.450	0.014	0.1002	0.9017
bKash	-0.0990	0.1387	-0.710	0.475	-0.3709	0.1729
bKash#qtile						
2	-0.80761	0.44866	-1.800	0.07200	-1.68697	0.07175
3	-0.34697	0.37390	-0.930	0.35300	-1.07981	0.38587
4	-0.31443	0.24224	-1.300	0.19400	-0.78920	0.16034
5	-0.39923	0.36346	-1.100	0.27200	-1.11161	0.31314
Population Density	0.001689	0.004554	0.370	0.711	-0.007236	0.010615
Literacy_D	1.6186020	4.1239640	0.390	0.695	-6.4642190	9.7014230
Secondary_D	-1.042671	3.508109	-0.3	0.766	-7.918438	5.833097
Agriculture_D	8.844649	4.057669	2.18	0.029	0.8917636	16.79753
Primary_D	11.17892	10.09794	1.11	0.268	-8.612682	30.97052
Constant	10.22931	5.831947	1.75	0.079	-1.201095	21.65972

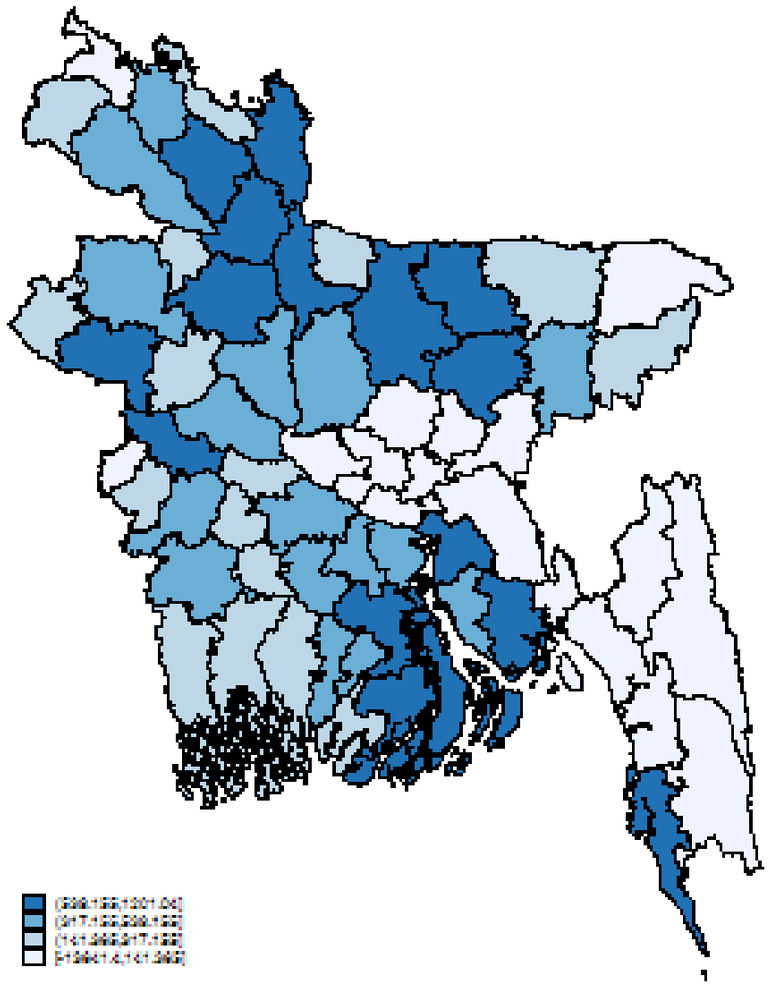
Findings: Marginal Impact of change in bKash transaction on poverty

Poverty_16	OLS	IV
Poverty_10	0.5383808**	0.5009293***
	(2.29)	(2.45)
bKash	-0.3192768	-0.4849947*
	(-1.19)	(-1.69)
bKash at Qtile 1	0.0106833	-0.0990259
	(0.1)	(-0.71)
bKash at Qtile 2	-0.5348736	-0.9066353
	(-1.06)	(-1.56)
bKash at Qtile 3	-0.3185078	-0.4459957
	(-0.73)	(-1.1)
bKash at Qtile 4	-0.3089281	-0.4134565
	(-1.09)	(-1.54)
bKash at Qtile 5	-0.4104859	-0.4982601
	(-0.98)	(-1.29)

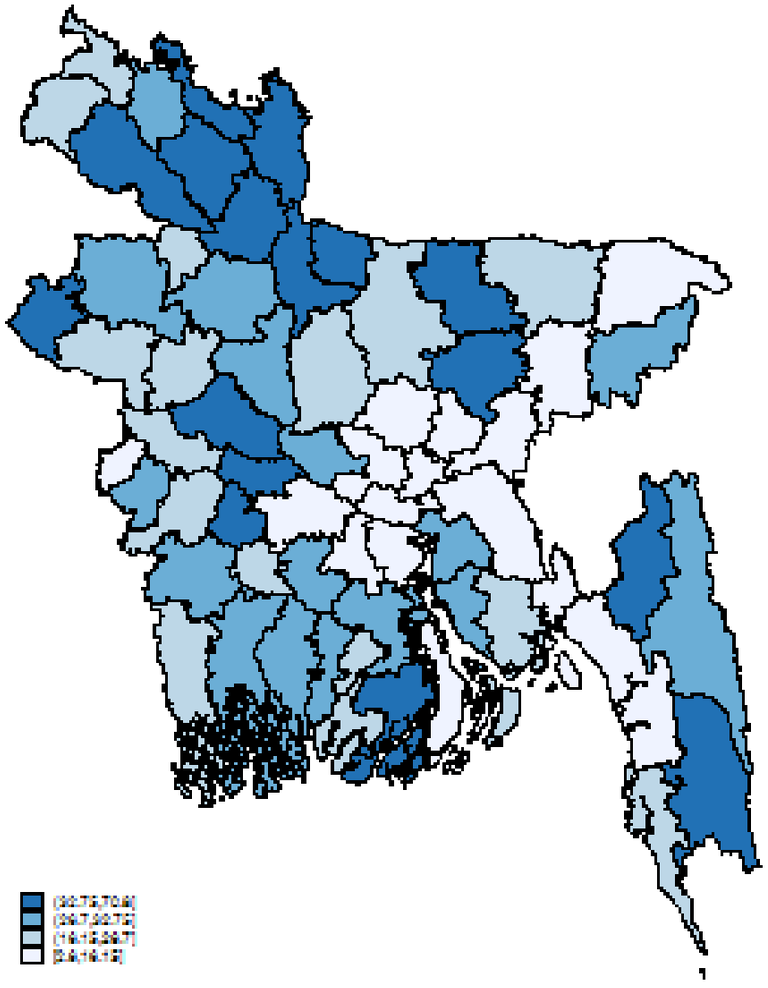
*Standard errors are clustered at the district level; *** p<0.01, ** p<0.05, * p<0.1*
t-statistics are given in the brackets

- For every 1 billion Taka increase in bKash transactions in Bangladesh, it helps reduce poverty by 0.48 percentage points. This estimate is statistically significant at 10% confidence level with a p-value of 0.092
- At each quintile, bKash helps reduce poverty however, the estimates lose statistical significance.
- The IV estimates reveal two important things to us from this study. Firstly, mobile money in general has a negative impact on poverty, i.e. it causes reduction in poverty rates.
- The second important finding is that even with a small sample size, the estimate is statistically significant on a two tailed test at 10% confidence level for the national poverty level

Findings: Net inflow-outflow & Poverty Map



Net inflow-outflow 2016



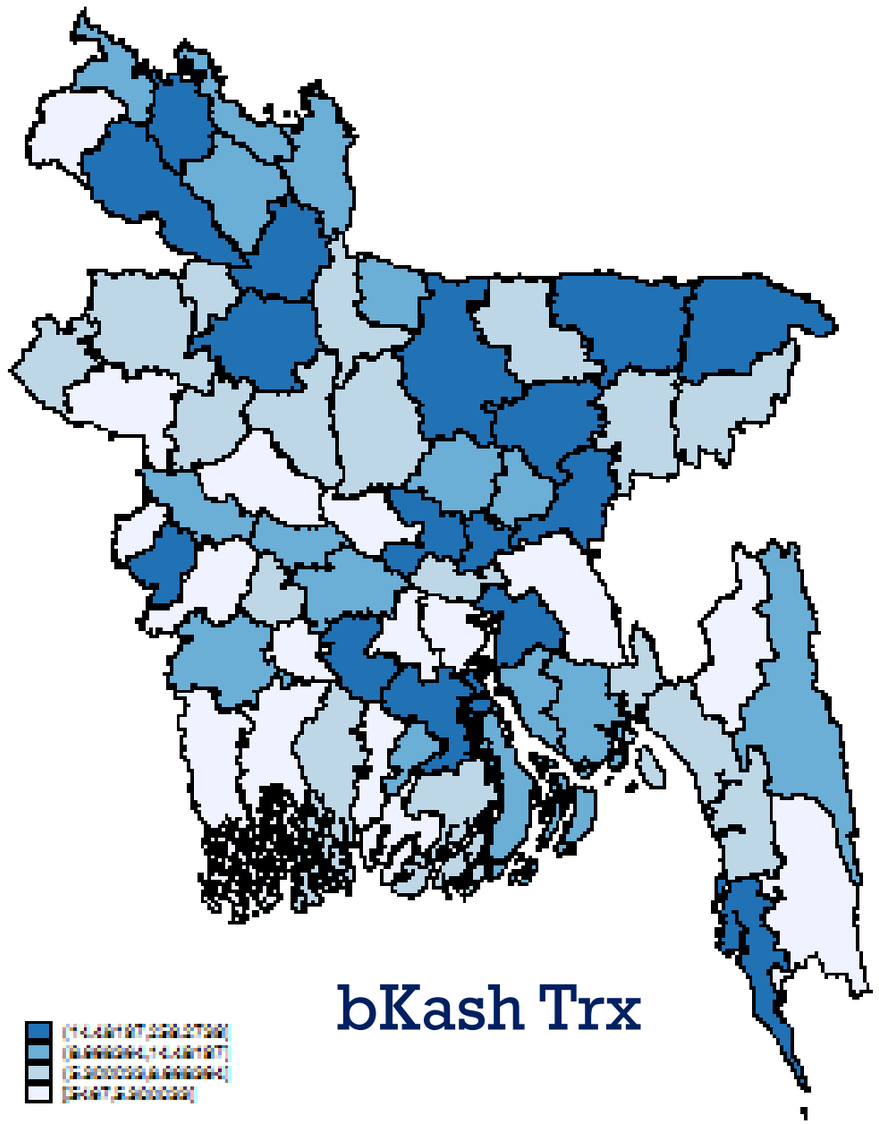
Poverty 2016

Conclusion

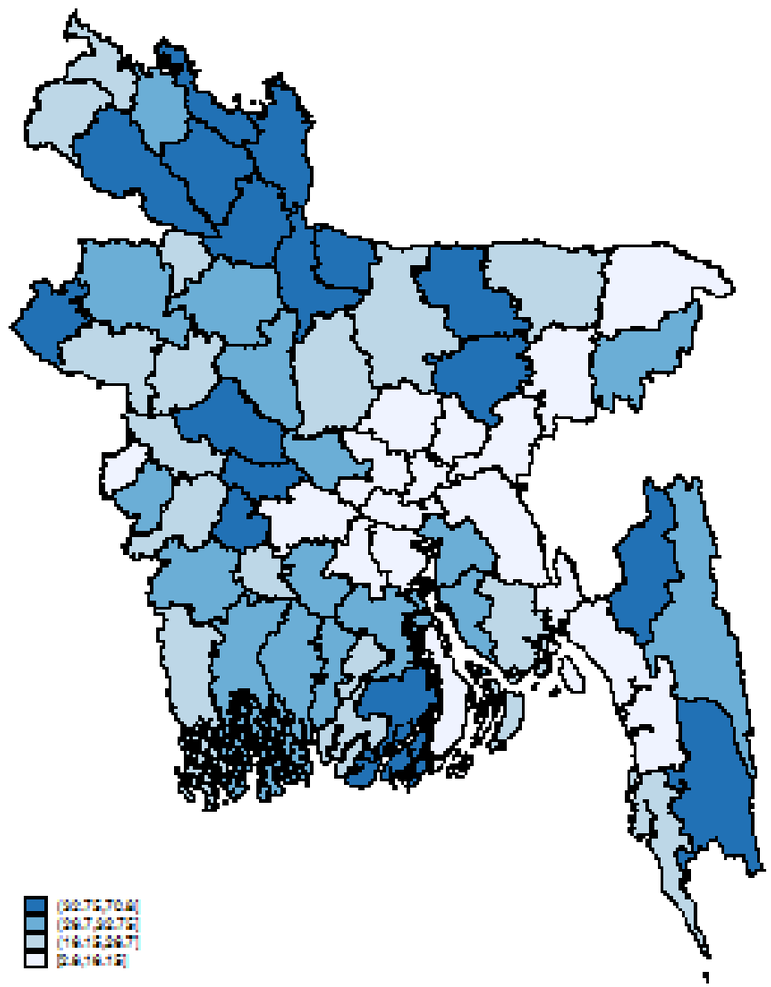
- The estimations of the regressions are consistent about the direction of movement with statistical significance, i.e., Mobile Money helps decrease poverty
- The estimate ranges around 0.27 to 0.48 percentage point decrease (since dependent variable poverty is in percentage)
- Districts which are less poor & more industrialized send local remittances to more poor districts using mobile money.
- 10 districts whose outflow was more than inflow are: Bandarban, Chittagong, Dhaka, Feni, Gazipur, Khagrachari, Narayanganj, Narshingdi, Rangamati & Sylhet.
- During and after each EID there is a rise & fall in the transactions of Mobile Money. This can be used to estimate the size of the Eid economy.
- **Limitations:**
  - The number of observations have been considerably small and does not have multi-period observations. A larger sample size with data about the districts collected over several time periods would have provide more robust estimates.
  - Due to the Lack of proper income or consumption data, we had to use Poverty HCR. Using income or consumption data would provide more intuitive results & interpretation.

THANK YOU

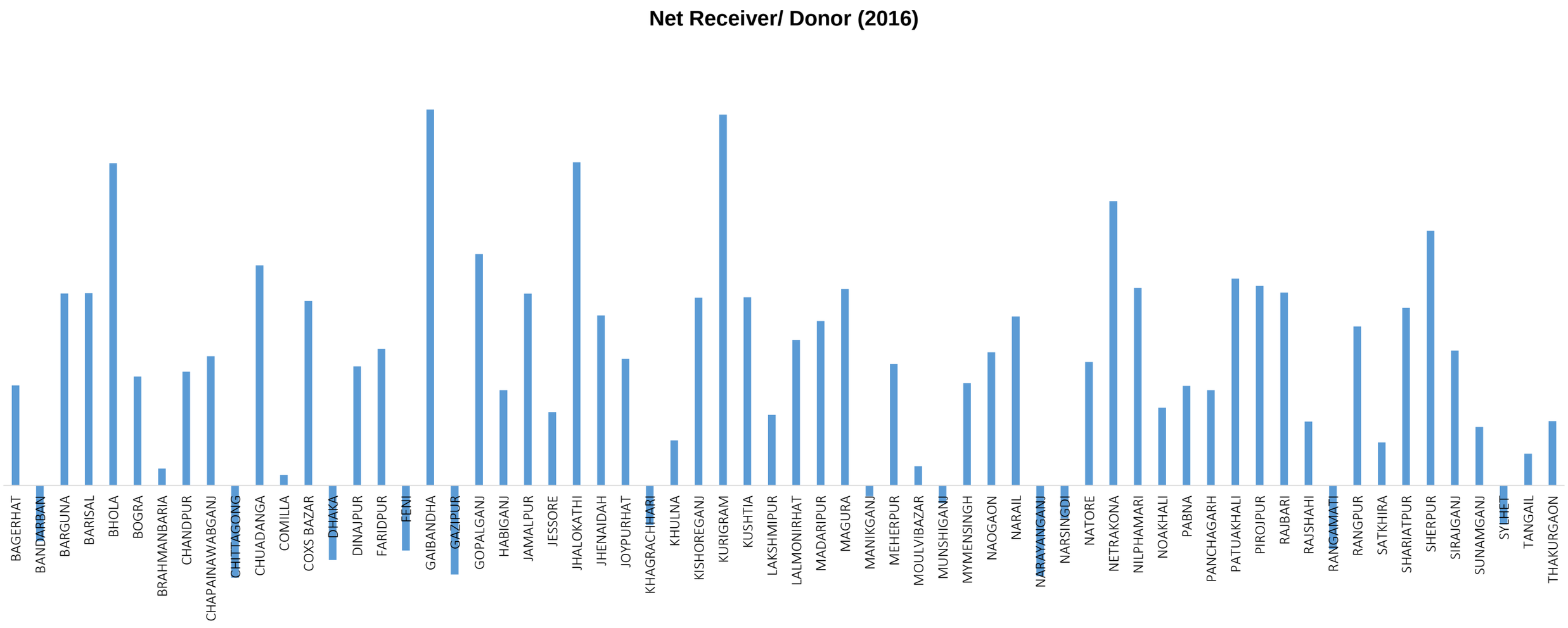
Appendix:



bKash Trx

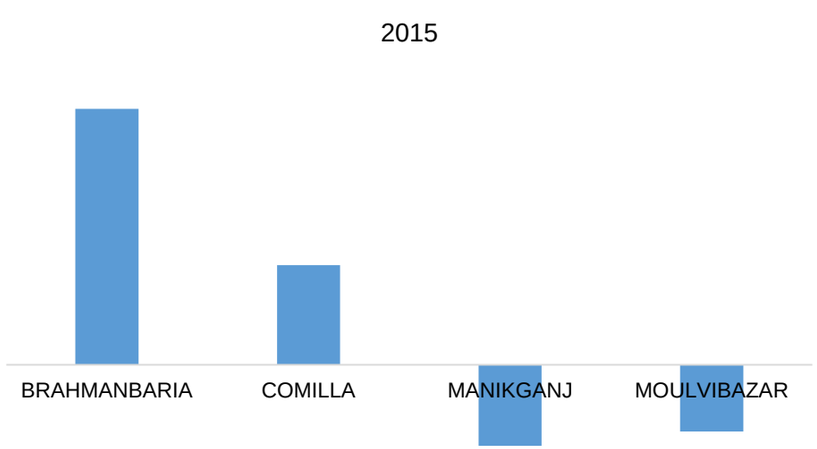


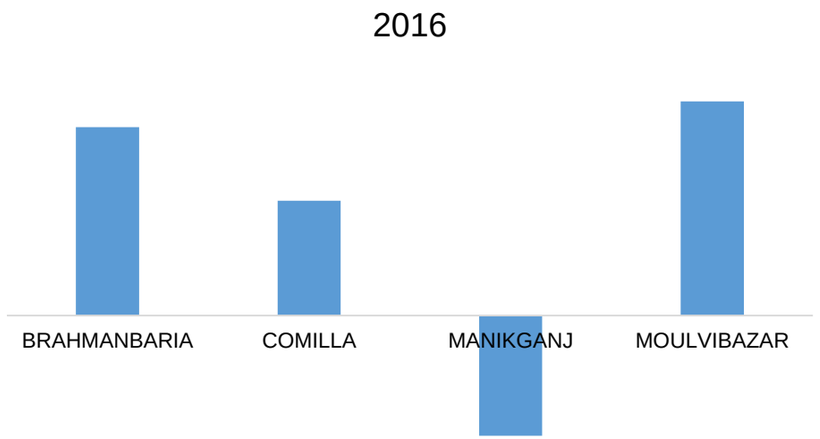
Poverty 2016

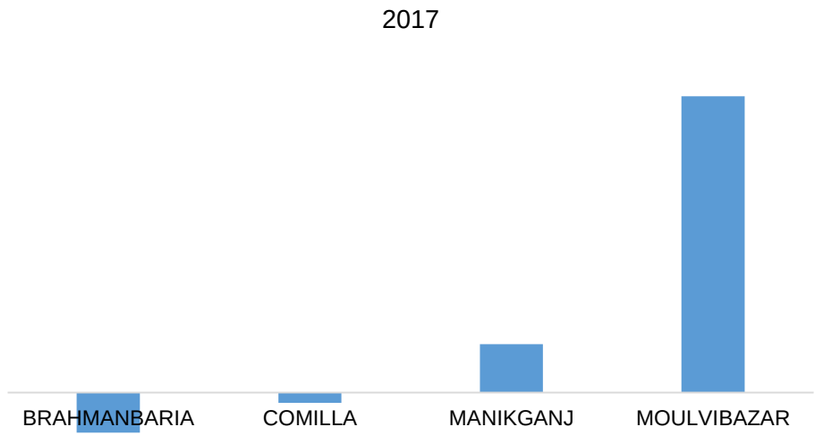


Net Donor districts (12) are Bandarban, Chittagong, Dhaka, Feni, Gazipur, Khagrachari, Manikganj, Narayanganj, Narshingdi, Rangamati and Sylhet.

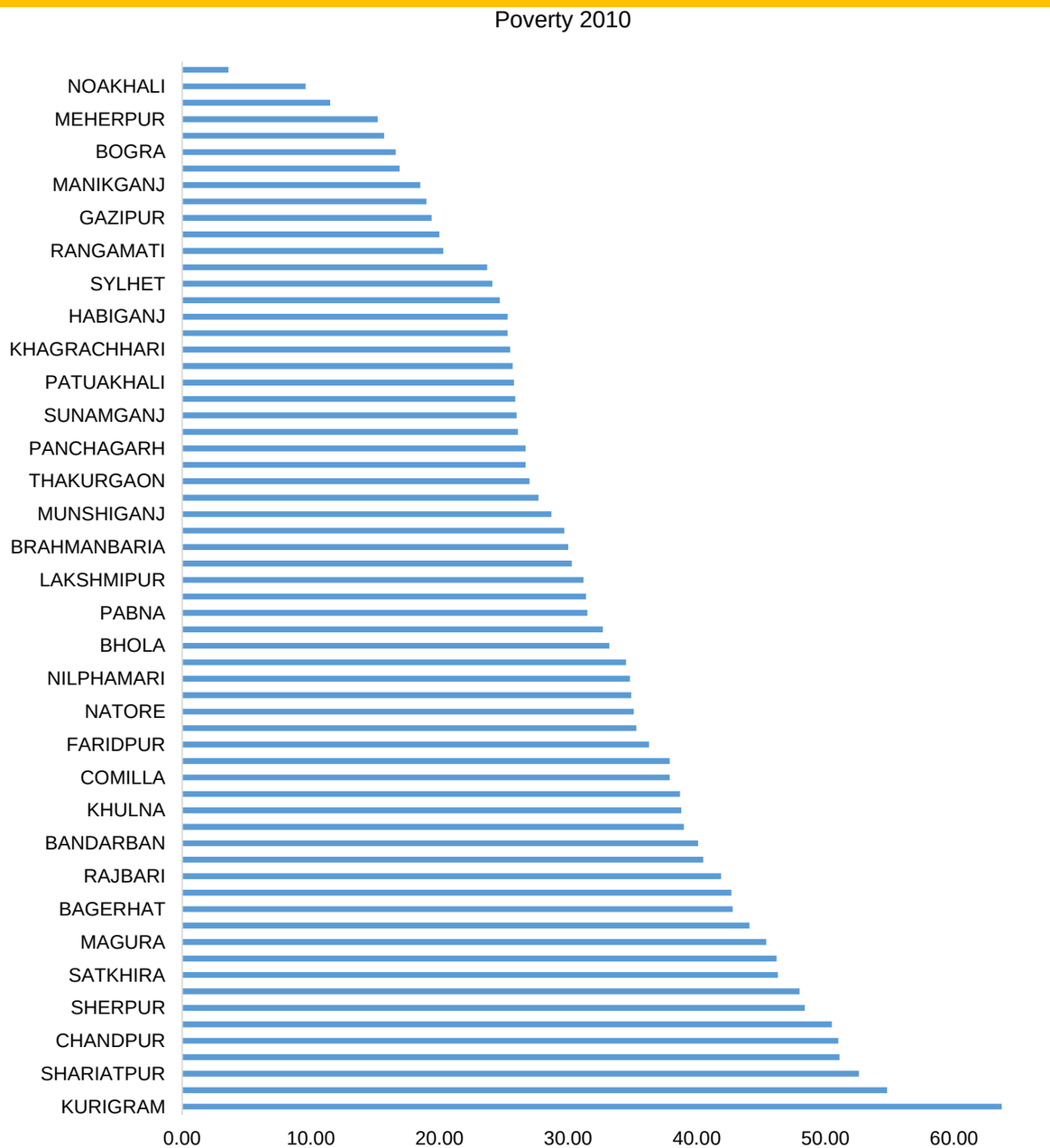
4 Districts changed their behavior pattern. They are Brahmanbaria, Comilla, Manikganj, Moulovibazar

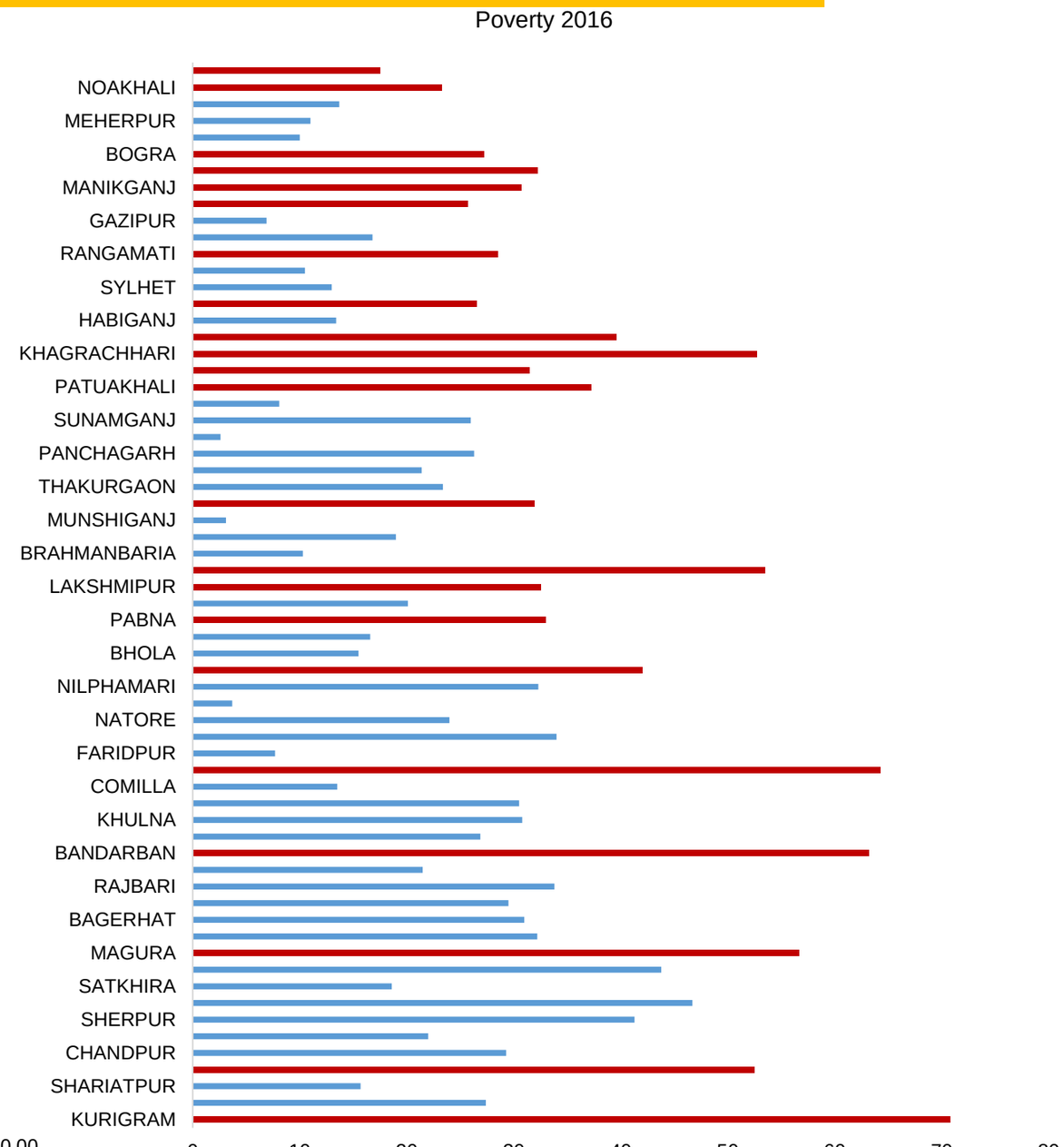

2015
BRAHMANBARIA
COMILLA
MANIKGANJ
MOULVIBAZAR


2016
BRAHMANBARIA
COMILLA
MANIKGANJ
MOULVIBAZAR

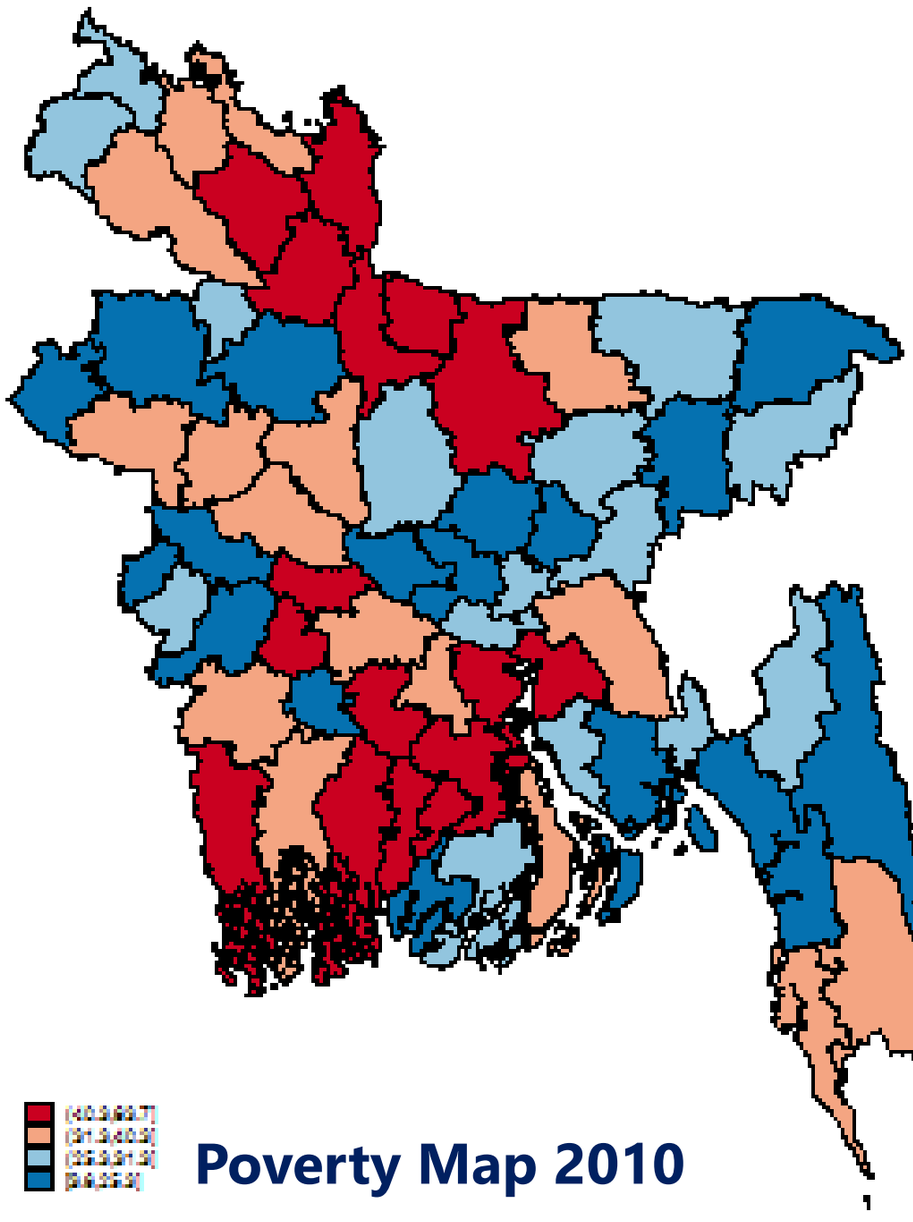

2017
BRAHMANBARIA
COMILLA
MANIKGANJ
MOULVIBAZAR

Appendix: Districts for whom Poverty Increased

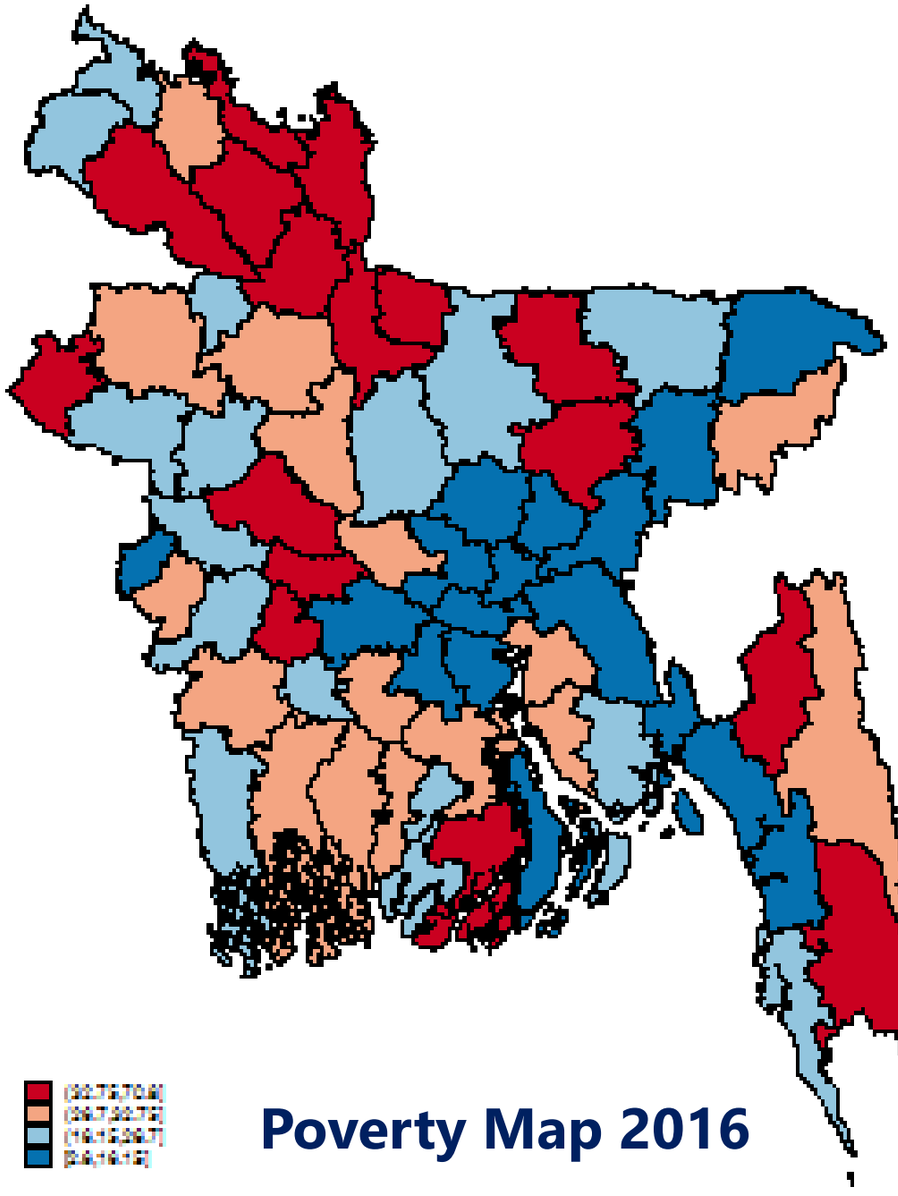




Appendix: Poverty Map (different colour)

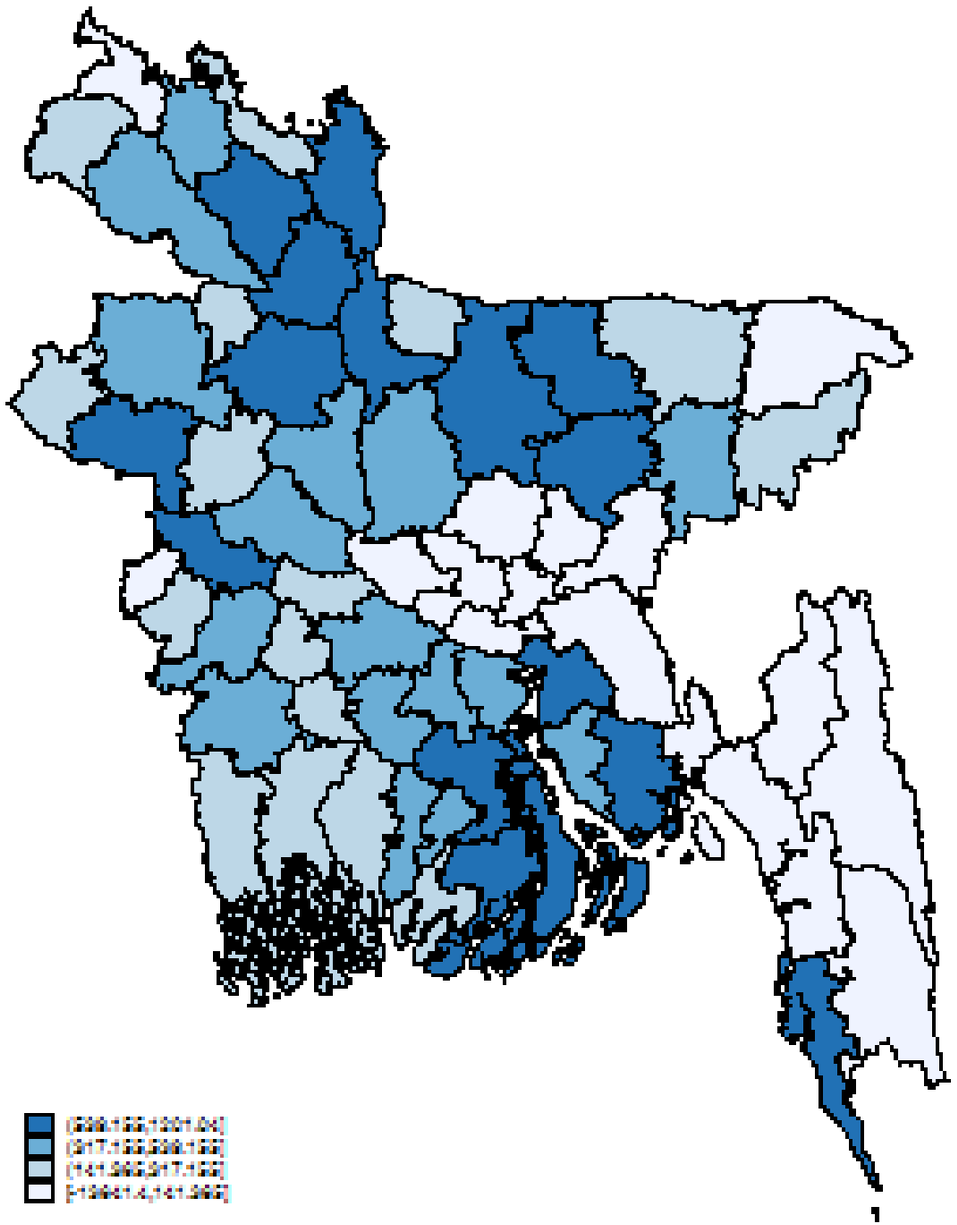


Poverty Map 2010

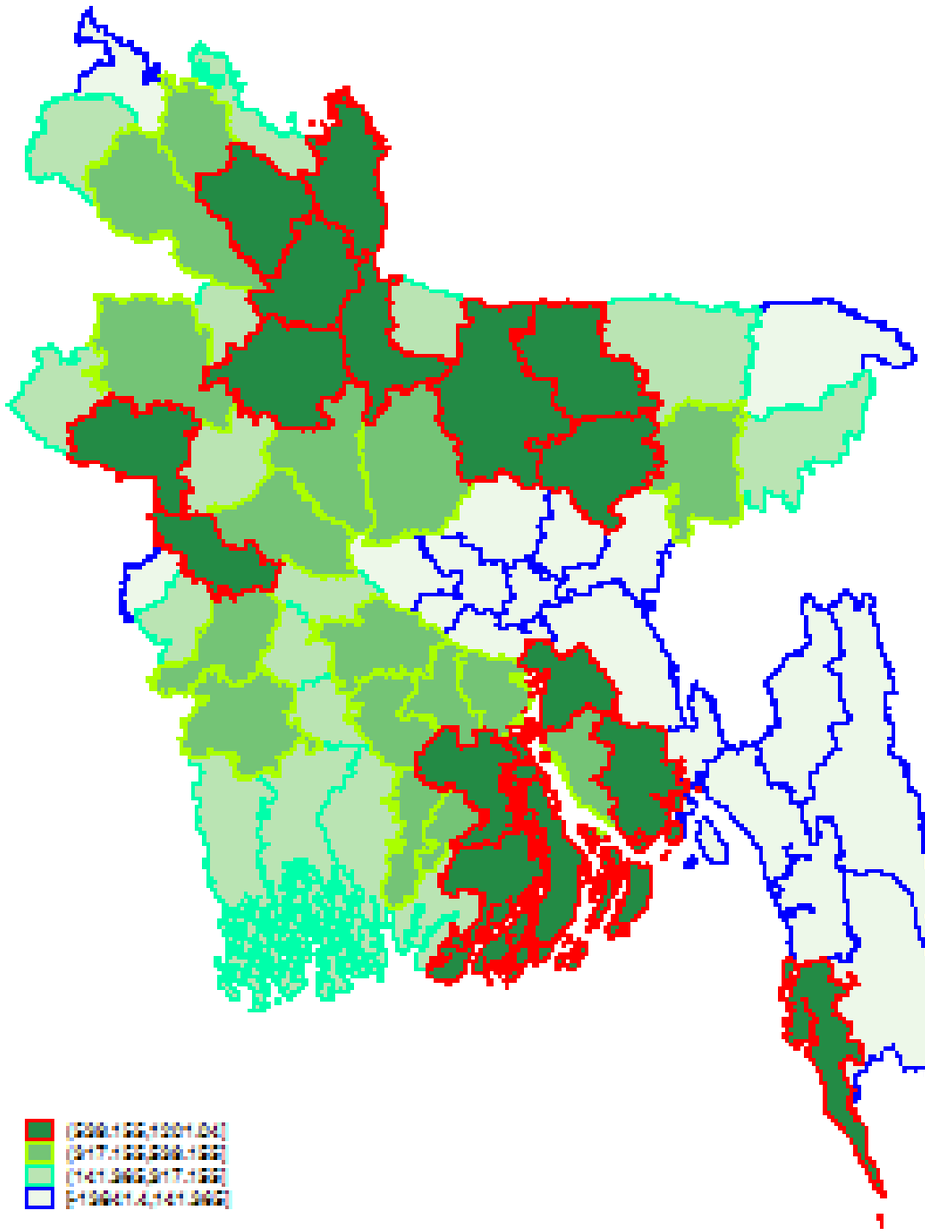


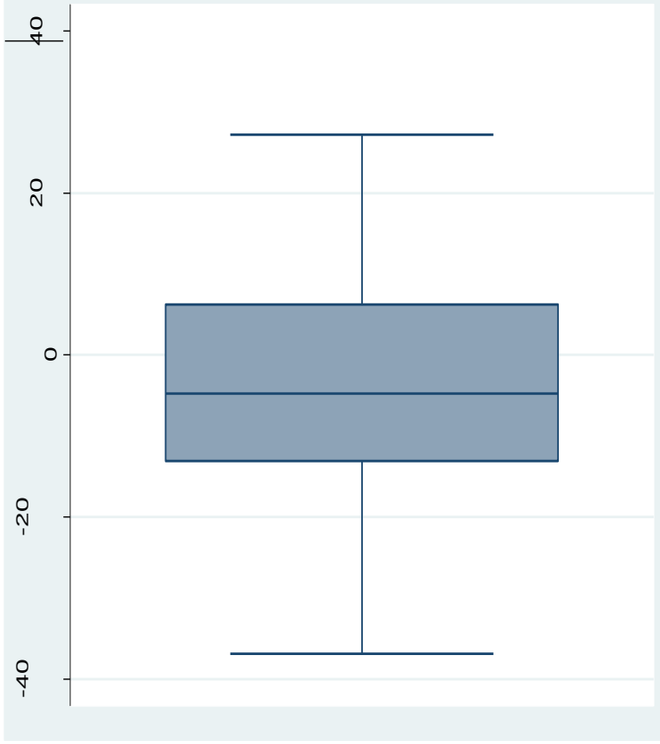
Poverty Map 2016

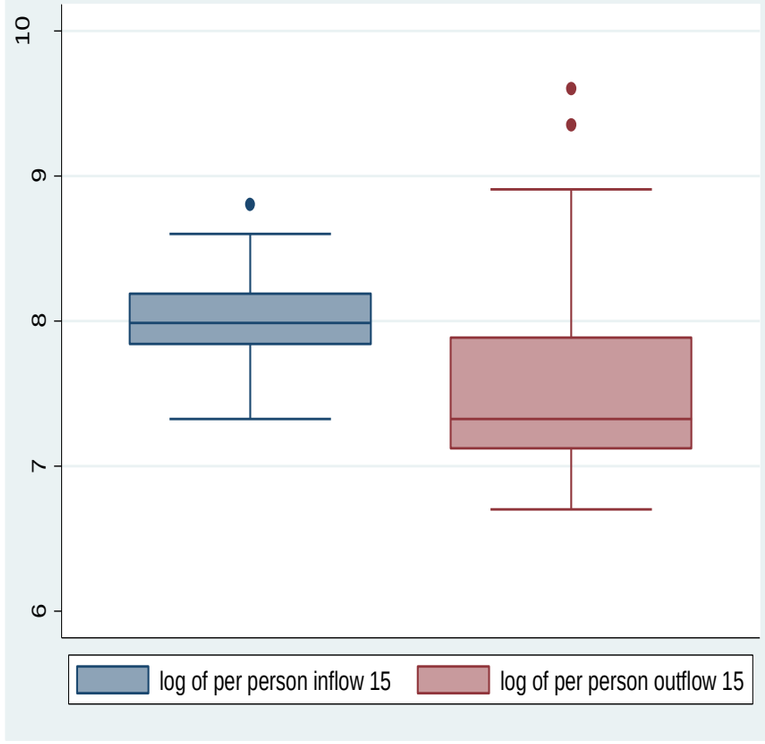
Net Receiver/Donor Map

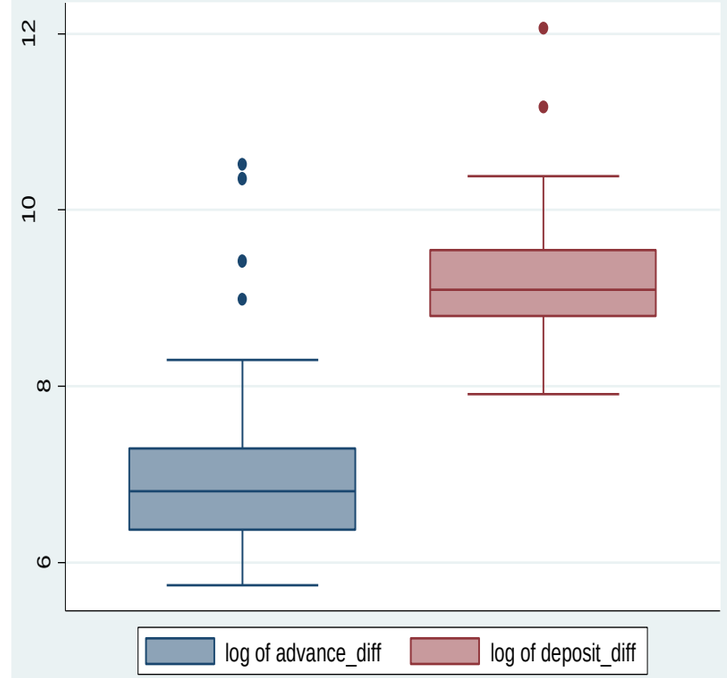


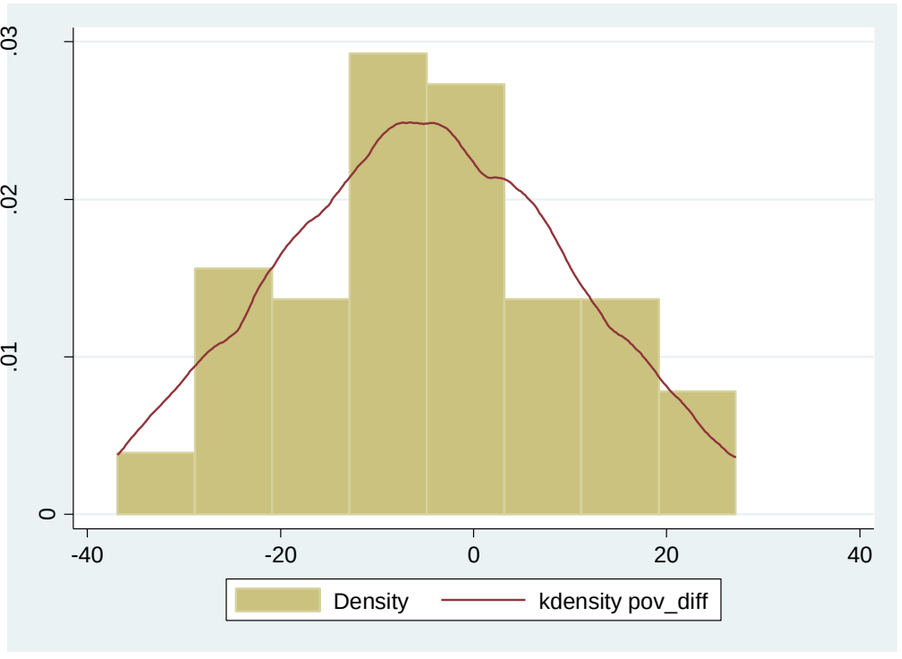
Most Inflow Districts

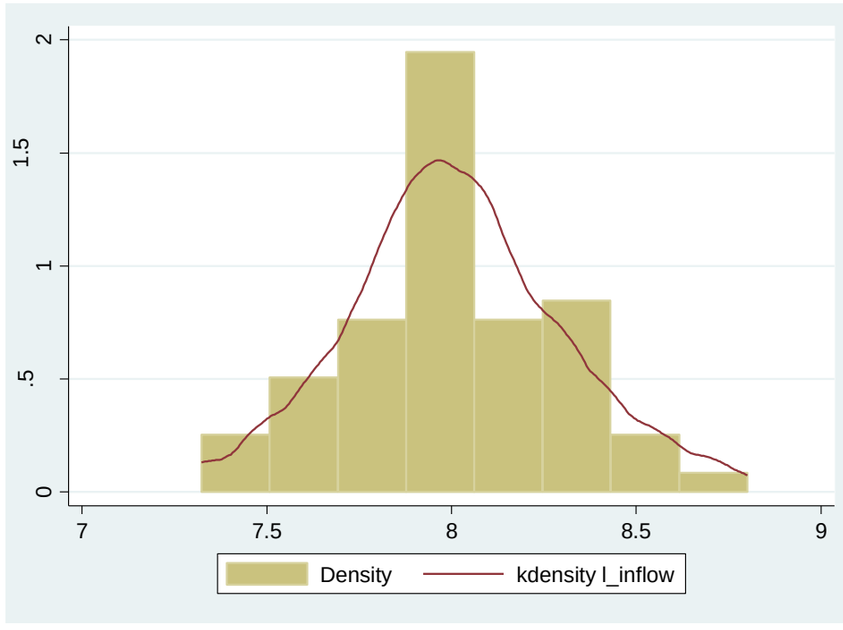


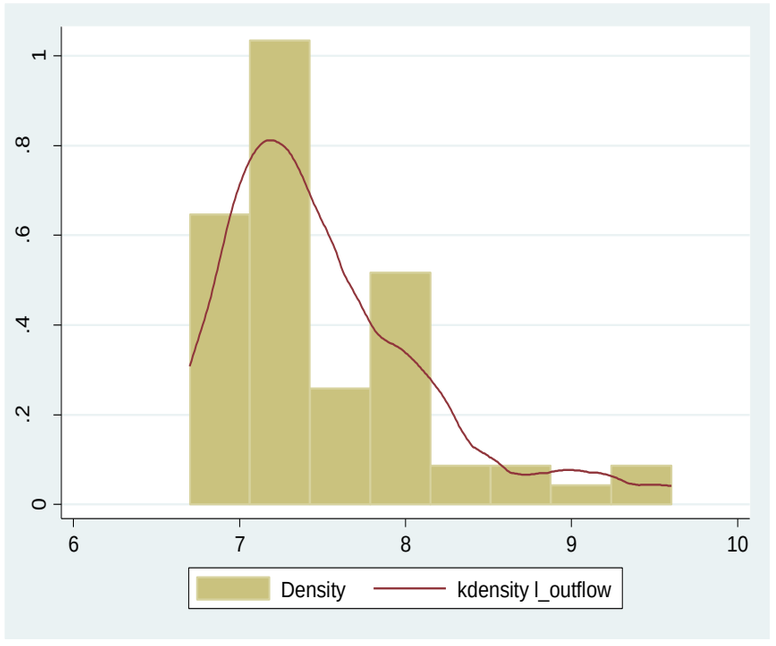

40
20
0
-20
-40


10
9
8
7
6
log of per person inflow 15
log of per person outflow 15


12
10
8
6
log of advance_diff
log of deposit_diff


.03
.02
.01
0
-40
-20
0
20
40
Density
kdensity pov_diff


2
1.5
1
.5
0
7
7.5
8
8.5
9
Density
kdensity l_inflow


1
.8
.6
.4
.2
0
6
7
8
9
10
Density
kdensity l_outflow

District Level Monthly Data (Population Normalized)