Effects of Financial Parameters on Poverty - Using SAS EM

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Abstract

Studies recommend that developing multiple financial establishments and money related markets plays an essential role in deciding the overall economic development of a nation. Economic advancement can be characterized in terms of GDP (Gross domestic product) and decline in poverty gap. At a stage where banks reduce their transaction costs, investors are encouraged to put resources into innovation and trade which enhances the macro level economic development. However, if financial institutions perform inadequately, it prevents the overall economic development of the country and thus increases the poverty inequality.

This paper attempts to provide insights into how financial parameters like domestic credit to private sector, stock market capitalization to GDP, turnover ratio of stock market, GDP, net interest margin etc. can affect the poverty inequality.

The primary objective is to understand how different financial parameters effect the poverty inequality of a nation and which financial parameters are significant.

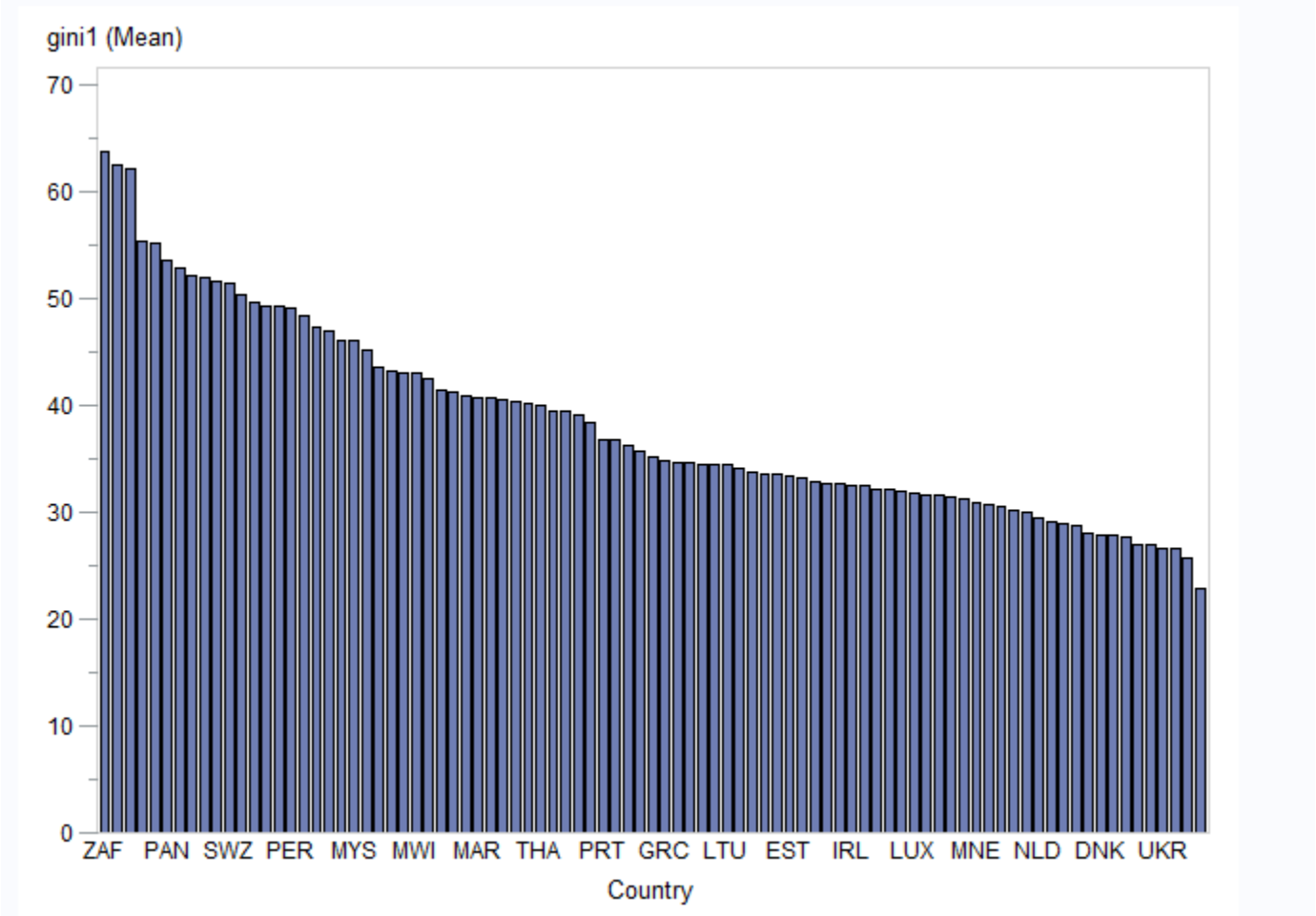
Introduction:

Financial parameters play a crucial role in determining how good an economy is. However, economic development does not necessarily mean that a country is well off. With high economic development, poverty inequality may increase. It may happen that, economic development could favor only the rich and, hence, increases the poverty inequality.

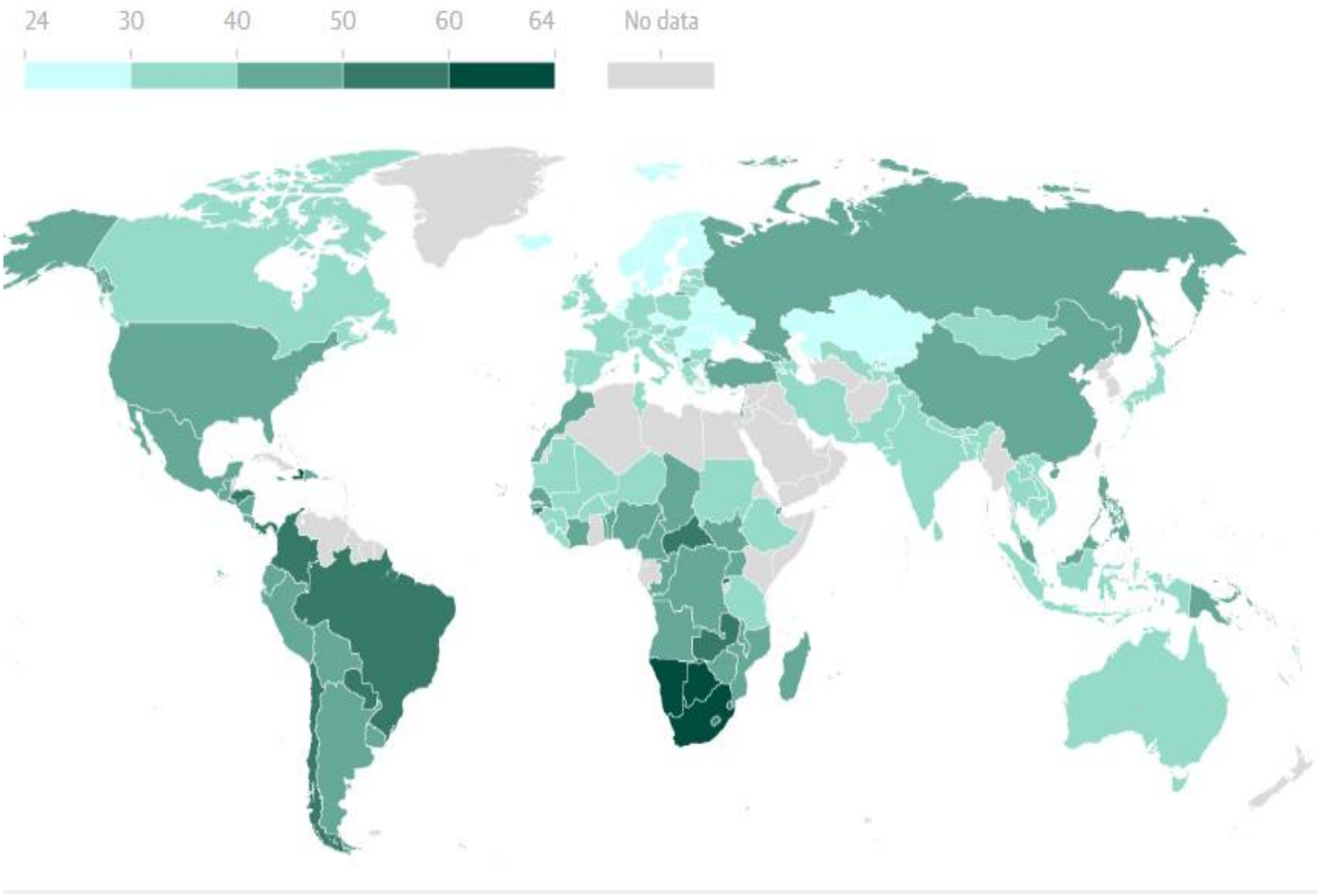
For instance, if banks only loan to high income people, it demotivates potential individuals to start their own venture and can increase the poverty gap, thus having a negative impact on GDP.

Financial parameters from the World Bank Repository were taken to study the effect on Gini Coefficient, which is our target variable. It is scaled from 0 to 100, 0 representing perfect equality where everyone is earning the same level of income and 100 representing inequality where there is large gap between rich and poor.

The below graph shows variation of average Gini across various countries. South Africa has the highest Gini coefficient. This indicates that there is high poverty gap between the citizens of South Africa. On the other hand, Azerbaijan has the lowest Gini index depicting that there is a small poverty gap in Azerbaijan.



Gini Index across various countries



Guardian graphic | Source: World Bank estimate. Map shows most recent Gini index estimates for 140 countries

Data and methodology:

The data set to be analyzed is from World Bank Repository which contains 115 different financial variables for 265 different nations. The data is a panel time series spread across different nations.

Data was available from 1960 to 2014. Below are the example for the list of the variables.

GDP –Per Capita
Stock Market Capitalization(% to GDP)
Stock turnover ratio
Bank Branches per 1000 adults.
Private Credit to GDP
Net Interest Margin by the banks
Stock Total Value Traded
Bank Cost to Income ratio

Above list is not exhaustive. It only contains the list of the variables, which can effect GINI based on literature review.

Data Review (Cleaning/validation)

The original data was structured with a row for each parameter and repeated for each country. Columns consisted of the actual value for each year from 1960-2014. Refer Appendix 1 for the entire data.

The data in its original structure had some major challenges -

- The data was not fit for analysis and modelling
- There were large number of missing values and no imputation technique was appropriate for it.

To overcome these problems, data was transposed by country and the resulting data had multiple rows for each country for each individual year. Transpose function was performed on each predictor variable and year. Refer Appendix 2 for cleansed data.

The target variable, Gini Coefficient, was also extracted from World Bank repository. The structure of Gini coefficient data set was similar to that of predictor data set. Similar transpose function was performed on this data set and the resulting data set was then merged with predictor data set.

The new structure contained 115 financial variables for each of the 221 countries for each year. We only considered those variables that could affect the GINI coefficient based on the literature review. However, there were lot of missing values prior to 2000 for many countries. Because of this, only data from 2000 to 2014 were considered for analysis.

Countries that had more than 50% of the values missing were eliminated from the analysis. Any remaining missing values in variables were then imputed with the median value. Because of the unique nature of the

target variable, if a missing value occurred within the GINI coefficient variable, it was imputed as the median GINI coefficient within the particular country. Appendix 3 contains an example of the resulting data.

Data Analysis:

The objective of this paper was to find the effect of financial parameters on GINI coefficient. Max normalization transformation was performed on the input variables to normalize the values.

The data was split into 70% training and 30% validation using data partition node in SAS Enterprise Miner. Refer Appendix 4.

Since our target variable was a continuous variable, Linear Regression and Decision Tree analysis was performed for modeling.

Linear Regression:

Linear regression was performed with a stepwise method to analyze the effect of variables.

Following were the effects of variables observed on Gini with the estimate:

Variable	Estimate	Significance(5 Percent)
GDP-Per Capita	Negative	Significant
Private Credit to GDP	Negative	Significant
Net Interest Margin	Positive	Significant
Stock Market Capitalization(% to GDP)	Positive	Significant
Turnover Ratio	Negative	Significant
Bank Branches per 1000	Negative	Significant

Decision tree:

A decision tree analysis was performed to examine the importance and the effect of the variables. The following were the results observed:

Variable	Importance
GDP-Per Capita	1.0
Stock Market Capitalization(% to GDP)	0.654
Turnover ratio	0.423
Net Interest Margin	0.306
Private Credit to GDP	0.209
Bank Branches per 1000	0.370

Results:

From the regression analysis, we could see that increasing numbers of bank branches per 1,000 adults had a negative effect on the GINI. Countries with more access to bank branches are able to deposit money or could avail loans from banks to start their own venture or business thus decreasing poverty Inequality.

GDP, which is a strong indicator for the economy also had a negative effect on the GINI. With increase in GDP, poverty inequality decreases.

The coefficient for net interest margin was significant. A higher net interest margin reflects higher inefficiency. This means that interest paid to the lenders or depositors were less hence increasing the GINI coefficient.

Stock market Capitalization has a positive effect on GINI. Therefore stock market size increases inequality.

Also Turnover ratio has a negative effect on GINI. Turnover ratio is a measure of stock liquidity. Thus higher stock liquidity tends to lower the inequality.

Conclusions

All the variables that were found to be significant could be divided into the following features-

- Depth: Financial depth is the measure of overall extent of services provided by the financial systems. Stock market capitalization and private credit to GDP can be used to measure the depth of financial institutions.
- Access: Financial access provides the breadth of use of financial institutions. Bank branches per 1,000 adults could be used to measure the financial access.
- Efficiency: Net Interest margin could be used to measure the efficiency of the financial institutions. Efficiency would determine how a particular financial institution is working.

Thus, to decrease the poverty inequality, these parameters need to be regulated and monitored to make the process more efficient.

Acknowledgement

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References

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- Benchmarking financial system around the world http://documents.worldbank.org/curated/en/868131468326381955/pdf/wps6175.pdf
- Financial Development, Inequality and Poverty: Some International Evidence: https://www.imf.org/external/pubs/ft/wp/2016/wp1632.pdf

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Appendix:

Appendix 1:

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	Country Code	Indicator Name	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973
35	EAP	Credit card (% age 15+)														
36	EAP	Credit to government and state owned enterprises to GDP (%)														
37	EAP	Debit card (% age 15+)														
38	EAP	Deposit money bank assets to deposit money bank assets and central bank assets (%)	65.293	75.13	79.29469	81.0711	84.87453	86.97738	88.13225	92.59494	92.482315	85.72025	84.83192	86.343965	80.29389	81.887
39	EAP	Deposit money banks' assets to GDP (%)	9.7283	12.45	12.465225	11.24532	12.67635	16.83123	17.79557	21.46428	24.09297	24.69446	23.33765	22.69213	23.4126	20.888
40	EAP	Depositing/withdrawing at least once in a typical month (% age 15+)														
41	EAP	Domestic credit to private sector (% of GDP)	9.5188	11.26	11.9844	11.869	11.1885	12.3646	13.1975	14.3925	15.8308	16.8778	19.3227	19.9801	20.9823	19.785
42	EAP	Electronic payments used to make payments (% age 15+)														
43	EAP	External loans and deposits of reporting banks vis-à-vis the banking sector (% of domestic bank deposits)														
44	EAP	Financial system deposits to GDP (%)	13.129	15.19	16.4921	15.72276	16.17658	16.59023	17.009965	19.321355	21.63278	23.59677	21.36459	24.10313	25.28868	20.486
45	EAP	Firms identifying access to finance as a major constraint (%)														
46	EAP	Firms not needing a loan (%)														
47	EAP	Firms using banks to finance investments (%)														
48	EAP	Firms using banks to finance working capital (%)														
49	EAP	Firms whose recent loan application was rejected (%)														
50	EAP	Firms with a bank loan or line of credit (%)														
51	EAP	Firms with a checking or savings account (%)														
52	EAP	Foreign bank assets among total bank assets (%)														
53	EAP	Foreign banks among total banks (%)														
54	EAP	GDP (Current USD)	8E+10	7E+10	64640970472	69454897958	80750834780	94666443768	1.03276E+11	99816226660	1.00973E+11	1.1361E+11	1.26911E+11	1.36089E+11	1.51967E+11	1.97329E+
55	EAP	GDP per capita (Constant 2005 USD)	168.26	147.6	144.5293309	151.1364005	162.6972176	175.0482027	184.83367	178.9111376	178.3518173	191.8630402	212.8589059	219.6783652	226.2017148	241.012805
56	EAP	Global leasing volume to GDP (%)														
57	EAP	GNI (Current USD)	8E+10	7E+10	63554382049	68265375384	79162299220	92954062418	1.0144E+11	98138356486	99149028925	1.11576E+11	1.2454E+11	1.33648E+11	1.48036E+11	1.93589E+

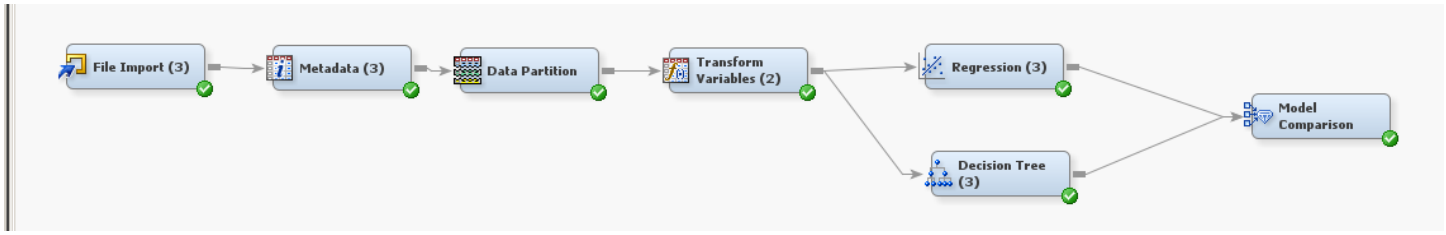
Appendix 2:

Country	year	ATMs per 100,000 adults	Bank_acc_100_person	Bank branches per 100,000 adults	Bank capital to total assets (%)	Bank concentration (%)	Bank cost to income ratio (%)	Bank credit t	Bank deposit	Bank lending	Bank net int	Bank nonint	Bank nonper	Bank overhe	Bank regulat	Bank return
AFG	2001															
AFG	2002															
AFG	2003															
AFG	2004	0,01644589		0,38647849			95,08311					43,88185				
AFG	2005	0,06348151		0,61894475		100	25,1282				9,798076	47,17949		7,692496		2,014344
AFG	2006	0,12307406		0,97690037		97,32105	61,60965	52,90562	8,861485		9,864671	39,05354		7,556132		1,647353
AFG	2007	0,21686578		1,3011947		89,18444	81,58277	56,81044	8,632092		8,214653	20,91218		7,62319		-0,4686672
AFG	2008	0,31292431	38,021832	1,5427896		92,71614	58,7023	59,87447	13,85904		10,3925	14,41298		5,496035		2,143443
AFG	2009	0,46672763	90,909562	2,3124233		73,06372	51,12392	58,23796	15,22389		11,03385	21,3169		6,039319		1,238361
AFG	2010	0,54810844	109,72213	2,4733393		59,73807	58,1288	59,41105	16,55383		5,590614	42,79649		8,479		0,7667747
AFG	2011	0,64186491	145,33079	2,3093903		66,5181	80,15118	42,89812	16,0926		6,449511	29,5158		4,52654		-0,6196613
AFG	2012	0,66951048	174,63352	2,2444542		64,20782	57,49844	24,51432	16,19284		5,896334	48,52435		4,182619		0,3351558
AFG	2013	0,74812891	165,27143	2,3915596		58,26855	75,2291	23,33253	16,86482		6,367546	41,22617		3,834881		0,5274844
AFG	2014	0,80208154	184,87708	2,4652212			60,34903	22,61515	17,37654		2,848517	37,86526		1,327455		0,1803268
AGO	2001					99,34298	45,14198	18,10695	11,08377	48,0578	7,475226	62,84639		10,58132		2,078119
AGO	2002					86,30695	40,09151	24,30992	11,31326	48,645	4,4407	67,41757		4,093633		1,435228
AGO	2003					84,19553	35,04311	31,53368	11,58034	69,0425	6,253756	69,14481		5,743696		2,477343
AGO	2004	1,018057	0,43944131	2,1558854		85,65129	37,08477	40,48317	10,39152	66,8948	6,991182	61,75902		5,215157		2,350725
AGO	2005	1,7361316	16,387161	2,6736426		77,1119	51,20941	42,20923	9,809109	54,3196	7,560606	50,84054		5,944627		2,651338
AGO	2006	3,6373273	25,294401	4,0402313		78,51916	49,74901	46,20543	11,83947	15,0105	5,684051	57,82064		5,397092		2,746511
AGO	2007	5,2831024	33,01977	4,6443667		76,42928	47,3362	56,86179	14,25728	10,0424	6,717704	43,67841		4,523253		3,147941

Appendix 3:

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y
1	Country	year	IMP_ATM:	IMP_Bank	IMP_Bank	IMP_Bank	IMP_Bank	IMP_Bank	IMP_Boor	IMP_Cons	IMP_Cred	IMP_Depc	IMP_Depc	IMP_Dom	IMP_Exte	IMP_Finar	IMP_Fore	IMP_GDP	IMP_GDP	IMP_GNI	IMP_Lern	IMP_Life	IMP_Liqui	IMP_Liqui	IMP_Loan
2	ARG	2001	27.18872	4.966029	12.35387	11.5418	9.477569	1	-0.08423	27.4909	11.0351	86.42957	33.14071	20.8336	7.603072	26.48931	37	5103.67	2.7E+11	2.6E+11	0.150468	1.13765	12.37748	90664.61	33.55493
3	ARG	2002	27.18872	0.464132	12.35387	12.4303	4.202601	1	0.093013	38.792	30.0964	74.33589	36.01212	15.3319	22.74289	21.61391	34	4497.49	9.8E+10	9.1E+10	-0.08495	1.16851	12.65004	31875.77	93.35733
4	ARG	2003	27.18872	2.701028	12.35387	8.98555	4.199222	1	-0.5701	27.6436	25.2529	69.7431	36.73464	10.7627	14.08194	20.98743	35	4841.27	1.3E+11	1.2E+11	-0.62318	0.70152	19.06316	46345.98	74.3019
5	ARG	2004	21.78252	3.965066	13.45527	4.16161	3.926205	0	-0.13251	16.8618	19.2721	68.92755	26.52075	8.76612	10.32716	17.77382	33	5221.27	1.8E+11	1.7E+11	0.084818	0.711986	18.37437	53534.21	51.23079
6	ARG	2005	22.90072	4.79938	13.23965	2.40092	4.230773	0	-0.11474	12.3282	15.5549	71.96016	24.00283	9.58826	6.065379	17.55417	32	5640.85	2.2E+11	2.1E+11	0.23028	0.816104	17.25006	61799.3	26.15009
7	ARG	2006	25.51903	5.468147	13.24133	2.20554	4.730809	0	-0.13674	13.0982	10.9563	75.04852	20.56135	10.545	4.878365	16.75467	32	6050.96	2.6E+11	2.6E+11	0.229494	0.693056	36.46976	71807.78	23.13542
8	ARG	2007	28.66643	5.329198	13.18854	3.0804	4.936092	0	-0.08145	11.3573	8.07823	76.43572	17.87494	11.4365	5.277081	16.11188	32	6465.75	3.3E+11	3.2E+11	0.247647	0.688757	34.22757	83510.1	19.24313
9	ARG	2008	33.14157	5.198202	13.13093	8.41883	5.591782	0	-0.1374	8.68774	6.79748	76.58596	16.32959	11.0263	3.706207	14.80671	33	6596.58	4E+11	4E+11	0.17937	0.608516	34.35096	82119.73	12.7081
10	ARG	2009	37.12462	5.82499	13.00563	4.05096	5.934482	0	-0.14767	9.11121	8.04754	74.41846	17.23416	10.9772	3.540741	15.14569	33	6532.46	3.8E+11	3.7E+11	0.26607	0.480401	37.93144	85047.48	13.41563
11	ARG	2010	42.22139	5.9137	13.02645	1.39066	6.409518	0	-0.14465	8.52489	8.45377	72.23399	17.14266	11.6452	2.88817	14.88906	33	7076.3	4.6E+11	4.5E+11	0.297319	0.394787	34.02722	106564.7	11.05645
12	ARG	2011	47.91404	5.787999	13.15217	3.40833	7.306188	0	-0.1562	8.62237	6.8806	70.02474	17.55271	13.2029	2.342982	14.89121	33	7590.07	5.6E+11	5.5E+11	0.298343	0.414613	30.65449	120427.5	9.165961
13	ARG	2012	51.37249	6.178026	13.2569	2.03734	7.611967	0	-0.14804	7.85243	6.88541	65.7594	18.65864	14.5106	2.639862	16.04104	32	7571.03	6E+11	5.9E+11	0.298559	0.48746	35.02299	139626.1	8.401028
14	ARG	2013	56.75402	6.283536	13.30162	2.29221	7.173565	0	-0.15259	6.92764	6.5593	61.17289	19.22658	15.4615	2.354638	17.02301	32	7708.34	6.1E+11	6E+11	0.294055	0.412765	34.26596	131631.8	8.551336
15	ARG	2014	59.44995	6.900649	13.30382	3.59148	7.199092	0	-0.16331	7.7161	8.88238	57.57243	21.16288	14.3029	2.020232	18.22153	39	7663.73	5.4E+11	5.3E+11	0.284564	0.418313	41.28433	129626.2	9.326527
16	ARM	2001	27.18872	6.181978	12.35387	11.7858	4.405291	0	-0.12	2.50189	2.53337	91.74426	10.18494	7.57305	107.1231	7.931726	36	986.344	2.1E+09	2.2E+09	0.273641	0.446074	54.54792	349.1763	1.32171
17	ARM	2002	27.18872	8.809604	12.35387	11.5382	3.617105	0	-0.13257	1.72536	2.5647	94.18098	8.935061	6.77653	120.2196	7.875891	38	1121.09	2.4E+09	2.5E+09	0.348888	0.446074	66.39929	438.9229	0.715387
18	ARM	2003	27.18872	7.861958	12.35387	13.9545	3.968612	0	-0.10244	1.67433	2.24708	97.68868	7.767591	5.68231	129.0221	8.034838	38	1283.06	2.8E+09	2.9E+09	0.411464	0.446074	74.39841	491.2867	0.463118
19	ARM	2004	3.029049	9.923526	10.79365	13.7373	4.277384	0	-0.12004	1.95716	2.10633	96.72779	7.880921	6.99065	109.7656	8.634981	43	1422.26	3.6E+09	3.7E+09	0.448809	0.446074	71.05918	677.8696	0.587147
20	ARM	2005	4.926592	12.39652	12.23154	12.1711	6.322372	0	-0.11327	3.24459	2.03903	96.00355	8.838818	8.04804	78.14463	9.113571	50	1625.41	4.9E+09	5.1E+09	0.421029	0.446074	53.47186	904.3351	1.326412

Appendix 4:



Appendix 5:

Data Role=TRAIN

Variable	Role	Mean	Standard Deviation	Non Missing	Missing
ATMs_per_100_000_adults	INPUT	38.66973	42.55593	1952	876
Bank_Z_score	INPUT	11.48421	7.92245	2586	242
Bank_acc_100_person	INPUT	491.6009	520.5083	1080	1748
Bank_branches_per_100_000_adults	INPUT	19.27699	25.8136	2109	719
Bank_lending_deposit_spread	INPUT	7.996964	6.40012	1995	833
Bank_noninterest_income_to_total	INPUT	37.51742	13.70277	2579	249
Bank_nonperforming_loans_to_gros	INPUT	6.7623	6.764894	1678	1150
Bank_overhead_costs_to_total_ass	INPUT	3.842574	3.432335	2567	261
Bank_regulatory_capital_to_risk_	INPUT	16.29206	4.850516	1695	1133
Banking_crisis_dummy__1_banking	INPUT	0.057544	0.232935	2068	760
Boone_indicator	INPUT	-0.07204	0.143378	2388	440
Checks_used_to_make_payments___	INPUT	7.718323	12.61234	160	2668
Consolidated_foreign_claims_of_B	INPUT	50.49487	115.8836	2622	206
Corporate_bond_average_maturity	INPUT	7.999069	3.240687	1015	1813
Corporate_bond_issuance_volume_t	INPUT	1.932215	3.19769	1014	1814
Credit_to_government_and_state_o	INPUT	9.036426	10.15036	2540	288
Deposit_money_bank_assets_to_dep	INPUT	87.2107	16.41576	2505	323
Deposit_money_banks__assets_to_G	INPUT	54.26501	43.54384	2635	193
Depositing_withdrawing_at_least	INPUT	43.21408	30.7661	160	2668
Domestic_credit_to_private_secto	INPUT	48.23995	44.3281	2649	179
Electronic_payments_used_to_make	INPUT	16.31952	23.37786	160	2668
External_loans_and_deposits_of_r	INPUT	70.49142	446.0737	2564	264
Financial_system_deposits_to_GDP	INPUT	49.4525	45.19964	2612	216
Firms_identifying_access_to_fina	INPUT	27.31919	14.12871	409	2419
Firms_using_banks_to_finance_inv	INPUT	22.80314	14.01859	414	2414
Firms_using_banks_to_finance_wor	INPUT	26.46667	14.73206	381	2447
Firms_whose_recent_loan_applicat	INPUT	12.14299	9.351366	107	2721
Firms_with_a_bank_loan_or_line_o	INPUT	33.78642	17.07432	313	2515
Firms_with_a_checking_or_savings	INPUT	87.1471	14.38195	310	2518
Foreign_bank_assets_among_total	INPUT	39.35446	33.55441	1199	1629
Foreign_banks_among_total_banks	INPUT	40.18691	27.85943	1803	1025
GDP	INPUT	10327.76	15531.19	2779	49
GDP__Current_USD_	INPUT	1.115E12	5.59E12	2800	28
GNI	INPUT	1.129E12	5.64E12	2756	72
Gross_portfolio_debt_assets_to_G	INPUT	21.89739	48.57018	1527	1301
Gross_portfolio_debt_liabilities	INPUT	23.89219	47.45105	1507	1321
Gross_portfolio_equity_assets_to	INPUT	14.39551	32.07091	1482	1346
Gross_portfolio_equity_liabiliti	INPUT	12.50957	26.39213	1475	1353
H_statistic	INPUT	0.570892	0.239967	658	2170
Insurance_company_assets_to_GDP	INPUT	14.82321	22.59275	1661	1167
International_debt_issues_to_GDP	INPUT	24.63629	36.81864	1463	1365
Investments_financed_by_banks___	INPUT	14.50894	9.576512	414	2414
Investments_financed_by_equity_o	INPUT	3.974576	4.543136	413	2415

Gross_portfolio_debt_assets_to_G	INPUT	21.89739	48.57018	1527	1301	2.3E-17	3.55238	489.911	4.61003	28.57891
Gross_portfolio_debt_liabilities	INPUT	23.89219	47.45105	1507	1321	0.000066	7.84832	572.859	4.920764	32.57975
Gross_portfolio_equity_assets_to	INPUT	14.39551	32.07091	1482	1346	0.00012	0.985494	295.897	4.486368	25.96238
Gross_portfolio_equity_liabiliti	INPUT	12.50957	26.39213	1475	1353	0.000134	3.07634	294.679	5.047086	34.03729
H_statistic	INPUT	0.570892	0.239967	658	2170	-0.672	0.589	1.705	-0.08864	3.363563
Insurance_company_assets_to_GDP	INPUT	14.82321	22.59275	1661	1167	0.122291	4.07396	189.645	2.55017	8.38224
International_debt_issues_to_GDP	INPUT	24.63629	36.81864	1463	1365	0.029864	11.11747	384.5476	3.939346	22.03229
Investments_financed_by_banks___	INPUT	14.50894	9.576512	414	2414	0	12.6	53	0.881217	0.83406
Investments_financed_by_equity_o	INPUT	3.974576	4.543136	413	2415	0	2.7	33.3	2.180354	7.046163
Lerner_index	INPUT	0.274652	0.140116	1901	927	-1.60869	0.268344	1.075592	-1.15635	20.3571
Life_insurance_premium_volume_to	INPUT	1.39341	2.101944	2245	583	0	0.445153	14.8457	2.465762	7.294555
Liquid_assets_to_deposits_and_sh	INPUT	37.61165	19.86484	2604	224	0	33.27161	162.1736	1.192908	2.275429
Liquid_liabilities_in_millions_U	INPUT	19396870	9.3682E8	2411	417	21.04996	9253.15	4.6E10	49.10177	2410.989
Loans_from_nonresident_banks__am	INPUT	30.99013	176.258	2655	173	0	7.25647	3679.218	14.71807	237.2001
Loans_from_nonresident_banks__ne	INPUT	0.802314	3.262726	1172	1656	-25.5909	0.277342	38.38324	1.900124	38.28645
Market_capitalization_excluding	INPUT	46.48607	17.6455	769	2059	0.900162	48.67675	99.0082	-0.42591	0.098089
Mobile_phone_used_to_pay_bills__	INPUT	2.991544	4.213151	133	2695	0	1.567456	25.65222	2.899145	9.940244
Mobile_phone_used_to_send_money	INPUT	3.943203	7.763138	133	2695	0	1.450015	60.478	4.537671	25.5627
Nonbank_financial_institutions_	INPUT	15.24698	31.30059	841	1987	0.000448	4.217654	174.4274	3.492567	12.24403
Nonfinancial_corporate_bonds_to	INPUT	11.71553	12.18974	442	2386	0	8.594728	100	2.943472	14.55623
Nonlife_insurance_premium_volume	INPUT	1.223429	0.870141	2343	485	0.005129	1.03529	6.42976	1.409894	2.889965
Number_of_listed_companies_per_1	INPUT	26.9289	49.68686	1682	1146	0.081517	8.595607	680.7473	4.998418	40.48319
Outstanding_domestic_private_deb	INPUT	26.57752	30.03293	755	2073	0.001785	16.86194	197.1345	2.296392	6.977587
Outstanding_domestic_public_debt	INPUT	33.87638	24.72055	838	1990	0.005638	28.69157	190.7722	2.489419	10.01955
Outstanding_international_privat	INPUT	21.09595	37.70494	1228	1600	0.00175	6.297861	369.1549	3.927408	20.77473
Outstanding_international_public	INPUT	7.527066	10.00338	1382	1446	0.00744	4.656521	96.51937	4.015922	23.03703
Population__Total_	INPUT	1.7788E8	7.5803E8	2828	0	27771	8300000	7.292E9	6.364149	44.17786
Private_credit_by_deposit_money	INPUT	47.16793	42.35671	2635	193	0.551347	32.70972	262.4577	1.633634	2.882722
Provisions_to_nonperforming_loan	INPUT	73.26773	44.4851	1560	1268	0	63.7	604.1	3.003822	20.00733
Saved_any_money_in_the_past_year	INPUT	43.78924	18.87831	313	2515	6.99465	41.13104	89.78808	0.249308	-0.83963
Saved_at_a_financial_institution	INPUT	19.96894	17.54471	313	2515	0.117297	14.36009	78.41033	1.168421	0.458507
Saved_using_a_savings_club_in_th	INPUT	8.418589	8.252173	283	2545	0.339268	5.523757	44.48003	1.827764	3.432255
Small_firms_with_a_bank_loan_or	INPUT	27.72524	16.25953	313	2515	1.9	26.3	72.5	0.317211	-0.72539
Stock_market_capitalization_to_G	INPUT	55.28343	91.01841	1599	1229	0.009511	33.31992	1086.478	7.322	69.65696
Stock_price_volatility	INPUT	21.13376	11.33529	1343	1485	2.394375	19.42653	141.6044	3.263958	23.2903
Stock_total_value_traded	INPUT	26.30157	58.96523	1639	1189	0.001255	3.726627	821.9629	6.01909	55.17718
Syndicated_loan_average_maturity	INPUT	6.21787	3.222148	1523	1305	0.342466	5.451294	20.0137	1.337283	2.415717
Syndicated_loan_issuance_volume	INPUT	4.792223	14.56123	1557	1271	0.006848	1.779711	268.9509	11.21861	157.6576
Total_factoring_volume_to_GDP___	INPUT	3.222432	3.978184	1067	1761	0	1.671	43.985	2.877288	15.48535

Appendix 6:

Model Comparison for Decision Tree and Regression

Selected Model	Predecessor Node	Model Node	Model Description	Target Variable	Target Label	Selection Criterion: Valid: Average Squared Error
Y	Tree3	Tree3	Decision Tr...	gini1	gini1	44.45447
	Reg3	Reg3	Regression...	gini1	gini1	69.18691

Appendix 7:

110				
111	Fit			
112	Statistics	Statistics Label	Train	Validation
113				
114	_NOBS_	Sum of Frequencies	863.00	370.00
115	_MAX_	Maximum Absolute Error	23.70	29.55
116	_SSE_	Sum of Squared Errors	28686.23	16448.15
117	_ASE_	Average Squared Error	33.24	44.45
118	_RASE_	Root Average Squared Error	5.77	6.67
119	_DIV_	Divisor for ASE	863.00	370.00