Financial System Classification: From Conventional Dichotomy to a More Modern View

Veysov, Alexander

MGIMO-University

21 July 2012

Financial System Classification:
From conventional dichotomy to a more modern view[1]

by

Alexander Veysov

And

Michael Stolbov

July 21, 2012

Abstract

This paper is to provide literature review on traditional financial system classification and offer and alternative classification of financial systems. Conventional wisdom holds that there are basically 2 types of financial systems – bank-based and market-based. But modern research points to the fact that such opinion may be quite biased. We consider several functions of financial system (not only financing, but corporate governance and information dissemination) and construct a database of financial metrics and institutional variables is order to conduct cluster-analysis. Our findings include: dichotomy does not hold; institutional environment is a key driver of financial system development; commodity exporters have inadequately low institutional development level.

JEL Classification:
Keywords: *financial system, classification, cluster analysis, alternative classification*

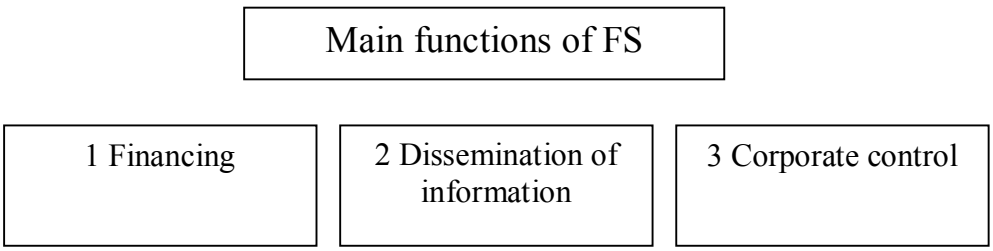
[1] This is merely a draft working paper, if you have any ideas to discuss or remarks to make please do not hesitate to contact me. My e-mail is snakers4@mail.ru.

Introduction

In the modern world changes occur much faster than in the beginning of the 20th century, which has both negative and positive implications. Primarily it affects the real economy, e.g. consider recent informational revolution. But vast economic experience accumulated during 50 years of active economic research and recent crisis events point to the fact that economies are becoming more synchronized and fragile breeding more instability. Such prominent scholars as Hyman Minsky or Paul Davidson claim that the flaw lies at the very root of market economy, but in this case we will limit ourselves only to financial aspect of it.

It's common knowledge that the main function of financial system is transferring savings into investments. Allan, Gale (2000) paraphrase this definition: financial system transfers funds from agents that have abundant funds to agents that require them. Grosfield (1994) lists the main functions of financial system:

Figure 1



Source: Alicia García Herrero, Javier Santillán Sonsoles Gallego, Lucía Cuadro and Carlos Egea, "LATIN AMERICAN FINANCIAL DEVELOPMENT IN PERSPECTIVE" — Banco de España

- Covering liquidity gap;
- Mobilizing and aggregating savings;
- Allocation and investment of mobilized funds;
- Decreasing and spreading risk;
- Borrower monitoring (or decentralized system of collecting information in case of market financial systems);
- System of corporate control.

So financial system (FS) does accumulation and spreading of funds as well as investment project risk monitoring. Doing this, it monitors performance of non-financial companies.

The umbrella task of classifying financial systems breaks down to several subtasks. We need to analyze and describe the existing methods of classification[2], find out their pros and cons and eventually offer alternative classification, which considers flaws of conventional ones and includes our findings.

Zingales and Rajan (2004) claim that the unprecedented process if financial globalization and liberalization is taking place since 1980 (it was somehow reversed by recent events though). It is quite probable that rapid development of financial sector together with financial deregulation all over the worlds will shape the global financial system. Conventional wisdom holds (with many exemptions that occurred recently, anyway such view usually dominates before major systemic crises happen) that FS of different countries tend to converge somehow which can shape economic policy[3]. Antzoulatos, Thanopoulos and Tsoumas (2011) also claim that in the economic literature there is some kind of consensus that market-based financial systems are superior to their banking counterparts. But can this fundamental premise have soft foundation? Block (2002) argues that traditional dichotomy (market systems vs. banking ones) can be put to probation as well.

Historically banking systems and market systems were viewed as two separate models. The global financial system development trend is a big issue in the literature, but many scholars agree that nowadays many countries do not qualify for either of these models. Lack of convergence and heterogeneity growth are to prove that. A significant number of countries will evolve from one model (say from banking model to market model) only if a large number of financial metrics (indices of financial depth, i.e. some financial system metrics divided by GDP) converge. When such convergence is not achievable or only some weak form is achievable we may expect that either clusters of homogenous countries

[2] Conventional classification is bank-oriented systems vs market systems.
[3] BIS and IMF are usually to be to blame for their unified approach.

form or just heterogeneity increases. Although presence of clusters increases entropy, it may provide some framework for more reliable economic policy.

So cluster analysis, financial system classification and convergence analysis are different facets of global financial system. Low convergence implies lower probability of countries moving in one direction financially. It its turn it means that we can observe many different types of financial systems, which may have little in common. It obviously can be an obstacle to forming adequate policy for international entities. One reflection of such heterogeneity is debt crisis in Europe, where different countries were to be measured with one yardstick. Also there is no proper system of checks and balances which makes this uneven system even more unbalanced which lead to current crisis. Some studies (e.g. Antzoulatos, Thanopoulos and Tsoumas (2011), Veysov, Stolbov (2011) provide some evidence that the global financial system is experiencing only a limited form of convergence that cannot result in rapid development of underdeveloped countries. If we assume that countries do not converge to a single superior model, they may move to different directions within certain other models or clusters.

To sum up, nowadays traditional dichotomy is becoming obsolete and we need to find a new way to describe and classify the diversity of modern financial landscape. Like many aspects of economics alternative classification may pursue 2 purposes:

- Academic;
- Applied;

Academic purpose implies making a contribution to the literature as many researchers claim that traditional approaches are outdated. Perhaps one of the reasons of fallibility of traditional approach is that is considers only the first function of the financial system, i.e. financing. To be more precise, if we take into consideration only a couple of variables (e.g. banking depth and stock market depth) we may miss the size of government sector or institutional development

level. You may refer to Herrero, Gallego, Cuadro et.al. (2002) to view an example of cluster analysis employing a limited amount of variables.

From more applied point of view knowing which country refers to which type of financial system can facilitate right decision taking and prevent governments from conducting destructive reforms. If we find that there are several prevailing models of financial systems in the world, it may serve as a proof that successful policy conducted in one country can be adopted in another with same structure of financial system. On the other hand, major difference of one financial system from others may provide some caution in adopting other countries' practices.

Financial system structure as a basis of classification

This section describes traditional views on FS classification and is structured as follows. At first key institutional differences between bank-based and market-based financial systems will be described. Then we will describe brief history of each type of financial system. We will finish by providing some stylized statistical facts to support our analysis. Allan and Gales (2000) in their fundamental work provide basis for our analysis.

The most popular and well-know classification is to divide financial systems into bank- and market-based. At the root of this concept lies relative importance of banking and stock market institutions which can be measure by means of corresponding coefficients. Usually Germany, Japan, France are portrayed as bank-based systems and the USA and the UK are portrayed as market-based. Therefore sometimes bank-based are referred to as continental and market-based as Anglo-Saxon. Figure xxx depicts stylized traditional view at FS classification.

The main agents of the FS are households and firms, who use services of banks, other intermediaries, insurance companies and stock and bond markets.

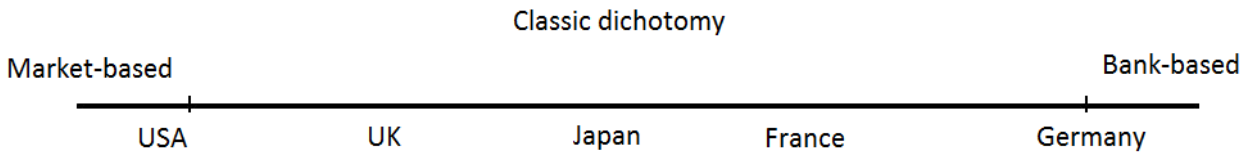
In ideal bank-based system the main role is played by banking institutions. Stock markets are relatively underdeveloped. Assets of households are to be allocated as claims on banks and insurance companies. The majority of companies are not listed, listed companies have very limited amount of major shareholders (banks are not uncommon among shareholders). Therefore institutional investors play a minor role. Relations between financial intermediaries and companies have long-term nature and are based on mutual information sharing. Such relations decrease asymmetry of information and borrowing costs. Financial monitoring is conducted by banks, which monitor investment projects and intervene if necessary. Some researchers nevertheless claim that on a certain stage of development using own funds can be more efficient for firms.

In ideal market-based system market institutions are well-developed and households' assets are allocated in the form of shares and bonds. Ownership

structure is very diluted and there are no major shareholders. Institutional investors play a major role. Main ways of raising capital are IPOs and corporate paper. Monitoring is conducted by stock markets, special government entities and rating agencies. It has an immediate implication that market-based systems rely heavily on information quality and accounting transparency. Herrero, Gallego et.al. (2002) claim that institutional framework has major effect on market-based system performance. Levine (2002) states that banking institutions can play a pivotal role during early stages of economic development or in bad institutional environment.

The next step is to evaluate comparative advantages and disadvantages of stylized types of financial systems. Usually the following features are discussed: competition vs. insurance, public information vs. private, external control vs. internal control, efficiency vs. stability.

Figure 2



Source (adapted): Angelos A. Antzoulatos, John Thanopoulos, Chris Tsoumas, "Financial System Structure, Change and Convergence: Evidence from the O.E.C.D. Countries", University of Piraeus 80 Karaoli & Dimitriou street Piraeus 18534, Greece.

Table 1

Main characteristics of Financial Systems

	Criterion	Market-based	Bank-based
1	Financial markets	Substantial, liquid	Small, less liquid
2	% of listed companies	High	Low
3	Risk dissemination	Via market mechanisms, spatial	Via banks, inter-temporal
4	Ownership and control	Dispersed	Concentrated
5	Corporate control change	Frequent hostile acquisitions	Rare hostile acquisitions
6	Principal agent problem	Shareholders vs. management	Major vs. minor shareholders
7	Bank role in external financing	Low	High
8	Debt to equity	Low	High

Source (adapted): Irena Grosfeld, "COMPARING FINANCIAL SYSTEMS PROBLEMS OF INFORMATION AND CONTROL IN ECONOMIES IN TRANSITION" — CASE Research Foundation, Warsaw 1994

To begin with, market-based systems are more competitive and offer more favourable financing terms decreasing financial intermediaries' profit. In bank-based systems households' assets are more stable as banks diversify their assets which cannot be done by households themselves. In this case so called inter-temporal smoothing of risk and yield takes place. It reduces risk during turbulent periods at the cost of lower yield during prosperity periods. In market-based systems agents cannot avoid non-diversifiable market risk, which is inherent to the whole economy and forces to sell assets during crises at fire sale prices. But under modern circumstances the role of banking system during crises is vaguer.

In this case stable financial intermediaries able to withstand financial turbulence and provide liquidity and fair price to assets play the stabilizing role. In this case stable financial intermediaries able to withstand financial turbulence and provide liquidity and fair price to assets play the stabilizing role. Davidson (2009) argues that the USA owed its success in overcoming previous mortgage crises to special purpose vehicles created by the government to stabilize the market.

Nevertheless nowadays the problems of moral hazard put traditional advantages of stable banking system to test. It is worth noting that the most of international (and even local Russian) scandals are connected with the names of the biggest and most revered financial institutions.

One of classic arguments for market-based systems is that they effectively disseminate information necessary for decision taking. Market systems are characterized by less concentrated structure of information, and diluted ownership gives a vast number of agents an incentive to conduct monitoring. These classic arguments should in ideal world imply that market systems are more advanced from informational standpoint. But in modern reality both systems face severe problems, free rider problem being the mildest one.

If information is accounted for and disclosed by the markets, then why spend money and recourses on processing and storing it? Therefore Allan and Gale (2000) note that market-based economies tend to under invest into information. Also the problems of moral hazard, asymmetric information and vague accounting have come to play the first role during this crisis. Stiglitz (2003) asserts that increased corruption within top-management and rating agencies undermines the very heart of market-based financial system – its informational advantage.

Financial intermediaries (although less efficient at small and very big scales) can internalize financial monitoring costs reducing information asymmetry. This requires redirection of recourses into creating monitoring framework. Its scaling can be quite costly as well.

It also important to consider how these two system types play their role in financing innovation. The study of connection between finance and innovation dates back to Schumpeter. Now researchers miss that these two types of systems specialize in gathering different types of information. Intermediaries decrease costs of processing vast arrays of information, but they cope poorly with uncertainty, innovation and new ideas. On the other hand the development of VC funds in Europe with active bank participation mitigates that problem. Banks are integrated there in creating and managing VC funds. Botazzi (2009) claims that banks

participate in 44% of VC funds in Europe and their share on average is about 40%. In a nutshell, empirical studies say the following about impact of financial system of innovation:

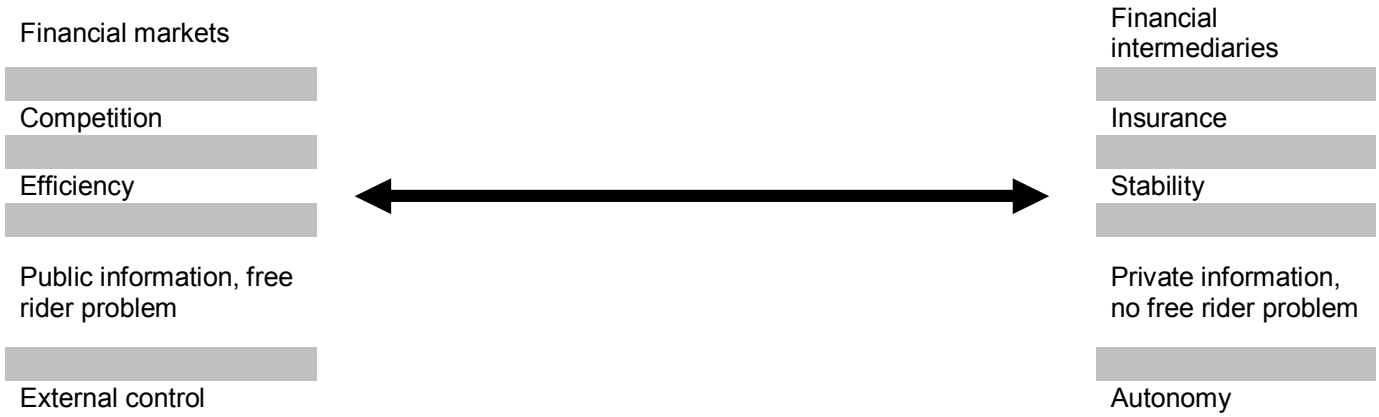
- Market based FS are suitable for financing break through innovation while bank-based are for incremental;
- Now VC funds make differences between these systems more vague;
- Developing markets should rely more and banking institutions due to poor institutional framework and ecosystem;

Other disadvantage of market systems stems from the fact that their high efficiency is based on big and highly liquid financial institutions. To maintain efficient performance financial markets a priori require higher level of financial depth, i.e. high capitalization of stock market related to GDP. In other words entry barriers are quite high. Also in modern world on stock markets there is equivalent of bank reserve systems, so weak and inefficient stock markets can have disastrous consequences. Also “fixed” costs of establishing market-based system make such systems viable only after reaching some “critical mass”. Also it was noted that markets suffer from information asymmetry, moral hazard and so on. Bank-based systems have lower entry barriers and do not rely heavily on quality of information. Also banks can use markets to diversify risk, and markets themselves cannot avoid their non-diversifiable risk. Also recent experience show that market asset prices can wobble due to non-fundamental factors. It is also worth noting that competition from financial markets can lead to disintermediation, which in long-term can result in higher risk and more fragile system.

Table 2

Pros and Cons of financial system types

США Великобритания Япония Франция Германия



Source (adapted): Franklin Allen, Douglas Gale, "Comparing Financial Systems", MIT Press, 2001, ISBN 0262511258, c. 3.

Also the inefficiency and incompleteness of markets can be added to the aforementioned disadvantages of market systems. There is a big discussion in the literature on this topic, but for simplicity we may just assume that markets possess a weak form of efficiency. Also there is a new fractal theory of finance inspired by B. Mandelbrot (see for example Mandelbrot and Hudson (1996) or Calvet, Fischer, Mandelbrot (1997)).

Also in bank-based systems banks execute not only external but also internal monitoring. In Japan the system of main bank has developed, where shareholding bank can exert significant influence on decision taking. In Germany the same systems is called hausbank system. In market-based systems financial institutions can impact corporate governance using three methods: via proxy contest, M&A or hostile acquisition. But in reality only hostile acquisitions proved to be a working method of discipline among top-management.

It is also interesting to view brief history of FS development. Some historical patterns may be useful in creating alternative classification.

A vast number of different FS types existed throughout history in developed countries. It is important, that FS were shaped primarily due to financial instability periods and governments' reaction to them. Due to political reasons in the USA the system of several big banks could not develop. Also due to political reasons in

Germany stock market plays more limited role than in the UK or the USA. Also it is important that all types of systems were somewhat fragile and their development usually ended in systemic crises and regime switching. The government played and active role in switching the paradigm. Also history shows us that there were abundant examples of irrationality of financial markets, i.e. irrational exuberance or pessimism. It indicated that market-based systems both rely heavily on information quality and should be monitored by special government entities. Also it is worth noting that not only government can drive reforms, but usually they are initiated by it.

Also in emerging markets there is destructive understanding that development of FS equals full deregulation according to "Washington Consensus". Historical analysis and empirical studies indicated that stock markets begin developing organically only given some level of financial sophistication in the country. Herrero, Gallego and Egea (2002) claim that hasty liberalization can have the following consequences:

1. Increased competition leads to lower business margin and external shocks can be destructive for the system;
2. Uncertainty and market risk rise in the short term;
3. During transition period financial institutions can issue too many credits which makes them prone to crises;
4. Lack of experience of regulators can have adverse consequences as well;

Then we will present several statistical tables to illustrate ideas described above. Table xxx illustrates main macro metrics for biggest financial systems in the world. To begin with we should look at credit and bank asset depth which are proxies for relative bank importance in a country. Among these countries Japan is an obvious outlier because of exaggerated influence of government there. Also stock market is very developed in Japan and we cannot clearly say that it belongs to bank-based type.

Then if we look at Germany we will see that banks are more important there than stock markets. At the same time Germany's banking depth is lower than that of the UK. In the UK banks and markets now are equally important.

Also France that is supposed to be a conventional example of bank-based system is moving towards some average type. In France banks and markets are also relatively equal. In this case only the USA remain a book example of market system, where stock markets are more important than banks. But the American economy has one principal difference – bank credit to economy is higher due to high leverage. Also corporate bond market in the USA is the most developed across major countries.

If we tackle government bond market, it's almost equally developed in all countries except Japan, in which government has a significant influence on the economy.

Also household fund allocation is another proxy of financial system type. Statistics indicates that conventional financial system types become more and more diluted nowadays as for example even Germany sees increased household ownership of stocks.

Table 3

Household assets allocation, 1994

Страна	Cash or equivalents	Home bonds	Home stocks	Foreign bonds	Foreign stocks	Loans and mortgages
USA	19	27	36	1	9	3
UK	24	10	39	2	13	1
Japan	52	12	11	1	1	6
France	38	30	13	3	3	2
Germany	36	31	11	5	2	4

Source: Franklin Allen, Douglas Gale, "Comparing Financial Systems" — MIT Press, 2001, ISBN 0262511258, c. 51

Also all studies discussing FS types usually tackle firm financing issue. It turns out that the most popular source of financing is retained earnings. Surprisingly enough, in the USA the major source is corporate paper, in the UK it is stocks. Japan and France are dominated by loans.

Table 4

Real sector financing sources, 1970-1985

Indicator	USA	UK	Japan	France	Germany
Retained earnings	66.9	72	33.7	44.1	55.2
Short-term bonds	1.4	2.3	N.A.	0	0
Loans	23.1	21.4	40.7	41.5	21.1
Commercial credit	8.4	2.8	18.3	4.7	2.2
Bonds	9.7	0.8	3.1	2.3	0.7
Stocks	0.8	4.9	3.5	10.6	2.1

Source: Mayer, C. (1990), "Financial Systems, Corporate Finance, and Economic Development." In R. G. Hubbard (ed.),Asymmetric Information, Corporate Finance and Investment (pp. 307332). Chicago: University of Chicago Press.

Table 5

Household asset allocation

	Cash and deposits		Securites other than stock		Loans		Stock		Insurance reserves		Other	
	2000	**2007**	**2000**	**2007**	**2000**	**2007**	**2000**	**2007**	**2000**	**2007**	**2000**	**2007**
DE	**35.2**	**35.5**	**6.5**	**7.3**	**0**	**02**	**28.2**	**25.1**	**28.9**	**31.3**	**1.3**	**0.9**
FR	**33.4**	**29.4**	2.9	1.6	0.8	0.7	**29.6**	**26.7**	29.9	**37.8**	**3.5**	**3.8**
UK	20.8	26.6	1.8	**0.5**	0.2	**0.1**	**23.3**	15.7	51.2	53.7	2.7	**3.4**

Источник: Financial Assets and Liabilities of Households in the European Union, Eurostat, Statistics in focus, 32/2009
European Union

Table 6

Main macro metrics of major financial systems

Country	Year	Central bank assets to GDP	Private credit to GDP	Bank deposits to GDP	Banks assets to GDP	Stock market cap to GDP	Bond market cap to GDP	Government bond market cap to GDP
UK	2008	0.017	1.896	1.536	1.896	1.366	0.163	0.320
UK	2005-2008	0.018	1.690	1.355	1.693	1.391	0.158	0.317
Germany	2008	0.002	1.022	1.036	1.213	0.650	0.361	0.398
Germany	2005-2008	0.002	1.066	1.003	1.295	0.539	0.347	0.402
USA	2008	0.053	2.107	0.783	0.691	1.478	1.300	0.469
USA	2005-2008	0.056	1.991	0.724	0.647	1.417	1.226	0.467
France	2008	0.009	1.067	0.683	1.213	1.123	0.570	0.512
France	2005-2008	0.006	0.972	0.675	1.138	0.967	0.470	0.518
Japan	2008	0.123	0.949	1.831	1.509	1.023	0.379	1.657
Japan	2005-2008	0.161	0.972	1.876	1.537	1.027	0.396	1.573

Source: World Bank Financial structure database[4]

[4] Thortsen Beck and Asli Demirgüç-Kunt, "Financial Institutions and Markets Across Countries and over Time: Data and Analysis" — World Bank Policy Research Working Paper No. 4943, May 2009.

Literature and database

As far as we are concerned, the literature on financial system cluster analysis is quite scarce. The most profound research on this topic was conducted by Antzoulatos, Thanoupolos and Tsoumas (2011), who employed 18 indicators from World Bank Financial Development Database to conduct cluster analysis. They analyze OECD countries using averages for 1994-2003. They use hierarchical agglomerative cluster analysis and simple Euclidian distance as a metric. The set of variables is quite similar to our. Eventually they produce 5 clusters within OECD:

1. Korea and the USA (market-based FS);
2. Japan, the Netherlands, Switzerland и Great Britain (both banks and markets are highly developed);
3. Austria, Belgium, Germany, Ireland, New Zealand, Portugal (bank-based type);
4. Australia, Canada, Denmark, Finland, France, Greece, Iceland, Italy, Norway, Spain and Sweden (average level of development);
5. Czech Republic, Hungary, Mexico, Poland, Slovakia и Turkey (relatively less developed FS).

We should note that Japan with high influence of government is one group with the UK, although it was said that central bank asset ratio is included in the set of variables. Taking only OECD into consideration implies automatic scope narrowing.

Ruzaa and Juanb (2009) conducted quite similar analysis employing only 2 indicators for OECD countries. It is obvious that if we want to develop an alternative classification for all countries, such methodology is inadequate.

Also Herrero, Gallego and Egea (2002) conducted cluster-analysis for 55 countries from Latin America. They employed only one financial metric, which is

the sum of credits, stock market and bond market cap. The second indicator was PPP GDP. Such analysis does not consider institutional framework and efficiency of banking sector,

We are going to use the following indicators in our analysis.

Table 7

Code	Variable list
V1	Monetization ratio (M2)
V2	Liquid liabilities to GDP
V3	Central bank assets to GDP
V4	Private credit to GDP
V5	Bank deposits to GDP
V6	Bank assets to GDP
V8	Life-insurance premium to GDP
V9	Other insurance premium to GDP
V10	Stock market cap to GDP
V11	Bond market cap to GDP
V12	Government bond market cap to GDP
V13	Deposit interest rate
V14	Credit interest rate
V15	Spread
V16	Credit risk premium
V17	Banking system capital ratio (WBFSD)
V18	Non-performing loans to total credits
V19	Banking system capital ratio (WDI)
V20	Banking systems costs to revenue ratio
V21	Bank ROA
V22	Bank ROE
V23	Concentration in banking system

All the indicators come from World Bank WDI or World Bank Financial Structure Databases. Dataset includes 180 countries. This amount will be limited during the procedure of cluster-analysis due to omissions of data. We also considered it beneficial to include several institutional indicators to catch intangible country ecosystem characteristics.

Table 8

Code	Name
IV6	Strength of legal rights index
IV5	Depth of credit information index
IV4	Ease of shareholder suits index
IV3	Extent of disclosure index
IV2	Monetary Freedom
IV1	Financial Freedom

Institutional Variable 1 and 2 are calculated by The Heritage Foundation[5]. IV 3-6 are available in World Bank Doing Business Database.

Monetary freedom is combined index of monetary stability. Inflation and excessive price controls disrupt the mechanism of market economy. Monetary freedom is estimated using two factors:

- Average inflation for 3 years;
- Existence of price controls.

Financial freedom is an estimate of efficiency of banking sector and independence of financial sector from government intervention. Government ownership of banks and other financial institutions usually lowers competition and quality of financial services. In ideal world independent central bank and regulators only conduct monitoring and intervene if necessary. Financial freedom index is constructed from following parts:

- The degree of government regulation of financial service regulation;
- The degree of government intervention into banking sector via direct or indirect ownership;
- Level of development of financial markets;
- Influence of government on credit issuance;
- Openness for foreign competition.

[5] Methodology for the 10 Economic Freedoms.
http://www.heritage.org/index/PDF/2011/Index2011_Methodology.pdf

Strength of legal rights index[6] measures how bankruptcy and credit laws protect borrowers and therefore facilitate lending. It includes 8 components related to credit laws and 2 components related to bankruptcy laws.

Credit information depth index measures quality of rules and laws regulating coverage, depth and availability of credit information. This index primarily measures quality of institutional environment for bank-based systems.

Extent of disclosure index[7] measures how fully public companies disclose their information. Market based systems' performance is to depend on this variable. *Ease of shareholders' suits* measures how easily shareholders can influence decision-taking within corporation via litigation.

To sum up, 2 IV measure institutional environment in general, 2 measure key features of bank-based systems and 2 measure key features of market systems.

Several a priori judgments were used when choosing variables for cluster-analysis:

1. Some variables simply have too many omissions. Also stock market variables were given a valued 0, if the value was omitted This assumes that underdeveloped stock markets provide scarce statistics;
2. Highly correlated variables were excluded as well;
3. Insurance and bond market variables were left behind because of too many omissions as well;
4. All IVs were included as they were calculated on consistent basis and had almost no omissions;

All in all, we included the following variables: IV1-IV6, V1-V3, V5, V6, V10, V14, V19-V23. We calculated averages for 2000-2008 to mitigate some data omissions and inconsistencies.

---

[6] Methodology Djankov, McLiesh and Shleifer, "Private Credit in 129 Countries" – Journal of Financial Economics, May 2007.

[7] Djankov and others, "The Law and Economics of Self-Dealing" – Journal of Financial Economics, June 2008.

Table 9

Correlation matrix

	IV6	***IV5***	***IV4***	***IV3***	***IV2***	***IV1***	***V1***	*V2*	*V3*	*V4*	*V5*	*V6*	*V8*	*V9*	*V10*	*V11*	*V12*	*V13*	***V14***	*V15*	*V16*	*V17*	*V18*	*V19*	*V20*	*V21*	*V22*	*V23*
IV6	1.00																											
IV5	0.18	1.00																										
IV4	0.47	0.26	1.00																									
IV3	0.06	0.27	-0.08	1.00																								
IV2	0.18	0.36	0.16	0.05	1.00																							
IV1	0.43	0.43	0.38	-0.13	0.59	1.00																						
V1	0.28	0.15	0.10	0.07	0.35	0.40	1.00																					
V2	0.38	0.16	0.22	-0.01	0.42	0.42	0.93	1.00																				
V3	-0.17	-0.12	-0.13	0.36	-0.16	-0.40	-0.12	-0.13	1.00																			
V4	0.49	0.44	0.35	0.09	0.51	0.58	0.63	0.69	-0.24	1.00																		
V5	0.42	0.17	0.24	0.08	0.41	0.45	0.92	0.99	-0.10	0.74	1.00																	
V6	0.26	0.34	0.06	0.81	0.24	0.11	0.38	0.35	0.29	0.52	0.47	1.00																
V8	0.36	0.01	0.11	0.05	0.37	0.39	0.78	0.73	-0.15	0.57	0.72	0.23	1.00															
V9	0.12	0.25	-0.08	0.86	0.06	-0.07	0.15	0.06	0.58	0.23	0.17	0.91	0.20	1.00														
V10	0.30	0.17	0.12	0.02	0.35	0.38	0.54	0.69	-0.22	0.66	0.67	0.24	0.54	0.06	1.00													
V11	0.33	0.19	0.11	0.00	0.36	0.24	0.07	0.05	-0.09	0.57	0.08	0.19	0.07	0.16	0.14	1.00												
V12	-0.11	0.31	-0.33	0.94	-0.14	-0.44	-0.02	-0.16	0.87	-0.10	0.01	0.93	-0.05	0.93	-0.18	0.03	1.00											
V13	-0.07	-0.11	-0.15	0.03	-0.61	-0.29	-0.30	-0.40	0.27	-0.40	-0.38	-0.17	-0.37	-0.04	-0.19	-0.18	0.10	1.00										
V14	-0.12	-0.21	-0.15	-0.06	-0.52	-0.27	-0.30	-0.49	0.15	-0.55	-0.53	-0.39	-0.36	-0.21	-0.13	-0.14	-0.17	0.94	**1.00**									
V15	-0.09	-0.20	-0.12	-0.04	-0.47	-0.23	-0.26	-0.40	0.09	-0.48	-0.43	-0.33	-0.27	-0.16	-0.09	-0.13	-0.13	0.85	**0.98**	1.00								
V16	-0.10	-0.16	-0.15	0.03	-0.41	-0.25	-0.21	-0.26	0.25	-0.32	-0.28	-0.10	-0.23	0.02	-0.10	-0.06	0.10	0.90	**0.95**	0.95	1.00							
V17	0.01	-0.35	-0.05	-0.16	-0.25	-0.20	-0.30	-0.33	0.02	-0.43	-0.32	-0.35	-0.26	-0.28	-0.23	-0.15	-0.20	0.13	**0.11**	0.10	0.00	1.00						
V18	-0.15	-0.35	-0.09	-0.16	-0.24	-0.32	-0.28	-0.30	0.26	-0.49	-0.33	-0.34	-0.38	-0.25	-0.28	-0.35	-0.16	0.24	**0.24**	0.22	0.19	0.20	1.00					
V19	0.18	0.38	0.14	0.03	0.23	0.27	-0.04	-0.03	-0.31	0.48	-0.01	0.23	0.06	0.07	0.08	0.67	-0.09	-0.15	**-0.15**	-0.12	-0.11	-0.16	-0.31	1.00				
V20	-0.19	0.09	0.02	-0.34	0.07	0.18	-0.15	-0.13	-0.15	-0.16	-0.20	-0.38	-0.11	-0.33	-0.11	-0.10	-0.56	-0.08	**-0.06**	-0.06	-0.18	0.04	0.15	-0.01	1.00			
V21	0.13	-0.12	-0.03	0.31	-0.07	-0.12	-0.02	-0.02	0.22	0.00	0.02	0.28	0.06	0.30	0.01	0.04	0.79	0.24	**0.21**	0.20	0.32	0.06	-0.02	-0.01	-0.41	1.00		
V22	0.12	-0.24	-0.10	0.33	-0.43	-0.25	-0.16	-0.21	0.38	-0.22	-0.14	0.26	-0.07	0.47	-0.12	-0.02	0.65	0.58	**0.53**	0.52	0.54	0.16	0.02	-0.20	-0.45	0.40	1.00	
V23	-0.14	-0.34	-0.18	-0.14	-0.02	-0.11	-0.25	-0.21	0.02	-0.14	-0.18	-0.09	-0.08	0.07	0.13	0.18	-0.12	0.00	**0.04**	0.03	0.01	0.03	-0.09	0.01	-0.04	0.15	0.19	1.00

Results

We used standard cluster analysis approach –agglomerative method with simple Euclidian distance as proximity metric. Dendrogram A refers to cluster analysis without using IVs. We derived the following conclusions from this analysis:

1. FS are clearly divided into developed and underdeveloped systems;
2. Such unique countries as Japan and Switzerland form separate clusters;
3. USA forms a clear separate cluster within developed countries;
4. Germany and Spain end up in the same final cluster. Also Canada the UK and the Netherlands end up in one final cluster. The same can be said about Scandinavian countries (one cluster) and France and Italy (one cluster).
5. Developing countries do not form clear clusters and their structure is very heterogenic. Clear clusters do not form until the very last iteration, which makes such analysis not entirely plausible and indicates that other approached should be used.

Table 10

Average IVs for clusters obtained using IV cluster analysis

Cluster	IV6	IV5	IV4	IV3	IV2	IV1
1	7.00	6.00	8.00	7.00	91.08	45.56
2	8.00	5.00	4.00	0.00	88.32	84.44
3	6.79	4.60	6.87	6.82	83.72	68.67
4	5.55	4.44	6.59	4.16	75.98	59.49
5	5.13	1.33	5.01	5.10	75.35	43.38
6*	3.63	2.02	4.07	4.63	67.03	34.41
RUS	3.00	2.00	7.00	6.00	58.77	32.22
BRA	3.00	5.00	3.00	6.00	77.13	47.78
VEN	2.00	1.00	2.00	3.00	55.82	41.11
IDN	3.00	2.75	3.00	9.00	67.32	32.22
IRN	4.00	3.00	0.00	5.00	60.20	10.00

Cluster analysis using IVs showed more sensible results. Situation drastically changed after employing 6 IV indicators. Dendrogram B appears to be more structured and to make more sense. We made the following conclusions from analyzing Dendrogram B:

1) Financial system dichotomy is not observed. We assume that FS develop in the following way. Fist develops banking sector and institutional environment improves creating critical mass for development of markets. Therefore classic dichotomy does not hold anymore. Also cluster 3, which included mainly OECD countries, shows that average banking and market indicators are roughly of the same size. This is points to the fact banks and markets are complementary.
2) We located 5 clusters in the end. Cluster 1 and 2 are Switzerland and Japan respectively with unique financial systems. Switzerland is so unique because both its banks and markets are exaggeratedly developed. Japan has very high government involvement in the financial system. Cluster 3 is formed mainly by developed OECD countries. Then clusters 4 and 5 are formed by developing countries.
3) Hypothesis that banks and markets are complementary is true;
4) The USA is separate in cluster 3;
5) The main principle of cluster forming is the quality of institutional environment. When it grows countries move from one group to another.
6) We should pay special attention to a group of countries in “cluster 6”, i.e. countries that did not fit into other clusters and formed no clear structure. In this countries level of financial development is not adequately supported by institutional environment and therefore they fall out.
7) “Cluster 6” includes Russia, Brazil, Uruguay, Venezuela and Iran, i.e. countries dependant on commodity exports and low development of institutions.

Conclusion

We have systematized some modern literature contributions on financial system classification and conducted cluster analysis. Main conclusions are the following:

- Traditional dichotomy is not applicable;
- Key driver of financial system development is institutional environment;
- There are actually 2 types of financial systems: developed and developing;
- Japan, the USA and Switzerland are unique countries in terms of their financial systems;
- Commodity exporters have inadequate development of institutional development which can hamper the development of their financial systems;

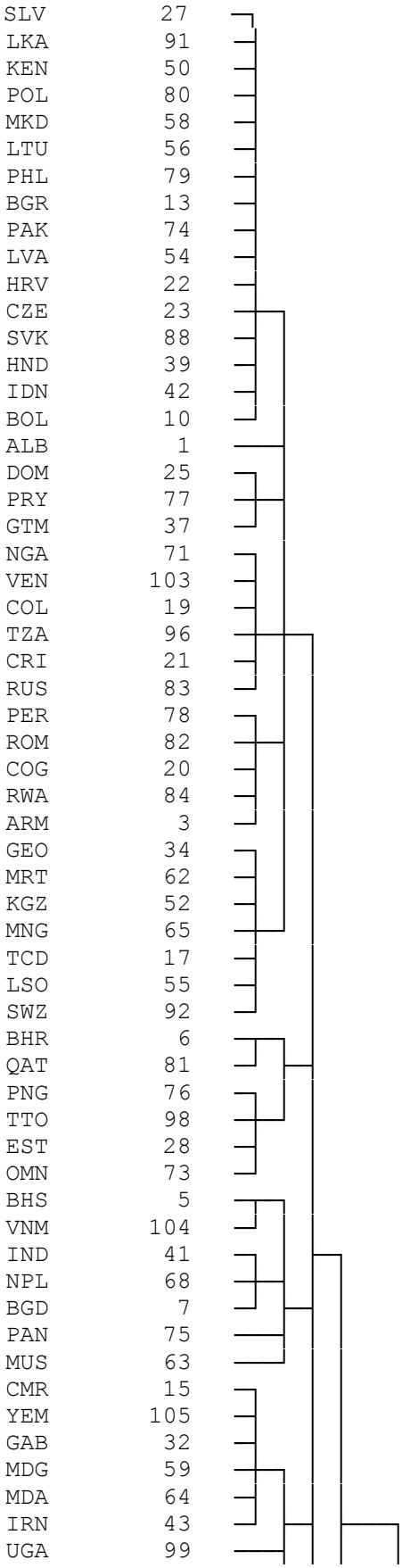
Appendix

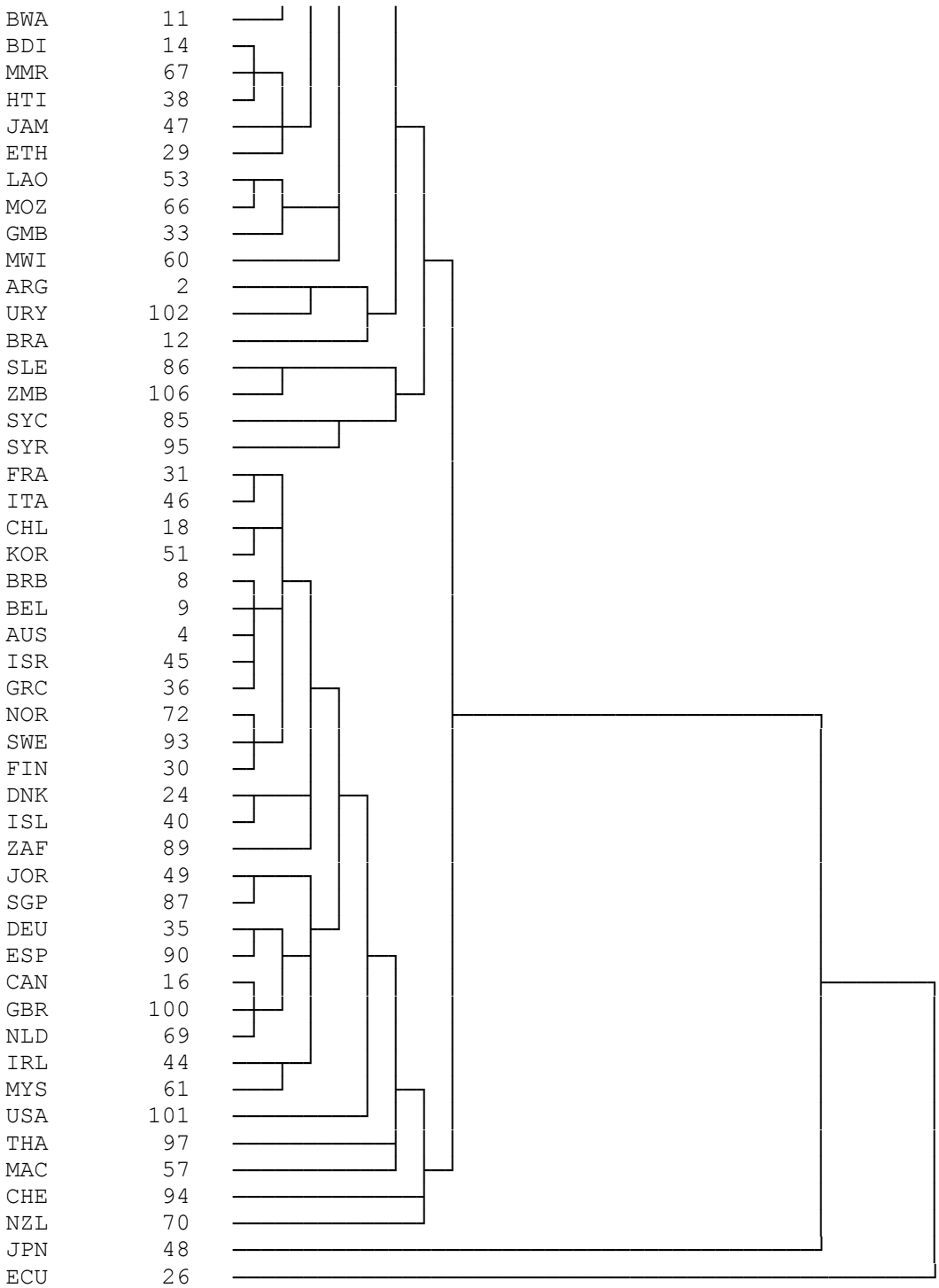
Table A1

Financial development by clusters, average 2000-2008

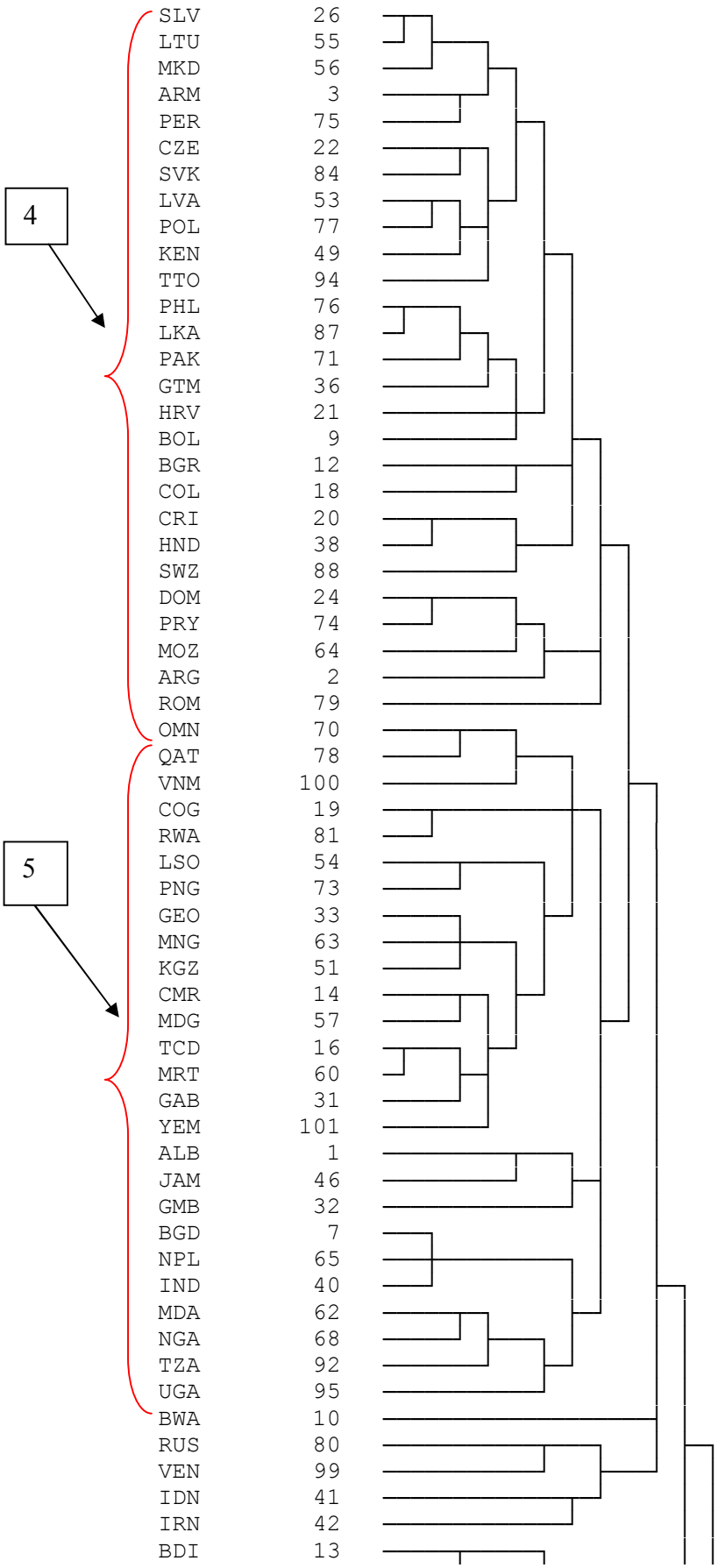
Кластер	V1	V3	V4	V5	V6	V8	V9	V10	V11	V12	V14	V17	V18	V19	V20	V21	V22	V23
1	2.13	0.16	1.17	1.97	1.68	0.0824	0.0222	0.84	0.435	1.29	1.85	4.24	3.96	0.56	0.71	0.000	0.002	0.405
2	1.38	0.02	1.60	1.30	1.73	0.0680	0.0480	2.64	0.353	0.27	3.51	5.34	1.33	1.25	0.72	0.015	0.100	0.858
3	0.92	0.03	1.05	0.76	1.05	0.0435	0.0282	0.92	0.476	0.39	7.82	7.33	4.43	1.33	0.65	0.012	0.107	0.716
4	0.36	0.03	0.29	0.31	0.35	0.0086	0.0152	0.19	0.040	0.26	16.43	9.59	9.37	0.94	0.75	0.011	0.116	0.645
5	0.30	0.05	0.18	0.24	0.25	0.0088	0.0102	0.17	0.013	0.29	18.36	13.60	9.69	0.80	0.59	0.020	0.176	0.763
6*	0.34	0.12	0.19	0.29	0.27	0.0076	0.0149	0.14	0.049	0.27	23.25	11.67	9.81	0.62	0.65	0.020	0.207	0.733
RUS	0.28	0.03	0.22	0.20	0.27	0.0034	0.0221	0.57		0.03	13.98	13.40	4.40	1.06	0.68	0.019	0.103	0.241
BRA	0.49	0.14	0.34	0.47	0.67	0.0116	0.0165	0.53	0.121	0.44	55.17	11.64	10.67	0.67	0.73	0.025	0.133	0.512
VEN	0.21	0.01	0.13	0.18	0.16	0.0007	0.0230	0.05	0.007	0.39	22.19	11.99	4.30	0.72	0.63	0.040	0.238	0.422
IDN	0.43	0.13	0.20	0.39	0.37	0.0081	0.0064	0.28	0.018	0.23	16.06	9.05	13.62	0.56	0.60	0.017	0.125	0.561
IRN	0.34	0.10	0.35	0.32	0.27	0.0009	0.0096	0.16			14.13			0.83	0.36	0.040	0.250	0.824

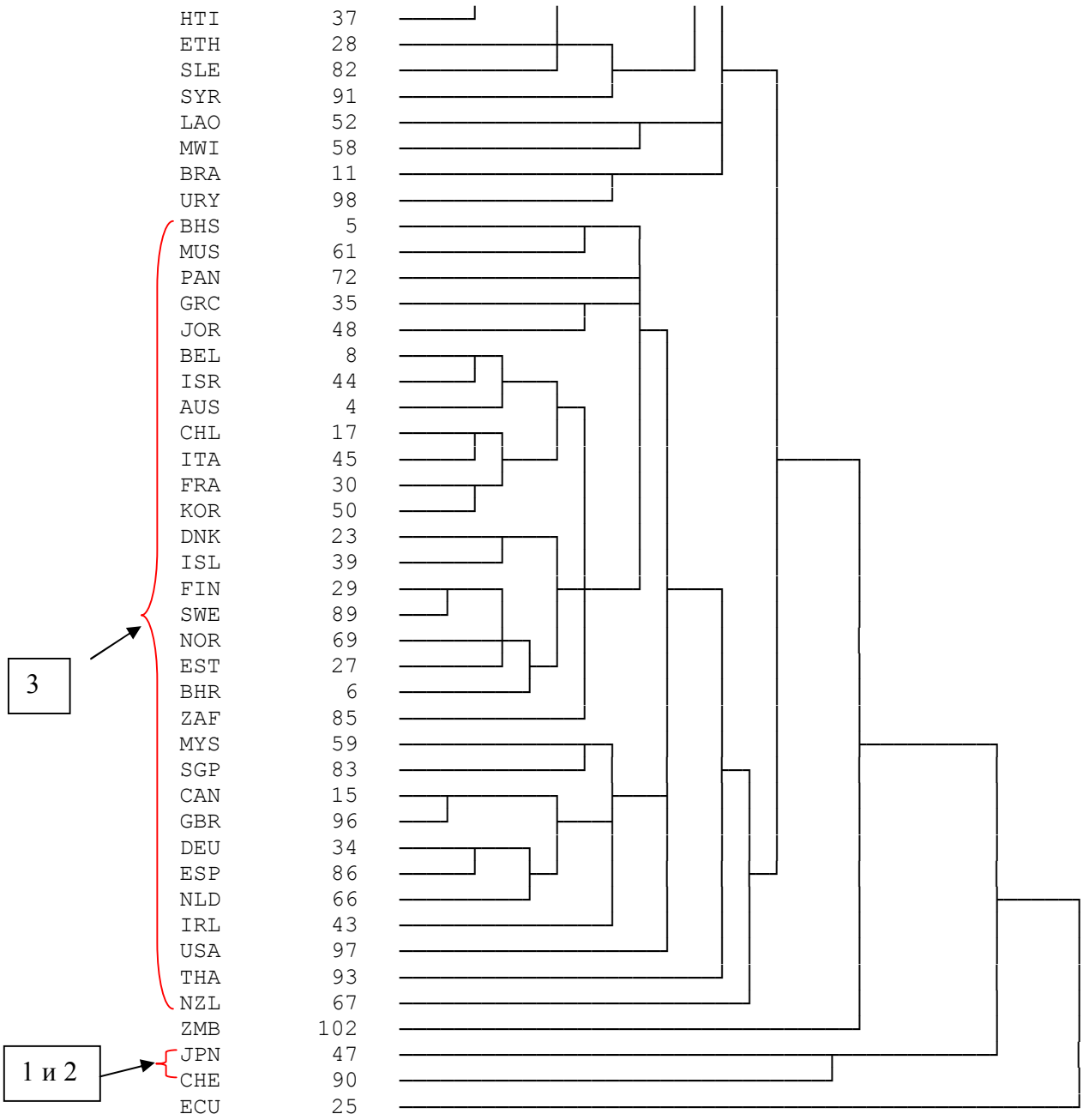
Dendrogram for cluster analysis without IVs




BWA 11
BDI 14
MMR 67
HTI 38
JAM 47
ETH 29
LAO 53
MOZ 66
GMB 33
MWI 60
ARG 2
URY 102
BRA 12
SLE 86
ZMB 106
SYC 85
SYR 95
FRA 31
ITA 46
CHL 18
KOR 51
BRB 8
BEL 9
AUS 4
ISR 45
GRC 36
NOR 72
SWE 93
FIN 30
DNK 24
ISL 40
ZAF 89
JOR 49
SGP 87
DEU 35
ESP 90
CAN 16
GBR 100
NLD 69
IRL 44
MYS 61
USA 101
THA 97
MAC 57
CHE 94
NZL 70
JPN 48
ECU 26

Dendrogram for cluster analysis with IVs




HTI 37
ETH 28
SLE 82
SYR 91
LAO 52
MWI 58
BRA 11
URY 98
BHS 5
MUS 61
PAN 72
GRC 35
JOR 48
BEL 8
ISR 44
AUS 4
CHL 17
ITA 45
FRA 30
KOR 50
DNK 23
ISL 39
FIN 29
SWE 89
NOR 69
EST 27
BHR 6
ZAF 85
MYS 59
SGP 83
CAN 15
GBR 96
DEU 34
ESP 86
NLD 66
IRL 43
USA 97
THA 93
NZL 67
ZMB 102
JPN 47
CHE 90
ECU 25
3
1 и 2

References

1. Alicia García Herrero, Javier Santillán Sonsoles Gallego, Lucía Cuadro and Carlos Egea, "LATIN AMERICAN FINANCIAL DEVELOPMENT IN PERSPECTIVE" — Banco de España

2. Angelos A. Antzoulatos, John Thanopoulos, Chris Tsoumas, "Financial System Structure, Change and Convergence: Evidence from the O.E.C.D. Countries" — University of Piraeus 80 Karaoli & Dimitriou street Piraeus 18534, Greece.

3. Angelos A. Antzoulatos, John Thanopoulos, Chris Tsoumas, "Financial System Structure, Change and Convergence: Evidence from the O.E.C.D. Countries" — University of Piraeus 80 Karaoli & Dimitriou street Piraeus 18534, Greece.

4. Benoit Mandelbrot and Richard L. Hudson, The (Mis)behavior of Markets: A Fractal View of Risk, Ruin, and Reward — Basic Books, 2004

5. Bottazzi L. "The Role of Venture Capital in Alleviating Financial Constraints of Innovative Firms" — European Investment Bank Papers. 2009. Vol. 14 (2). P. 44.

6. Chaos and Order in the Capital Markets: A New View of Cycles, Prices, and Market Volatility, Second Edition by Edgar E. Peters John Wiley and Sons, Inc, 1996

7. Cristina Ruzaa, Rebeca de Juanb, "A new appraisal of the Structure of European Banking Systems", Facultad de CC. Económicas y Empresariales, UNED, Paseo Senda del Rey, nº 11, 28040 Madrid, Spain

8. Djankov, McLiesh and Shleifer, "Private Credit in 129 Countries" – Journal of Financial Economics, May 2007.

9. Franklin Allen, Douglas Gale, Comparing Financial Systems — MIT Press, 2001, ISBN 0262511258

10. Hyman Minsky, John Maynard Keynes — McGraw-Hill Professional. ISBN 978-0-07-159301-4 или Davidson, Paul

11. Hyman Minsky, Stabilizing an Unstable Economy — McGraw-Hill Professional. ISBN 978-0-07-159299-4, 2008

12. Irena Grosfeld, “COMPARING FINANCIAL SYSTEMS PROBLEMS OF INFORMATION AND CONTROL IN ECONOMIES IN TRANSITION” — CASE Research Foundation, Warsaw 1994

13. J. Stiglitz, The Roaring Nineties: A New History of the World's Most Prosperous Decade (2003).

14. La Porta, R., Lopez-de-Silanes, F., Shleifer, A. and Vishny, R.W. (1997) “Legal Determinants of External Finance” — *Journal of Finance* LII (3): 1131-1150.

15. Laurent Calvet & Adlai Fisher & Benoit Mandelbrot, 1997 "Large Deviations and the Distribution of Price Changes," — Cowles Foundation Discussion Papers 1165, Cowles Foundation for Research in Economics, Yale University

16. Levine, R. (2002), “Bank-Based or Market-Based Financial Systems: Which is Better?” — William Davidson Working Paper Number 442, p. 1-45.

17. Mayer, C. (1990), "Financial Systems, Corporate Finance, and Economic Development." In R. G. Hubbard (ed.),Asymmetric Information, Corporate Finance and Investment (pp. 307332). Chicago: University of Chicago Press.

18. The Keynes Solution: The Path to Global Economic Prosperity - Palgrave=McMillan. ISBN 978-0230619203

19. Thorsten Block, “Financial Systems Innovations and Economic Performance” — MERIT-Infonomics Research Memorandum Series, 2002.

20. Thortsen Beck and Asli Demirgüç-Kunt, "Financial Institutions and Markets Across Countries and over Time: Data and Analysis" — World Bank Policy Research Working Paper No. 4943, May 2009

21. Werner Hölzl , “CONVERGENCE OF FINANCIAL SYSTEMS: TOWARDS AN EVOLUTIONARY PERSPECTIVE” — Research Group Growth and Employment in Europe, and Department. of Economics, VWII University of Economics and Business Administration (WU)