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Recently, the remarkable trend upon central bank independence and the efficient monetary policy were seriously highlighted in the monetary economics field. Starting from 1990s' central bank independence was at the core of policy making and central banking problems, because of the widespread economical, political, personal and budgetary autonomy of the central bank. Nowadays, we can observe an increasing trend upon central bank transparency, for evaluating more accurate the central bank's performances by the wide public, mass-media and financial markets. Consequently, a central bank must encompass a high degree of accountability and responsibility, because of the final liability in case of failure. In this paper we present, analyze and assess the construction of the most important indices regarding central bank independence, transparency and accountability in a chronological manner, presenting also the advantages and disadvantages of these indices related to actual practices of central banks. Moreover, we analyze the analytical results of the empirical testing of these indices with a considerable impact upon the developed and developing country group. In regard with the empirical results of different authors, we suggest the importance and the necessity for constructing an aggregate index for measuring central bank independence, transparency and accountability, based on de jure stipulations and the actual practices of the central banks.

Keywords: Central Bank Credibility, Public Accountability, Transparency, Monetary Policy.

JEL Classification: E50, E52, E58.

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1. Introduction

Given their specific characteristics and attributes, central banks started to function in an increasing number of countries. At the end of the 19th century there were only 18 such institutions, while by the beginning of the 21th century their number has grown to 173. Although the first central banks were government banks, they progressively incorporated functions that turned them into the bank of the banks of the 20th century. This historic role they were assigned changed during the 1990s as they were gradually required to become more independent from government control. The transformation has affected the majority of these institutions, 34 central banks adopting new statues.

Over the last 20 years, many countries around the world have implemented institutional reforms which grant their central banks more independence from the political process. Kydland and Prescott (1977) and Barro & Gordon (1983) work on time inconsistency problem in monetary policy, together with Rogoff's (1985) suggestion that a central bank with more inflation averse preferences can make a low and stable inflation policy credible, are the theoretical rational for these central banks reforms.

According to Siklos (2008), Spinesi (2009) and Williams (2009) the notion of independence is a misleading description of the position that monetary authority involves in the affairs of the state. An institution that is entirely owned by the government can, at best, be autonomous but not entirely independent form the government. Other authors like Gabillon & Martimort (2004), Yang (2008) and Mixon & Upadhyaya (2004) suggest that the proponents and opponents of central bank autonomy cannot agree on why such an arrangement is beneficial to society.

Forder (2005) considers central bank's autonomy a convenient policy that suits certain governments when convenient, while Cukierman (1992) and Eijffinger & de Haan (1996) view the device as an important ingredient that can lead to a permanent reduction in inflation.

Moreover, Siklos, Bohl, Wohar (2010) suggest that in the aftermath of the financial crises a special focus must be attached to the financial stability system, its measurement and its implications and in the near future towards a monetary policy strategy based on delivering low and stable inflation, and the prospects of replacing it with price-level targeting.

Croitoru (2012) debates upon the possibility that central bank must counter-react over the effusive asset prices increases, since they could end with severe financial crises and consequently pushing the economy into liquidity trap and monetary policy ex post acting. It would see more appropriate that instead of lower and stable inflation level the central bank must tackle a moderate and stable inflation.

Summarizing, the recent trend of literature upon central banking and monetary economic stands for the delegation of the monetary policy tasks to a bureaucracy that is independent of both politicians and the industry sector and consequently being accountable to Parliament, mass-media and wide public for the discharge of its functions.

Finally, in this paper we highlighted the recent empirical trend towards a more independent, transparent and accountable central bank with a special focusing on the bureaucracy literature with a direct impact on central bank credibility, authority and reputation policy. Moreover, we took into account the most important indices for measuring central bank independence, transparency and accountability, in order to assess the final impact over the central bank credibility and to foreseen the most important need to construct and aggregated index for measuring central bank independence, transparency and accountability, with a special focus on both de jure and de facto central banking aspects.

2. Central Bank Independence, Transparency and Accountability: Theoretical Framework

Nowadays, central bank independence is seen as a premise in attaining the objectives which have been traditionally attributed to central banks – especially those of attaining price stability. However, the rationale behind central bank independence is, sometimes, misunderstood, fact that will lead, especially in the developing and emerging countries, political authorities not being fully fledged of it's importance and significance. Central bank independence does not suppose, literally, independence from the government, because, especially in the emerging and developing countries central banks are part of the government. The relationship between government and central banks is in practice, more complex that the independence term emphasis.

The concept of central bank transparency is, sometimes, included in the accountability definition. According to this statement, there are two different views: one which considers transparency as a prerequisite for accountability, and the other one, which sustains the fact that transparency is solely a consequence of the accountability process. Although these two concepts are related, accountability needs to encompass the qui pro quo status of the central bank in fulfilling its' tasks and targets. However, central bank transparency represents the overall tool of society, media, financial markets and wide public in establishing whether the central banks have reached their objectives and agendas within the presence of: clarity, truthfulness, efficiency and deontic powers. In this sense, it can be remarked the existed distinction between transparency as an accountability premise, and transparency as a consequence of the accountability act. Transparency, although it is connected with accountability, must be analyzed distinctly. Due to the fact that central bank is accountable and must sequi some precise objectives (especially price stability), transparency represents the instrument conceived for attaining these objectives more rapidly. Attaining these objectives will be facilitated through improving the communication process over the society, of the actions and targets, which need to be undertaken for their fulfillment. The transparency effects must be seen as higher than accountability and efficiency upon the market impacts.

The response of a standard monetary policy over some inflationary biases, caused by a discretionary monetary policy constitutes the delegation of monetary policy to an independent institution and consequently accountable. Accountability means a responsible behavior of the central bank beyond its obligations imposed by legislation; this means that it is remarked when the central bank feels accountable for explaining the undertaken monetary policy actions. Accountability means a powerful tool in establishing the democratically political order. Because the actions and activities engaged by the central banks affect the entire economic, social and political community, central banks must be the subject of the scrutiny of the citizens and their elective representative, especially Parliament, which is, certainly, the most democratically institution in a modern country. Central banking must be the subject of the so-called "political order" in which day-to-day decisions of politicians and decision makers must not affect the conduct of monetary policy. Thus, accountability and consequently responsibility must encompass a shape of civil and moral obligations of the central banks enriched with deontic powers by the authorities, and must be taken apart of the so-called "economic order" that many politicians create by exerting their power to achieve short-term gains.

The society is in a motus perpetuus and its' preferences are changing rapidly, phenomenon which is extremely expensive for delegating the decisions to an independent institution. This is because society finds itself in a difficult position in order to specify clearly its objectives, as the preferences can be changed therefore the society will be in a position in which it cannot discard its officials. However, it can be noticed that central bank independence is an important condition for a long-run path of price stability (Dumiter, 2009).

Careless the way in which the central bank commitment is expressed, lack of transparency risk depends on the influence exerted on the central bank by the political sphere. At first sight, the solution is simple: granting central bank independence from the political power. However, central bank independence raises a series of problems. The main idea is that behind legal independence it can be shadowed a political abetment or a bureaucratic-political privileges exchanges (Cerna, 2012).

Specialists like Adolph (2013, p. 3) see the central bank as a bureaucratic organization and debates the delegation and institutions in political economy:" if models and measures of bureaucratic preference can shed new light even on monetary technocrats, there is little doubt the same techniques will reveal new insights about regulators and policy implementers in all corners of the state". Ciccarone & Marchetti (2012) reveal the fact that in cases in which uncertainty is reflected in central bank's degree of conservativeness, the incentive contracts do not eliminate the inflation bias which may be positive or negative.

Another very insightful study regarding the important nature of central bank independence represents the studies of Carlo Tognato. In the ultimate study the author highlights the symbolical performances of the cultural impact of central bank independence:" in the light of such challenges, understanding the link between legitimacy, public support and central bank independence may turn out to be a valuable asset. So far, scholars and practitioners have intuitively perceived that culture may have something to do with it and have even coined a concept – that of stability culture – to refer to that link....Stability cultures, in other words, are simply described as cultures conducive to macroeconomic stability...Independent central banks, as a result, find it easier to keep inflation under check, because their societies more willingly accept the sacrifices that come along with a tight monetary policy" (Tognato, 2012, p. 3).

A successful decision – making process is an institutional problem bounded upon the artisans responsible for the decision. Lately, economists have come to tackle a central bank archetype: independence beyond the political agenda, accountability upon society, transparency in fulfilling its tasks and a more efficient and complex communication mechanism (Dumiter, 2011).

The success of monetary policy decisional process is an institutional problem strictly tied by the people responsible of the decision-making process (Laurens, Arnone, Segalotto 2009; Siklos, Bohl, Wohar 2010). In the last decades, specialists have come to the best practice way for a successfully central bank: independence from the political pressures, accountability over the society, transparency beyond its actions and an efficient mode of communicating with the financial market and wide public.

From these elements independence is the most important one, because accountability, transparency and the communication channels become crucial only after granting independence to the central banks (Oritani, 2010). The ways in which these objectives are attained depends, essentially, upon the local culture, different in several countries, but with some universal elements (Ingves, 2011). First, raising central bank credibility by the public announcement of the central bank targets; second, regularly publishing the central bank's macroeconomic indicators.

3. Former Indices of Central Bank Independence, Transparency and Accountability

The research methodology in this article is based on the observation of the most important features of central bank independence, transparency and accountability indices. The survey intends to tackle the soundness and sensitivity on the empirical results by making a framework of measuring these institutional characteristics in the developed and developing countries. This fine-tuning observation process is a qualitative one for observing the main patterns of constructing indices for measuring central bank independence, transparency and accountability in countries with different development stages and in different time periods.

The central bank independence indices were the first indices constructed in order to evaluate the degree of de jure central bank independence. *Table 1* summarized the chronological development of the de jure central bank independence indices. As we can see, Bade & Parkin (1988) was the first attempt to evaluate central bank independence, the index based on two pillars: political and financial independence measured only in 12 industrial countries. Grilli, Masciandaro & Tabellini (1991) index was a more complex and comprehensive index based on two pillars: economical independence and political independence and extended to 18 industrial countries study.

Table 1

De Jure and De Facto Central Bank Independence Indexes

Index	Index pillars	Main variables	Countries
A. Bade &Parkin (1988)	A1. Political Independence	A1.1. Final authority. A1.2. The presence of the Government representative in the central bank Board. A1.3. The degree in which the Government appoints the Board members. A1.4. Board members' number. A1.5. Board members' tenure. A1.6. Central Bank Governor's tenure.	12 developed countries
	A2.Financial Independence	A2.1. Financial and Fiscal Independence. A2.2. The authority which stipulate the check and balances of the Board members. A2.3. The authority which determines the profit distribution.	
B. GMT (1991)	B1. Economical Independence	B1.1. Budgetary deficit monetary financing. B1.2. Monetary policy instruments.	18 developed countries
	B2. Political Independence	B2.1. Governor's and Board members' appointments. B2.2. The relationship between central bank and Government. B2.3. The fundamental law.	
C. LVAU & LVAW (1992)	-	C1. Governor. C2. Monetary policy making process. C3. Monetary policy objectives. C4. Limits upon the unguaranteed borrowings. C5. Limits upon guaranteed borrowings. C6. Terms of lending. C7. Potential beneficiaries of the central bank borrowings. C8. Imposed limits upon the central banks borrowings. C9. Maturity of loans. C10. Restriction on interest rates. C11.Prohibition on lending on primary market.	68 developed and developing countries.
D. TOR (1995)	-	Turn over rate of central bank Governor	19 developed countries. 39 developing countries.

Source: Own preparation, based on Bade & Parkin (1988), Grilli, Masciandaro & Tabellini (1991), Cukierman et al. (1992), Cukierman & Webb (1995).

The most complex central bank de jure independence indices were those constructed by Cukierman (1992) and Cukierman et al. (1992) – LVAU and LVAW – and examine more precisely and complex the central bank independence issue in the personal independence field, monetary policy objective, monetary policy decision-making process and budgetary independence; the authors extended also the sample of countries to 68 developed and developing countries. In response of the criticism for the gap between de jure and de facto central bank independence Cukierman (1992) and Cukierman & Webb (1995) developed indices based on actual practices of the central bank (Turn Over Rate of the Governor and Political Vulnerability of Governor) in order to evaluate more accurate actual central bank independence practices.

The indices constructed by several authors upon measuring central bank accountability rose from the idea that the conceptual differences translated into transparency excludes or includes from the accountability index. The index constructed by Briault, Haldane & King (1996), de Haan, Amtenbrink & Eijffinger (1998), Bini-Smaghi & Gros (2001) and Siklos (2002) are presented in *Table 2*. It must be noted that the sources of information used by these authors are taken from the central bank statues.

Table 2

Ex Ante and Ex Post Central Bank Accountability Indexes

Index	Index pillars	Main variables	Countries
A. Briault, Haldane& King (BHK) (1996)	-	A1. Is the central bank subject to external monitoring by Parliament? A2. Are the minutes of meetings to decide monetary policy published? A3. Does the central bank publish an inflation or monetary policy report of some kind, in addition to standard central bank bulletins? A4. Is there a clause that allows the central bank to be overridden in the event of certain shocks?	20 developed countries[a] and European Central Bank
B. de Haan, Amtenbrink & Eijffinger (HAE) (1998)	B1. Ultimate objectives of monetary policy.	B1.1. Does the central bank law stipulate the objectives of monetary policy? B1.2. Is there a clear prioritization of the objectives? B1.3. Are the objectives clearly defined? B1.4. Are the objectives quantified (in the law or based on document the law)?	20 developed countries[a] and European Central Bank
	B2. Transparency of actual monetary policy.	B2.1. Must the central bank publish an inflation or monetary policy report of some kind, in addition to standard central bank bulletins/reports? B2.2. Are minutes of meetings of the central bank board made public within a reasonable time? B2.3. Must the central bank explain publicly to what extent it has been able to reach its objectives?	

Index	Index pillars	Main variables	Countries
	B3. Final responsibility for monetary policy.	B3.1. Is the central bank subject to monitoring by parliament? B3.2. Has the Government the right to give instructions? B3.3. Is there some kind of review in the procedure to apply the override mechanism? B3.4. Has the central bank the possibility for an appeal in case of an instruction? B3.5. Can the central bank law be changed by a simple majority in parliament? B3.6. Is past performance a ground for dismissal of a central bank Governor?	
C. Bini-Smaghi & Gros (BS-G) (2001)	C1. Ex ante accountability.	C1.1. Clear definition of the objective of price stability. C1.2. Announcement of the operational target. C1.3. Announcement of intermediate target. C1.4. Announcement of indicators for assessing monetary policy. C1.5. Explanation of how monetary policy targets affect other policies and objectives.	20 developed countries[a] and European Central Bank
	C2. Ex post accountability.	C2.1. Publication of data on intermediate target or explanation of possible deviation. C2.2. Publication of inflation forecast and deviation from inflation target. C2.3. Explanation of main policy measures and underlying reasons. C2.4. Explanation of how these measures affect other policies. C2.5. Regular public reports. C2.6. Hearings in Parliament.	
	C3. Accountability procedures.	C3.1. Participation of government representative at meeting of the decision-making bodies as observers. C3.2. Publication of summary minutes. C3.3. Publication of detailed minutes. C3.4. Publication of the votes of the members of the decision-making bodies.	
D. Siklos (2002)	-	D1. Clarity of the objective. D2. Quantification of objective. D3. Publication of an economic outlook. D4. Publication of statement of accountability and ultimate responsibility for monetary policy. D5. Conflict resolution procedures. D6. Reporting mechanisms and procedures. D7. Decision-making structure. D8. Gives explicit advice to government. D9. Clear and detailed explanation of appointment procedures. D10. Regular appearances before parliament? D11. Is the central bank subject to possible interference in the conduct of monetary policy? D12. Who sets the objectives of monetary policy?	20 developed countries[a] and European Central Bank

Source: Own preparation, based on Briault, Haldane & King (1996), de Haan, Amtenbrink & Eijffinger (1998), Bini-Smaghi & Gros (2001), Siklos (2002), Laurens, Arnone & Segalotto (2009).

Note: [a] Australia, Austria, Belgium, Canada, Denmark, Finland, France. Germany, Ireland, Italy, Japa, New Zeeland, Netherland, Norway, Portugal, Spain, Switzerland, Sweden, United Kingdom, United States.

Regarding central bank accountability indices we can observe the following: the first attempt to evaluate the degree of central bank accountability was the index of Briault, Haldane & King (1996) upon 21 developed countries and having a simple four variables concerning: the external monitoring of the central bank, publishing the meetings of the monetary policy council, publishing central bank information in regular publications and the existence of an overridden mechanism in case of certain shocks. de Haan, Amtenbrink & Eijffinger (1998) elaborated a complex index base on three main pillars (ultimate objectives of monetary policy, transparence of some actual monetary policy and final responsibility for monetary policy) and 13 variables for evaluating the degree of accountability in 21 developed countries. Bini-Smaghi & Gros (2001) have constructed a very interesting indicator based on three pillars (Ex ante accountability, ex post accountability and Accountability procedures) with 15 variables in order to evaluate more complex and accurate the degree of accountability in 21 developed countries. Siklos (2002) extrapolates the previous indices and developed and index having 12 variables measured in 21 developed countries and focusing upon the clarity of objectives, decision-making process, reporting mechanisms and conflict resolution procedures.

The indices for measuring central bank transparency have been conceived several years after the indices of central bank independence. Through the indices for measuring central bank transparency reflects the amount of information released by the central banks, the quality and clarity of this information, the complexity of the central banks' websites, the degree of openness regarding the financial markets, media and the wide public. *Table 3* summarizes the main central bank indicators chronologically presented also their principal variables.

The first attempt in measuring central bank transparency is Siklos' (2002) index which offers 11 variables regarding the supply of information, the understanding of the monetary policy process, procedural transparency and central bank autonomy and responsibility.

Eijffinger & Geraats (2002 [2004]) has distinguished five types of transparency: political, economical, procedural, policy and operational. Eijffinger & Geraats used a normalization technique the minimum score being 0 and the maximum score 1.

Stasavage (2003) has created an index based on a questionnaire with four questions: first - regard the publications form of forecast, second - the publication of the forward-looking analyzes, third - publishing the forecast risks, fourth - the discussion about the past forecast errors.

de Haan & Amtenbrink (2003) developed an index based on three main pillars: objectives (clear objectives, clear priorities, clear definition, clear time horizon, quantification), strategy (announcement of strategy, interest rate decision immediately announced and always explained, inflation forecast), communication strategy (parliamentary hearings, frequency of reports, meeting schedule, press conferences/press releases, publication of minutes, publication of individual votes).

Dumiter, F. C. (2014).
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Table 3

Central Bank Transparency Indexes

Index	Index pillars	Main variables	Countries
A. Siklos (2002)	-	A1. Publication of minutes of central bank meetings. A2. Key assumptions in generating outlook. A3. Publication of committee voting record. A4. Regular information published about how monetary policy decisions are made and their justification. A5. Operational instrument of monetary policy. A6. Instrument independence. A7. Are monetary policy and operational objectives the same? A8. Special recognition of the role of financial system stability. A9. Economic modeling procedures. A10. Forms of communication. A11. Publication of a monetary policy strategy and/or limits of monetary policy.	*20 developed countries[a] and European Central Bank*
B. Eijffinger & Geraats (2002/ 2004)	B1. Political Transparency.	B1.1. Is there a formal statement of the objective(s) of monetary policy with an explicit prioritization in case of multiple objectives? B1.2. Is there a quantification of the primary objective(s)? B1.3. Are there explicit institutional arrangements or contracts between the monetary authorities and the government?	*20 developed countries[a] and European Central Bank*
	B2. Economical Transparency.	B2.1. Are the basic economic data relevant for the conduct of monetary policy publicly available? B2.2. Does the central bank disclose the formal macroeconomic model(s) it uses for policy analyses? B2.3. Does the central bank regular publish its own macroeconomic forecast?	
	B3. Procedural Transparency.	B3.1. Does the central bank provide an explicit policy rule or strategy that describes its monetary policy framework? B3.2. Does the central bank give a comprehensive account of policy deliberations within a reasonable amount of time? B3.3. Does the central bank disclose how decisions on the level of its main operating instrument/target were reached?	
	B4. Policy Transparency.	B4.1. Are decisions about adjustments to the main operating instrument or target promptly announced? B4.2. Does the central bank provide an explanation when it announces policy decisions? B4.3. Does the central bank disclose an explicit policy inclination after every policy meeting or an explicit indication of likely future policy actions?	

Index	Index pillars	Main variables	Countries
	B5. Operational Transparency.	B5.1. Does the central bank evaluate to what extent its main policy operating targets have been achieved? B5.2. Does the central bank regularly provide information on macroeconomic disturbances that affect the policy transmission process? B5.3. Does the central bank regularly provide an evaluation of the policy outcome in light of its macroeconomic objectives?	
C. Stasavage	-	C1. What is the form of publication of forecasts? Is it words only or is it presented in terms of numbers? C2. Does the central bank publish forward-looking analysis in standard bulletins on at least an annual basis? C4. Is there a discussion of past forecast errors, and if so is this a standard feature of discussion?	*21 OECD countries.* *countries.*
D. de Haan & Amtenbrink (2003)	D1. Objectives.	D1.1. Clear objectives. D1.2. Clear priorities. D1.3. Clear definition. D1.4. Clear time horizon. D1.5. Quantification.	*20 developed countries[a] and European Central Bank*
	D2. Strategy.	D2.1. Announcement of the strategy. D2.2. Interest rate decision immediately announced and always explained. D2.3. Inflation forecast.	
	D3. Communication strategy.	D3.1. Parliamentary hearings. D3.2. Frequency of reports. D3.3. Meeting schedule. D3.4. Press conferences/press releases. D3.5. Publication of minutes. D3.6. Publication of individual votes.	

Source: Own preparation, based on Siklos (2002), Eijffinger & Geraats (2002[2004]), Stasavage (2003), de Haan & Amtenbrink (2003), Laurens, Arnone & Segalotto (2009).

Note: [a] Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japa, New Zeeland, Netherland, Norway, Portugal, Spain, Switzerland, Sweden, United Kingdom, United States.

4. Empirical results of measuring central bank independence, transparency and accountability by alternative indices

After the presentation of the different indices for measuring central bank independence, transparency and accountability it is very important to analyze and assess their clarity, conformity and soundness in order to establish their advantages and disadvantages.

Table 4 reveals the measuring of central bank independence according to the following indices: Bade & Parkin (1977), Bade & Parkin (1988), Alesina (1988, 1989), Grilli, Masciandaro &

Tabellini (1991). Bade & Parkin (1977) measured 12 industrial countries having the following score: the most independent central banks are those of Switzerland and Germany (4 points) followed by United States (3 points) and Netherlands (2 points), the rest of the countries obtain just one point. The Bade & Parkin (1988) index measure also 12industrial countries but the results are quite different: Switzerland and Germany (4 points), Japan and United States (3 points), and the less independent central bank had been Australia (1 point). Alesina (1988, 1989) measured 17 developed countries with the following results – at the top of the hierarchy are Germany, Switzerland, United States and Japan while at the bottom are Spain, New Zeeland, Australia and Italy. The GMT (1991) index measured in 18 developed countries registered the following results: according to the political index countries as: Italy, Canada, United States, Netherlands, Switzerland & Germany has the highest score, while according to the economical index, Australia, Denmark, Canada, Belgium, United States, Switzerland, Germany and Austria foster the most independent central banks.

Table 4

Central Bank Independence Alternative Indexes - Empirical Results

Country	Bade & Parkin (1977) Independence Index	Bade & Parkin (1988) Independence Index	Alesina (1988, 1989) Independence Index	GMT (1991) Political Index	GMT (1991) Economical Index
Italy	1	2	1/2	4	1
Spain	-	-	1	2	3
New Zeeland	-	-	1	0	3
United Kingdom	1	2	2	1	5
Finland	-	-	2	-	-
Australia	1	1	1	3	6
France	1	2	2	2	5
Denmark	-	-	2	3	5
Sweden	1	2	2	-	-
Norway	-	-	2	-	-
Canada	1	2	2	4	7
Belgium	1	2	2	1	6
United States	3	3	3	5	7
Japan	1	3	3	1	5
Netherlands	2	2	2	6	4
Switzerland	4	4	4	5	7
Germany	4	4	4	6	7
Austria	-	-	-	3	6
Greece	-	-	-	2	2
Ireland	-	-	-	3	4
Portugal	-	-	-	1	2

Source: Own preparation, based on Bade & Parkin (1977), Bade & Parkin (1988), Alesina (1988, 1989), Grilli, Masciandaro & Tabellini (1991).

Table 5a and *Table 5b* encompass the most complex de jure independence indices (LVAU – the un-weighted index and LVAW the weighted index) reveal the most complex and comprehensive analyses regarding central bank independence measuring 28 developed and 28 developing countries. The result shows that LVAU and LVAW are comprehensive indices only in developed countries because the jure independence complies with the de facto independence but not comprehensive in developing countries where central bank laws differ from actual practices. Because of this situation, Cukierman & Webb (1995) developed the TOR (turn over rate) – an actual behavior indicator – measured as the changes in the Governor tenure during its mandate. *Table 5b* suggests that with a few exceptions, the developing country group foster higher turnover rates of central bank Governors in almost cases which shows a political influence and instability.

Table 5a

LVAU, LVAW and TOR Indexes - Empirical Results for Developed Countries

Country	LVAU	LVAW	TOR
Switzerland	0.66	0.76	0.13
Germany	0.63	0.68	0.10
Sweden	0.62	0.65	0.15
Malta	0.61	0.71	0.28
France	0.59	0.70	0.15
Belgium	0.57	0.67	0.13
United Kingdom	0.56	0.42	0.10
Netherlands	0.54	0.55	0.05
Slovenia	0.53	0.60	0.23
Spain	0.53	0.63	0.20
Austria	0.52	0.63	0.10
Finland	0.52	0.63	0.13
Canada	0.49	0.44	0.10
Greece	0.47	0.70	0.18
United States	0.46	0.51	0.13
New Zeeland	0.44	0.32	0.15
Portugal	0.44	0.47	0.16
Ireland	0.39	0.36	0.15
Luxemburg	0.39	0.39	0.08
Israel	0.38	0.39	0.14
Australia	0.36	0.34	0.10
Iceland	0.35	0.43	0.03
Italy	0.34	0.38	0.08
Denmark	0.32	0.47	0.05
Japan	0.31	0.39	0.20
Korea	0.30	0.39	0.43
Singapore	0.26	0.24	0.37
Norway	0.19	0.19	0.08

Source: Cukierman (1992), Cukierman et al. (1992), Cukierman & Webb (1995).

Table 5b

LVAU, LVAW and TOR Indexes - Empirical Results for Developing Countries

Country	LVAU	LVAW	TOR
Poland	0.94	0.95	0.19
Bulgaria	0.86	0.77	0.16
Hungary	0.77	0.89	0.38
Bosnia & Herzegovina	0.71	0.67	0.20
Czech Republic	0.69	0.73	0.23
Romania	0.66	0.53	0.16
Serbia	0.64	0.49	0.20
Moldova	0.63	0.72	0.20
Lithuania	0.61	0.76	0.20
Macedonia	0.57	0.67	0.16
Estonia	0.57	0.68	0.33
Russia	0.57	0.64	0.25
Slovak Republic	0.56	0.52	0.23
Turkey	0.55	0.64	0.40
Argentina	0.56	0.54	0.66
Chile	0.55	0.60	0.45
Croatia	0.54	0.57	0.25
Albania	0.52	0.50	0.14
Latvia	0.50	0.61	0.13
Ukraine	0.47	0.63	0.25
Egypt	0.43	0.50	0.31
Peru	0.41	0.61	0.33
Montenegro	0.39	0.48	0.16
Mexico	0.33	0.41	0.15
South Africa	0.32	0.45	0.10
Belarus	0.30	0.30	0.30
Columbia	0.27	0.26	0.20
Brasil	0.17	0.21	0.33

Source: Cukierman (1992), Cukierman et al. (1992), Cukierman & Webb (1995).

Table 6 reveals the importance of measuring central bank accountability with several indices. Briault et al. (1996) measure the accountability of 14 developed countries; as we can see the most accountable central banks are those of: Denmark, Japan, New Zeeland & United Kingdom, while the less accountable are: Belgium, France, Italy and Switzerland. De Haan et al. (1998) measure accountability in 16 developed countries. The results suggest higher accountable central banks in Australia, Canada, New Zeeland and United Kingdom, while the least accountable ones are those of Belgium, Switzerland and Germany. Siklos (2002) expanded the sample at 21 developed countries for a more accurate the degree of central bank accountability. The result show higher accountable central banks in Australia, Finland, Germany, Japan, New Zeeland, European central Bank, while at the opposite side are: Belgium, Ireland, Italy, United States and Canada.

Table 6

Central Bank Accountability - Alternative Indexes

Country	Absolute values			Normalized values		
	Briault et al. (1996)	de Haan et al. (1998)	Siklos (2002)	Briault et al. (1996)	de Haan et al. (1998)	Siklos (2002)
Australia	1,5	7	8,75	0,375	0,5385	0,7292
Austria	-	-	6,75	-	-	0,5625
Belgium	0	3	3,5	0	0,2308	0,2917
Canada	-	7	6	-	0,5385	0,5
Denmark	2,5	4	4,25	0,625	0,3077	0,3542
Finland	-	-	7,58	-	-	0,6317
France	1	6	6,92	0,25	0,4615	0,5767
Germany	0	3	8,83	0	0,2308	0,7358
Ireland	-	-	4,88	-	-	0,4067
Italy	1	4	4,88	0,25	0,3077	0,4067
Japan	1,5	6	9,5	0,375	0,4615	0,7917
New Zeeland	3	10	10	0,75	0,7692	0,8333
Netherlands	0,5	5	7,75	0,125	0,3846	0,6458
Norway	-	-	6,67	-	-	0,5558
Portugal	-	-	7,38	-	-	0,615
Spain	2	7	8,67	0,5	0,5835	0,7225
Switzerland	0	2	6,75	0	0,1538	0,5625
Sweden	2	5	7,38	0,5	0,3846	0,615
United Kingdom	3,5	11	8,25	0,875	0,8462	0,6875
United States	2	6	6,75	0,5	0,4615	0,5625
European Central Bank	-	4	8,5	-	0,3077	0,7083

Source: Briault, Haldane and King (1996); de Haan, Amtenbrink and Eijffinger (1998); Siklos (2002); Laurens, Arnone & Segalotto (2009)

Table 7 reveals the measuring of central bank transparency with three indices: Siklos (2002), de Haan & Amtenbrink (2003), Eijffinger & Geraats (2002 [2004]). According to Siklos (2002), who measured 21 developed countries, Canada, Germany, Japan, New Zeeland, Sweden, United Kingdom and United States are the most transparent central banks, while Belgium, France, Portugal and Norway have less transparent central banks. De Haan & Amtenbrink (2003) had measured only six developed countries and had reached the conclusion that United Kingdom, Canada, European Central Bank & New Zeeland are the most transparent central banks, while at the opposite side, the most opaque central banks are those of Germany and United States.

Finally, Eijffinger & Geraats (2002[2004]) measures eight developed countries in order to establish the most transparent central banks. Their results suggest that Canada, New Zeeland and United Kingdom are the most transparent central banks, while the less transparent central banks are those of Australia, Japan, United States and the European Central Bank.

Table 7

Central Bank Transparency Indexes - Empirical Results

Country	Siklos (2002)	de Haan & Amtenbrink (2003)	Eijffinger & Geraats (2002[2004])
Australia	6.5	-	8
Austria	2.7	-	-
Belgium	0.5	-	-
Canada	9.5	16	10.5
Denmark	2.5	-	-
Finland	5.5	-	-
France	2.5	-	-
Germany	8	10	-
Ireland	4.7	-	-
Italy	5	-	-
Japan	8.5	-	8
New Zeeland	9.5	16	13.5
Netherlands	7.5	-	-
Norway	6	-	-
Portugal	4.5	-	-
Spain	7	-	-
Switzerland	7.5	-	-
Sweden	10	-	12
United Kingdom	10.5	17	12.5
United States	10	11	10
European Central Bank	6	15	10

Source: Siklos (2002); de Haan & Amtenbrink (2003); Eijffinger & Geraats (2004); Laurens, Arnone & Segalotto (2009).

5. Conclusions

The empirically observed trend towards a more independent transparent and accountable central bank is supported by a large extent by modern theory of monetary policy. The main idea of different approaches is that central banks, which are independent from the government, are able to reduce the inflation bias without having to implement completely inflexible rules. However, monetary theory does not conclude that establishing an independent central bank alone leads to an improvement in social welfare. To achieve this, either the preferences of the independent central bank must differ from those of the government in an appropriate way, and/or the independently acting central bank must be provided with policy targets or incentive structures.

The main objective of this article was to identify, present and assess the main indicators of the central bank independence, transparency and accountability. The purpose was to present and assess the whole set of indicators of measuring central bank independence, transparency and accountability in a chronological manner with focusing upon the main advantages and disadvantages in measuring these three institutional characteristics in developed and developing countries. However there are several limitations of the study. First, because of the vast majorities of empirical studies the study cannot encompass all the indices developed by the authors around the globe. Second, the time periods of measuring central bank independence with de jure and de facto indicators vary from the periods of measuring central bank accountability and transparency because transparency and accountability concepts and indicators were developed after a long period since the first central bank independence indices were developed. Finally, the cross-country comparison is spurious because the whole set of the indicators could not be applied to the same set of developed countries and developing countries. Moreover in least developed countries there were lack of empirical studies and data regarding measuring central bank independence, transparency and accountability.

Analyzing central bank independence indices in a chronologically manner we can observe the deviation between central bank de jure and de facto independence in developed and developing countries. Moreover, it can be noticed that in the developed country group legal indices are used to measure central bank independence, while for developing country group variables, as turnover rate of central bank Governor and the political vulnerability of the central bank Governor, are proxies to measure actual practices. This is because in emerging and developing countries the legal frameworks differ systematically from the actual practices of the central banks.

Regarding central bank accountability indices we can observe several points of views of different authors. Moreover, the authors had measured accountability only in the developed country group, but their studies measured different sample of developed countries. The results and opinions are quite different and diverge in several points of views.

Central bank transparency has been measured by three main important authors in the economic literature regarding central banking and monetary policy. However, the experts' opinion is quite different about the best practice way of gaining a more transparent central bank. Moreover, the different sizes and complexity of samples used by different authors is another problem of measuring more accurate central bank transparency.

Finally, in order to measure more accurate the central bank independence, transparency and accountability it needs to be undertaken several actions. First, it must be constructed an overall index for measuring central bank independence, transparency and accountability based of three pillars: pillar I –encompass central bank de jure and the facto independence which must encompass variables like: appointment and dismissal procedures of the Governor and the Board members, turnover rate and political vulnerability of central bank Governor and the Board members, profit internalisation, professional background of the Board members; pillar II –

central bank transparency must variables like: the degree of openness, the capacity of generating reports and other reporting mechanism, disclosure of the main macroeconomic models used for policy analyses and quarterly time series of the main economic indicators; pillar III – central bank accountability which must encompass variables like: Governor accountability, the authority in establishing monetary policy objectives and targets, policy conflict resolution, the structure of the monetary policy committee.

Second, the index of measuring central bank independence, transparency and accountability must be constructed taking into account a normalisation technique. The index must have a scale between a range of 0 minimum level and 1 maximal level. It is important to establish also the quality and quantity of characteristics of each pillar. Another very important issue in this sense is the range of score and importance which must be encompassed to each characteristic.

In the third place, it must be measured in three types of countries: developed countries, emerging and developing countries and least developed countries in order to tackle more accurate central bank independence, transparency and accountability in the whole range of countries. The time period is very important, because central banking and monetary policy have a long-run path. In this sense it must be taken into account a long-run time horizon in order to capture the institutional shifts of the main institutional characteristics of the central banks.

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