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Measuring Central Bank Independence: Ordering, Ranking, or Scoring?

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Central bank independence (CBI)as an area for international comparison and for study by international political economists has been around for approximately two decades, spurred on by the work of Bade and Parkin (1982). It probably reached its full fruition with the work of Cukierman and others, centering on work done at the World Bank. There are others too, and we should not ignore them, but since the mid-1990s most of the work done has centered on the Cukierman-type model.

Interest in the CBI intensified after models of monetary policy found the likelihood of an inflationary bias in monetary policy operated by democratic governments. That analysis turned on the potential for monetary surprises being perpetrated by governments seeking electoral advantage. Later analysis found that if such incentives were fully anticipated by the public, inflation rates in democracies are higher than they would be if somehow government could make a credible commitment to price stability. The search began for how to establish monetary institutions that can be viewed as credible commitments. Delegation of monetary policy to an independent central bank was one strand of that exploration.

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* Forthcoming in King Banaian and Bryan W. Roberts Jr., eds, The Design and Use of Political Economy Indicators. New York: Palgrave, 2008.

It is also believed that independent central banks would reduce the scope of monetization of government budget deficits and thereby put downward pressures on deficits. (Cukierman, Webb and Neyapti 1992) argued,

> "Economists and practitioners in the area of monetary policy generally believe that the degree of independence of the central bank from other parts of government affects the rates of expansion of money and credit and, through them, important macroeconomic variables, such as inflation and the size of the budget deficit."

Over time, views of CBI have evolved as our own understanding of institutions has. Central bank structures are chosen in a political system that reflects the nature of the polity. Forder (1998) points out, for example, that statutory CBI only matters if the law conditions behavior. Posen (1993) argues that without a political coalition that wishes to have monetary stability, legal independence would not be granted. Banaian and Luksetich (2001) show that countries with more economic freedom (particularly those with greater security of private property rights) tend to choose central bank structures with greater independence.

Endogeneity issues are only one of the many discussions surrounding the measurement of CBI. Political economists have sought measures of these institutional arrangements, and while some researchers have used measures such as the turnover of central bank governors or survey data, legal independence measures continue to dominate the research agenda. These measures tend to focus on relatively large sets of central bank attributes rather than deciding which ones are more important.

In this paper, I first examine what measures are used. My argument is that in the search for a measure that can embrace the many possible dimensions of independence we have lost sight of why wish to measure CBI. Along the way, we have made decisions

regarding the scales on which we measure institutional arrangements that are arbitrary and atheoretic. An absence of theory also surrounds the decisions of averaging. Some measures use simple arithmetic averages while others place weights in ways that are difficult to justify by monetary theory.

In the second half of the paper, I appeal to theory in order to justify using a classification scheme that is lexicographic and simplified. Rather than placing central banks on a scale, I suggest placing them in broad categories; if a researcher were to choose to use an index number that was to be meaningful, one have to choose a ranking a priori of which central bank attributes mattered most. It may be that some matter more for inflation control, while others matter more for long-run economic growth (by reducing uncertainty over monetary policy) or for budget deficit control. My point is not to argue for a particular new ranking, though I will offer one. It is that the researcher cannot avoid deciding what counts, and why, by using a one-size-fits-all measure of CBI.

1 Early Measures: Ranking Central Banks

Early iterations of the CBI measure centered on two legal characteristics – the appointment process for the central bank's board, and whether or not the central bank maintained autonomy for monetary policy or whether the government held a veto. Bade and Parkin (1982) created eight classifications by marking three binary choices:

- Who has final authority for monetary policy?
- Are a majority of the members of the central bank board appointed independently of the government?

- Is there a government official on the central bank board (whether or not she or he is a voting member)?

All of these are references in one way or another to central bank autonomy. As Akhtar (1995) notes, there is no reference to the goals of the central bank, no reference to price stability. Bade and Parkin then asserted from this a rank ordering of which structures were more independent than others by adding up how many of the three choices favored the central bank's independence. Eijffinger and De Haan (1996) show that this is relatively accidental: Only four of the eight possible classifications appeared in the industrialized economies: some had none of the autonomy measures; some had only the absence of a government official on the bank board; some had the absence of a government official and final authority for monetary policy; and two had all three desirable qualities (the Bundesbank and the Swiss National Bank). They thus gave the banks scores of one to four.

Others tried to insert additional criteria. Alesina (1993) adds a fiscal dimension to this list: Are central banks required to purchase Treasury bills?[i] This is the beginning of consideration of the concept of fiscal dominance, or that governments can force even the most autonomous central bank to issue base money if it must act as a backstop for debt issuance. This would mean that such central banks may not have operational independence. A lack of operational independence also accords to central banks that are chartered to guard for "financial stability." As the problems stemming from the subprime mortgage crisis and resulting credit crunch made clear, the Federal Reserve has less than complete operational independence.[ii]

The Bade-Parkin, Alesina and Eijffinger-Schaling indexes are in fact not cardinal in any way.[iii] They describe four or five separate central bank types, as described by these three attributes. All three indexes have some agreement over the order of the bank types towards independence. Such ordering is lexicographic: Central banks that have final authority over monetary policy are always ranked ahead of those where the government has final authority (or that authority is shared, in the Eijffinger-Schaling index) regardless of the appointment process.

2 Cardinal Measurements: Cukierman and GMT

Most CBI indices that researchers use these days involve either some point count of various institutional features or some scale determined by a reading of the experts. The Grilli, Masciandaro and Tabellini index would be an example of this type. Their point count type index usually uses a yes/no choice for some institutional feature, e.g., is the chair of the central bank appointed by the country's chief executive? Does the government have a direct representative like a finance minister on the central bank board? Does the central bank's constitution specify price stability as the sole objective of central bank policy? The number of "yes" answers are summed to construct the index. Sometimes these get combined with the second, more judgmental index type to get a blended measure, as in Alesina and Summers (1993).

The Cukierman, Webb and Neyapti index is quite different from these earlier versions. It is additive of various features, as does the Grilli, Masciandaro and Tabellini index. But the CWN index places a much richer set of possible institutional arrangements along a variety of scales. Some of them will be two or three-point scales, others as high as a seven-point scale. They are then added, sometimes in an unweighted average and

other times in a weighted average (called LVAU and LVAW in their paper). For example, the conflict resolution variable included in Cukierman is a six-point scale as follows:

1. CB given final authority over issues clearly defined in the law as CB objectives.
2. Government has final authority only over policy issues that have not been clearly defined as CB goals in the case of conflict with CB.
3. In case of conflict, final decision is up to a council whose members are from CB, legislative branch and executive branch.
4. Legislative branch has final authority on policy issues.
5. Executive has final authority on policy issues, but subject to due process and possible protest by CB.
6. Executive branch has unconditional authority over policy.

These get marked as 1, 0.8, 0.6, … 0. The authors then take each of these measures and collect a set of sub-averages, and then average the sub-averages for either a weighted or an unweighted number lying between zero and one that is considered a measure of legal central bank independence.

In Table 1 I have arrayed the various components of the indexes, and shown the weights applied to each. An advantage of the GMT measurements is that the measure is an unweighted summation (though as discussed below, it assumes all values are equivalent in contributing to independence, without complementarities.) When broken down, the CWN measure has a set of weights that are

Table 1: Weightings in various central bank independence indices

	Bade/Parkin	ES 1993	C92 - LVAU	C92 - LVAW	GMT91 -- political	GMT91 -- economic
Term of office of CEO	0.000%	0.000%	3.125%	5.000%	12.500%	0.000%
Who appoints CEO	0.000%	0.000%	3.125%	5.000%	12.500%	0.000%
Dismissal provisions	0.000%	0.000%	3.125%	5.000%	0.000%	0.000%
Can CEO hold another office?	0.000%	0.000%	3.125%	5.000%	0.000%	0.000%
Other board members appointed by someone other than the government	25.000%	33.333%	0.000%	0.000%	12.500%	0.000%
Board appointment term of office	0.000%	0.000%	0.000%	0.000%	12.500%	0.000%
Government sits on CB board	25.000%	33.333%	0.000%	0.000%	12.500%	0.000%
Who forms monetary policy?	0.000%	0.000%	3.125%	3.750%	12.500%	0.000%
Conflict resolution	25.000%	33.333%	6.250%	7.500%	12.500%	0.000%
CB advises budget	0.000%	0.000%	3.125%	3.750%	0.000%	0.000%
CB objectives	25.000%	0.000%	12.500%	15.000%	12.500%	0.000%
Limits on advances	0.000%	0.000%	12.500%	15.000%	0.000%	14.286%
Limits on securitized lending	0.000%	0.000%	12.500%	10.000%	0.000%	0.000%
Who controls terms of lending	0.000%	0.000%	12.500%	10.000%	0.000%	0.000%
Width of circle of borrowers from CB	0.000%	0.000%	12.500%	5.000%	0.000%	0.000%
Lending limits	0.000%	0.000%	3.125%	2.500%	0.000%	14.286%
Maturity limits	0.000%	0.000%	3.125%	2.500%	0.000%	14.286%
Interest rate limits	0.000%	0.000%	3.125%	2.500%	0.000%	14.286%
CB prohibited from primary market	0.000%	0.000%	3.125%	2.500%	0.000%	14.286%
Discount rate set by CB	0.000%	0.000%	0.000%	0.000%	0.000%	14.286%
Bank supervision	0.000%	0.000%	0.000%	0.000%	0.000%	14.286%
Sources: C92, Cukierman (1992, p 379-80)						
GMT -- EconPolicy (1991, pp 368-370)						
Bade and Parkin (1988)						
ES93 -- Eijffinger and Schaling (1993, p.65)						

Another issue with these broader measures is the need for a broader set of judgments. In addition, some central bank laws are silent on some measures. For example, few of the 34 central bank laws offered Cukierman, Miller and Neyapti (2002) enough information to measure all sixteen instruments. In this case, the measure averages up the values into the four subcategories and then averages the subaverages in the same way as if they had all sixteen measurements of legal independence.

Further, it is quite difficult to imagine how central banks in transition economies could avoid some participation in the government debt markets. There are few countries with financial markets active enough to permit full private purchase of government debt. In Ukraine, for instance, few banks have the ability to hold any significant portion of the government's debt. The debt "market" is simply the central bank wire, the closed network of computers that connect commercial banks with the National Bank of Ukraine. The auction of treasury bonds is conducted by the NBU in conjunction with the Ministry of Finance. At some points, the NBU has acted as "buyer of last resort" in the government debt market because there were no bids available at any interest rate.iv Since that debt is dominant as well in the central bank's portfolio (with the exception of the Baltic states with their currency boards), there may be little choice for the central bank legislation than to allow some participation in the debt market.

3 The Linear Scale and Averaging

The use of linear scales and averaging to create a single number presents two issues in measurement. First, the linear scale introduces the notion that the gap between

each type of institutional arrangement within a certain measure, such as term of office, has an equal effect on independence or on inflation fighting.

So for example, the conflict resolution variable in CWN implies that every step along the path from institutional arrangement 1 to institutional arrangement 6 has the same effect, for example, on reducing inflation or on reducing budget deficits. There's no reason to believe that is true. Banaian and Luksetich (2001) show that only those central banks with the most independent of these six structures have had better inflation performance.

This is a very basic insight of econometric analysis. When using categories such as those in the conflict resolution variable above, one can agree to the ordering without agreeing what the distances between them are. But that is exactly what the CWN and CMN later do. The number created by GMT says that two central banks are "equal" in, say, political independence if each of them has six of the eight characteristics of politically independent central banks. It does not matter which six. And then one is tempted to place those numbers in a regression and derive a slope, or a partial derivative. I argue the measures are not to be used in that way. The researcher can measure the difference in means between inflation rates of countries with central banks of different types and gain insight, but the regression coefficient does not reveal anything more meaningful.[v]

As noted earlier, the CWN, CMN and GMT measures also average or add up a set of institutional values. GMT is always an unweighted average as shown in Table 1. The other two measures though, because they average subgroups and then average the sub-averages imply a set of weights. The weights are quite arbitrary. Principal components

gives much different weights, awards most of the weight on three variables. (See: Banaian, Burdekin, and Willett 1998)

An example will illustrate. CMN extended the index to 34 countries in transition from planned to market economies. Their data set gave multiple indicators for eight countries that have changed central bank laws since twice since transition began. Of those, five have changed towards giving complete final authority over meeting goals stated in the central bank law as the central bank's objectives (Armenia, Kazakhstan, Lithuania, Poland and Uzbekistan). The Central Bank of Mongolia already had that power in its earlier law. Those countries followed the lead of the Czech Republic, Estonia, Hungary, Latvia and Slovakia. So of the 26 countries, 12 now have central banks with complete autonomy. Another, Belarus, says that the government can only act against the wishes of the CB on those items not in the central bank's objectives. The remaining give the CB little autonomy, subject to either an unchecked parliamentary (5 of 12) or executive veto.

Was the grant of autonomy a wise choice? I look at the data for price depreciation (D in their paper, equal to the inverse of 1 plus the average rate of CPI inflation) for the latter subperiods, which are defined by CMN based on the date of adoption of central bank laws.[vi] Their data indicate that the countries with complete central bank autonomy have an average rate of price depreciation of 17% per year, while those with any other form of conflict resolution had an average annual depreciation rate of 37%.

Of course, the effects of price liberalization may reduce the size of that effect, as CMN demonstrate. However, the size of the effect of complete central bank autonomy may still be large. To make a good comparison, I have re-run their regression on just the

post transition periods.[vii] These regressions may be compared to their Table 3, except for not using the pre-transition sub-period. I then substituted a simple dummy variable that equals one if the central bank has complete autonomy (i.e, if CMN find that the "(central bank is given final authority over issues clearly defined in the law as CB objectives", then my autonomy variable will equal 1; otherwise it equals zero).

Table 2: Inflation and CBI in Transition Economies

Variable	Regression 1	Regression 2	Regression 3	Regression 4
Cumulative liberalization index	–.07307 (0.05)	–.08308 (0.02)	–.11543 (0.01)	–.09477 (0.01)
War Dummy	–.06471 (0.39)	0.07214 (0.32)	0.04479 (0.53)	0.06371 (0.36)
Index of internal price liberalization	–.48445 (0.19)	–.45589 (0.21)	–.47241 (0.18)	–.50993 (0.15)
CMN index ("LVAW")	–.28473 (0.14)		–.33270 (0.08)	
LVAW slope shift (for CLI > 4)			0.24414 (0.07)	
Central bank autonomy		–.09679 (0.11)		–.16563 (0.02)
Autonomy slope shift (for CLI > 4)				0.16620 (0.07)
Joint signif. of central bank measure			0.67	0.04
Adjusted R^2	.62	.63	.65	.66

p-values for significance in parentheses. Sample size = 31

The results suggest that perhaps the simple measure of central bank autonomy is as useful a measure of CBI as the fuller measure CMN employ. This result confirms what was found in Banaian, Burdekin and Willett (1995) for industrialized economies. The first and third equations replicate the first and fourth columns of their Table 3. The size and significance of most coefficients are similar, except for the index for internal price liberalization. Like CMN, I see little evidence of significant effects of CBI as measured

by their LVAW index (the p-value of 0.14 indicates a 14% probability of no significance.) The measure of central bank autonomy fares little better.

In the third and fourth columns I take advantage of CMN's insight that the effectiveness of CBI may depend on creating a price system more like those in the industrialized economies, as measured by the cumulative liberalization index (CLI). They use a slope dummy which splits the slope of LVAW at a CLI measure greater than 4. They used a cut-off at 2, but since this is a cumulative index, it will naturally have higher values in later periods. The mean value of CLI for the third sub-period is 3.42 and only five countries had values less than 2. In their example, this brings the significance of the LVAW measure in total (for a country that has liberalized prices) to about 5-6%.

CMN expected that CBI would only obtain anti-inflationary effects if the degree of price liberalization placed the country's price system more in line with those in the West. Thus, they found that "The coefficients of (CBI) at low levels of cumulative liberalization remain insignificant and the coefficient of CLI (which was significant before) becomes insignificant at conventional levels, but its sign remains negative…" (p. 20). My results show just the opposite when one resets the slope shift dummy to occur at CLI greater than four. It now appears that the effects of CBI in reducing inflation are significant only for countries that have liberalized less. For countries that have CLI > 4, the effect of CBI is nil, while the effects of CLI continue to be as strong as in those regressions without the slope shift coefficient.

It might therefore be useful to run a regression with the principal components along as CMN have. One may use the principal components and then re-arrange or "unscramble" the results to obtain coefficients on the original central bank attributes.[viii]

This appears in the next table. I dropped the third principal component (which mostly loads the ability of the CB governor to hold another office) as it was insignificant. The result of that estimation is that the conflict resolution mechanism in the central bank law and the CB's objectives are significantly correlated with a country's price depreciation. One should approach these results with due caution, however, as they are based on only 20 central banks for whom full data are available.

Table 3: Unscrambled Principal Components Analysis of CBI in Transition Economies

Variable	Coefficient	p-value
War dummy	0.089	0.34
Cumulative liberalization index	–.111	0.02
Internal liberalization	–.026	0.96
Principal component 1	0.161	0.10
Principal component 2	–.115	0.27
Constant	0.698	0.05
1. Unscrambled coefficients		
Term of office	–.071	0.12
Dismissal process	–.039	0.39
Governor can hold another office	–.008	0.61
Who formulates monetary policy	–.093	0.19
Who has final authority	–.073	0.04
Participation in budget process	–.010	0.73
Statutory objectives of CB	–.187	0.04
Adjusted R-square	0.64	
Standard error	0.118	

Dependent variable is inflation rate. See Table 2 for more details.

4 Issues with Other Measures

Some researchers have used turnover rates for central bank governors as an alternative means of testing central bank independence. The problem with this measure however is that turnover may be endogenous to economic performance (see de Haan and Kooi (2000) or Dreher, de Haan and Sturm (2006)) Central bank governors may change when governments themselves are unstable. And countries with different attitudes towards inflation (or more precisely, different dominant interest groups with different preferences for inflation) may in fact prefer longer or shorter turns in office. The importance of commercial banks would be one example.

It is somewhat of a stretch then to say that high rates of turnover of a central bank's CEO is evidence for or against independence. Central bank accountability may call for a frequent review of performance, while granting high amounts of independence in the inter-review period. It would be odd to view these reviews then as political interference.

Evidence on turnover by Cukierman (1992) found two-way causality between inflation and turnover. Dreher, Sturm and De Haan (2006) show that CEOs are replaced more often when inflation is higher, along with higher degrees of political instability and turnover and the election of left-wing governments. Again, the problem arises: Is this a measure of independence or accountability? As Eijffinger and De Haan (1996) note, a long term in office may just reflect a subservient central bank governor, while shorter terms could mean a central bank governor who stands up to the executive and/or legislative branches.

Cukierman and Webb (1995) try to refine the turnover measure by looking only at those changes in central bank CEOs that happen within six months of a change in government. Eijffinger and De Haan (1996) argue that this measure may be quite useful in developing economies, where weak rule of law may mean the central bank's legal and actual independence differ sharply.

Other attempts to measure autonomy have met with more success. For example, Oatley (1999) finds that when holding labor market structure and policy preferences of the government equal, simple measures of autonomy explain inflation outcomes better than either the GMT or CWN indices. Likewise, Banaian, Burdekin and Willett (1995) find that the absence of a government override of central bank policy outperforms the CWN index.

Fry, Goodhart and Almeida (1998) include the results of a 1996 survey of central bankers in developing countries conducted by the Bank of England. Central bankers who saw themselves as more autonomous did not finance government deficits through the inflation tax or by financial repression. Cobham, Cosci and Mattesini (2005), studying the central banks of France, Italy and the United Kingdom, rely on a different set of measures of informal CBI, defined as a central bank being able to pursue price stability when it is not the central bank's goal and without regard to government's preferences. They look at seven attributes, none of which refers to a legal document. The resulting ranking is very subjective and while interesting, the paper has so far not attracted much attention.

5 Back to the Future: A new Lexicography of Central Banks.

Thus it appears from this analysis that the two or three most important factors in determining which central bank de jure features help reduce inflation are the CB's focus on price stability and whether or not it has final authority in setting monetary policy. My strategy is to use that feature to return to a model such as Eijffinger and Schaling (1993). However, to do so requires a few adjustments to their process.

First, as central banks have focused on inflation targeting, many elements of political autonomy for central banks have ceased to have much variation between them. Arnone, Laurens and Segalotto (2006a) recoding of the GMT index in the OECD countries finds that only four countries have no provided legal protections to CBs to strengthen them in case of conflict with government. But these three of these four countries – Australia, Canada, and New Zealand – use an inflation target which is enacted by legislation or otherwise imposed by government. The same was true of the United Kingdom when inflation targeting was first introduced in 1993; the Bank of England gained independence only in 1997 after the election of the Blair government. Many countries in the OECD also placed greater emphasis in their laws on price stability. This and longer terms for CB governors constitutes a great amount of the improvement in political autonomy in OECD central banks since 1990.

This means two things. First, as noted by Arnone, Laurens and Segalotto (2006a), if the researcher uses a GMT index for central banks today, there's less variation for the OECD countries. The EMU countries all score eight of eight marks for political autonomy, and Switzerland has moved to seven of eight from the five it scored in the original coding by GMT. Second, the GMT index as recoded by Arnone et al. (2006a)

gives four of the five lowest marks to the four Anglospheric central banks, which have inflation targeting imposed by legislation or by approval of the government. (The three remaining banks are Denmark, Japan and the USA.) Among emerging market economies, there is more heterogeneity in terms of conflict resolution, but only the South African Reserve Bank does not have inflation in its charter as its primary objective. Yet it adopted an inflation-targeting rule in 2000 (for details of its relation to the government see van der Merwe (2004)).[ix]

Arnone et al. (2007) review the evidence on central bank independence and draw four "consensus views" of monetary policymakers from global trends.

1. "Set price stability as the primary objective of monetary policy." The time-inconsistency argument for inflationary bias in democratic countries has led to broad agreement on the establishment of price stability as the sole goal as part of a credible commitment.
2. "Curtail direct lending to governments." Consensus has formed among central bankers that any lending to government should be temporary, restricted by amount and subject to market rates of interest.
3. "Ensure full autonomy for setting the policy rate." This implies both instrument independence (in the sense of Debelle and Fisher (1995)) and a consensus that a short-term interest rate is the best operational target for monetary policy.
4. "Ensure no government involvement in policy formulation." There should be no veto by government in the decisions, and the structure of central

bank laws should strengthen the position of the central bank when conflicts arise with the government.

I argue that this list constitutes an effective set of categories for classification of central banks. Rather than develop a new system of weights and steps, the method I propose takes these four consensus views and creates a category indicating which of these each country's central bank has adopted, along the lines of Eijffinger and Schaling (1993) and Schaling (1995, chapter 3), who create eight potential central bank structures but discover only five of the eight were adopted by any of the central banks of the OECD countries.

Arnone et al. (2007) argue for a sequencing of reforms in which goals and basic autonomy of the central bank (in particular instrument independence) would come before the imposition of limits on central bank lending to government. In developing economies, central bank participation in government debt markets may help in countries with shallow money markets. Governments would demonstrate that direct lending is curtailed if they make their central bank completely autonomous. As noted in Banaian, Burdekin and Willett (1995, 1998), direct lending does not provide any further explanation of inflation control in either developing or industrialized economies once autonomy is accounted for. Therefore, in the following discussion, I do not account for it.[x]

All three of the remaining criteria are political variables. Both the CWN and GMT indices measure these, and Arnone et al. update those measurements for newer central bank charters. As GMT uses a simple 0-1 measure it would seem easy to use their measurements, but there remains the question of drawing the lines in converting them as Arnone et al. do. They consider the price stability objective criterion to be met in cases

where price stability is mentioned with other goals, even those that would "potentially conflict" with price stability. This is quite outside the consensus view they claim.[xi] In the case of many laws governing central banks in the EU, laws are worded to state that price stability is the primary objective of monetary policy and task of the central bank, and then say "without prejudice to its primary objective", the central bank can support macroeconomic policies of the government. In this case, I believe the subsidiary of full employment or other objectives is sufficiently clear to fit the consensus, and I treat those central banks as if they had a sole objective.

A very important consideration in this would be whether objectives for financial stability in a central bank charter conflict with price stability, when those are the only two objectives listed in the law. In the ECB law makes it quite clear that financial stability is secondary to price stability, but in central bank laws of countries where central banks are said to have a great deal of autonomy – such as the Reserve Bank of New Zealand, the Bank of Canada, or the Riksbank – financial stability is provided more as a constraint on pursuit of price stability.[xii] It is quite true, as Ferguson (2002) points out, that if the central bank does not produce price stability it will get financial instability, as expectations for macroeconomic outcomes are not met. But the question remains whether the reverse is true: can one have financial instability when the central bank is producing price stability, and if so, does financial instability then threaten price stability? Ferguson argues that it is not a question of whether one ignores financial stability in that case, but what weight one places on it. It is still a very open question, but in the classification that follows, I will treat financial stability as being consistent with price stability.

Also, for strengthening the hand of the central bank in conflicts with the government, Arnone et al. use a curious recoding of the CWN measure to say the hand is strengthened either if there is a conflict resolution by committee of the central bank, executive and legislature, or if conflicts are decided by the legislature alone. Certainly, in the second case this cannot be considered removing political interference from central bank policy. I argue that in a negotiation with the central bank, parliaments and presidents will hold a great deal of sway and make it difficult for the central bank to hold onto the conflicting policy. There are arguments for the central bank having more autonomy; the more transparent is the veto of the legislature or executive. I will nonetheless argue for a very clear autonomy, and thus the only veto that will be seen as still permitting a strong central bank hand in conflicts will be provisions that only allow for veto over matters not defined as the bank's primary objective – that is, if the central bank has a sole objective of price stability but wanted to build new, ornate branch offices, the government could object to that. Just not the bank's pursuit of price stability.[xiii]

In Table 4 I show these classifications for the OECD banks in 1993 and 2006.[xiv] The data reveal the broad movement of central banking towards this consensus view. Every central bank listed has moved towards what theory would state is a better central bank structure in the last twenty years except Switzerland and the USA, both of which started with very good structures.[xv] All central banks that had none of the three desired central bank attributes in the consensus view have changed their laws to take at least one of them, and all have made price stability one of monetary policy's objectives if not the only one. In developing countries, a broad majority follow this advice. Mahadeva and Sterne (2000) found in a survey of 94 central banks that 26% had only monetary stability

as a goal, while another 57% had monetary policy and other goals that did not compete with that goal, such as financial stability or stability of the payments system.

Most of the countries that have retained a government override do so within a framework of inflation targeting. In these cases the government has made the commitment to the inflation targeting regime and assigned the central bank the task of meeting that objective. Many developing and emerging-market economies have also chosen this path. It may be in this case that this method provides some accountability to government of reducing pressures from fiscal deficits. Australia is an interesting case insofar as it retains (in Section 10 of the Reserve Bank Act of 1959) both the goal of providing for "the stability of the currency of Australia" and to "(maintain) full employment in Australia." The consensus view would find this one step below the independence of the other government-adopted inflation targeters in the OECD.

In a strong sense, there is a parallel between these central banks and the pre-ECB Nederlandsche Bank. As Burdekin and Willet (1991) argue, the Dutch government could provide for an override of the bank's policy, but had to do so by an open directive that was laid before the parliament, with an explanation. Likewise, these inflation targeting central banks are under the control of government, but the government has to argue openly why their override is consistent with the agreed inflation target. Governments cannot use the central banks as scapegoats for a failed macroeconomic policy when they have a veto over policy.

It is tempting to place the central banks listed here on a scale, much as Alesina or Eijffinger and Schaling did using a similar strategy fifteen years or more ago. But, the nature of the differences in the scale would now be very different. The difference

between the two most independent structures that we actually observe is over the possibility that the Federal Reserve and the Swiss National Bank are less inflation-averse because of their dual mandates. But Meyer (2001) points out that the sole goal of the ECB may not mean a zero weight on output variability from full employment.[xvi] I do not think we have yet enough data on the ECB to determine whether it has a weight on output variability greater than zero. Likewise, it is worth considering whether the step between Japan and Australia is the same as between Australia and the other inflation targeters (outside of the ECB or Mexico.) It is, however, quite reasonable to treat the Fed, SNB, the ECB and the Bank of Mexico as qualitatively more independent than those where the government has an override (even when providing accountability through an inflation targeting program.) As argued earlier in this paper, ordinal rankings make some sense but cardinal values do not.

6 Conclusions

It is more contentious to use the classification scheme described here, but it has precedent. The IMF (2006) classifies exchange rate regimes into eight categories, and monetary policy frameworks into five possible structures, without placing any numbers on them. Levy-Yeyati and Sturzenegger (2003) use cluster analysis to classify exchange rate regimes and frameworks. A cluster analysis uses a type of discriminant analysis that seeks groupings as I have in this paper, and chooses each central bank as part of a cluster depending on the similarity of experiences with some macroeconomic target. For exchange rate regimes, the variances of the exchange rate and of the change of the exchange rate are chosen.

If one wanted to move from a de jure measure of central bank independence to a de facto measure, this would seem the path to take. The exchange rate classification uses theorized outcomes of exchange rate behavior to make the classification. Is the central bank's structure or its legal mandate the only determinants of, say, price level variability? If one wanted to include fiscal dominance, should budget deficit or government debt ratios (to GDP) be included as a criterion for grouping?

Instead, I have argued for a return to a simpler measure of central bank independence that uses the coalescing of professional opinion in research since the development of these measures fifteen years ago. By focusing on the price stability mandate, instrument independence and the conflict resolution mechanism, I find that a group of banks led by the ECB have moved ahead of the Federal Reserve and Swiss National Bank. Using those criteria keeps the Fed and SNB ahead of the countries whose governments have imposed an inflation target on their central banks.

Most importantly, I argue that central bank independence needs to be thought of as a set of categories, not a continuous variable. While the latter is tempting for the purposes of statistical analysis, the process of creating continuous variables leads to problems in interpretation, and these problems are not solved by computing better. The method used instead is quite arbitrary, in particular the ordering of which criterion goes first. I believe it is better to make the choice and do so explicitly than to provide any sense of evenhandedness or numerical certainty through an aggregation scheme.

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8 APPENDIX

Table 4. Classification of OECD Central Banks

Prototype	Government override?	Price stability objective?	Instrument independence	Exists 1989?	Exists 2007?	1989 Examples	2007 Examples
a	YES	None	NO	YES	NO	Belgium, Canada, France, United Kingdom, Japan, Korea, Mexico, Norway, New Zealand, Poland, Sweden	
b	YES	None	YES	NO	NO		
c	YES	Multiple	NO	YES	YES	Australia, Hungary, Iceland, Spain	Japan
d	YES	Multiple	YES	NO	YES		Australia
e	YES	Sole	NO	YES	YES	Finland, Greece, Ireland, Netherlands	Canada, Korea, Norway, New Zealand, United Kingdom
f	YES	Sole	YES	NO	NO		
g	NO	None	NO	NO	NO		
h	NO	None	YES	NO	NO		
i	NO	Multiple	NO	YES	NO	Denmark	
j	NO	Multiple	YES	YES	YES	USA, Switzerland	USA, Switzerland
k	NO	Sole	NO	NO	NO		
l	NO	Sole	YES	YES	YES	Germany	ECB and its membership (incl. associates), Mexico
Source: 1989 from Cukierman [1992]. 2007 by author, from BIS [2007] collection of central bank laws							

[i] As Schaling (1995) notes, this is not a direct criterion applied but implied in the discussion of the "divorzio" of the Banca d'Italia from absorbing the excess supply of Treasury securities. See also Tabellini (1988).

[ii] Buiter (2006) refers to complete operational independence as equivalent to a lack of substantive accountability. There is no judgment or consequence for a central bank that, acting as a delegate of authority from the people and/or the government, suffers when its actions are not desired by those principals.

It is not surprising that truly operationally independent central banks have effectively no substantive accountability at all. Independence *has* to mean that those in charge of monetary policy cannot be fired except for incapacity or serious misconduct, and that financial remuneration and working conditions likewise cannot be used to reward or punish them. (pp. 23-24)

[iii] I say this despite the fact that Alesina goes so far as to classify the Bank of Italy with a fractional number. That is clearly a judgment meant to indicate that he thought there was some difference between BI and other dependent central banks, but not enough to fit into the classifications warranting the next integer. The intent is nonetheless ordinal.

[iv] That is not to deny that at other times the NBU has bought debt or refused bids because the government would not accept the interest rate that the debt market would bear at that time.

[v] That does not preclude, of course, the use of categorical or dummy variables in regression so that one can obtan conditional differences in means.

[vi] There are eight countries for which there are two subperiods after reform of the central bank law, so these means are for a set of 34 time periods of varying length. See CMN, Table A4; the means I offer skip the first subperiod in every case.

[vii] Mongolia is excluded because CMN have no inflation data, and Poland after the second central bank law is excluded because there is no information on price liberalization.

[viii] One might wish to argue that the price liberalization measures should be included in the principal components analysis. It turns out that those data are mostly orthogonal to the central bank attributes, and it makes little difference whether they are included or excluded.

[ix] For the purposes of this paper, the following countries are listed as inflation targeters as of 2004: Australia, Brazil, Canada, Chile, Columbia, Czech Republic, Hungary, Iceland, Israel, Korea, Mexico, New Zealand, Norway, Poland, South Africa, Sweden, Thailand and the United Kingdom. I would also include the European Central Bank.

[x] There is also a practical consideration. Using a classification scheme for consensus views with verbs like "set" or "ensure" are straightforward. Either price stability is the sole goal or it is not; either the CB has final authority over monetary policy or it does not. "Curtail" is a different matter. We can curtail without eliminating entirely, so deciding whether one has curtailed is a judgment call. This reintroduces the same arbitrariness that I have faulted in the CWN and GMT indices.

[xi] In terms of the CWN measure, they state price stability is a primary objective if the central bank's score on the CWN table is greater than or equal to 0.4.

[xii] The Bank of England is stranger yet. It is told to pursue price stability and "subject to that", pursue policies to support government goals for economic growth and employment. It also has a memorandum of understanding with the government to provide for stability of the monetary system and the financial system (particularly regarding the payments system), and to provide oversight for the financial system more generally.

[xiii] Again, in terms of the CWN measure, I would count only those central banks with values of 0.8 or 1 as holding the upper hand in conflicts.

[xiv] On the website that complements this book, you can find a longer list of other central banks.

[xv] The dual mandate of the Swiss National Bank may be less known. Article 5, section 1 states "The National Bank shall pursue a monetary policy serving the interests of the country as a whole. It shall ensure price stability. In so doing, it shall take due account of the development of the economy." I am not interpreting the words "In so doing" as providing the same degree of subsidiarity in policy objectives as I have described elsewhere.

[xvi] Another way to think of this is whether a central bank that has the upper hand in policy conflicts with the government and instrument independence is any less "weight conservative" in the Rogoff (1985) or Svensson (1997) sense than a central bank with those qualities and a stated sole goal for price stability. Such banks may nonetheless have the ability and incentive to smooth output or interest rate fluctuations.