Central Bank Independence and the Global Financial Meltdown:

A View from the Emerging Markets

SIEMS Issue Report

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Content

Executive Summary

Central banks have been both blamed and praised for their part in the global financial crisis, but how much did their independence in setting policy actually affect a country's economic performance? This study shows that countries with more transparent central banks were more prone to higher credit and, for the most part, lower interest rates, in both developed and developing countries. Despite much of the hype over central bank independence and its supposed benefits for an economy, it appears that bank independence didn't matter that much for how an economy weathered the crisis, and may actually have contributed to the asset bubbles in developed countries.

This study is based on an examination of 91 countries over 1989-2008 and the effects of an independent central bank on different variables, including growth rate of GDP per capita, inflation, and credit to the private sector extended by the banking sector. The study breaks new ground in utilizing several different measures of bank "independence," including using a "transparency index" that measures the openness of a central bank to public discussion.

The key results from the study include:

- A long history of both central bank independence and transparency lowers interest rates for all economies, while rapid turnover of central bank governors raises them by a large amount;
- Over the long run, an independent and transparent central bank should create the right conditions for growth, but in the short-term, price stability may lead to lower growth than would have been achieved if a central bank were acting politically;
- Growth in bank credit appears to be much higher with transparent central banks than with non-transparent ones, possibly because a central banker still has the incentive to please his audience, which is more "the economy" and less "the government."
- Looking specifically at the BRIC (Brazil, Russia, India, China) economies, central bank independence from 2003 onward correlates with a strong positive effect on bank credit, meaning that independence appears to have fueled the root causes of the global recession rather than stemmed them.

In sum, the paper concludes that central bank independence may not even matter for growth or inflation if the policies pursued still are erroneous. If central banks were independent during the credit boom of the early 2000s, perhaps it's more important to wean both developed and emerging market bankers off bad models rather than make them more independent. Experimentation with different term-limits for bank governors, as well, may help to avoid some of the problems seen in the run-up to the crisis, removing the temptation to play God with the economy.

Introduction

The story of the global financial meltdown has been told in many different ways, but the basic facts and effects are familiar to all: the collapse of the real estate bubble in the United States became a financial crisis that reversed the growth of economies around the world and brought skyrocketing unemployment. As Figure 1 shows, the effect of the crisis was varied depending on the particular economy, with advanced economies hardest hit and developing and emerging in the aggregate weathering the storm; however, even within emerg-

FIGURE 1
World GDP Change, 2007–2011

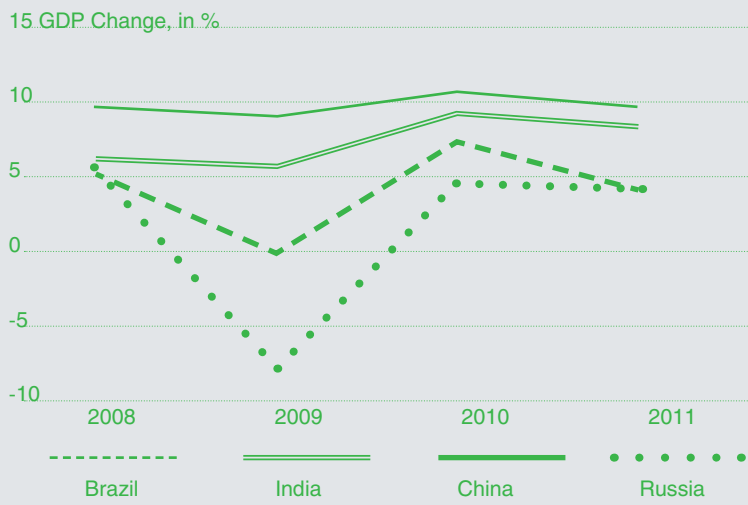
Source: IMF World Economic Outlook Update, July 2010. Data for 2010 and 2011 are projections.

ing markets, there were wildly different effects (Figure 2). In particular, the so-called BRIC countries (Brazil, Russia, India, and China) also had varying changes to their growth trajectory, with India and China seeing a mere bump in their blistering pace, but with Brazil and Russia contracting as a result of the world economic woes.

While much attention has been paid to the governmental responses to the crisis and their effects in mitigating or exacerbating the downturn, less attention has been focused on the root causes of the crisis. In particular, the role of central banks (CBs) has been somewhat overlooked, an interesting oversight given that central banks have been front and center in policy maneuvers to bring the crisis to an end. Indeed, some have theorized that the banks themselves created the crisis and were now being enlisted to clean up their own mess, while others have postulated that central banks in advanced economies were the key in preventing a recession from becoming another Depression.

The role of central banks in the financial meltdown is a doubly interesting research question, as an extensive body of economics work has asserted that central bank independence in the policy process is a positive factor, good for

FIGURE 2
The BRIC Economies and the Global Financial Meltdown



Source: IMF World Economic Outlook Update, July 2010. Data for 2010 and 2011 are projections.

fighting inflation (but with ambiguous effects on growth). It would thus stand to reason that an independent central bank would also help to ensure greater stability of economic outcomes through prudent macroeconomic management and insulation from political pressures.

The effects of the recession offer a new opportunity to examine the relationship between central bank independence and growth/stability, and see if having an independent central bank made a difference during the "Great Recession." This paper will thus examine CB behavior during the recent and ongoing financial crisis, and try to answer the following questions:

Did the established relationship between independence and inflation (and also growth) hold during the financial crisis?

Did central bank independence influence how a country fared in terms of its economic performance?

During the crisis, given the massive "stimulus" response of most countries, did central bank independence actually hold up?

What are the future prospects for CBI in the face of such a large economic correction? Is CBI on the wane, or more important than ever before?

BACKGROUND: THE LITERATURE ON CBI[1]

1

1/ Much of this section is based on work done in Hartwell (2010) on central bank independence for the University of Illinois Urbana Champaign.

The theory of central bank independence derived from a long process of research into the central problem of modern macroeconomic policy, the prevalence and persistence of inflation in both developing and developed economies. Early theories about inflation asserted that there was a relationship between inflation and unemployment, and that higher inflation would actually lower unemployment (as more money was about, creating more demand for labor, and because prices were slow to adjust). With "stagflation" (high unemployment and high inflation) in the developed world in the 1970s calling this theory into question, researchers turned their thoughts to the role of government in causing inflation. In particular, researchers identified that governments have an incentive to create bursts of inflation, as inflation was a boon for the government's fiscal position; it lowers the burden of debt, and thus governments would be motivated to continue inflating away their debt burdens (and most likely seek to accrue more debt). Additionally, governments would be tempted to print money to finance a deficit, which can trigger sustained and recurring episodes of inflation and hyperinflation (as in Bolivia).

In order to combat these incentives, attention amongst economists shifted to designing mechanisms that would remove from government the power to create inflation in the first place. The first debates in the literature focused on the effects of "rules versus discretion," and how discretion to inflate the money supply could be limited for the individual policymaker through the creation of binding monetary rules. Early papers by luminaries in the field[2] showed that monetary rules would provide a lower inflation rate than discretion, but, unfortunately, rules alone would still fail to achieve an optimal rate of inflation for society as a whole. Based on this work, others surmised that the problem may not have been the rules per se but the actors involved, and suggested that appointing a better policymaker who was more conservative than society in his preferences for inflation would offer the best of both worlds.[3] This approach, however, was far too simplistic, as voters or policymakers could wipe out the gains of this imaginary "conservative banker" by replacing him with someone more amenable to inflationary temptations.

If better people were then not the answer to fighting inflation, perhaps crafting a better organization was. By the early 1990s, economists duly shifted their emphasis from the people running the monetary system and instead looked at the design of the institutions overseeing monetary policy. It was

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2/ See Barro and Gordon's 1983 paper, as well as the seminal work done by Rogoff in 1985.

3/ Rogoff's solution, familiar to any earnest student of public administration, also ignored the entire public choice literature, as well as the emerging literature on institutional economics, and, indeed, the incentives of nearly every other actor involved.

here that the literature on central bank independence (CBI) emerged,[4] which posited that a central bank that was "independent" from the normal political process and public administration appeared to best mitigate the incentives government had to create inflation. In the first instance, an independent central bank would not have the pressure or incentive to deliver temporary boosts to the economy via inflation (presumably because of the lack of political incentive for the bank's governors). Additionally, in regards to fiscal chicanery, an independent bank (and bankers) would be insulated from the budget process, and thus have no incentive to inflate away the debt burden; indeed, their only concern would be price stability, and this would remove the government's ability to lower debt via debasing the currency. Finally, the "revenue motive" could also be defeated by an independent bank as an emphasis on price stability would remove the government's ability to run the printing presses in order to finance a deficit.

However, a central bank could never be truly "independent" from public pressures, as the bankers must be held accountable for their actions in pursuing monetary stability, both to elected officials and to the public at large. The structure of this accountability could take various forms, including the appointment of directors by elected officials for longer-terms (the preferred solution in practice), or an arrangement where a contract is concluded with the central banker that imposes costs on the banker when inflation deviates for an "optimal" level.[5] But perhaps most importantly, independence can always be threatened, for "if government has the capacity to create a formally independent central bank, it might also be strong enough to overrule its decisions, simply ignore them, or abolish the independent central bank again."[6]

THE EVIDENCE FOR CBI

The empirical evidence on the relationship between inflation and central bank independence seemed to bear out the theory, with some caveats. Early work showed that independent central banks did indeed correlate with lower inflation, but only for industrial countries; if developed countries were included in the methodology, the relationship was barely significant. Later work showed that CBI was perhaps just a poor measure for inflationary preferences in an

4/ The key papers in this literature are Alesina (1988, 1989), Grilli, Masciandaro, and Tabellini (1991), Eijffinger and Schaling (1993), and Cukierman (1992).

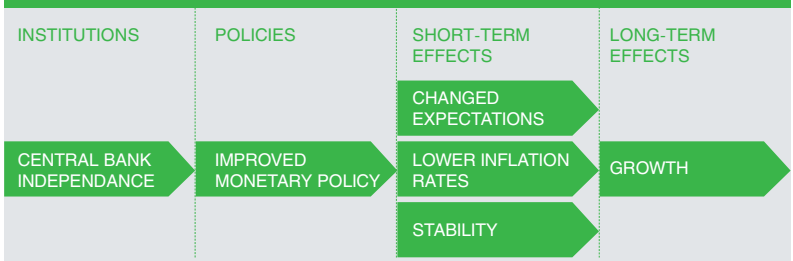
5/ This was suggested in a paper by Walsh (1995). Unfortunately, this measure of accountability is rarely, if ever, present in a government bureaucracy and would most likely be difficult to enforce.

6/ Quotation taken from Hayo and Voigt (2008), p. 752.

economy that could be better captured elsewhere, and if these other measures were included, the effect of CBI disappeared (although some papers claimed that this was just due to the methodology utilized). On the whole, the literature has somewhat come to a consensus that central bank independence, within a properly functioning legal framework, can have positive effects in lower inflation in both developed and developing countries, but that there may be other factors at play.

Building on these early studies on CBI versus inflation, economists in the 1990s turned towards the question of CBI and growth, both in the short-run and the long-run. Unlike inflation, however, neither the empirical evidence on the relationship with growth nor the theory was clear-cut. On the pro-growth side, some theorists conjectured that the price stability imparted by bank independence would lead to long-run growth (see Figure 3) by increasing savings and investment and altering an individual's perceptions of the monetary environment. Others have also conjectured that, since most recessions in the U.S. historically have occurred because of a Federal Reserve monetary contraction after inflation has already gone "too far," more consistent inflation-averse policy would smooth economic variability and flatten boom and bust cycles. Thus, CBI would provide the "free lunch" of higher growth and less volatility, a result that was confirmed in the sense of inflation volatility but had not been tried in terms of growth.

FIGURE 3/ Possible Effect of CBI on Growth



Source: Hartwell (2010)

On the other hand, a large number of economists have countered these assertions by focusing on interest rate effects and the institutional incentives of the central bank itself. In the first instance, the effect on interest rates of an

independent central bank (lower inflation would raise real interest rates in the short-term) could actually dampen growth rates. Additionally, the very nature of the central bank and its objectives, shifting the institution's focus from growth to price stability, may also impact growth at the seasonal and business cycle level: because central bank governors are more interested in price stability, an independent central bank could increase output variability, which could then theoretically depress long-run growth rates, as it goes about its business of decreasing inflationary variability.

The debate on the effect of CBI on growth has not been conclusively decided, mainly because the empirical evidence has been ambiguous. While one early paper showed that growth and CBI were positively linked in a sample of less-developed countries (with no relationship for developed countries),[7] for the most part, economists have been unable to find a conclusive link between growth and CBI. For output volatility as well, the literature, both theoretical and empirical, has been mixed. Empirical evidence has appeared to be slightly in favor of the view that CBI would avert "stop-go" policies that would create fluctuations in economic growth. Thus, the question of how growth is affected by CBI, and why different countries would have different effects, remains unresolved.

7/ Cukierman et. al (1993).

CENTRAL BANKS, RECESSION, AND THE GLOBAL FINANCIAL MELTDOWN

2

The question of the effect of central bank independence on growth and volatility has become incredibly relevant in the face of the global financial meltdown, as central banks played both a major role in the creation of the recession as well as in the massive international governmental responses. Understanding the crisis itself, its effects in emerging markets, and how central banks operated both before and during, may provide some clues as to the effect of CBI in the recession.

CENTRAL BANKS AND THE GESTATION OF THE CRISIS

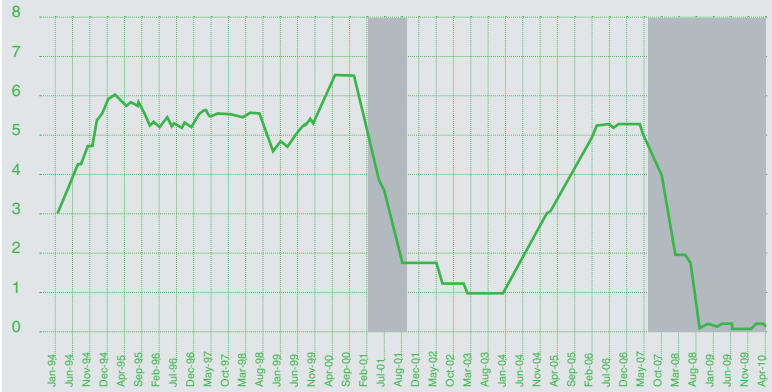
While much attention has focused on the role of central banks in responding to the crisis, it is important to step back and see the effect that banks had in actually fostering the conditions that led to the global recession. Led by noted economist (and former Undersecretary of the Treasury) John Taylor, several commentators have suggested that the starting point for the crisis was that central banks pursued a policy that was overly "accommodative," keeping interest rates low for too long and creating conditions in credit markets that led to bubbles in real estate markets around the world. In the words of one commentator, "the Federal Reserve was overly stimulative in the formative years of the bubble and remained much too stimulative long after the bubble began to deflate." [8]

Using an analysis pioneered by Taylor, researchers at the OECD concurred that interest rates in the developed countries were indeed far too accommodative during the period from 2002-2005. The sheer speed and size of the drop (from 6.52% to 1.82%) in the federal funds rate in the US from September 2000 to December 2001 (Figure 4), especially as compared to emerging markets (Figure 5 A-D), could have been seen as a response to extraordinary events (in particular, the events of September 11, 2001).[9] However, the fact that the rates were held so low for so long – from December 2001 to December 2004, the federal funds rate averaged 1.37% - lends credence to the theory that central banks were the starting point for the global financial crisis. The effect of this easy money was to fuel an asset price boom in the developed countries, especially in housing.

8/ Quotation from Foster (2009).

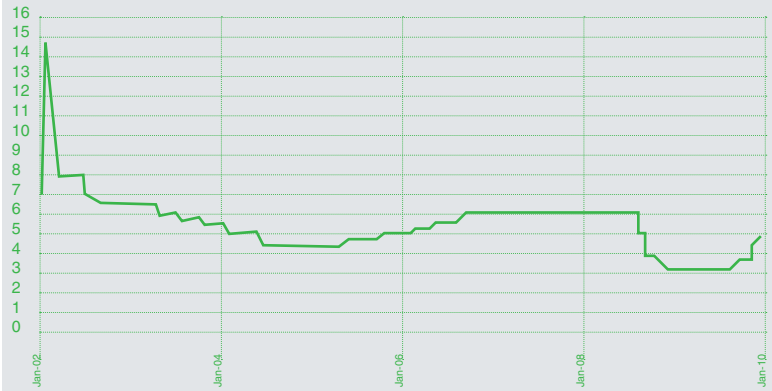
9/ Of course, interest rates in emerging markets (and elsewhere) are determined by more than government policy, and in emerging markets especially reflect a risk premium.

FIGURE 4/ The US Federal Funds Rate, 1994–2010



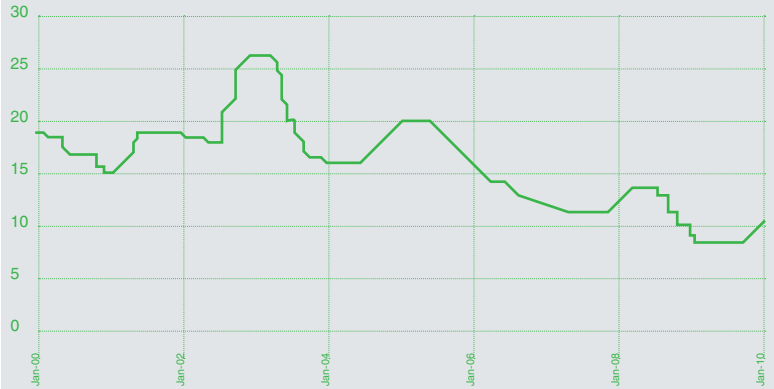
Source: Based on data from the Federal Reserve Bank. The federal funds rate is a weighted average of rates on brokered trades. Shaded areas are recessions as defined by NBER.

FIGURE 5 A/ Interest Rates in BRIC Economies, India



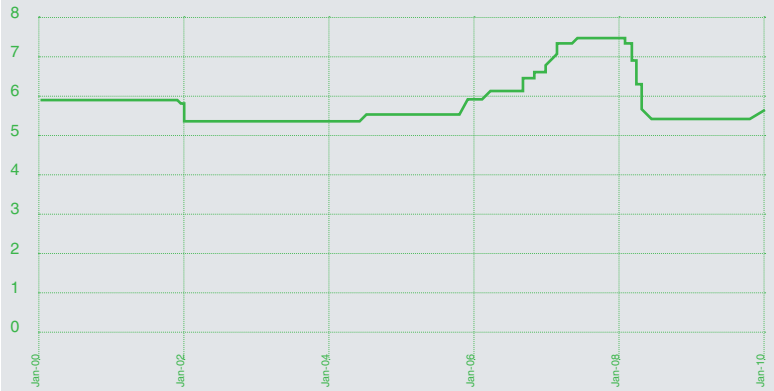
Source: Reserve Bank of India

FIGURE 5 B/ Interest Rates in BRIC Economies, Brazil



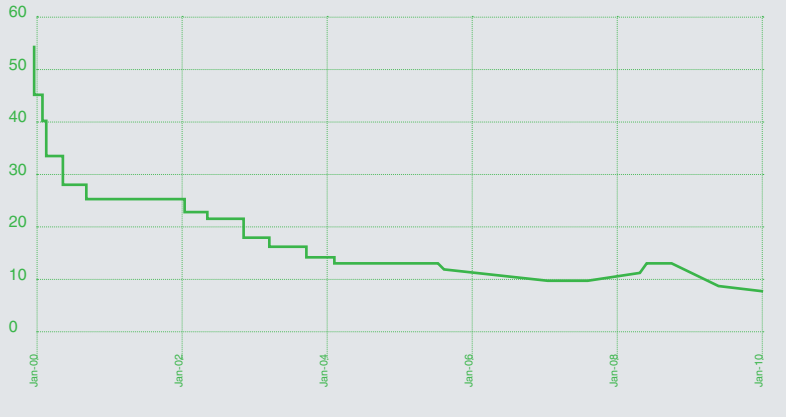
Source: Banco Central do Brasil

FIGURE 5 C/ Interest Rates in BRIC Economies, China



Source: The People's Bank of China

FIGURE 5 D/ Interest Rates in BRIC Economies, Russia



Source: Central Bank of Russia

THE RESPONSE TO THE CRISIS IN DEVELOPED AND EMERGING ECONOMIES

Central banks in the developed economies may not have been the only cause of the global financial recession, but it is clear that the evidence points to them being a prime contributor. Thus, it was ironic that central banks would play such a large role in leading the response to the crisis, and even more ironic that the solution was more of the same: accommodative monetary policy, although in this instance coupled with profligate fiscal policy. Led by the US, who passed two separate "stimulus" packages totaling over $1 trillion in 2008-09 while simultaneously maintaining real negative interest rates, central banks in the OECD countries and elsewhere dropped their interest rates to historical lows in order to stave off recession. The behavioral responses to the crisis in the developed countries was indeed more consistent with output targeting rather than inflationary targeting (although the threat of deflation during a recession was cited by more than one Central Banker as a factor in the low interest rate policies).

While the emerging countries appeared to have not necessarily followed developed countries' central banks in the time before the crisis, central banks

in emerging market economies tended to be more like their developed brethren once the crisis hit, and followed the lead of lower interest rates and lax monetary policy (see Table 1). In one sense, the global response to the crisis was similar to a "beggar-thy-neighbor" approach to tariffs that the world saw in the 1930s, as countries raised tariff after tariff in order to avoid being put at a competitive disadvantage. Similarly, with developing countries highly dependent on exports, being caught with a larger gap in interest rates (essentially a higher premium) would encourage currency appreciation and have deleterious effects on trade. Thus, developing countries had a built-in incentive to follow the lead of central banks rather than suffer possible competitiveness problems (which would have compounded trade effects already occurring, as major developed trading partners saw their demand for imports go down as a result of the recession).

TABLE 1/ INTEREST RATES BEFORE AND AFTER THE CRISIS IN EMERGING ECONOMIES

	January 2008	June 2010	Lowest rate	Date(s) of lowest rate	Highest rate	Date(s) of highest rate
Brazil	11.25	10.06	8.75	August 2009–March 2010	13.75	October–December 2008
Russia	10.00	7.75	7.75	June 2010–current	13.00	January–March 2009
India	6.00	3.98	3.25	May 2009– February 2010	6.00	January–November 2008
China	7.47	5.31	5.31	January 2009–current	7.47	January–August 2008

Source: Bloomberg

Whether or not the response taken by developing countries in following the developed countries is correct is a question that remains to be answered, and unfortunately is beyond the scope of this paper (although, from an economics standpoint, re-creating the conditions that led to the crisis in the first place might not be the wisest course of action). What is in the scope of this paper, however, is whether or not central bank independence had any effect on the monetary policies pursued, and whether or not CBI translated to policies that either mitigated or exacerbated the effects of the crisis. This is the topic of the next section.

AN EMPIRICAL ANALYSIS OF CBI AND RESPONSE AND RECOVERY IN EMERGING MARKETS

3

This analysis of the role of central banks in both creating and responding to the global financial crisis summarizes and echoes research done by several authors grappling with the root causes of the financial meltdown. However, overlooked to this point has been the effect of central bank independence over the past 3 years, and the current literature on the crisis ignores the expansive literature on CBI and how this may have impacted not only the run-up to the crisis, but how economic outcomes such as growth were affected. In this section, I'll examine the correlation between central bank independence and the effects of the crisis. Did the extent of CBI influence monetary policy in the early 2000s in emerging markets, as measured by both interest rates and extension of credit by the banking sector? After the crisis hit, were countries with a more independent CB more or less effective in responding to the crisis? Is there empirical evidence that more independent central banks had fewer effects from the recession?

HOW DO WE MEASURE CENTRAL BANK INDEPENDENCE?

One of the biggest problems encountered in the literature regarding CBI is exactly how one would go about measuring "independence." Early works that developed the theory of CBI also attempted to quantify independence by coding central bank laws according to several dimensions of political independence:

- the legal relationship between the central bank and the executive,
- the procedure to nominate and dismiss the head of the central bank,
- the role of government officials on the central bank board, and
- the frequency of contacts between the executive and the bank.
- The gold standard of CBI, led by Cukierman, Webb, and Neyapti's 1992 paper, combined the legal approach with an emphasis on operational aspects, creating an index based on:
- an index of de jure legal independence based on the country's Central Bank law;
- the actual frequency of turnover of central bank governors; and
- questionnaire responses from specialists on monetary policy in 23 countries

The CWN index of legal independence was built from 16 different legal indicators, ranked from 0 (lowest level of independence) to 1 (highest independence) into four clusters:

1. How a central bank's chief executive officer is appointed, dismissed,

and how long they are in office (comprised of four indicators which were averaged to create this cluster);

2. How policy is formulated and conflicts are resolved between the executive branch and the central bank over monetary policy (as well as the participation of the central bank in the budget process);

3. The explicit objectives of the central bank (i.e. monetary stability, growth, etc.); and

4. Limitations on the ability of the central bank to lend to the public sector.

This methodology gave higher (more independent) ratings to banks that had longer-serving CEOs that could not be removed by the executive branch; those that had wider latitude in determining monetary policy; banks which focus on price stability rather than other goals; and those which had severe or tight limitations on lending to the government. Each cluster was then further weighted to create a total composite legal index of independence for each country, also from 0 to 1, with the limitations on a central bank to lend to the public sector weighted as 50% of the legal index, the relationship of the executive officer next important (20% of the index), then conflict resolution and objectives weighted the same at 15% of the index a piece.

While many economists have criticized this index on different grounds, for the most part it remains the base methodology for measuring central bank independence. Another measure that has been recently devised , however, is a transparency index that limits itself to five areas of central bank transparency as a measure of independence:

1. political transparency: the relationship between the executive and the central bank and if it is codified in "measurable objectives" (such as specific policy targets);

2. economic transparency: if a central bank releases economic information, including forecasts, to allow independent assessment and scrutiny of its decisions by the private sector;

3. procedural transparency: the internal decision-making of the central bank, including if the central bank publishes information on how it arrives at its policy decisions,

4. policy transparency: the release of information on the policy decision once it is arrived at, including a "detailed account of the thinking" of the central bank after a policy decision; and

5. operational transparency: the transmission of the policy decision in practice.

For each of these areas, two yes-or-no questions were assigned a 1 for yes and a 0 for no, and the overall transparency index was created via the unweighted average of the 5 categories; each category is unweighted average of all sub-

categories. This makes the transparency index of simpler construction than the CWN indices, which relies heavily on somewhat arbitrary weights assigned to various facets of independence, as well as focusing on areas that were perhaps the by-product of independence rather than "independence" per se.

THE METHODOLOGY

To investigate the questions posed above on the effects of CBI on growth and inflation during the crisis, we'll look at two separate analyses, one utilizing averaged data and one using time-series data (full equations are shown in the Appendix). For the averaged data, we'll be analyzing the effects of CBI, as measured by three separate indices, on average growth rates over 2001-08 (as the world lurched from one crisis to another), average inflation, and average credit extended by the banking industry, in order to ascertain if central bank independence had a positive effect over the entire period. To more fully explore the aggregate effects, however, we will also utilize time-series data, using an econometric technique to capture any country-specific effects. We will also, as per the earlier literature, examine if there was a difference in the results if a country was developed or developing. Finally, a separate sample containing all of the available data for the BRIC countries will be analyzed to see if the relationships of CBI and growth/inflation/credit still hold in these four important emerging markets.

While the equations detailed in the Appendix are simplistic, they follow from previous work in the literature. This analysis also provides a starting point for researchers as more data comes on-line and the crisis continues to work its way through the global financial system. But most importantly, it should provide a first salvo at seeing if the relationship between CBI and inflation or growth held throughout these extraordinary events.

THE RESULTS

AVERAGED DATA

In regards to the questions posed above, we begin the analysis using the entire dataset of countries, then re-running the analysis for developing countries alone. Tables 2a and 2b show the results of the analysis for the full sample and developing countries (respectively), with a few notable trends standing out; in the first instance, it is amazing how consistently insignificant the central bank independence indicator, as measured by the CWN legal index, is across all

metrics. For both the full sample and developing countries, the legal index of central bank independence is an exceedingly poor indicator of growth, inflation, bank credit, or interest rates over 2001-08 (and in the case of inflation, also over 2006-08), in many places being statistically indistinguishable from mere white noise. In part, these poor results can be attributed to the data that we have, in that the numbers of observations are severely reduced using averages. However, the consistent lack of relationship over the past 10 years, for both prior years CBI (over 1989-2000) and more recent CBI (from 2003) should also signal that there may be a specific problem with the legalistic approach to defining central bank independence.

Central bank governor turnover also fares poorly as a predictor of macroeconomic outcomes for both samples, with its only effect showing up across all countries as a negative relationship between turnover and bank credit and a positive relationship between turnover and interest rates; this is most likely due to the fact that turnover is a proxy for instability, thus making banks less likely to lend while also imposing a risk premium in the form of higher interest rates. Contrary to the theory and previous results, turnover also has no effect on inflation, although it confirms earlier findings by also being insignificant to growth!

Finally, the transparency indicators show slightly better explanatory results, with a country's central bank transparency in 1998 predicting lower interest rates on average (again, possibly due to a lower risk premium) and also lower inflation (again with no effect on growth) in the full sample. For developing countries, the relationship was weaker for inflation, but slightly stronger for interest rates. This is most likely due to the emphasis that the transparency index places on public discussion and information regarding monetary policy, thus placing interest rate movements at the forefront of the media and public mind (witness the media frenzy in the United States surrounding every Federal Reserve meeting).

While this analysis is disappointing from the point of view of ascertaining the effects of CBI over the past decade, an interesting fact does emerge. Across all samples, institutional imperatives from the past seem to weigh more on the present than recent policy moves, as witnessed by the effect of transparency from the decade prior on interest rates and inflation. This perhaps suggests that monetary policy takes time to influence an economy (a subject of much discussion in the literature), but may also suggest that an economy's expectations must also take time to change and adjust after an institutional change within the central bank; that is, that institutional changes may not cause instantaneous outcomes, especially if markets adopt a wait-and-see approach (which may explain the insignificance of the legal CBI indices and the near total-insignificance of recent CBI changes in our analysis).

TABLE 2A – PANEL DATA RESULTS, FULL SAMPLE

	Dependent variables				
Explanatory variables	Average Growth, 2001-08	Average Inflation, 2001-2008	Average Inflation, 2006-08	Average Credit from the Banking Sector (% of GDP), 2001-08	Average Interest Rates, 2001-2008
CWN CBI 1989-2000	-1.31	-356.76	-1190.34	-13.83	-18.8
	-0.61	1.53	-1.23	-0.33	-1.01
constant	5.44	213.90	697.52	84.04	20.68
	5.33**	-1.23	1.49	4.21**	2.46*
R-squared	0.004	0.02	0.02	0.001	0.02
n	91	88	88	90	58
CWN CBI 2003	-0.04	-118.02	-389.51	-35.52	6.03
	-0.03	-0.52	-0.51	-1.16	0.43
constant	4.44	130.01	415.67	106.18	9.06
	4.79**	0.86	0.82	5.19**	1.02
R-squared	0.00	0.0004	0.00	0.02	0.004
n	80	78	78	80	53
Turnover 1995-2004	5.03	-454.37	-1541.39	-124.32	64.83
	1.75	-0.86	-0.88	-1.96*	2.12*
constant	3.28	153.07	503.37	109.35	1.62
	5.07**	1.29	1.27	7.67**	0.24
R-squared	0.04	0.01	0.01	0.06	0.09
n	68	66	66	68	45
Transparency 1998	-0.14	-7.05	-5.49	97.62	-25.49
	-0.09	-2.43*	-2.11*	2.68*	-3.34**
constant	4.65	9.05	8.74	35.33	22.56
	5.71**	5.92**	6.37**	1.85	5.45**
R-squared	0.00	0.08	0.06	0.1	0.22
n	67	66	66	67	41

Note: t-stats are under the coefficients, with * signifying significance at the 10% level and ** at the 1% level.

TABLE 2B – PANEL DATA RESULTS, DEVELOPING COUNTRIES

	Dependent variables				
Explanatory variables	Average Growth, 2001-08	Average Inflation, 2001-2008	Average Inflation, 2006-08	Average Credit from the Banking Sector (% of GDP), 2001-08	Average Interest Rates, 2001-2008
CWN CBI 1989-2000	0.54	-436.18	-1462.33	-47.23	-19.84
	0.21	-1.11	-1.11	-1.49	-0.93
constant	5.25	264.32	864.63	73.75	22.90
	4.29**	1.42	1.39	4.95**	2.37*
R-squared	0.00	0.02	0.02	0.03	0.02
n	66	63	63	65	48
CWN CBI 2003	0.91	-198.04	-654.35	-49.62	1.19
	0.45	-0.54	-0.53	-1.79	0.07
constant	4.43	204.16	657.07	88.00	13.99
	3.35*	0.84	0.81	4.87**	1.26
R-squared	0.004	0.01	0.01	0.06	0.00
n	55	53	53	55	43
Turnover 1995-2004	4.63	-679.78	-2297.98	-68.18	66.64
	1.24	-0.90	-0.91	-1.26	1.84
constant	3.92	233.25	768.39	72.95	2.90
	4.50**	1.31	1.30	5.76**	0.36
R-squared	0.03	0.02	0.02	0.04	0.09
n	46	44	44	46	37
Transparency 1998	2.68	-8.81	-5.6	24.73	-29.81
	1.18	-1.98*	-1.50	0.57	-2.81*
constant	4.07	11.19	10.21	45.48	24.50
	3.70**	5.17**	5.61**	2.16*	4.74**
R-squared	0.03	0.09	0.05	0.01	0.20
n	44	43	43	44	33

Note: t-stats are under the coefficients, with * signifying significance at the 10% level and ** at the 1% level.

TIME-SERIES DATA

The difficulty with broad averages is that they can miss inter-country nuances, as well as provide skewed results in the presence of outliers (such as hyperinflation in emerging markets or deep recessions due to the shock of transition). Thus, a time-series approach can be more useful in ascertaining the effects of central bank independence both pre- and post-crisis. This is not to say that there are no problems in time-series analysis, as the very nature of the CBI indicators in all their forms may present some difficulties. In particular, central bank independence often needs to be measured over longer time-spans, as measures of independence (especially turnover) require a longer time-series to tease out effects. Additionally, there is a high probability of us missing other factors that may be to blame for the results shown by CBI. However, once again, the time-series data provides an excellent sketch (if not a complete picture) of the relationship between CBI and the macroeconomic outcomes before and during the crisis, one that can be filled in more over the coming years.

Tables 3a and 3b show the results of this analysis, once again split into the full sample and a sample of just developing countries. The results tell a story that is markedly different than the broad aggregates found in the previous section, and a story that is much more interesting for policymakers (and also more interesting according to the theory). We will begin with the full sample, which shows that legal CBI from 1989 shows little significance for growth or inflation in the full sample across all years from 1989-2008, with a slight positive effect on bank credit across all countries and a hugely negative impact on interest rates (i.e. more independent banks have lower interest rates); as noted above, countries with more independence tend to have lower risk premia, and this may be captured by the CWN index for 1989.

The CBI index for 2003, showing the effect of independence on macroeconomic metrics from 2003-2008, by contrast, shows significance across the broad range of metrics, including a significant negative effect on growth, inflation, and credit from the banking sector, and a very significant positive effect on interest rates (exactly the opposite effect found from the long-term independence ratings). The effect of CBI in 2003 on growth and inflation is anticipated by theory, but the results for bank credit are interesting indeed. The data here appears to be catching some of the effects of an independent central bank's response to a financial crisis, in that bank credit should be curtailed if too much credit were deleterious to price stability (alternately, an independent central bank might recognize the problems of easy credit earlier and move to restrict it before it threatened prices). Along these same lines, interest rates could be moved higher by an independent central bank to deal with the credit crunch, in order to wring out bad loans and malinvestments from the economy

(although, in practice, this has not been the approach of the largest central banks of the developed world, as in the United States). This paradoxical result will require further research, but could also be a function of other issues at play.

Beyond the CWN legal index, the other indicators of central bank independence also paint a more complete picture than in the panel data. Central bank governor turnover has the expected effect on interest rates (higher turnover, higher rates) and bank credit (higher turnover, lower credit), with no effect on growth and a somewhat counterintuitive negative effect on inflation. The result of higher turnover leading to lower inflation could be a result of bank governors not having enough time to deviate from central bank charters or rules, thus avoiding inflationary pressures by simply not allowing governors to be in office long enough to make them policy. Transparency in 1998, on the other hand, has the expected effect on growth, while also lowering inflation and interest rates. But once again, there is a paradox, and that is bank credit, which appears to be much higher with transparent central banks than with non-transparent ones; this may be because central banks can be insulated from political processes but not market ones, and banks that are more open and subject to scrutiny can feel pressures from the business community to lend and loosen credit, especially if every move the bank makes is debated in the media. A central banker thus has incentive to please his audience, which is more "the economy" and less "the government." This result holds even more strongly for the years 2006-2008 which, although a much smaller sample and a very short time frame for monetary policy to begin affecting the economy, shows how transparency has an even bigger influence on bank credit (and also a much more negative effect on growth).

These results on CBI over time were done using all the countries in the sample, while Table 4b shows the results of pulling the developed countries out of the sample and just focusing on the developed countries. Growth appears to be slightly positively correlated with legal central bank independence from 1989, but is just as negatively correlated with independence from 2003 onward; while turnover is insignificant for growth, transparent central banks have a very strong negative correlation with growth for developing countries, with the correlation getting stronger the closer in time to present day we come (although, to be fair, the low number of observations from 2006-08 can severely skew the data). These results appear to vindicate both theories concerning central bank independence and growth: over the long run, an independent and transparent central bank should create the right conditions for growth by focusing on price stability, but over shorter-terms, and where there is volatility, the focus on stability may lead to lower growth than would have been achieved if a central bank were acting politically.

This interpretation is reinforced by the results for inflation in developing countries. Over the long-term, legal CBI has an insignificant but negative effect on inflation, while in the short-term, it has a much more significant negative effect on inflation. Thus, inflation is kept down in the short-term (here, over 2003-08), but at the expense of growth. This result also holds for transparent central banks, which are under more scrutiny to perform their role as price stabilizers. Perhaps for reasons mentioned above, turnover has an insignificant effect on inflation.

The same story as for the full sample occurs for bank credit, although the CBI for 1989 is insignificant; otherwise, recent independence and turnover has a dampening effect on credit, while transparent banks appear to play to their audience and have more credit extended. Finally, interest rates may tell the most interesting tale for developing countries. Like in the full sample, a long history of both central bank independence and transparency lowers interest rates, while turnover raises them by a large amount. Unlike the full sample, however, developing countries see no significant shift in interest rates due to recent CBI changes, and, while the full sample saw no change in interest rates due to recent moves to transparency, developing countries actually saw higher interest rates if they were rated as more transparent in 2006. Again, much of this effect is likely due to the small sample size, but should be examined as more data becomes available.

TABLE 3A – TIME-SERIES DATA RESULTS, FULL SAMPLE

	Dependent variables			
Explanatory variables	Growth	Inflation	Credit from the Banking Sector (% of GDP)	Interest Rates
CBI 89	0.31	-7.66	8.48	-13.89
	0.67	-1.37	2.35*	-7.48**
constant	3.13	20.1	66.82	18.75
	17.85**	7.67**	46.51**	22.29**
R-squared	0.00	0.001	0.003	0.05
n	1708	1633	1650	1040
CWN CBI 2003	-1.09	-5.49	-34.38	4.75
	-2.36*	-2.09*	-7.81**	3.92**
constant	5.57	11.00	104.78	6.93
	17.39**	5.11**	36.08**	10.13**
R-squared	0.02	0.01	0.12	0.05
n	467	467	457	319
Turnover 1995-2004	0.80	-23.57	-100.74	42.75
	1.11	-5.96**	-17.51**	21.96**
constant	3.46	14.52	97.86	4.07
	24.86**	11.79**	62.19**	18.99**
R-squared	0.001	0.040	0.25	0.44
n	940	916	924	614
Transparency 1998	-2.22	-7.37	99.72	-20.73
	-5.25**	-10.99**	22.20**	-27.24**
constant	5.10	8.62	20.97	20.37
	22.99**	21.09**	8.28**	42.48**
R-squared	0.04	0.16	0.46	0.66
n	618	615	614	389
Transparency 2006	-7.18	-3.26	105.96	0.58
	-8.63**	-4.41**	15.61**	0.58
constant	8.08	5.82	58.57	5.87
	15.17**	11.61**	15.20**	9.23**
R-squared	0.39	0.15	0.69	0.01
n	117	117	111	66

Note: t-stats are under the coefficients, with * signifying significance at the 10% level and ** at the 1% level.

TABLE 3B – TIME-SERIES DATA RESULTS, DEVELOPING COUNTRIES

	Dependent variables			
Explanatory variables	Growth	Inflation	Credit from the Banking Sector (% of GDP)	Interest Rates
CBI 89-00	1.43	-8.78	-3.08	-12.13
	2.01*	-0.90	-0.90	-4.23**
constant	3.54	25.30	47.99	21.7
	13.29**	5.64**	36.84**	17.61**
R-squared	0.003	0.001	0.001	0.02
n	1209	1136	1136	801
CWN CBI 2003	-1.41	-9.60	-20.64	-1.67
	-2.99*	-2.23*	-4.54**	-0.94
constant	6.73	15.37	66.77	11.92
	20.60**	4.17**	19.87**	11.57**
R-squared	0.03	0.02	0.06	0.004
n	318	317	316	249
Turnover 1995-2004	-0.66	-3.99	-46.11	31.48
	-0.62	-0.46	-9.06**	7.13**
constant	4.50	12.79	60.69	7.63
	19.92**	5.19**	46.41**	10.09**
R-squared	0.001	0.000	0.12	0.10
n	633	608	627	479
Transparency 1998	-2.16	-7.09	19.79	-21.99
	-2.88*	-4.50**	4.11**	-16.34**
constant	5.49	9.95	40.44	20.86
	16.70**	13.87**	17.17**	30.21**
R-squared	0.02	0.05	0.04	0.47
n	432	428	434	309
Transparency 2006	-7.01	-3.98	8.15	5.92
	-6.91**	-3.46**	0.95	4.78**
constant	9.82	7.28	69.59	5.30
	17.56**	10.61**	15.18**	9.13**
R-squared	0.51	0.21	0.02	0.40
n	48	48	48	36

Note: t-stats are under the coefficients, with * signifying significance at the 10% level and ** at the 1% level.

THE BRIC ECONOMIES

Table 4 shows the various indicators of central bank independence for the BRICs, which are quite diverse in terms of their "independence," but follow a broad trend internationally towards greater independence of the central bank. China, at least legally, shows the greatest move towards independence, with the large jump in its independence coming due to a move towards price stability as part of the bank's charter and stricter limits on lending to the government (on appointments, the bank continues to score poorly). Likewise, Brazil's striking gains in the index comes from its shift in policy objective (namely that the central bank had no interest in price stability in 1989) and less interference in the appointments process (Table 5 shows the change by component over 1989 to 2003). India is the only central bank in the sample (and one of only a handful in the world) that saw its CBI decline over the period, mainly due to its abandonment of price stability as a goal and greater governmental interference in appointment of the central bank governor.

TABLE 4 – OVERALL CBI IN THE BRIC ECONOMIES, 1989-2003

	Brazil	Russia	India	China
1989	0.21	n/a	0.34	0.29
1990	0.21	n/a	0.34	0.29
1991	0.21	n/a	0.34	0.29
1992	0.21	n/a	0.34	0.29
1993	0.21	n/a	0.34	0.29
1994	0.21	0.43	0.34	0.29
1995	0.21	0.49	0.34	0.29
1996	0.21	0.49	0.34	0.29
1997	0.21	0.49	0.34	0.29
1998	0.21	0.49	0.34	0.29
1999	0.21	0.49	0.34	0.29
2000	0.21	0.49	0.34	0.29
2003	0.46	0.63	0.29	0.63

Source: 1989-2000 data from Polillo and Guillen (2005), 2003 data from Crowe and Meade 2008

With this evolution in the approaches to central banks in mind, Table 6 shows the analysis done in the previous section repeated for just the BRIC economies from 1998-2008 using the same five explanatory variables of CBI from 1989-2000, CBI in 2003, governor turnover from 1995-2004, and trans-

parency in 1998. Data is sparser for the BRIC economies due mainly to the lack of CBI coding for these countries, although turnover is well covered. The inclusion of the transparency variable was done, as in the previous section, as transparency of the central bank in 1998 would have captured, theoretically, macroeconomic effects caused by the bank's behavior in the pre-crisis period from 1998-2005 while also perhaps catching the longer-term institutional effects of independence during the crisis.

Looking at the conventional legal indicator of CBI from the 1990s for Brazil, Russia, India, and China, we find that the effects are almost wholly insignificant across growth, inflation, and interest rates, with a very strong negative effect on banking credit. However, as Table 6 makes clear, this correlation flips once central bank independence is updated in 2003, with CBI from 2003 showing a strong positive effect on bank credit. It is more than likely that the low sample size for this indicator is to blame for this change, or perhaps other variables are in play that aren't captured in this simple analysis. In either case, it is an interesting regime change to have independence fuel the problems of the global recession rather than stem them!

TABLE 5 – CBI BY COMPONENT, 1989 V. 2003

	1989	2003
Brazil		
Appointments	0.13	0.38
Policy formulation	0.17	0.33
Policy objective	0.00	0.40
Limits on CB lending to government	0.32	0.55
Russia		
Appointments	n/a	0.65
Policy formulation	n/a	0.47
Policy objective	n/a	0.60
Limits on CB lending to government	n/a	0.66
India		
Appointments	0.52	0.31
Policy formulation	0.00	0.27
Policy objective	0.40	0.00
Limits on CB lending to government	0.35	0.35
China		
Appointments	0.25	0.42
Policy formulation	0.53	0.27
Policy objective	0.20	0.80
Limits on CB lending to government	0.25	0.71

Source: Crowe and Meade 2008

In regards to turnover, it too shows results in the BRIC economies as predicted by theory, but with some surprises. In particular, inflation appears to be uncorrelated with turnover, but high turnover of governors is strongly correlated with lower growth. This result could be a function of high turnover signaling instability to the markets, thus demanding a risk premium that can dampen growth, a result that is confirmed by the strong correlation between high turnover and high interest rates. Clearly other omitted variables, perhaps country-specific, are at play in explaining inflation during this period, but turnover appears to project an image of instability.

Finally, tests were done of the measure of transparency for 1998. The results of this analysis, shown in Table 6, are quite the contrast from the full sample and developing country samples noted above, as transparency has almost no correlation across all economic outcomes. This is probably due to the notable absence of Brazil in the transparency rankings, but can also point to the absence of other effects that may be important in larger developing

countries. Only further analysis with a proper set of control variables (notably, exchange rate regimes) will bear this out.

TABLE 6 - EFFECTS OF CBI IN THE BRIC ECONOMIES

Explanatory variables	Growth	Inflation	Credit from the Banking Sector (% of GDP)	Interest Rates
CBI 89	12.57	142.7	-347.14	-44.24
	1.87	0.38	-13.06**	-1.69
constant	1.85	-28.88	176.09	23.31
	0.87	-0.22	16.88**	2.86*
R-squared	0.05	0.001	0.70	0.04
n	76	76	76	66
CWN CBI 2003	-1.15	7.52	104.05	12.51
	-0.42	1.71	3.51*	1.86
constant	8.14	3.19	32.70	3.83
	5.38**	1.90	3.28*	0.98
R-squared	0.008	0.12	0.36	0.14
n	24	24	24	24
Turnover 1995-2004	-18.22	27.11	-29.22	65.02
	-8.13**	1.73	-0.97	6.84**
constant	12.03	0.33	76.15	-5.99
	15.21**	0.10	6.73**	-2.94*
R-squared	0.55	0.06	0.02	0.47
n	56	56	56	55
Transparency 1998	4.72	16.53	-59.25	31.91
	0.86	0.79	-1.12	1.83
constant	4.42	-3.60	89.55	-9.52
	1.36	-0.32	2.84*	-1.02
R-squared	0.03	0.03	0.05	0.13
n	24	24	24	24

Note: t-stats are under the coefficients, with * signifying significance at the 10% level and ** at the 1% level.

CONCLUSION AND POLICY IMPLICATIONS: THE FUTURE OF CBI IN THE WAKE OF THE FINANCIAL CRISIS

4

The issue of central bank independence has been a thriving and rich source of research in the economics literature over the past two decades, but the influence of central bank independence on macroeconomic variables during the ongoing global financial crisis is an area that has thus far been overlooked. The analysis above shows that it is an area that needs more scrutiny. While the measurement of CBI can be a factor in some of these results (as well as the low number of observations during the crisis), there still remains questions regarding CBI, and both before and after the crisis hit.

One such area that could stand further research is if CBI did actually maintain itself through the financial crisis. Given that the last coding of CBI indices was either for 2003 (CWN) or 2006 (Crowe-Meade), we still have no sense if independence shifted as governments mobilized a response. Was CBI reined in so that the recessionary contraction was mitigated, with central banks shifting from their normal focus on inflation targeting to output targeting? If this did in fact occur, it could explain for some of the results we have seen, but would still not comport with our result that more transparent banks saw much larger output declines. In either instance, it is an area fruitful for examination.

However, a more relevant question for policymakers might just be: does CBI even matter? The disparity between the results for independence as measured by the CWN index and the measure of transparency may point the way to future thinking about the design of central banks and how independence may actually influence economic outcomes. Indeed, some of the more interesting results from the analysis pertained to transparency, showing that countries with more transparent central banks were more prone to higher credit and, for the most part, lower interest rates, in both developed and developing countries. As noted above, these results may point the way for an "independent" central bank to be independent not just from the government, but also from political pressures arising from the business community. While legal independence may have been maintained, there still may have been pressure on central banks to keep interest rates low and credit pumping in order to avoid the harsh scrutiny that the public gaze provided. In this sense, perhaps less transparency was a better route for central banks to take than the road that was chosen.

Along these lines, the effect of turnover of central bank governors also has a contradictory effect in our results. While the standard approach takes frequent turnover to be a bad policy move, and our results confirm that too much turnover can raise interest rates, perhaps there is a certain length of time that is best for a central bank governor to serve, so that stability is maintained in terms of the institution (thus lowering interest rates) but so that temptation to play God with the economy (a la Alan Greenspan in the United States) is reined in. The experience of the past decade shows that more experimentation with governor's terms may be called for.

In this debate on the optimal institutional structure for a central bank, and given the role central banks may have played in creating the crisis and then their work in responding to it, we can hear echoes of the earliest debates on central banks and their influence on the economy): does the institutional make-up of a central bank have as much of an effect as the models and policies pursued? If the institution of the Central Bank was independent during the credit boom of the early 2000s, perhaps it's more important to wean both developed and emerging market bankers off bad models rather than make them more independent. The big difference between a central bank that is independent and one that is not may come in implementation, but as the past decade has shown, being more effective at implementing erroneous policies does not lead to optimal outcomes.

Appendix

REGRESSION EQUATIONS

Equation	Panel Data		Time-Series
	Growth 2001-08		**Growth**
1	$\Delta y_{\text{average 01-08}} = CBI_{\text{1989 and 2003}} + \varepsilon$	15	$\Delta y_{it} = CBI_{\text{1989 and 2003}} + \varepsilon\varepsilon$
2	$\Delta y_{\text{average 01-08}} = \text{turnover9504}_i + \varepsilon$	16	$\Delta y_{it} = \text{turnover 9504}_i + \varepsilon\varepsilon$
3	$\Delta y_{\text{average 01-08}} = \text{transparency1998}_i + \varepsilon\,\varepsilon$	17	$\Delta y_{it} = \text{transparency1998}_i + \varepsilon\,\varepsilon$
	Inflation 2001-08		**Inflation**
4	$\Delta\pi_{\text{average01-08}} = CBI_{\text{1989 and 2003}} + \varepsilon$	18	$\Delta\pi_{it} = CBI_{\text{1989 and 2003}} + \varepsilon\,\varepsilon$
5	$\Delta\pi_{\text{average01-08}} = \text{turnover9504}_i + \varepsilon\,\varepsilon$	19	$\Delta\pi_{it} = \text{turnover9504}_i + \varepsilon\varepsilon$
6	$\Delta\pi_{\text{average01-08}} = \text{transparency1998}_i + \varepsilon\,\varepsilon$	20	$\Delta\pi_{it} = \text{transparency1998}_i + \varepsilon\,\varepsilon$
	Inflation 2006-08		**Bank Credit**
7	$\Delta\pi_{\text{average01-08}} = CBI_{2003} + \varepsilon\,\varepsilon$	21	$\Delta\text{BankCredit}_{it} = CBI_{\text{1989 and 2003}} + \varepsilon\,\varepsilon$
8	$\Delta\pi_{\text{average01-08}} = \text{turnover9504}_i + \varepsilon\,\varepsilon$	22	$\Delta\text{BankCredit}_{it} = \text{turnover9504}_i + \varepsilon\,\varepsilon$
9	$\Delta\pi_{\text{average01-08}} = \text{transparency1998}_i + \varepsilon\,\varepsilon$	23	$\Delta\text{BankCredit}_{it} = \text{transparency1998}_i + \varepsilon$
	ΔBank Credit 2001-08		**Interest Rate**
10	$\Delta\text{BankCredit}_{\text{average01-08}} = CBI_{2003} + \varepsilon\,\varepsilon$	24	$\Delta i_{it} = CBI_{\text{1989 and 2003}} + \varepsilon\,\varepsilon$
11	$\Delta\text{BankCredit}_{\text{average01-08}} = \text{turnover9504}_i + \varepsilon$	25	$\Delta i_{it} = \text{turnover9504}_i + \varepsilon\,\varepsilon$
	Interest Rate 2001-08	26	$\Delta i_{it} = \text{transparency1998}_i + \varepsilon$
12	$\Delta i_{\text{average01-08}} = CBI_{2003} + \varepsilon\,\varepsilon$		
13	$\varepsilon\Delta i_{\text{average01-08}} = \text{turnover9504}_i + \varepsilon\,\varepsilon$		
14	$\varepsilon\Delta i_{\text{average01-08}} = \text{transparency1998}_i + \varepsilon\,\varepsilon$		

Notes:

– Δy is change in real GDP annually or as an average over the specified time

– $\Delta\pi$ is change in inflation annually

– Δi is change in interest rate annually

– CBI_{2003} is the CWN unweighted index of independence in 2003

– Turnover9504 is the Crowe-Meade measure of central bank governor turnover

– Transparency1998 is the Crowe-Meade index of transparency

– ε is an error term.

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