

CENTRAL BANK INDEPENDENCE & ECONOMIC EFFICIENCY

By

By Partha Gangopadhyay

University of Western Sydney

&

James Glenn

Reserve Bank of Australia

Abstract:

The tendency for nations to move towards implementing independent and conservative central bankers has gained momentum over the past two decades. This trend continues despite the fact that the benefits of central bank independence are highly contested amongst economists. Authors examining the costs and benefits of central bank independence remain in disagreement as to exactly how central bank independence promotes better economic performance. There are inconsistencies in the empirical literature examining central bank independence suggesting there is continued scope for further examination into the issue. This paper contributes to the literature on central bank independence by introducing analytical methods not previously used in empirical examination of central banks. Analysis has uncovered the presence of high mobility in economic variables that is unexplained by changes in central bank independence. The paper addresses the question of mobility by making use of mobility measures and linear regression in an attempt to identify the source of this mobility. The results from the regression are significant to the theory of central bank independence as they imply that consolidation of inflation rates are not reciprocated with consolidation of economic growth, as conventional theory would suggest.

1. Introduction

The analysis conducted within this paper uncovers the presence of high mobility in macroeconomic indicators such as inflation, interest rates and GDP growth. That is, it appears as though a country whose economic performance is relatively high during one period in time is not necessarily one of the best performing nations in the next time period. To attempt to determine the source of the mobility, this paper develops an economic mobility model using Shorrocks (1978) mobility measures. Interest in income mobility has escalated in recent years with researchers such as Kuhl (2003) attempting to find the sources of income inequality within particular countries. This paper continues and expands upon the works of these authors by attempting to apply the concepts of income mobility to economic growth at an international level. Therefore, rather than strictly asking the traditional question underlying income mobility, “do the poor stay poor, and the rich stay rich” (Kuhl, 2003), this paper asks whether countries with weak economic performance continue to perform poorly, and those with strong economic performance continue to perform well? If not, what is the cause of changes in relative economic performance? In particular, is it monetary policy, fiscal policy, investment (public and private) or some other factor causing the mobility?

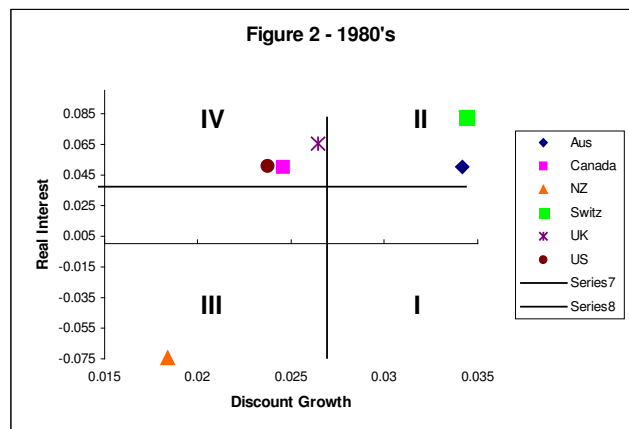
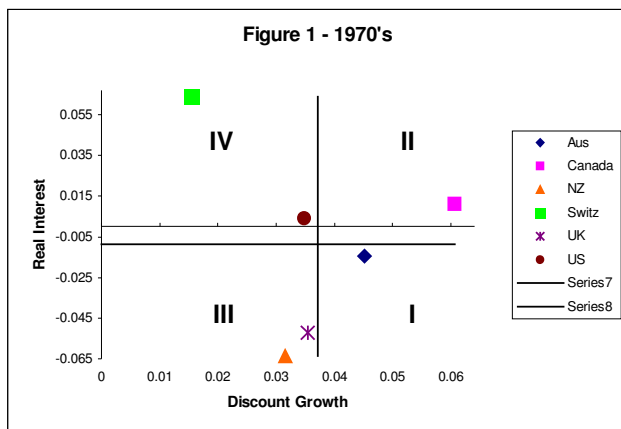
An examination of mobility is interesting in the sense that one can use such an approach to try and determine where the source of mobility stems from and what policy choices are possibly contributing to this mobility. With regard to monetary policy in particular, examination of growth and inflation mobility provides a means of evaluating how consolidation of monetary policy rules and inflation targets are associated with shocks to economic growth. Thus, the following analysis is potentially useful for evaluating the theoretical foundations behind implementing

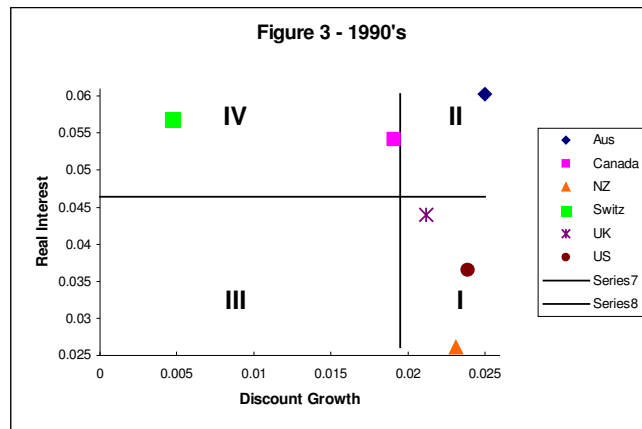
independent and conservative central bankers. Authors Schellekens (2002) argue in support of central bank independence (CBI) stating that (CBI) produces a free lunch with low inflation and growth volatility simultaneously. We attempt to test this proposition below.

Economic Mobility

This section begins with a graphical examination of the data to further illustrate how mobile the economic indicators have been over the three decades. Due to convenience and data availability, analysis on mobility has been restricted to six nations, which includes Australia, Canada, New Zealand, Switzerland, United Kingdom. The remainder of this section further demonstrates the nature of mobility in economic variables highlighting the need for a closer examination of its cause.

Figure 1 through to Figure 3 given below graph real growth against real interest for the six nations for the 1970's, 1980's and 1990's. A horizontal line through the average real interest rate and a vertical line through the average real growth rate divides the graph into four quadrants. Assuming that high growth rates are preferred to low interest rates we can rank the quadrants from most favourable (I) to least favourable (IV).





From the graph we can see that each nation shifts quadrants at least once over the three decades, some more dramatically than others. From the 1970's to the 1980's, Canada experienced the most dramatic change moving from quadrant two to quadrant four. That is, Canada went from experiencing relatively strong real growth and high real interest rates during the 1970's to relatively low real growth but continuing high real interest rates. Other countries including Australia shifted quadrants over the period, however, it appears as though most countries moved to less preferable quadrants excluding Switzerland

From the 1980's to the 1990's many of the nations once again experienced a shift in quadrants most of which were favourable. New Zealand moved from the third quadrant to the first quadrant and both the US and UK moved from the fourth quadrant to the first quadrant indicating a dramatic improvement from an environment where both nations experienced low growth and high interest to a much superior situation with low real interest rates and stronger real growth.

By the use of simple graphs, we notice that there is a high degree of mobility present in the data. Therefore, it appears as though countries experiencing relatively high growth rates as compared to other nations are unlikely to remain in this privileged position. This is also the case for both real interest rates and inflation,

which have shown mobility just as strong as economic growth. Assuming that interest rates and inflation can be controlled to some extent by monetary policy, we then ask whether it is in fact the mobility of interest rates and inflation that contributes to growth mobility, or is it dependent on other key economic variables such as government spending and investment? The following section will attempt to address this issue through the use of the linear regression models using more sophisticated mobility measures.

2. A Model of Economic Mobility

The DEA and data analysis above reveals high mobility in economic indicators. That is, it appears as though nations with relatively strong economic growth are unlikely to remain in this dominant position from one period to the next. A similar observation can be made with regard to inflation and interest rate data. The percentage change of each mobility measure has also demonstrated that each variable has undergone periods of either significant consolidation or significant severance. At face value, the examination of aggregate mobility for each decade above indicates that all three of the variables went through periods of consolidation simultaneously during the 1990's. The model proposed below attempts to examine in greater detail (with the use of yearly data) how severance, or consolidation of interest rate and inflation mobility impact upon the mobility of economic growth. The proposed model begins with the following straightforward regression:

$$M_t = \beta_0 + \beta_1 K_t + \beta_2 H_t + \varepsilon \quad (1)$$

Where M signifies growth mobility, K represents inflation mobility and H is interest rate mobility. Mobility is calculated using Shorrocks (1978) mobility measures which are explained later in this paper.¹

The argument behind this model is that we expect the inflation and interest rate mobility variables to be significant if monetary policy does indeed influence inflation and economic performance. We would also expect the coefficients for each variable to be positive if conventional ideas of interest rates and inflation hold true. That is, if inflation is a necessary determinant of economic growth, increased mobility in inflation rates should subsequently result in greater mobility of growth rates. A similar argument may be applied to interest rates. If interest rates are an effective policy tool, greater mobility in interest rates should also create mobility in growth rates.

Essentially, advocates for central bank independence argue that the appointment of an independent and conservative central bank removes inflationary bias, thus lowering the inflation rate to either zero or some manageable level. For example, in Australia, the target inflation rate for the Reserve Bank is between 2 to 3 percent. The logic behind these targets lies on the proposition that low levels of inflation are beneficial for the economy and result in sustainable growth and better economic performance. Therefore, it would seem that if this argument is plausible, inflation mobility must also have a similar effect on growth mobility. We expect that if the arguments for CBI hold, as nations shift toward the implementation of conservative, inflation targeting central bankers, inflation mobility should decrease and economic growth should become more stable thus also lowering growth mobility. Therefore, β_1 is expected to be positive. Similarly, as interest rates are considered an

¹ See pp. 6.

effective policy tool influential to the economy we would also expect increased mobility in interest rates to produce greater mobility in economic growth. The models from this section of the paper seek not only to test this hypothesis, but to also determine other possible sources of mobility.

Kuhl (2003) uses a model similar to the one above to examine income mobility. In particular, Kuhl (2003) adopts the use of linear regressions of mobility and first difference variables to evaluate what affect economic booms and recessions have on income mobility within nations. The model above endeavours to readapt the approach of Kuhl (2003) to an international level. The simplified model does however omit some potentially important variables. The model fails to take account of the potential influence of other causes of growth including government spending and investment. To address this issue, the model was expanded to include these variables:

$$M_t = \gamma_0 + \gamma_1 K_t + \gamma_2 H_t + \gamma_3 T_t + \gamma_4 I_t + \xi \quad (2)$$

Where T is government spending mobility and I is total fixed investment mobility. This expanded model will serve as a test of the robustness of the results from the basic model. Both of the regressions are estimated using OLS adopting Newey-West standard errors to allow for robust inferences. Although these are not comprehensive models, they will provide valuable insight into the source of economic mobility at an international level as well as information on the role of monetary policy on economic performance.

3. Data and Sources

The mobility regressions below use GDP growth, interest rate, inflation, Fiscal spending and fixed capital investment data from the United States, United Kingdom, Switzerland, Canada, Australia and New Zealand.

GDP data was gathered from the IMF International Financial Statistics database and the OECD Annual National Accounts (Main Aggregates). Annual GDP data was used to calculate annual growth rates. Interest rates were gathered from OECD Economic Outlook No.79: Annual and Quarterly Data. Annual long-term interest rates were used. Consumer Price Index data collected from IMF's International Financial Statistics database was used to calculate annual change in prices.

Fiscal policy data was collected from the IMF International Financial Statistics database. The dataset used was Fiscal Deficit/Surplus given in terms on national currency. The fiscal deficit/surplus was then calculated as a percentage of GDP to make the data set more comparable in the analysis. Finally, the proxy used for investment was total fixed investment collected from the OECD Economic Outlook No.79: Annual and Quarterly data. The dataset initially expressed in terms of volume was used to calculate annual percentage growth in total fixed investment.

4. Mobility Regression Results

This section starts with a description of the mobility measure used in the regressions given above, and is followed by the regression results. A modified version of the mobility measure introduced by Shorrocks (1978) is used in the linear regressions examined in this section. The original measure introduced by Shorrock as applied to income mobility defines the state of no mobility to occur if the annual individual shares of income are constant over time (Aaberge et al., 2002 at 9). Aaberge et al (1998) modified this approach defining zero mobility in terms of rankings. That is, zero mobility occurs if the annual *rankings* of all individuals are constant over time (Aaberge et al., 2002 at 9). This indicates that there may be no mobility even if

individual income shares change over time. The advantage of this approach is that it allows for a measure of mobility based on the Gini coefficient (Aaberge et al., 2002 at 9).

This approach measures mobility as the relative reduction in the weighted average of single-year inequality when the accounting period of income is extended (Aaberge et al., 2002 at 9). The formula used to calculate the Shorrocks mobility index is as follows:

$$M = 1 - \frac{G}{\sum_{t=1}^T \frac{\mu_t}{\mu} G_t}, \quad (3)$$

Where G_t and μ_t represent the Gini coefficient and the mean of the distribution of income in year t . For an improved understanding of this measure Aaberge et al (1998) suggest a closer look at the ‘natural’ decomposition of the Gini coefficient from which the authors derive the following inequality:

$$G \leq \sum_{t=1}^T \frac{\mu_t}{\mu} G_t \quad (4)$$

We can see from this equation that the left side of the inequality is equal to the numerator and the right hand side is equal to the denominator of the second part of the mobility equation. The left side of the inequality will equal the right side if and only if all individuals maintain the same ranking within the distribution of income in all years (Aaberge et al., 2002 at 10). From this we can see that if none of the individuals change their ranks, the T-year inequality will be equal to the weighted average of the inequality within the separate years.² If individuals do change their annual rank positions, the T-year inequality is strictly less than the weighted average of the inequality within the separate years. Thus, M becomes an appropriate measure of

² Where T is the period of years under consideration.

mobility with a value of zero attained if and only if there is no mobility. The maximum possible value of one occurs when complete equality in the distribution of the T-year incomes arises from income mobility (Aaberge et al., 2002 at 10).

Although discussion of these measures has been confined to income mobility, the same principles can be applied to economic indicators. The above approach to the Shorrocks mobility measure was used to calculate mobility for real discounted growth, real interest rates and inflation for the period from 1970 to 1999 and the measures are presented in Table 1.

Table 1

Shorrocks Mobility Measure (1970-1999)	
Discounted Growth	0.703
Real Interest Rate	0.886
Inflation	0.891

These initial measures exhibiting high mobility and are thus consistent with the findings above. Inflation has the highest mobility and discounted growth has the lowest according to this measure.

The same method of measuring mobility was used for the sample period on an annual basis and used to estimate linear regression models (1) and (2). The results of the OLS estimation of equation (1) are presented in Table 2.

Table 2

Basic Regression Results		
Variable	Coefficient	t-statistic
Inflation Mobility	-2.07***	-4.62
Interest Rate Mobility	2.84***	5.86
Constant	0.22***	3.49
*** 1 per cent significance		
** 5 per cent significance		
* 10 per cent significance		

The results from the basic regression reveals that both inflation and interest rate mobility as well as the constant are significant determinants of growth mobility. All the coefficients are also economically significant, however, the coefficient for inflation mobility is negative. This result was unexpected as economic theory suggests that inflation is an important factor for economic growth. Inflation is thought to create uncertainty about the nature of price signals distorting production, investment, employment and consumption decisions, which may cause substantial losses. Investors are aware of this and become cautious about long-term investments when inflation persists. The long-term investments that inflation fears tend to discourage are often those most necessary to sustain and promote economic growth. The negative coefficient seems difficult to reconcile with this hypothesis although, as we are dealing with annual data it may reflect the short to medium-term reactions of investors to inflation movements. A possible interpretation of this result could be that consolidation of monetary policy rules and inflation targets has a destabilising effect on economic growth. This is a significant finding as it has already been mentioned above that arguments for the implementation of independent central bankers would suggest that consolidation of inflation rates through the imposition of inflation targets must similarly establish consolidation in economic growth.

Putting the issue of the negative coefficient for inflation aside, the significance of both variable coefficients highlights the important role that monetary policy and inflation policies play in determining the level of economic growth mobility. Thus these results provide further evidence that monetary structures are crucial to economic performance. To test the robustness of the above results, the coefficients and t-statistics for equation (2) are as follows:

Table 3

Regression Results		
Variable	Coefficient	t-statistic
Inflation Mobility	-1.82***	-2.94
Interest Rate Mobility	2.48***	3.62
Govt. Spending Mobility	-0.03	-0.12
Investment Mobility	0.13	0.43
Constant	0.23***	3.04

*** 1 per cent significance
** 5 per cent significance
* 10 per cent significance

Government spending mobility was found to be trend stationary and was thus adjusted as required. The results from the second regression show that after including government spending and fixed investment in the regression, the coefficients for inflation and interest rates remain significant although their economic significance is reduced. The government spending and fixed investment coefficients appear to be insignificant. One needs to exercise caution when drawing inference from the extended model results however as the fiscal spending mobility data indicates the presence of a unit root, meaning the results may be spurious. It may simply be the case that the null hypothesis of a unit root under the Augmented Dickey-Fuller could not be rejected as our sample does not contain sufficient information, that is, the sample may be too short and standard errors are simply too high to reject the unit root (Verbeek pp. 278). In any case, one must remain aware that the fiscal mobility variable may not be stationary.

Finally, high standard errors for government spending and investment mobility may indicate the existence of collinearity. High correlation between the two variables also supports this hypothesis suggesting that one of these variables must be removed from the model. Table 5 reports the estimated model with investment mobility omitted. Inflation and interest rate mobility remain significant and their coefficients

change only slightly. Government spending mobility also remains insignificant although the coefficient has now become positive.

Table 5

Regression Results		
Variable	Coefficient	t-statistic
Inflation Mobility	-1.92***	-4.1
Interest Rate Mobility	2.59***	4.76
Govt. Spending Mobility	0.08	1.75
Constant	0.24***	4.02
*** 1 per cent significance		
** 5 per cent significance		
* 10 per cent significance		

5. Conclusion

This paper has introduced a number of methods to demonstrate the mobility of interest rates, inflation and economic growth. To attempt an examination of the relationship between the mobility of each of these variables, a simple linear model was proposed regressing economic growth mobility as a function of interest rate and inflation mobility. The analysis has shown that inflation mobility and interest rate mobility are significant determinants of economic growth mobility. This arguably highlights the important role monetary policy and inflation targeting play in the formulation of shifts in economic growth. These results were robust for the inclusion of fixed investment mobility and fiscal spending mobility as additional variables in the linear model. The interest rate and inflation mobility coefficients were also economically significant. One unexpected result was that the coefficient for inflation mobility was negative. The negative coefficient seems difficult to reconcile with conventional economic theory, which states that long-term investments necessary to sustain and promote growth are discouraged by inflation fears. We initially anticipated that inflation mobility would also encourage mobility in GDP growth if

arguments for CBI hold. Specifically, authors such as Schellekens (2002) argue that the implementation of an independent and conservative central banking will result in a 'free lunch' where we would necessarily experience low inflation and low output variability simultaneously. Thus we would expect that the consolidation of inflation rates anticipated from an increase in CBI must also create consolidation of output growth. One may interpret the negative coefficient as a result that casts doubt on the merits of imposing an independent central banker. That is to say, the result suggests that consolidation of inflation rates through the use of inflation targets may actually destabilise economic output, escalating the mobility of economic growth. This point may warrant further discussion in subsequent research. In any case, the model was successful in demonstrating that monetary policy can be a significant cause of economic mobility. In conclusion, this paper has demonstrated that the current belief that a nation must impose an independent central banker to enjoy a 'free lunch' with low inflation and low output variability may be unjustified according to the data. The mobility regressions demonstrate that the data does not support the hypothesis that consolidation of inflation rates necessitates consolidation of economic growth. This result has a significant impact on our current understanding of how monetary structures contribute to the effectiveness of monetary policy.

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