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We document increased central bank independence within the set of industrialized nations. This increased independence can account for nearly two thirds of the improved inflation performance of these nations over the last two decades.

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1. Introduction.

A remarkable achievement among industrialized nations during the last two decades is the dramatic decline in annual inflation rates. A long line of research dating to Kydland and Prescott (1977) and Barro and Gordon (1983ab) has argued that larger degrees of central bank independence can improve average inflation rates.[1] Hence, a natural question to ask is: how much of the improved inflation performance of the industrialized nations can be attributed to increased central bank independence?

To answer this question we use two measures of central bank independence from two different points in time. The first is the measure of independence used by Alesina and Summers (1993), and represents a measure of independence for the period 1955-88. Second, we use a more recent measure of independence reported by Fry et al. (2000) that is derived from a central bank survey conducted in 1997. We restrict our analysis to the industrialized nations. Since many of our nations are now part of the European Central Bank (ECB), we restrict the time frames to 1955-88 (the original Alesina and Summers (1993) time frame), and 1988-2000 (pre-ECB).

We report three principle results. First, measured independence has significantly increased across time for nearly all the central banks in the survey. The average independence score rose from an index of 59 to an index of 83. Second, the slope of the linear relationship between inflation and independence that was originally reported in Alesina and Summers (1993), is statistically identical to the fitted slope in the more recent data. This suggests some stability in the inflation-independence trade-off. Third and finally, using this fitted slope, we deduce that increased independence is responsible

[1] Walsh (2004) includes a survey of this research.

for nearly two thirds of the decline in the inflation rates for industrialized countries as a whole.

2. Data and Results.

All of the data used for this analysis are reported in Table 1. The first three columns in Table 1 are the data used by Alesina and Summers (1993) in their study of central bank independence and inflation performance. Alesina and Summers' (1993) measure of independence is an average of the scale used by Bade and Parkin (1982) and the scale used by Grilli, Masciandaro, and Tabellini (1991). Bade and Parkin's (1982) measure of independence reflects "political independence" which is defined as the ability of the central bank to select its policy objectives without influence from the government. This measure is based on institutional factors such as term length of bank governors, whether government representatives sit on the board, etc. Grilli et al (1991) combine this measure of political independence with what they term "economic independence" which is defined to be the ability to use monetary policy instruments without government restrictions, eg., whether the central bank is required to finance the government deficit. Alesina and Summers (1993) normalize their independence scale on a 0-4 index.

The remaining two columns of Table 1 report the Fry et al. (2000) data set. This data set includes a larger set of industrialized nations. As is clear in Table 1, countries that had little independence in the Alesina and Summers' (1993) sample had significantly greater independence in the later sample. The variation of independence among the Alesina and Summers' (1993) countries thus decreased, limiting our ability to draw conclusions about independence in the latter time period. Because of this we broaden our

sample to include the other industrialized nations reported in Fry et al. (2000). The new sample includes the original Alesina and Summers' (1993) countries plus Austria, Greece, Hong Kong, Iceland, Ireland, Korea, Portugal, Singapore, Taiwan, and Finland. Fry et al.'s (2000) measure of independence follows Grilli et al. (1991) by considering a wide range of characteristics including governors' term of office, legal objectives, deficit finance, etc. Fry et al (2000) normalize their scale from 0-100.

Because of the different scales, we transform Alesina and Summers' (1993) 0-4 scale to make this index comparable to Fry et al.'s (2000) 0-100 scale. Since the means have clearly changed over the period, we need another way to transform the different scales. We assume that the independence score for the most independent central bank stayed the same across the sample periods. The most independent country in the Alesina and Summers' (1993) data was Germany with an independence score of 4, while in Fry et al.'s (2000) sample Germany had a score of 96 (essentially 100). Hence, our transformation amounts to multiplying the multiply the Alesina and Summers' (1993) scale by 25. With this transformation it is comforting to note that the US independence score in the Alesina and Summers' data set is essentially the same as it is in Fry et al. Arguably there was little change in US central bank independence between the two time periods.

Turning first to the Alesina and Summers' (1993) data, Figure 1 plots their (transformed) data along with the linear regression line. The coefficients for this regression line are reported in Table 2. The celebrated result of Alesina and Summers (1993) is the remarkably good fit of the inflation-independence trade-off with a slope coefficient of -0.065.

Comparing the Alesina and Summer's data with the Fry et al. data (2000) we note a substantial increase in mean central bank independence scores across the two time periods. Independence increased from a score of 59.0 in the 1955-88 time period to 83.4 in 1997. There was also a sharp decline in the standard deviation of independence across nations. This data strongly supports the assertion that the central banks of industrialized nations are substantially more independent than they were two decades ago. Furthermore, and not surprisingly, the improvement is most pronounced for the central banks that were the least independent in Alesina and Summers' original study.

The Fry et al. data (2000) is plotted in Figure 2 along with the linear regression line. Because all nations have substantially more independence now than in the earlier sample, there is less variability with which to clearly identify the slope coefficient. However, as noted in Table 2, the slope coefficient is statistically significant with a point estimate of -0.0662. This is essentially identical to the earlier slope coefficient. An F-test fails to reject the hypothesis of a common slope at a 1% confidence level.

Table 3 reports the results of a pooled regression in which we combine the Alesina and Summers (1993) data with the Fry et al. (2000) data. In particular, our regression has 42 observations and is of the form:

$$Inflation = \beta_0 + \beta_1 Independence + \beta_2 I_F + \beta_3 (I_F * Independence)$$

I_F is the indicator variable or the dummy which takes a value of zero for the Alesina and Summers (1993) data, and a value of one for the Fry et al. (2000) data. We add dummy variables for the Fry et al. (2000) data points to allow for a different constant (β_2, the coefficient on the dummy) and a different slope (β_3, the coefficient on the interaction term). The results of the pooled regressions again strongly suggest a common slope

across the two samples (the interaction term is insignificant), but an intercept difference of about 65 basis points. In other words, the data suggests that 65 basis points of the 2.3 percentage point decline in inflation is due to factors other than independence. Figure 3 plots the combined data set along with the two linear regression lines. The 65 basis point gap is quite apparent.

In summary, we conclude that the data support the assertion that: (1) central banks of industrialized nations are significantly more independent now than in the earlier sample, and (2) there is evidence of stability in the independence-inflation relationship across the two time periods.

We can now use these two implications to assess the importance of independence in reducing mean inflation rates. Using a slope coefficient of -0.06, and the 24 point mean increase in independence from 59 to 83, the statistical relationship predicts a decline in average inflation rates of 1.44 percentage points. The actual mean decline in inflation is 2.3 percentage points. By this approach, we conclude that increased independence explains 1.44/2.3 = 63% of the decline in average inflation rates.

3. References.

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Table 1

	Alesina-Summers independence	Alesina-Summers independence rescaled[2]	Average inflation 1955-88	Fry et al. Survey of Independence	Average inflation 1988-2000
Australia	2	50.00	6.40	73	3.33
Belgium	2	50.00	4.10	77	2.22
Canada	2.5	62.50	4.50	91	2.54
Denmark	2.5	62.50	6.50	88	2.44
France	2	50.00	6.10	90	2.01
Germany	4	100.00	3.00	96	2.41
Italy	1.75	43.75	7.30	88	4.14
Japan	2.5	62.50	4.90	93	1.10
Netherlands	2.5	62.50	4.20	91	2.41
New Zealand	1	25.00	7.60	89	2.68
Norway	2	50.00	6.10	57	2.85
Spain	1.5	37.50	8.50	80	4.35
Sweden	2	50.00	6.10	97	1.65
Switzerland	4	100.00	3.20	90	2.27
UK	2	50.00	6.70	77	3.98
USA	3.5	87.50	4.10	92	3.25
Austria				68	2.43
Finland				91	2.70
Greece				86	5.29
Hong Kong				74	6.10
Iceland				59	6.17
Ireland				87	2.79
Korea				73	5.51
Portugal				85	6.36
Singapore				90	1.98
Taiwan				85	2.73
Mean		58.98	5.58	83.44	3.30
Std. Dev.		20.91	1.62	10.70	1.48
Number		16	16	26	26

[2] Alesina and Summers (1993) independence measure was a 0-4 scale. To make it comparable to the 0-100 scale of Fry et al. (2000), we multiplied the Alesina and Summers independence measure by 25.

Table 2
Regression by Time Period

Time period	Constant	Coefficient on independence	R^2
1955-88	9.44* (0.69)	-.0654* (0.011)	0.71
1988-2000	8.82* (2.09)	-.0662* (0.025)	0.23

(Linear regression of inflation on independence. Standard errors are in parentheses.)

Table 3
Pooled Regression

Constant	Coefficient on independence	Fry Dummy	Interaction= Dummy*Independence	R^2
9.45* (0.77)	-.0657* (0.012)	-.679 (0.48)	NA	0.80
9.44* (0.92)	-.0654* (0.015)	-.618 (2.08)	-0.0008 (0.027)	0.80

(Linear regression of inflation on independence, Fry dummy, and Interaction.
Standard errors are in parentheses.)

Figure 1: Inflation vs. independence, 1955-88

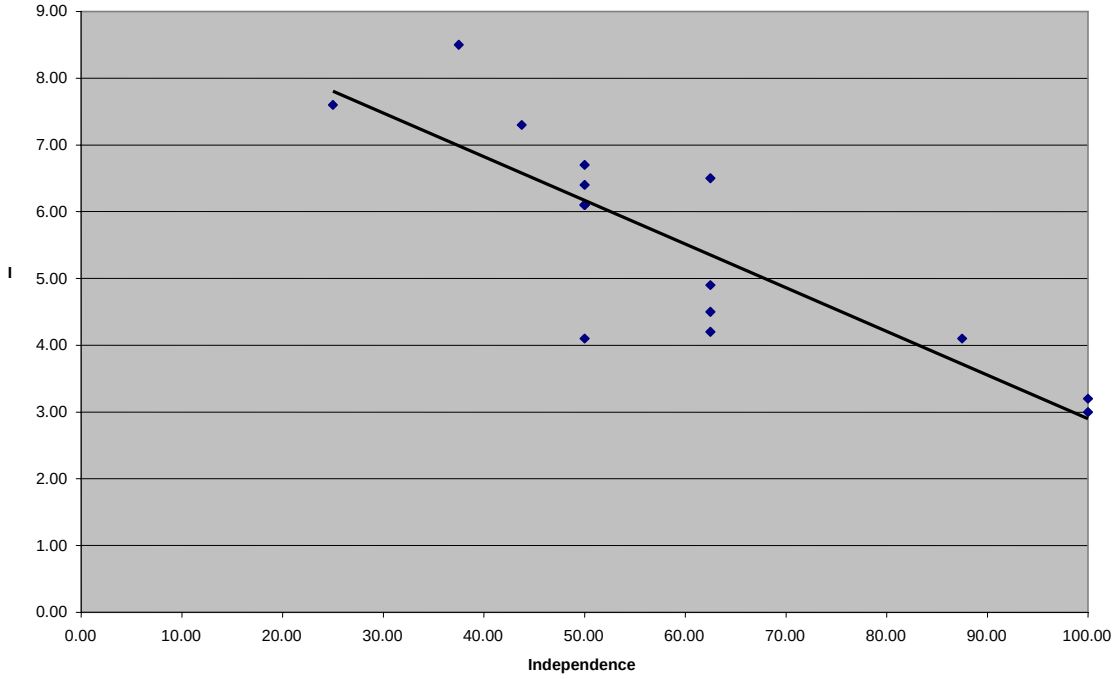

Figure 2: Inflation vs. Independence, 1988-2000

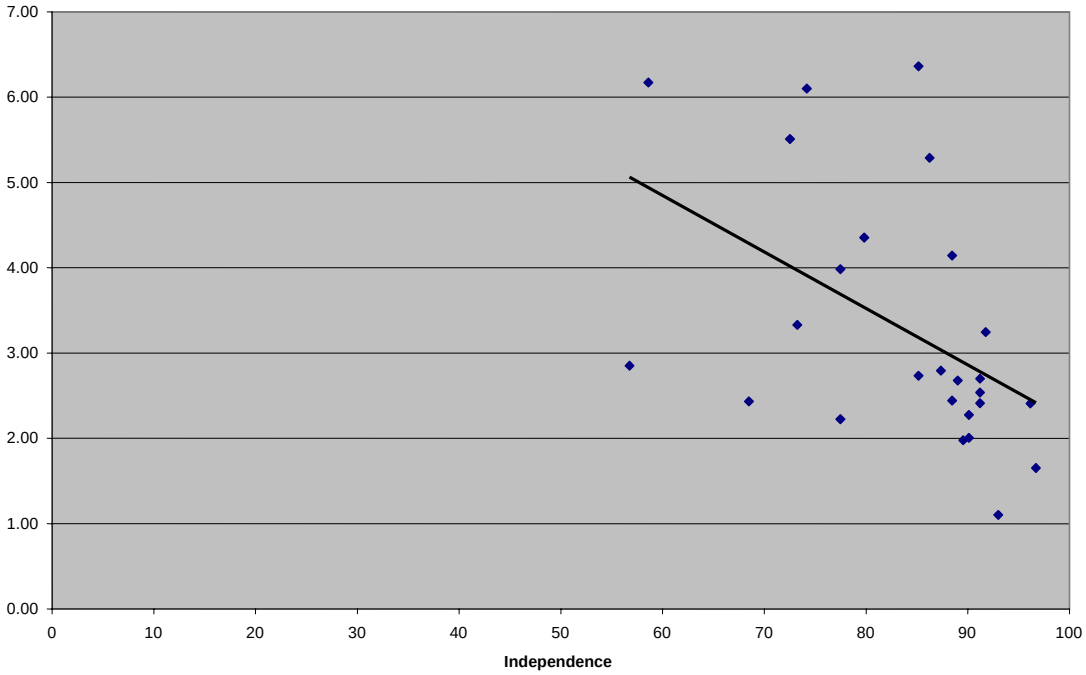

Figure 3: inflation vs. Independence, Pooled Data