ME
7/10/07
3:00 PM

Do Markets Care Who Chairs the Central Bank?

Kenneth N. Kuttner Adam S. Posen*

May 1, 2007

Abstract

This paper assesses the effects of central bank governor appointments on financial market expectations of monetary policy. To measure these effects, we assemble a new dataset of appointment announcements from 15 countries, and conduct an event study analysis on exchange rates, bond yields, and stock prices. The analysis reveals a significant reaction of exchange rates and bond yields to unexpected appointments. The reactions are not unidirectional, and thus do not suggest new governors suffer from a generic credibility problem. Federal Reserve chairman appointments stand out in terms of their unusually pronounced effects on financial markets.

JEL codes: E58, E61, G14.

*Kuttner: Oberlin College and NBER, Economics Department, Rice Hall, 10 North Professor Street, Oberlin, OH 44074, e-mail kenneth.kuttner@oberlin.edu. Posen: Peterson Institute for International Economics, 1750 Massachusetts Ave. NW, Washington, DC 20036, e-mail aposen@petersoninstitute.com. Our thanks go to seminar participants at the Bank of England, the Bank of Japan, Birkbeck College, the Federal Reserve Bank of Cleveland, Oberlin College, the Reserve Bank of New Zealand, and the Zentrum für Europäische Wirschaftsforschung; to Barbara Craig, Simon Gilchrist and Peter Pedroni for constructive suggestions. Dimitar Vlahov provided research assistance, and we are also grateful to Marta Abreu, Geoffrey Barrows, Özer Karagedikli, and Tarja Yrjola for their help in assembling the data.

1 Introduction

The appointment of a new central bank governor usually makes headlines in the financial press, and those reports often attribute to the appointment the subsequent reaction in the financial markets.[1] Ben S. Bernanke's October 24, 2005 appointment to chair the U.S. Federal Reserve, for example, generated hundreds of press reports, and nearly as many analyses and commentaries speculating on his policy leanings.[2] Stocks climbed sharply immediately following the announcement, while bond prices fell.

That financial markets should react to the appointment of a new governor is hardly surprising. After all, central banks' policies can have significant macroeconomic effects, and it is often assumed that the governor exerts a disproportionate influence over those policies. This may have been especially true in the case of Alan Greenspan, to whom extraordinary powers of foresight were sometimes attributed, and who was increasingly personally identified with U.S. monetary policy over the course of his long tenure.[3] And decades earlier, a similar degree of prescience and personal influence was attributed to Benjamin Strong, the governor of the Federal Reserve Bank of New York (then the locus of U.S. monetary policy decisionmaking), whose death in 1928 is thought by some to have contributed to the onset of the Great Depression.[4]

Governor-specific attributes also play a central role in much of the theoretical literature on monetary policy. The currently standard framework for modeling policymakers' incentives, which began with Kydland & Prescott (1977) and Barro & Gordon (1983), opened the door to characterizing differences in central bank behavior as a function of the objective function attributed to the central banker, as well as the institutional setting within which he

[1]This paper uses the term "governor" generically to refer to the head of the central bank, even when the actual job title is "president" or "chair."

[2]Factiva alone reports 1322 such articles on the day of, and the day following, his appointment.

[3]This is nicely illustrated by Senator John McCain's unforgettable quip from a 1999 G.O.P. presidential debate: "...if Mr. Greenspan should happen to die, God forbid, I would do like they did in the movie 'Weekend at Bernie's', I would prop him up and put a pair of dark glasses on him and keep him as long as we could."

[4]Friedman & Schwartz (1963, p. 412-13) conjectured that "if [Benjamin] Strong had still been alive and head of the New York [Federal Reserve] Bank in the fall of 1930, he would very likely have recognized the oncoming liquidity crisis..." and taken "appropriate measures to head it off."

served. This was made explicit in the influential Rogoff (1985) model of the "conservative" central banker, as well as in those, such as that of Cukierman & Meltzer (1986), that distinguish between different central banker "types" (e.g., "hawks" versus "doves"). Financial market commentary often makes much of this distinction in central bankers' preferences when forecasting the impact of likely appointments to central bank boards.[5]

The point of this paper is *not* to determine whether, and to what extent, central bank governors influence monetary policy, and the economy. (Implicitly, it is assumed that they do.) Rather, it is to determine whether financial markets *perceive* that the central bank appointments contain new information relevant to policy expectations.[6] If so, then these appointments (or more precisely, the announcements) should move markets through their effects on expected inflation and interest rates.

The overall objective is therefore to assess empirically the perceived information content (if any) of governor appointments in the eyes of financial market participants. The paper's specific goals are threefold. The first is to document the reaction of exchange rates, bond yields and stock prices to announcements of new central bank governors, using a new dataset encompassing 15 countries covering a time span of over three decades. The second goal is to determine whether, taken together, these reactions are statistically significant, and whether they tend in one direction (e.g. due to doubts about the appointee's credibility). The third is to interpret the results in terms of shifts in the underlying determinants of monetary policy, including the preferences of the central bank governor.

So far as we are aware, this is the first effort to analyze the impact of new central bank governors on financial markets and monetary policy expectations. There is, of course, a large literature on how economic news affects financial markets, and a number of recent

[5]Bernasek (2005), for example, wrote following Bernanke's appointment: "Greenspan did, however, make one thing clear [at the time of his appointment]: the need to combat inflation. He realized that he needed to establish his credibility on this front. Soon after his appointment, the Fed raised interest rates by half a percentage point and sent a message about his determination to tame price increases. He understood that an unhappy bond market could undo a Fed chairman and that the economy would suffer the consequences… The first test will be [Bernanke's] credibility on inflation … the vote that ultimately matters more will be the one cast by the bond markets. Inflation will be their litmus test. Bond traders are already scouring Bernanke's record for evidence one way or the other… The bond market reacted by inching rates higher."

[6]Note that these the shifts in expectations created by these announcements need not be correct *ex post*.

papers have examined the effects of specific monetary policy actions (i.e., changes in the target federal funds rate for the U.S.) on financial markets. Examples include Kuttner (2001) for the bond market, Rigobon & Sack (2004) and Bernanke & Kuttner (2005) for the stock market, and Faust *et al.* (2003) for the foreign exchange market. The paper most closely related to the present study may be that of Gürkaynak *et al.* (2005), who entertain the possibility that certain kinds of macroeconomic news (including policy changes) could affect market participants' inferences about the central bank's policy objectives.

Our results, which are based on an event-study analysis of 61 announcements of changes in the central bank governor, reveal a pronounced and statistically significant response of exchange rates; and to a lesser extent, bond yields. Although there are a few conspicuous equity market reactions (Bernanke's case being a rare example), the stock price response overall is only marginally significant. Just as important, the reactions are not unidirectional. Some announcements appear to create expectations of tighter monetary policy (i.e., higher real interest rates, or a lower inflation objective), while others are more consistent with more expansionary policy. In the aggregate, there is no discernible tendency one way or the other. Overall, the results suggest that appointments *do* contain (or, at least are *thought* to contain) new information about future monetary policy. Moreover, the market appears to distinguish between what we term "newsworthy" appointments and those for which the announcement contains no new information regarding the new governor's likely preferences. Doubts about credibility do not appear to be a generic feature of new appointments, however.

The paper is organized as follows. Section 2 discusses the nature of the information that might be contained in the announcement of a new governor, and presents some descriptive analysis of the dispersion in inflation outcomes across central bankers. Section 3 describes the construction of the announcement data set, and the selection of the sample. Section 4 contains the paper's central event-study results, and Section 5 concludes.

2 The information content of bank appointments

This section focuses on two interrelated questions: first, why might governor appointments contain information about monetary policy? And second, what is the nature of the information contained in the announcement of a new governor? To address these questions, it first reviews key elements of the theory of monetary policy, using that theory to identify three potential sources of heterogeneity across central bank governors. Next, it documents the dispersion in inflation outcomes for the countries and time span used in the analysis. Finally, based on these theoretical and empirical observations, it formulates two testable hypotheses concerning the nature of the information contained in the governor appointments.

2.1 Why governors might differ ex ante

The cornerstone of modern monetary policy modeling is an objective function, which is used to characterize mathematically the central bank's policy objectives, and the relative weights it places on potentially conflicting outcomes. The most common approach is to assume the central banker minimizes a quadratic loss function of the form,

$$L = \sum_{t=0}^{\infty} \delta^t [(\pi_t - \pi^T)^2 + \lambda (y_t - y_t^*)^2] \ , \tag{1}$$

where π is the inflation rate, π^T is the central bank's desired or "target" inflation rate, y is real output, and y^* is equilibrium or potential output. Future outcomes are discounted by the factor δ, and λ parameterizes the relative weight assigned to output fluctuations in assessing welfare costs, vis à vis deviations of inflation from π^T.

In this context, one way in which central bankers might differ from one another is in the weight they attach to output relative to inflation stabilization—that is, they may have different values for λ. Much of the literature on central bankers' preferences has focused on this parameter, which is typically interpreted as summarizing the monetary authority's

"conservatism," defined as in Rogoff (1985). A more conservative central banker will have a smaller value of λ, indicating a greater willingness to forego output stabilization for the sake of inflation stabilization. This means that, faced with a higher-than-desired inflation rate, a "low-λ" central banker will pursue a relatively restrictive policy (i.e., high real interest rates) in order to achieve a rapid disinflation. Several efforts have been made to estimate the λ values associated with chairs of the Federal Reserve, such as Özlale (2003), and Favero & Rovelli (2003).

Central bank governors may also differ in terms of their desired inflation rate itself, π^T. This possibility has not received much attention in the theoretical literature, for the simple reason that, under the standard assumption of a vertical long-run Phillips curve, there are no gains to choosing a higher π^T.[7] Consistent with this assumption, most central banks have converged in recent years towards average inflation rates of roughly two percent. This has not always been the case, however: Favero & Rovelli (2003) estimate that the Federal Reserve's post-Volcker implicit inflation objective is three percentage points lower than it was in the 1960s and 1970s. In addition, Gürkaynak *et al.* (2005) found long-run inflation expectations (measured by the spread between nominal and inflation-indexed bonds) are not well "anchored" in the U.S., implying some uncertainty about the Fed's ultimate inflation objective.

Finally, though not readily apparent from equation 1, central bank governors may differ with respect to their perceived "credibility," defined as the extent to which they are trusted to follow through with their announced policies. As shown by Barro & Gordon (1983), the absence of credibility (along with a preference for higher-than-equilibrium output) can lead central banks to choose higher inflation rates, in an (ultimately futile) effort to boost output.[8] To the extent that it creates an upward inflation bias, therefore, the lack of credibility

[7] There may, however, be technical reasons for choosing $\pi^T > 0$, such as to compensate for the upward bias in measured inflation rates, or to create a buffer zone in order to avoid the zero lower bound on the nominal interest rate and the possibility of outright deflation.

[8] This should be seen not as a literal mistake or willful ignorance by central bank governors, but as a proxy for political and other pressures to expand output in an unsustainable way, or for the lack of will to follow through with a difficult period of disinflation.

has observable implications that are similar to a higher π^T.

In certain models, the lack of credibility is a generic problem facing newly-appointed central bank governors. In Schaumburg & Tambalotti (2003) and Kara (2007), for example, the incumbent central bank governor can commit to policy during his or her own administration; but the commitment is not binding on his successor, who may have an incentive temporarily to pursue a discretionary policy. Interestingly, based on the increase in the degree of inertia in its policy rule, Kara (2007) concludes that the Fed's credibility increased under Volcker and Greenspan.

A similar, and more directly relevant, phenomenon arises in models in which the market participants are uncertain about the underlying preferences of the incoming governor, as in Cukierman & Meltzer (1986). In their model, a less conservative ("weak") governor initially has an incentive to mimic the behavior of the a more conservative ("strong") policymaker, at least until some point at which it becomes optimal to behave opportunistically, thus revealing his true colors. Uncertainty about a governor's type is therefore likely to be highest at the start of a governor's tenure, before he has had an opportunity to demonstrate his anti-inflation credentials. In this "weak until proven strong" view, markets may have a tendency to react adversely (i.e., with an increase in inflation expectations) to the announcement of a new central bank governor, thus creating an "inflation scare" à la Goodfriend (1993).

2.2 Ex post differences in inflation outcomes

How much variation is there in central bankers' preferences? Because these preferences are unobservable, there is no way to know for certain. But the descriptive analysis presented in this section demonstrates that the historical variation in average inflation rates across central bank governors' tenure in office is quite large, even controlling for time and country-specific effects. While this finding does not *prove* that the governor "matters," it is at least consistent with the notion that a governor can leave a significant imprint on monetary policy; and by extension, that the appointment of a new governor can potential alter

expectations about future policy.

Figure 1 illustrates this point graphically, with a display of two simple gauges of the inflation outcomes associated with 47 of the 50 central bank governors in our sample. (Three governors with very short tenures are excluded.) The data are discussed in greater detail below in section 3; for now, it suffices to say that the 15 countries in the sample represent a subset of the OECD, and that the analysis focuses on the post-Bretton woods period from 1974 through 2006.

The diamonds show average CPI inflation, calculated over each central bank governor's term, excluding the first year. (The rationale for excluding the first year is to minimize the contribution of the inflation rate inherited from the predecessor while allowing the new governor's policies to take effect, and thus presumably giving a clearer indication of the new governor's preferences.) Not surprisingly, the observed inflation rates vary dramatically: the high is 13.6 percent for Italy's Baffi, and the low -0.6 percent for Japan's Hayami.

Ordering the observations chronologically, as in Figure 1, reveals an important feature of the data, namely the steady downward trend in average inflation rates over the past 30 years: the 1970s and early 1980s were characterized by very high inflation rates, while those from the mid 1980s onward typically achieved much lower inflation. The average inflation rates plotted in the figure may therefore exaggerate the degree to which central bankers' inflation performance differs from that of their peers.

Instead, one could look at the difference between each central bank governor's inflation rate and the average across the 15 countries in the sample, for the time span corresponding to the governor's term. These differences are plotted as the bars in Figure 1, where Portugal's Moreira and Switzerland's Leutwiler take the prizes for the highest and lowest inflation rates, relative to their peers. It is clear from Figure 1 that this time-effect adjustment greatly reduces the variability across central bankers—and that this variability has shrunk in recent years, along with the average inflation rate. Considerable dispersion remains, however, even in recent years.

Another slightly more systematic (but still descriptive) way to characterize the central

bank governors' inflation performance is to regress average inflation rates on variables capturing time and country effects. The simplest such specification is one that is linear in the variables,

$$\pi_i = \pi_{77} + \beta_1(t-1977) + \beta_2(t-1977)^2 + \sum_{j=1}^{14} \gamma_j d_j + \varepsilon_i \ , \tag{2}$$

but includes a quadratic time trend to allow for a change in the rate of inflation reduction. The d_j are country dummies, and the intercept π_{77} captures the average inflation rate prevailing in 1977 (the first year in the sample). Note that because the country-specific effects are additive, a country dummy for the 15th country (the U.S.) is omitted; consequently, the γ_j coefficients represent (time-invariant) inflation differentials relative to the U.S. The time term t is defined as the midpoint of the central bank governor's tenure, as in Figure 1.

An important shortcoming of the linear specifications is that it fails to account for the observed convergence towards an inflation rate of approximately two percent. Modeling this requires a nonlinear specification, such as

$$\pi_i = \pi_0 + \left(\sum_{j=1}^{15} \gamma_j d_j \right) e^{-\delta(t-1977)} + \varepsilon_i \ . \tag{3}$$

Here, the country-specific effects disappear as t increases, and eventually every country converges to an inflation rate of π_0. The d_j are again country-specific dummies, but in this specification they capture the inflation differential prevailing in 1977. (Because the country-specific effects are not additive a complete set of country dummies can be included.)

Estimates for both specifications appear in Table 1. Two variants of each specification are estimated: for the linear model, one with a linear time trend and another with both linear and quadratic terms; for the nonlinear model, one with π_0 set to 2 and another with π_0 estimated as a free parameter. The parameter estimates are just what one would expect: the coefficient on the time effects are negative (implying lower inflation over time) and the

country effects capture plausible differences in average inflation across countries (positive for countries such as Italy and Portugal, negative for Germany and Switzerland). Allowing for convergence in inflation rates greatly improves the fit of the nonlinear model, relative to the linear specification.

The parameter estimates themselves are not of primary interest, however. Rather, the main point of the exercise is to determine how much inflation variation remains to be explained by differences in governors' characteristics, after controlling for these time and country effects. Despite respectable $\bar{R}^2$s (in excess of 0.75 for the nonlinear specification), an economically meaningful amount of variation remains: the standard deviation of the error term is around 2 percentage points in the linear specifications, and 1.5 percentage points in the nonlinear specifications. While it would be an exaggeration to claim that this was *all* due to the governors' preferences, it nonetheless suggests that these preferences may be an important determinant of the average inflation rate.

Finally, it is worth nothing that average inflation is not the only potentially measurable outcome of differences in governors' preferences. For example, different degrees of "conservatism" will, *ceteris paribus*, generate differences in the relative volatilities of output and inflation. The problem is that these volatilities will also be affected by parameters other than λ: the slope of the aggregate supply curve, and the variances of the various shocks affecting the economy. Estimating central bankers' preferences from the second moments would therefore require a structural approach like that of Favero & Rovelli (2003) or Özlale (2003). The average level of inflation, on the other hand, is ultimately under the central bank's control.[9] Consequently, variation in average inflation across governors should provide at least prima facie evidence for differences in preferences.

[9]This would not be true in cases of fiscal dominance, but our sample of advanced economies includes no such cases.

2.3 Policy expectations and asset prices

Together, the theory sketched in section 2.1 and the descriptive results from section 2.2 suggest central bank appointments could shift financial market expectations for future inflation and real interest rates. Empirically discerning such an effect is complicated by the lack of high-frequency direct expectations data, however. Surveys, such as those compiled by Consensus Economics, are too infrequent to be of any use. Market-based measures derived from nominal and inflation-indexed bonds, such as those used by Gürkaynak *et al.* (2005) are recent innovations, and only available for a handful of countries. Lacking suitable expectations data, the analysis in this paper relies on financial variables that are traded in deep and liquid markets, and likely to be influenced by inflation and interest rate expectations: exchange rates, bond yields, and stock prices. Discerning the link between monetary policy and financial market expectations turns out to be more straightforward for exchange rates and bond yields than it is in the case of stock prices.

The theory of uncovered interest rate parity (UIP), which relates the expected change in the (log) nominal exchange rate, $E_t \Delta e_{t+1}$, to the spread between domestic and foreign interest rates, $i_t - i_t^*$,

$$E_t \Delta e_{t+1} = i_t - i_t^* \tag{4}$$

establishes a link between policy expectations and the exchange rate. Solving equation 4 forward makes this linkage more explicit,

$$e_t = E_t \left(\sum_{s=0}^{T-1} (i_{t+s}^* - i_{t+s}) + e_T \right) \quad , \tag{5}$$

where e_T, the nominal exchange rate at some future date T, might be thought of as a long-run equilibrium exchange rate, determined, for example, by purchasing power parity (PPP) for large values of T.

Expected changes in monetary policy can therefore affect the nominal exchange rate either via the path of future interest rate differentials, or through an effect on the per-

ceived equilibrium exchange rate. Expectations of a more restrictive monetary policy, which would result from the appointment of a more conservative (smaller λ) central banker in an environment of higher-than-desired inflation, would tend to decrease e (appreciate) through two channels: first, by increasing i relative to i^*; and second, by reducing the expected future price level via the PPP effect.

Announcements affecting the central bank's perceived credibility (or alternatively, π^T), on the other hand, would tend to produce ambiguous exchange rate responses. While an increase in inflation expectations would tend to increase i relative to i^*, reducing e, it would at the same time *raise* the expected equilibrium e_T via the PPP channel. Consequently, the exchange rate is likely to provide a clearer indication of perceived differences in conservatism (i.e., different values of λ) than it would be for differences in inflation expectations.

For understanding the link between bond and policy expectations, the natural benchmark is the expectations hypothesis. The simplest version of the theory expresses the long-term nominal bond yield i^L as the average of expected future short-term (one-period) nominal interest rates, i^S, plus a (constant) term premium ϕ,

$$i_t^L = \frac{1}{T} E_t \sum_{s=0}^{T-1} i_{t+s}^S + \phi \quad . \tag{6}$$

Within the context of the expectations hypothesis, the effect of an increase in the desired inflation rate (or an increase in the inflation bias resulting from diminished credibility) is clear, as an increase in expected inflation would tend unambiguously to raise nominal interest rates, and thus bond yields. The effect of central bank conservatism (given π^T) is less clear, however. The reason is that, while a tighter monetary policy will raise the nominal short-term interest rates over some horizon, it will also *reduce* those rates over a longer horizon, as inflation expectations decline. Bond yields, therefore, arguably provide a clear signal of pure shifts in inflation expectations (whether coming from differences in perceived credibility or revisions in π^T), but a somewhat more ambiguous indicator of changes in conservatism (λ). Nonetheless, it is reasonable to assume that an increase in

either λ or π^T would raise bond yields initially.

Equity prices are even harder to interpret directly in terms of monetary policy expectations, even in the context of the simplest possible model in which the equity price represents the discounted sum of future earnings. Monetary policy clearly can affect equity prices through its effects on the discount rate applied to future earnings. What complicates interpretation is that policy expectations are also likely to affect those future earnings—both through the level of real economic activity, and via its effects on inflation. Additionally, the possible effects of monetary policy on risk premia, which Bernanke & Kuttner (2005) found to account for a significant share of the variance of equity returns, are not necessarily consistent in sign with these other channels' effect on equity prices, further complicating the interpretation. Still, because higher inflation tends to be bad for stocks, examining the stock market's response to central bank appointments may contain useful information on shifts in long-run inflation expectations.[10]

2.4 Two testable hypotheses

The theoretical discussion above in section 2.1 suggests two testable hypotheses regarding the information content of central bank governor announcements. One hypothesis is that new governors are assumed to be "weak" until they have had a chance to prove themselves "strong." As discussed above, this hypothesis is suggested by the models of Cukierman & Meltzer (1986), Schaumburg & Tambalotti (2003) and Kara (2007), and implies that changes in central bank governors will tend to be associated with at least a transitory rise in inflation expectations. Thus, if this "weak until proven strong" hypothesis is correct, then one should see in the data a tendency for new governors to be associated with exchange rate depreciations, and/or increases in bond yields.

A second testable hypothesis is that central bank governor appointments contain new information about the likely future path of monetary policy—but that the new governor is not presumed to be "weak." In other words, based on whatever information they might

[10] See Fama (1981) for evidence on the link between inflation and stock returns.

have at their disposal, market participants perceive that the new governor's characteristics (λ, π^T, or "credibility") differ from those of his predecessor. Thus, appointments may increase or decrease inflation expectations; by parallel logic, they may alter expectations about the time path of real interest rates. Changes in these expectations will of course affect exchange rates, interest rates, and (less deterministically) stock prices—but the *direction* of movement will depend on the perceived governor-specific characteristics.

The underlying null hypothesis in either case is that central bank appointments contain *no* discernible information, and thus generate no market reaction at all. There are several reasons the appointment of a new central bank head might be a non-event. One possibility is that macroeconomic outcomes are determined primarily by luck (i.e., exogenous shocks), or by policies outside of the central bank's control, making the central bank (and its governor) largely irrelevant. A second possibility is that financial market participants lack the information required to make meaningful inferences about the appointee's preferences. Alternatively, there may be little perceived variation among central bankers: if all governors were selected from basically a pool of candidates that differed little on any of the characteristics in question, then any new appointee would be expected to pursue policies similar to those of his predecessor.

A fourth possibility is that central bank governors are constrained by their institutional environment. That is, to the extent that the central bank is constrained by legal strictures and institutional structures, there will be little scope for any individual central bank governor to impose his preferences on the policy process. This is clearly going to be the case when the central bank is committed to maintaining a fixed exchange rate, and it is for this reason that countries with hard pegs are excluded from our analysis (see section 3). But the governor's discretion may also be constrained by political or structural factors. Investigating the practical implications of central banks' institutional features as perceived by financial markets would be a natural extension of the present study.

3 Data and sample selection

Two criteria were used to determine which countries were included in the analysis, and over what time period. First, the scope of the analysis is limited to industrialized countries. One reason to do so is that a great deal of turnover among central bank governors in emerging markets appears to be related to (or precipitated by) macroeconomic or financial crises, making it hard to distinguish the impact of the appointment from the contemporaneous financial turmoil. In addition, because reliable English-language press reports from these countries are scarce, it is often hard to pin down the precise announcement dates with any certainty.

The second criterion used in selecting the sample is that the currency in question must exhibit some degree of exchange rate flexibility. Because a credible hard peg essentially removes any scope for an independent monetary policy, central bank appointments in these cases would contain no information on the likely future path of inflation and interest rates.[11] Consistent this criterion, the sample is limited to the post-Bretton Woods and (for euro adopters) the pre-euro period.[12] European countries maintaining a hard DM peg during the pre-euro period (e.g., Austria, Denmark, Belgium) were also dropped from the sample.[13]

The application of these two criteria yields a sample of 15 countries, covering the years from 1974 through 2006 (or 1999 for euro adopting countries). The next step is to determine the dates of the governor appointments in the sample. It is important to note that, because the analysis focuses on the financial market impact, the relevant dates are those

[11] For less than fully credible pegs, appointments could be seen as affecting the likelihood of exiting, or adjusting the parity. Such a "peso-problem" phenomenon would, presumably, be reflected in interest rates and inflation expectations.

[12] Although many of the countries in the sample were members of the ERM, during most of the period the bands were of sufficient width to allow for some degree of exchange rate variation and monetary autonomy, as reflected in the measurable and persistent inflation differentials between ERM members outside of the hard-DM core. Vanhala's June 1998 appointment to head the Bank of Finland was dropped, however, as the adoption of the euro was imminent, all but eliminating any variability in the Markka-DM exchange rate.

[13] When Klaus Liebscher left the presidency of the Austrian National Bank (OeNB) in 1998 to join the General Council of the ECB, the *Financial Times* quipped that he would have a "proper" job for the first time since he took over as head of the OeNB in 1995, noting that "some unkind critics have joked that his job could easily have been done by an incoming fax machine linked to the Bundesbank's Frankfurt headquarters" (Hall, 1998).

for the *announcements* of a new central bank governor's appointment (or his predecessor's departure), rather than the dates on which the new governor formally took office. Unfortunately, these announcement dates are not documented in any official sources, requiring us to turn to published news sources available electronically (i.e., via Nexis-Lexis and Factiva). In the end, announcement dates for 50 central bank appointments were determined through this process.

3.1 Defining and classifying events

There is considerable variation in the circumstances surrounding the 50 appointments in the dataset, making for a fairly heterogeneous set of events. Some are orderly transitions to a widely-anticipated successor, while others are more abrupt, or involve the appointment of a relative unknown. Because the information content of the announcements will depend to some extent on these circumstances, it will be important to make distinctions among them along two key dimensions.

One dimension has to do with whether the transition to the new governor was *scheduled*, or *unscheduled*. Scheduled transitions are those involving the expiration of a term, or a planned retirement; by contrast, unscheduled appointments would be those in which the incumbent retired unexpectedly, or was replaced. This is also a potentially useful distinction because, in cases where there is a lag between the two, the (one-term) incumbent's departure and the announcement of the successor can be treated as two separate events—at least for those cases in which the date of the departure announcement can be determined. In addition to the 50 new governor announcements, there are 12 such "unscheduled exit" announcements, yielding a total of 62 distinct events.

In practice, distinguishing between scheduled and unscheduled transitions is usually relatively straightforward: expirations of terms, planned retirements, and the like, are generally matters of public record, and thus easy to verify from press reports, central bank sources, and Pringle (2007). Cases in which the incumbent was eligible for reappointment, but did not receive it, are classified as unscheduled, on the grounds that the typical pattern

is to serve out an additional term, if allowed.[14]

The second key dimension is whether the identity of the new governor is known in advance of the official announcement. This critical distinction determines the extent to which the announcement represents real "news," as opposed to the ratification of a *fait accompli* already discounted by the markets. The distinction is an especially important one for the purposes of this paper, as efficient financial markets should, in theory, respond only to *new* information. Considering this factor jointly with the scheduled/unscheduled distinction, we can usefully partition the sample into two subsets: one consisting of 42 "newsworthy" events, defined as unscheduled departures and surprise new governor announcements; and a second consisting of 20 non-"newsworthy" events encompassing appointments in which the new appointee's identity was generally anticipated.

Discerning the extent to which the new governor's identity was known in advance is a challenge, as there is no direct means to divine the market's expectation of the next central bank governor.[15] In the absence of market data, we rely on press accounts during the period leading up to and including the announcement date. Often, the accounts are very clear as to whether the appointment was as expected; in others, some judgment is required.[16] Preventing sample selection bias naturally requires that this judgment be based exclusively on external sources, such as contemporary press accounts—and not on the financial market reaction itself.

This method of classification is, of course, somewhat crude and susceptible to errors. Fortunately, the possibility of classification errors should not undermine the results: misclassifying anticipated appointments as "surprises" should tend to attenuate the measured

[14]Examples of events classified as unscheduled for this reason include the transitions from Burns to Miller in the U.S., and from Crow to Thiessen in Canada.

[15]At least not until recently: in 2005, the betting site Intrade.com offered a futures contract allowing investors to take positions on Greenspan's successor. According to Intrade, Bernanke was the favored candidate, in the weeks leading up to the appointment, with a 40 percent probability of appointment; but Martin Feldstein and Glenn Hubbard were also thought to be serious possibilities, with probabilities of 27 and 20 percent, respectively (Pethokoukis, 2005).

[16]In the case of Mervyn King's appointment to head the Bank of England, for example, the press accounts suggest that, although King was the clear front-runner, Andrew Crockett was also a possibility. But because King was so heavily favored, his appointment is coded as "known in advance."

response to announcements, biasing the results *against* finding a significant reaction to central bank appointments. It is therefore unlikely that any such random misclassification would result in the spurious rejection of the null "no reaction" hypothesis. It could, however, mask a distinct reaction to newsworthy versus non-newsworthy events, and as discussed below, this is the likely source of one minor anomaly in our results.

Table 2 lists all 62 events, encompassing announcements of unscheduled departures and new appointments. The table also indicates whether the identity of the appointee was anticipated according to press reports.

3.2 Financial data

Having determined a set (and a number of interesting subsets) of events, the next step is to assemble the relevant financial data. As mentioned above, three financial variables are used: exchange rates, bond yields, and stock prices.

The daily exchange rate data are taken from the Federal Reserve's H.10 release. For the nine European countries in the sample (other than Germany), the exchange rate is the bilateral rate relative to the DM. For Germany, and the other countries in the sample, the bilateral exchange rate with the U.S. is used; the U.S. exchange rate is relative to the DM (the Euro, post 1999).[17]

Daily bond yields are obtained from a variety of sources. Some are reported by the central banks themselves, while others were collected by the Federal Reserve Bank of New York. Most are the yields on benchmark government securities, typically of a 10-year maturity. The availability of high-frequency bond yield data is rather limited, however, as liquid long-term bond markets are a relatively recent development in some countries in our dataset; consequently, bond yields are available for only 39 of the 62 events.

Daily values of the major equity market indexes in each country were obtained from Haver Analytics, and other sources. These high-frequency data are even more limited,

[17]It might seem at first that using the Federal Reserve exchange rate data, which are collected at noon Eastern time, would complicate the analysis—but the timing is such that announcements taking place during normal business hours in both Europe and Asia would be reflected in the Fed's data.

however, and the stock price is available for only 33 of the 62 events. Further details on the sources and availability of the financial data used in the analysis appear in the appendix.

4 How do financial markets react to governors' appointments?

The object of the analysis is the change in one of the three financial variables Δy_t (where y represents the log exchange rate, the bond yield, or the log stock price) on the date corresponding to announcement i. But, because the volatility of each of the three variables varies across countries and over time, in gauging the size of the financial market reaction (if any), it is necessary to normalize Δy by an estimate of its standard deviation, $\hat{\sigma}$. If there were a trend in y, it would also be appropriate to subtract off an estimate of the average $\overline{\Delta y}$.[18] Thus, the statistic used to measure the size of the response will be $z_i \equiv (\Delta y_t - \overline{\Delta y})/\hat{\sigma}$. The estimated $\hat{\sigma}$ and $\overline{\Delta y}$ are obtained from a 90-day window prior to the announcement.[19]

The measured financial reactions (i.e., the zs and Δys) also appear in Table 2, along with the appointment data discussed above. The zs are generally centered on zero, and the majority less than one in absolute value. The sample nonetheless contains a number of relatively large reactions with many (11 out of 62) exceeding two in absolute value. There is one conspicuous standout on this dimension: the exchange rate reaction to Finland's appointment of Sirkka Hamalainen in 1992. Following a period of relative stability, the 2.5 percent appreciation in the Markka on April 3 (occurring immediately after an equally sharp depreciation) represents a 13 standard deviation change. Because including this single extreme observation could easily skew the results, we drop it from the analysis as an outlier, leaving 61 usable observations.[20]

[18] In practice, $\overline{\Delta y}$ is usually very close to zero, so this adjustment has no practical effect.

[19] In cases where the announcement was preceded by an unanticipated departure by the previous governor, a 90-day window prior to the departure announcement is used. In two cases, there was not enough pre-announcement bond yield data, and so a window beginning ten days following the announcement was used for calculating $\hat{\sigma}$.

[20] As it happens, Hamalainen's appointment followed the resignation of her predecessor, Rolf Kullberg, in a public dispute over policy that sent a "shock wave through the Finnish money markets," and also resulted in an spike in the Helibor rate of nearly four percentage points (Webb, 1992). With by far the largest market reaction

4.1 Are new governors perceived as weak?

Under the null hypothesis that the governor announcement contains no information, the announcement-day changes in the financial variables will be drawn from the prevailing pre-announcement distribution; in this case, the zs should have a mean of zero and a unit variance. This allows for a straightforward test of "weak until proven strong" hypothesis, which implies a systematic reaction of the financial variables consistent with higher inflation expectations (i.e., a weaker currency and/or higher bond yields). In this case, the mean of the zs should be strictly less than zero.

Table 3 reports the average change in each of the three financial variables for the full sample of events, and several subsets. Under the null hypothesis the z_i have mean zero and variance one, so the average will be distributed (approximately) as a normal random variable with variance equal to $1/N$, the reciprocal of the number of events in the sample.

The table shows that, on average, announcements do not generate a consistent, statistically significant change, in either direction, in any of the financial variables. Regardless of the sample chosen, the average change is neither statistically nor economically significant. The average change in the (log) exchange rate for the full sample, for example, is only -0.110, an appreciation of 0.1 percent; the average changes in the bond yield and the (log) stock price are -0.1 basis points and 0.01 percent, respectively. The average change is also small for each of the subsets of the sample considered. Even restricting the sample to newsworthy events makes little difference: although one might have expected a larger measured response to unanticipated turnover, the average changes in this case are again very small and statistically insignificant. Overall, there is no discernible tendency for exchange rates, bond and stock prices to rise in response to new information about the central bank governor; nor is there a systematic tendency for them to decline, as the "weak until proven strong" hypothesis would predict.

in the sample, omitting this particular newsworthy event can only weaken the evidence for a significant aggregate financial market response. Moreover, since the Markka appreciated sharply, the omission of this observation will strengthen the evidence for the view that new governors are perceived as weak.

4.2 Do appointments contain any information?

If new governor appointments are perceived to contain some sort of information about future monetary policy, then the appointments should be accompanied by a larger-than-normal financial market reaction. The problem is that these responses could be either positive *or* negative, depending on the nature of the information conveyed by the announcement. Consequently, when the *average* reaction is close to zero, a simple t test for a zero mean will fail to detect a tendency for unusually large reactions. Instead, we use a method proposed by Fisher (1941, p. 97) for combining a number of independent hypothesis tests into a single test of aggregate significance.[21] Fisher's procedure exploits the properties that -2 times the log of a p-value is distributed as a χ^2_2 random variable, and that the sum of χ^2 random variables also obeys a χ^2 distribution. Together, these properties imply that under the null, $-2\sum_{i=1}^{N} \ln P_i$ is distributed as a χ^2_{2N}, where the P_i are the p-values from the individual tests. In this application, each event can be thought of as an independent test of the null hypothesis; Fisher's test for the joint significance of the reactions can then be derived from the p-values from two-sided tests of the "no reaction" hypothesis, based on the t statistics that have already been calculated.

The results from these calculations appear in Table 4. In contrast to the results reported in Table 3, the Fisher tests provide strong evidence for significant reactions by the foreign exchange market. Specifically: for the full 61-event sample, the χ^2 statistic of 162.4 is significant at the one percent level, rejecting the null hypothesis of no reaction.[22] Twelve of the 61 events are associated with a "significant" (i.e., p-value less than 0.10) reaction, *double* the six that would have been expected had the responses been random draws from the same, pre-announcement distribution.

The evidence is stronger for the 49 appointments than it is for the 12 unscheduled departures, although this may be due in part to the smaller number of distinct observations on exits. The evidence is stronger still when the sample is restricted to newsworthy events,

[21] Our thanks to Peter Pedroni for suggesting Fisher's method.

[22] Again, the Hamalainen appointment is dropped.

defined, as above, as the set of unscheduled departures plus appointments where the new governor's identity is not known with (near-) certainty in advance: for this 41-event subset of sample, the χ^2 statistic of 119.3 is significant at the one percent level. A similarly strong rejection is obtained when the 12 unscheduled departures are dropped, leaving 29 newsworthy appointments. Lastly, there is *no* measured reaction when the sample is restricted to the 20 non-newsworthy events (i.e., anticipated appointments), just as implied by the principle of efficient markets.[23]

The bond market also reacts to newsworthy central bank appointments, although, with less usable data, the evidence is not quite as strong (at least in a statistical sense) as it is for the foreign exchange market. As shown in Table 4, the reaction is significant at the five percent level in the full sample, and new governor announcement subsamples; on the other hand, there is no significant reaction to unscheduled exits. With the sample restricted to newsworthy events, the reaction is significant at the ten percent level; further restricting the sample to the 20 newsworthy appointments also yields a rejection of the null at the ten percent level.

One puzzling result involving the bond yield is that there is a significant market reaction for the non-newsworthy subsample, which is meant to consist only of appointments that were widely anticipated ahead of time. At first glance, this seems to contradict the proposition that the market should respond only to new information. An inspection of the individual responses in Table 2 reveals that this anomalous response can be traced to two observations: Australia's 1989 appointment of Bernie Fraser, and Norway's 1996 appointment of Kjell Storvik. Both of these were classified as anticipated appointments, based on the press reports; and yet, both were associated with pronounced bond market responses. Yields rose 15 basis points (two standard deviations) on Fraser's announcement, and *fell* 19 basis points (over four standard deviations) on Storvik's.

In Fraser's case, the reason for the unusual reaction is relatively clear. The likely choice of Fraser, the sitting Secretary of the Treasury, had been criticized in the weeks prior to

[23]This parallels the finding in Kuttner (2001) that bond yields do not react to anticipated changes in the federal funds rate target.

the announcement as an appointment which would predispose the Reserve Bank of Australia (RBA) to yield to political pressure for more accommodative monetary policy.[24] And, while Fraser was widely viewed as the clear front-runner for the job, there was some speculation that Hawke's government would back away from its preferred candidate and appoint instead one of several viable candidates from within the RBA.[25] Thus, the adverse market reaction provoked by the announcement suggests Fraser's appointment was not thought to be entirely certain. Reclassifying the appointment as newsworthy along these lines would make the bond market's reaction significant at the five percent level for newsworthy events, and not significant for non-newsworthy events, thus eliminating one minor anomaly in the results.[26]

The pronounced reaction to Storvik's appointment is slightly more puzzling. Deputy governor of the Norges Bank, Storvik was appointed acting governor after his predecessor, Torstein Moland, resigned in 1995 to fight tax evasion charges. With Storvik's confirmation for the permanent position widely anticipated, it is unclear why the market would respond enthusiastically to his official appointment, unless it was a "relief rally," or a response to some unrelated event occurring on the same day.[27]

Overall, the average stock market reaction to central bank appointments is weaker than it is for the bond and foreign exchange market. While the data set contains a few strong reactions (notably the 2.8 percent rally on Bernanke's 2005 appointment), a significant overall reaction is detectable only in the case of newsworthy appointments, where the response is jointly significant at the ten percent level. There are two likely reasons for the lack of clarity in the equity results. One, as already noted, is the relative scarcity of data (only 29 observations total). In addition, equities are less directly affected by changes in in-

[24] Ironically, Fraser went on to establish inflation targeting at the Reserve Bank of Australia. This underscores the point made previously, that the financial market's reaction to an appointment need not correctly anticipate the policy changes occurring under a new governor.

[25] See Walsh (1989) and Lloyd (1989).

[26] Specifically, reclassifying the Fraser appointment as newsworthy reduces the p-value for newsworthy events to 0.047 (0.033 for newsworthy appointments), and increases the p-value for the non-newsworthy events to 0.078.

[27] Unfortunately, the English-language business press contains no clues as to the cause of the bond market reaction.

flation expectations, and relatively more affected by factors not directly related to monetary policy, such as expected future earnings.

Taken together with the findings from Table 3, these results suggest that financial markets (or at least the foreign exchange and bond markets) *do* respond to news about the new central bank governor. The reactions, however, are not unidirectional: in particular, the data provide no support for the "weak until proven strong" hypothesis. That reactions are observed in both directions suggests they are based on perceived characteristics of specific appointees, rather than a generic concern that all new governors lack credibility.

4.3 Is the Fed different? (and other robustness checks)

A glance at the responses tabulated in Table 2 suggests that the U.S. is somewhat unusual, in that each of its four appointments in our sample is associated with a large reaction in one (or more) of the financial variables. In particular, the appointments of Miller, Volcker and Greenspan all generated exchange rate changes in excess of two standard deviations; Greenspan's appointment also led to a 27 basis point (three standard deviation) *increase* in the bond yield. It is natural to ask whether the results are generally robust to the exclusion of these four U.S. observations—and then, why the market reactions to Federal Reserve chairman appointments are so large.

Unsurprisingly, given the large reactions to Fed appointments shown in Table 2, it turns out that our results' strength does depend to some extent on the inclusion of the events from the U.S. As shown in the first three lines of Table 5, excluding these four observations, the p-value for the exchange rate test becomes 0.076—still significant at the ten percent level, but not as strong as in the full sample. For stocks and bonds, the reaction is no longer significant at even the ten percent level. There are at least two reasons why dropping the U.S. observations might diminish the strength of the results. The first is simply that dropping a nontrivial share of observations will reduce the power of the tests, especially in light of the fact that the Federal Reserve appointments have tended to contain a larger element of surprise than many of the other appointments in the sample.

The second possibility is that certain attributes specific to the Fed explain the strong market reactions. These might include the lack of a clearly-defined policy mandate or explicit anchor (such as the ERM or an inflation target); the greater discretion available to Fed chairs than to other governors, either because of the Fed's pronounced independence or of the sheer size and autonomy of the US economy; the demonstrably higher scrutiny in terms of press coverage paid to Fed appointments (presumably read by market participants in response to some combination of these other factors); or a certain American institutional tendency to "personalize" monetary policy, a tendency to which Bernanke *et al.* (2000) argue the Fed was particularly vulnerable to following a good performing governor (and Blinder & Reis (2005) argue became more pronounced under Greenspan). Future research on the institutional determinants of governors' scope for impact should help clarify why the Federal Reserve is an outlier in terms of the effects its appointments have on financial markets.

Another question is whether the financial market responses have become less pronounced in recent years, as central banks have largely converged on a low (implicit or explicit) inflation objective, and as the inflation differentials between the countries in our sample have shrunk. In order to investigate this possibility, the Fisher tests were recalculated using only post-1984 newsworthy events, thereby excluding the volatile, high-inflation 1970s and early 1980s. For the exchange rate results, this reduces the sample size substantially, from 41 to 28. (Fewer observations are lost for the bond yields and stock prices, as these much of these data were not available for the pre-1985 period.)

Despite this reduction in sample size, the results remain significant in the post-1984 sample: as shown in Table 5, the bond yield response is significant at the five percent level, and the exchange rate response nearly so. With a p-value of 0.12, the stock price response is not quite significant at the ten percent level, however. The results suggest the significant financial market reactions are not being driven entirely by the early observations in the sample.

Finally, as a check on the empirical method, it would be useful to verify that statistically

significant responses are not observed on days *other than* the event days. To perform this check, the Δy and z variables were calculated, for two days prior to, and two days following each event date. The Fisher test statistics then were calculated, as described above, for these "non-event" days.

As expected, the Fisher statistics show no tendency for unusually large movements on these days. As shown in the bottom half of Table 5, none of the responses are jointly significant at even the ten percent level, on either side of the event date. (For brevity, only the results corresponding to the newsworthy events are reported.) This check provides further confirmation that the governor announcements contain (or at least are perceived to contain) a significant amount of news about future course of monetary policy.

5 Conclusions

This paper has investigated the question of whether the appointment of a new central bank governor (or the departure of the incumbent) affects financial markets—and if so, why. To address this question, we assembled a unique dataset consisting of the announcement dates of appointments and unscheduled departures, and merged it with high-frequency data on exchange rates, bond yields, and stock prices.

The results show that, in general, markets *do* care who chairs the central bank. Financial markets tend to react to the appointment of a new central bank governor with larger-than-normal price changes, especially when a distinction is made between "newsworthy" announcements (i.e., those plausibly incorporating new information) and those merely confirming an anticipated appointment. In a statistical sense, the observed reaction is strongest for the foreign exchange market, where the results are highly significant, and robust to alternative choices of sample. Bond yields also tend to react to announcements, although these results are somewhat weaker, in terms of statistical significance, than those for exchange rates. The stock market response is less distinct, as expected, given the smaller role of monetary policy conditions, relative to other factors, in determining equity price

movements.

Another key result is that overall, there is no systematic tendency for bond yields to rise, or the exchange rate to depreciate, in response to the announcement of a new governor; nor is there a significant negative response to the unscheduled departure of the incumbent. These findings contradict the widely-held view in both the academic literature and the business press, which holds that uncertainty about a new central bank governor's commitment to low inflation is high when initially appointed, and that the new governor can only establish his credibility (i.e., reveal his true type) through tough, anti-inflation policy actions.[28] The lack of support for this hypothesis in the financial data suggests that new governors are not, in fact, perceived to be "weak until proven strong." Instead, financial market participants appear to sift through the available information on the new governor in an effort to form an unprejudiced (but not necessarily accurate *ex post*) inference regarding the appointee's likely policy preferences. Using the dataset on appointments created for this paper, future research will investigate the extent to which new governors do nonetheless pursue more conservative policies at the start of their terms.

The high degree of statistical significance associated with the exchange rate response, relative to that of bond yields, is likely due to some combination of two factors. One is simply that more exchange rate data are available than for bond yields, thus increasing the power of the tests. The other reason is that, to the extent that it is driven by the principle of interest rate parity, the exchange rate response to a shift in conservatism is unambiguous; the response of the bond yield, on the other hand, will depend on the relative magnitudes of the expected inflation and real interest rate effects. This provides some evidence to suggest that the observed financial market responses are driven primarily by perceived differences in conservatism (λ), rather than governor-specific inflation objectives (or equivalently, "credibility"). This view seems to be corroborated by press reports, which often speak of an appointee as being "pro-growth, relative to inflation" (Stanton, 2005), or "favoring faster interest rate reductions" as a means to restore full employment (Harverson &

[28] As previously noted, the classic statement of this view in the academic literature is Cukierman & Meltzer (1986), while Bernasek (2005) is a good illustration from the business press.

Corrigan, 1993), rather than focusing on a governor's desired inflation rate.

Left for future research is the question of what factors, such as institutional arrangements or broader economic policy frameworks, decrease the likelihood of strong market reactions to new governor appointments. In principle, such reactions should be less likely for those central banks with a clearly-defined nominal anchor (such as an explicit inflation target), a greater degree of independence from political pressure, a more diffuse (as opposed to governor-centric) decisionmaking structure. Further investigation along these lines might suggest steps elected officials appointing governors might take in order to limit the effect of individual appointee's preferences on monetary policy expectations, and yield further insights regarding the markets' unusually sharp reactions to Federal Reserve appointments.

References

Barro, Robert J., & Gordon, David B. 1983. A Positive Theory of Monetary Policy in a Natural-Rate Model. *Journal of Political Economy*, **91**, 589–610.

Bernanke, Ben S., & Kuttner, Kenneth N. 2005. What Explains the Stock Market's Reaction to Federal Reserve Policy? *Journal of Finance*, **60**(3), 1221–1258.

Bernanke, Ben S., Mishkin, Frederic S., & Posen, Adam S. 2000. What Happens When Greenspan Is Gone? *The Wall Street Journal*, January 5, A22.

Bernasek, Anna. 2005. To Fill His Shoes, Mr. Bernanke, Learns to Dance. *Washington Post*, October 30, B02.

Blinder, Alan S., & Reis, Ricardo. 2005. Understanding the Greenspan Standard. *In: The Greenspan Era: Lessons for the Future*. Jackson Hole, Wyoming: Federal Reserve Bank of Kansas City.

Cukierman, Alex, & Meltzer, Allan. 1986. A Theory of Ambiguity, Credibility and Inflation Under Discretion and Asymmetric Information. *Econometrica*, **54**, 1099–1128.

Fama, Eugene F. 1981. Stock Returns, Real Activity, Inflation, and Money. *American Economic Review*, **71**(4), 545–565.

Faust, Jon, Rogers, John H., Swanson, Eric T., & Wright, Jonathan H. 2003. Identifying the Effects of Monetary Policy Shocks on Exchange Rates Using High Frequency Data. *Journal of the European Economic Association*, **1**, 1031–1057.

Favero, Carlo, & Rovelli, Ricardo. 2003. Macroeconomic Stability and the Preferences of the Fed: A Formal Analysis. *Journal of Money, Credit and Banking*, **35**(4), 545–556.

Fisher, R. A. 1941. *Statistical Methods for Research Workers*. 8th edn. Oliver and Boyd.

Friedman, Milton, & Schwartz, Anna J. 1963. *A Monetary History of the United States, 1867-1960*. Princeton, NJ: Princeton University Press.

Goodfriend, Marvin. 1993. Interest Rate Policy and the Inflation Scare Problem: 1979-1992. *Federal Reserve Bank of Richmond Economic Quarterly*, **79**, 1–23.

Gürkaynak, Refet S., Sack, Brian, & Swanson, Eric. 2005. The Sensitivity of Long-Term Interest Rates to Economic News: Evidence and Implications for Macroeconomic Models. *American Economic Review*, **95**(1), 425–436.

Hall, William. 1998. A job shaped by arrival of euro. *Financial Times*, December 11.

Harverson, Patrick, & Corrigan, Tracy. 1993. Long-dated US Treasuries slip on lack of support. *Financial Times*, November 4, 31.

Kara, Hakan. 2007. Monetary Policy under Imperfect Commitment: Reconciling Theory with Evidence. *International Journal of Central Banking*, **3**(1), 149–177.

Kuttner, Kenneth N. 2001. Monetary policy surprises and interest rates: Evidence from the Fed funds futures market. *Journal of Monetary Economics*, **47**(3), 523–44.

Kydland, Finn E., & Prescott, Edward C. 1977. Rules Rather Than Discretion: The Inconsistency of Optimal Plans. *Journal of Political Economy*, **85**, 473–490.

Lloyd, Simon. 1989. Time runs out for Johnston's Heir. *Australian Financial Review*, June 26.

Özlale, Ümit. 2003. Price Stability vs. Output Stability: Tales from Three Federal Reserve Administrations. *Journal of Economic Dynamics and Control*, **27**(9), 1595–1610.

Pethokoukis, James. 2005. Capital Commerce: Race is on at the Fed. *U.S. News and World Report*, September 30.

Pringle, Robert. 2007. *Morgan Stanley Central Bank Directory*. 2007 edn. London: Central Banking Publications Ltd.

Rigobon, Roberto, & Sack, Brian. 2004. The Impact of Monetary Policy on Asset Prices. *Journal of Monetary Economics*, **51**(8), 1553–1575.

Rogoff, Kenneth. 1985. The Optimal Degree of Commitment to an Intermediate Monetary Target. *Quarterly Journal of Economics*, **100**, 1169–89.

Schaumburg, Ernst, & Tambalotti, Andrea. 2003. *An Investigation of the Gains from Commitment in Monetary Policy*. Staff Report 171. Federal Reserve Bank of New York.

Stanton, Elizabeth. 2005. Bonds and Dollar Fall, Stocks Rise on Bernanke Pick. *Bloomberg.com*, October 24.

Walsh, Max. 1989. Fraser is a fine fellow, but not a man to bank on. *Sydney Morning Herald*, June 29.

Webb, Sara. 1992. Finland names Bank governor. *Financial Times*, April 4, 2.

Table 1
Central bank governors' inflation performance

The table reports the results from regressions of central bank governors' average inflation rates as a function of year effects and country-specific dummy variables. The inflation rate is at an annual rate, and expressed in percentage terms. The sample consists of the 45 of 49 central bank governors' tenures whose length exceeded 12 months. Estimation is by ordinary least squares for the linear model, nonlinear least squares for the nonlinear mode. Parentheses indicate statistical significance: *** for the 0.01 level, ** for 0.05, and * for 0.10. A † indicates that the value of the parameter is imposed, not estimated.

	Linear model		Nonlinear model	
Regressor	(a)	(b)	(c)	(d)
1977 inflation (π_{77})	8.96***	10.34***	...	...
(Year – 1977) (β_1)	−0.28***	−0.64***	...	...
(Year – 1977)^2 (β_2)	...	0.013**	...	...
Terminal inflation (π_0)	...	...	2†	1.16
Decay rate (δ)	...	...	0.16***	0.13***
Australia dummy	−0.59	−0.19	9.8	13.4
Canada dummy	−0.79	−0.49	11.5	12.5
Finland dummy	−0.25	0.36	18.7***	16.7***
France dummy	−1.33	−1.10	8.5***	9.3***
Germany dummy	−3.02*	−2.66	2.1	3.3*
Italy dummy	2.04	2.09	12.4***	13.4***
Japan dummy	−2.51	−2.42	−17.3	−3.3
New Zealand dummy	−0.12	−0.24	5.8	13.3
Norway dummy	−0.44	−0.38	5.4	14.9
Portugal dummy	1.68	2.62	51.9**	36.6***
Spain dummy	−0.17	0.75	24.1**	19.9**
Sweden dummy	−0.88	0.77	20.5*	17.0**
Switzerland dummy	−3.01*	−2.85*	1.3	2.6
UK dummy	0.11	0.24	16.3*	15.1**
US dummy	...	...	11.0***	11.3***
$\bar{R}^2$	0.551	0.623	0.774	0.784
Standard error	2.22	2.03	1.58	1.54

Table 2
Announcements of governor departures and appointments

The table lists the events (announcements of new governors plus unscheduled departures) used in the analysis. For new appointments, the column labeled "ID?" indicates whether the identity of the appointee was anticipated in advance of the announcement. For the exchange rate, positive numbers correspond to depreciations.

			Exchange rate		Bond yield		Stock price	
Event	date	ID?	% Δ	*t*	bp Δ	*t*	% Δ	*t*
Australia								
Fraser	7/5/1989	Y	-0.53	-0.76	15	1.99	0.58	0.70
MacFarlane	8/14/1996	Y	0.03	-0.01	5	1.00	-0.35	-0.53
Stevens	8/1/2006	Y	0.42	0.79	1	-0.01	-0.06	0.00
Canada								
Crow	12/17/1986	N	-0.02	-0.16	-4	-0.63	-0.07	-0.15
Thiessen	12/22/1993	N	-0.60	-1.82	-10	-1.61	0.29	0.50
Dodge	12/20/2000	N	-0.03	-0.20	-5	-1.43	-2.78	-1.54
Finland								
Koivisto departure	6/14/1979		0.01	0.14				
Karjalainen	2/5/1982	Y	-0.56	-2.27				
Karjalainen departure	5/13/1983		0.16	0.37				
Kullberg	5/27/1983	Y	-0.38	-0.75				
Hamalainen	4/3/1992	N	-2.55	-13.01	-19	-1.53		
France								
Clappier	6/12/1974	N	-0.81	-1.59				
De la Geniere	11/14/1979	N	0.28	0.77				
Camdessus	11/14/1984	N	0.00	-0.05				
Camdessus departure	12/17/1986		0.03	0.15				
De Larosiere	1/16/1987	Y	0.19	1.82	1	0.18		
De Larosiere departure	8/17/1993		-0.77	-2.50	6	1.47	-0.55	-0.68
Trichet	9/13/1993	Y	-0.73	-2.38	-3	-0.38	0.51	0.49
Germany								
Emminger	3/9/1977	N	0.17	0.54				
Poehl	9/19/1979	Y	-0.33	-0.90				
Poehl departure	5/16/1991		0.41	0.30	-4	-0.71	0.48	0.23
Schlesinger	5/29/1991	Y	0.91	0.85	-3	-0.51	-0.04	-0.12
Tietmeyer	6/23/1993	Y	-0.21	-0.35	2	0.58	0.08	0.07
Italy								
Baffi	7/30/1975	N	-0.61	-1.57				
Ciampi	9/21/1979	N	0.46	2.05				
Ciampi departure	4/26/1993		-1.22	-1.87	-3	-0.27		
Fazio	5/4/1993	N	-0.12	-0.24	-3	-0.27		

Continued…

Table 2, continued

Event	date	ID?	Exchange rate		Bond yield		Stock price	
			% Δ	*t*	bp Δ	*t*	% Δ	*t*
Japan								
Mieno	11/22/1989	Y	0.07	0.06	-1	-0.25	0.63	1.13
Matsushita	11/10/1994	Y	0.14	0.29	0	-0.12	-0.82	-1.15
Matsushita departure	3/12/1998		-0.04	-0.07	2	0.60	-1.09	-0.53
Hayami	3/16/1998	N	0.91	1.13	-4	-1.16	-1.17	-0.55
Fukui	2/24/2003	N	-0.85	-1.41	-2	-0.97	0.60	0.52
New Zealand								
Brash	6/14/1988	N	0.53	0.91			-0.68	-0.43
Brash departure	4/26/2002		0.20	0.42	-8	-1.39	0.13	0.21
Bollard	8/22/2002	N	0.22	0.44	3	0.52	0.87	1.60
Norway								
Moland departure	11/17/1995		0.09	0.36				
Storvik	2/23/1996	Y	-0.05	-0.17	-19	-4.15		
Gjedrem	10/2/1998	N	1.74	2.46	-1	-0.10	-1.58	-0.74
Portugal								
Constancio departure	3/24/1986		-0.69	-1.50				
Moreira	5/16/1986	N	0.28	0.43				
Beleza	4/9/1992	Y	-0.26	-1.04				
De Sousa	6/23/1994	N	-0.15	-0.66	-14	-1.38	3.09	2.58
Spain								
Rubio	7/20/1984	Y	-0.59	-1.01				
Luis Rojo	6/29/1992	N	0.45	1.96	8	1.26	-1.73	-2.53
Sweden								
Dennis	10/1/1982	N	0.10	0.34				
Baeckstroem	11/3/1993	N	0.00	-0.12	-13	-1.62		
Heikensten	6/13/2002	Y	-0.19	-1.30	-7	-1.78	0.02	-0.01
Heikensten departure	9/29/2005		-0.53	-2.02	3	0.77	0.00	-0.30
Ingves	10/11/2005	N	-0.02	-0.19	2	0.50	0.16	0.22
Switzerland								
Leutwiler	3/15/1974	Y	0.15	0.43				
Leutwiler departure	6/13/1984		0.01	-0.08				
Languetin	10/31/1984	Y	-0.04	-0.24				
Lusser	9/10/1987	Y	0.08	0.36				
Meyer	10/26/1995	N	-0.31	-1.10			0.03	0.10
Roth	9/18/2000	N	-0.21	-0.69	4	1.29	-0.98	-1.58
United Kingdom								
Leigh-Pemberton	12/23/1982	N	1.15	2.30	-1	0.04		
George	1/22/1993	N	0.64	0.49	3	0.42	0.28	0.13
King	11/27/2002	Y	-0.36	-0.87	0	-0.03	0.99	0.44
United States								
Miller	12/28/1977	N	1.17	2.59	1	0.25	0.06	-0.05
Volcker	7/25/1979	N	-0.80	-2.51	-2	-0.44	0.02	0.01
Greenspan	6/2/1987	N	1.65	2.35	27	3.19	-0.47	-0.46
Bernanke	10/24/2005	N	0.33	0.56	6	1.28	1.66	2.81

Table 3
Average market reaction to governor announcements

The table reports the average change in the exchange rate (in percent), bond yield (in basis points), and stock price (in percent) on event days. The exchange rates are bilateral with respect to the U.S.; for the U.S., it is the bilateral exchange rate with respect to the DM (Euro, post 1999). The change is defined so that positive numbers correspond to depreciations. The reported *p*-values are for the null hypothesis that the mean change is zero.

Sample		Exchange rate	Bond yield	Stock price
Full sample	Avg. change	−0.110	−0.142	0.011
	N	61	38	33
	p-value	0.389	0.380	0.948
New governor announcements	Avg. change	−0.009	−0.184	0.051
	N	49	32	28
	p-value	0.952	0.299	0.785
Unscheduled exits	Avg. change	−0.525	0.077	−0.213
	N	12	6	5
	p-value	0.069	0.850	0.633
Newsworthy events	Avg. change	0.018	−0.074	−0.028
	N	41	26	23
	p-value	0.911	0.704	0.894
Newsworthy events, appointments only	Avg. change	0.242	−0.120	0.024
	N	29	20	18
	p-value	0.192	0.591	0.919
Non-newsworthy events	Avg. change	−0.372	−0.289	0.101
	N	20	12	10
	p-value	0.096	0.316	0.749

Table 4
Joint significance of market reactions to governor announcements

The table reports tests for the joint significance of the reactions of the exchange rate, bond yield, and stock price. The test statistic is constructed as $-2\sum_{i=1}^{N}\ln(P_i)$, where P_i is the p-value calculated to the t-statistic associated with the market's reaction to announcement i. The statistic is distributed as a χ^2 with $2N$ degrees of freedom.

Sample		Exchange rate	Bond yield	Stock price
Full sample	χ^2 stat	162.4	104.5	63.0
	N	61	38	33
	p-value	0.0085	0.0167	0.5836
New governor announcements	χ^2 stat	134.4	92.3	59.2
	N	49	32	28
	p-value	0.0087	0.0119	0.3589
Unscheduled exits	χ^2 stat	28.1	12.3	3.7
	N	12	6	5
	p-value	0.2571	0.4234	0.9586
Newsworthy events	χ^2 stat	119.3	66.4	52.9
	N	41	26	23
	p-value	0.0045	0.0862	0.2242
Newsworthy events, appointments only	χ^2 stat	91.3	54.1	49.2
	N	29	20	18
	p-value	0.0035	0.0671	0.0702
Non-newsworthy events	χ^2 stat	43.1	38.1	10.0
	N	20	12	10
	p-value	0.3406	0.0337	0.9678

Table 5
Robustness checks

The table reports tests for the joint significance of the reactions of the exchange rate, bond yield, and stock price. For further details, see notes to Table 4.

Sample		Exchange rate	Bond yield	Stock price
Newsworthy events, excluding U.S.	χ^2 stat	92.1	48.9	41.4
	N	37	22	19
	p-value	0.0755	0.2845	0.3256
Post-1984 newsworthy events	χ^2 stat	73.9	65.1	52.8
	N	28	23	21
	p-value	0.0545	0.0334	0.1219
Two days prior to newsworthy events	χ^2 stat	76.6	43.1	14.5
	N	41	22	19
	p-value	0.6473	0.5098	0.9998
Two days following newsworthy events	χ^2 stat	63.4	43.6	43.4
	N	41	21	18
	p-value	0.9371	0.4021	0.1860

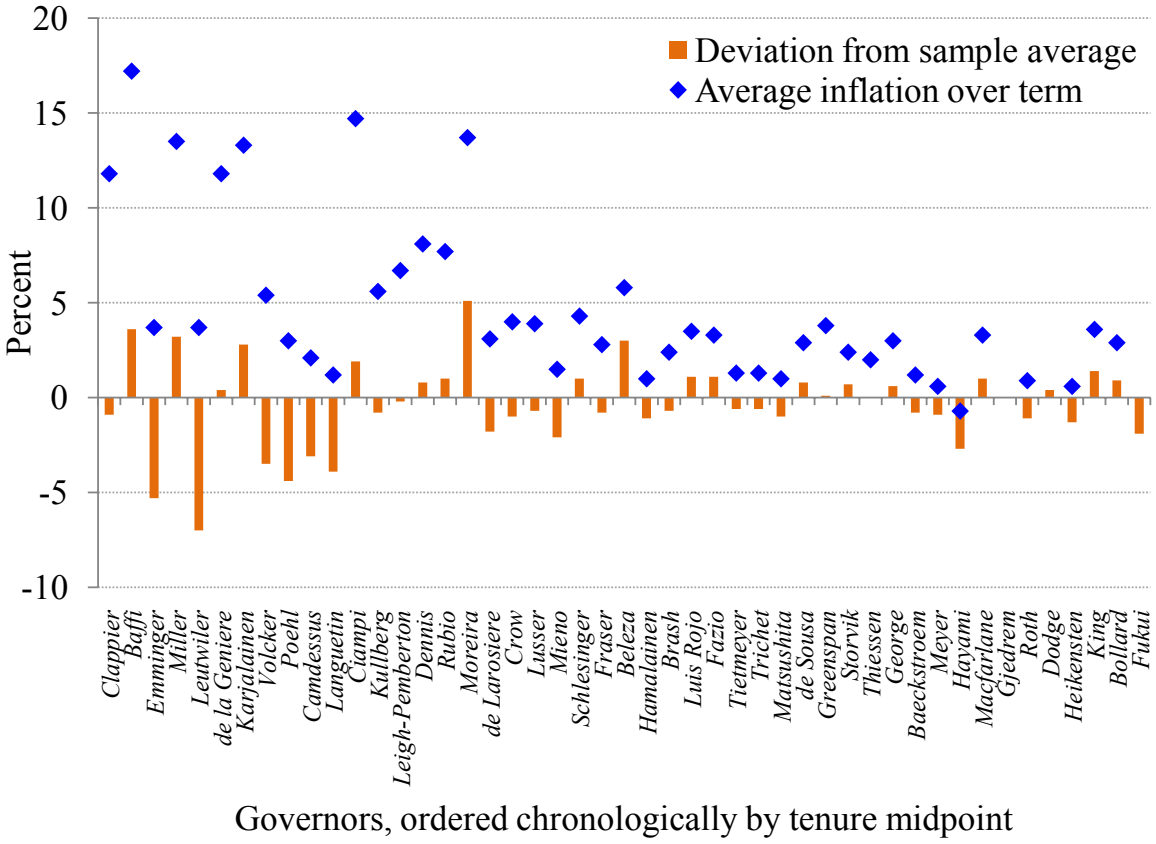

Figure 1. Inflation outcomes of central bank governors. The figure depicts the CPI inflation rates associated with 47 of the 50 central bank governors in the dataset used for the analysis. The diamonds show average annual inflation, calculated over each central bank governor's term, excluding the first year. The bars represent the difference between each central bank governor's average inflation rate, and the average for the 15 countries in the sample during the time span corresponding to the governor's term. The inflation rates of three governors with tenures in office of less than one year are not depicted.

Appendix: data sources

The table below summarizes the sources and availability of daily bond yield and stock price data. Unless otherwise noted, the yield is that of a 10-year government bond. FRBNY data were compiled by the Research Department of the Federal Reserve Bank of New York, and Haver refers to Haver Analytics (www.haver.com). All daily exchange rate data were obtained from the Federal Reserve's H.10 release. The inflation series used in section 2.2 were calculated from consumer price index data obtained from the International Monetary Fund, International Financial Statistics.

Country	Bond yield	Stock price
Australia	RBA Occasional Paper No. 10, 1/1989-9/1993 & update, 10/1993-	All Ordinaries, Haver, 1/1985-
Canada	FRBNY, 6/1985-	Toronto 300 Composite, 1/1984-
Finland	Bank of Finland, 8/1991-	OMX Helsinki, Haver, 1/1995-
France	FRBNY, 1/1987-	CAC40, Haver, 1/1988-
Germany	FRBNY, 1/1983-	DAX30, www.econstats.com, 1/1981-
Italy	FRBNY, 1/1989-	MIB30, Haver, 1/1996-
Japan	FRBNY, 2/1982-	Nikkei 225, Haver, 1/1984-
New Zealand	10-year swap rate, RBNZ, 12/1997-	Barclay's Capital Price Index, 1988; NZSE Top 50, 2002; RBNZ.
Norway	Norges Bank, 1/1996-	Oslo OBX, Haver, 4/1996-
Portugal	Bank of Portugal, 7/1993-	PSI20, Haver, 1/1993-
Spain	Bank of Spain, 4/1991-	Madrid General Index, Haver, 1/1990-
Sweden	Riksbank (Reuters), 2/1987-	Stockholm Affarsvarlden, Haver, 1/1996-
Switzerland	Swiss National Bank, 1/1998-	Zurich Swiss Market, Haver, 7/1998-
United Kingdom	Bank of England, 1/1979-	FTSE100, Haver, 1/1984-
United States	Federal Reserve H.15, 1/1974-	S&P500, Haver, 1/1974-