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Does a good central banker make a difference?*

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Abstract

The personalities of central bankers moved center stage during the recent financial crisis. Some central bankers even gained "superstar" status. In this paper, we evaluate the pivotal role of superstar central bankers by assessing the difference an outstanding governor makes to economic performance. We employ school grades given to central bankers by the financial press. A superstar central banker is one receiving the top grade. In a probit estimation we first relate the grades to measures of economic performance, institutional features, and personal characteristics. We then employ a nearest neighbor matching approach to identify the central bankers which are closest to those receiving the top grade and compare the economic performance across both groups. The results suggest that a superstar governor indeed matters: a top-graded central banker faces a significantly more favorable output-inflation trade-off than his peers. This effect is driven by outstanding central bankers in emerging markets.

Keywords: Central bankers, monetary policy, nearest neighbor matching.

JEL classification: E52, E58

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"You've heard of an international market for superstar soccer players. We need an international market for superstar central bankers."

Matthew O'Brien, April 19, 2012.[1]

1 Introduction

On November 26, 2012, the British Chancellor of the Exchequer announced the appointment of Mark Carney as the next Governor of the Bank of England. At that time Carney served as the Governor of the Bank of Canada. This was the first time an acting central bank governor was headhunted to lead another central bank.

This incidence is symptomatic for the personalities of central bank governors moving center stage during the recent financial crisis and the subsequent Great Recession. Some central bankers, such as Mark Carney, even gained "superstar" (Financial Times, 2013) status. This attribute is also shared by Raghuram Rajan, the new governor of the Reserve Bank of India, whose nomination raised the highest expectations. Another example is Mario Draghi, president of the European Central Bank, whom the public dubbed "Super Mario." A decade ago, a "cult of personality" (Blinder and Reis, 2005) emerged around Alan "The Maestro" Greenspan, who was probably the role model of a superstar central banker.

Attached to these characterizations is the hope that an exceptionally charismatic and highly competent governor could steer the economy through an expedited recovery from the recession and a more favorable output-inflation trade-off in general. As central banks these days rely more on unconventional measures of monetary policy such as forward-guidance and less on conventional interest rate policy the success of these policies became even more dependent on how policy is perceived by the public. This shifts attention to the personalities of the central bankers involved. Whether the hope associated with hiring a superstar central banker is justified, however, is an open issue. The question of how much a good central banker is worth has not yet been addressed.

In this paper, we evaluate the pivotal role of the superstar central bankers empirically. We assess the difference a governor makes to the course of the business cycle and whether the superstar status some central bankers enjoy is justified based on economic performance. Given the complexity of the central bankers' tasks and the

[1] http://www.theatlantic.com/business/archive/2012/04/how-much-is-a-good-central-banker-worth/256089/.

multiplicity of shocks and factors driving economic performance, this is a complicated task.

An empirical analysis of superstar central bank governors faces two major challenges. The first is how to quantify the superstar status and the changes thereof. The second is to isolate the effect of the governor's personality on the economy while acknowledging that the superstar status is of course highly endogenous and reflects good economic performance. A low and stable rate of inflation and a sustainable path of economic growth, for example, are likely to qualify a central banker for a superstar status. Given the persistence of macroeconomic developments and the prevalence of good monetary policy, however, such an economy will continue to exhibit a favorable path in the future, independent of whether the central banker enjoys a superstar status or not. Hence, netting out the effect of status alone is not straightforward. Of course, the impact is also highly dependent on the institutional framework. We therefore control as much as possible for institutional factors. We follow the approach of Malmendier and Tate (2009) in their seminal analysis of CEO performance to address these challenges in the following two-step procedure.

First, we hand-collect data on school grades regularly given to central bankers by the financial press. A superstar central banker is one receiving the top grade. Hence, the status can be gained and lost during our sample period. The school grades range from A to D and are given once a year such that we have a panel structure at hand. We construct a data set for 29 countries covering the period $2001-2012$. We use a probit approach to relate the grades to standard measures of economic performance, institutional variables, and personal characteristics. This gives us probabilities for a central banker with certain characteristics to receive the top grade and, in addition, allows us assessing the reasonableness of the grading decisions.

Second, we employ a nearest neighbor matching approach to identify the central bankers which are closest to those receiving the top grade. We then compare the performance of economies under superstar central bankers to those economies which are not fortunate enough to have a superstar governor heading its central bank. By doing this we isolate the effect of the central banker's status on economic outcomes. Detecting a markedly favorable development in the former economy would be indicative for the conducive role of a superstar governor. This would also indicate that the personality of the central banker matters beyond and above the central bank as an institution.

A priori, the effect of superstar status on economic performance is ambiguous. An outstanding central banker could lead to anchored inflation expectations and, hence, raise the central bank's credibility such that the sacrifice ratio falls. In an ailing economy, a superstar central banker could also be a boost to private sector confidence and, therefore, being supportive to consumption and investment. A prominent central banker could raise the public's trust in the central bank's strategy, in particular, if unconventional policies lead the central bank into uncharted territories. Furthermore, such a central banker might be seen as an insurance for avoiding particularly severe recessions or financial crises. These channels would explain why the economies of superstar central bankers are outperforming others.

However, there could also be detrimental effects. If a highly respected central banker devotes too much attention to, for instance, international fora or academic conferences the quality of policy could suffer. Moreover, his peers with a less favorable reception by the financial press or, more important, the public in general might feel the pressure to improve their performance which would eventually narrow the gap between the performance of superstar-led economies and the rest.

Our results suggest that superstar central bankers indeed matter. Under a top-graded central banker, the growth rate of real GDP at the end of the award year is about 0.74 percentage points (pp) higher compared to an economy under a central banker as close as possible to the superstar. In addition, the expected growth rate of real GDP is 0.33 pp higher at the end of the award year and 0.56 pp in the year thereafter. In contrast, there is no significant difference in terms of inflation during the two years after the award. This suggests that the additional reputation of top-graded central bankers helps improving the output-inflation trade-off since inflation expectations remain anchored despite higher growth (expectations). Overall, our results suggest that hiring a superstar central banker pays off. We also find that the favorable role of superstars stems from the emerging market subsample. Coming back to the before mentioned cases, it seems that a superstar governor Rajan matters more than a superstar heading the Bank of England.

The remainder of this paper is organized as follows: Section two embeds this paper into the related literature and highlights our contribution. Section three introduces the data set and the econometric methodology. Section four explains the central bankers' status with institutional variables, person-specific variables, and macroeconomic outcomes. Section five sheds some light on the actual worth of a superstar

central banker in terms of subsequent macroeconomic performance compared to his peers. A robustness test is documented in section six. Section seven concludes.

2 Related literature and our contribution

It is widely acknowledged that the institutional design of a central bank matters for the short- to medium-run economic performance of a country. Issues such as independence and accountability of monetary policy, a clear mandate on price stability, and a fair degree of transparency contribute to efficient macroeconomic stabilization. We do not know, however, whether the personalities of individual central bankers matter above and beyond what is already represented by the institutions they are heading. While the fact that monetary policy decisions are often taken by committees is frequently interpreted as a means to move policy away from individuals to collectives, we recently see the (re-)appearance of strong and popular central bank leaders.

A small literature deals with the impact of central banker personalities, as opposed to central bank characteristics, on economic outcomes.[2] Siklos (2002) offers an early attempt to link central bank personalities to policy outcomes. Some anecdotal remarks are discussed in Mehrling et al (2007). One strand of the literature looks at the determinants and the effects of a replacement of the central bank governor. Dreher et al (2008) show that the probability of replacement increases with years in office, the degree of political instability, and the level of inflation. Furthermore, Dreher et al (2010) estimate the probability for a replacement of the governor before the end of his term in office. Again, mainly political variables drive the probability of replacement. The replacement of a central bank governor also reveals information about the likely course of future policy which is reflected in financial market responses. Kuttner and Posen (2010) show that exchange rates respond significantly to the announcement of a replacement at the top of the central bank. These announcement effects are stronger if the central bank has no credible nominal anchor or if central bank independence is underdeveloped.

Another strand of research assesses the impact of policymakers' education and career background on policy outcomes. Göhlmann and Vaubel (2007) study the members of monetary policy committees of European economies before the euro inception.

[2] Besides this empirical literature, much work has been devoted to analyzing reputation building and signaling of central bank governors theoretically. See Backus and Driffill (1985a), Backus and Driffill (1985b), Barro (1986), Vickers (1986), Sibert (2002), and Sibert (2003).

They find that former central bank staff members who have been promoted to sit on the policy committee prefer lower inflation than other members. Likewise, Havrilesky and Schweitzer (1990), Havrilesky and Gildea (1991a), Havrilesky and Gildea (1991b), and Harris et al (2011) find that experience in government, in the central bank, in the industry sector, and in academia are sources of variation in policy preferences. Farvaque et al (2011) use data from OECD countries and show that policymakers' background influences inflation and the effect of policymakers' experience is stronger in countries adopting inflation targeting. The role of insiders versus outsiders on monetary policy committees is studied by Besley et al (2008). Interestingly, they do not find differences across members' affiliations with respect to inflation and output responses. Neuenkirch and Neumeier (2013) use estimated instrument rules to explain differences across central bankers with different career backgrounds or party affiliations. They are able to show that party affiliation has more explanatory power than previous professional occupations. Another dimension of the personality of central bankers is addressed by Badinger and Nitsch (2013). They argue that national representation in the mid-level management of the European Central Bank helps explaining the observed interest rate policy.

A third strand of the empirical literature links monetary policy preferences of central bankers and their policy decisions to the administration under which they were appointed. For example, Chappell et al (1993) provide evidence for Democrat appointees at the Federal Open Market Committee voting differently on interest rate steps than Republican appointees.

None of these studies, however, addresses the superstar status of some selected central bankers and the economic performance following the enhancement of the governor to superstar status. In the following sections, we try to shed light on this issue.

3 Data and econometric methodology

Our empirical approach is inspired by the seminal work of Malmendier and Tate (2009). They essentially show that corporate CEOs significantly underperform over the three years following a CEO of the year-award.[3] This result is established using a two-step procedure. First, they estimate a binary-choice model to identify observable firm and CEO characteristics that predict CEO awards. Second, they

[3]In a more recent paper, Horsch (2013) finds that superstar CEOs outperform observationally equivalent CEOs.

identify the non-winning CEOs which are closest to each actual award winner. The performance of the superstar CEOs and their nearest neighbors are then contrasted with each other.

3.1 The World's Top Central Bankers

We start by collecting data on central banker grades given by the financial press. These grades serve as a proxy for the superstar status of some central bankers in our investigation. The top grade is used to identify the superstar central bankers in our investigation. Consequently, we do not believe that receiving a top grade necessarily changes a central banker's behavior.

We use the "Central Banker Report Card" feature, published annually by *Global Finance* magazine, typically in July or August.[4] The magazine grades central bank governors on an "A" to "D" scale for success in areas such as inflation control, economic growth goals, currency stability, and interest rate management. The magazine acknowledges that "subjective criteria also apply." Mark Carney, for example, was graded A in 2012 when he was governor of the Bank of Canada. It is important to note that these grades are given to central bank governors personally and neither for the policy of the central bank nor for the performance of the monetary policy committee.

One obvious doubt when it comes to (at least partly) subjective grading is that rankings of central bankers reflect the preferences of those constructing the rankings. Since these preferences or the journalists' knowledge of the functioning of monetary policy are unobservable to us we cannot a priori rule out such a problem. However, before we calculate the "actual worth" of a superstar central banker in terms of subsequent performance (Section 5) we explain the grading decisions by the *Global Finance* magazine using a large set of explanatory variables (Section 4) thereby also testing if, for example, financial journalists prefer governors well-known for dovish monetary policy.

[4]See `http://www.gfmag.com/`. To the best of our knowledge, these central banker grades have not been used for a serious empirical investigation before. Of course, there are other awards like, for instance, the "Central Bankers of the Year Award" handed out annually since 2004 by the *The Banker* (http://www.thebanker.com/Awards/Central-Bank-Governor-of-the-Year). However, there are at least two major advantages of the "Central Banker Report Card." First, it is available online since the year 2001 rather than 2004 which results in three additional years of data. Second, there is a panel for 29 continuously graded central banks which allows us to contrast and comfortably match the award winners with their peers rather than artificially creating a control group out of all central banks worldwide.

The grades given by *Global Finance* receive substantial attention by the financial community. A key factor for the high media impact is that the grades are published right before the annual Jackson Hole symposium of the world's central bankers organized by the Federal Reserve Bank of Kansas City. For example, on August 23, 2012 Bloomberg reports "Bernanke Given B Grade in Global Finance Central Bank Study." The year before, on August 25, 2011 Bloomberg had the news that "Bernanke Given C Grade in Global Finance Central Bank Study."

Our sample covers the period 2001−2012 and 29 central banks.[5] Table A1 in the Appendix displays the central bankers which are part of the annual grading and Table A2 shows the grade received by a country's central banker over time. A first look at this data suggests that the governors of the world's two largest central banks, the Federal Reserve and the European Central Bank, are graded not too favorably compared to their counterparts at, for instance, the Reserve Bank of Australia and the central bank of Malaysia. However, Table A2 also indicates that the grading of a single central banker can substantially change over time as, for instance, Jean-Claude Trichet was given a C during the first five years of his tenure and an A or B afterwards.[6]

Figure 1 presents the distribution of grades over time. First, with 2008 being the only exception, the magazine tends to grade the central bankers more favorably over time. For instance, 43 percent of the governors are graded A or B in 2001. In 2012, this figure has increased to 82 percent. A priori, we do not know whether this reflects an improvement in central banking or just a laxer assessment of central bankers' performance. In any case, we will control for year-fixed effects, that is, for potential "grade inflation" in the empirical analysis below. Second, approximately 19 percent of the central bankers get the best grade, and this figure is roughly stable over time with the years 2001, 2003, and 2008 being exceptions. The latter finding implies that the control group is four times larger than the treatment group which allows us to obtain an appropriate match for the superstar central bankers in a comfortable way. Finally, the magazine does not privilege central banks in the ten

[5] We focus on these 29 central banks since either the grading of other central banks started after 2001 or some of the variables used to explain the grading are not available for the complete sample period. The grades in 2012 are only used to evaluate the subsequent grading of superstar central bankers.

[6] As the sample ends in 2012, it does not include the recent appointments of Raghuram Rajan at the Reserve Bank of India and Mark Carney at the Bank of England which were mentioned in the introduction.

advanced economies[7] or the 19 emerging economies[8] since 18 top grades are handed out to governors in the former group (19.6%) and 35 to the latter group (19.8%).

3.2 Explanatory variables

Since the criteria mentioned by the *Global Finance* magazine are far from being exhaustive we consider a long list of potential determinants of the central bankers' grades in the subsequent analysis. Table A3 in the Appendix summarizes these variables and the respective sources. Table A4 provides some descriptive statistics of the explanatory variables split for the top grade A and the other grades B−D.

The variables can be assigned to two different groups. First, we explain the central bankers' grades with various *institutional* and *person-specific* factors. A dummy variable for the ten "advanced" central banks in the sample is included to test if these are, on average, graded differently than emerging market central bankers. The level of central bank transparency is used as an additional explanatory variable. Horvath and Vasko (2013) provide an update to the commonly used transparency index of Eijjfinger and Geraats (2006), which we employ.[9] Since parts of the empirical literature on central bank transparency (van der Cruijsen et al, 2010; Neuenkirch, 2013) find that an intermediate degree of transparency is most favorable for the success of monetary policy we also include this indicator as a squared variable to capture potential non-linear effects. Next, two dummy variables capture if the central bank is an inflation targeter (Roger, 2009) or has a freely floating exchange rate (Ilzetzki et al, 2010). In addition, we test if female central bank governors are graded differently than their male counterparts. Since the annual Jackson Hole Summit gathers a lot of media attention, we include a dummy variable for those central banker governors who have been invited as a presenter or discussant in the previous year. Finally, experience might also play a (non-linear) role in the grading of central bankers. Therefore, we include two variables measuring the (squared) years bygone since a governor has taken office.

[7] Australia, Canada, Euro Area, Japan, Norway, New Zealand, Switzerland, Sweden, the United Kingdom, and the United States.

[8] Argentina, Brazil, Chile, China, the Czech Republic, Hungary, Indonesia, India, Israel, Korea, Mexico, Malaysia, Philippines, Poland, the Russian Federation, Singapore, Thailand, Turkey, and South Africa.

[9] We also considered using an additional variable measuring central bank independence in the regression analysis. However, the commonly used indicators by Klomp and de Haan (2009) and Dincer and Eichengreen (2013) are not available for all years in sample and all countries in the sample, respectively.

Second, we include *macroeconomic* variables such as the central bank target rate, real GDP growth, expected real GDP growth for the next calendar year, stock returns, and credit depth.[10] The latter variable is included in a non-linear fashion as some preliminary regressions indicate that there is an optimal intermediate degree of credit depth. Since all central banks explicitly or implicitly target stable prices (as sole target or as part of a dual mandate) we include four additional variables for inflation and expected inflation for the next calendar year into the analysis. For that purpose, we relate actual inflation and expected inflation to the central bank's target and create separate variables for absolute positive deviations and absolute negative deviations of (expected) inflation.[11] Next, we proxy the "appropriateness" of the monetary policy stance using a forward-looking Taylor (1993) rule with 1.5 and 0.5 as weights for the expected inflation gap and expected output growth, respectively, and a time-varying real interest rate (Clarida, 2012). This hypothetical Taylor interest rate is then related to the actual interest rate set by the central bank and two separate variables measure if a too "hawkish" or too "dovish" monetary policy can explain the grading decision. Finally, we include a variable measuring currency crises for those countries where the exchange rate devalues by more than one standard deviation (Moser and Dreher, 2010).

3.3 Probit estimations

As mentioned before, we proceed in a two-step approach. First, we estimate a probit model to identify observable institutional and person-specific characteristics as well as macroeconomic outcomes that predict the grade A at the annual "Central Banker Report Card." The specification is as follows:

$$grade^*_{i,t} = \alpha + \beta X_{i,t} + \eta_t + \epsilon_{i,t} \quad (1)$$

[10]The choice in favor of (expected) real GDP growth is motivated by the fact that most central banks focus on this variable rather than on GDP gap measures in their communications (Gerlach, 2007), probably due to the difficulty of measuring the latter in real time. Accordingly, we follow the recent Taylor rule literature (see, for example, Gorter et al, 2008; Sturm and de Haan, 2011; Neuenkirch and Tillmann, 2014) and use GDP growth measures rather than GDP gap measures.

[11]The choice of the target value is straightforward in the IT economies. In case of the advanced economies without an official IT (ECB, JAP, SUI, US) and "low-inflation" emerging economies (CHN, MYS, SIN), we use 2% as proxy of an inflation target, whereas in case of "high-inflation" emerging economies (ARG, IND, RUS) we calculate deviations from a hypothetical 5% target. Finally, some of the IT economies adopted this regime for the first time during the sample period (HUN, IDN, KOR, MEX, NOR, PHI, TUR). In these cases, we employ the first officially announced IT value as proxy for a hypothetical IT before the actual start.

$grade^*_{i,t}$ is the latent continuous variable representing the grading decision. We use a binary variable (1 represents the grade A and 0 the grades B−D) to describe the decision by the *Global Finance* magazine. The vector X contains institutional and person-specific characteristics as well as macroeconomic variables as described before. Year-fixed effects[12] are captured by η_t and the residuals $\epsilon_{i,t}$ are assumed to follow a standard normal distribution, which implies that the probabilities of the different outcomes can be written as:

$$Pr[grade_{i,t} = 1|Z_{i,t}] = \Phi(Z'_{i,t}\delta) \quad \text{and} \quad Pr[grade_{i,t} = 0|Z_{i,t}] = 1 - \Phi(Z'_{i,t}\delta) \qquad (2)$$

Φ denotes the cumulative standard normal distribution, Z_t is the vector of explanatory variables and year-fixed effects, and δ the vector of coefficients.

Figure 2 provides an illustration on the timing of the grading and the assumptions on the information sets used for the probit estimations and the calculation of the treatment effects. We use end of previous year data for the probit estimation for three reasons. First, this ensures comparability across variables since some of these variables are available at a high frequency (for instance, stock returns) while others (for instance, the transparency index or the de facto measure of the exchange rate regime) are available at annual frequency only. Second, we reduce potential endogeneity problems which might arise due to reputational effects when we use data from the year in which a central banker is considered a superstar. Finally, we can be sure that all of the variables are actually observable to the *Global Finance* magazine journalists at the time of their grading decision.

Since we can explicitly distinguish between the non-superstar grades B, C, and D another obvious specification is to estimate Equation (1) using an ordered probit model. For this purpose, we create a discrete variable for the grades where the top grade A has the highest value. However, since the nearest neighbor matching algorithm, which we use to identify differences in the subsequent performance of central bankers, relies on a binary distinction between top-graded central bankers and those who get the grades B, C, and D we show ordered probit estimates only as a robustness test in Section 4.

[12]We also considered including country-fixed effects. However, a regression including these leads to highly insignificant estimates for all institutional variables, probably due to the fact that these rarely change during the sample period. Since the estimates of institutional variables are more interesting from an economic point of view we decided against inserting country-fixed effects.

3.4 Calculation of treatment effects

Second, we use a nearest neighbor matching approach to identify the central bankers which are closest to those receiving the top grade. Obviously, the grading decision is not independent of the macroeconomic and institutional environment of a central banker. A favorable environment might explain why a central banker has received the top grade and, given the persistence of macroeconomic variables, be an indicator of high growth rates and subdued inflationary pressures in the future. To overcome this simultaneity problem, we create a control group which is, compared to the superstars, as identical as possible in terms of observable characteristics. Finally, we contrast the subsequent performance in terms of macroeconomic outcomes across both groups. The resulting Abadie-Imbens (2006, 2011) average treatment effect on the treated provides us an estimate of the influence of superstar central bankers compared to those individuals that are most similar but do not get the top grade:

$$\tau_{ATT} = E[y_1|\tau = 1] - E[y_0|\tau = 1] \tag{3}$$

The counterfactual mean for those being treated, $E[y_0|\tau = 1]$, is not observed. Therefore, we have to choose a proper substitute for it in order to estimate the average treatment effect on the treated. Using the mean outcome of untreated individuals, $E[y_0|\tau = 0]$, in our non-experimental setup is not suitable because, as mentioned before, it is most likely that components which determine the treatment decision also determine the outcome variable of interest. The nearest neighbor matching approach attempts to mimic randomization by finding the most similar individual that did not receive the treatment. For that purpose, we rely on the same covariates as used in the probit estimations. Formally, the distance between two observations x_i and x_j is parameterized by:

$$||x_i - x_j||_S = \{(x_i - x_j)'S^{-1}(x_i - x_j)\}^{1/2} \tag{4}$$

S is a symmetric, positive-definite matrix with 1_n being an $n \times 1$ vector of ones, I_p being the identity matrix of order p, $\bar{x} = (\sum w_i x_i)/(\sum w_i)$, and W being an $n \times n$ diagonal matrix containing frequency weights w_i:

$$S = \frac{(X - \bar{x}'1_n)'W(X - \bar{x}'1_n)}{\sum w_i - 1} \tag{5}$$

To obtain the nearest neighbor, we minimize the distance between each superstar and all non-superstar observations.[13] The mean of this artificially created control group of nearest neighbors is then employed as a substitute for $E[y_0|\tau = 1]$ in (3).

A concern is that the remaining heterogeneity, which is not correlated with the explanatory variables, across superstar central bankers and their matches biases our estimation. To minimize this concern, we include a large number of explanatory variables to ensure that award winners and those in the control sample are indistinguishable along most observable dimensions. Therefore, the differences in terms of subsequent macroeconomic performance between the top-graded central bankers and their nearest neighbors should be due to unobservable characteristics or, put differently, the superstar status.

Another problem associated with our procedure is that some of the top-rated central bankers and some of the nearest neighbors retire during the year after the award was handed out. Since this paper is interested in the impact a superstar central banker has compared to her/his peers we drop these observations for the calculation of treatment effects for the year $t + 1$. On the other hand, monetary policy is typically associated with a considerable outside lag. To account for this phenomenon, we conduct a robustness test where we compare the influence of superstar central bankers during the year $t + 1$ even if they have left office before.

4 Explaining central bankers' status

Table 1 shows the results of the probit estimation (left panel) and the ordered probit estimation (right panel) of Equation (1). To conserve space, we concentrate on the probit estimations in the following interpretation.

First, more experience in office increases the probability of becoming a superstar central banker. The maximum positive effect is found after 8.9 years when the conditional likelihood of being awarded with an A is 32.4 pp higher than for a governor without any experience in office.[14] Staying in office for too long, however, reduces the probability of getting an A. In addition, the conditional probability of being a superstar central banker is 28.5 pp higher for the four female governors in our sample (Mercedes Marco del Pont, Zeti Akhtar Aziz, Tarisa Watanagase, and Gill

[13] We do not a priori restrict the group of non-superstars to, for instance, the second-best grade B since 39.6 percent of the superstar central bankers are matched with a C or D counterpart.

[14] Examples for top-graded governors with a lot of experience in office are Zeti Akhtar Aziz (2009, 9 years; 2010, 10 years; 2011, 11 years) and Tito Mboweni (2008, 9 years).

Marcus) than for their male counterparts. One possible explanation is that female governors are more charismatic or more talented than their male counterparts as raising the ranks of the male-dominated central bank is harder for them.

Second, only one of the institutional variables significantly explains the grading. Central bankers who work under a freely floating exchange rate regime are 19.3 pp more likely to being awarded the top grade. Maintaining a floating exchange rate might be seen as a good insurance against a painful currency crisis and, hence, rewarded by a good grade. Since all other institutional factors considered in the probit estimation do not significantly explain the grading we can conclude that the press abstracts mostly from the institutional framework when awarding their grades. Instead, it seems that is indeed the individual governor that is subject to the evaluation.

Finally, credit expansion is appreciated by the press but only up to a degree which they consider as not too excessive. Up to a ratio of domestic credit to the private sector over GDP of 67.4 percent the likelihood a becoming a superstar central banker increases with a maximum change of 17.3 pp. For higher ratios, the effect is decreasing. In addition, higher real GDP growth rates also contribute to a higher probability of being a top-graded central banker with an average marginal effect of 2.5 pp.

One obvious doubt is that financial journalists might prefer governors well-known for dovish monetary policy. Our results indicate that such a claim is unjustified. Positive deviations of expected inflation from target are significantly penalized, whereas negative deviations are not. A one unit increase in the former variable reduces the probability of being a top-graded central banker drastically by 14 pp. In addition, positive and negative deviations from Taylor's suggested interest rate lead to an almost perfectly symmetric decrease in the conditional chances of receiving the top grade A. The marginal effects are -1.5 pp for too hawkish monetary policy and -1.6 pp for too dovish monetary policy.

Turning to the ordered probit results, the findings of the probit estimation are confirmed with the estimates for too dovish and too hawkish monetary policy being the only exceptions. Note that, however, the significances and the model's fit are weaker in the right panel of Table 1.

5 How much is a superstar central banker worth?

5.1 Baseline results

First, we illustrate the macroeconomic performance of superstar central bankers, their nearest neighbors ("predicted winners"), and all non-superstar central bankers in Figure 3.

In case of the (expected) inflation gap, actual winners perform better than predicted winners at the end of the pre-award year and the end of the award year. At the end of the post-award year, this picture changes as the predicted winners perform better. Since the expected inflation gap is, on average, never larger than 23 bps both groups are able to anchor inflation expectations well. A similar picture emerges when looking at the difference between these two groups in case of the central bank's target interest rate. Superstar central bankers have an, on average, a lower interest rate over the first two years, whereas in the third year their target rate is slightly higher compared to the predicted winners. Most strikingly are the differences in case of (expected) real GDP growth. The difference between the superstars and the nearest neighbors is positive all the time and it widens considerably at the end of the post-award year.

These figures illustrate why it is important to create an appropriate control group before calculating treatment effects since all non-winners perform considerably different than the predicted winners. In addition, the matching procedure generated a really competitive control group as the predicted winners perform even better in case of some years and variables than the top-graded central bankers.

Next, to get a more formalized picture of the differences between superstar central bankers and their matches, we estimate the average treatment effects on the treated. Table 2 shows the results for the end of the award year and the end of the subsequent year.

The estimates for the overall sample confirm the visual impression that there is no significant difference in case of inflation (expectations) and the central bank rate for top-graded central bankers compared to their nearest neighbors.[15] In case of (expected) real GDP growth, however, there are significant differences. In a superstar-led economy, real GDP growth is 0.74 pp larger than in an economy led by a nearest neighbor at the end of the post-award year. In addition, superstars boost

[15]Note that in case of inflation at the end of the award year, the difference is "close" to being significant (p-value: 0.14).

growth expectations before the actual increase in growth as we notice a difference of 0.33 pp at the end of the award year. This positive effect carries over to the end of the next year where we observe a "superstar effect" of 0.56 pp.

Thus, superstar central bankers do indeed perform better than their matches as they boost the economy in terms of higher (expected) real GDP growth without generating significantly higher inflation (expectations). The emerging picture is consistent with a more favorable output-inflation trade-off for superstar central bankers. Finally, we look a bit closer at the grading of top-graded central bankers and their nearest neighbor in the subsequent year. The average grade of superstar central bankers remains about 0.98 notches better which implies that there is some persistence in the grading.

5.2 Subsample analysis and further results

Table 2 also shows the results for several subsamples. First, we slice our sample into advanced and emerging countries, respectively. We re-do the analysis separately on each subsample when assigning the nearest neighbor to the 18 top-graded central bankers in the advanced economies and the 35 superstars in the emerging economies. The estimates indicate that the latter drive our main findings as a superstar central banker in emerging economies realizes higher GDP growth, both current and expected, and even a lower expected inflation gap. For mature economies, we observe a similar pattern, which is, however, not significant at the 10% level. One interpretation of these findings is that top-graded central bankers can compensate for "weak" institutions. They have more discretion at hand and, thus, more room to shine at the top of the central bank.

Our analysis is inspired by the fact that central bank governors have moved center stage ever since the outbreak of the recent financial crisis. Consequently, the second extension of our analysis is to examine impact of the 16 superstars in the financial crisis years in our sample (2008−2011) and the 37 top-graded central bankers in pre-crisis years (2001−2007) separately. During the pre-crisis period, top-graded central bankers make a statistically significant difference in terms of lower inflation at the end of the award year. Thus, this finding is even stronger compared to the overall sample where the difference was "close" to being significant. Similarly to the top of Table 2, we also find a positive and significant effect on (expected) real GDP growth. During the crisis period, however, we observe an even stronger influence of superstars on output as the treatment effect is three times higher at the end of

the next year in case of actual real GDP growth and at the of the award year in case of expected real GDP growth. These results suggest that economies led by a superstar central banker experience a boost in confidence. During the turbulent economic and financial crisis, a superstar central banker helps restoring confidence in the economy and leads to a massive increase in (expected) growth. However, one negative consequence during the crisis period is that boosting the economy has a negative side-effect in terms of a significantly higher expected inflation gap.

Finally, as mentioned in Section 3.4, one problem associated with our procedure is that some of the top-rated central bankers and some of the nearest neighbors retire during the year after the award was handed out. So far, we dropped these observations for the calculation of treatment effects for the year $t + 1$. However, it can be argued that due to the considerable outside lag of monetary policy central bankers might have an impact on the economy even after they have left office. Thus, we also compare the influence of superstar central bankers with their peers during the year $t + 1$ even if they have left office before (bottom of Table 2). The results are a bit weaker than in the top of Table 2 as only the coefficient for expected real GDP growth is significant. This indicates that the more favorable output-inflation trade-off is directly linked to the personality of the superstar central bankers and less so to the economy in which the superstar central banker works.

6 Robustness test using a non-matching approach

In this section, we explore the robustness of our findings using a different approach. Thus far, we have relied on a nearest neighbor matching approach and a time-varying definition of the superstar status via the grades of *Global Finance*. It might be argued, however, that these grades are a combination of time-varying institutional and macroeconomic conditions and the time-invariant ability (see also Hansen et al, 2014) of a central banker.

To obtain a proxy of the central bankers' ability, we regress the grades on the same set of explanatory variables as used in Sections 4 and 5 and central banker-fixed effects in a linear probability model:[16]

[16]Of course, the indicator variables "Big 10" and "Female" are excluded from the list of explanatory variables to avoid perfect collinearity with the central bank-fixed effects. We also considered an (ordered) probit estimation of Equation (6). However, the estimation of discrete choice models with that many fixed effects does not yield robust convergence of the maximum likelihood algorithm.

$$grade_{i,t} = \alpha + \beta X_{i,t} + \eta_t + \theta_i^{CB} + \epsilon_{i,t} \tag{6}$$

The central banker-fixed effects θ_i^{CB} are then extracted from Equation (6) and represent the time-invariant part of the grading decision which is not explained by the vector of explanatory variables. Thus, these fixed effects proxy the relative ability of central bankers beyond the macroeconomic and institutional environment.

In a final step, we regress the outcome variables on a constant term and this newly created ability variable:

$$y_{i,t} = \alpha + \beta \hat{\theta}_i^{CB} + \epsilon_{i,t} \tag{7}$$

A significant coefficient for β implies that the central bankers' ability has an impact on the policy variable of interest. To give the constant term α a natural interpretation, we de-mean the central banker-fixed effects. That is, a positive fixed effect implies a central banker with an above average ability and vice versa.

Table 3 sets out the results. Whereas we do not find significant coefficients in case of the (expected) inflation gap and the central bank rate, the central bankers' ability matters for both, the actual real GDP growth rate and the expected real GDP growth rate. A central banker with an ability that is, on average, one notch better than predicted by the macroeconomic and institutional environment, yields a 0.88 pp higher real GDP growth rate than a central banker whose average grade is in line with the average environment he or she works in. The corresponding coefficient for expected real GDP growth is a bit smaller with 56.5 bps for a one-unit change in the ability variable.

To summarize, the nearest neighbor matching results using a time-varying definition of the superstar status are confirmed using a non-matching approach and a time-invariant central banker ability variable. Superstar central bankers can boost (expected) output growth with no adverse consequences for (expected) inflation. Finally, it is worth mentioning that the ability variables can explain 4.2% and 7.2% of the fluctuations in actual and expected real GDP growth, respectively.

7 Concluding remarks

Recently, ECB president Mario Draghi (2013) argued: "there was a time, not too long ago, when central banking was considered to be a rather boring and unexciting

occupation." He continued by saying: "some thought that monetary policy could effectively be placed on auto-pilot." The financial crisis and the subsequent recession changed this. Not only became central banking more important than ever before but also the personalities involved in the making of monetary policy entered the spotlight. Central bankers turned from technocrats into charismatic public figures.

This paper showed that the hopes the press and the public attach to top central bankers are, at least partly, justified. Central bankers receiving the top grade by the financial press, our empirical proxy for a superstar status, deliver significantly higher rates of (expected) real growth in the absence of higher inflation (expectations). Thus, they face a more favorable output-inflation trade-off than other central bankers. The nearest neighbor matching approach isolates the effect of the superstar status by appropriately controlling for the endogenous nature of the school grade.

We also show that the more favorable output-inflation trade-off is directly linked to the personality of the superstar central bankers and less so to the economy in which the superstar central banker works. In particular, exceptional central bankers in emerging markets make a difference and appear to drive our main findings. Thus, outstanding central bankers are able to compensate for "weak" institutions. Overall, a "boost in confidence" is one of the most plausible reasons why a superstar has a influence on (expected) real GDP growth.

If one is willing to interpret becoming a superstar central banker as building a reputation the results presented in this paper could also be seen through the lens of the signaling or reputation-building literature.[17] Although signaling in the theoretical literature is narrowly defined as being tough on inflation in order to transmit information to the public receiving a top grade also reveals information that helps improving the output-inflation trade-off.

Monetary policy across the globe has become more difficult: new measures such as forward guidance are widely used tools for more, more central banks facing the zero lower bound on nominal interest rates, financial stability concerns extend the traditional mandates of central banks and spillovers from advanced countries impact emerging markets' monetary conditions. Based on our findings we can assume that competition among countries for top central bankers such as Mark Carney and, in particular, Raghuram Rajan will intensify in the future.

[17] See Backus and Driffill (1985a) and Backus and Driffill (1985b) for the classic contribution and Hansen and McMahon (2013) for a recent empirical implementation of signaling in monetary policy.

One caveat seems to be warranted. A major tendency in central banking over the past two decades is the increasing role of collective decision making by monetary policy committees (MPC). Prominent central bank governors often lead MPCs with other charismatic policymakers, either as deputy governors or ordinary MPC members. It cannot be ruled out completely that the superstar status of a single governor in fact reflects the superstar status of the MPC at a whole or at least a substantial fraction of it. On the other hand, being a superstar might imply that the governor has de facto more authority in the monetary policy committee or vis-a-vis the government. For that purpose, an analysis of the voting behavior before and after a governor is considered a superstar would be an interesting future task of research.[18]

[18] We would be happy to include such a measure into this paper. However, the number of central banks publishing voting records is not sufficiently large enough to conduct such an analysis.

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Figures

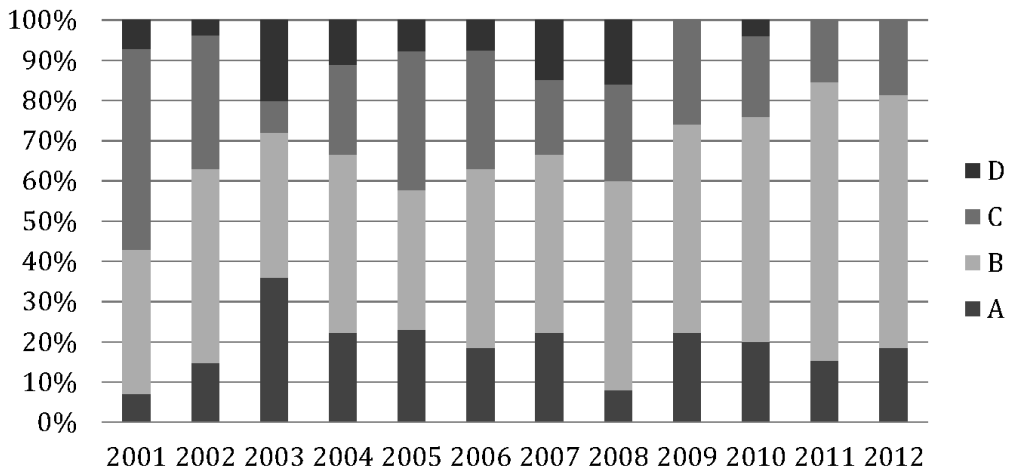

Figure 1: Distribution of grades over time

Year *t*		Year *t+1*		Year *t+2*
Early-Year	Mid-Year	Early-Year	Mid-Year	Early-Year
Information for Year *t-1* becomes available and is used for Probit Estimat. in Year *t*	Grades for Year *t*	Information for Year *t* becomes available and is used for Treatment Effects in Year *t*	Grades for Year *t+1*	Information for Year *t+1* becomes available and is used for Treatment Effects in Year *t+1*

Figure 2: Timing of grades and information sets

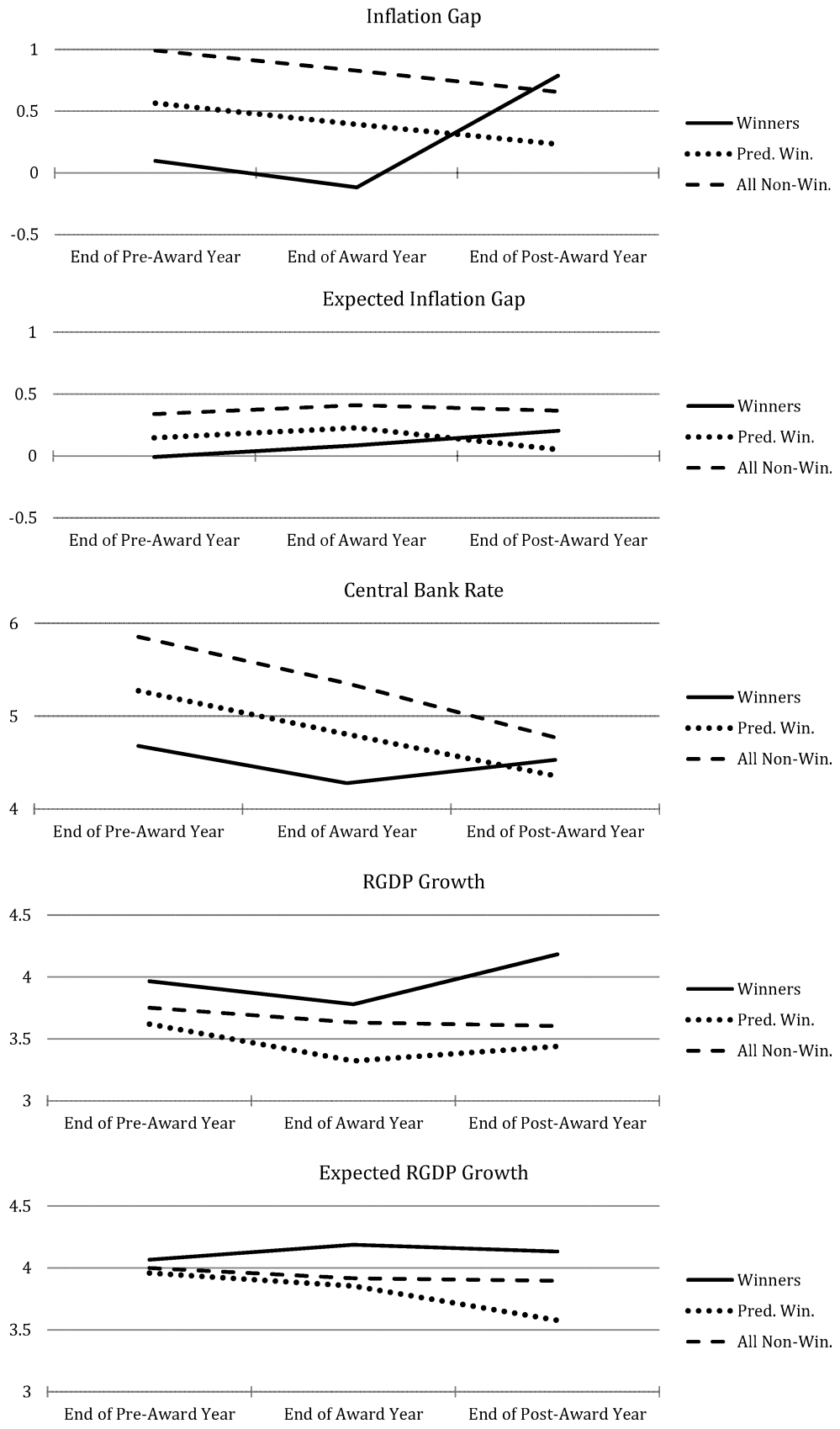

Figure 3: Performance of winners, predicted winners, and all non-winners

Tables

Table 1: Explaining central bankers' status

	Probit		Ordered Probit	
	Coeff.	Prob(A)	Coeff.	Prob(A)
Big 10	0.449	0.074	0.324	0.072
Transparency	0.223	0.037	0.044	0.010
Transparency^2	−0.010	−0.002	−0.009	−0.002
Years in Office	0.443***	0.073***	0.221***	0.049***
Years in Office^2	−0.025***	−0.004***	−0.014***	−0.003***
Female	1.730***	0.285***	1.060*	0.234*
Jackson Hole	0.760	0.125	0.266	0.059
Inflation Gap > 0	−0.010	−0.002	0.070	0.015
Inflation Gap < 0	0.137	0.023	0.122	0.027
Expected Inflation Gap > 0	−0.848**	−0.140**	−0.442***	−0.097***
Expected Inflation Gap < 0	−0.083	−0.014	−0.204	−0.045
Central Bank Rate	0.056	0.009	0.017	0.004
Real GDP Growth	0.152**	0.025**	0.093**	0.020**
Expected Real GDP Growth	0.080	0.013	−0.173	−0.038
Deviation from Taylor Rule > 0	−0.092*	−0.015*	−0.020	−0.004
Deviation from Taylor Rule < 0	−0.100***	−0.016***	−0.011	−0.002
Stock Returns	0.002	0.000	0.001	0.000
Credit/GDP	3.120**	0.514**	1.678**	0.370**
(Credit/GDP)^2	−2.314***	−0.381***	−1.065***	−0.235***
IT	0.340	0.056	0.598**	0.132**
Floating FX Rate	1.171***	0.193***	0.491	0.108
Currency Crisis	−0.173	−0.028	0.091	0.020
Constant Term	−5.979***		—	
1st Cut Point	—		−0.483	
2nd Cut Point	—		0.663	
3rd Cut Point	—		2.223**	
Observations	269		269	
Pseudo R^2	0.409		0.172	

Notes: Results of probit (left panel) and ordered probit (right panel) estimation of Equation (1). Model includes year-fixed effects (not shown). A significance level of 1%, 5%, and 10% is indicated by ***, **, and *, respectively. Standard errors are clustered at the central banker's level (Rogers, 1993).

Table 2: Superstar central bankers and subsequent macroeconomic performance

	$\tilde{\pi}$	$\tilde{\pi}^E$	i^T	gY	gY^E	N
Full Sample						
Award Year	−0.511	−0.142	−0.527	0.457	0.334**	269
Next Year	0.554	0.152	0.172	0.743*	0.555***	229
Advanced Economies						
Award Year	−0.027	0.270	0.192	0.320	0.310	92
Next Year	0.028	−0.020	0.122	0.673	0.265	80
Emerging Economies						
Award Year	−0.790	−0.308*	−1.163*	0.812*	0.617***	177
Next Year	0.749	0.063	−0.490	0.613	0.675***	149
2001−2007						
Award Year	−0.759*	−0.249	−0.408	0.903**	0.280	181
Next Year	0.905	0.072	0.840	1.044***	0.551**	152
2008−2011						
Award Year	−0.218	0.267*	−0.559	−0.245	0.927***	88
Next Year	0.509	0.203	0.739	3.187***	0.444	77
Impact Beyond Tenure						
Next Year	0.155	0.570	0.129	0.202	0.333*	269

Notes: Results of Abadie-Imbens (2006, 2011) estimation of average treatment effects on the treated (Equation (3)). A significance level of 1%, 5%, and 10% is indicated by ***, **, and *, respectively. Abadie-Imbens (2012) robust standard errors are used. $\tilde{\pi}$: inflation gap; $\tilde{\pi}^E$: expected inflation gap; i^T: central bank rate; gY: real GDP growth rate; gY^E: expected real GDP growth rate; N: number of observations.

Table 3: The ability of central bankers and macroeconomic performance

	$\tilde{\pi}$	$\tilde{\pi}^E$	i^T	gY	gY^E
Constant Term	0.817**	0.270	5.612	3.777***	4.002***
Ability	−0.096	0.053	0.533	0.877***	0.565**
R^2	0.001	0.001	0.007	0.042	0.072
N	269	269	269	269	269

Notes: Results of least squares estimation of Equation (7). A significance level of 1%, 5%, and 10% is indicated by ***, **, and *, respectively. Standard errors are clustered at the central bank's level (Rogers, 1993). $\tilde{\pi}$: inflation gap; $\tilde{\pi}^E$: expected inflation gap; i^T: central bank rate; gY: real GDP growth rate; gY^E: expected real GDP growth rate; N: number of observations.

Appendix

Table A1: List of central bank governors in the sample

ARG	Maccarone (01); Pignanelli (02); Gay (03−04); Redrado (05−09); del Pont (10−12)
AUS	Macfarlane (01−05); Stevens (06−12)
BRA	Fraga (01−02); Meirelles (03−10); Tombini (11−12)
CAN	Dodge (01−07); Carney (08−12)
CHI	Massad (01−02); Corbo (03−07); de Gregorio (08−11); Vergara (12)
CHN	Xianglong (01−02); Xiaochuan (03−12)
CZE	Tuma (01−09); Singer (10−12)
ECB	Duisenberg (01−03); Trichet (04−11); Draghi (12)
HUN	Jarai (01−06); Simor (07−12)
IDN	Sabirin (01−02); Abdullah (03−07); Boediono (08); Nasution (09−12)
IND	Jalan (01−03); Reddy (04−07); Subbarao (08−12)
ISR	Klein (01−04); Fischer (05−12)
JAP	Hayami (01−02); Fukui (03−07); Shirakawa (08−12)
KOR	Chon (01); Seung (02−05); Lee (06−09); Kim (10−12)
MEX	Martinez (01−09); Carstens (10−12)
MYS	Aziz (01−12)
NOR	Gjedrem (01−10); Olsen (11−12)
NZ	Brash (01); Bollard (02−12)
PHI	Buenaventura (01−04); Tetangco Jr. (05−12)
POL	Balcerowicz (01−06); Skrzypek (07−09); Belka (10−12)
RUS	Gerashchenko (01); Ignatiev (02−12)
SIN	Loong (01−03); Tong (04−05); Keat (06−10); Menon (11−12)
SUI	Roth (01−09); Hildebrand (10−11); Jordan (12)
SWE	Backstrom (01−02); Heikensten (03−05); Ingves (06−12)
THA	Devakula (01−06); Watanagase (07−10); Trairatvorakul (11−12)
TUR	Serdengecti (01−05); Yilmaz (06−10); Basci (11−12)
UK	George (01−02); King (03−12)
US	Greenspan (01−05); Bernanke (06−12)
ZAF	Mboweni (01−09); Marcus (10−12)

Table A2: Grades of central bankers

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
ARG	D		D	D	D	D	D	D	C	D	D	D
AUS	A	A	A	A	A		B	B	A	A	A	A
BRA	C	C	B	B	B	B+	B	B+	B+	B+	B+	B
CAN	B	B	D	C+	C	C	C	C	B	B+	B	A
CHI	A	B		B+	A−	A−	B−	B−	B	B	B+	B+
CHN	B	C	B	C	C+	C+	C	B−	C	C	B	B−
CZE	C	B	B	C	C+	B−	B	B	A		B	B
ECB	C	C	D	C−	C	C	C+	C	A	A	B−	B−
HUN	D	C	B	D	D	D		B	B	C	C	C
IDN	C	B		A	C	B	A			D	B	B
IND	C	C	A	B	B+	B+	A		B	C	B−	C
ISR	C	C	B	B		B	A	B	A	A	A	A
JAP	D	D	B	B	B	C−	C		B−	C	C	C−
KOR	C	B	A	B	C	D	B	B	A		C	C
MEX	B	B	B	B−	B	B+	B+	B	B	B	B	B+
MYS	C	B	A	A	A	A	A	B	A	A	A	A
NOR	B	B	A	A	A	A	B	B	C−	B		B
NZ	B		C	B	B	B	D	D	C	B	B	B
PHI	B	A	A	B		A−	A	B	B	B	A	A
POL	C	B	A	B	C	B	D	D	B		B	B−
RUS	C	C	D	D	D	C	D	D	C−	B	B	B+
SIN	C	C	C		B	B+	B	A	B	B	B	B−
SUI	B	B	D	B	B−	B	B	C	B	B−	B−	
SWE	C	A	B	A	A	C	A	B	C−	B	B+	B
THA	B	B	A	C	B	C	B	C	C	B	B+	B+
TUR	C	B	B	B+	B+	B−	B	C	B	A		B
UK	B	A		C	C−	B−	D	D	B	B	B	B−
US	C	C	D	D	C−	C	C	C−	C	C	C	B
ZAF	B	B	A	A−	A	A	B	A	B	B	B	C

Notes: The missing observations correspond to those cases where a new governor has taken office and the time elapsed since inauguration is too short to reliably assess her/his performance. The Global Finance magazine acknowledges that it is "too early to say" something about the governor's performance.

Table A3: Variable description and data sources

Variable	**Description**	**Source**
Big 10	"Advanced" central banks	
Transparency	Transparency index from 0 to 15	Horvath and Vasko (2013)
Years in Office	Number of years in office	Central bank websites
Female	Female governors	Central bank websites
Jackson Hole	Governor on the program of the Jackson Hole Summit	Kansas City Fed website
Inflation	Annual growth rate of consumer price index (CPI)	IMF
Inflation Expectations	Expected annual growth rate of CPI in next year	Consensus Economics
Central Bank Rate	End of year central bank target interest rate	IMF
Real GDP Growth	Annual growth rate of real GDP	IMF
Exp. Real GDP Growth	Expected annual growth rate of real GDP in next year	Consensus Economics
Real Interest Rate	End of year real interest rate	World Bank
Stock Returns	Annual growth rate of MSCI equity index	Thomson Reuters Datastream
Credit/GDP	Domestic credit to private sector over GDP	World Bank
IT	Inflation targeting (IT) countries	Roger (2009) and central bank websites
Floating FX Rate	Freely floating exchange rate regime	Ilzetski et al (2010)
Currency Crisis	Exchange rate devaluates by more than one standard deviation	Own calculations

Table A4: Descriptive statistics

	Grade A	Grades B−D
Observations	53	216
Big 10	0.34	0.34
Transparency	8.54	8.13
Years in Office	4.74	3.38
Female	0.15	0.04
Jackson Hole	0.09	0.03
Inflation Gap	0.10	0.99
Expected Inflation Gap	−0.01	0.34
Central Bank Rate	4.68	5.85
Real GDP Growth	3.97	3.75
Expected Real GDP Growth	4.07	4.00
Deviation from Taylor Rule	−0.88	−1.75
Stock Returns	10.46	12.47
Credit/GDP	0.90	0.94
IT	0.72	0.56
Floating FX Rate	0.28	0.16
Currency Crisis	0.04	0.08

Notes: There are only 269 observations since either (i) grades for some of the governors/years (see also Table A2) or (ii) observations for some of the explanatory variables are missing.