

Do International Bureaucrats Matter? Evidence from the International Monetary Fund*

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Abstract

Scholars of international cooperation argue that member states delegate decision making authority to international organizations (IOs) – and by implication the bureaucrats who staff them – as a commitment to non-interference. Yet others question the credibility of this delegation, arguing that institutions are epiphenomenal to member state interests. We test the credibility of delegation within the International Monetary Fund (IMF) using event study methods. Where delegation is credible, the announcement of new bureaucratic appointments provides a costly signal of the institution’s future lending policies, and investors should update assessments of the risk associate with member state borrowing accordingly. We estimate the abnormal returns to sovereign bond risk premia following the announcement of new, high-level staff appointments at the IMF. We find strong support for the credibility of bureaucratic delegation and demonstrate the robustness of our results to alternative estimation strategies.

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1 Introduction

This research note provides evidence of the credibility of delegation to bureaucrats within international organizations, specifically the International Monetary Fund (IMF). Traditional theories of international institutions emphasize their role as commitment devices: states delegate authority to international organizations in order to prevent themselves from renegeing on agreements they may otherwise be tempted to abrogate (Keohane, 1984). In these accounts member states act as principals while organizations act as agents, fulfilling their policy mandates while also pursuing their own independent institutional prerogatives (Hawkins et al., 2006). While early studies of bureaucratic preferences interpret organizations as unified actors – focusing on preferences derived from shared socialization, education, and institutional mandates¹ – a growing number of studies theorize how variation in individual bureaucratic characteristics and experiences might shape their policy making priorities (Thrall, 2023; Clark and Zucker, 2022; Malis, 2021; Lindsey, 2023).

Still the ability of individual bureaucrats to influence political outcomes remains one of the central debates in international relations. Critics have long argued that international organizations - and by extension the bureaucrats who staff them - are epiphenomenal to the interests of powerful member states (Mearsheimer, 2017). This contention is supported by a large body of empirical evidence showing the disproportionate influence of powerful member states in IO decision making (Stone, 2011; Dreher et al., 2009). We contribute to this literature by directly testing the credibility of member state delegation to international bureaucrats. Where bureaucratic delegation is credible, individual bureaucrats will exert independent impact on policy, making them a consequential yet under-studied class of actors in international politics.

Our empirical test builds on the observation that in the absence of credible delegation, *ex ante* signals of lending intent are simply cheap talk. This is the case because principals of the IMF have incentive to misrepresent the stringency of lending policies both to borrowers and to market actors. Doing so encourages fiscal responsibility among the former and confidence in securities markets among the latter. Both contribute to the stability of the international financial system. In contrast, if market actors update beliefs in response to the appointment of new bureaucrats at the IMF, this suggests that bureaucratic appointments represent costly signalling and that the degree of delegation embodied within the institutional structure is therefore non-zero. If delegation is negligible and Mearsheimer (2017) and others contend, then we should observe no updating of investor beliefs following the announcement of new bureaucratic appointments.

We estimate the shift in investor beliefs – as measured by risk assessments – following each ap-

¹See *inter alia* Chwieroth (2013); Copelovitch (2010); Nelson (2014).

pointment using event study methods and aggregating across individual countries within each affected region. Our results confirm that, on average, new appointments lead to statistically significant shifts in investor beliefs, supporting the credibility of delegation to high-level IMF staff. The shifts are large in magnitude relative to shifts in investor beliefs following IMF voice and quota reforms, a heavily politicized set of reforms widely seen as consequential for the relative influence of the United States in particular. The results are robust to a number of alternative specifications, covariates, and estimation strategies including randomization inference and matching methods designed for time-series, cross sectional data (Imai et al., 2019).

We conclude with a discussion of how the study of bureaucratic impacts may be advanced in future work, highlighting a growing number of data sources and creative approaches with promise to facilitate further accumulation of knowledge on the role of individuals within international organizations.

2 Empirical Strategy

We employ an event study framework to estimate the impact of staff appointments. Event studies have been widely employed in the literature on corporate finance and, increasingly, the study of international institutions. In the context of corporate finance, event studies explore changes in firm stock prices in reaction to the disclosure of new information. The core intuition behind these event studies is that the magnitude of unanticipated returns to stock prices provides a useful measure of the impact of events on shareholder estimations of value (Kothari and Warner, 2007).

More recently, within the study of international institutions, event studies have been employed to assess the credibility of negotiated outcomes. Wilf (2016) studies the impact of Basel III negotiations on regulated banks, finding evidence that international negotiations are viewed as credible and thus impact perceptions of banks' value. In a similar vein Kucik and Pelc (2016) demonstrate that dispute settlement rulings within the World Trade Organization impact the value of firms even in countries not party to specific disputes, evidence that investors anticipate systemic shifts in regulatory policy following novel judicial rulings. In contrast to these approaches we employ an event study to assess whether the identity of new staff appointments conveys credible information about the likely directions of future policy and thus the riskiness of sovereign lending.

The logic of the empirical test is as follows: powerful member states select bureaucratic figures strategically both since they are the figures who will shape and implement policy if delegation

is credible and also because appointments convey information to market actors and borrower states about the principals' own future intentions and preferences. Thus market reactions to bureaucratic appointments should reflect both the identity of the bureaucrat his or herself and any encoded information in his or her appointment about the preferences of powerful principal states.

However consider a case in which delegation is not credible. Market actors have no reason to update expectations in response to the identity of new bureaucratic appointments since the bureaucrats themselves do not matter directly and any information encoded in their appointments is therefore cheap talk. Evidence that investors update risk assessments following bureaucratic appointments serves as evidence of credible delegation to those same bureaucrats. In Appendix A we formalize this logic and show that if delegation is not credible then investor beliefs are unresponsive to bureaucratic appointments. Conversely, if changes in investor beliefs are observed, then delegation must in fact be credible.²

We define an event as any change in the heads of area departments, and consider the date of the event the first announcement identifying the appointment of a new Department Director. The IMF has a total of five area departments: African Department; Asia and Pacific Department; European Department; Middle East and Central Asia Department; Western Hemisphere Department.³ Each of these engages directly with borrower states, playing a lead role in both lending activities and macroeconomic surveillance. While non-regional departments also operate in the IMF, they cover functional or support activities only, so we do not consider them in our analysis.

2.1 Estimation

To identify the events in our sample we gather IMF press releases detailing new staff appointments. The press releases constitute the first public announcement of such changes in senior official positions. We then code all announcement dates as the dates of the events. Table 1 lists the set of staff appointments which we identify and employ in the analysis below. A condition for identification of market reactions to new appointments is for these new appointments to be unexpected. If new appointments were entirely predictable, they should not impact investor sentiment in a specific window. We employ three methods to verify the events in our sample were unexpected.

²In Appendix B we also provide a formal characterization of the change in investor beliefs and show that this maps directly to the estimand in the event study analysis below.

³<https://www.imf.org/external/about/staff.htm#area>

First, we conduct systematic reviews of investor news reports such as the Wall Street Journal (WSJ) for the year preceding an appointment announcement. We pay particular attention to those cases where the head of an area department announces her decision to quit far in advance, or similarly, in cases where exogenous shocks led to a change in the head of an area department. Second, we conducted a series of interviews about the appointment process at the IMF. Both methods led us to conclude that the process is highly confidential, and that, in practice, both internally within the IMF and externally the information on the appointment is known almost simultaneously, when the communications department issues an official announcement about the appointment. We also tackle this issue empirically, by dropping days -4 to -1 from our estimation window. Doing so ensures that any anticipation effects will not affect the results.

To construct our dependent variable, we collect data on daily sovereign bond interest rates for all available countries for each event using the Global Financial Database (GFD). Data availability is limited in particular for developing countries prior to 2010. For this reason we are forced to drop several events from our sample, as noted in Appendix Table B1. To calculate our dependent variable we subtract the U.S. daily interest rate on benchmark ten year bonds from that of each country in the sample. The resulting measure, *Spread*, describes the risk premia associated with a particular country’s borrowing.

We follow the standard literature in finance to implement the event study. For each event we define treated countries as those within the region corresponding to the new staff appointment, irrespective of the country’s IMF loan status. That is, we include all countries in the relevant region regardless of their prior interactions with the IMF. In doing so we rely on the anticipated systemic consequences of IMF lending decisions for the region as a whole.

Index events by $k = 1, \dots, K$ and treated countries by $i = 1, \dots, N_k$. For all events we define an estimation window, $[-L, -l]$, consisting of a continuous period of $L - l + 1$ days prior to the event date. We also define an event window, $[t, T]$, consisting of a $T - t + 1$ length interval of days following each event. Index days by $t = -L, \dots, 0, \dots, T$, where $t = 0$ corresponds to the announcement date. For each treated country and each event we first estimate the following “market model” of normal returns using data from days within the estimation window only, $t \in [-L, -l]$,

$$Spread_{i,t} = \alpha_i + \beta_i Index_{k,t} + \epsilon_{i,t}$$

$Index_{k,t}$ is calculated as the mean of $Spread_{j,t}$ for all countries outside of the treated region for event k . We use the resulting parameter estimates to predict $Spread_{i,t}$ for each day in the event window, $t \in [t, T]$.

Country i 's abnormal return following event k is equal to the difference between the observed risk premium $Spread_{i,t}$ and the predicted risk premium $\widehat{Spread}_{i,t}$. This abnormal return corresponds to unanticipated shifts in risk premia resulting from the information conveyed by announcement k . We define cumulative abnormal returns for country i following event k as,

$$\widehat{CAR}_{i,k} = \sum_{t \in [t, T]} Spread_{i,t} - \widehat{Spread}_{i,t}$$

and cumulative average abnormal returns following event k as,

$$\widehat{CAAR}_k = \frac{1}{N} \sum_{i=1}^N \widehat{CAR}_{i,k}$$

Our estimate of the sampling variance for event k is calculated as the mean variance of abnormal returns observed during the estimation window.⁴ Appendix Figure B3 provides intuition for the methodology by plotting the observed (black) versus predicted (grey) risk premia for several countries before and after an event announcement (indicated by the red dotted line).

3 Results

Figure 1 presents the main results of our event study analysis, testing the primary hypothesis that financial markets will react to new appointments. We present results for an estimation window of $(-180, -5)$ days and three different event windows, $(0, 1)$, $(0, 3)$, and $(0, 5)$. The figure illustrates substantial heterogeneity in both direction and magnitude of the Cumulative Abnormal Returns Effects. Nevertheless, the analysis establishes that the announcement of new area department directors sends credible signals to the market about the future direction of IMF policy for the region where the change occurred. Effects are consistent across estimations.

To assess the substantive significance of the estimated shifts in risk premia we compare the results above with those corresponding to several high-profile events which we also expect to have an impact on expectations of country risk. First, we consider the announcement of reforms to the IMF's formal governance structure. These reforms reflect a growing consensus that the representation of countries such as Brazil, China, and Mexico have not kept pace with their growing contribution to the global economy. To examine these changes, we consider two milestones in the reform process: first, the entry into force of the Voice and Participation

⁴See Kothari, S.P. and Jerold B. Warner. *Econometrics of Event Studies*. In B. Espen Eckbo (eds) *Handbook of Corporate Finance*, Vol 1, Elsevier B.V., 2007.

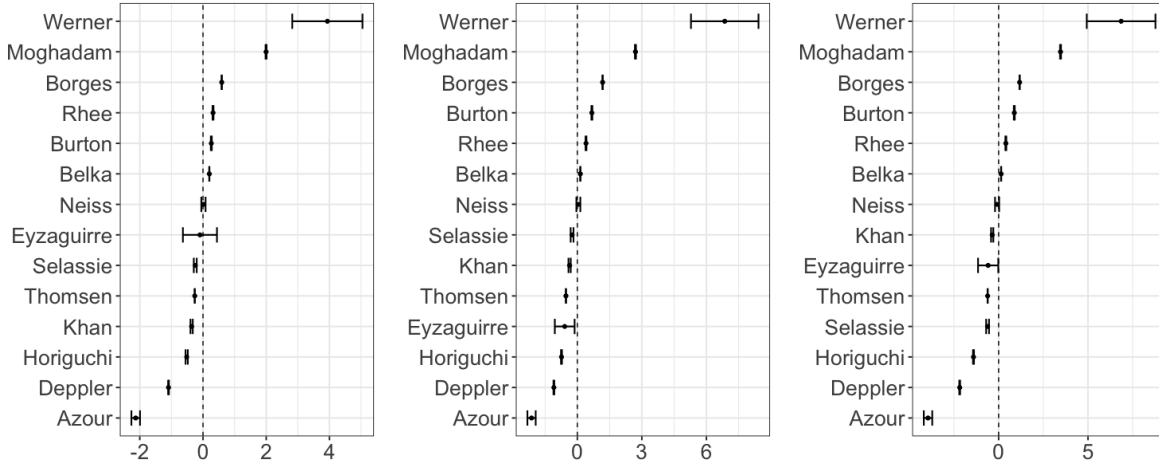


Figure 1: **Cumulative Abnormal Returns Effects by Event.** Cumulative abnormal returns effects by event for estimation window $(-180, -5)$ for different event windows (from left to right): $(0, 1)$, $(0, 3)$, and $(0, 5)$. Standard Errors clustered by region.

Amendment and second, passage of legislation by the United States Congress approving reforms to IMF quota allocations.^{5,6}

As a second benchmark we consider financial market reactions to the arrest of then-IMF Managing Director, Dominique Strauss-Kahn for sexual assault of a hotel employee on May 14, 2011. Strauss-Kahn resigned his position at the IMF in the immediate aftermath of his arrest, though given the seriousness of the charges against him we employ the date of arrest as the first significant signal that a change in top-level leadership was immanent.

Our analysis of these three events is similar to that in the main estimation above with one change. Rather than define treatment at the region level (since all regions arguably receive the same treatment for each of these events) we define treated countries only as those most directly impacted by IMF policies, that is countries under IMF lending arrangements during each event. We anticipate that quota reforms, which result in a more equal distribution of political influence, will lead to higher risk assessments, reflecting enhanced credibility of IMF conditionality.⁷ We anticipate that the arrest of Strauss-Kahn will also lead to higher risk assessments reflecting market uncertainty about his replacement and implications for future policy. The results are plotted in Figure 2.

⁵While we identified several additional milestones in the course of the reform process we are forced to limit our attention to the two described above due to data constraints.

⁶See Appendix C for additional background on quota reform and the specific events employed in the analysis.

⁷This follows Copelovitch (2010) which argues that heterogeneity of influential state interests can act as a check on overall politicization of lending decisions.

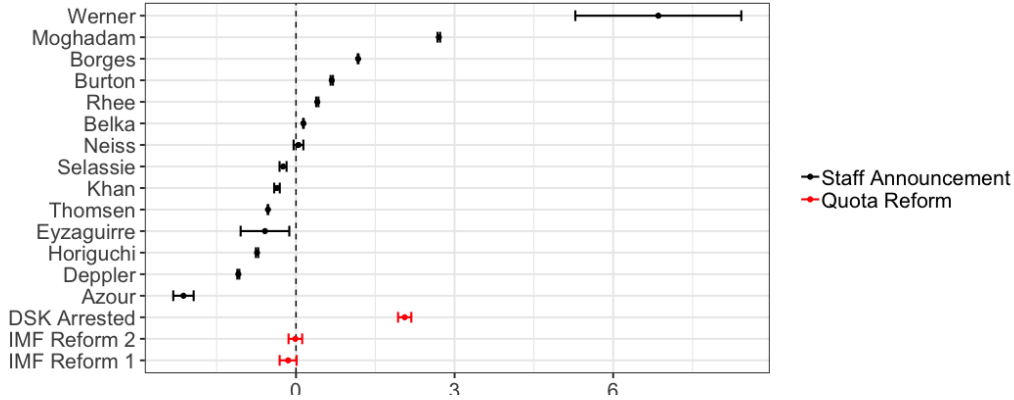


Figure 2: **Substantive Significance: Magnitude Relative to Other Events.** Cumulative abnormal returns with confidence intervals by event for estimation window $(-180, -5)$ and event window $(0, 3)$. Black indicates staff announcement. Red indicate either quota reform announcements or the date former IMF Managing Director Dominique Strauss-Kahn was arrested. Standard Errors clustered by region.

3.1 Robustness to Alternative Estimation Strategies

The validity of our results above rely on the accuracy of our predicted bond spreads for treated countries in the absence of a new staff appointment. Where the mean bond spread of untreated countries follows a different trend from our treated observations our predictions will be noisy and potentially biased. We use 2 different robustness checks to address the possibility of biased bond spread predictions.

Permutation Test

First, we conduct a permutation—or randomization—test to assess the sharp null hypothesis that our treatment—changes in area department heads—has no effect on the quantity of interest, change in investor beliefs. Under the permutation test, we compare our observed average treatment effect to its reference distribution under the sharp null hypothesis. To do so, we first shuffle the day of appointment of the area department head over a window of 60 days prior to the true appointment announcement date, as we expect appointments during this window to be plausibly random. We do so 100 times for each area department head announcement. We run the same estimation as above with these alternative permutations of treatment assignment, in practice calculating the test statistic that would have been observed under this alternative treatment schedule.

Appendix Table B2 shows results of the permutation test for an estimation window of $(-180, -5)$ days and event windows of $(0, 1)$ and $(0, 5)$ days. The p-value under the null hypothesis rep-

resents the proportion of permutations with a test statistic at least as large as the observed one. Lower p-values indicate a low number of shuffled CAAR estimations exceeded the true CAAR calculated under observed data. We can see that for most appointments the proportion of permutations with a CAAR as large in magnitude as the observed CAAR is lower than 0.05. Figure 4 shows histograms of the CAAR under the permutation test by new area department head appointment, for an estimation window of $(-180, -5)$ days and event windows of $(0, 1)$ days. Here, we plot the true CAAR (vertical red line) against the histogram of shuffled CAAR. Since our hypothesis is not directional, no shuffled CAAR preceding the true CAAR—for true CAAR less than 0—and no shuffled CAAR exceeding the true CAAR—for true CAAR larger than 0—indicate we can reject the null hypothesis of no effects. We therefore reject the null hypothesis for most appointments.

Weighted Difference-in-Differences

As an additional robustness exercise, we employ a weighted difference-in-differences design to estimate the average treatment effect on the treated (ATT) of a change in area department head on $Yield_{i,t}$. We match treated observations with control observations similar on observable characteristics, using the matching methodology proposed by Imai et al. (2019). To apply the method, we first select a set of control observations with identical treatment history in the period preceding treatment, for each treated observation. Following the main estimation, we consider each area department head appointment as separate treatments, and the countries under the area department where the change occurred as treated units. We therefore have a total of 25 treatments. Due to data limitations, the total number of treatments that enter the analysis is 16.

We further refine this matched set to increase similarity of the covariate histories and outcomes of the matched control and treated observations. To do so, we use the lagged Yield for 5 days prior to treatment, as well as IMF Program—an indicator variable that takes the value 1 if a country was under an IMF program at the time of treatment—as matching covariates. We use two refining methods: minimizing the Mahalanobis distance between control and treated observations, and Covariate Balance Propensity Score (CBPS) weighting. Finally, we adjust for possible unobserved time trends via a difference-in-differences estimator.

We estimate the average treatment effect on treated units (ATT) at time t on the outcome Yield from time $t+0$ to $t+3$.⁸ Results for the CBPS weighting method are shown in Appendix Figure B5, while results for Mahalanobis matching are shown in Figure B6 in the appendix. In

⁸All analysis has been implemented in R with the package `PanelMatch` (Imai et al., 2019), available at <https://github.com/insongkim/PanelMatch>

most cases, the direction of the ATT effect is similar to the direction of CAAR effect identified in the main estimation. Not all effects in the estimation obtained with panel match achieve statistical significance. This could be because of the difference in sample sizes: the matches control set is much smaller than the full control set in the CAAR estimation.⁹

4 Conclusion

Do individual bureaucrats matter in international organizations? Existing explanations for IO policy emphasize the preferences of powerful member states as a central determinant of these institutions' policy making. Where credible delegation from member states to IOs exists, principals confer such delegation to the organization itself, conceptualized as the agent. Yet most IOs are highly bureaucratized organizations composed of individuals with motivations and preferences that might diverge not only from those of principals, but also from those of other bureaucrats. This suggests the potential for impact at the individual bureaucrat level. We provide evidence that delegation to senior staff members is credible. Announcements of new staff appointments to area departments result in statistically significant shifts in risk premia for countries in the affected region. We also provide direct evidence of the (heterogenous) impact of individual bureaucrats on policy making, analyzing IMF country-level forecasts of economic indicators and finding significant evidence of systematic forecast errors.

This work contributes to a growing body of scholarship which studies how individual bureaucratic experiences shape subsequent behavior and policy priorities. Future work should move beyond institution-level analyses in order to understand how individual bureaucrats and bureaucratic structures shape the outcomes of international cooperation.

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⁹Also note that in the CAAR estimation, we average the cumulative abnormal return over a period of up to 5 days after a unit receives treatment, whereas the ATT in the weighted difference-in-differences specification is estimated separately for each day up to 3 days following treatment. In most cases, the average ATT over these 3 days following treatment would lead to more statistically significant results.

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Appendix A: Formal Analysis

Model

To explore the ideas laid out above we develop a model of strategic appointment and delegation to an international bureaucrat, against a background of (potential) international financial crisis and lending. Our model draws on canonical theories of central bank independence as well as models of credible signalling in the presence of costs to misrepresentation. The actors in our model consist of a principal, a member state, and a (non-strategic) representative investor. The principal's objective is to minimize the expected losses associated with a balance of payments crisis within the member state. This expected loss depends both on the probability of crisis occurring and on the loan disbursement issued given that crisis materializes. We begin by describing the role of the IMF in case a crisis materializes and subsequently describe the actions of each player which may mitigate the potential for crisis as well as its expected costs.

In the event that a crisis occurs, the IMF offers a loan to cover the balance of payments gap. The *optimal* loan is a random variable, ω , normalized to lie within the unit interval. ω is distributed according to F with associated density, f , which is continuous with full support on \mathbb{R}^+ . Substantively ω may represent either the expected economic needs of the member state or alternatively may incorporate a measure of the importance of that state to powerful members of the executive board. Thus ω may interchangeably represent the ideal loan of either the IMF's managing director or of powerful members within the executive board. We assume that ω is realized at the beginning of the game and observable to both principal and member state (though not the representative investor).

The realized loan provided by the IMF depends on the level of delegation embedded within the institution and the type of bureaucrat appointed by the principal to oversee policy making. Delegation reflects the likelihood - or extent to which - the bureaucrat's own preferences are reflected in the final loan amount. That is, delegation can be interpreted as the bureaucrat's bargaining power vis a vis the principal. Let $r \in \mathbb{R}_0^+$ represent the exogenous degree of (credible) delegation and $\theta \in [0, 1]$ the bureaucrat's type, observable to all. The expected loan is given by $l(\theta, \omega, r)$, continuously differentiable in each of its arguments. Letting subscripts denote derivatives we make the following assumptions: $l_1 \geq 0$, $l_2 > 0$. These assumptions ensure that the expected loan is increasing in both the bureaucrat's and principal's ideal loan size.

The relative influence of bureaucrat and principal preferences on the final loan size is moderated by the degree of delegation r . We assume that $l_{1,3} > 0$ so that when r is high, changes in the bureaucrat's type have a larger impact on the realized disbursement than otherwise. Lastly

we assume $\lim_{r \rightarrow 0} l_1 = 0$ and $\lim_{r \rightarrow 0} l(\theta, \omega, r) = \omega$.¹⁰ The former implies that when there is no credible delegation, the bureaucrat has no effect on policy. The latter implies that when the bureaucrat has no effect on policy, the realized disbursement will coincide with the principal's ideal disbursement, $l(\theta, \omega, 0) = \omega$.

While we maintain the more general form throughout the analysis, it is easy to identify an intuitive functional form for $l(\theta, \omega, r)$. Let $\theta\omega$ be the bureaucrat's ideal policy and r be the bargaining power of the bureaucrat vis á vis the principal. In this case, the expected loan can be represented by a simple contest function,

$$l(\theta, \omega, r) = r\theta\omega + (1 - r)\omega$$

Note that in the general case $l(\theta, \omega, r)$ may be probabilistic - representing the expected disbursement - or fully deterministic. Note that selecting $\theta < 1$ reduces the ability (or expected ability) of the principal to achieve her ideal disbursement, ω .

Next we introduce two channels through which the principal's selection of θ may moderate the likelihood of crisis, thus factoring into the principal's optimal choice of bureaucrat. First, the probability of crisis is decreasing in the valuation of a representative investor, updated continuously throughout the game. Second, the probability of crisis is decreasing in the extent of economic reform chosen by the member state, $x \in \mathbb{R}^+$. For the former, the investor's valuation depends on the anticipated (or realized) level of reform adopted by the member state as well as the expected loan disbursement in case of crisis. In contrast to the principal and member state, the investor is unable to observe the true state of the world, $\omega \in \mathbb{R}$. Denote the investor's beliefs about the state of the world by, $\hat{\omega}$.

The investor's valuation is, $V(x, \theta, \hat{\omega})$ where $V_1 > 0$, $V_2 \geq 0$ and $V_3 > 0$. This means that the investor's valuation is increasing in the extent of reform undertaken by the member state. Investor valuations are also increasing in the leniency of the bureaucrat (i.e. in the type θ) reflecting the fact that higher loan disbursements are anticipated when more lenient bureaucrats are appointed, conditional on $r > 0$. Finally investor valuations are also increasing in the perceived preference of the principal since this also contributes to a higher expected loan conditional on crisis. We make several further assumptions reflecting the impacts of delegation on investor beliefs: $V_{11} < 0$ and $\lim_{r \rightarrow 0} V_2 = 0$.¹¹ These assumptions ensure that the investor

¹⁰Implicitly we draw on the logic of Rogoff (1985) in assuming that principals select bureaucrats more conservative than themselves in order to resolve the moral hazard induced by the availability of IMF financing. Formally $\max_r l(1, \omega, r) = \omega$ for any $r \geq 0$.

¹¹We allow for the possibility that the internal workings of the IMF are not fully observable to investors thus the dependence of V on θ , $\hat{\omega}$, and r may take a different form than $l(\theta, \omega, r)$ as is the case for the principal and member state.

perceives decreasing returns to scale in the value of economic reform and that - as in the case of $l(\theta, \omega, r)$ - as credibility approaches zero, the impact of the bureaucrat's type on investor valuations also approaches zero.

We note that the principal's equilibrium choice of θ may depend on the realization of ω and thus reveal information about the state of the world to investors. Where this is the case, $\hat{\omega}$ will reflect beliefs updated via Bayes' Rule. The probability of crisis at any given time is $\gamma(x, V(x, \theta, \hat{\omega}))$, where γ is a mapping, $\gamma : \mathbb{R}^+ \times \mathbb{R}^+ \rightarrow [0, 1]$. We make the following assumptions on the probability function: $\gamma_1 < 0$, $\gamma_2 < 0$, $\gamma_{11} > 0$, and $\gamma_{22} > 0$. The probability of crisis is decreasing in the degree of reform adopted by the member state and similarly in the confidence of the representative investor.

Turning to the member state's incentives, economic reforms induce political costs to the member state government according to continuously differentiable mapping, $\phi : \mathbb{R}^+ \rightarrow \mathbb{R}^+$, where $\phi' > 0$ and $\phi'' > 0$. The member state balances the costs of reform against the expected losses induced by economic crisis. We represent these losses by $u_m(l(\theta, \omega, r), P)$. For any loan disbursement, $l(\theta, \omega, r)$, crisis has a net negative impact on member state utility: $0 > u_m$ for any parameter values. The member state's expected loss from crisis depends on the anticipated loan in case a crisis is realized and a second parameter, $P > 0$, which represents the costs induced by long-term loss of market confidence. No matter the loan agreed by the IMF, crisis produces long-term losses for the member state. Let $u_{m,1} > 0$ and $u_{m,2} < 0$: the losses associated with crisis are decreasing in the size of the IMF's disbursement, but decreasing in the degree of long-term reputational damage, P . Taking into account the probability of crisis, member state expected utility is

$$U^m = \gamma(x, V(x, \theta, \hat{\omega}))u_m(l(\theta, \omega, r), P) - \phi(x)$$

Finally, consider the preferences of the principal. As in the case of the member state, the costs incurred by a crisis are strictly negative and depend on the realized loan size, the optimal loan size (from the principal's perspective), and an exogenous parameter $D > 0$ representing the non-monetary long-run costs of crisis to the principal. The principal's expected utility is,

$$U^P = \gamma(x, V(x, \theta, \hat{\omega}))u_P(l(\theta, \omega, r), \omega, D)$$

where we assume $u_{P,1} > 0$, $u_{P,2} < 0$, $u_{p,3} < 0$, and $u_{P,1,2} > 0$. These assumptions ensure that the principal's utility is increasing in the size of the loan disbursement in case of crisis, but decreasing in both the principal's preferred loan size and the long-run costs of crisis. The last assumption ensures that the marginal impact of the IMF's equilibrium disbursement on the principal's welfare is increasing in the principal's ideal loan, ω . This reflects the idea that ω

may reflect not only underlying economic fundamentals, but also political affinity between the principal and member state or any other source of bias in the principal’s evaluation of the costs of crisis.

The sequence of events is as follows. Following realization of ω , the principal appoints a bureaucrat of type θ . After observing θ , the member state selects an optimal level of reform, x . Following this, crisis is realized or not, and the IMF disburses a loan according to $l(\theta, \omega, r)$. Investors update beliefs according to Bayes’ Rule continuously through the game. For our analysis we focus on characterizing investor beliefs following the announcement of θ in keeping with our empirical design below. We refer to these beliefs as investor interim beliefs. At times we also refer to investor *ex ante* or *ex post* beliefs defined respectively as those prior to the principal’s choice of bureaucrat and those following the member state’s choice of reform respectively.

The equilibrium concept is Bayesian Perfect Equilibrium, requiring that investor beliefs about ω are derived according to Bayes’ rule on the equilibrium path and that the actions of other players are sequentially rational given these beliefs. Importantly the presence of investor uncertainty transforms the game from one of simple moral hazard between the principal and member state into a signalling game with lying costs.¹² The presence of an imperfectly informed investor induces audience costs for the principal. Appointment of a hawkish bureaucrat could solve the moral hazard problem by committing to a small disbursement in case of crisis and thereby inducing the member state to embrace reform efforts. But doing so in full view of investors incurs the cost of worsening market anxieties in proportion to the bureaucrat’s hawkishness. Kartik (2009) establishes the impossibility of a fully separating equilibrium in a general model of signalling with costs of dissimulation. Accordingly we focus in the present work on characterizing semi-separating and pooling equilibria.¹³ A strategy for the principal is given by $\mu : \Omega \rightarrow \Theta$. A strategy for the member state is, $x : \Omega \times \Theta \rightarrow \mathbb{R}^+$.

Analysis

We begin by describing equilibrium behavior when information transmission is possible.¹⁴

¹²See Kartik, Navin. “Strategic communication with lying costs.” *Review of Economic Studies*. 76(4):1359-1395, 2009.

¹³Kartik (2009) also shows that every semi-separating equilibrium of a general signalling game with lying costs converges to a pooling equilibrium as costs increase. Our analysis below yields a similar result.

¹⁴Appendix A provides a formal characterization of equilibrium strategies as well as proofs of all Propositions stated below.

Proposition 1 (Equilibrium Characterization). *Let $r > 0$. Then Γ^c admits a semi-separating equilibrium. For some $\bar{\omega} \in (0, 1)$:*

1. *The Member State's choice of x^* is strictly decreasing in θ .*
2. *The Principal's optimal strategy is defined piece wise.*
 - *For $\bar{\omega} > \omega$, μ is one-to-one (perfectly informative), monotone increasing, and continuously differentiable.*
 - *For $\omega \geq \bar{\omega}$, the principal's optimal choice is $\mu(\omega) = 1$ (no information transmission).*
3. *Investor interim beliefs are,*

$$\hat{\omega} = \begin{cases} \omega & \text{if } \bar{\omega} > \omega \\ \frac{1}{1-F(\bar{\omega})} \int_{\bar{\omega}}^1 t dF(t) & \text{otherwise} \end{cases} \quad (1)$$

Note that when delegation is at least somewhat credible - i.e. the bureaucrat is invested with influence over policy making - equilibrium selection of the bureaucrat's type described in Proposition 1 must balance several (potentially competing) direct and indirect effects. θ exercises a *direct* effect on the member state's choice of policy reform and on investor (interim) beliefs about the likely level of IMF financing in case crisis occurs. θ also *indirectly* affects both investor (interim) valuations and the member state's choice of policy reform since both are influenced respectively by the direct effects just described: the member's state's optimal reform choice reflects anticipated investor valuations while investor valuations simultaneously reflect the direct effect of bureaucratic appointments on member state efforts at reform.

To provide a concise intuition, we momentarily set aside the indirect effects just described and consider only the direct impact of θ on policy reform and investor valuation. Choosing a higher bureaucratic type signals to investors that the IMF will provide generous levels of finance in case of crisis. This reassures investors, increasing their interim valuation and reducing the probability of crisis. On the other hand, a higher value of θ signals the same to the member state - that generous IMF financing will be made available in case of crisis - reducing that member's incentive to reform. This has the opposite effect of increasing the probability of crisis.

In contrast to a simple game of cheap talk in which the principal would have no credible way of signalling its intentions to markets, the offsetting effect of reducing member state incentives to reform renders higher signals more costly to the principal. In equilibrium the principal selects the bureaucrat's type so that the marginal gain from inflating investor valuations is exactly offset

by the marginal cost of reducing member state incentives to reform. Proposition 1 establishes that this same intuition holds when taking into account the indirect effects described above, that is the inter-dependent nature of investor perceptions and member state reform efforts.

Crucially Proposition 1 hinges on the existence of a threshold $\bar{\omega}$: only principals with types below this threshold are willing to bear the costs of delegation in equilibrium. Doing so enables the principal to achieve an optimal balance of induced reform in member states and reassurance of market actors. The cost of doing so is a loss of bargaining power - or otherwise control over the loan outcome - in case crisis materializes. High type principals - those who are especially invested in the outcome of the crisis or well being of the member state - will be unwilling to bear the costs of delegation even if doing so could achieve hoped for economic reform on the part of the borrower state.

Note that this equilibrium occurs only where institutional delegation is credible ($r > 0$). Yet Principals with $\omega > \bar{\omega}$ are able to circumvent this delegation by selecting a bureaucrat with preferences identical to their own ($\theta = 1$). Nevertheless even this decision conveys information to market actors. Since all types above the threshold $\bar{\omega}$ adopt the same equilibrium strategy, the information embedded in this signal is weaker and imprecise. Investors will update beliefs, but only so imprecisely.

Next we consider equilibrium behavior as the level of delegation approaches zero. Proposition 2 establishes that as $r \rightarrow 0$ no information transmission is possible.

Proposition 2 (Convergence to Pooling Equilibrium). *As $r \rightarrow 0$ every semi-separating equilibrium converges to a pooling equilibrium in which $\theta^* = 1$. Investor interim beliefs are,*

$$\hat{\omega} = \int_0^1 t dF(t)$$

When delegation is no longer guaranteed by the institutional setting, the choice of bureaucrat exerts no influence whatsoever on expected IMF financing. In turn it exerts no influence on member states' incentives to reform. This reduces the cost of selecting higher bureaucratic types while also reducing the informativeness of this selection. In the limit, information transmission collapses and bureaucratic appointments are no more than cheap talk. At the same time, the member state's reform efforts are no longer influenced by the bureaucratic type. Thus when delegation is not credible investor valuations will reflect neither information transmission nor changes in the expected level of member state reform. Corollary 1 establishes this formally: in the absence of credible delegation, the selection of bureaucrats exerts no equilibrium impact on investor valuations.

Corollary 1 (Irresponsiveness of Equilibrium Beliefs). *As $r \rightarrow 0$, the investor's interim beliefs converge to her ex ante beliefs.*

This result provides a basis for our empirical test below. By Proposition 1, if delegation is credible, then bureaucratic appointments result in shifts in investor valuations (HA). In turn if bureaucratic appointments produce no discernable shift in investor valuations, then we conclude that there is no evidence of credible delegation (H0).

Leveraging the equilibrium characterization in Proposition 1 we can characterize the change in investor beliefs following any announcement of bureaucratic appointments. Doing so is valuable as it makes clear precisely what can and cannot be inferred from the empirical results below. Suppose $r > 0$. The change in investor valuations following the appointment of a bureaucrat of type θ is,

$$\Delta^\theta = V^{ExAnte}(\mathbb{E}_F[x^*|\mu(\omega), \omega], \mathbb{E}_F[\mu(\omega)], \mathbb{E}_F[\omega]) - V^{Interim}(\mathbb{E}_{F|\theta^*}[x^*|\theta^*, \omega], \theta^*, \mathbb{E}_{F|\theta^*}\omega) \quad (2)$$

The selection of θ impacts this quantity firstly by shifting investor beliefs from F to $F|\theta^*$ and secondarily by eliminating uncertainty as to the realization of θ^* itself. While our analysis below estimates the value of Δ_0 for a series of individual appointments, our estimates cannot disentangle the relative effect of changes in investor beliefs about F - the distribution of principal types - from newfound certainty about the principal's choice θ . That is, positive changes in market valuation do not (only) imply added certainty stemming from the appointment of a comparatively lenient bureaucrat; they also (potentially) imply new assessments of the principal's own preferred policy.

Relation of Analytical Results to Empirical Estimand

4.1 Relation to Analytical Results

We next establish that the standard market model precisely recovers the quantity of interest, δ_0 , derived from the formal analysis above. Index countries by $i = 1, 2, \dots, N$ and time periods by $t = \dots, -2, -1, 0, 1, 2, \dots$. We normalize time so that $t = 0$ corresponds to the announcement of a new bureaucratic appointment relevant to country i . Let $\alpha_{i,0}$ denote time invariant factors prior to announcement of the type θ , that is for all periods, $t < 0$. The parameter $\alpha_{i,0}$ thus incorporates investors' *ex ante* beliefs and expectations. Let $\mathbf{X}_{i,t}$ be a vector of time-varying factors which also influence investor valuations. We assume that *ex ante* valuations of country

i 's perceived risk take the following form,

$$V_{i,0} = \alpha_{i,0} + \mathbf{X}_{i,t}\boldsymbol{\beta}_i + \epsilon_{i,t}$$

where $\boldsymbol{\beta}_i$ is a coefficient vector and $\epsilon_{i,t}$ is an exogenous shock distributed normally with mean zero and variance σ^2 .

Now, consider investor *interim* beliefs. Again, these can be decomposed into the *ex ante* time-invariant component $\alpha_{i,0}$, a shift parameter, $\alpha_{i,1}$ representing the change in investor beliefs and expectations as well as and time-varying factors $\mathbf{X}_{i,t}$. *Interim* valuations then take the form,

$$V_{i,1} = \alpha_{i,0} + \alpha_{i,1} + \mathbf{X}_{i,t}\boldsymbol{\beta}_i + \epsilon_{i,t}$$

where each element of $\boldsymbol{\beta}_i$ is assumed constant across time. With these expressions in hand, we can characterize the change in investor valuations attributable to the bureaucratic appointment,

$$\Delta_0 = \alpha_{i,1} = V_{i,1} - \alpha_{i,0} - \mathbf{X}_{i,t}\boldsymbol{\beta}_i - \epsilon_{i,t}$$

The above equation directly corresponds to the standard “market model” frequently employed in the context of event studies. To see this, note that the expression can also be written in terms of the predicted value of sovereign risk employing estimates of $\alpha_{i,0}$ and $\boldsymbol{\beta}_i$ from the pre-announcement period,

$$\Delta_0 = \alpha_{i,1} = V_{i,1} - \hat{V}_{i,1} - \epsilon_{i,1}$$

where $\hat{V}_{i,1} = \hat{\alpha}_{i,0} + \mathbf{X}_{i,t}\hat{\boldsymbol{\beta}}_i$

Proofs

Proof of Proposition 1

Proof. For (1) the Member State's problem is,

$$\max_{x \in \mathbb{R}} \gamma(x, v(x, \theta, \hat{\omega})) u_m(l(\theta, \omega, r), P) - \phi(x)$$

Re-arranging the first order condition yields,

$$\phi'(x^*) = [\gamma_1(x^*, v(x^*, \theta, \hat{\omega})) + \gamma_2(x^*, v(x^*, \theta, \hat{\omega})) [v_1(x^*, \theta, \hat{\omega})]] u_m(l(\theta, \omega, r), P) \quad (3)$$

Note that the solution is well-defined since ϕ' and $V_1 > 0$, while u_m , γ_1 , and $\gamma_2 < 0$.

Optimality is confirmed via the second order condition,

$$u_m(l(\theta, \omega, r), P) [\gamma_{11}(x, v(x, \theta, \hat{\omega})) + \gamma_{22}(x, v(x, \theta, \hat{\omega}))V_1(x, \theta, \hat{\omega}) + \gamma_2(x, v(x, \theta, \hat{\omega}))V_{11}(x, \theta, \hat{\omega})] - \phi''(x)$$

which is strictly negative by the assumptions on u_m , γ , V , and ϕ . The next step of the analysis relies on the following lemma.

Lemma 1. $0 \geq \frac{dx^*}{d\theta}$

For (2), the principal's problem is,

$$\max_{\theta \in [0,1]} \gamma(x, v(x, \theta, \hat{\omega}))u_p(l(\theta, \omega, r), \omega, D)$$

Note that when $\hat{\omega} > \omega$, the strategy $\mu : [0, \bar{\omega}] \rightarrow [0, 1]$ is one-to-one and invertible, implying investor equilibrium beliefs $\hat{\omega} = \omega$. By equilibrium hypothesis, the Principal's first order condition can be written,

$$0 = \gamma(x, v(x, \theta^*, \omega))u_{p1}(l(\theta^*, \omega, r), \omega, D)l_1(\theta^*, \omega, r) + u_p(l(\theta^*, \omega, r), \omega, D) \times \left[\gamma_1(x, v(x, \theta^*, \omega)) \frac{dx}{d\theta} \gamma_2(x, V(x, \theta^*, \omega)) \left[V_1(x, \theta^*, \omega) \frac{dx}{d\theta} + V_2(x, \theta^*, \omega) + V_3(x, \theta^*, \omega) [\mu^{-1}(\theta^*)]' \right] \right]$$

Noting that $\theta^* = \mu(\omega)$ and $[\mu^{-1}(\theta)]' = [\mu'(\omega)]^{-1}$ we can re-write the optimal equilibrium strategy in the form of the following ordinary differential equation,

$$\mu'(\omega) = - \frac{u_p(l(\mu(\omega), \omega, r), \omega, D)\gamma_2(x, V(x, \mu(\omega), \omega))V_3(x, \mu(\omega), \omega)}{\Delta} \quad (4)$$

where,

$$\Delta \equiv \gamma(x, V(x, \mu(\omega), \omega))u_{p1}(l(\mu(\omega), \omega, r), \omega, D)l_1(\mu(\omega), r, \omega) + u_p(l(\mu(\omega), \omega, r), \omega, D) \times \left[\gamma_1(x, V(x, \mu(\omega), \omega)) \frac{dx}{d\mu(\omega)} + \gamma_2(x, V(x, \mu(\omega), \omega)) \left[V_1(x, \mu(\omega), \omega) \frac{dx}{d\mu(\omega)} + V_2(x, \mu(\omega), \omega) \right] \right]$$

Note that the numerator in (4) corresponds to the marginal gain from signalling a higher type and is strictly positive. A sufficient condition for μ to be monotone increasing is simply $0 > \Delta$.

Finally, define $\bar{\omega}$ by the indifference condition,

$$\begin{aligned} & \gamma(x^*(\mu(\bar{\omega})), V(x^*(\mu(\bar{\omega})), \mu(\bar{\omega}), \bar{\omega})) u_p(l(\mu(\bar{\omega}), \bar{\omega}, r), \bar{\omega}, D) \\ & \qquad \qquad \qquad = \\ & \gamma\left(x^*(1), V\left(x^*(1), 1, \int_{\bar{\omega}}^1 tdFt\right)\right) u_p(l(1, \bar{\omega}, r), \bar{\omega}, D) \end{aligned} \tag{5}$$

Investor interim beliefs follow directly from Bayes' rule. \square

Proof of Proposition 2

Proof. For the first part, note that as $r \rightarrow 0$, $l(\theta, \omega, r)$ increases but cannot exceed ω . Thus the numerator in (4) is increasing in r but bounded above.¹⁵ At the same time,

$$\lim_{r \rightarrow 0} \Delta = 0$$

implies $\mu'(\omega) \rightarrow \infty$ and $\bar{\omega} \rightarrow 0$. The second part follows from the characterization of beliefs in Proposition 1. \square

Proof of Proposition 3

Proof. Recalling that investors update beliefs continuously throughout the game, consider the difference between investor beliefs prior to, and immediately following, the announcement of θ . Prior to the announcement, beliefs are,

$$V^{t-1}(\mathbb{E}_{\Omega}[\mathbb{E}_{\Theta}[\mathbb{E}[x|\theta, \omega]|\omega]], \mathbb{E}_{\Omega}[\mathbb{E}[\theta|\omega]], \mathbb{E}_{\Omega}[\omega]) \tag{6}$$

or by the law of iterated expectations,

$$V^{t-1}(\mathbb{E}[x], \mathbb{E}_{\Theta}[\theta], \mathbb{E}_{\Omega}[\omega]) \tag{7}$$

Similarly, beliefs following the revelation of θ are,

$$V^t(x^*, \theta^*, \omega) \quad \text{if } \bar{\omega} > \omega \tag{8}$$

$$V^t(\mathbb{E}[x|\theta = 1, \omega \in [\bar{\omega}, 1]], 1, \mathbb{E}[\omega|\omega \in [\bar{\omega}, 1]]) \quad \text{otherwise.} \tag{9}$$

¹⁵ γ_2 and V_2 remain unaffected by changes in r .

As $r \rightarrow 0$, $\bar{\omega} \rightarrow 0$ by Proposition 2. Thus the change in beliefs approaches,

$$V^{t-1}(\mathbb{E}[x], \mathbb{E}_\Theta[\theta], \mathbb{E}_\Omega[\omega]) - V^t(\mathbb{E}[x|\theta = 1, \omega \in [0, 1]], 1, \mathbb{E}[\omega|\omega \in [0, 1]])$$

or,

$$V^{t-1}(\mathbb{E}[x], \mathbb{E}_\Theta[\theta], \mathbb{E}_\Omega[\omega]) - V^t(\mathbb{E}[x|\theta = 1], 1, \mathbb{E}_\Omega[\omega])$$

But note that by Lemma 1, as $r \rightarrow 0$, it must be $\frac{dx}{d\theta} \rightarrow 0$ since $l_1 \rightarrow 0$. Finally since θ has direct bearing on policy, it must be that $V(x, \theta, \omega) = V(x, 1, \omega)$ for any pair (x, ω) . Finally we can write the difference in beliefs as $r \rightarrow 0$,

$$V^{t-1}(\mathbb{E}[x], 1, \mathbb{E}_\Omega[\omega]) - V^t(\mathbb{E}[x], 1, \mathbb{E}_\Omega[\omega]) = 0 \tag{10}$$

□

Appendix B: Additional Figures and Tables

Table 1: IMF Senior Staff Appointments, 1990-2016

Department	Director	Announcement Date	In Sample?
European II	John Odling-Smee	9-Jan-92	No
Middle Eastern	Paul Chabrier	20-Nov-92	No
African	Evangelos Calamitsis	5-Oct-94	No
Western Hemisphere	Claudio Loser	5-Oct-94	No
Asia Pacific	Hubert Neiss	6-Dec-96	Yes
European I	Michael Deppler	6-Feb-97	Yes
African	G.E. Gondwe	8-Dec-98	No
Asia Pacific	Yusuke Horiguchi	28-Jan-00	Yes
African	Abdoulaye Bio Tchane	10-Jan-02	No
Middle Eastern	George Abed	10-Apr-02	No
Western Hemisphere	Anoop Singh	10-Jun-02	No
Asia Pacific	David Burton	30-Sep-02	Yes
Middle East and Central Asia	Mohsin Khan	30-Jul-03	Yes
Asia Pacific	Anoop Singh	1-May-08	Yes
Middle East and Central Asia	Masood Ahmed	1-May-08	No
African	Antoinette Sayeh	27-May-08	No
European	Marek Belka	15-Jul-08	Yes
Western Hemisphere	Nicolas Eyzaguirre	27-Aug-08	Yes
European	Antonio Borges	26-Oct-10	Yes
European	Reza Moghadam	16-Nov-11	Yes
Western Hemisphere	Alejandro Werner	6-Nov-12	Yes
Asia Pacific	Changyong Rhee	26-Nov-13	Yes
European	Poul Thomsen	3-Nov-14	Yes
African	Abebe Aemro Selassie	15-Sep-16	Yes
Middle East and Central Asia	Jihad Azour	1-Dec-16	Yes

Announcement of new senior staff appointments 1990 - 2018. *Announcement Date* refers to the date of IMF press release detailing the appointment of a new director. Gray indicates those events dropped from the analysis due to data limitations.

Appendix C: Background on Quota Reforms

Above we provided evidence of the substantive significance of the estimated shifts in risk premia by comparing the results above with those corresponding to changes in the IMF's formal governance structure. Here we provide additional background on the Quota and Voice and Quota and Government Reforms, two packages of IMF reform intended to increase the representation

Table 2: **CAAR Permutation Test**

Staff Name	p event (0, 1)	p event (0, 5)
Azour	0.010	0.010
Belka	0.110	0.150
Borges	0.010	0.090
Burton	0.020	0.120
Deppler	0.010	0.040
Eyzaguirre	0.040	0.120
Horiguchi	0.010	0.070
Moghadam	0.010	0.010
Neiss	0.130	0.150
Rhee	0.060	0.140
Sayeh	0.020	0.120
Selassie	0.040	0.120
Singh	0.010	0.010
Tchane	0.010	0.060
Thomsen	0.040	0.120
Werner	0.010	0.010

Note: Proportion of permutations with a CAAR as large as the true CAAR computed from the observed data. P refers to the p-value under the null hypothesis and represents the proportion of permutations with a CAAR as large in magnitude as the observed CAAR. Bolded area department head appointments indicate a p-value lower than 0.05.

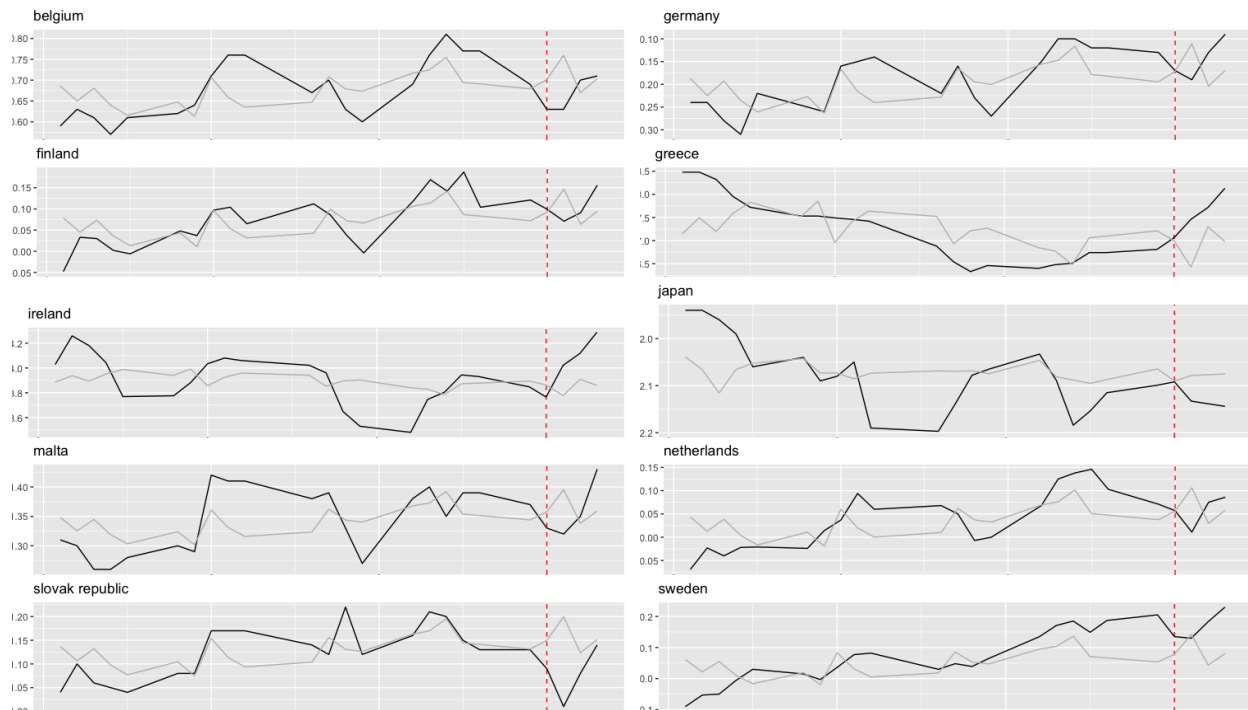


Figure 3: **Country Trends.** Raw risk premia trends following the announcement that Antonio Borges would be appointed director of the European Department. Plots depict estimation window $(-30, -5)$ and event window $(0, 5)$.

of emerging economies in Fund decision making. These reforms reflect a growing consensus that the representation of countries such as Brazil, China, and Mexico have not kept pace with their growing contribution to the global economy. As noted above, we consider two milestones in the reform process: first, the entry into force of the Voice and Participation Amendment and second, passage of legislation by the United States Congress approving reforms to IMF quota allocations.

First, the Voice and Participation Amendment modified Article XII, Section 5(a), changing how basic votes are allocated among IMF member states. This shifted vote allocation from a fixed number of 250 basic votes to 5.502% of total voting power. The amendment was meant to ensure that “the ratio of total basic votes in total voting power [was] not eroded by quota increases.”¹⁶

Second, in order for the Quota and Government reforms to take effect, the IMF requires official approval from at least three fifths of IMF member countries, accounting for at least 85% of the total vote share. Since the U.S. alone holds over 15% of total votes, its authorization of the reforms was a key prerequisite for enactment. While the Obama administration included requests for authorization for the reforms in its budget requests for several years running, up

¹⁶See IMF Report SM/11/44, March 3, 2011 for more details.

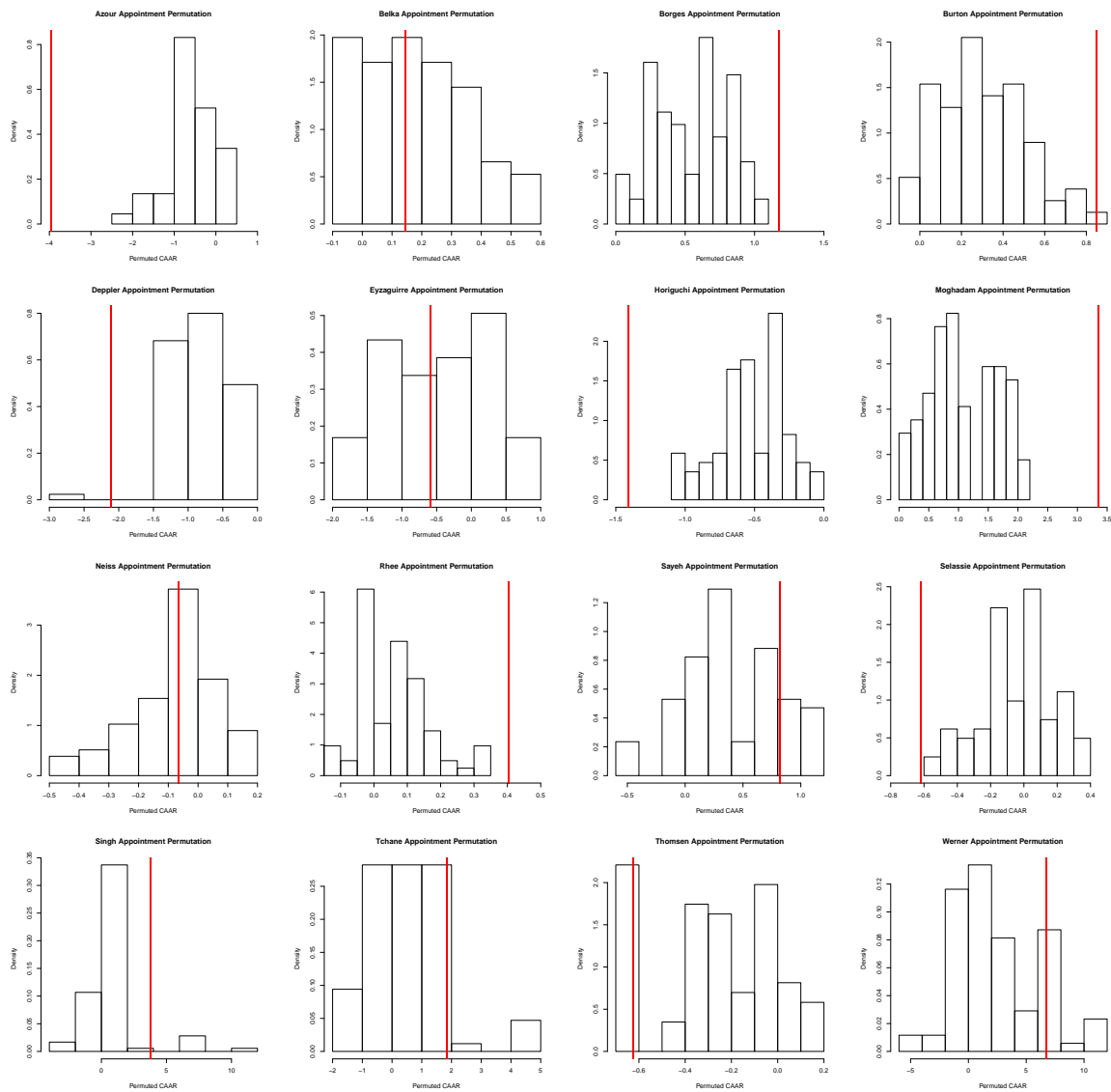


Figure 4: **Histogram of CAAR Under Permutation Test.** Red vertical lines indicate the true CAAR value under observed data, plotted against histograms of shuffled CAAR for each area director appointment event.

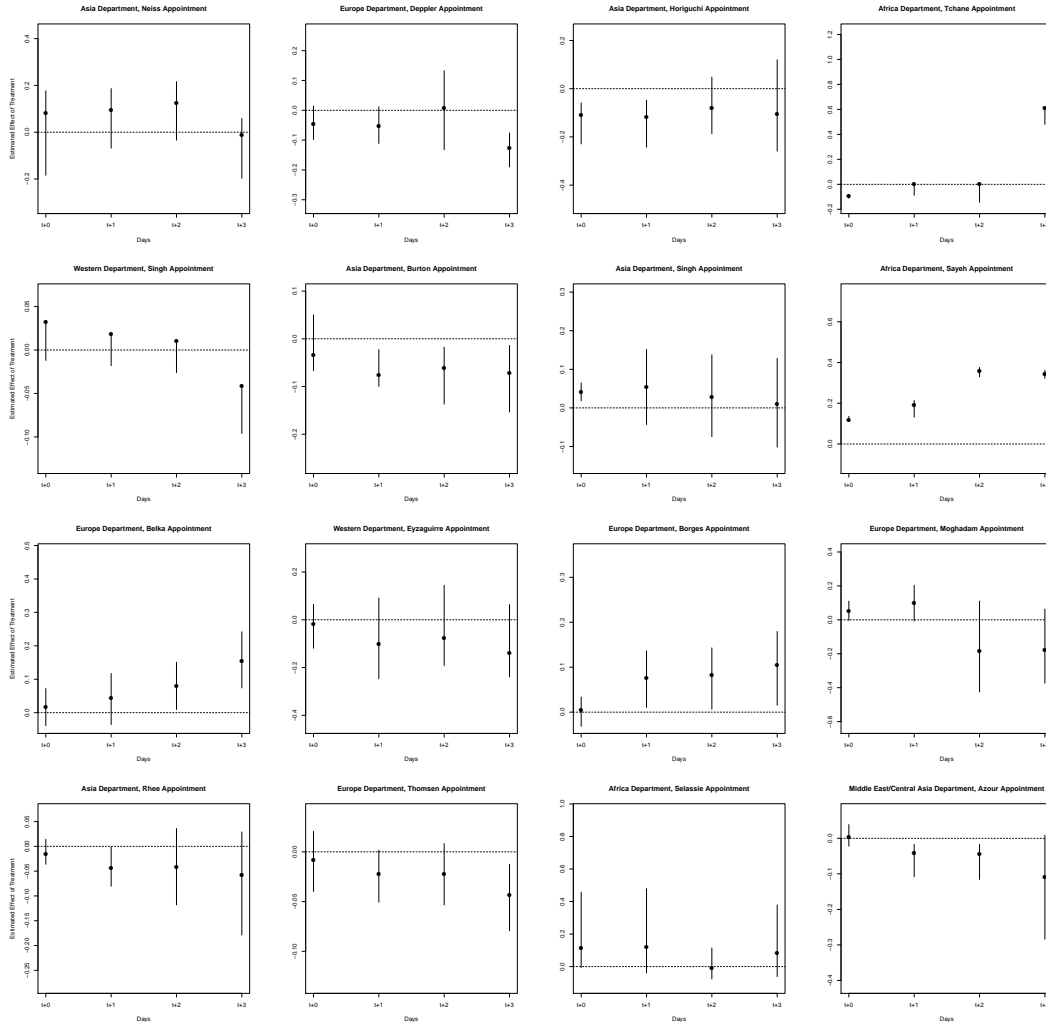


Figure 5: **Estimated Average Treatment on the Treated For Each Area Director Appointment.** Estimated effects are shown for a period of 3 days after an area department head appointment, with 95% bootstrapped confidence intervals. Here we use Covariate Balance Propensity Score Weighting.

until 2015 there was little sign of progress.¹⁷ At least as late as October 2015 U.S. Treasury officials indicated that the rule would remain in place. Officials relented and agreed to remove the rule only at the 11th hour in time for last-minute inclusion of the necessary language in the 2016 appropriations legislation. Congressional leaders announced that authorization would be included on December 16, just two days before the bill was passed in Congress.¹⁸

¹⁷Nelson, Rebecca M. and Martin A. Weiss. “IMF reforms: Issues for Congress.” *CRS Report No. R42844, 2015.*

¹⁸See Talley, Ian “How Congress finally passed imf governance overhauls, five years after the deal was signed.” *Wall Street Journal*, Jan 4, 2016.

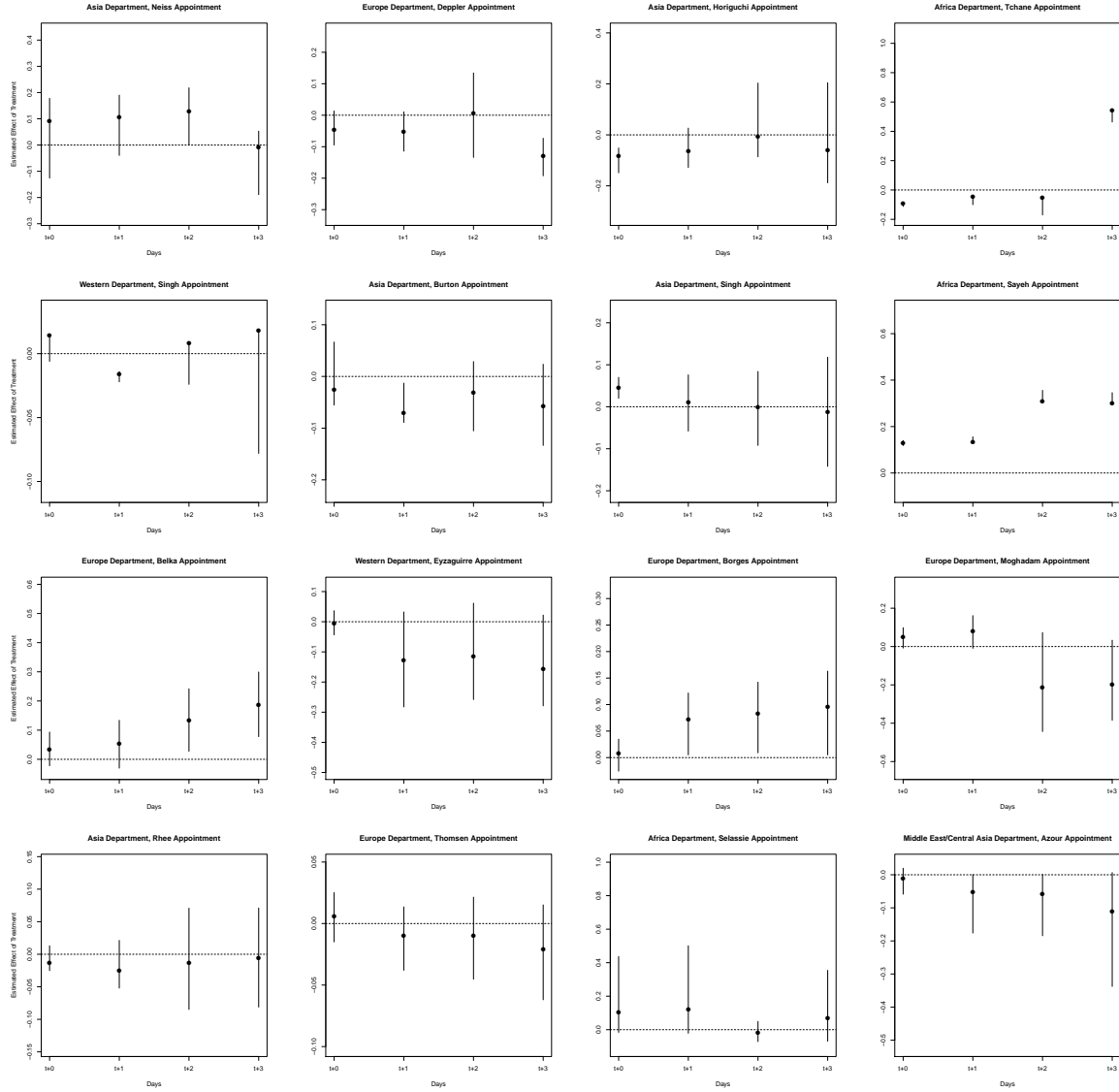


Figure 6: **Estimated Average Treatment on the Treated For Each Area Director Appointment.** Estimated effects are shown for a period of 3 days after an area department head appointment, with 95% bootstrapped confidence intervals. Here we use Mahalanobis Distance Matching.