

---

# Information transmission within federal fiscal architectures: theory and evidence

By Axel Dreher<sup>a</sup>, Kai Gehring<sup>b</sup>, Christos Kotsogiannis<sup>c</sup>  
and Silvia Marchesi<sup>d</sup>

<sup>a</sup>Heidelberg University; e-mail: mail@axel-dreher.de

<sup>b</sup>University of Zurich; e-mail: mail@kai-gehring.net

<sup>c</sup>University of Exeter; e-mail: c.kotsogiannis@exeter.ac.uk

<sup>d</sup>Department of Economics, University of Milano Bicocca, Piazza dell'Ateneo Nuovo 1, 20126 Milan, Italy; e-mail: silvia.marchesi@unimib.it

## Abstract

This paper explores the role of information transmission and misaligned interests across levels of governments in explaining variation in the degree of decentralization across countries. We analyse two alternative policy-decision schemes—'decentralization' and 'centralization'—within a two-sided incomplete information principal-agent framework. The quality of communication depends on the conflict of interests between the government levels and on which government level controls the degree of decentralization. We show that the extent of misaligned interests and the relative importance of local and central government knowledge affect the optimal choice of policy-decision schemes. Our empirical analysis confirms that countries' choices depend on the relative importance of private information. In line with our theory the results differ significantly between unitary and federal countries.

**JEL classifications:** H70, H77, D82, D83, C23.

---

## 1. Introduction

Decentralization, or federalism, allocates responsibilities over policies across different levels of government. With responsibilities over policy divided, the effective transmission of information between government levels is crucial. When the interests of government levels are misaligned, transmission is noisy. In this paper, we identify the optimal degree of decentralization in such a setting. We use a two-sided incomplete information principal-agent framework, in which the transmission of information between local and federal governments is 'soft' and cannot be verified. Whenever the interests of the two government levels differ, the quality of the transmitted information depends on such conflicts of interest, with each level of government rationally expecting the information transmitted by the other level to be distorted (cheap talk game). We compare two types of incentive structures, relative to the quality of the transmitted information: 'centralization' and 'decentralization'. Under

centralization the control rights over policies are assigned to the federal government, whereas under decentralization the local governments control policies.

Delegation of decision-making (by either the federal or the local governments) to the other level can be optimal for each government depending on the relative importance of private knowledge. The federal government might opt for delegating policies to the local government in order to be able to fully utilize local knowledge. In equilibrium, the federal government's own information will then only be partially exploited. Under centralization, conversely, the federal government's knowledge will be fully utilized and any deviation from its preferences (due to the local government's reporting bias) will be avoided, at the cost of not fully using local information. Therefore, the optimal allocation of control rights over policies will depend on the relative importance of both levels' information, as well as on the size of the agency bias, which simultaneously affects the amount of information transmitted and the degree of (de-)centralization chosen. What is more, we show not only that 'communication' is important in determining decentralization, but also that institutional differences can explain the different impact that private information of government levels may have.

We relate to several strands of literature.<sup>1</sup> The first is the cheap-talk literature building on the seminal work by Crawford and Sobel (1982), who consider the conflict of interests between the owner of a firm and its managers (see, for example, Dessein, 2002) or between the CEO and its division managers (as in Harris and Raviv, 2005). The second strand of literature emphasizes political incentives (as in, among others, Bordignon *et al.*, 2001; Lockwood, 2002; Kotsogiannis and Schwager, 2008) within a decentralized system of governments. Most recently, Kessler (2014) analysed the public spending decisions of a legislature when legislators engage in truthful information transmission. Assuming that only local governments have an informational advantage, Kessler (2014) finds that misaligned interests between government levels make communication incomplete, which leads to inefficiencies in federal spending decisions. Like Kessler (2014), we analyse challenges of communication in a decentralized economy. However, we focus on communication between a (representative) local and a federal government and the analysis of which level should, optimally, have control over policies when private information is two-sided.

Third, we also relate to the literature on state formation and state development (see Bardhan, 2016) as well as to the emerging literature on the structure of unions of political entities (e.g. Alesina *et al.*, 2005 and Gehring and Schneider 2016). Similar to Alesina *et al.*, we consider the trade-off between the benefits from economies of scale and the internalization of externalities versus the costs of combining heterogeneous populations and the limited use of local private information. While this literature endogenizes the boundaries of jurisdictions (Alesina and Spolaore, 2003) and the decision to become members of international unions (Alesina *et al.*, 2005), we take the latter as given and endogenize the allocation of policy control between the local and the central level.<sup>2</sup>

- 1 Closest to our contribution, Hooghe and Marks (2013) show that even with no heterogeneity of preferences across localities, more populous countries tend to be more decentralized. This is because public good provision depends on soft information, which increases with population size and is difficult to standardize.
- 2 Hatfield and Padró i Miquel (2012) propose a positive theory of (partial) decentralization in which decentralization should balance the need for redistribution with the need to avoid highly distortive

Finally, the contribution of this paper is also empirical.<sup>3</sup> We demonstrate the empirical relevance of our model in a cross-sectional panel analysis of sub-national expenditure decisions over the 1972–2010 period. The empirical analysis yields results in line with the theoretical prediction of our model. The relative importance of local and federal information as well as the bias between national and sub-national governments helps to explain the degree of decentralization. As predicted, the results differ according to whether the federal or the local governments have the right to decide on the share of subnational expenditures.

## 2. Modelling communication between government levels

The framework relies on the model of [Marchesi et al. \(2011\)](#), which we modify to be applicable to analyse federalism. We distinguish between two regimes according to which government level has the decision power at the beginning of the game (which we call ‘the principal’), as determined by the constitution of the country.<sup>4</sup>

When the *status quo* is a unitary country, the federal government is the principal with the final decision rights or veto powers on whether or not to delegate decision-making power to the local governments (e.g. in France, the UK, and Sweden). A unitary system is one in which decision-making may be decentralized, but final authority rests with the centre. Conversely, a federal system (e.g. in the USA, Canada, and Switzerland) disperses authority between ‘regional governments and a central government in such a way that each kind of government has some activities on which it makes final decisions’ ([Riker, 1987](#)). Most importantly, regions or their representatives can veto constitutional reform. This distinction across regimes will become crucial when taking the theoretical predictions to the data.

To analyse whether the federal (local) government has an incentive to delegate the control of decision-making to the local (federal) governments we focus on the central aspects of the model to derive our hypotheses. For reasons of clarity, all detailed derivations and proofs are delegated to the Online Appendix.<sup>5</sup> The model features two players—federal and local governments—that possess different types of information both required for the optimal design of policies. The optimal policy is defined by  $p^* = l + f$ , where  $l$  and  $f$  are stochastic variables that proxy for information observed only by the local and, respectively, the federal government.  $l$  and  $f$  are independently and uniformly distributed on the intervals  $[0, L]$  and  $[0, F]$ , respectively. This captures that the larger the interval  $[0, L]$  ( $[0, F]$ ), the larger the informational advantage of the local (federal) government.<sup>6</sup>

taxes. They also derive an endogenous federal structure but in their paper federalism is seen as a mechanism for commitment rather than ‘information disclosure’.

- 3 Following [Oates \(1972\)](#), a large number of articles have empirically analysed the determinants of the degree of fiscal decentralization. See [Treisman \(2006\)](#), [Bodman et al. \(2010\)](#), [Blume and Voigt \(2011\)](#), and [Sacchi and Salotti \(2014\)](#) for recent contributions.
- 4 We do not endogenize who the principal is. This would substantially complicate the analysis but provide no additional insights on the questions we are interested in here. Given that we also work with observed constitutional settings in the empirical part, rather than explaining who is the principal, we leave this extension for future research.
- 5 Specifically, Appendix A defines and shows the properties of the communication game, Appendix B derives the *ex ante* expected losses of the federal and local government, while Appendix C contains proofs of the statements made in Sections 4 and 6 below.
- 6 To simplify the analytical setting, we focus on the interaction between a central government and one local government (taken as the ‘representative region’), which is assumed not to cover the

The local government's superior information over  $l$  could, for example, originate from its greater proximity to the 'local business environment' relative to federal government officials or from better knowledge about the risks and opportunities of local investment projects. On the other hand, the federal government's informational advantage, relative to the local government, can originate from several sources. First, country-wide knowledge is accumulated during its activities across the local jurisdictions. Second, the federal government is also likely to possess information with higher informational value about confidential issues such as security or military matters or activities related to the negotiation and implementation of commercial treaties or multilateral activities. Overall, the federal government should therefore be better equipped to take country-wide economic conditions into account. We assume both types of information to be (at least partly) soft.

Events unfold in three stages: allocation of control rights by the principal, communication, and policy implementation.<sup>7</sup> In the first stage, the principal (federal or local government) either allocates authority over the choice of the policy vector to the agent or retains authority. Centralization refers to the scheme in which the federal government decides on the policy vector, whereas under decentralization control rights are allocated to the local governments. After the first stage of the game, the real state of the world is revealed to both players. Then, in the second stage, communication takes place. Under centralization, the local government sends a 'message' to the federal regarding its 'local knowledge'. Upon receiving the message, the federal government updates its beliefs and chooses the policy vector. Under decentralization, the federal government sends a message to the local government concerning its private knowledge. In this case, the local government updates its beliefs and chooses the policy vector. Finally, in the third stage, the chosen government level implements the policy vector and outcomes are realized.

The federal government is assumed to maximize the following objective function:

$$U^F = U_0^F - (p - p_F^*)^2. \quad (1)$$

where  $U^F$  decreases with the distance between the actually implemented policy  $p$  and the central government's preferred policy  $p_F^*$ , and  $U_0^F = U^F(p_F^*)$ .<sup>8</sup> The optimal policy of the federal government,  $p_F^*$ , differs from the optimal policy from the regional perspective in the sense that  $p_F^* = p^* + b_F$ , with  $b_F > 0$ . A possible interpretation of  $b_F$  is the existence of externalities created by non-cooperative behaviour on the part of local governments. When choosing policies, local governments do not internalize the impact of their policy actions on their neighbouring localities (for example, when deciding whether or not to provide tertiary education, sharing information potentially useful to national security, regulation, or other

same population as the central government. This allows us to focus on the implications of information transmission for the choice of centralization vs decentralization. A model with multiple regions would not provide additional insights to the issues at hand as data to empirically distinguish the degree of decentralization of different regions within a country do not exist.

- 7 The analytics feature the case in which both levels of government cannot commit to an incentive-compatible decision rule in which the Revelation Principle applies. This assumption fits in well with the specific relationship between a federal and a local government in which the principal cannot use a standard mechanism to elicit private information from the agent.
- 8 The utility function (1) can be derived from a more general objective function  $\hat{U}^F = W(p) + \gamma W^{RC}(p)$ , where  $W$  is the region's welfare and  $W^{RC}$  measures the welfare of the rest of the country. They both depend on the region's policy  $p$ . The parameter  $\gamma$  ( $0 \leq \gamma \leq 1$ ) denotes the importance of spillover effects. Taking a Taylor expansion of  $\hat{U}^F$  up to the second term, one obtains (1).

public goods). This generates a misalignment of interest between the two levels of government relative to the federal government's country-wide objectives.<sup>9</sup>

Similarly, the local government maximizes:

$$U^L = U_0^L - (p - p_L^*)^2, \quad (2)$$

which is decreasing in the distance between the implemented policy  $p$ , and the local government's preferred policy  $p_L^*$ , and  $U_0^L = U^L(p_L^*)$ .<sup>10</sup> The optimal policy choice from the perspective of the local government deviates from the optimal policy  $p^*$  by a factor  $b_L > 0$  and is given by  $p_L^* = p^* - b_L$ .  $b_L$  proxies for all factors that might lead to a deviation of the local government's preferences from  $p^*$ : the pressure of local interest groups, re-election concerns, or different time-horizons.

Therefore, the difference in policies that are optimal from the federal and local governments' perspective is given by:

$$p_F^* - p_L^* = p^* + b_F - (p^* - b_L) = b_F + b_L = B, \quad (3)$$

where  $B$  represents the extent of the agency problem between the federal and the local government.

### 3. Communication equilibria

#### 3.1 Federal government as the principal

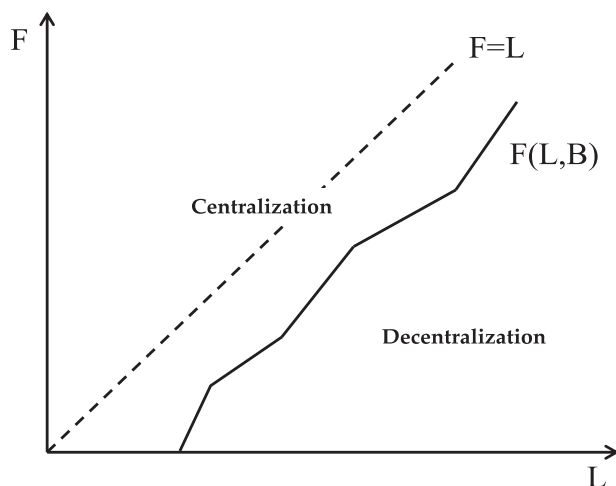
As principal, the federal government can choose between centralization or decentralization. Centralization refers to the case in which the federal government has the final choice over policies it wishes to implement in the third stage. It needs to communicate with the local government in the second stage of the game. Opting for centralization, the federal government minimizes the costs of misaligned incentives as it makes full use of its private knowledge. At the same time, it under-utilizes the local government's information. Under decentralization the federal government allocates policy decision-making to the local government. In this case, the local government's private knowledge is fully exploited, but the results can deviate from the federal government's optimal policy.

In the communication equilibrium *under decentralization* the local government obtains only incomplete information about the federal government's knowledge. More specifically, the state space  $[0, F]$  is partitioned into intervals and the federal government only reveals which interval the true value of  $f$  belongs to. Therefore, the local government chooses policies by using its own private information and taking the average value of  $f$  over the interval  $(f_b, f_{i+1})$ .<sup>11</sup> The smaller the size of the partition interval, the more informative the federal

9 [Lorz and Willman \(2005\)](#) introduce a parameter that is similar to  $b_F$  capturing the importance of externalities in the provision of public goods. More generally, deviations from optimal policy can arise from a number of reasons, such as externalities from sub-national policy decisions, the influence of special interests the federal government takes account of, or personal interests of government members.

10 The more general function is:  $\hat{U}^L = W(p) + \theta C(p)$ , where  $C$  are contributions from special interests groups. We assume that  $C$  decreases with  $p$  and that the parameter  $\theta$  ( $0 \leq \theta \leq 1$ ) denotes the importance of lobbies. Using a Taylor expansion of  $\hat{U}^L(p)$  up to the second term, one obtains (2).

11 Proposition 1 in Appendix A (online) contains more details on the properties of the communication game.



**Fig. 1.** Choice between centralization and decentralization as a function of  $L$  and  $F$  when the federal government is the agenda setter

government's message. We denote the maximum number of intervals,  $N(F, B)$ , as a function of the bias  $B$  and the length of the partition of the federal's knowledge  $F$ . As one would intuitively expect, the maximum precision of the information transmitted by the federal government decreases with the extent of the agency bias  $B$ . Put differently, the extent and quality of information transmission depends on the proximity of the preferences of the federal and the local governments: the larger the bias  $B$ , the less precise and informative cheap talk will be.

Following Crawford and Sobel (1982), the most informative equilibrium—in which the number of intervals  $N$  is maximal—always exists and is a focal equilibrium of the communication game. In the focal equilibrium, the federal government's *ex ante* expected welfare loss increases with the importance of the federal government's private information  $F$ , since the federal government's private information is not fully exploited under decentralization.<sup>12</sup>

On the other hand, *under centralization*, information flows from the local to the federal government. The federal government now fully exploits its own information  $F$  and chooses its preferred policy vector  $p$  in the third stage, after receiving a signal from the local government in the second stage. In this case the federal government sets the policy using its own private information and the average value of  $l$  over the interval  $(l_i, l_{i+1})$ . As centralization results in an underutilization of the local government's information  $L$ , the local government's *ex ante* expected loss is increasing with its informational advantage.<sup>13</sup>

The federal government determines whether or not to retain its control rights over policies by comparing its *ex ante* expected loss under decentralization with its expected loss

12 Equations B.1 and B.2 (in Appendix B) show that the federal government's *ex ante* expected welfare loss increases with the size of the bias  $B$  and the *ex ante* residual variance of  $f(\sigma_f^2)$ , which is in turn increasing in  $F$ .

13 Equations B.4 and B.5 (in Appendix B) show that the federal government's *ex ante* expected welfare loss increases with the size of the *ex ante* residual variance of  $l(\sigma_l^2)$ , which is increasing in  $L$ .

under centralization.<sup>14</sup> Since both are increasing in  $F$  (under decentralization) and  $L$  (under centralization), we can identify cut-off values of  $F$  and  $L$  at which the scheme choice switches. The scheme choice, thus, depends on the extent of the conflict of interest ( $B$ ) and the relative importance of the two players' respective informational advantage ( $F, L$ ).

Figure 1 represents the choice between centralization and decentralization as a function of  $L$  and  $F$ . The threshold  $F(L, B)$  is upward sloping and divides the  $(L, F)$  plane into two regions (centralization and decentralization) lying below the  $45^\circ$  line. The federal government will opt for decentralization only if the local government's private information  $L$  is (strictly) greater than its own private information  $F$  and greater than the threshold level  $F(L, B)$ . The decentralization region is smaller than the centralization region: the agency bias  $B$  requires  $L$  to be strictly greater than  $F$  in order for decentralization to be optimal. This holds because the loss due to underutilization of the local government's information is compensated for by the elimination of the bias and the full exploitation of the federal government's own private information  $L$ . Conversely, the federal government always chooses centralization when its private information  $F$  is more important than the agent's private information (that is,  $F > L$ ). Additionally, it opts for centralization if  $F(L, B) \leq F < L$ , that is, even when its informational advantage  $F$  is smaller than  $L$ , but greater than the threshold value  $F(L, B)$ .

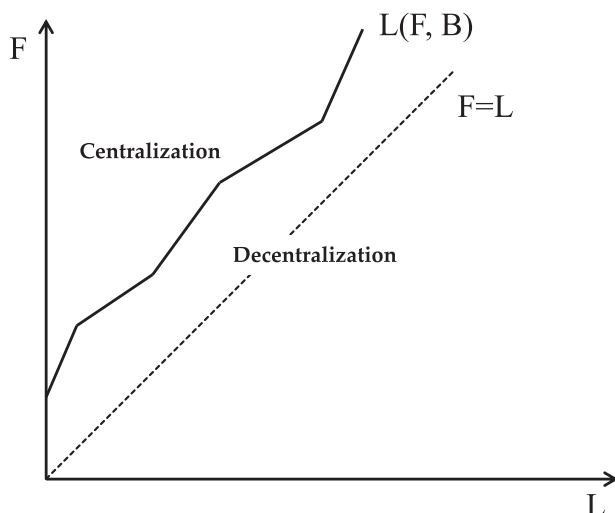
In general, the threshold  $F(L, B)$  is not monotone in the bias  $B$ , as an increase in  $B$  has both direct and indirect effects. Directly, it increases the agency problem, thus reducing the federal government's incentive to delegate. Indirectly, an increase in  $B$  also reduces the equilibrium amount of information transferred by the local to the federal government under centralization, thus making decentralization more attractive. Therefore, an increase in the agent's bias, while making the agent's choice less attractive to the principal, can also decrease the incentives of the agent to communicate its private information in the centralization game more than in the decentralization game. This is a key insight we can derive from the model. The net effect can even result in switching from centralization to decentralization, as a result of an increased bias, in order to make better use of the agent's private information.

### 3.2 Local government as the principal

When the local government takes the role of the principal and the federal government is the agent the local government is able to take the lead in deciding the level of centralization by taking advantage of its agenda-setting power. Like the federal government in the case described above, the local government chooses whether or not to delegate policies. Any divergence of the implemented policy  $p$  from its optimal policy  $p_L^*$  results in a utility loss for the local government. The game under the decentralization scheme unfolds in analogy to the previous analysis. The local government chooses whether or not to retain its control rights over policies by comparing its *ex ante* expected loss under decentralization with its expected loss under centralization. The choice will then, once again, depend on the size of the conflict of interest ( $B$ ) and on the relative importance of the two players' informational advantage ( $L, F$ ).

Figure 2 depicts the choice between centralization and decentralization as a function of  $L$  and  $F$ . The boundary level  $L(F, B)$  is upward sloping, and divides the  $(L, F)$  plane into two regions (centralization and decentralization) lying above the  $45^\circ$  line. In the setup with the local government as the principal, the centralization region is now smaller than the

14 A sketch of the proof is reported in Appendix C.



**Fig. 2.** Choice between centralization and decentralization as a function of  $L$  and  $F$  when the local government is the agenda setter

decentralization region: the existence of the agency bias requires  $F$  to be strictly greater than  $L$  in order for centralization to be optimal. Even when the local government has no private information and  $L$  equals zero, centralization with delegated control rights to the federal government requires  $F$  to be strictly greater than zero for all  $B > 0$ . Conversely, the local government will opt for the decentralization scheme whenever its private information is more important than that of the federal government, that is  $L > F$ , and  $L(F, B) \leq L < F$ . Due to the misalignment of interests which causes the bias  $B > 0$ , it can still be optimal for the local government to decentralize even when its informational advantage is smaller than  $F$ . The loss caused by the underutilization of the federal government's information is compensated for by the elimination of the bias and the full utilization of its own private information. As above, the threshold level  $(F, B)$  is not monotone in  $B$ .

### 3.3 Empirical implications

Several testable implications can be derived from the model. The main prediction of the model is that decentralization prevails when the importance of the local government's private knowledge either dominates the size of the bias or dominates the importance of the federal government's private knowledge. Centralization prevails when either the importance of the federal government's knowledge or the size of the agency bias dominates the importance of local knowledge. A higher importance of local private knowledge should be related to more, and the importance of the central government's knowledge to less decentralization.

A second important feature of the model is the presence of a non-monotonic relationship between decentralization and the misalignment of interests between the government levels, which depends on the differences between the preferences of the local and federal government. Specifically, this bias in preferences has both direct and indirect effects, which are working in the opposite direction. The reason is that the federal (local) government's informational advantage may depend not only on how relevant its knowledge is *per se*, but



also on how valuable such information is relative to those of the local (federal) government.

In countries that lack information transparency, informational advantages are salient compared to more transparent countries. Less transparency decreases the share of ‘hard’ information that can easily be transferred between government levels, and increases the importance of private ‘soft’ knowledge. The relative share of soft to hard information also depends on the quality of the communication infrastructure. The quality of information transmission makes the existing informational asymmetry, *ceteris paribus*, more (or less) salient and leads to a delegation of control rights over policies. Therefore, we expect that the indirect effect prevails in intransparent environments, where the information transferred by the agent is of high value to the principal.

Finally, we highlight that the principal can either be a federal government delegating more decision-power to the local authority, or a local government delegating more decision-power to the federal level. This distinction across regimes is an interesting testable implication based on the theoretical considerations. For this reason, we begin our empirical application with a sample that contains all countries, but also explore the two cases where either the federal or the local government is the principal. We interact the ‘bias’ with the quality of ‘information transmission’ to disentangle the direct and the indirect effects of the bias.

On the one hand, we expect to find a positive interaction between bias and information transmission when the local government is the principal, because better information transmission reduces the salience of the federal government’s information and should plausibly enhance the effect of the bias on decentralization. Put simply, the easier the local governments can access specific federal knowledge, the lower the likelihood that they are willing to delegate decision-making authority based on the importance of this knowledge. On the other hand, we would expect to find a negative (or insignificant) interaction between the two when the federal government is the principal. The reason is that better information transmission reduces the salience of local information and should weaken the effect of the bias on decentralization.

Our model helps to better explain the existing variations across countries and augments the existing literature in an important way. We do however not claim to be able to estimate causal relationships in the empirical section below. Rather, we aim to test whether the data are broadly in line with the predictions of our model.

## 4. Data

### 4.1 Decentralization

We capture expenditure decentralization by the share of sub-federal expenditures in all government expenditures, taken from the International Monetary Fund’s (IMF) Government Finance Statistics (GFS).<sup>15</sup> The numerator of our measure is the total expenditure of sub-federal government tiers, while the denominator is total spending by all levels of government. In federal countries we use aggregated expenditures for the state and local level to proxy for ‘local’ expenditures given that the data do not allow further distinction. We use data for the 1972–2010 period and a maximum of 66 countries, averaged over three-year

15 Appendix D contains the definitions and sources of the variables included in the regressions below, while we provide descriptive statistics in Appendix E.

periods to eliminate the influence of short-term fluctuations. Among the countries in our sample, expenditure decentralization ranges between 3.6% and 64.13%, with an average of 27.97%.<sup>16</sup> In the following, we propose a number of proxies to measure the extent of the agency bias and the relative informational advantages of the federal and local governments.

## 4.2 Variables of interest

We focus on what we call ‘informational variables’. These variables capture the impact of the bias and the importance of the country’s local and federal knowledge for optimal decision-making. Some are available for most of the sample, but others only for a smaller subgroup of countries and years. We therefore run separate regressions, one for the most extensive sample, and one that contains all variables.

**4.2.1 Bias** The conflict of interest between the federal and the local governments (agency bias) depends on the degree of externalities. As one proxy for externalities, we use the perceived risk of *external conflict*. The larger the risk of conflict, the more important the potential externalities from centralized foreign policy on the regions. In the presence of local decision-making the deviation from the federal government’s bliss point thus increases with external conflict. We use the International Country Risk Guide’s (ICRG) external risk index, and transformed the original scale so that higher values imply more external risk, on a scale of 1–12. We also include *trade openness*, as trading with other countries involves negotiations about trade agreements or meetings and travel to other countries to open new markets for national companies. Both local and state policies in this area might impose externalities that they do not take account of. For example, the federal government might negotiate tariff-reductions in certain areas that benefit the country as a whole, but might increase unemployment in certain regions. Local governments’ trade missions might result in competition among regions, leading to trade diversion from other regions rather than trade creation. We measure openness to trade using the sum of imports and exports as a share of GDP (from the Penn World Table 7.1). Oil production also imposes externalities (Dreher and Kreibaum 2016). Large parts of the proceeds usually accrue to the federal government, while environmental damages are born locally. This can give rise to distributional conflict between the centre and the regions (Gehring and Schneider 2016).<sup>17</sup>

We include additional measures of heterogeneity to proxy for bias. Our expectation is that greater diversity of the population will, on average, imply larger differences in the policy preferences of the federal government compared to that of the local governments. Our main index for the measurement of *heterogeneity* is Alesina *et al.*’s (2003) ethnic fractionalization index. As an alternative indicator, we also consider an index of *ethnic tensions*, provided by the ICRG (2013). The index captures perceptions among experts, ranging between 1–12 (rescaled so that higher values indicate larger tensions). As a further potential measure

16 We fill missing data for countries of the European Union since 1990 using data from Eurostat, which follows the same accounting guidelines. We tested for significant differences between the effects of data from the two sources by inserting a binary indicator in our regressions, which turned out to be insignificant at conventional levels.

17 All these sources of externalities might as well reflect the reluctance of federal politicians to devolve power to the local government for reasons related to the bias, such as interest group pressure, as outlined above.

of bias, we include the *migrant share* of the total population, taken from the [World Bank \(2013\)](#), as migration also increases the heterogeneity of a society, *ceteris paribus*.

Furthermore, we include *government fractionalization*, as it reflects the relative political weight of the average governing party in national policymaking, which might also be an important factor in decisions about career advancement for local politicians ([Banks and Wilson, 2013](#)). Low fractionalization of government parties indicates that a government consists of a small number of strong parties, that each have substantial impact on policy decisions. High fractionalization, on the other hand, is indicative of a larger number of weak governing parties each of which has little influence over policies. Since the ability to influence policy makes national political office attractive, higher government fractionalization, *ceteris paribus*, results in less attractive career options for local politicians. Their interest might consequently be less focused on central and overall country needs, which increases the misalignment of interests across government levels.<sup>18</sup>

Finally, we also use an index of *government stability*, taken from the [ICRG \(2013\)](#). Arguably, stability of the political system is an important determinant of the politicians' career concerns. One could anticipate that local politicians take the expected lifetime of their party into account when making decisions about how much effort to invest in career advancement within the party. The higher is stability, the more attractive national office becomes, and the more local politicians take the centre's and overall objectives of the country into account. Thus, higher stability should relate to a smaller bias and to interests that are more aligned. The index ranges between 1–12, with higher values indicating higher stability.

**4.2.2 Knowledge** Knowledge variables capture the relative importance of each side's private information and can affect the degree of decentralization in both directions, depending on who is in charge of deciding about the degree of centralization in policymaking. In order to proxy this measure, we rely on two alternative variables, *information transmission* and *information transparency*.

The availability of reliable information is a crucial factor in determining the delegation-decision of the respective principal. The higher the share of hard relative to soft information, the lower the risk of not being fully informed by the agent. We choose two alternative proxies for this crucial variable in our model, each with distinct advantages and disadvantages. Our main proxy is the quality of information transmission, measuring how easily the local governments can get access to the federal government's knowledge and vice versa. A higher quality makes it easier to verify information and, therefore, to assess its relevance and importance for outcomes and decisions. Our variable information transmission uses the number of telephone lines per 100 inhabitants ([International Telecommunication Union, 2011](#)), which is available for a large number of countries and years. It is meant to proxy for all kind of technological barriers to the transmission of information. The most relevant technology clearly varies over time: While the availability of Internet access or mobile phones arguably is a better proxy in more recent years, it is hardly available in the earlier years of our sample. Our variable is, however, highly correlated with a combined 'media access' variable (0.80) and a variable

18 Of course, politicians might also switch back from the federal level to a leading position at the local level. This is for instance the case for Commissioners at the European Union, who in the past often changed backed to positions at the national level. As [Gehring and Schneider \(2017\)](#) document, this can also cause a deviation from federal interests which we can interpret as biased decision-making.

capturing the number of computers *per capita* (0.87) in those periods where both are available.<sup>19</sup> As an alternative indicator for information availability we use information transparency from Williams (2015), with higher values indicating more transparency. It is highly correlated with information transmission ( $\rho = 0.73$ ).

We follow Hollyer *et al.* (2011) and include the share of data series in the areas economic policy and debt that are missing for a particular country and year in the World Bank's World Development Indicators Database (2013), labelled as *missing data*.<sup>20</sup> Higher values indicate a smaller share of missing data, implying that more information is publicly available at both the central and local level. It thus decreases the principal's dependency on the respective other level, with more information being available in cases where no delegation is chosen.<sup>21</sup>

Following a similar intuition, we use two further proxies for the importance of differences between local and federal knowledge: An indicator measuring the degree of *press freedom* (taken from Freedom House [2011], on a scale from 0–100), and an indicator of perceived *corruption* (ICRG 2013, rescaled from the original scale, ranging from 1–12). Higher values indicate more press freedom and more corruption.

**4.2.3 Importance of local knowledge** The importance of local knowledge increases with greater complexity, which we proxy using ethnic tensions, ethnic fractionalization ('heterogeneity'), and migrant share, as discussed above in the context of bias. Ethnic fractionalization relates to the existence of language barriers and cultural differences that make local information more important to the federal government. All three variables increase the dependence of the federal government on local knowledge and should, therefore, lead to more decentralization.

**4.2.4 Importance of federal knowledge** In many countries in our sample highly skilled labour is scarce. Federal government jobs typically pay better and are held in higher regard than local government jobs. Hence, if there is a shortage of highly qualified bureaucrats, they will favour jobs with the federal government. Accordingly, a lower overall level of education reduces the capacity and quality of the local bureaucracy relative to the federal one. A higher *educational quality* reduces the local government's dependence on the federal's knowledge and capacity and leads to more decentralization.

The importance of the federal government's knowledge increases when *external risk* is more prevalent. Given that negotiations with foreign authorities are the prerogative of the federal government, its knowledge gains in importance. A greater reliance on international trade, measured by trade openness, also makes the federal government's knowledge more important. Negotiations on important trade policies—like preferential trade agreements or

19 'Media access' combines access to TV, radio, papers and Internet (taken from Banks and Wilson, 2013). Using the media access variable does not change our results, but substantially reduces the size of our sample.

20 When we instead use the share of missing data in all categories of the World Development Indicators (World Bank, 2013) our results are unchanged. We also calculated the share of missing data for four main indicators only (the rate of inflation, budget balance, current account balance, domestic investment), which also did not affect our results.

21 Note that the correlation between the number of telephone lines and missing data is weak, indicating that these measures account for different aspects of transparency. See Hollyer *et al.* (2013) for a detailed discussion of these differences. Also see Dreher *et al.* (2017).

negotiations in the context of the World Trade Organization—fall into the realm of the federal government, which should render its knowledge relatively more important. Oil production might also be important given that the federal government’s knowledge matters more in oil-rich countries, for example due to tasks like working with other governments to maintain a cartel (like the Organization of the Petroleum Exporting Countries [OPEC]), or building pipelines and other large-scale national and international projects. In addition, oil companies in the bulk of oil-producing nations are often at least partly owned by the central government with oil revenue making up a significant part of total government revenue.

Clearly, and as outlined above, some of the variables introduced here refer to both the influence of the agency problem and the importance of federal knowledge. Since the impact of such indicators could be conflicting, the sign of the coefficient will show the net effect, that is, the impact that dominates. Appendix G shows the correlations of all variables included in the analysis. Note in particular that the correlations between the variables measuring the bias and the informational variables are low. We would again like to stress that our estimates are not necessarily causal. The variables of interest are correlated with a large number of potentially important omitted variables. Moreover, some of the indicators might be determined by changes in decentralization, giving rise to reverse causality (though this is partially mitigated by using lags of the explanatory variables). However, we have no reason to expect the bias to be systematically different between countries with a federal or unitary constitution, which is a decisive distinction we aim to capture.

## 5. Method and basic results

We examine the determinants of expenditure decentralization using data for a maximum of 66 countries over the 1972–2010 period, with the respective sample size depending on the set of control variables being included. Given the lack of significant time variation in the decentralization variable we have averaged the data over three years.<sup>22</sup> Using OLS with standard errors clustered at the country level, we estimate

$$D_{i,t} = \alpha + \beta_1 Z_{i,t-1} + \eta_i + \tau_t + u_{i,t}, \quad (4)$$

where  $D_{i,t}$  represents expenditure decentralization in country  $i$  at period  $t$ , and  $Z$  is a vector containing the (lagged) explanatory variables. In addition to the variables of interest, we include a set of standard control variables.<sup>23</sup> Finally,  $\eta_i$  and  $\tau_t$  are region- and period-fixed effects, respectively, and  $u_{i,t}$  is the error term.<sup>24</sup>

- 22 We replicated the analysis using averages of five years. While the number of observations is substantially lower, the results hold.
- 23 Economic control variables are (log) real *per capita* GDP, (log) land area (in square kilometers), (log) population, the share of the urban population in total population and a binary variable indicating whether the country is a democracy. Some of these variables might also relate to our hypotheses. With rising *per capita* GDP—and so economic activity—the exchange of information becomes more important for the design of optimal policy. This variable is obtained from the Penn World Tables and is measured in purchasing power parities (constant 2005 prices).
- 24 We want to use cross-sectional variation for identification in addition to within-country variation due to the limited variation in the dependent variable. The results are similar with a random effects model (Appendix H).

Table 1 presents the results, using our first proxy—information transmission. Column 1 reports the coefficients of the standard variables that are most commonly used in decentralization studies. Column 2 shows the first set of variables of interest which is available for a reasonably large number of countries and years. Column 3 includes both.

The results of column 1 show that decentralization increases with *per capita* GDP and land size, at the 1% level of significance. To the extent that larger and richer countries are more diverse, controlling for the other variables in the regression, this is in line with the model: greater diversity increases decentralization. The size of population, urbanization, and the dummy for democracies are not significant at conventional levels.

Column 2 turns to our variables of interest. As can be seen, decentralization increases with greater heterogeneity (at the 1% level of significance). This is in line with the model's predictions. First, greater heterogeneity makes the local government's information comparably more important, leading to decentralization. Second, it increases the agency bias. As specified above, a greater bias has both a direct and an indirect effect, making the overall impact *a priori* ambiguous. The direct effect is to increase the agency problem, thus reducing the local government's incentive to centralize (and *vice versa*). The indirect effect reduces information transmission, namely the amount of information transferred by the federal to the local government under decentralization, leading to centralization (and *vice versa*). On average, the direct effect seems to dominate the indirect one.

The results also show that decentralization increases with less openness to trade, better information transmission, and better educational quality, all significant at the 1% level. The negative effect of trade openness on decentralization is intuitive. In more open economies, the importance of externalities—implying a larger bias—and the federal government's knowledge is higher, making centralization better-suited compared to more closed economies. The positive effect of educational quality is also in line with our hypothesis on the importance of federal knowledge: the larger availability of well-educated people allows local governments to recruit 'better' officials, making decentralization comparably beneficial. *Oil rents* and missing data are not significant at conventional levels.<sup>25</sup> Finally, better information transmission makes any difference in knowledge between the local and the federal government less decisive and is on average related to more decentralization.

Column 3 includes the variables of interest in tandem with the control variables. *Per capita* GDP is no longer significant at conventional levels, and trade openness also loses its significance. Heterogeneity is significant at the 5% level and substantively important: an increase in heterogeneity by one standard deviation increases the share of subnational expenditures by about 5%. The subnational share increases by more than 8% with an increase of information transmission by one standard deviation. An increase of one standard deviation in educational quality increases the local share of expenditures by about 5%. All of these effects are substantial in size, significant at the 5% level at least, and jointly explain a significant share of the variation in the dependent variable. This supports the relevance of our model.

Column 4 adds the variables that are available for a reduced sample only. Note that changes in coefficients might partly be due to changes in sample size rather than the impact of these additional variables. Overall, however, the results are similar. The exceptions are

25 Note that the missing data variable from Hollyer *et al.* (2011) remains insignificant when we omit information transmission from the regression, while the effect of information transmission is unchanged when we exclude Hollyer *et al.*'s indicator.

**Table 1.** Decentralization, bias and knowledge, 1972–2010, OLS

Dependent variable:	(1)		(2)		(3)		(4)		(5)	
	Coef.	Std. err.	Coef.	Std. err.	Coef.	Std. err.	Coef.	Std. err.	Coef.	Std. err.
Expenditure Decentralization										
(log) GDP	6.55***	[2.33]			-1.42	[3.04]	-3.66	[4.31]	-3.98	[2.70]
(log) Land area	3.37***	[1.11]			2.24*	[1.21]	0.64	[1.41]	2.35**	[1.09]
(log) Population	0.45	[1.41]			0.19	[1.41]	1.50	[1.35]	0.13	[1.14]
Urbanization	0.13	[0.13]			0.00	[0.11]	0.14	[0.12]	0.01	[0.09]
Democracy dummy	2.04	[2.52]			-3.90	[2.59]	-8.41	[5.87]	-6.40**	[2.37]
Heterogeneity			0.25***	[0.08]	0.21**	[0.09]	0.26**	[0.10]	-0.11	[0.09]
Trade openness			-0.10***	[0.03]	-0.03	[0.04]	-0.10*	[0.05]	-0.03	[0.03]
Oil rents			0.04	[0.13]	-0.13	[0.13]	-0.14	[0.18]	0.00	[0.12]
Information transmission			0.40***	[0.13]	0.49**	[0.20]	0.32	[0.21]	0.33*	[0.19]
Missing data			-0.01	[0.04]	-0.03	[0.04]	-0.05	[0.05]	-0.04	[0.03]
Educational quality			0.29***	[0.08]	0.24**	[0.09]	0.26***	[0.09]	0.30***	[0.08]
Ethnic tensions							-1.45	[1.45]		
Government stability							-0.53	[0.68]		
Government fractionalization							0.09	[0.06]		
Migrant share							0.36**	[0.17]		
Risk of external conflicts							-2.41***	[0.71]		
Corruption							2.23	[1.67]		
Press freedom							-0.03	[0.10]		
Heterogeneity*information transmission									0.01***	[0.00]
Period dummies	Yes		Yes		Yes		Yes		Yes	
Region dummies	Yes		Yes		Yes		Yes		Yes	
Adj. R-squared	0.43		0.53		0.56		0.63		0.60	
Number of observations	389		338		338		225		338	

Notes: Standard errors (clustered at the country level) in brackets. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

the country's *land area* and the quality of information transmission, which are no longer significant at conventional levels. Trade openness becomes significant (again), at the 10% level, with a negative coefficient.

Turning to the additional control variables, decentralization significantly increases with a larger migrant share in the population and lower risk of external conflict. The coefficients are significant at the 5% and 1% level. A larger migrant share reflects greater heterogeneity, which in turn makes more decentralization optimal. An increase in the share of migrants by one standard deviation implies an increase in decentralization by nearly 7%. Larger risks increase the importance of federal knowledge and thereby decrease the optimal level of decentralization, given the larger role of externalities. It is also economically significant, as an increase of one standard deviation would reduce the subnational expenditure share by over 19%. In summary, the evidence highlights the importance of local and federal knowledge, as well as the importance of externalities in the design of a country's degree of decentralization. Overall, the results are more in line with the model's predictions when the local governments decide on the degree of centralization.

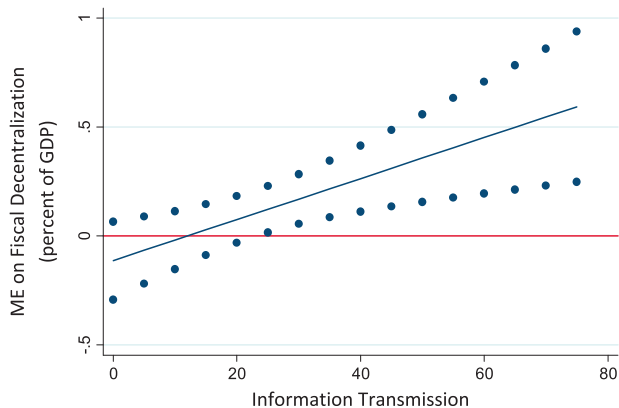
Column 5 of Table 1 turns to the two components of the bias. In order to disentangle the countervailing effects of knowledge and bias, we add an interaction of information transmission with heterogeneity to our preferred specification in column 3. Greater heterogeneity leads to a higher optimal degree of decentralization, as local knowledge becomes more important. As can be seen, the coefficient of the interaction term is positive and significant at the 1% level. On average, the effect of heterogeneity increases with better quality of information transmission, i.e. when the gap between federal and local knowledge is smaller. Thus, for any given bias, decentralization becomes more likely with easier availability of information, as predicted by the model when the *status quo* is decentralization.

Turning to the second component of the interaction, the bias, note that decentralization should increase with a larger bias if the local government is the principal, and decrease otherwise. This argument, however, overlooks the fact that an increase in the bias also has the (indirect) effect of reducing the amount of communication, thus making decentralization more costly from the local government's perspective (and centralization more costly from the federal government's perspective). As outlined above, the interaction between the two allows us to differentiate between the direct and the indirect effects. Specifically, with the local government as principal, we expect to find that a greater bias increases centralization only when information transmission is low. The positive interaction in column 5 confirms this intuition. Figure 3 shows that the marginal effect of heterogeneity on decentralization becomes positive and significant only for high levels of information transmission. It is insignificant when information transmission is low. While these results for the overall sample seem consistent with the prediction when the local government is the principal, our model suggests that they might hide considerable heterogeneity.

## 6. Who is the principal and who is the agent?

We therefore split the sample in two sub-groups according to whether the federal or the local government is more likely to have the final say on the degree of decentralization. This allows us to test the predicted differences between the two regimes. As it is arguably hard to decide which empirical proxy is most likely to capture our theoretical notion of principals and agents, we show results using a broad range of indicators. First, we consider whether a country is federal or unitary. Classifications are available from Norris (2008)





**Fig. 3.** Marginal effect of heterogeneity on the share of subnational government expenditure for different levels of information transmission (Table 1, column 5). The dashed line shows the 90% confidence interval

and Elazar (1995), the latter being updated by Treisman (2008). Second, we distinguish countries where the constitution explicitly grants sub-national governments residual power to legislate from those where all legislative power remains with the central government (Treisman 2008). Beck *et al.* (2001) provide data indicating whether sub-national governments have authority over taxing, spending, or legislating. In this case, they can directly influence the degree of expenditure decentralization. Third, we divide the sample based on the fact that in some countries sub-national governments are locally elected (Treisman 2008). Direct election by voters increase the legitimacy and discretionary power of subnational governments, so that it becomes more difficult for the federal government to resist and impede changes they propose. Online Appendix I shows how individual countries are classified according to the different measures.

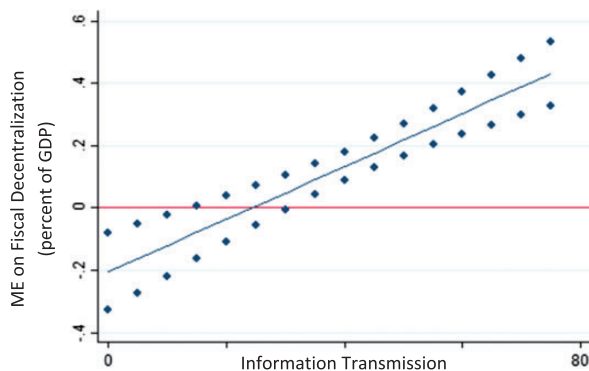
Ideally, we would like to test our hypotheses on the importance of who is in charge of deciding about decentralization in a model including country fixed effects. However, the noise-to-signal ratio with the available data is so high that the coefficients of all variables in such a model become insignificant at conventional levels. Rather than including country fixed effects, we therefore address the main reason for their presence—unobserved omitted variables that are related to the decentralization ratio—by controlling for the level of decentralization in the first period in all of the following models. Under the assumption that omitted factors only have an influence on the level and not on the change in decentralization and are time-invariant, this should mitigate a potential bias.

Table 2 shows the results, focusing on the interaction between bias and information. The table employs both proxies for the importance of private information: information transmission and information transparency, and the five different definitions of whether a country is federal or unitary. While the theoretical effect of heterogeneity as a proxy for bias and importance of information is ambiguous in the overall sample, our model yields clearer predictions when we take institutional differences into account. For a given level of heterogeneity, an improvement in information transmission reduces the importance of federal information, leading to more decentralization with the local government as the principal (‘agenda-setter’). Facing the trade-off between loss of control and loss of information,

Table 2. Interaction between heterogeneity and information, 1972–2010, OLS

Agenda setting government level:	Local		Federal		Local		Federal	
	Information Transmission				Information Transparency			
	Coef.	Std. err.	Coef.	Std. err.	Coef.	Std. err.	Coef.	Std. err.
	<i>Federation type: Unitary or federal (Norris 2008)</i>							
Heterogeneity*Information	0.017***	[0.004]	-0.002	[0.002]	0.030***	[0.007]	0.002	[0.002]
Adj. R-squared	0.84		0.89		0.870		0.89	
Number of observations	126		212		119		191	
	<i>Classified as 'federal' (Elazar 1995)</i>							
Heterogeneity*Information	0.008***	[0.003]	-0.002	[0.002]	0.017***	[0.004]	0.006	[0.006]
Adj. R-squared	0.88		0.82		0.88		0.80	
Number of observations	191		147		175		135	
	<i>Residual powers to legislate (Treisman 2008)</i>							
Heterogeneity*Information	0.009***	[0.002]	-0.001	[0.002]	0.016***	[0.005]	0.002	[0.004]
Adj. R-squared	0.85		0.85		0.850		0.83	
Number of observations	207		131		190		120	
	<i>Sub-national government authority (Keefer 2013)</i>							
Heterogeneity*Information	0.006***	[0.002]	-0.012	[0.016]	0.013**	[0.005]	-0.016	[0.012]
Adj. R-squared	0.82		0.96		0.83		0.89	
Number of observations	299		39		276		34	
	<i>Legislature or executive locally elected (Treisman 2008)</i>							
Heterogeneity*Information	0.009***	[0.002]	-0.003	[0.003]	0.017***	[0.006]	-0.004	[0.004]
Adj. R-squared	0.81		0.93		0.82		0.930	
Number of observations	265		71		242		66	

Notes: Interaction effect between Heterogeneity and the respective information proxy for local and federal government as agenda setters. Includes initial decentralization and control variables of column 3 in Table 1 as additional regressors. Standard errors (clustered at the country level) in brackets. \* p < 0.10, \*\* p < 0.05, \*\*\* p < 0.01. The p-value corresponds to a Wald test for significant differences between the coefficients for federal and unitary states.



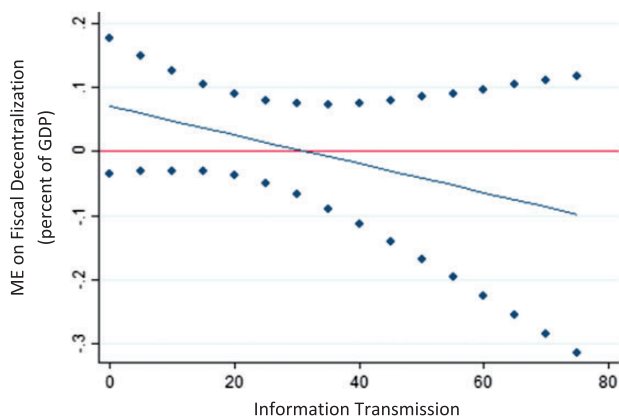
**Fig. 4.** Marginal effect of Heterogeneity on the share of subnational government expenditure for different levels of Information Transmission (Table 2, row 2).

The regressions are restricted to countries that Elazar (1995) defines as ‘local’, i.e. where the local government is the agenda setter. The dashed line shows the 90% confidence interval

the local government is less willing to give up part of its authority in exchange for informational gains. This should be reflected in a positive interaction between the information variable and heterogeneity. On the contrary, if the central government maintains the final decision rights, better access to information means less reliance on local information. In this case, we would expect a negative interaction. Most importantly, we want to test significant differences between the two cases, which would support the relevance of the theoretical distinction we highlight.

The results are in line with our predictions and surprisingly robust across the five indicators and both information variables. In all specifications, the interaction between heterogeneity and our proxy for information is positive and significant at least at the 5% level in federal countries, while it is negative or not significantly different from zero in unitary countries. The number of observations that are classified as local or federal agenda-setter differs across indicators, but the difference between the interaction terms is significant in all regressions (tested employing a seemingly unrelated regression model, with corresponding p-values shown in the table).

Figures 4 and 5 illustrate the differential effects for the specification using information transmission and Elazar’s (1995) classification, which results in the most equal share of federal and unitary states. Figure 4 depicts the marginal effect of better information transmission on decentralization for federal states. For low levels of information transmission, higher heterogeneity does not lead to more decentralization. Only above a certain level of information transmission does higher heterogeneity make local governments opt for more decentralization. The intuition is simple: the higher the perceived misalignment of interest, the fewer tasks local governments want to delegate to the central one. However, decentralization is also limited by the need of local governments to utilize information from the centre. Thus, heterogeneity only has a positive effect on decentralization when it is sufficiently easy for the local government to independently access federal information. The opposite holds when the central government is the agenda setter. If information transmission is of poor quality, greater heterogeneity makes the central government decentralize more, arguably to cope with the increased importance of local information. When access to local information is easier, the central government—being aware of the increased misalignment



**Fig. 5.** Marginal effect of Heterogeneity on the share of subnational government expenditure for different levels of Information Transmission (Table 2, row 2).

The regressions are restricted to countries that Elazar (1995) defines as ‘federal’, i.e. where the federal government is the agenda setter. The dashed line shows the 90% confidence interval

in interests—does not need to decentralize. This is in line with Fig. 5, which shows the marginal effect for unitary states.

## 7. Conclusion

This paper examines the endogenous allocation of control rights in federations by explicitly relating the quality of the information supplied by local governments to the federal government (and vice versa) to the misalignment of interests between the two. The results show that, for a given agency bias, and when the local government decides about the degree of centralization, the informational advantage of the federal government must be strictly greater than the informational advantage of the local governments for the centralization scheme to be optimal.

We disentangle the centralization and decentralization schemes by focusing on the interaction between the agency bias and information transmission. When control rights remain with the local levels of government, and the quality of information transmission is high, the effect of the agency bias on decentralization should be higher. This is the case because local governments depend less on central information, and thus react to a larger misalignment of interests by increasing decentralization, which provides more room for deviation from the federal government’s preferred policies. When control rights remain with the federal government, higher quality of information transmission means less reliance on local soft and unverifiable information. Thus, the federal government will react to a larger misalignment of interests by increasing centralization.

We test the model’s implications by focusing on expenditure decentralization, relating the degree of fiscal decentralization to information transmission and the size of the bias. Controlling for country-characteristics, their economic performance, and for ‘political’ motivations, we find empirical results consistent with the theory. Overall, better information transmission leads to more decentralization, which is consistent with the model when the *status quo* is decentralization. Heterogeneity captures the importance of local knowledge

and the agency bias. While greater importance of the local government's knowledge leads to more decentralization, the impact of the bias is less straightforward, as it is influenced by who has the final control rights over the degree of decentralization. In our overall sample, we find that the effect of heterogeneity on decentralization increases with better quality of information transmission. This positive interaction is in line with the case where control rights lie with local governments, but masks considerable differences between unitary and federal states.

To measure these differences, we use five distinct constitutional and statutory country characteristics to separate countries where the federal government is more likely to be the principal from those where the local governments possess more constitutional power to decide on the degree of decentralization. As predicted by our model, when the local government is the principal, an increase in the bias leads to decentralization only when the quality of information transmission is relatively high. When the federal government is the principal, the interaction is negative but insignificant. Most importantly, there are significant differences between the two regimes, which supports the importance of the mechanisms highlighted in our model.

Important policy implications arise from these findings. This holds both at the country level and for supranational institutions like the European Union, in which centralized fiscal spending is rare even among groups of nations that coordinate on many policy areas, such as the Eurozone (e.g. [Simon and Valasek, 2017](#)). In the case of the EU, for example, centralization may on the one hand be too low as a consequence of the bias in objectives between the member states and the institutions of the European Union. More specifically, the allocation of control rights over policies may sub-optimally remain with local governments (the member states) in certain areas, under-exploiting the knowledge of the EU institutions in the presence of a bias. On the other hand, in other areas like regional policy and investments decision-making might remain with the federal entity (European Commission) even though regional information is crucial and might only be incompletely shared.

## Supplementary material

Supplementary material (the Appendix) is available online at the OUP website

## Acknowledgements

We thank Paolo Balduzzi, Daniel Bochsler, Massimo Bordignon, Adi Brender, Jan Fidrmuc, Fabio Fiorillo, Ilaria Fioroni, Umberto Galmarini, Mario Jametti, Geert Langenus, Katharina Michaelowa, Andrea Presbitero, Agnese Sacchi, and Christoph Schaltegger for helpful comments and suggestions and Jamie Parsons for proof-reading. We also thank participants at the Workshop on Public Finance (Rome 2017), Bruneck Workshop on Political Economy (Bruneck 2016), Crisis, Institutions, and Banking Union Workshop (Berlin 2014), Royal Economic Society Annual meeting (Manchester 2014), Second Workshop on Federalism and Regional Policy (Siegen 2014), 7th Annual Conference on the Political Economy of International Organizations (Princeton 2014), Political Economy of Fiscal Policy Workshop (European Central Bank 2013), Reforming Europe Conference (Mannheim 2013), EPCS Annual Meeting (Zurich 2013), the Beyond Basic Questions Workshop (Lucerne 2013), Annual Meeting of the Italian Society for Public Economics (SIEP) (Pavia 2013), the Research Training Group Globalization and Development (Hannover 2014) and seminar participants at the University of Ancona, University

of Milano Bicocca, University of Calabria, Cattolica University of Milan, LUISS University in Rome, University of Munich, University of Siena, and University of Zurich for helpful comments.

## References

- Alesina A., Angeloni, I. and Etro, F. (2005) International unions, *American Economic Review*, **95**, 602–15.
- Alesina A., Devleeschauwer, A., Easterly, W., Kurlat, S. and Wacziarg, R. (2003) Fractionalization, *Journal of Economic Growth*, **8**, 155–94.
- Alesina, A. and Spolaore, E. (2003) *The Size of Nations*, MIT Press, Boston, MA.
- Banks, A.S. and Wilson, K.A. (2013) *Cross-national time-series data archive*, Databanks International, Jerusalem, Israel.
- Bardhan P. (2016) State and development: the need for a reappraisal of the current literature, *Journal of Economic Literature*, **54**, 862–92.
- Beck, T., Clarke, G., Groff, A., Keefer, P. and Walsh, P. (2001) New tools in comparative political economy: the database of political institutions (updated Jan. 2013), *World Bank Economic Review*, **15**, 165–76.
- Blume, L. and Voigt, S. (2011) Federalism and decentralization—a critical survey of frequently used indicators, *Constitutional Political Economy*, **22**, 238–64.
- Bodman, P., Ford, K., Gole, T. and Hodge, A. (2010) What drives fiscal decentralisation? Further assessing the role of income, *Fiscal Studies*, **31**, 373–404.
- Bordignon, M., Manasse, P. and Tabellini, G. (2001) Optimal regional redistribution under asymmetric information, *American Economic Review*, **91**, 709–23.
- Crawford, V. and Sobel, J. (1982) Strategic information transmission, *Econometrica*, **50**, 1431–51.
- Dessein, W. (2002) Authority and communication in organizations, *Review of Economic Studies*, **69**, 811–38.
- Dreher, A. and Kreibaum, M. (2016) Weapons of choice: the effect of natural resources on terror and insurgencies. *Journal of Peace Research*, **53**, 539–53.
- Dreher, A., Langlotz, S. and Marchesi, S. (2017) Information transmission and ownership consolidation in aid programs, *Economic Inquiry*, forthcoming.
- Elazar, D.J. (1995) From statism to federalism: a paradigm shift, *Publius*, **25**, 5–18.
- Freedom House. (2011) World Press Freedom Index. Available at: <https://rsf.org/en/ranking> (accessed 1 May 2017).
- Gehring, K. and Schneider, S.A. (2016) Regional resources and democratic secessionism, ETH and University of Zurich CIS Working Paper No. 90.
- Gehring, K. and Schneider S.A. (2017) Towards the greater good? EU Commissioners' Nationality and Budget Allocation in the European Union, *American Economic Journal: Economic Policy*, forthcoming.
- Harris, M. and Raviv, A. (2005) Allocation of decision making authority, *Review of Finance*, **9**, 353–83.
- Hatfield, J.W. and Padró i Miquel, G. (2012) A political economy theory of partial decentralization, *Journal of the European Economic Association*, **10**, 605–33.
- Hollyer, J.R., Rosendorff, B.P. and Vreeland, J.R. (2011) Democracy and transparency, *Journal of Politics*, **73**, 1194–205.
- Hollyer, J.R., Rosendorff, B.P. and Vreeland, J.R. (2013) *Data disclosure, accountability and the facets of transparency*, unpublished manuscript.
- Hooghe, L. and Marks, G. (2013) Beyond federalism, *Publius: The Journal of Federalism*, **43**, 179–204.

- ICRG (International Country Risk Guide). (2013) Country Rankings, The PRS Group, East Syracuse, NY, various years. Available at: <https://www.prsgroup.com/category/risk-index> (accessed 1 May 2017).
- International Telecommunication Union. (2011) *World telecommunications database/ ICT indicators database*, CD-ROM, 15th edition 2011, Geneva.
- Kessler, A. (2014) Communication in federal politics: universalism, policy uniformity, and the optimal allocation of fiscal authority, *Journal of Political Economy*, **122**, 766–805.
- Kotsogiannis, C. and Schwager, R. (2008) Accountability and fiscal equalization, *Journal of Public Economics*, **92**, 2336–49.
- Lockwood, B. (2002) Distributive politics and the costs of centralization, *Review of Economic Studies*, **69**, 313–37.
- Lorz, O. and Willmann, G. (2005) On the endogenous allocation of decision powers in federal structures, *Journal of Urban Economics*, **57**, 242–57.
- Marchesi, S., Sabani, L. and Dreher, A. (2011) Read my lips: the role of information transmission in multilateral reform design, *Journal of International Economics*, **84**, 86–98.
- Norris, P. (2008) *Driving democracy: do power-sharing institutions work?*, Cambridge University Press, New York.
- Oates, W.E. (1972) *Fiscal Federalism*, Harcourt Brace Jovanovich, New York.
- Riker, W.H. (1987) *The Development of American Federalism*, Kluwer Academic Publishers, Boston, MA.
- Sacchi, A. and Salotti, S. (2014) How regional inequality affects fiscal decentralisation: accounting for the autonomy of subcentral governments, *Environment and Planning C: Government and Policy*, **32**, 144–62.
- Simon, J. and Valasek, J.M. (2017) Centralized fiscal spending by supranational unions, *Economica*, **333**, 78–103.
- Treisman, D. (2006) Explaining fiscal decentralisation: geography, colonial history, economic development and political institutions, *Journal of Commonwealth and Comparative Politics*, **44**, 289–325.
- Treisman, D. (2008) Decentralization dataset .Available at <http://www.sscnet.ucla.edu/polisci/faculty/treisman/> (accessed 1 May 2017).
- Williams, A. (2015) A global index of information transparency and accountability, *Journal of Comparative Economics*, **43**, 804–24.
- World Bank (2013) *World Development Indicators 2013*, Washington, DC.