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# KOF Working Papers

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# The Inverse Domino Effect: Are Economic Reforms Contagious?\*

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## Abstract

This paper examines whether a country's economic reforms are affected by reforms adopted by other countries. A simple model of economic reforms is developed to motivate the econometric work. Unsurprisingly, the model predicts that reforms are more likely when factors of production are internationally mobile and reforms are pursued in other economies. More interesting is the finding that reforms are *not* driven by greater trade openness. Using the change in the Index of Economic Freedom as the measure of market-liberalising reforms, we examine two issues. Using data for a panel of 144 countries and the years 1995-2006, we identify the most important channels through which reforms are transmitted from country to country. We find evidence of the importance of reforms in other countries. Moreover, consistent with our model, international trade is *not* a vehicle for the diffusion of economic reforms, rather the most important mechanism is geographical or cultural proximity.

*Keywords:* Economic reforms; economic freedom; resource flow models; spatial interdependence

*JEL classification:* H71, H77, P51, O57

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*Finally, you have broader considerations that might follow what you would call the “falling domino” principle. You have a row of dominoes set up, you knock over the first one, and what will happen to the last one is the certainty that it will go over very quickly. So you could have a beginning of a disintegration that would have the most profound influences.* **Dwight D. Eisenhower**, press conference, 7th April, 1954. (<http://www.nps.gov/archive/eise/quotes.htm>.)

## 1 Introduction

In this paper, we investigate whether economic reforms in one country are influenced by economic reforms in other countries. We are specifically concerned with the question of whether there is a “contagion effect” which might lead to co-movements in the implementation of reforms. Since economic crises often seem to spread from country-to-country, it seems intuitive that beneficial effects may do so as well. The latter includes mimicking political economic institutions that are thought to generate superior outcomes for a nation’s citizens.

While the opening quotation has admittedly been taken somewhat out of historical context, there are many implications of changes to the institutions that protect and foster economic freedom in modern economies. Among other things, economic freedom has been associated with higher average income per person, higher life expectancy, higher literacy, lower infant mortality, less income inequality and less corruption (see e.g., Gwartney and Lawson, 2005). In what has become a large literature, researchers consistently find a link between economic freedom and economic growth.<sup>1</sup>

There is a recent and large literature in political science on the effects of forces such as trade openness and the way in which such factors help to diffuse policy reforms (e.g., Simmons and Elkins, 2004; Jahn, 2006; Simmons *et al.*, 2006; Franzese and Hays, 2007, 2008). The empirical literature is often couched in terms of addressing *Galton’s Problem* where the challenge is to distinguish common shocks across countries from the effects of spatial interdependence. The interdependence between countries could be either mechanical or strategic. In this paper, we focus on economic competition and the migration of factors of production as the mechanism for transmitting reforms from country to country. The specific questions addressed are: (i) how habit-forming are economic reforms, i.e., are governments committed to a reform agenda; (ii) through which channel are reforms mainly transmitted; and (iii) how can the effects be empirically identified? The latter two questions are motivated by developing a simple theoretical model.

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<sup>1</sup>See de Haan and Sturm (2000), Scully (2002), Carlsson and Lundström (2002) and de Haan *et al.* (2006), for instance.

In particular, in this paper we examine the commonly held presumption that international trade is the main vehicle for transmitting reforms and increasing economic freedom. This presumption is so ingrained, for economists in particular, that it is hard to know its precise historical origin. A recent article by some prominent economists typically argues: “*Trade liberalization not only establishes powerful direct linkages between the economy and the world system, but also effectively forces the government to take actions on the other parts of the reform program under the pressures of international competition*” (Sachs *et al.*, 1995, p.2).

To examine our questions empirically we use the Index of Economic Freedom developed by the Heritage Foundation and the Wall Street Journal. Economic freedom is defined as constituting the right of property ownership, freedom of movement for labour, capital and goods. In addition, there is an absence of coercion or suppression of economic liberty. On the other hand, constraints that secure property rights are an essential ingredient of economic freedom. Thus, individuals are free to work, produce, consume and invest as they choose. By implication, government intervention is kept to a minimum and economic activity is best left to markets.

The remainder of the paper is as follows. In section 2, we selectively review some of the literature on the policy and institutional interactions between countries. In section 3, we present a simple model of economic reform that highlights the possible links between the reforms in one country and those in other countries. We use the expressions economic reforms and increases in the level of economic freedom interchangeably although, strictly speaking, economic reforms are a pre-condition for greater economic freedom. In section 4, we present our main empirical tests and results. Specifically, we use panel regressions to analyse whether economic reforms are spatially dependent or “contagious”. Particular attention is paid to measuring the appropriate spatial linkages or “diffusion mechanisms” between countries. Section 5 concludes.

## **2 Does economic freedom spread from country to country?**

Hall and Soskice (2001) introduced a useful framework for understanding differences among national economies. They distinguish between ‘liberal market economies’ and ‘coordinated market economies’. Among the developed economies, examples of the former are the United States, the United Kingdom and Australia; representative of the latter are Germany, Japan and Switzerland. The economic activity in liberal market economies tends to rely on markets, while the coordinated market economies have more relational contracting, government intervention and higher levels of non-market coordination. A keystone of what Hall and Soskice term the “varieties of capitalism”

approach is that there is more than one path to economic success. Nations need not converge to a single Anglo-American model, for instance. In fact, the authors show that despite significant differences in political economic institutions and some economic outcomes (e.g., income inequality), that economic performance over the last three economic cycles has been remarkably similar when the two types of economy are compared in terms of economic growth rates, per capita GDP and unemployment.

From a dynamic perspective, an important issue is raised by the most recent wave of globalisation, specifically, the stability of regulatory regimes and domestic institutions in the face of global competition. There are two competing perspectives on the relationship between the survival of the welfare state and globalisation. The first is that globalisation places considerable stress on the architecture of the welfare state, so that some social protection policies will display tendencies of a “race to the bottom” or convergence. For instance, Tanzi (1995) argues that increased mobility of capital not only erodes the tax base, reducing the welfare state’s ability to fund its programmes, but by shifting taxes onto labour, the capacity of the State to redistribute is reduced. In a similar fashion, Garrett (1998) has argued that, by forcing welfare states to turn increasingly to borrowing to fund their programmes, the international capital market ends up imposing an increasing premium on large welfare states. In ways that are harder to quantify, but seem *prima facie* plausible, the decreasing cost of the exit option increases the relative power of business in policy-making (Huber and Stephens, 1998). Finally, it has been argued that globalisation increases the general credibility of orthodox (i.e., market-oriented) policy advice, thus reducing the plausibility of arguments supporting welfare state expansion and enhancing the credibility of arguments in favour of welfare state retrenchment (Krugman, 1999). In other words, the sceptical view of globalisation suggests that it is homogenising; competitive forces drive deregulation, trade and investment liberalisation that, in turn, underpin the convergence of economies to a common market model. Taken to extremes, a corollary of these arguments is that economic integration or globalisation could undermine the sovereignty of the nation state.

The opposing view is that social policies and domestic institutions, respond in ways such as to minimise any adverse consequences of globalisation. For example, the classic, large welfare states developed in the context of considerably more open economies than did the smaller, market conforming welfare states (Huber and Stephens, 1998). A plausible story advanced by some authors is that changes to tax and transfer systems have arisen to ensure acquiescence by the potential losers from globalisation and microeconomic reforms, such as trade liberalisation (e.g., Rodrik,

1998). That is, greater “progressive” redistribution has been “the price to pay” for political or social compliance with the labour market and microeconomic reforms necessitated by globalisation.

Interestingly, Bordo *et al.* (1999) extend this argument by suggesting that the presence of sizable welfare states, and Keynesian macroeconomic policy, may have played an important role in providing sufficient indifference to globalisation, that policies like support for the GATT/WTO system and the Bretton Woods institutions continued even in the face of recessions that might have had system closing consequences in earlier eras. In addition, it has been widely argued that the heterogeneity of domestic political and socio-economic institutions supports a diversity of responses to globalisation (Calmfors and Driffill, 1988; Swank, 2002). That is, there is no convergence of national policies; they differ now as much as they ever used to. In fact, national policies could be even more distinctive because they involve far greater government intervention.

Consistent with the latter point of view, Hall and Soskice (2001) argue that financial and capital mobility should actually reinforce differences in national institutional frameworks, as firms that have shifted their operations to benefit from particular institutions seek to retain them. In other words, institutional comparative advantages can be profitable. This argument is persuasive, because increasing trade flows do not seem to have homogenised institutional and policy differences across nations.<sup>2</sup> In fact, as we will “rediscover” in our modelling exercise below, due to comparative advantages, nations often prosper, not by becoming more similar, but by maintaining or building on their institutional differences.

In the economics literature on the spatial interactions among governments, Brueckner (2003) identifies two broad categories of models: spillover models and resource flow models. Models in both categories share the feature that policy-makers – either of states within a federation or of nation-states themselves - maximise their utility with a view to the policy choices made in other jurisdictions. The policy objectives often consist of a combination of the welfare of the policy-maker’s own welfare and the welfare of the jurisdiction’s citizens.

Spillover models involve the strategic interaction between jurisdictions (Wilson, 1996). Good examples of spillover effects are environmental abatement and infrastructure investment (e.g., Fredriksson and Millimet, 2002). For many types of pollutants, individuals at home as well as in the foreign country benefit from increased spending on environmental protection at home. In other words, beneficial externalities may be generated by the policy-decisions taken in any one of

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<sup>2</sup>For example, Gaston and Rajaguru (2008) find that domestic concerns are far more important determinants of labour market expenditures than are global influences such as increased trade. Similarly, Gaston and Nelson (2004) find that trade is a less significant economic influence than government indebtedness when it comes to the generosity of unemployment benefits.



the neighbouring jurisdictions.

The most familiar type of resource flow model is concerned with tax competition. The intuition behind tax competition is simple. Economic agents compare their tax burdens with the tax burden of similar individuals in foreign countries. If taxes at home rise, agents have an incentive to emigrate, i.e., they “vote with their feet” in order to avoid higher taxes. This behaviour places downward pressure on the taxes levied by home jurisdictions, i.e., the tax base decreases with higher (own) rates of taxation. Hence, any policy-maker faces the problem of maximising tax revenue given the reaction of its citizens and policy-makers’ policy settings in other neighbouring (possibly, competing) jurisdictions.<sup>3</sup>

Models of how institutions and policies are affected by the policies and institutions chosen by other jurisdictions can be described by the following reduced form (see Brueckner, 2003 or Franzese and Hays, 2007, 2008):

$$y_i = R(y_{-i}, X_i), \tag{1}$$

where  $y_i$  stands for the policy of country  $i$ ,  $y_{-i}$  is the policy choice of ‘related’ countries and  $X_i$  represents a vector of characteristics for country  $i$ . The primary empirical issue is whether economic reforms are driven by domestic factors, such as the strength of domestic lobbies and domestic structural conditions, or by international competition and the reforms adopted by ‘related’ countries. In the next section, we outline a simple resource flow model of economic reform which motivates the choice of regressors and underpins the econometric estimation of equation (1) performed in section 4.

## 3 A simple model of economic reform

### 3.1 Autarchy

Consider an economy consisting of two sectors – a private sector ( $e$ ) and a government or publicly-protected sector ( $g$ ). The latter sector can be thought to be protected by an import barrier or to be directly subsidised. As in Rodrik (1995), the expansion of the private sector must come at the expense of the protected sector. We also assume that the private sector workers are more

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<sup>3</sup>Another type of resource flow model is concerned with welfare competition (see Brueckner, 2000). In these models, the altruistic rich provide transfers to the poor people in their country. The poor work in unskilled jobs and are attracted by the amount of transfers. The policy-maker therefore has to determine the level of transfers which balances the inflow of unskilled workers and the incentives for redistribution by the rich subject to the welfare choices of foreign jurisdictions.

productive than their protected sector counterparts are (so that productivity gains would result from economic reforms). We further assume that wages net of any subsidy or tax are higher in the private sector. All else equal, workers would prefer to work in the private sector. However, not all workers can find jobs in the private sector, so there is distributive conflict.<sup>4</sup>

The marginal (and average) product of workers in the protected and private sectors is  $\theta$  and  $\pi$ , respectively, with  $\pi > \theta$ . Following Rodrik (1995), we model the protected sector as being supported by a subsidy,  $s$ , which is financed by a tax on the private sector,  $\tau$ . (For example, the former could be an import-competing agricultural sector in a developed country or an unskilled-labour intensive manufacturing sector in an LDC.) Net of taxes and subsidies, wages for protected and private workers are

$$w_g = \theta + s \text{ and } w_e = \pi - \tau, \quad (2)$$

with  $w_g \leq w_e$ .

Workers inelastically supply one unit of labour time to either sector. They are heterogeneous with a probability of being employed in the private sector denoted by  $\lambda$ . Hires and layoffs are independent across agents and time. On average, high- $\lambda$  workers spend more time working in the private sector. The distribution of types (abilities) is public knowledge. Workers are assumed to know their type. While employers do not know the worker's exact type, they have a selection mechanism that ensures that high- $\lambda$  workers are hired. The wage differential therefore reflects worker heterogeneity.

The aggregate steady state sectoral employment rates are

$$e^* = \int \lambda dF(\lambda) = \bar{\lambda} \text{ and } g^* = \int (1 - \lambda) dF(\lambda) = (1 - \bar{\lambda}), \quad (3)$$

where  $F(\lambda)$  is the distribution function of worker types. The policy-maker faces the steady state budget constraint

$$\bar{\lambda}\tau = (1 - \bar{\lambda})s. \quad (4)$$

Workers derive utility from private- and protected-sector goods. Utility is assumed to take the simple Cobb-Douglas form:

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<sup>4</sup>Using survey data, Boeri *et al.* (2001) find that conflicts over welfare state reform are mainly to do with the economic situation of individual respondents, rather than differences in political ideology.

$$U_i(c_e, c_g) = \ln c_e + \ln c_g, \quad (5)$$

The relative demand for the two goods is simply

$$\frac{c_g^*}{c_e^*} = \frac{p_e}{p_g} = p, \quad (6)$$

where  $p$  is the relative price of the private-sector good in terms of the public-sector good. The equilibrium (relative) price is determined by the equality of demand and supply, i.e.,<sup>5</sup>

$$\frac{q_g}{q_e} = \frac{(1 - \bar{\lambda})\theta}{\bar{\lambda}\pi} = p^*. \quad (7)$$

Let the policy-maker maximise the following objective:

$$W(s) = \lambda_m V(\mathbf{p}, w_e) + (1 - \lambda_m) V(\mathbf{p}, w_g), \quad (8)$$

where  $V(\mathbf{p}, w_i)$  is the indirect utility function for workers ( $\mathbf{p}$  is the vector of prices) and  $\lambda_m$  is the median value of  $F(\lambda)$ . The first-order condition is

$$\lambda_m V'_s(\mathbf{p}, \pi - zs) + (1 - \lambda_m) V'_s(\mathbf{p}, \theta + s) = 0, \quad (9)$$

where  $V'_s(\mathbf{p}, w_i) = \partial V / \partial s$ ,  $i = e, g$  and  $z = (1 - \bar{\lambda}) / \bar{\lambda}$ . Note that  $z$  does not depend on  $\lambda$ .<sup>6</sup> From equations (5) and (6), it follows that

$$s^* = \left( (1 - \lambda_m) \frac{\pi}{z} - \lambda_m \theta \right). \quad (10)$$

The key results are summarised in the following Proposition.

**Proposition 1**

Define  $m = \lambda_m / \bar{\lambda}$ .

- i. If  $m \leq 1$ , then  $s^* = s_{\max} = \bar{\lambda}(\pi - \theta)$ ;*
- ii. If  $m > 1$ , then  $s^* = \left( (1 - \lambda_m) \frac{\pi}{z} - \lambda_m \theta \right)$ ;*
- iii. A worker with  $\lambda > \lambda_m$  prefers lower subsidies.*

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<sup>5</sup>If the probability of working in the private sector depends on price, i.e.,  $\lambda'(p) > 0$ , then relative supply also depends on  $p$ , which lowers the equilibrium  $p^*$ .

<sup>6</sup>Also note that both prices are independent of changes in  $s$ , due to the balanced budget condition (i.e., equation (4)).

**Proof.** For part *i*, first note that the maximum possible subsidy,  $s_{\max}$ , is determined by the incentive compatibility constraint,  $w_g \leq w_e$ . Next, it is straightforward to show that the subsidy defined by equation (10) is greater than [equal to; less than] the expression for  $s_{\max}$  when  $m < [=; >] 1$ . Part *iii* follows directly from equation (9). ■

In models of voting on welfare in which voters differ only according to their income, support for government spending depends on the ratio of the income of the median voter to the mean income (see e.g., Moene and Wallerstein, 2003). In our model, voter income and welfare depend directly on  $\lambda$ . Part *i* indicates that if the median voter is more likely to work in the protected sector, then the policy-maker sets the maximum possible subsidy. In general, if  $F(\cdot)$  is unimodal and negatively skewed, then  $m > 1$ . In this case, the more likely the median voter is to work in the unprotected sector, part *ii* indicates that the subsidy is lower than the maximum possible subsidy.<sup>7</sup> This is offset by what may be termed a tax base effect, as average income rises (as captured by a higher  $\bar{\lambda}$  or lower  $z$ ), then the policy-maker raises subsidies. Finally, and somewhat obviously, part *iii* shows that workers with a sufficiently high  $\lambda$  always prefer lower subsidies and taxes.<sup>8</sup>

### 3.2 Global Economy

Now we turn to the importance of international linkages and the effects on domestic economic reforms. First, consider the effects of tax competition and labour mobility. In the case of Tiebout sorting, the most heavily-taxed individuals “vote” by migrating to lower tax locations. In our model, these are simply the high- $\lambda$  workers. This “brain-drain” effectively lowers the tax base, i.e., lower taxes in other jurisdictions lower taxes and subsidies in the jurisdiction under consideration.

Secondly, consider the effects of international trade. Suppose that the private sector is the sector of comparative advantage. In the standard trade model, all country differences are supply-side or endowment-based (and therefore, so too is trade). To capture this most simply, allow the dependence of  $\lambda$  on the international terms of trade,  $p$ . That is, relative supply and any worker’s probability of working in the private sector increases with improved terms of trade. From equation (10), the effect of international trade can be seen to *increase* the subsidy. Intuitively, the private sector can only expand by drawing resources from the protected sector. In turn, this raises the

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<sup>7</sup>As an aside, note that as the gap between  $\pi$  and  $\theta$  shrinks (or  $\lambda_m$  increases), the optimal subsidy falls. This is consistent with Persson and Tabellini (1994) who show that the “need” for redistributive policy falls with greater equality.

<sup>8</sup>Our model shares features with Wright (1986) in which protected workers are the unemployed and the subsidy is interpreted as an unemployment benefit.

tax base and therefore raises  $s^*$ . Alternatively, if  $\lambda$  and  $p$  are independent then  $s^*$  is unaffected by more liberal trade.

The relevant results are contained in Proposition 2.

**Proposition 2**

*Economic reforms in a country . . .*

- i. are more vigorously pursued when labour is more mobile and a neighbouring country pursues economic reforms (i.e., tax competition is more important); and*
- ii. are reversed or display a status quo bias when labour is less mobile and trade is more open.*

**Proof.** For part *i*, assume no trade, but costless mobility between, Home,  $H$ , and Foreign,  $F$ . Assume that  $H$  and  $F$  are identical in all respects except that  $\lambda_m^H < \lambda^F \leq 1$ . From Proposition 1, the taxes and subsidies in  $H$  are higher, i.e.,  $s^H > s^F$  and  $\tau^H > \tau^F$ . A type- $\lambda$  worker moves from  $H$  to  $F$  iff:  $\lambda V(\mathbf{p}^H, w_e^H) + (1 - \lambda)V(\mathbf{p}^H, w_g^H) < \lambda V(\mathbf{p}^F, w_e^F) + (1 - \lambda)V(\mathbf{p}^F, w_g^F)$ .<sup>9</sup> Note that  $w_e^H < w_e^F$  and  $w_g^H > w_g^F$ . It follows that all workers of type  $\lambda > \tilde{\lambda}$ , where  $\tilde{\lambda} \in (\lambda_m^H, \lambda^F)$  migrate.<sup>10</sup> If  $m \leq 1$ , the migration of high- $\lambda$  workers lowers  $\bar{\lambda}^H$  and by Proposition 1 part *i*, lowers  $s^*$  in  $H$ . Alternatively, if  $m > 1$ , the migration of high- $\lambda$  workers lowers  $\lambda_m^H$ , which by equation (9) also lowers  $s^*$ .

For part *ii*, assume no mobility, but a free trade agreement between  $H$  and  $F$ . Suppose that the private sector is the sector of comparative advantage in  $H$ . The sector can only expand by drawing resources from the protected sector, i.e., the distribution  $F(\cdot)$  is translated to the right, so that  $e^*$  rises and  $g^*$  falls. When  $m \leq 1$ , this trivially raises the tax base and therefore raises  $s^*$ . If  $m > 1$ , then  $\lambda_m$  is higher, which by equation (9) raises  $s^*$ . Obviously, if  $\lambda$  is independent of prices, then  $s$  remains unchanged. ■

In other words, freer trade may be inimical to economic reform! This somewhat counter-intuitive result is explicable from a different, but obviously related, perspective. Consider the simple two country-two sector standard trade model. Differences in the shapes of the production possibility frontiers reflect the pattern of comparative advantages. Suppose that the two countries have identical endowments but different economic institutions. Obviously, economic freedoms are

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<sup>9</sup> $\lambda$  is a person-specific parameter. However, the following proof goes through as long as the probability of employment in the unprotected sector,  $\lambda$ , is non-increasing in the subsidy to the protected sector, which seems reasonable.

<sup>10</sup>Recall that  $z$ , and  $\bar{\lambda}$ , are independent of  $\lambda$ . Hence, the individual migration decision of a type- $\lambda$  worker is not affected by the expected impact on prices at home and abroad.

highly unlikely to affect both sectors equally. It follows that diversity in economic institutions can be a source of gains from trade. Moreover, even if the less free country has an absolute *dis*-advantage in the production of both goods, it has a comparative advantage in the production of one of the goods. Moreover, in the context of the Ricardo-Viner model, freer trade benefits the specific factor of production in the exporting sector. While the sum of these gains from trade may fall short of the total gains from reforming the entire economy, if the specific factor owner in the export sector is politically influential, then reforms will not be pursued. That is, trade reinforces a status quo bias. Ironically, a reversion to autarchy is likely to increase the demand for domestic economic reform.<sup>11</sup>

The results indicate two main effects on any country’s economic reform process. First, what happens in neighbouring countries is likely to be important. Assuming, as seems reasonable, that the costs of factor mobility are inversely related to distance, we hypothesise that economic reforms in the closest neighbours are likely to be important for domestic reforms. This is a manifestation of what is termed the first law of geography, or Tobler’s Law, which states that “*everything is related to everything else, but near things are more related than distant things*” (see Franzese and Hays, 2008). Secondly, the effects of international trade do *not* help to transmit economic reforms from trading partner to trading partner. Of course, this latter result is the more interesting one, because it runs counter to so much popular wisdom.

## 4 Empirical Analysis

### 4.1 Econometric model

Let  $y$  be the measure of economic reform. Our model relates each country’s  $y$  to its own characteristics and to the  $y$  of other countries, as in equation (1) in section 2. The estimating equation can therefore be written as

$$y_{it} = \alpha y_{it-1} + \beta \sum_{j \neq i} \omega_{ijt} y_{jt} + \gamma X_{it-1} + \eta_i + \phi_t + \varepsilon_{it}, \quad (11)$$

where  $\alpha, \beta$  and  $\gamma$  are unknown parameters (the latter a vector).  $\eta_i$  is a country-specific fixed effect,  $\phi_t$  is a time effect and  $\varepsilon_{it}$  is a normally distributed random disturbance with zero mean.

We model economic reforms as the difference of a country’s current economic freedom value and

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<sup>11</sup>Practically speaking, India may be an example; while it is politically freer than China, it is economically less free (Foreign Policy, 2005). On the other hand, our model implies little about the extreme cases in which *both* trade and factor mobility are abrogated (e.g., North Korea).

its last period's value.<sup>12</sup> If we assume that only the level of economic freedom exhibits unobserved country characteristics, then equation (11) can be estimated by pooled OLS ignoring  $\eta_i$  as they are eliminated by differencing. The  $\omega_{ijt}$  represent non-negative weights, which are specified a priori. These weights indicate the relevance of other countries  $j$  in the diffusion of reforms. In essence, they can be viewed as part of jurisdiction  $i$ 's characteristics. The weights typically capture the location of  $i$  relative to other jurisdictions. Once the pattern of interaction has been specified, the weights are normalised so that their sum equals one for each  $i$ . In what follows, the weights are motivated by the theoretical considerations raised in the previous section as well as subjective judgements about the pattern of interaction.

The use of panel data may also help eliminate spatial error dependence, which arises through spatial autocorrelation of omitted variables (Brueckner, 2003; Franzese and Hays, 2007, 2008). When the influence of such variables is captured in country-specific intercept terms, the remaining error term in the equation may exhibit little spatial dependence. Since the lagged endogenous variables and the error term in equation (11) are correlated in panels with a limited time dimension (see Nickell, 1981) and our panel has a large cross section but a small time dimension, we estimate the coefficients in equation (11) by the generalised methods of moments (GMM) technique proposed by Arellano and Bond (1991). This technique uses the pre-determined lags of the system variables as instruments to exploit a potentially large set of over-identifying restrictions and provides consistent coefficient estimates (Bond, 2002).

More specifically, we obtain our estimates using the two-step estimator implemented by Roodman (2006) in Stata, including Windmeijer's (2005) finite sample correction.<sup>13</sup> We treat the lagged dependent variable and the weighted economic reforms of related countries as endogenous and the additional covariates as strictly exogenous (i.e., their lags are used as instruments). We report results of the Sargan-Hansen test for the validity of the instruments (which amounts to a test for the exogeneity of the covariates) as well as the Arellano-Bond test of first- and second-order autocorrelation. While first-order autocorrelation has to be present in order for the estimator to be consistent, second-order autocorrelation must be absent. We use six lags as instruments. Doing so reduces the number of instruments to 92 or less, depending on the specification (the exact numbers are given in Table 1). It is necessary to limit the number of instruments, otherwise

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<sup>12</sup>This practice follows Belke *et al.* (2007), Dreher and Rupprecht (2007) as well as Heckelman and Knack (2008).

<sup>13</sup>There are two closely related estimators for dynamic panel data models. The first is the Arellano and Bond (1991) estimator and the second is an augmented version outlined in Arellano and Bover (1995) and developed in Blundell and Bond (1998). The original estimator is sometimes called "difference GMM", and the augmented one, "system GMM". See Bond (2002) for an introduction to these estimators.

the Sargan-Hansen test has low power (see Bowsher, 2002).<sup>14</sup>

## 4.2 Data

To examine whether economic reforms are transmitted from country to country we use the change in the Index of Economic Freedom developed by the Heritage Foundation and the Wall Street Journal (see Kane *et al.*, 2007).<sup>15</sup> The overall Index of Economic Freedom is measured on a scale of 0 to 100 and is calculated as the mean of ten sub-components, which are also measured on scales of 0 to 100. Higher values indicate an economic environment or set of policies that are more conducive to economic freedom. The sub-components and their definitions are displayed in Appendix Table A-1.

The vector of covariates includes variables that have previously been used in the literature on the determinants of economic reforms (e.g., de Haan and Sturm, 2003 and Heckelman and Knack, 2008). Specifically, we include the change in civil liberties, the annual growth rate of real GDP, inflation, as well as aid received as a percentage of Gross National Income. The first variable can be interpreted as political reforms. This controls for the possibility that a pre-condition for economic reforms might be political reforms. Economic growth and inflation both proxy the domestic “necessity” for economic reform. Aid has also been hypothesised to affect the reform process. Further, we include an European Union (EU) dummy variable and a left-wing government indicator. The latter two variables control for the political environment. Tavares (2004) finds that the political persuasion of the ruling party is important for fiscal policy reforms.

We also include trade openness as suggested by our theoretical model. With the exception of aid, the EU and the left-wing government dummies, all control variables enter the model with one year lags. Lagging mitigates potential endogeneity problems and also takes into account the fact that reforms may take time to implement. The sources and summary statistics of the variables used are given in Table A-2 in the Appendix.

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<sup>14</sup>To test the robustness of our results to different lag structures we estimated the model using from four to eight lags. All the relevant findings remain unchanged. For simplicity, we opt to report the model with the median lag length of six. All other results are available upon request.

<sup>15</sup>There are three major surveys that measure economic freedom: the Fraser Institute’s economic freedom of the world index, Freedom House’s economic freedom indicators and the Heritage Foundation’s indices of economic freedom. The latter has the greatest coverage of countries. However, the three indices are very similar and each has been found to have a strong positive impact on economic growth. “*The chief differences have to do with the degree of emphasis on monetary stability and on the size of the government sector. Both the Fraser Institute and Heritage Foundation surveys take explicit account of the extent to which a country’s monetary institutions have successfully controlled inflation; the Freedom House survey simply assesses whether there is an independent central bank that might protect against citizens’ savings losses via inflation. In addition, both Fraser and Heritage include (as negative indicators) measures of the size of the government sector and tax rates; Freedom House is more neutral on these indicators. The latter difference explains why, for example, the Freedom House survey ranks such countries as Sweden, France, Norway, and Spain more highly than Fraser and Heritage.*” Hanke and Walters (1997, p.126).



Our model highlights the existence of an effect of other countries' reforms on the reform process of the country in question. Hence, the relative differences in economic freedom between countries are fundamental. Our model proposes several characteristics that could influence the interaction. We start by weighting each country equally. This implies that the reforms in each country have the same impact on every other country. Obviously, this is an over-simplification. We denote the simple weight by the label NAÏVE. The second weighting scheme we use is the classical spatial weighting matrix, i.e., the geographical distance between countries. According to resource flow models, such as the one outlined in the previous section, countries that are more proximate may have a greater impact than more distant countries. Greater distance bears directly on the costs of factor mobility, particularly in the case of labour migration. The variable created is labelled DISTANCE.<sup>16</sup> The third weighting scheme we use is related to trade openness. This variable is labelled TRADE.<sup>17</sup>

Our fourth weighting scheme is motivated by the difficulty in discriminating between the last two schemes. In its most basic form, the gravity model of trade assumes that only economic size and distance are important for trade. Specifically, the bilateral trade flow between any two countries is given by:  $T_{ij} = AY_iY_j/D_{ij}$ , where  $T_{ij}$  is the value of trade between country  $i$  and country  $j$ ,  $A$  is a constant,  $Y_i$  the GDP of  $i$ ,  $Y_j$  is the GDP of  $j$  and  $D_{ij}$  is the distance between  $i$  and  $j$ . Hence, if distance between  $i$  and  $j$  doubles, then bilateral trade halves. Unfortunately, the gravity model underestimates actual trade in some instances. The difficulty for present purposes is that measured trade flows might seriously understate actual openness. For example, according to Polak (1996, p.535), the 'location index' score for the Netherlands is six times more favourable than that for Australia. Since Australia and the Netherlands have about the same income and population, then according to the gravity model imports by the Netherlands should be about six times larger than Australia's. However, the actual ratio in 1990, even with a strong EU effect, is about three. To separate the effects of distance and a "pure" trade effect we create a fourth weighting scheme labelled TRADEG. This is created by taking the product of actual unscaled bilateral trade flows and distance for each pair of countries.<sup>18</sup>

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<sup>16</sup>The data on distances are from CEPII (2006). For each country, we first take the maximum bilateral distance. This value is subtracted from the remaining distances. After this transformation, the most distant country receives a value of zero and the other countries receive a positive value which rises the closer they are to the country in question. These weights are then normalised to sum to one by summing all distances and dividing each distance by the sum. Finally, the weights are multiplied by the pertinent value of economic reform.

<sup>17</sup>Openness is defined as a country's (total exports + total imports) ÷ GDP. Countries with greater openness receive a greater weight, while the own openness is excluded from the calculation. Again the weights are normalised by dividing each openness value with the total sum. The data are from World Bank (2006).

<sup>18</sup>The data on bilateral trade flows are from Comtrade (2007). We take the average of annual bilateral trade flows from 1995 to 2005. The product of bilateral trade flows and distances are normalised in the manner already described.

Our final weighting scheme is LANGUAGE. The motivation in this case is that a common language lowers the cost of communication and also represents a common culture and heritage.<sup>19</sup> It's a different perspective on distance than geographical proximity.

### 4.3 Results

Since there is no formal test for Arellano-Bond GMM versus pooled OLS, we estimated our model using both techniques. While the results from the two estimation procedures are qualitatively similar there are some differences. Accordingly, we focus on the GMM results which are reported in Table 1.<sup>20</sup> In order to address the problem of separating common shocks (which could lead to a “mechanical” transmission of economic reforms) from our hypothesised channels of spatial interdependence, we incorporate time fixed effects in all specifications.

The ten columns of Table 1 contain estimates for the five weighting schemes. For each weighting scheme we display the results from a parsimonious specification and for the most complete specification. In the latter we treat aid as endogenous, following Heckelman and Knack (2008). As for the covariates, it is clear from all specifications that most of the included variables have little impact on the economic reform process, at least for the time period we examine (1995-2006). In other words, inflation, left-wing governments, openness and aid have generally not fostered economic reforms.<sup>21</sup> The result for economic growth indicates that economic reforms have a greater chance of being implemented during periods of economic expansion. During expansions, adjustment costs are more likely to be easier to bear. The result for political reforms gives mild support to the notion that past political reforms help foster economic reforms.<sup>22</sup> (However, the latter finding is not robust.)

Although statistically significant is just one specification, the dummy for membership of the EU always exhibits a positive sign. This may reflect the movement towards greater reforms in the EU area for the time period studied. Past economic reforms are significant in some of the specifications, where they enter with a negative sign. This is consistent with the argument that reforms display a status quo bias, i.e., there is no convergence to a common norm. This finding is

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<sup>19</sup>The data are from CEPII (2006). The countries are weighted equally if they share the same language. All other countries are assigned a zero weight.

<sup>20</sup>If the results of both estimation procedures are similar, then the pooled OLS results are preferable as they are more efficient. However, if the results differ, then the Arellano-Bond results are more reliable. Franzese and Hays (2007, 2008) note the broad similarity of what they term spatial OLS and maximum likelihood estimators when investigating the impact of spatial interdependence on various social spending programmes. An appendix containing the pooled OLS results is available from the authors on request.

<sup>21</sup>The statistical insignificance of additional control variables is in line with the existing spatial dependence literature.

<sup>22</sup>Before calculating the changes in the civil liberties indicator we inverted the scale so that positive numbers indicate greater freedom. This ensures that a positive value indicates a reform towards greater freedom.

very much in line with Hall and Soskice’s (2001) notion that national institutional architectures are distinct and tend to remain so, i.e., there is no convergence to some (possibly, U.S.) benchmark.

Although not displayed in Table 1, we find that some of the time dummies for 2002 and after are statistically significant and negative. This could be indicative of a world-wide reaction to the terror attacks of September 11, 2001 and may give credence to the observation that in the aftermath of the attacks many countries reacted by tightening security and introducing restrictions on individual freedom. It is possible that economic freedom may have also been stifled.

Most interest obviously centres on the results attributable to the different weighting schemes. The atheoretical NAÏVE weighting scheme is significant only in the absence of control variables. The rest of the world clearly matters, but not in an undifferentiated way. Addressing the exact magnitude of the different spatial relationships it is clear that geographic distance is the most important transmission mechanism for reforms. While the rest of the world matters, reforms in the “closest” countries are the most important factor behind the push for reforms in any country. This not only holds for geographical proximity (DISTANCE), but also for cultural proximity as measured by LANGUAGE.

The results for trade openness are also extremely interesting. Note two things. First, a country’s own trade openness does not affect its economic reform process. Secondly, the reforms in trading partners (weighted by either trade weight, i.e., TRADE or TRADEG) do not influence domestic reforms. This implies that trade openness is *not* driving the reform process. That is, international trade is *not* the main vehicle for conveying economic freedom and reforms as is sometimes claimed.<sup>23</sup> Rather it is proximity which is the relevant factor for the transmission of economic reforms from other countries.

To ascertain the sensitivity of our key findings, we conduct extensive tests of robustness. The results are displayed in Table 2. To keep the table tractable, we generally focus on results involving the DISTANCE weighting scheme which our analysis identifies as the most important transmission mechanism.<sup>24</sup> To further examine this finding we use a variant of measuring geographical proximity: a common border. For the BORDER weighting scheme, we weight the reforms of all adjoining neighbours equally.<sup>25</sup> The results are displayed in the first two columns. Consistent

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<sup>23</sup>Martin *et al.* (2008) find a somewhat related and intriguing result. They show that trade does not promote peace, even when trade is beneficial to all. On the other hand, they find that the probability of war is lower for countries that trade more bilaterally because of the opportunity cost associated with the loss of trade gains. Countries that are more open to global trade have a higher probability of war because multi-lateral trade openness decreases bilateral dependence on any given country.

<sup>24</sup>All models have been tested, however. In general, all previous findings are robust. The results of all robustness tests are available from the authors upon request.

<sup>25</sup>The data on common borders are from CEPII (2006).

with the results for DISTANCE, there is a positive and statistically significant effect. While the variable becomes insignificant in column (2), this might be driven by the significant drop in the degrees of freedom due to the reduced sample size and the sharp rise in the number of instruments. Overall, the results reinforce the relevance of the most obvious dimension of proximity.

Next, we test whether there was in fact a common negative shock in the world which reduced economic reforms by replacing the time fixed effects with a post-9/11 dummy variable in specifications (3) and (4). The coefficient is not statistically significant, i.e., evidence of a general world-wide reversal of economic reforms after the September 11, 2001 attacks is absent.

We also check whether our empirical model picks up the possibility that the world “has gotten smaller”, i.e., whether economic freedom are affected by the advances in international communication and exchange of information. We capture this possibility by including the social globalisation sub-index of the KOF index of globalisation in specification (5). This sub-index consists of variables measuring personal contact, data on information flows and data on cultural proximity. It ranges between 0 and 100 where higher values indicate a higher level of social integration.<sup>26</sup> As with the other covariates, the social globalisation variable is lagged. The estimates in column (3) reveal little change compared to the results reported in Table 1. The distance-weighted reform variable remains positive and significant at the five per cent level and the magnitude of the effect is comparable. In addition, the index of social globalisation is insignificant, i.e., our results are not driven by the increased global flow of information.

In addition, in column (4) we include a dummy variable indicating the presence of an IMF programme to emphasise the role of specific forms of aid.<sup>27</sup> As in Dreher and Rupprecht (2007), we include this variable with a one year lag and treat it as endogenous because IMF programmes might be implemented in countries conditional on reforms being undertaken. We find no effect of IMF programmes on the level of reforms and the remainder of our findings are unaffected by the inclusion of this variable.

As a final robustness check, in the last two columns of Table 2 we exclude OECD members from our analysis and re-estimate our model for non-OECD countries. In this case, we have to modify our specification slightly, because all (current) EU members are members of the OECD, the EU dummy is omitted. For the non-OECD countries, the diffusion of reforms based on proximity

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<sup>26</sup>For details about the measurement of the KOF index, see Dreher (2006a) and Dreher *et al.* (2008). The data are available at: [http://globalization.kof.ethz.ch/static/rawdata/globalization\\_2007\\_short.xls](http://globalization.kof.ethz.ch/static/rawdata/globalization_2007_short.xls).

<sup>27</sup>The IMF variable indicates whether a country is subject to a stand-by arrangement, extended fund facility arrangement, structural adjustment facility arrangement or enhanced structural adjustment facility arrangement. A dummy variable is used because a country can generally only have one IMF programme at a time. See Boockmann and Dreher (2003) and Dreher and Rupprecht (2007).

prevails, i.e., our results are not driven by the developed countries alone.

## 5 Conclusion

We have examined whether a country's economic reforms are affected by the reforms in other countries. A simple model of economic reforms is developed to motivate the econometric work. Unsurprisingly, the model predicts that reforms are more likely when factors of production are more internationally mobile. Consequently, assuming that the costs of factor mobility are positively correlated with distance, the economic reforms in neighbouring countries are more likely to be influential. More interesting is the finding that reforms do not become more important when trade flows are larger. Within the narrow confines of the tax competition model considered, this finding results because freer trade expands the tax base. This is consistent with the cross-country empirical research that finds that government budget constraints and indebtedness restrict the freedom of the welfare state to spend on its preferred programmes.

We used changes in the Index of Economic Freedom, developed by the Heritage Foundation and the Wall Street Journal, as the measure of market-liberalising reforms to examine two issues. First, we examined whether economic reforms are 'habit-forming', and secondly, we tried to identify the most important channels, or diffusion mechanisms, through which reforms are transmitted from country to country. For a panel of 144 countries and the years 1995-2006, we found little evidence that reforms are habit-forming, if anything there is evidence of a status quo bias. However, we do find evidence of the importance of reforms in other countries. Consistent with our model, the most important factor for transmitting economic freedom and reforms is geographical and cultural proximity and not international trade. What is happening next door is most important for the economic reform process.

Table 1: The determinants of economic reforms – dynamic panel estimation

Weighting Scheme	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	NAÏVE	NAÏVE	TRADE	TRADE	TRADEG	TRADEG	DISTANCE	DISTANCE	LANGUAGE	LANGUAGE
Economic Freedom (t-1)	-0.031 (0.046)	-0.054 (0.050)	-0.044 (0.103)	-0.051 (0.084)	0.073 (0.137)	-0.140 (0.106)	-0.098** (0.048)	-0.094* (0.053)	-0.107 (0.073)	-0.149** (0.068)
Growth (t-1)	0.017 (0.013)	0.036* (0.019)	0.014 (0.013)	0.036 (0.023)	0.032* (0.017)	0.035 (0.022)	0.011 (0.009)	0.030* (0.016)	0.015 (0.012)	0.027 (0.025)
European Union	0.072 (0.155)	0.334 (0.238)	0.219 (0.202)	0.261 (0.233)	0.023 (0.166)	0.393* (0.236)	0.000 (0.196)	0.208 (0.228)	0.122 (0.263)	0.303 (0.288)
Aid		0.018 (0.024)		0.007 (0.026)		0.040 (0.027)		0.010 (0.022)		0.027 (0.026)
Inflation (t-1)		0.000 (0.000)		0.001 (0.001)		0.001 (0.001)		-0.000 (0.000)		-0.001 (0.002)
Openness (t-1)		0.002 (0.002)		0.003 (0.002)		0.001 (0.002)		0.002 (0.002)		0.001 (0.002)
Political Reforms (t-1)		0.234 (0.220)		0.202 (0.265)		0.342* (0.199)		0.071 (0.216)		0.498** (0.236)
Left-Wing Government		0.074 (0.195)		0.048 (0.214)		0.217 (0.219)		0.083 (0.207)		-0.088 (0.207)
NAÏVE	1.102** (0.517)	-2.880 (2.468)								
TRADE			-0.499 (1.967)	-2.347 (2.132)						
TRADEG					-0.510 (0.431)	-0.403 (0.343)				
DISTANCE							1.629*** (0.459)	3.259*** (1.213)		
LANGUAGE									0.428* (0.223)	0.305* (0.157)
Constant	-0.143 (0.304)	2.494 (1.793)	1.068 (1.906)	2.639 (2.036)	0.358* (0.186)	0.372 (0.274)	-0.294 (0.286)	-1.945** (0.948)	0.198 (0.173)	0.076 (0.312)
Observations	1282	1107	1143	1107	1282	1107	1282	1107	1010	869
Number of countries	144	141	144	141	144	141	144	141	113	111
Sargan-Hansen (p-value)	0.679	0.317	0.242	0.199	0.327	0.457	0.410	0.565	0.359	0.334
Instruments	46	76	56	92	68	92	68	92	68	92
AR1 (p-value)	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000
AR2 (p-value)	0.613	0.713	0.912	0.708	0.399	0.678	0.904	0.872	0.988	0.735

Table 2: The determinants of economic reforms – robustness tests

Weighting Scheme/Sample	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	BORDER	BORDER	DISTANCE	DISTANCE	DISTANCE	DISTANCE	non-OECD	non-OECD
Economic Freedom (t-1)	-0.139 (0.155)	-0.121 (0.115)	-0.107** (0.050)	-0.095* (0.052)	-0.078 (0.055)	-0.082 (0.053)	-0.124** (0.050)	-0.120** (0.058)
Growth (t-1)	0.015 (0.011)	0.030 (0.023)	0.014 (0.009)	0.037* (0.021)	0.036 (0.035)	0.023 (0.019)	0.008 (0.010)	0.016 (0.018)
European Union	-0.265 (0.216)	0.203 (0.240)	-0.014 (0.182)	0.221 (0.207)	0.234 (0.242)	0.352 (0.272)		
Aid		0.017 (0.025)		0.007 (0.023)	-0.003 (0.024)	-0.002 (0.022)		0.014 (0.024)
IMF Programmes (t-1)						0.497 (0.461)		
Inflation (t-1)		0.000 (0.001)		0.000 (0.000)	0.001 (0.001)	-0.000 (0.001)		-0.001 (0.001)
Openness (t-1)		0.002 (0.002)		0.002 (0.002)	0.003 (0.002)	0.003 (0.002)		0.002 (0.003)
Political Reforms (t-1)		0.277 (0.280)		0.107 (0.221)	0.316 (0.264)	0.104 (0.230)		0.09 (0.243)
Left-Wing Government		0.009 (0.231)		0.086 (0.225)	-0.033 (0.232)	0.015 (0.232)		0.253 (0.229)
Post-911			0.119 (0.234)	0.003 (0.268)				
Social Globalisation (t-1)					-0.001 (0.006)			
BORDER	0.711*** (0.157)	0.171 (0.141)						
DISTANCE			1.330*** (0.348)	1.254*** (0.367)	3.861*** (1.283)	2.301* (1.254)	1.986*** (0.531)	4.031*** (1.207)
Constant	0.226 (0.174)	0.243 (0.316)	-0.222 (0.245)	-0.542* (0.296)	-2.555** (1.095)	-1.489 (0.965)	-0.385 (0.341)	-2.279** (0.973)
Observations	1136	989	1282	1107	886	1107	1015	870
Number of countries	127	125	144	141	112	141	115	112
Sargan-Hansen (p-value)	0.268	0.216	0.456	0.470	0.329	0.311	0.543	0.758
Instruments	68	92	68	92	92	123	68	92
AR1 (p-value)	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000
AR2 (p-value)	0.609	0.721	0.811	0.957	0.522	0.780	0.934	0.648

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## Appendix

Table A-1: The components of the Index of Economic Freedom

<b>Sub-index</b>	<b>Description</b>
Business freedom	Ability to create, operate, and close an enterprise quickly and easily
Trade freedom	Absence of tariff and non-tariff barriers which affect imports and exports of goods and services
Monetary freedom	Presence of price stability with an assessment of price controls
Freedom from government	Size of government expenditures – including consumption and transfers – and state-owned enterprises
Fiscal freedom	Burden of government from the revenue side – including top tax rate and tax revenue as portion of GDP
Property rights	Assessment of the ability of individuals to accumulate private property, secured by clear and enforced laws
Investment freedom	Unobstructed flow of capital – especially foreign capital
Financial freedom	Measurement of banking security as well as independence from government control
Freedom from corruption	Assessment of the perception of corruption in the business environment – including levels of governmental legal, judicial, and administrative corruption
Labour freedom	Ability of workers and businesses to interact without restriction by the state

Source: Kane *et al.* (2007), Chapter 3.

Table A-2: Variable sources and descriptive statistics

<b>Variable</b>	<b>Mean</b>	<b>Std.Err.</b>	<b>Min</b>	<b>Max</b>	<b>Source</b>
Economic reforms	0.60	2.72	-10.37	17.08	Kane <i>et al.</i> (2007)
Growth (real annual rate)	4.07	5.58	-31.30	106.28	World Bank (2006)
EU dummy	0.12	0.33	0	1	EU homepage
Aid (per cent of GNI)	4.73	7.59	-0.69	62.87	World Bank (2006)
IMF programme dummy	0.37	0.48	0	1	Dreher (2006b)
Inflation (GDP deflator)	15.12	58.10	-23.48	1172	World Bank (2006)
Openness ([imports + exports]/GDP)	82.79	44.69	1.53	376.22	World Bank (2006)
Political reforms	0.06	0.35	-2	2	Freedom House (2006)
Left-wing government dummy	0.31	0.46	0	1	Beck <i>et al.</i> (2001)
Social globalisation	51.42	21.22	9.71	93.1	Dreher <i>et al.</i> (2008)