

# Democratic Institutions and Equity Market Liberalization

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**Abstract:** In the past two to three decades, the financial liberalization of equity markets has grown rapidly across the developing world. Concurrent with financial liberalization, there has been there has been a global movement toward democracy in several developing countries since the late 1970s. Are these two trends – democratization and liberalization of equity markets – related? Are new democracies in the developing world more likely to initiate equity market liberalizing reforms compared to autocracies? This paper attempts to address these questions empirically by testing the impact of democratization on equity market liberalization via estimation of an original Spatial Autoregressive Error Heckman Selection model (SAE Heckit model) on a sample of 129 developing countries between 1980 and 2008. The SAE Heckit model and its main properties are presented in some detail as it will be shown that it is a useful tool for empirical analysis for scholars of international finance. Note that estimates from the SAE Heckit model provide strong statistical support for the claim that democratization has a positive effect on equity market liberalization. This result remains robust across different specifications.

## 1. Introduction

In the past 25 years, the financial liberalization of equity markets has grown rapidly across the developing world. The sharp increase in equity market liberalization has been followed with an equally dramatic increase in portfolio capital flows to developing countries and particularly to large emerging markets in the developing world (Prasad *et al* 2003). Yet the turn to greater liberalization of domestic stock markets to especially flows of foreign portfolio capital is by no means ubiquitous across the developing world. For instance developing countries in East and Central and Latin America have been relatively more receptive to equity market liberalization compared to nations in Africa and Asia (Standard and Poors 2000; Bekaert *et al* 2001).

Why do some developing countries liberalize their equity markets more rapidly than others? Put differently, why are some equity markets in the developing world more open than others? Interestingly, a large volume of research has developed in empirical finance in recent years trying to understand the *consequences* of equity market liberalization on volatility of growth, interest rates and inflation (e.g. Beck *et al* 2000; Prasad *et al* 2003; Bekaert *et al* 2001, 2004). However, relatively less research has been conducted on the determinants of stock market liberalization in especially developing countries. The few extant empirical studies that examine when developing countries are more likely to liberalize their equity markets either focus on the IMF's role in "coercing" governments in the developing world to liberalize their financial markets<sup>1</sup> or examine how the degree of domestic financial development influences the likelihood of liberalization of equity markets.<sup>2</sup>

While useful, these studies potentially ignore or underestimate another key *political* factor that may have driven not just equity market liberalization in some developing countries but could also

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<sup>1</sup> See, for example, Abiad and Mody (2005).

<sup>2</sup> A fairly large literature examines how financial development, in particular the degree of stock market capitalization, affects equity market liberalization in the developed and developing world. In this regard, see, for instance, Beck *et al* 2000; Kim and Singal 2000.

account for variation in the liberalization of financial markets liberalize their equity markets. This paper submits that a critical political factor that has arguably driven equity market liberalization in the developing world and which has been underappreciated in the empirical finance literature is the introduction of democratic institutions, i.e. democratization, in several developing countries around the globe that were previously autocracies.

Specifically, from the late 1970s onwards, there has been a global movement toward democracy that has been recognized by political scientists. For instance, in 1975, there were approximately thirty democracies in the world. By 1994 there were about ninety-five democracies, which was slightly more than half the total number of independent countries in the world. By 2002, this figure had risen to more than 120 countries. On the other side of the coin, data has revealed that equity market liberalization has also “taken off” in the developing world since the mid-to-late 1980s. For instance, Bekaert *et al* (2001) point out that more than 30 developing countries have undertaken drastic steps toward equity and financial markets liberalization starting from the 1980s. A later study by these authors that uses a continuous measure of equity market liberalization further confirms that several developing countries and emerging markets were increasingly “jumping on the bandwagon” of stock market liberalization policies from the mid-1980s.

Are these two trends – that is, democratization and liberalization of equity markets – related? Are democracies more likely to initiate financial markets, specifically equity market, liberalizing reforms than autocracies? This paper attempts to address this question empirically. That is, I test carefully whether or not the introduction of democratic institutions in the developing world has had a positive impact on liberalization of domestic markets. There are two key innovations in the empirical tests conducted in this paper. First, as described later, I use a relatively larger sample of developing countries to test the idea that the phenomenon of democratic transitions may have had a positive impact on equity market liberalization within developing countries and across the developing world. Second, I both introduce and estimate an original statistical model, the Spatial

Autoregressive Error (SAE) Heckman selection (i.e. SAE Heckit) model on a sample of several developing countries between 1980 and 2004.

The SAE Heckit model has several methodological advantages compared to existing estimators. For one, it not only accounts for the fact that democratization is a non-random phenomenon but also for the possibility that unobservable factors that influence the likelihood of democratization may affect equity market liberalization. Second, and more importantly, it accounts in the estimation process for international diffusion effects –more technically the impact of spatial dependence – on both equity market liberalization and the likelihood of democratization. Estimates from the SAE Heckit model provide strong statistical support for the claim that democratization has a positive effect on equity market liberalization. This result remains robust when I vary the specification and use different measures of the main independent variable.

This paper proceeds as follows. In the next section, I briefly justify why the introduction of democratic institutions and thus democratization is likely to have a positive effect on equity market liberalization.. In section 3, I present the SAE Heckit model in some detail. In sections, 4 and 5, I present the data and results from the statistical model. This empirical paper concludes by discussing the implications of the findings presented here for the literature on empirical finance.

## **2. Testable Hypothesis**

As mentioned earlier, the empirical research on the causes of financial liberalization has been not really focused on developing countries, based almost. Some studies of developed countries have found that the ideology of the dominant party affects financial liberalization, but were unable to provide evidence on the role of the government's ideology in developing countries.<sup>3</sup>

Does politics and/or political institutions and specifically a change in political institutions foster equity market liberalization in developing countries? This paper submits that there are four

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<sup>3</sup> For this see, Kim and Singal (2000).

plausible reasons that may account for why the phenomenon of democratization in the developing world has a positive impact on equity market liberalization. First, in an interesting and important empirical study, Quinn (2000) suggests that democratization plays a crucial role in financial, in his case capital account, liberalization. He suggests that democracies provide useful legal rights that avoid arbitrary harm and that democratization leads to greater respect for property rights. As a result, democratizing developing countries can attract more foreign investors to help develop their economy when the right to undertake international financial transactions is likely to be respected.

Note that if leaders in democratizing developing countries recognize *ex ante* that foreign investors are more willing to invest portfolio capital in their stock markets because these countries respect and recognize the validity of international financial transactions, then these leaders have greater incentives to liberalize their equity markets. Put differently, liberalization of their equity markets combined with the introduction of democratic institutions that may strongly encourage foreign capital inflows *ex post* will provide leaders of democratizing developing countries with powerful incentives to liberalize their domestic equity markets especially given that foreign capital flows can bring real economic benefits in the short and long run.

Second, in a recent study Rodrik (2000) suggested and found empirically that democracies, both new and old, can more easily weather external economic shocks than autocracies. This is an interesting and important claim that has critical applications for this study. Specifically, it is well known that liberalizing domestic equity markets leads to a rapid inflow of foreign portfolio capital that can make domestic more vulnerable to exogenous economic and price shocks. If it is indeed true that democracies are better than autocracies at withstanding economic shocks, as claimed by Rodrik, then incumbent governments in democratizing regimes will be more willing *ex ante* to take the risk of opening their equity markets to foreign portfolio capital inflows. This is because they will recognize that they have the *ex post* ability to handle more competently external shocks stemming from greater equity market openness. Thus rational anticipation of being able to handle *ex post*

exogenous shocks from greater equity market openness will provide the necessary democratizing leaders with the necessary ex ante confidence to adopt equity market reforms.

Third, political scientists have suggested earlier that democratization promotes the political power of especially the skilled middle class in developing countries (see, for e.g., Boix 2003). Note that skilled middle class individuals gain from open stock markets. For one, they are more likely to have investments in stocks and equity whose value typically increases. Consequently, they will have a strong preference for open equity markets that allows for foreign portfolio capital inflows. Since the skilled middle class attains substantial political power in democratizing regimes, governments in such regimes have political incentives to pander to the preferences of the skilled middle class. This implies that that they have incentives to adopt policies that lead to greater liberalization of the equity market.

Fourth, similar to democracies, governments in democratizing regimes are more politically accountable to their electorate compared to autocratic leaders. Greater accountability implies that incumbents in democratizing states have incentives to optimally provide public goods and redistributive transfers to votes. To finance provision of public goods and redistributive transfers, governments in democratizing therefore have incentives to increase capital inflows and investment into their equity markets as taxes on such investment or financial transactions will provide them with revenue needed to finance public spending. In short, political incentives to raise revenue will provide governments in democratizing countries to adopt equity market liberalization.

Gathering the discussion in the preceding paragraphs together thus leads to the following testable hypothesis:

*Hypothesis 1: Democratization increases the degree of equity market liberalization in developing countries.*

### **3. Statistical Model**

To test the claim that democratization has a positive effect on equity market liberalization in developing countries on available data, one needs to explicitly account for certain methodological issues in the estimation process. First, democratization is a non-random phenomenon and

moreover, it is possible that unobservable factors that influence the likelihood of democracy may also affect equity market liberalization. For instance, unobservable strategic factors that influence the governing elite's decision to adopt democracy – which can neither be explicitly measured nor incorporated in the specification—may also affect their (or their successor governments) to liberalize the stock market. Since unobservable factors that account for a non-random phenomenon such as democratization may also liberalization of financial markets in democratizing developing countries and because equity market is operationalized as a continuous variable for the empirical tests (this is described below), I use a Heckman selection model to test this paper's main claim.

But unlike a standard Heckman model, I estimate a sample selection model with spatial autoregressive errors (SAE) in the selection and the outcome equation. The sample selection model is estimated with spatial autoregressive errors (SAE) that specifies spatially autocorrelated disturbances in both the selection and the outcome equation. I estimate the SAE Heckman selection model, also known as the SAE Heckit model, on our data because of two reasons. First, in the political science literature, numerous scholars have suggested that geographical proximity plays a critical role in the international diffusion of economic reform policies including liberalization of equity markets. That is, a country is more likely to increase the degree of liberalization of its domestic stock markets when it observes “neighboring” countries liberalize their stock markets (see, for e.g., Simmons and Elkins 2004).<sup>4</sup> As described below, a key advantage of the spatial Heckit model I employ is that it allows us to control for the influence of international diffusion on equity

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<sup>4</sup> Simmons and Elkins (2004) use spatial econometric techniques to test the effects of diffusion – including diffusion resulting from geographic proximity—on capital account liberalization. The spatial econometric techniques are similar to those used by Franzese and Hays (2005, 2006) and Beck, Gleditsch and Kyle (2006). But none of these scholars estimate a spatial Heckman selection model, as done here.

market liberalization via geographic proximity by explicitly incorporating spatially autocorrelated disturbances in the outcome equation of the empirical model.<sup>5</sup>

Second, political scientists have long recognized and found that international diffusion, i.e. spatial effects, strongly influence the likelihood of democratization (see, for e.g., Gleditsch and Ward 2004; Gleditsch 2005; Coppedge and Brinks 2006). In particular, autocratic countries usually face greater pressures to adopt democratic institutions and practices when other neighboring countries experience democratic transitions. Simple tests conducted on our sample that is described below reveals spatial dependence effects on the likelihood of democratization and the degree of equity market liberalization in our sample. Specifically, Moran-I Statistics for the residuals from a panel probit equation where the democratization dummy is the dependent variable strongly (at the 1% level) rejects the null of zero spatial autocorrelation in data. Likewise, Moran-I Statistics for the residuals from a prais-winsten model estimated where the degree of equity market liberalization is the dependent variable also rejects the null of zero spatial autocorrelation in the data at the 1% level.

To econometrically account for both sample selection and spatial dependence in the data – with respect to democratization and the extent of equity market liberalization – one needs to estimate a two-stage empirical model that accounts for the selection of countries that experience democratic transitions and spatially autocorrelated disturbances. Hence, as mentioned, I estimate a Heckman-type sample selection model with spatial autoregressive errors (SAE) in *both* the selection and outcome equations, which is called the SAE Heckit model. This model, developed by Kelejian and Prucha (1999) and expanded upon by Flores-Lagunes and Schneier (2006), specifies spatially

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<sup>5</sup> If diffusion in terms of geographic proximity may be playing a critical role in determining increasing levels of capital account liberalization, then failing to account for such diffusion-mechanisms –i.e. spatial dependence in the data – will lead to inconsistent and inefficient parameter estimates. Since a SAE Heckit model statistically accounts for diffusion that occurs via geographic proximity in the data, it prevents bias in the parameter estimates and is thus a valid econometric tool.

autocorrelated disturbances (after dropping subscript  $t$  that denotes time for notational convenience):

$$y_{1i}^* = \alpha_0 + x'_{1i}\alpha_1 + u_{1i}, \quad u_{1i} = \delta \sum_{j \neq i} c_{ij} u_{1j} + \varepsilon_{1i} \quad (1)$$

$$y_{2i}^* = \beta_0 + x'_{2i}\beta_1 + u_{2i}, \quad u_{2i} = \gamma \sum_{j \neq i} c_{ij} u_{2j} + \varepsilon_{2i} \quad (2)$$

where  $y_{1i}^*$  and  $y_{2i}^*$  are latent variables with the following relationship with respect to the observed variables  $y_{1i}^* = 1$  if  $y_{1i}^* > 0$  and  $y_{1i} = 0$  otherwise, and  $y_{2i} = y_{2i}^* \times y_{1i}$ . Therefore, (1) is the selection equation that accounts for participation of countries in the IMF's financial stabilization programs while (2) is the outcome equation that estimates the impact of covariates on the degree of capital account liberalization. The two equations (1 and 2) exhibit spatial dependence in their respective error term, as  $u_{1i}$  and  $u_{2i}$  depend on the other  $u_{1j}$  and  $u_{2j}$  through their location in space, as given by the spatial weights  $c_{ij}$  and the spatial autoregressive parameters  $\delta$  and  $\gamma$ . I briefly discuss the operationalization of the spatial weights in (1) and (2) below. At this stage, observe that we assume that the errors  $\varepsilon_{1i}$  and  $\varepsilon_{2i}$ ,  $i=1, \dots, N$  are *iid*  $N(\mathbf{0}, \Sigma)$ .<sup>6</sup> Hence, the statistical model in (1)-(2) can be presented in a reduced form

$$y_{1i}^* = \alpha_0 + x'_{1i}\alpha_1 + \sum_j w_{ij}^1 \varepsilon_{1j} \quad (3)$$

$$y_{2i}^* = \beta_0 + x'_{2i}\beta_1 + \sum_j w_{ij}^2 \varepsilon_{2j} \quad (4)$$

where the weights  $w_{ij}^1$  and  $w_{ij}^2$  are the  $(i,j)$  elements of the inverse matrices  $(1 - \delta C)^{-1}$  and  $(1 - \gamma C)^{-1}$ , respectively, with  $C$  the matrix of spatial weights  $c_{ij}$ . Note that both sets of weights  $w_{ij}^1$  and  $w_{ij}^2$  depend upon the unknown parameters  $\delta$  and  $\gamma$ .

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<sup>6</sup>  $\Sigma = \begin{pmatrix} \sigma_1^2 & \sigma_{12} \\ \sigma_{12} & \sigma_2^2 \end{pmatrix}$

Many weighting schemes have been used to operationalize elements of the geographic diffusion parameter  $w_{ij}$  in spatial regression models by political scientists. For e.g., Simmons and Elkins (2004: 178) use directed trade-flow shares of country  $j$  in country  $i$ 's total for  $w_{ij}$  based on the hypothesis neighboring countries tend to trade more with each other. Franzese and Hays (2006: 174), however, code  $w_{ij} = 1$  for countries  $i$  and  $j$  that share a border and  $w_{ij} = 0$  for countries that do not. Since scholars suggest that a key component of diffusion of equity market liberalization may operate via geographic proximity – i.e. “neighbor effects” where a country may liberalize its stock markets because its neighbors are doing the same – we use a geographic measure of spatial contiguity.

This geographic measure of spatial contiguity is operationalized as the inverse distance between states  $i$  and  $j$ , where  $w_{ij} = 1/d_{ij}$ . As the distance between states  $i$  and  $j$  increases (decreases),  $w_{ij}$  increases (decreases), thus giving less (more) spatial weight to the state pair when  $i \neq j$ . While there is no consensus on how distance between cross-sectional units should be measured, we consider the distance between capital city of countries; data for this variable is drawn from EUgene in the COW dataset. The results reported below remain robust when I use other measures of spatial contiguity including directed trade-flow shares of country  $j$  in country  $i$ 's total and whether or not states share a border.

I use GMM estimation to estimate the SAE Heckit model, as suggested by Kelejian and Prucha (1999), Pinske and Slade (2006) and Flores-Lagunes and Schneier (2006).<sup>7</sup> The GMM estimation technique for the SAE Heckit model is described in the appendix. One key advantage of the GMM estimator is that it accounts for heteroskedasticity induced by the SAE process. Additionally, to correct for serial correlation, I use Newey-West standard errors. Fixed effects are included in the outcome equation of the SAE Heckit model to minimize omitted variable bias.<sup>8</sup>

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<sup>7</sup> The SAE Heckit model is estimated by using the MATLAB *Spatial Statistics Toolbox*, version 2.0.

<sup>8</sup> The outcome equation is also estimated with random effects but the results from the SAE

#### 4. Data and dependent variable

To test the claim that democratization has a positive effect on equity market liberalization in developing countries, I together a time-series-cross-sectional (TSCS) dataset of 129 developing states between 1980 and 2008. The size of the sample is determined primarily by the availability of data that is used to construct the continuous measure of equity market liberalization that is described below. The sample is restricted to 129 developing countries observed between 1980 and 2008 and it consists of developing countries from different regions including Africa, Asia, East and Central Europe and Latin America. The 129 developing countries in the sample are listed in Table 1. As described in more detail below, 67 countries in the sample experienced a democratic transition between 1980 and 2008, another 38 countries remained as dictatorships during this period and finally 24 countries were democratic for the entire time period under consideration. Hence, there is sufficient variation in the main phenomenon of interest, i.e. democratization, to test this paper's main claim.

<< Insert Table 1 about here >>

In the SAE Heckit model, the key dependent variable of interest, the level of *equity market liberalization*, is conceptualized as a continuous variable. Scholars in empirical finance have used a variety of measures to operationalize equity market liberalization (see Bekaert and Harvey 2002a,b; Bekaert, Harvey, and Lumsdaine 2005). Earlier measures operationalized equity market liberalization in dichotomous terms that takes a value of one when the equity market is officially (by regulation) liberalized; otherwise, it takes a value of zero (see Mathieson and Rojas-Suarez 1993; Bekaert, Harvey, and Lumsdaine 2002a). Official liberalization dates that are used to construct this measure are drawn from the chronology presented in Bekaert and Harvey (2005).

While useful, the dichotomous measure of equity market liberalization suffers from three main flaws. First, the binary measure is too coarse and as a result lacks sufficient information about

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Heckit models with random effects are not reported to save space.

the true extent of stock market liberalization. Second, there is controversy about the exact dates in which governments “announced” liberalization of their domestic stock markets. Third, a cursory examination of the news reveals that stock market liberalization occurs gradually over time and is rarely (if ever) an “either closed or open” decision taken by governments. That is governments in emerging markets almost never choose to completely open or retain fully closed equity markets, therein raising the question of the viability of the dichotomous measure described above.

For the tests in this paper, I use for the dependent variable a continuous measure that captures the degree of *equity market liberalization*. This measure takes into account that most liberalizations are not one-time events, but are gradual since they may not be comprehensive at first. The indicator that operationalizes the degree of equity market liberalization follows from Bekaert (1995) and Edison and Warnock (2003), who take the ratio of the market capitalizations of the constituent members of the International Financial Corporation (IFC) investable and the IFC global indices for each country. This measure is defined for each country-year as,

$$\text{equity mkt liberalization} = \frac{MC_{i,t}^{IFCI}}{MC_{i,t}^{IFCG}} \quad (5)$$

where the market capitalization at time  $t$  of country  $i$ 's (i) IFC investable index is  $MC_{i,t}^{IFCI}$  and (ii) IFC global index is  $MC_{i,t}^{IFCG}$ . The ratio of the market capitalization of the constituent firms comprising the IFC Investable index to those that comprise the IFC Global index for each country-year ( $MC_{i,t}^{IFCI} / MC_{i,t}^{IFCG}$ ) measures the extent to which foreign investors can purchase the stock of domestic firms (Bekaert *et al* 2009). Hence, the continuous measure in (5) is based on the ratio of the market capitalization of the constituent firms comprising the IFC Investable index to those that comprise the IFC Global index for each country.

Note that the IFC Global index, subject to some exclusion restrictions, is designed to represent the overall market portfolio for each country, whereas the IFC Investable index is designed to represent a portfolio of domestic equities that are available to foreign investors. Hence, a ratio of one means that all of the stocks are available to foreign investors. For example, during the

1990s Korea lifted foreign ownership restrictions in a number of steps leading to an indicator value that gradually moved from zero to one. In the continuous measure, fully closed countries are assumed to have an indicator value of zero, and fully liberalized countries are assumed to have an indicator value of one.

As mentioned earlier, the continuous measure of *equity market liberalization* has been operationalized for all the developing countries between 1980 and 2008. A key advantage of this continuous measure is that it contains substantial cross-sectional and temporal variation. As a result, one is able to exploit the information available in the panel data set to test this paper's main claim as effectively as possible.

#### **4.1 Independent and control variables**

One needs to operationalize the occurrence of democratization in the sample, which will serve as the key independent variable for testing the central prediction posited earlier. To carefully identify the exact timing of democratic transitions for the countries in our sample, I followed the two-step procedure suggested by Papaioannou and Siourounis (2004: 8-9). First, following recent research on democratic transitions,<sup>9</sup> I identify each episode of democratic transition in the data at the timing of the first international deemed “free and fair elections” and the adoption of a new democratic constitution after a prolonged period of autocratic rule.<sup>10</sup> Based on the aforementioned criteria and the sources mentioned above, I find that during the 1980 to 2008 time period, there have been 58 episodes of democratic transition across the developing countries in the sample for which data on trade barriers is available. Table 2 lists each of these 58 episodes of democratic transitions in the developing countries in the data, the year in which a democratic transition occurred in these countries, and a brief description of each transition event.

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<sup>9</sup> For this see, Boix 2003; Boix and Stokes 2003; and Przeworski *et al* 2000.

<sup>10</sup> In most cases of democratic transition, the adoption of a new constitution and elections occur within one or two years.

Next, I identified significant changes in the nature of political regimes according to the Polity index during the 1980 to 2004 period. Specifically, if the 21-point Polity measure -- ranging from -10 (full autocracy) to + 10 (complete democracy) -- for a country increases from a negative to a positive value and if it remains at the higher democracy score for at least three years, then that country is considered to have experienced a democratic transition. Changing the three year requirement to four, five, six or seven years does not substantively or significantly (in the statistical sense) alter the results I obtain.<sup>11</sup> Hence the main independent variable is a dummy variable *Democratization* that takes the value one in the year in which a democratization episode occurs --based on the criteria described above -- and in all the years following in which the country remains democratic according to Przeworski *et al's* (2000) criteria for a democracy.

Finally, to ensure accuracy, I consulted numerous primary sources to check whether the timing of democratization episodes as recorded in these sources is consistent with the criteria described to code *Democratization*. These primary sources are: (i) the country studies/area handbook series of the Federal Research division of the US library of Congress, (ii) the CIA's *World Fact Book* and (iii) George Kurian (1998), *World Encyclopedia of Parliaments and Legislatures*. The timing of democratization episodes for countries in our sample following the criteria described above matches exactly the occurrence of democracy in these countries according to the aforementioned primary sources. Further, the *Democratization* dummy for these countries also matches closely with the year in

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<sup>11</sup> I do not code countries that experienced a democratic transition in a year and then relapsed into an autocracy the year (or two years) after as a democratization episode. This is because the effect of democratization on trade policies, as envisaged in our model, is meaningful only after some democratic institutions are established properly and at least partially consolidated. And such partial consolidation takes at least two years (see O' Donnell and Schmitter 1986). Fortunately, there only exists one case in our data where the country that experienced a democratic transition relapsed almost immediately into an autocracy; hence the three year criterion that I use is not stringent.

which these countries become a democracy in Przeworski *et al's* (2000) data set thus indicating consistency of our measure with Przeworski *et al's* (2000) operationalization of democracy. Indeed, not surprisingly, the results I report below remains robust when I use the Przeworski *et al* (2000) dummy measure of democracy. Note that the *Democratization* dummy also acts as a dependent variable in the selection equation of the SAE Heckit model.

<<Insert Table 2 about here>>

I now turn to first briefly list the economic and political controls in the outcome equation and then do the same for the selection equation. With respect to economic controls in the outcome equation, scholars have suggested that greater trade openness encourages countries to liberalize their stock market (Bekaert *et al* 2001; Prasad *et al* 2003). Therefore, I control for the well known measure of *Trade Openness* in the outcome equation. It has also been claimed that greater openness to foreign direct investment (FDI) fosters stock market liberalization. I control for *FDI*, which is a country's net foreign direct investment as a percentage of its GDP. The data source is the World Bank's CD-ROM of *World Development Indicators*.

Financial development in developing countries is measured by the stock market turnover ratio (*stock turnover<sub>t,t</sub>*), which equals the ratio of the value of stocks traded to stock market capitalization. Foreign investors should be more interested in the stock market turnover ratio than in other measures of financial development (e.g., the stock market capitalization to GDP ratio and the stocks traded to stock capitalization ratio) because this is a better indicator of the efficiency of the stock market. A small but active stock market will have a high turnover ratio, whereas a large but less liquid stock market will have a low turnover ratio. To control for the possibility that equity market liberalization may lead to a larger stock turnover ratio, I use the one year lagged value of the stock turnover ratio in the outcome equation. I also incorporate real *GDP per capital* in the outcome equation since its plausible that countries with relatively higher per capita income might be more receptive to open financial markets. Data for this variable is drawn from the World Bank's World Development Indicators.

Numerous scholars have suggested that external pressure from international institutions such as the IMF that provides conditional funds to developing countries may have encouraged these countries to reduce their investment barriers on equity markets (Abiad and Mody 2005; Dailami 2000). The claim here is that the IMF has used conditional aid programs to "force" developing countries to liberalize their stock markets. To control for this effect, I include a dummy variable *IMF program* that indicates whether the country has participated in an IMF program and has thus received conditional aid from the IMF. The dummy *IMF Program* is coded as 1 when the IMF provides funds to countries – that voluntarily opt for IMF stabilization programs – in order to (i) assist them in dealing with the effects of externally generated and temporary export shortfalls, (ii) to provide financial assistance for exceptional balance-of-payments difficulties, (iii) to increase reserves and (iv) finally to increase confidence in financial markets. When the IMF provides conditional loans to countries under its financial stabilization program, it almost always “requests” the recipient country to further liberalize its capital account. Note that IMF short-run financial stabilization programs do *not* include programs for long-term economic reform and structural adjustment.

Following the criterion described, three types of IMF funding are provided under its stabilization program: (i) Stand-by (and extended stand-by) Arrangements (SBA), (ii) Supplementary Reserve Facility (SRF) and (iii) Extended Fund Facility (EFF).<sup>12</sup> Therefore, the dummy *IMF program* is coded as 1 when the IMF provides either one or some combination of these three types of funds

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<sup>12</sup> The other three types of IMF short-run financial stabilization programs are (i) Contingency funding facility (CFF), (ii) Buffer Stock funding facility (BSFF) and (iv) Currency Stabilization funds (CSF). Unfortunately, information on when and where these types of funding programs were initiated by the IMF as well as the contents of these programs are extremely weak. Given the poor information we have about these programs, we chose not to include them in our coding of *IMF program*. Fortunately, these programs are rarely offered by the IMF; indeed they make up only 7% of all IMF financial stabilization programs that have been initiated and implemented since 1975.

mentioned above to financially distressed countries that opt to participate in its stabilization program. Data for *IMF program* is drawn from several sources: the IMF's (2004) *Review of Fund Facilities*, Hutchison (2001), Vreeland (2003) and Joyce and Noy (2005).<sup>13</sup>

## 5. Findings and Analyses

In this section, I primarily focus on analyzing the estimates from the outcome equation since this equation includes the key independent variable that is used to directly test the main claim posited in this paper. I then briefly report the results from the selection equation before discussing findings from various robustness and diagnostic tests.

### 5.1 Results from Outcome Equation

A cursory analysis of the data, which is presented in Table 3, indicates confirmation for the idea that democratization promotes equity market liberalization. In particular, Table 3 reveals that in the 1980 to 2008 period the mean level of the dependent variable, *Equity Market Liberalization*, is indeed statistically higher than the mean level of this variable for autocracies during the same period. This descriptive result is encouraging but insufficient.

<<Insert Table 3 about here>>

Model 1 in Table 4 reports the estimates from the outcome equation of the SAE Heckman selection model where *Equity Market Liberalization* is the dependent variable and the *Democratization* dummy is the main independent variable of interest. Model 2 presents the results from the outcome equation with the same dependent variable but where the independent variable is Przeworski *et al'* s (2000) binary measure of *Democracy* that has been updated till 2004.

<<Insert Table 3 about here>>

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<sup>13</sup> Note that fund facilities such as the Structural Adjustment Fund (SAF) and the Poverty Reduction and Growth Facility (PRGF) are not included in the *IMF program* dummy as these funds are used only for long-run structural adjustment.

The coefficient of the dummy variable *Democratization* is positive and highly significant at the 1% level in model 1 where the continuous measure of *Equity Market Liberalization* is the dependent variable. This result statistically corroborates theoretical claim posited earlier that democratization leads to a decline in foreign investment barriers in domestic stock markets and thus engenders equity market liberalization in developing countries. For robustness checks, I replaced the *Democratization* dummy with Przeworski *et al's* (2000) binary measure of *Democracy* in the outcome equation of the SAE Heckit model. This dichotomous measure of democracy also served as the dependent variable in the selection equation of the same SAE Heckit model.

The results from the aforementioned robustness tests are, as mentioned earlier, reported in model 2 of Table 3. Specifically, observe in model 3, the estimate of *Democracy* is positive and highly significant. This result from the robustness estimation exercise thus reveals that the introduction of democratic institutions (and in this case the consolidation of democracy) as well has a statistically positive effect on the degree of equity market liberalization.

With respect to marginal effects, simple calculation from the estimate of *Democratization* in model 1 reveals that when this variable is increased from 0 to 1 and other variables in the outcome and selection equation are held at their mean in the sample, the continuous measure of the dependent variable *Equity Market Liberalization* increases by almost 47.6%. This is a substantively important result and it demonstrated empirically the important impact that the introduction of democratic institutions has on liberalization of stock markets in developing countries and thus emerging markets as well.

The illustration in Figure 1 broadly shows the effect that democratization has on the autoregressive moving average in the degree of equity market liberalization across time in the sample of countries listed in Table 1. Specifically, note that in the first four years after which a democratic transition occurs, i.e. between  $t=0$  and  $t=4$  in figure 1, the degree of equity market liberalization increases, on average, by an astounding 50%. This figure, which is derived from the data, thus illustrates the dynamic and substantial effect that democratization has on stock market liberalization in developing nations. To

further derive and fully understand the substantive effect of *democratization* on *equity market liberalization*, I used the the estimates from model x, and parametric bootstraps,<sup>14</sup> to compute the marginal effect of a 0-to-1 change in the binary *democratization* measure on the level of *equity market liberalization*. The resultant first differences in expected values are reported—via box plots of their distributions—in figure 2 The illustration in this figure first indicates that in developing states that had (and have) not democratized (that is, developing states in which the *democratization* dummy is equal to 0), the effect on *capital liberalization* is statistically insignificant and substantively negligible. By contrast, and in support for hypothesis 1, I find that in developing countries that have democratized (developing states in which the *democratization* dummy is equal to 1), the binary independent variable has a sizable positive effect on *equity market liberalization*. Specifically, a 0 to 1 increase of the dummy *democratization* variable approximately yields an almost 12% increase in the level of equity market liberalization in developing countries. This marginal effect is statistically significant at the 95% confidence level. Hence there exists strong statistical and substantive support for hypothesis 1.

<<Insert Figures 1 and 2 about here>>

Interestingly, the spatial autoregressive error (SAE) term in the outcome equation of models 1 and 2 is statistically insignificant. This indicates that international diffusion pressures for equity market liberalization stemming for reasons related to geography does not significantly, in the statistical sense, affect the degree of liberalization of financial markets. Hence, although for example, it is widely believed by scholars alike that each country in Latin America hastened the pace of financial liberalization in the 1990s because their neighbors were rapidly opening their stock markets to foreign portfolio investment, the statistical results reveal that claims about such spatial effects leading to further equity market liberalization may be exaggerated.

At the same time, however, one does not want to suggest from the statistical insignificance of the diffusion parameter in the empirical models that international diffusion mechanisms have no effect on financial liberalization. It is possible, for instance, that the influence of diffusion on equity

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<sup>14</sup> For the bootstraps in this case,  $m=1000$ . All control variables were held to their means or modes.

market liberalization is conditional on other political or economic variables. Alternatively it is plausible that the absence of temporal variation in the diffusion parameter that is accounted by spatial autoregressive errors may explain why they do not have a significant effect on the level of equity market liberalization that has changed so dramatically in the last 10-15 years. At a minimum, the results in outcome equation in Table 4 suggest that scholars need to theorize more about the influence of international diffusion on equity market and financial liberalization in general before testing the impact of such systemic variables on data.

Having discussed the results obtained for the main independent variable and the autoregressive error, I now turn to briefly report the results from the economic and political control variables in the outcome equations in models 1 and 2. Unlike the strong statistical support we obtain for the prediction in hypothesis 1, the estimated results of the control variables in the outcome equations of the different empirical models provide mixed evidence. For example, the estimate of the controls *IMF program dummy*, *Divided Government* and (surprisingly) *FDI* are largely insignificant in the outcome equations of the SAE Heckit models estimated for the sample of developing countries.

However, the coefficient of the other economic control variables relatively fare much better in the outcome equation. For instance, the estimates of *GDP per capita*, *Trade Openness* and the lag of the *Stock Turnover* variable is consistently significant and in the predicted direction in the outcome equations. Finally, the estimate of the “adjusted” Inverse Mill’s ratio is positive and significant in the outcome equations of all the estimated SAE Heckit models. This indicates albeit indirectly that unobservable factors that influence the likelihood of democracy are also affecting the degree of equity market liberalization in the data.

## **5.2 Selection Equation Results and Robustness tests**

Turning to the estimates of the selection equation of models 1 and 2 –that are reported in Columns A and B in Table 5 respectively – we find that the coefficient of the lag of the *democratization* dummy is positive and significant, which is not surprising. The estimate of *Trade*

*Openness* is also positive and significant, which is along expected lines. The economic variables *GDP per capita* and *Growth rate* are significantly positive in the selection equation, while the OIL dummy is insignificant. The estimate of the SAE parameter in the selection equation of all the SAE Heckit models is positive and significant. This confirms existing studies which suggest that international diffusion of democratic practices and norms helps to promote democratization.

<<Insert Table 5 about here>>

Finally, to check the econometric validity and consistency of the results reported earlier, I conducted some robustness tests and a series of diagnostic checks. First, we added some control variables to the outcome equation of each SAE Heckit model in table 4 and then re-estimated the model, including the selection and the augmented outcome equation. These additional controls in the outcome equation are: *log of inflation*, a de facto *exchange rate regime* variable that is drawn from Reinhart and Rogoff's (2004) data on de facto exchange rates, a dummy for *currency crisis* and *balance of payments* crisis. I do not report the results from the SAE Heckit models with the additional controls owing to space constraints. Including these additional controls did not substantively or significantly alter any of the empirical results discussed earlier. Last but not the least, some standard post-estimation diagnostic checks were conducted on the data set. These diagnostic tests revealed that none of the empirical models estimated for this paper suffer from severe multicollinearity, serial correlation and omitted variable bias and that the residuals are normally distributed.<sup>15</sup>

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<sup>15</sup> The largest VIF value in each empirical model is substantially lesser than 10, thus suggesting that multicollinearity is not a problem. The Breusch-Godfrey LM test failed to reject the null of no serial correlation in all the outcome equations, while Gourieroux et al's (1982) score test failed to reject the null of no serial correlation in the selection equations. The RESET test indicates that the models do not suffer from omitted variable bias and the Jarque-Bera indicates that the residuals approximate a normal distribution.

## 6. Conclusion

This paper has examined the political determinants of when x developing countries liberalized their financial equity markets over the last twenty five years. More importantly, it has demonstrated empirically that the introduction of democratic institutions, i.e. democratization, has played a critical role in increasing the level of equity market liberalization in developing countries. The findings presented here provide at least three main contributions to the study of financial markets liberalization in empirical finance.

First, all but one of the studies of the determinants of financial liberalization has used no more than a handful of developing countries in their sample. This study is among the first to empirically analyze when financial liberalization occurs in a relatively bigger sample of developing countries. Second, this paper is first to propose the idea that democratization may have fostered equity market liberalization in the developing world in the last two to three decades. This hypothesis receives strong empirical support in the data. Third, from an econometric perspective, this study is the first, to the best my knowledge, to estimate a spatial autoregressive error (SAE) Heckman selection model to test the impact of democratization on equity market liberalization. Estimating a Heckit model that explicitly accounts for spatial dependence in the data in the estimation process is necessary given the presence of systematic spatial autocorrelation in the degree of equity market liberalization across developing countries. Despite accounting for spatial autocorrelation in the data, one still found that democratization consistently has a positive and statistically significant effect on equity market liberalization. Hence the results presented here are statistically robust.

An important consideration in developing countries is whether the financial markets are sufficiently developed to warrant opening them to foreign investors. The stock market turnover ratio is used to assess the vitality of the stock market. We find that countries with a more developed stock market open their equity markets earlier, but this variable has a small impact on the timing of financial liberalization.

In addition to the main findings summarized above, this paper also provides some interesting supplementary findings that has largely been overlooked in the extant literature. First, the empirical analysis provides some evidence which shows that higher levels of trade openness encourages developing countries to open up their financial markets at an earlier date. Since the volume of exports from developing to developed countries has grown dramatically in the last two decades, this suggests that trade with developed countries is an important determinant of when financial markets are liberalized. One also finds, perhaps not surprisingly, that financial equity market liberalization occurs earlier in relatively richer countries even among the developing world. Second, this study shows that the effects of international diffusion mechanisms that operate via geographic proximity on equity market liberalization has been exaggerated. Finally, the empirical results presented here suggest that the degree of a developing country's financial development is necessary for equity market liberalization.

Numerous policy recommendations emerge from this study. For one, it suggests that increasing trade with developed countries, which brings about greater interaction with developed countries, should be encouraged as this may strongly encourage developing countries to further liberalize their stock markets. Similarly, efforts to develop a country's stock market and thus promote financial development would help emerging markets to adopt policies that foster liberalization of their financial markets. Most important of all, this study demonstrates that encouraging greater political transparency and openness that results from the introduction of democratic institutions is necessary in order to promote equity market liberalization.

Future research in this issue-area can (and should) develop in two main directions. First, the sample of developing countries used for the tests should certainly be expanded in both cross-sectional and temporal terms. Doing so will increase the generalizability of the statistical inferences presented here. Second, scholars also need to develop a logically consistent theory on why and how democratization promotes equity market liberalization in the developing world. Theoretical work in

this topic will further enhance our understanding of how the introduction of democracy may promote liberalization of equity markets.

### References

- Abiad, A., Mody, A., 2005. Financial reform: what shakes it? what shapes it? *American Economic Review* 95, 66-88.
- Beck, T., Demirgüç-Kunt, A., Levine, R., 2000. A new database on the structure and development of the financial sector. *World Bank Economic Review* 14, 597-605.
- Bekaert, G., Harvey, C.R., Lundblad, C., 2001. Emerging equity markets and economic development. *Journal of Development Economics* 66, 465-504
- Bekaert, Geert and Campbell R. Harvey, 2005, A Chronology of Important Financial, Economic and Political Events in Emerging Markets,  
[http://www.duke.edu/~charvey/Country\\_risk/couindex.htm](http://www.duke.edu/~charvey/Country_risk/couindex.htm)
- Bekaert, Geert, Campbell R. Harvey and Robin Lumsdaine, 2002a, Dating the Integration of World Capital Markets. *Journal of Financial Economics* 65, 203–247.
- Bekaert, Geert, Campbell R. Harvey and Robin Lumsdaine, 2002b, The Dynamics of Emerging Market Equity Flows. *Journal of International Money and Finance* 21, 3, 295–350.
- Bekaert, Geert, Campbell R. Harvey and Christian Lundblad, 2001, Emerging Equity Markets and Economic Development, *Journal of Development Economics* 66, 465–504.
- Bekaert, Geert, Campbell R. Harvey and Christian Lundblad, 2005, Does Financial Liberalization Spur Growth?, *Journal of Financial Economics* 77, 1, 3–56.
- Bekaert, Geert, Campbell R. Harvey, Christian Lundblad and Stephan Siegel, 2005, Growth Opportunities and Market Integration, National Bureau of Economic Research, Cambridge, MA.
- Bienen, H., Van de Walle, N., 1991. *Of Time and Power: Leadership Duration in the Modern World*. Stanford University Press, Stanford.

- Borjas, G.J., 2000. *Labor Economics*. Irwin/McGraw-Hill, Boston.
- Boix, Carles. 2003. *Democracy and Redistribution*. New York, NY: Cambridge University Press.
- Brinks, D. and M. Coppedge. 2006. "Diffusion is no Illusion: Neighbor Emulation in the Third Wave of Democracy." *Comparative Political Studies*, 39(4): 463-489.
- Dailami, M., 2000. Financial openness, democracy, and redistributive policy. Policy Research Working Paper Series 2372, World Bank.
- Flores-Lagunes, A. and Schnier, K.E. 2006. Estimation of Sample Selection Models with Spatial Dependence. Unpublished Manuscript.
- Gleditsch, K., and Ward, M. D. 2003. Diffusion and the International Context of Democratization", Paper delivered in the Conference on the International Diffusion of Political and Economic Liberalization, Harvard, October 3-4.
- Haggard, S., Maxfield, S., 1996. The political economy of financial internationalization in the developing world. *International Organization* 50, 35-68.
- Helleiner, E., 1994. *States and the Reemergence of Global Finance: From Bretton Woods to the 1990s*. Harvard University Press, Cambridge.
- Henry, P.B., 2000. Stock market liberalization, economic reform, and emerging market equity prices. *Journal of Finance* 55, 529-564
- International Finance Corporation, 1999. *Emerging Stock Markets Factbook 1999*. International Finance Corporation, Washington.
- International Monetary Fund, 2002. *World Economic Outlook*. International Monetary Fund, Washington.
- Kenny, L.W., Winer, S.L., forthcoming. Tax systems in the world: an empirical investigation into the importance of tax bases, administrative costs, scale and political regime. *International Tax and Public Finance*.
- Kelejjan, H.H. and I.R. Prucha. 1999. A Generalized Moments Estimator for the

- Autoregressive Parameter in a Spatial Model. *International Economic Review*, 40: 509-533.
- Kim, E.H., Singal, V., 2000. Stock market openings: experience of emerging economies. *Journal of Business* 73, 25-66
- Li, Q., Smith, D.L., 2002. "The dilemma of financial liberalization: policy autonomy and societal demands." *Journal of Politics* 64, 764-790
- Pinkse, J. and Slade, M.E.. 1998. "Contracting in Space: An Application of Spatial Statistics to Discrete-Choice Models." *Journal of Econometrics* 85 (1998), 125-154.
- Pinske, J., Slade, M.E. and Brett, C. 2002. "Spatial Price Competition: a Semiparametric Approach." *Econometrica* 70: 1111-1153.
- Pinkse, J. and Slade, M.E. 2006. "Dynamic Spatial Probit with Fixed Effects using One-Step GMM: An Application to Mine Operating Decisions," *Spatial Economic Analysis*, 1 (1): 53-90.
- Prasad, E.S., Rogoff, K., Wei, S.-J., Kose, M.A., 2003. Effects of financial globalization on developing countries: some empirical evidence. Occasional Paper 220, International Monetary Fund, Washington.
- Przeworski Adam., Michael E. Alvarez, Antonio Cheibub, and Fernando Limongi. 2000. *Democracy and Development: Political Institutions and Well-Being in the World, 1950-1990*. Cambridge: Cambridge University Press.
- Quinn, D.P., 2000. "Democracy and international financial liberalization". Working paper, Georgetown University.
- Quinn, D.P. Inlan, C., 1997. The origins of financial openness: a study of current and capital account liberalization. *American Journal of Political Science* 41, 771-813.
- Standard & Poors, 2000. *Emerging Stock Markets Factbook* 2000. Standard & Poors, New York.
- World Bank, 2002. *World Development Indicators* 2002. World Bank, Washington.

## Appendix

### A. Estimation of SAE Heckit Model:

In the presence of spatial error dependence, MLE of the spatial Heckit model will result in inconsistent estimates of the parameters. Consistent estimates can only be obtained with methods such as MLE that account for the full structure of the non-spherical variance-covariance matrix via multidimensional integrals that depends on the sample size. Unfortunately, approximating multidimensional integrals becomes technically intractable when the sample used is large. Therefore, we follow Pinkse and Slade (1998, 2006), Kelejian and Prucha (1999) and Flores-Lagunes and Schnier (2006) by using a feasible estimator for relatively large samples that achieves consistency by accounting for heteroskedasticity induced by spatial errors. More specifically, we use a two-step procedure a la' Heckman (1976, 1979) that is estimated jointly in a Generalized Methods of Moment (hereafter GMM) framework. The selection equation is estimated using Pinkse and Slade (1998, 2006) and Pinkse *et al's* (2005) GMM estimator, while the outcome equation is estimated with spatial methods proposed by Flores-Lagunes and Schnier (2006). An estimate of the Inverse Mills Ratio (hereafter IMR) is included in the outcome equation to correct for selectivity bias. To estimate these two parts simultaneously, the corresponding moment conditions are stacked, and a GMM criterion function is minimized with respect to all parameters in the model. For estimating the SAE Heckit model in (1)-(2) via GMM, we start with the following calculations from McMillen (1995):

$$\text{var}(u_{1i}) = \sigma_1^2 \sum_j (\omega_{ij}^1)^2 \quad (\text{A.1})$$

$$\text{var}(u_{2i}) = \sigma_2^2 \sum_j (\omega_{ij}^2)^2 \quad (\text{A.2})$$

$$E(u_{1i}, u_{2i}) = \sigma_{12}^2 \sum_j (\omega_{ij}^1 \omega_{ij}^2)^2. \quad (\text{A.3})$$

Because the presence of spatial autoregressive errors induces heteroskedasticity in the error terms that results in inconsistent probit estimates, Pinkse and Slade (1998) propose a consistent

estimator used here for the spatial probit model. This estimator takes into account the known form of the induced heteroskedasticity.

Let  $\theta_1 = \{\alpha_0, \alpha_1, \delta\}$  be the parameters to be estimated in the spatial probit model, and

$\psi_i(\theta_1) = \frac{\alpha_0 + x_{1i}'\alpha_1}{\sqrt{\text{var}(u_{1i})}}$  in the index function of the probit model weighted by the standard deviation

of the residual. The corresponding ‘‘generalized residuals’’ of this model are:

$$\tilde{u}_{1i}(\theta_1) = \{y_{1i} - \Phi[\psi_i(\theta_1)]\} \cdot \frac{\phi[\psi_i(\theta_1)]}{\Phi[\psi_i(\theta_1)]\{1 - \Phi[\psi_i(\theta_1)]\}}. \quad (\text{A.4})$$

The GMM estimates for  $\theta_1$  can be obtained as follows:

$$\hat{\theta}_{1,GMM} = \arg \min_{\theta_1 \in \Theta_1} S_N(\theta_1)' M_N S_N(\theta_1) \quad (\text{A.5})$$

where  $S_N(\theta_1) = \frac{1}{N} z_N' u_{1N}(\hat{\theta}_1)$ ,  $z_N$  is a data matrix of regressors plus at least one instrument (to

identify the extra parameter  $\delta$ ,  $\tilde{u}_{1N}(\theta_1)$  is the vector of generalized residuals with elements as

shown in (A.6), and  $M_N$  is a positive definite matrix such that  $M_N \xrightarrow{p} M$ . Pinkse and Slade (1998)

prove that this estimator is consistent and asymptotically normal.

The consistent estimates of  $\theta_1$  can be used to construct the IMR to correct for sample selection bias. Note that the conditional regression function for the outcome equation has the following form (see McMillen 1995):

$$\begin{aligned} E[y_{2i} | y_{1i} > 0] &= \beta_0 + x_{2i}'\beta_1 + E[u_{2i} | u_{1i}] > -(\alpha_0 + x_{1i}'\alpha_1) \\ &= \beta_0 + x_{2i}'\beta_1 + \frac{E(u_{1i}, u_{2i})}{\sqrt{\text{var}(u_{1i})}} \cdot \frac{\phi[-\psi_i(\theta_1)]}{\{1 - \Phi[-\psi_i(\theta_1)]\}} \\ &= \beta_0 + x_{2i}'\beta_1 + \frac{\sigma_{12} \sum_j \omega_{ij}^1 \omega_{ij}^2}{\sqrt{\sigma_1^2 \sum_j (\omega_{ij}^1)^2}} \cdot \frac{\phi[-\psi_i(\theta_1)]}{\{1 - \Phi[-\psi_i(\theta_1)]\}} \end{aligned}$$

$$= \beta_0 + x'_{2i}\beta_1 + \frac{\sigma_{12}}{\sigma_1} \cdot \frac{\sum_j \omega_{ij}^1 \omega_{ij}^2}{\sqrt{\sum_j (\omega_{ij}^1)^2}} \cdot \frac{\phi[-\psi_i(\theta_1)]}{\{1 - \Phi[-\psi_i(\theta_1)]\}}$$

Therefore, the selectivity correction implies the following adjusted IMR:

$$\lambda_i \equiv \frac{\sum_j \omega_{ij}^1 \omega_{ij}^2}{\sqrt{\sum_j (\omega_{ij}^1)^2}} \cdot \frac{\phi[-\psi_i(\theta_1)]}{\{1 - \Phi[-\psi_i(\theta_1)]\}}. \quad (\text{A.7})$$

Once estimated  $(\hat{\lambda}_i)$ , the adjusted IMR may be included as an additional variable in the outcome equation, which in turn could be estimated by several spatial methods developed for this linear equation. However, note that the adjusted IMR in (A.6) depends on a parameter that is not estimated in the first step:  $\gamma$ , which is included in the weights  $\omega_{ij}^2$ . In order to increase the efficiency of the estimator and directly obtain its variance-covariance matrix, I follow Pinkse and Slade (1998, 2006) and Flores-Lagunes and Schnier (2006) and use GMM to estimate simultaneously all parameters of the sample selection model by rewriting it as a sequential estimator (Newey 1984). Specifically, stacking the corresponding moment conditions leads to

$g(z_N, \theta) = [s(z_{1N}, \theta), m(z_{2N}, \theta)]$ ,  $\theta = \{\alpha_0, \alpha_1, \delta, \beta_0, \beta_1, \mu, \gamma\}$  with  $s(z_{1N}, \theta) = z'_{1N} \tilde{u}_{1N}(\theta)$ ,  $\tilde{u}_{1N}(\theta)$  and  $m(z_{2N}, \theta) = [y_{1N} \cdot z_{2N}] \tilde{u}_{2N}(\theta)$ ,  $\tilde{u}_{2N}(\theta) = y_{2N} - \beta_0 - x'_{2N} \beta_1 - \mu \hat{\lambda}_N(\delta, \gamma)$  where  $N$  denotes the corresponding matrix of data, we let  $z'_N = (z'_{1N}, [y_{1N} \cdot z_{2N}])$ ,  $z_{1N}$  and  $z_{2N}$  includes the regressors from the selection and outcome equation respectively with the estimated “adjusted” IMR in the outcome equation represented as  $\hat{\lambda}_N(\delta, \gamma)$  to make explicit its dependence on both SAE parameters. Let  $\tilde{u}'_N(\theta) = (\tilde{u}'_{1N}(\theta), \tilde{u}'_{2N}(\theta))$ ; then the parameters of the SAE sample selection model can be estimated as:

$$\hat{\theta}_{GMM} = \arg \min_{\theta \in \Theta} g'_N(\theta) M_N g_N(\theta) \quad (\text{A.8})$$

where  $g_N(\theta) = \frac{1}{N} z_N' \tilde{u}_N(\theta)$ , for a conformable positive definite  $M_N$  such that  $M_N \xrightarrow{p} M$ .  $\hat{\theta}_{GMM}$  is the estimator for the Heckit model with spatial autoregressive errors in the selection and outcome equation. Pinkse and Slade (2006) prove that  $\hat{\theta}_{GMM}$  is consistent (i.e.  $\hat{\theta}_{GMM} \rightarrow \theta_0$ ) and asymptotically normal.

**Table 1:** Developing countries in Sample, 1980-2008

Country	Country	Country	Country	Country
Albania	Congo, D.R.	India	Myanmar	Somalia
Algeria	Costa Rica	Indonesia	Namibia	South Africa
Argentina	Cote d'Ivoire	Iran	Nepal	Sri Lanka
Armenia	Cyprus	Jamaica	Nicaragua	Sudan
Bahamas	Czech Republic	Kazakhstan	Niger	Suriname
Bahrain	Djibouti	Jordan	Nigeria	Swaziland
Bangladesh	Dominica	Kenya	Oman	Syria
Barbados	Dominican Rep.	Korea	Pakistan	Tajikistan
Benin	Ecuador	Kuwait	Panama	Tanzania
Belize	Egypt	Kyrgyzstan	Papua N. Guinea	Thailand
Bhutan	El Salvador	Latvia	Paraguay	Togo
Bolivia	Ethiopia	Lebanon	Peru	Tonga
Botswana	Estonia	Lesotho	Philippines	Trinidad & T.
Brazil	Fiji	Liberia	Poland	U. A. E.
Brunei	Gabon	Lithuania	Romania	Tunisia
Bulgaria	Georgia	Madagascar	Russia	Turkey
Burkina Faso	Gambia	Malawi	Rwanda	Uganda
Burundi	Ghana	Malaysia	St. Kitts	Ukraine
Cameroon	Grenada	Maldives	St. Lucia	Uruguay
Central Af. Rep.	Guatemala	Mali	St. Vincents	Vanuatu
Chad	Guinea	Malta	Senegal	Venezuela
Chile	Guinea Bissau	Mauritius	Seychelles	Vietman
China	Guyana	Mexico	Sierra Leone	Yemen
Colombia	Haiti	Mongolia	Singapore	Zambia
Comoros	Honduras	Moldova	Slovakia	Zimbabwe
Congo, Rep.	Hungary	Morocco	Slovenia	

**Table 2:** Episodes of Democratic Transition in Dataset

<i>Country</i>	<i>Democratic transition year</i>	<i>Brief description of democratic transition episode</i>
Albania	1992	Subsequent (in 1991 and 1992) elections marked the ending of the communist rule. Coded as <i>new democracy</i> from 1992 to 1996.
Argentina	1983	First free and fair elections after a prolonged period of military dictatorship. Coded as <i>new democracy</i> from 1983 to 1987.
Bangladesh	1991	First post independence (1971) free and fair elections. Coded as <i>new democracy</i> from 1991 to 1995.
Benin	1991	Adoption of new democratic constitution; free and fair elections. Coded as <i>new democracy</i> from 1991 to 1995.
Bolivia	1982	Return to civilian rule. Military steps down. Reconvocation of 1980 democratic constitution. Coded as <i>new democracy</i> from 1982 to 1986.
Brazil	1985	Return to civilian rule. Military steps down. Reconvocation of 1980 democratic constitution. Coded as <i>new democracy</i> from 1985 to 1989.
Bulgaria	1990	First internationally deemed fair and free elections after a more than a decade long military rule. Coded as <i>New Democracy</i> from 1990 to 1994.
Cape Verde	1991	First post-communism free and fair general assembly elections. Coded as <i>New Democracy</i> from 1991 to 1995.
Central African Republic	1993	First free election after the oppressive Bokassa rule. The 1996 presidential elections were deemed free, but marked by fraud allegations. Huge political instability is still present. Coded as <i>New Democracy</i> from 1993 to 1997.
Chile	1990	First free and fair presidential elections; Ending of two decade long military rule of Augusto Pinochet. Coded as <i>New Democracy</i> from 1990 to 1994.
Comoros	1990	First post independence (1975) free and fair elections. Coded as <i>New Democracy</i> from 1990 to 1994.
Croatia	2000	First free and fair legislative and presidential elections since independence and the ending of the Bosnian War. Coded as <i>New Democracy</i> from 2000 to 2004.
Czech Republic	1993	Independence from Czechoslovakia. First post-communism constitution came into effect. Coded as <i>New Democracy</i> from 1993 to 1997.
Djibouti	1999	First post-independence internationally declared free and fair election. Coded as <i>new democracy</i> from 1999 to 2003.
Dominican Republic	1978	Return to civilian rule. Free and fair presidential elections. Coded as <i>New Democracy</i> from 1978 to 1982.
Ecuador	1979	Internationally deemed free and fair Presidential elections after a prolonged period of military rule. Coded as <i>New Democracy</i> from 1979 to 1983.
El Salvador	1994	First free and fair elections after the end of a long-lasting civil war and military rule. Coded as <i>New Democracy</i> from 1994 to 1998.
Estonia	1991	Independence from USSR. Ratification of old (1938) constitution. Coded as <i>New Democracy</i> from 1991 to 1995.
Ethiopia	1995	First multi-party elections after a long-lived communist era. Coded as <i>New Democracy</i> from 1995 to 1999.
Ghana	1996	Internationally deemed free and fair elections. Coded as <i>New Democracy</i> from 1996 to 2000.
Guatemala	1996	End of civil-war; return to civilian rule. Coded as <i>New Democracy</i> from 1996 to 2000.
Guyana	1992	First post independence (1966) free and fair elections. Coded as <i>New Democracy</i> from 1992 to 1996.
Haiti	1994	A US intervention brought in power the winner of the 1990 elections. Coded as <i>New Democracy</i> from 1994 to 1999.

<i>Country</i>	<i>Democratic transition year</i>	<i>Brief description of democratic transition episode</i>
Honduras	1982	Adoption of new democratic constitution after a prolonged period of oppressive rule. First democratically elected president takes office. Coded as <i>New Democracy</i> from 1982 to 86.
Hungary	1990	First post communism free and fair Presidential elections. Coded as <i>New Democracy</i> from 1990 to 1994.
Indonesia	1999*	First multi-party elections after the collapse of the Suharto regime. Coded as <i>New Democracy</i> from 1999 to 2003.
Korea, Republic of	1988	Democratically elected government resumes office. Adoption of new democratic constitution. Coded as <i>New Democracy</i> from 1988 to 1992.
Latvia	1991	Independence from USSR. Ratification of old (1922) democratic constitution. Coded as <i>New Democracy</i> from 1991 to 1995.
Lesotho	1993	Military abandons power and internationally deemed free and fair elections mark. The return to civilian rule. Coded as <i>New Democracy</i> from 1993 to 1997.
Lithuania	1991	Independence form USSR. Coded as <i>New Democracy</i> from 1991 to 1995.
Macedonia	1991	Independence from former Yugoslavia. First Constitution approved. National Unity government formed. <i>new democracy</i> from 1991 to 1995.
Madagascar	1993	Presidential elections after a twenty-year long military junta. Coded as <i>New Democracy</i> from 1993 to 1997.
Malawi	1994	First post independence (1961), free and fair parliamentary and presidential elections. Coded as <i>New Democracy</i> from 1994 to 1998.
Mali	1992	New democratic constitution established a multi-party system. Fair and free legislative and presidential elections followed. Coded as <i>New Democracy</i> from 1992 to 1996.
Mexico	1997	For the first time since 1929 the Institutional Revolutionary party (PRI) lost absolute power in the Lower House after the 1997 legislative elections. Coded as <i>New Democracy</i> from 1997 to 2001.
Mongolia	1992	New democratic constitution established a multi-party system. Coded as <i>New Democracy</i> from 1992 to 1996.
Mozambique	1994	First post independence (1975) parliamentary and presidential election. Coded as <i>New Democracy</i> from 1994 to 1998.
Nepal	1991	First free and fair elections since the early sixties. Coded as <i>New Democracy</i> from 1991 to 1995.
Nicaragua	1990	Free and fair elections after the Somosa dictatorship and the Santinist revolution. Coded as <i>New Democracy</i> from 1990 to 1994.
Nigeria	1999	After consecutive coups and military interventions, internationally declared free and fair elections mark the return to civilian rule. Coded as <i>New Democracy</i> from 1999 to 2003.
Pakistan	1988	Legislative elections were held; restoration of the 1985 democratic constitution. In spite of fair and free elections in the nineties, the military coup of 1999 blocked democratization. Coded as <i>New Democracy</i> from 1988 to 1992.
Panama	1994	Free and fair presidential and legislative elections after the US intervention. Coded as <i>New Democracy</i> from 1994 to 1998.
Peru	1980	Internationally declared fair and free legislative and presidential elections. Coded as <i>New Democracy</i> from 1980 to 1984.
Philippines	1987	Adoption of new democratic constitution; free and fair elections led to the overthrow of Marcos' regime. Coded as <i>New Democracy</i> from 1987 to 1991.
Poland	1990	First post-communist, free and fair, presidential, legislative and local elections. Adoption of new democratic constitution. Coded as <i>New Democracy</i> from 1990 to 1994.
<i>Country</i>	<i>Democratic transition year</i>	<i>Brief description of democratic transition episode</i>
Slovak Republic	1993	Independence form Czechoslovakia. First post-communism elections and new democratic constitution came into effect. Coded as <i>New Democracy</i> from 1993 to 1998.

		from 1993 to 1997.
Slovenia	1992	First since gaining independence from Yugoslavia, free presidential and legislative elections. Adoption of a new democratic constitution. Coded as <i>New Democracy</i> from 1992 to 1996.
South Africa	1994	First free elections with universal participation, brought in power Nelson Mandela and ended the Apartheid regime. Coded as <i>New Democracy</i> from 1994 to 1998.
Thailand	1992	Military was forced to step down. Free legislative elections followed. Coded as <i>New Democracy</i> from 1992 to 1996.
Uruguay	1985	Army returned the power to the democratically elected president. Coded as <i>New Democracy</i> from 1985 to 1989.
Paraguay	1993	First Presidential elections after decades of military rule. Coded as <i>New Democracy</i> from 1993 to 1997.
Russia	1993	Adoption of first post-communist constitution; Free and fair Duma elections. Coded as <i>New Democracy</i> from 1993 to 1997.
Senegal	2000*	First post independence (1960), internationally deemed fair and free elections. Coded as <i>New Democracy</i> from 2000 to 2004.
Suriname	1991	Return to civilian government after a one-party regime; free and fair elections. Coded as <i>New Democracy</i> from 1991 to 1995.
Tanzania	1995	First post independence, internationally deemed free and fair election. Coded as <i>New Democracy</i> from 1995 to 1999.
Turkey	1983	First free and fair legislative elections after a military dictatorship. Coded as <i>New Democracy</i> from 1983 to 1987.
Ukraine	1991	Independence from USSR. Legislative elections followed. Coded as <i>New Democracy</i> from 1991 to 1995.
Zambia	1991	First post independence, free and fair elections. New democratic constitution came into effect. Coded as <i>New Democracy</i> from 1991 to 1995.

NOTES: Table 2 reports the country, timing and a brief description of the democratization event in each case. The table lists full incidents of democratic transitions. That is, in these countries democratic institutions became fully consolidated (according both to the Polity and Freedom House indicators) in the 5 years after they made a transition to democracy.

**Table 3:** Some Descriptive Results

Group Mean	<i>Democratization<sub>it</sub></i>	<i>Autocracy<sub>it</sub></i>	<i>Difference-of-means</i>
Equity Mkt Liberalization	.67	.42	p=0.000

**Table 4:** Outcome Equation Results for Full Sample, 1980-2008

	<b>Model 1</b>	<b>Model 2</b>
IMF program	.050 (.046)	.033 (.037)
Democratization	.137*** (.055)	
Democracy		.125*** (.040)
FDI	.059 (.077)	.022 (.055)
Trade Openness	.037*** (.010)	.025*** (.009)
GDP per capita	-.051*** (.018)	-.042** (.018)
Stock turnover <sub>t-1</sub>	.033*** (.012)	.047*** (.021)
Divided government	.027 (.048)	.021 (.020)
Constant	.447*** (.062)	.424** (.061)
SAE parameter ( $\gamma$ )	.050 (.046)	.033 (.037)
“Adjusted” IMR ( $\hat{\lambda}_i$ )	.326* (.185)	.249* (.136)
$\rho$	.82	.77
$N$	2568	2568

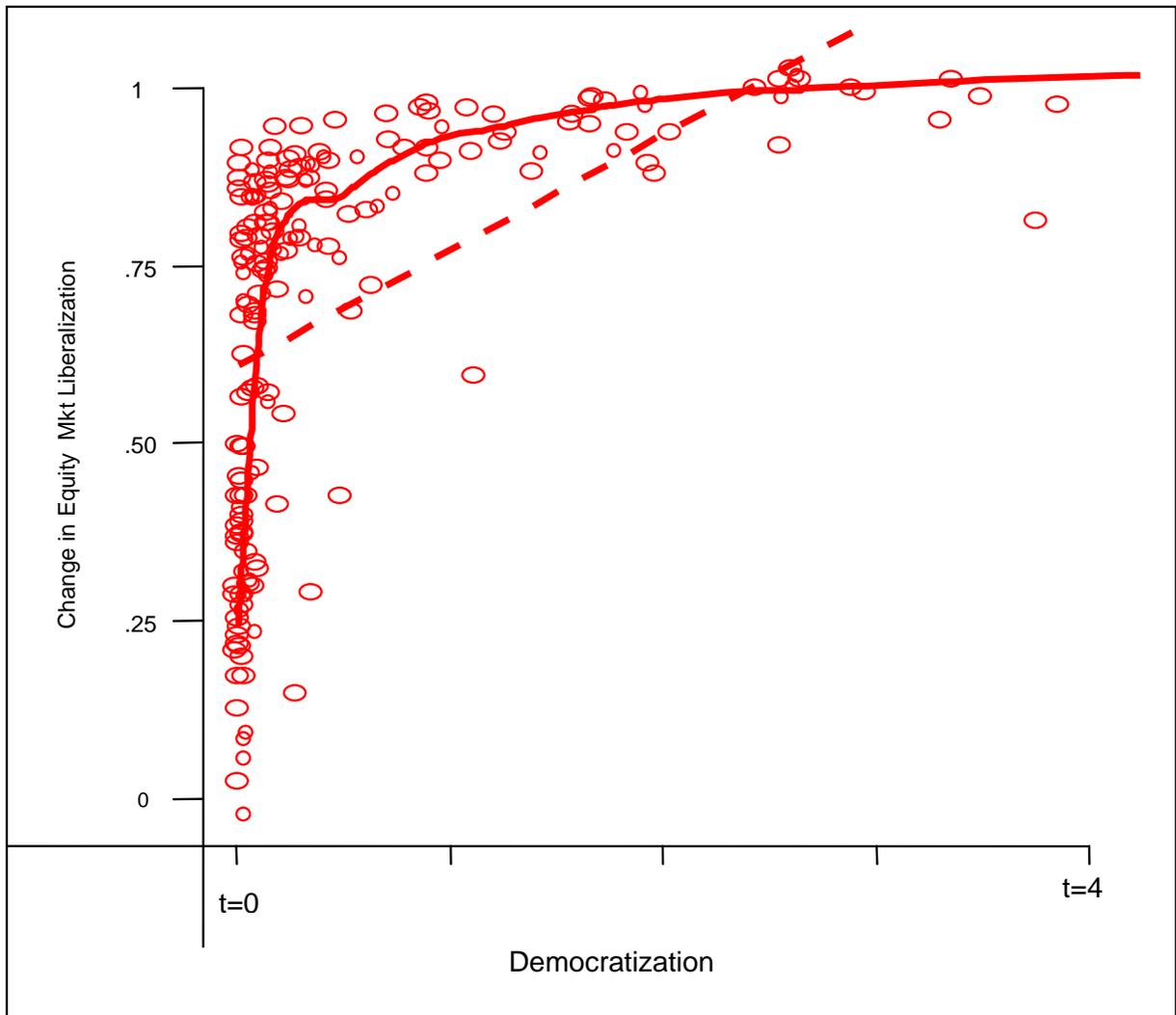
**Notes:** \*\*\*, \*\*, \*: 1%, 5% and 10% levels of significance. Numbers in parentheses are Newey-west standard errors. The standard errors are also corrected for heteroskedasticity via the GMM estimation procedure. The outcome equation of the SAE Heckit models are estimated with fixed effects that are not reported above.

**Table 5:** Selection Equation Results for Sample, 1980-2008; DV: *Democratization*

	Column A	Column B
	selection equation for Model 1	selection equation for Model 2
Past authoritarianism	-.068 (.074)	-.065 (.092)
Lag Democratization	-.039*** (.018)	-.032*** (.010)
GDP per capita	.024*** (.008)	.031*** (.010)
Growth rate	.054 (.041)	.042 (.039)
Ethnic fractionalization	-.030 (.071)	-.039 (.050)
Trade openness	.028*** (.011)	.036*** (.014)
Oil	.041 (.040)	.065 (.052)
Lagged IMF program	.060*** (.011)	.073*** (.028)
Constant	.290*** (.089)	.316*** (.078)
SAE parameter ( $\delta$ )	.030*** (.014)	.039*** (.018)

**Notes:** \*\*\*, \*\*, \*: 1%, 5% and 10% levels of significance.

**Figure 1:** Democratization and change in *Equity market liberalization*



**Figure 2:** Marginal effect of *Democratization* on *Equity Market Liberalization*

