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ABSTRACT

This paper studies the association between the current account and real estate valuation across countries, subject to data availability [43 countries, of which 25 are OECD], during 1990-2005. We find robust and strong positive association between current account deficits and the appreciation of the real estate prices/(GDP deflator). Controlling for lagged GDP/capita growth, inflation, financial depth, institution, urban population growth and the real interest rate; a one standard deviation increase of the lagged current account deficits is associated with a real appreciation of the real estate prices by 10%. This real appreciation is magnified by financial depth, and mitigated by the quality of institutions. Intriguingly, the economic importance of current account variations in accounting for the real estate valuation exceeds that of the other variables, including the real interest rate and inflation. Among the OECD countries, we find evidence of a decline overtime in the cross country variation of the real estate/(GDP deflator), consistent with the growing globalization of national real estate markets. Weaker patterns apply to the non-OECD countries in the aftermath of the East Asian crisis.

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1. Introduction and overview

The financial liberalization wave in emerging markets during the 1990s has frequently led to boom-bust cycles, when the initial boom had been often followed by a financial crisis. Significant literature has focused on the dynamics of financial liberalization in emerging markets, accounting for some of these boom/bust dynamics as a reflection of the "Overborrowing syndrome" [McKinnon and Pill (1996)]. Accordingly, financial liberalization has led to large inflows of capital, bankrolling growing current account deficits, investment and consumption booms. Frequently, these booms were manifested in sizable real estate and real exchange rate appreciations, and in the buildup of balance sheet vulnerabilities. These vulnerabilities had been magnified in countries using a fixed exchange rate, where occasionally incipient capital flights and sudden stops led to financial crises, abrupt real deprecation, and to a bust in the real estate market and to V type recessions. Observers frequently noted that the real estate market played a key role in the propagation of the boom and bust cycle. A frequent concern has been that capital inflows tend to magnify the welfare costs of preexisting distortions (like moral hazard), as they may increase the size of the distorted activities, deepening the bust at the end of the cycle.[1]

Most of the above literature dealt with East Asia and Latin America, implicitly presuming that the US and Europe are less exposed to the vulnerabilities that come with such cycles. The ability of OECD countries to borrow in their currency, the greater reliance on flexible exchange rate regimes, and the presumption of better institutions suggests that the potential volatility induced by real estate boom/bust cycles is indeed larger in developing countries. Yet, there is little evidence regarding the degree to which countries share similar qualitative links between current account patterns and national real estate markets. The purpose of our paper is to provide evidence on the robustness of the current account/real estate channel across all countries, subject

[1] See Kyotaki and Moore (1997) and Aghion et al. (2001) for models of credit cycles in the closed and open economy, respectively. For further discussion of the association between capital inflows, asset valuation and financial fragility, see Calvo, Leiderman and Reinhart (1996), Krugman (1998), Edison, Luangaram and Miller (1998), Quigley (2001), and Kim and Lee (2002). See Aizenman (2004) for an overview of the policy challenges facing financial opening, and the magnification of domestic distortions associated with capital inflows. See Debelle and Galati (2007), Edwards (2004), Chinn and Ito (2005), Freund (2005) and Faruqee and Lee (2006) for overviews of current account patterns in recent decades.

to data availability. Our main finding is that, indeed, this channel is potent across all countries, subject to interactions with other domestic variables.

We don't pertain to deal with causality, as we don't model and control for the factors that may induce capital flows. Instead, we take the view that current real estate valuation has a sizable dependence on lagged macroeconomic variables. This is consistent with the notion that adjustment to changing macro conditions is more protracted in real estate markets than in stock markets [see Glaeser and Gyourko (2007) and Case and Shiller (1989)].[2] We study regressions that account for the real appreciation of the housing stock, controlling for lagged variables, including GDP per capita, real interest rate, inflation, and the current account. We find that lagged current account patterns are important in accounting for the real appreciation of the real estate market. In addition, the current account changes interacted with other macro variables are important in accounting for future real valuation of housing. Specifically, a one standard deviation increase of the lagged current account deficits [by 4% in our sample] is associated with real appreciation of real estate prices by about 10%. This real appreciation is magnified by financial depth [about 2%], and mitigated by the quality of institutions [about 3%]. Intriguingly, the economic importance of current account variations in accounting for the real appreciation of real estate prices exceeds that of the other variables, including the real interest rate -- a one standard deviation drop of the lagged real interest rate [by 2.5% in our sample] is associated with real appreciation of real estate prices by about 7%. Among the OECD we find evidence of decline overtime in the cross country variation of the relative real estate prices, consistent with the deeper globalization of national real estate market. Weaker patterns apply to the non-OECD countries in the aftermath of the East Asian crisis.

Section 2 overviews the data; section 3 outlines the univariate t-tests; the multivariate panel tests are summarized in section 4. Section 5 closes the paper with concluding remarks.

[2] Adjustments in the real estate markets are subject to significant transaction costs on behalf of consumers, and time consuming installation costs on behalf of producers. These features imply that demand-side factors play important and persistent roles in explaining protracted adjustment in the real estate market. See Brock (1988) for an open economy analysis of these issues. For empirical studies of the determinants of the real estate prices see Englund and Ioannides (1997), Case, Goetzmann and Geert (2000), Case, Quigley, and Shiller (2005), da Mata (2007), and Shiller (2007).

2. **Sample**

National real estate price indices are taken from the Datastream and the Global Property Guide (see the Data Appendix for details). While the collection methods of the primary indices are admittedly much different across countries, these indices are representative of the level of appreciation in the corresponding national markets. More than half of the indices are compiled by the government agencies, and the rest by private consulting firms. We have data for 43 countries, of which 25 are OECD countries. The sample is unbalanced, covering 1990 to 2005. The raw data of real estate indices are given in nominal term, whereas it is more relevant from a cross-country perspective to consider the appreciation of real estate prices in real term. We therefore deflate the indices with the local GDP deflator, and call the resultant series "appreciation of real estate prices" or "real estate/(GDP deflator) appreciation." We choose the GDP deflator over the consumer price index mainly to maximize the sample size, due to the lack of continuous CPI series for many developing countries at the beginning of the sample period. Another added benefit of using the GDP deflator is that it may control for the changing basket and expenditure patterns across countries.

A major limitation of using one property index per country is that we make no distinction between different types of property markets: residential, industrial, office, and retail. What would be ideal is to use the sectoral international property return data. However, this kind of data is mostly available at city level. In addition, the return data across countries is difficult to obtain, and if available, rather short due to the discontinuity of private collecting agencies and property consulting firms; the existing sources of the return data cover about ten to fifteen industrial countries, starting from early 2000s.[3]. The data is also subject to sample selection, as the lack of data in some countries may result from the lack of interest and investment opportunities in the real estate markets there. Another limitation facing us is that we do not have enough city-level information that would allow for an in-depth comparison across countries. For instance, our figures for China seem to understate the trends in major Chinese cities.[4]

[3] See for example Investment Property Databank (IPD), Knight Frank LLP, Jones Lang LaSalle Research, and the Economist's global house-price indicators.

[4] Another important consideration is government policy. Zheng and Kahn (2008) find in the case of Beijing that while the land prices and real estate prices decline with distance from the city center, the residential building heights and housing unit sizes do not, indicating some binding

The data on current account deficits and other macroeconomic variables are taken from the World Development Indicators (WDI) and the International Financial Statistics (IFS). Following the literature, we control for the annual growth of population in the urban areas (Urban Population Growth), the annual growth of real GDP per capita (Capita GDP Growth), GDP deflator inflation (Inflation), domestic credit provided by the banking sector as a percentage of GDP (Financial Depth), and the domestic real interest rate. We use the real interest rate from WDI, which is constructed from bank's one year lending interest rate, adjusted for inflation by the GDP deflator. It would be more appropriate to use the mortgage rates, testing both the prime and sub-prime real estate loans. To our knowledge, a panel data on the mortgage rates at that level of disaggregation is not publicly available across the OECD and Non-OECD countries. We also use International Country Risk Guide (ICRG) scores on law & order (the higher the better) as a proxy for quality of institutions. Global and local financial conditions are represented by variable dealing with the nominal interest rates, the appreciation of local stock markets (deflated by GDP deflator), the 3-month US Treasury Bill Rate, Japan Financing Bill Rate, and the London Interbank Offer Rates (pound sterling).[5]

Table 1 provides for each national real estate market the number of observations, sample averages, standard deviations, and the Mackinnon approximate p-value of Dickey-Fuller test for unit root. While the real estate prices/(GDP Deflator) appreciation is available only from 1990-2005, the Current Account Deficits/GDP series go back much further, to 1980 for most of the countries. Missing data is the norm for emerging markets, particularly for several of the Eastern European countries. In our sample, the average number of observations (years available) for Real Estate /(GDP deflator) appreciation is 12 for all countries, 10 for the emerging markets, and 14 for the OECD countries.

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urban planning policies that do not reflect market forces.

[5] Warnock and Warnock (2007) find that countries with stronger legal rights for borrowers and lenders, deeper credit information systems, and a more stable macroeconomic environment have a deeper housing finance system. There are several important financial variables which we lack in the cross-country data, including loan-to-value ratios, credit restrictions, and securitization of housing loans (see also BIS, 2006). Due to the data availability, these figures also miss the recent market turbulences; the credit shock hitting the financial markets in 2007 has generated a decline in securitization of mortgages, which sharply reduces the demand for housing (Deutsche Bank, 2008).

We can see from Table 1 that the average appreciation of real estate prices in some countries is extreme: for the 7-12 year period, the appreciation exceeds 14 % in Estonia and Lithuania whereas the depreciation exceeds 20 % in Bulgaria and Russia. During 1990-2005, the average Real Estate /(GDP deflator) appreciation is .64 % per year for all countries, -1.35 % per year for the emerging markets, and 2.08 % per year for the OECD countries. The emerging markets tend to be more volatile: their average standard deviation of the appreciation is 17.57, compared to 5.90 for the OECD countries. Using the Dickey-Fuller test for unit root with a trend term, we also see that most of the Real Estate /(GDP deflator) appreciation series are non-stationary: the Mackinnon approximate p-value of 35 countries is larger than .005.

For the patterns of the Current Account Deficits/GDP, some of the extreme numbers come from countries running large current account surpluses: for example Singapore and Switzerland run an average 10% surplus over a 25-year period. The average Current Account Deficits/GDP is .25 for all countries, .66 for the emerging markets, and -.04 for the OECD countries. As in the case of the real estate prices, the emerging markets tend to be more volatile: the average standard deviation of the Current Account Deficits/GDP is 4.56, compared to 2.85 for the OECD countries. Using the Dickey-Fuller test for unit root with a trend term, we also find that most of the current account series are non-stationary: the Mackinnon approximate p-value of 41 countries is larger than .005.

Figure 1 provides the unconditional sample distribution of the average Real Estate/(GDP deflator) appreciation between the early 1990s and the early 2000s. From the kernel density estimates, we can see that the cross-sectional distribution of the real estate appreciation has expanded over the recent decade.[6] There is an increase in the dispersion, with the mass of the distribution being less concentrated around the mean of zero (from 1991-95, the average appreciation = 1.2 percent per year) and shifting out toward the higher positive tails (from 2001-05, the average appreciation = 22.5 percent per year). The peakedness, measured by the kurtosis, of the sample distribution suggests that more of the variance is due to infrequent extreme deviations in the early 1990s, as opposed to frequent and modest size deviations in the early 2000s.

Figure 2 shows the trend in the Real Estate /(GDP deflator) appreciation and the Current Account Deficits/GDP during 1990 through 2005, for 18 Non-OECD countries, 24 OECD

[6] The density estimates are based on Epanechnikov kernel function.

countries excluding the US, and the US. The bust of the global property markets in the early 1990s, and the Asian financial crisis of 1997 are clearly evident. We can also see some positive association between the Real Estate/(GDP deflator) appreciation and the Current Account Deficits/GDP during that period. This relationship is particularly prominent in the case of the US for the past fifteen years.

As a check on whether the cross-country dispersion in the appreciation of real estate prices corresponds to that in the stock markets, Figure 3 depicts the standard deviation of the two for the OECD and the Non-OECD countries. The dispersion among the Non-OECD countries is higher than among the OECD countries, but this difference is varying over time with periodic jumps, i.e. during the Asian Financial Crisis in 1997. A tighter connection between the two markets applies to the OECD countries: the correlation between the standard deviation in the real estate markets and that in the stock market is .77 for the OECD countries, but only .06 for the Non-OECD countries. In the real estate markets, the standard deviation of Real Estate/(GDP deflator) appreciation declines on the order of 0.02 % per year (p-value .05) among all countries, 0.26 % (p-value .06) among the OECD countries, and 0.0004 percent (p-value .99) among the Non-OECD countries.[7] In the stock markets, the standard deviation of Stock Price /(GDP deflator) falls 0.01 % per year (p-value .21) among all countries, 0.02 % (p-value .01) among the OECD countries, and .002 % (p-value .89) among the Non-OECD countries. The observed global convergence in both the real estate markets and the stock markets is quite compelling.

Figure 4 shows the correlations between the Current Account Deficits/GDP and the Real Estate /(GDP deflator) appreciation. To provide a reference for the level of global interest rates, we also plot the 3-month nominal interest rates using the U.S. Treasury Bill, the Japan Financing Bill, and the London Interbank Offer Rate (LIBOR, pound sterling) in the bottom of the figure. During the sample period, the correlations between the appreciation of real estate prices and the current account deficits increase by 0.041 % per year (p-value 0.0) among all countries, 0.029 % (p-value .006) among the OECD countries, and 0.036 % (p-value .283) among the Non-OECD countries.[8] In order to test whether the correlations are associated with the global market interest

[7] Let σ denote the standard deviation and t the time trend, the approximate convergence rate (b_1) is derived from running the OLS regression of $\ln(\sigma) = a_1 + b_1 t + \omega_1$; where ω_1 is an error term.

[8] Let ρ denote the correlation and t the time trend, the approximate convergence rate (b_2) is

rates, we regress the correlations on the LIBOR for each country groups. The estimated coefficient is -.061 (p-value .000) for all countries, -.051 (p-value .000) for the OECD countries, and -.048 (p-value .449) for the Non-OECD countries.

Before implementing the econometric tests, we examine in details the stationarity of the real estate and the current account series. Table 2 reports the unit root tests, applying on the individual series for each of the sample countries, and across series in the panels. In the top panel, we can see that the rejection rates from these tests on the individual countries suggest that the stationarity properties of the series are inconclusive.[9] The augmented Dickey-Fuller test and the Phillips-Perron test indicate that more than half of the Real Estate/(GDP deflator) Appreciation and around 90 percent of the Current Account Deficits/GDP are non-stationary. In contrast, the Kwiatkowski-Phillips-Schmidt-Shin (1992) test indicates that most of the two series are stationary.[10] These mixed results highlight the low-power of the unit-root tests on the limited length of time series that we have.

The bottom panel of Table 2 reports the results from applying the panel unit root tests. Because the sample must be a balanced panel in order to perform the existing panel test procedures, we restrict the sample to 12 years (1993-2004) and 25 countries.[11] The test statistics correspond to specifications with time trend. The null hypothesis is non-stationarity for the Levin-Lin-Chu (2002) test and the Im-Pesaran-Shin (2003) test. For the Nyblom-Harvey (2000) test, the test statistic can be considered as the generalization of the Kwiatkowski-Phillips-Schmidt-Shin test, and a failure to reject the null hypothesis of zero common stochastic trends is an indication that the series do not form a cointegrated combination. Applying to the panel of

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derived from running the OLS regression of $\rho = a_2 + b_2 t + \omega_2$; where ω_2 is an error term.

[9] The test statistics correspond to specifications with time trend. Except for the Kwiatkowski-Phillips-Schmidt-Shin test, the null hypothesis is non-stationarity. The rejection of stationarity under the Kwiatkowski-Phillips-Schmidt-Shin test is reported as a non rejection of the unit root.

[10] Faruqee and Lee (2006) also find that the Kwiatkowski-Phillips-Schmidt-Shin test tends to not rejecting the null of unit root (88 percent out of 94 countries from 1960-2003).

[11] The countries available for the panel unit-root tests include 19 OECD and 6 Non-OECD: Australia, Austria, Belgium, Bulgaria, Canada, Denmark, Finland, France, Germany, Indonesia, Ireland, Italy, Japan, Korea, Malta, Netherlands, New Zealand, Norway, Singapore, Sweden, Switzerland, Taiwan, Thailand, United Kingdom, and United States.

Real Estate/(GDP deflator) appreciation that we have, the Levin-Lin-Chu and the Im-Pesaran-Shin tests reject the null of non-stationarity. The Nyblom-Harvey test rejects the null of zero common trends for the panels of OECD and Non-OECD, but not for the whole sample. For the Current Account Deficits/GDP panels, the results are also inconclusive: the Levin-Lin-Chu test rejects, but the Im-Pesaran-Shin test cannot reject the null of panel unit root. The mixed results seem to underline a number of limitations with the existing panel unit root tests.[12]

3. **Univariate t-tests**

Table 3 provides the t-tests for the hypothesis that the national real estate markets are correlated through the current account patterns.[13] We first remove the effects of a country's own current account deficits on its real estate/(GDP deflator) appreciation series using a linear regression of the real estate/(GDP deflator) appreciation on the contemporaneous current account deficits to GDP:

$$(1)\quad \left(\frac{\text{Real Estate}}{\text{GDP Deflator}}\,appreciation\right)_{i,t} = \phi_1 + \phi_2\left(\frac{\text{Current Account Deficits}}{\text{GDP}}\right)_{i,t} + \psi_{i,t}$$

Then we compare the correlation matrices of the raw appreciation of real estate prices, $\left(\frac{\text{Real Estate}}{\text{GDP Deflator}}\,appreciation\right)_{i,t}$, to the regression residuals, $\psi_{i,t}$. In the last step, we conduct a paired t-test of the off-diagonal elements in the raw appreciation and the residual correlation matrices to determine whether the difference in the means of correlations is significant. Specifically, let ρ_i^j denote the correlation of the real estate/(GDP deflator) appreciation in country *i* and country *j*, and $\tilde{\rho}_i^j$ denote the correlation of the corresponding residuals from equation (1). The off-diagonal elements for the tests using *N*=43 countries are:

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[12] See Enders, 2004, pp.156-230.

[13] We adopt this test from Case, Goetzmann, and Rouwenhorst (2000), though they apply the test to sectoral property returns with the GDP factor in a smaller set of countries.

$$\begin{bmatrix} . & . & . & . & . \\ \rho_2^1 & . & . & . & . \\ \rho_3^1 & \rho_3^2 & . & . & . \\ \rho_*^1 & \rho_*^2 & \rho_*^3 & . & . \\ \rho_N^1 & \rho_N^2 & \rho_N^3 & \rho_N^* & . \end{bmatrix} \text{ and } \begin{bmatrix} . & . & . & . & . \\ \tilde{\rho}_2^1 & . & . & . & . \\ \tilde{\rho}_3^1 & \tilde{\rho}_3^2 & . & . & . \\ \tilde{\rho}_*^1 & \tilde{\rho}_*^2 & \tilde{\rho}_*^3 & . & . \\ \tilde{\rho}_N^1 & \tilde{\rho}_N^2 & \tilde{\rho}_N^3 & \tilde{\rho}_N^* & . \end{bmatrix}$$

If the null hypothesis of equality of the correlations in raw appreciation ρ_i^j and the correlations in residuals $\tilde{\rho}_i^j$ is rejected, then this would suggest that the co-movements of the national real estate markets are associated with common factors driving the current account patterns.

Let σ denote standard deviation, the means of correlations of the raw real estate /(GDP deflator) appreciation are .089 (σ = .382) across all countries, .027 (σ = .361) across the Non-OECD countries, 0.147 (σ = .366) across the OECD, and 0.158 (σ = .438) between the OECD and Non-OECD countries. After removing the effects of the current account deficits, the correlations are 0.024 (σ = .377) across all countries, -0.030 (σ = .366) across the Non-OECD countries, 0.058 (σ = .337) across the OECD countries, and 0.116 (σ = .446) between the OECD and the Non-OECD countries. The t-tests reject the null of equality of means of correlations for all-country pairs (though the test barely rejects that for the OECD versus Non-OECD countries pairs). Thus, removing the effects of own-country current account deficits results in a statistically significant drop in mean correlation of the real estate/(GDP deflator) appreciation across countries. The most significant drop is for the OECD countries. We can also see that removing the effects of current account deficits decreases the variance of the Real Estate/(GDP deflator) appreciation by 2.7 %.

4. **Multivariate panel tests**

In this section, we use a panel data estimation, controlling for the effects of other macroeconomic variables. The analysis thus far suggests that the contemporaneous current account factor is important in explaining the real estate markets across countries. However, the real estate markets are more likely to adjust to the current account deficits with lags. In addition, we also need to include relevant macro variables as regression controls. These include Urban Population Growth, Capita GDP Growth, Inflation, Financial Depth, Institution, and Real

Interest Rates.

Because the macro variables are cross-country time series, we need to make the following transformation of the variables. First, we include in the panel estimation the lagged values of the Current Account Deficits/GDP and other macro variables. The current account variable enters the panel regressions using annual observations with a maximum of five lags, and other macro variables with one lag. While the choice of five lags is arbitrary, we test with other lags, and it serves our purpose to illustrate the association between the current account patterns and the appreciation in national real estate markets. We also provide the results using the average and the cumulative change of the explanatory variables. These results are not directly comparable because the annual-observation panel data allows for the lag structure and short- to medium-run dynamics, whereas the average and the cumulative change samples do not.

Second, trend and non-stationarity not only characterize the Real Estate /(GDP deflator) appreciation and the Current Account Deficits/GDP reported in Table 1, but also apply to other macro time series in the sample. The trends in these series may contain both stochastic and deterministic components: differencing can remove the former, and detrending can remove the latter. We have seen that the results of various individual and panel unit root tests on these series are inconclusive. The maximum length of our time series is sixteen years (1990-2005): though the standard Box-Jenkins methodology recommends differencing as the form of the trend may not be essential for short-term forecasts, but the form of the trend becomes more important as the forecast horizon expands. Yet, some series may have a deterministic trend, a stochastic trend and a stationary component (trend plus noise series). For our panel sample, we adopt a second-best parsimonious approach to the macro series of each country by first-differencing the time-series already in a percentage change format (Real Estate /(GDP deflator) appreciation; Urban Population Growth; Capita GDP Growth; Real Interest), or converting to percentage form for those variables not in a percentage change format (Financial Depth; Institution; Current Account Deficits/GDP), and de-trending. This correction is not perfect, but after using these transformations, all of the individual time series of each country pass the Augmented Dickey-Fuller unit-root with trend tests at 5 % level of significance. While we use these transformed series in our baseline estimation, we also provide additional results using a sign-preserving detrended current account series (to take into account the persistent trend feature of the current accounts) and results using non-transformed series (of which the estimates are not consistent and

the statistical inference do not hold). After constructing the lags and transforming the variables, we have 354 observations and 41 countries ready for the panel estimation. Table 4 provides the sample correlations of the variables.

For the panel data estimation, we apply the following dynamic equation on the appreciation of real estate prices ($y_{i,t}$; %change per year of real estate prices/(GDP deflator))

$$(2) \qquad y_{i,t} = \alpha y_{i,t-1} + \gamma' x_{i,t-1} + \beta'(L) z_{i,t-1} + \theta' \left[x_{i,t-1} \times z_{i,t-i} \right] + \lambda_t + \eta_i + \upsilon_{i,t}$$

where x is a set of controlling variables, including Urban Population Growth, Capita GDP Growth, Inflation, Financial Depth, Institution, Real Interest rate; z is a vector of past Current Account Deficits/GDP; $\beta(L)$ a vector of polynomials in the lag operator; λ_t a time effect common to all countries; η_i a permanent but unobservable country-specific effect; $\upsilon_{i,t}$ an error term. To provide a comparison between the equation (2) and other panel specifications, Table 5 reports the benchmark results, with the 'Dynamic Panel' regressions (equation (2)) in columns 1-5 using Arellano and Bond's (1991) GMM estimators; the 'Fixed Effects' regressions using the least squares dummy variable (LSDV) estimation in columns 6-7; and the pooled OLS in column 8.

Across the econometric specifications, the lagged Real Estate /(GDP deflator) appreciation is negatively associated with its current value. The lagged Urban Population Growth and the lagged Capital GDP Growth are consistently associated with the appreciation of real estate prices. A higher lagged Inflation is associated with a lower Real Estate/(GDP deflator) appreciation in the next period. The effects of the Financial Depth and the lagged Institution are statistically insignificant. The effect of the lagged real interest is significant with the expected sign: the higher the cost of borrowing, the lower the appreciation of real estate prices.

Most significantly, we find that the lagged Current Account Deficits/GDP is positively associated with the appreciation of real estate prices across the econometric specifications. The effects are stronger for the lags 1-3 according to the benchmark dynamic panel specification. Based on the fixed-effects and the OLS estimation, the positive effects of the Current Account Deficits/GDP on the Real Estate /(GDP deflator) appreciation persist five years, and are statistically significant. Looking at the interaction between the current account and other key macro variables, we also see that the effects of the current account deficits are magnified by the

level of inflation and financial depth. A deeper Financial Depth in itself has no statistical association with the real estate prices, but it fuels the effects of the current account deficits on the real estate market appreciation. The interaction between the CA Deficits and the Institution is negative and significant: the effects of the current account deficits on the real estate appreciation tend to be smaller in a country with a better quality of institution. Overall, the macro models yield a consistent message and are able to explain around 70 % of the variation in the real estate/(GDP deflator) appreciation across countries.

Table 6 provides some additional results. We first split the sample into the appreciation and the depreciation of real estate prices, then use the panel Tobit estimation. We find that the positive effects of the CA Deficits on the real estate prices are more significant in the appreciating or boom period (top left panel, censoring "appreciation of real estate price" <0). We also run a similar dynamic panel estimation using the average and the cumulative change of the explanatory variables. Because these additional regressions ignore the short- to medium-run dynamics and the lag structure of the current account deficits, they are informative, but not comparable to the annual-observation benchmark panel estimation. Nevertheless, using the average and the cumulative change of the explanatory variables, we can see that the negative effects of Inflation and Real Interest hold, as well as the positive effects of the interaction of Inflation and Financial Depth with the Current Account Deficits/GDP.

Two extra features of the current account patterns are reported in Table 7. The first is, as also noted by Faruqee and Lee (2006) and Taylor (2002), that the current account is a persistent series. A resultant possibility is that countries may run current account deficits/surpluses for an extended period, followed by a brief reversal. To account for this trend pattern, we de-trend the current accounts using the sign-preserving trend:

$$(3) \qquad \operatorname{sgn}\left(CA_{i,t-1}\right)\times trend; \operatorname{sgn}\left(CA_{i,t-1}\right)=\frac{CA_{i,t-1}}{\left|CA_{i,t-1}\right|}.$$

Using the sign-preserving detrended current account series, we can see in Table 7 that our main findings continue to hold: the current account deficits are positively associated with the real estate appreciation, the effects which increase with the rate of inflation, the level of financial depth, and the lower quality of institution. The size of the coefficient estimates on the five lags

of the current account deficits are also similar, though somewhat smaller, that those obtained using the normal de-trended current account series.

Another possible feature is that the sustainability of the current account imbalances may be related to the country's size.[14] Figure 5 plots the correlations between the Real Estate/(GDP deflator) appreciation and the Current Account Deficits/GDP, against the countries' GDP Size. The observed association is weak, but excluding large countries uncovers a small and negative correlation between the country size and real estate-current accounts correlations. To account for the size feature more precisely, we include in our base regression the interaction between the Current Account Deficits/GDP with the country's GDP Size. Because our estimation period is 1990-2005, we calculate the GDP Size as the average over the 1980s. Table 7 reports the results from including the GDP Size interactions of five lags, for both the normal de-trended and the sign-preserving de-trended current account series. We can see that the main results continue to hold. The country-size effects are negative at all lags, but only statistically significant at lag one in the regression using the sign-preserving de-trended current account series. Thus, there is a tentative evidence that the real estate markets respond more to current account deficits in smaller countries.

Factors accounting for real estate/(GDP deflator) variation

We summarize the key factors accounting for real estate/(GDP deflator) variation in our sample by reporting the economic significance of the explanatory variables in our benchmark regression (Table 5, first column). This is done in Figure 7, reporting the association between a one standard deviation change in each of the conditioning variables and the real estate/(GDP deflator). The estimated response of the appreciation of real estate prices ($y_{i,t}$; % change per year of real estate prices/(GDP deflator) in Table 5), are calculated for each macroeconomic variable ($x_{i,t}$; $z_{i,t}$; $x_{i,t-1} \times z_{i,t-1}$) by multiplying a one standard deviation increase (σ) of the variable with its estimated coefficient (γ, β, θ). Figure 6 provides the sample distribution of the lagged current account deficits to GDP used in the panel estimation of Table 5. Note that the distribution for the Non-OECD countries in our sample is more skewed to the left. For the whole sample, the mean of the lagged CA Deficits is 3 % and the standard deviation is 4.0 %. The importance of the various factors accounting for variations of the real estate/(GDP deflator) is gauged in Figure

[14] Aizenman and Sun (2008) find that, with the exception of the US, the length of current account deficit spells is negatively related to the relative size of the countries' GDP.

7. A one standard deviation increase of the current account deficit (about 4%) is associated with a cumulative real estate/(GDP deflator) appreciation of about 10%.[15] The impact of the current account deficit on the real estate/(GDP deflator) appreciation is further magnified by financial depth (about 1.8%)[16], and mitigated by better quality of institutions (about 2.8%). Intriguingly, the most important factor accounting for the appreciation of the national real estate is a one standard deviation increase of the *current account deficit* (associated with 10 % real estate/(GDP deflator) appreciation), exceeding the adjustment to a one standard deviation drop of the *real interest rate* (about 7 % appreciation), and a one standard deviation increase of the *GDP/Capita growth* (about 2% appreciation).

5. Concluding remarks and interpretations

Our results are consistent with the notion that for all countries, current account deficits are associated with sizable real appreciation of the real estate. This effect holds controlling for the real interest rate, GDP growth, inflation, and other conditioning variables. We also find evidence consistent with growing globalization of national real estate markets. These findings are consistent with various scenarios explaining patterns of capital flows across countries, including differential productivity trends and varying saving patterns. In the absence of pre-existing distortions, financial inflows are unambiguously welfare improving. Yet, in a second-best environment, public finance considerations imply that inflows of capital may magnify distorted activities, increasing thereby the ultimate costs of these distortions. Arguably, the experience of emerging markets in the aftermath of financial liberalizations during the 1990s illustrated these concerns. Needless to say, this second-best assertion is not an argument against financial integration, but a cautionary tale -- greater financial globalization implies the need to be more assertive in dealing with moral hazard and other pre-existing domestic distortions.

[15] The 10% change is the product of a one standard deviation current account shock (4%) times the sum of the coefficients of its lags = 4.0x(1.02+0.57+0.64+0.18+0.14) ≈ 10 %.

[16] The 1.8% change is the product of a one standard deviation of (Financial Depth*CA Deficits), (= .14) times its estimated coefficient = 0.14 x 12.76 = .14*12.76 ≈ 1.8 %.

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Table A.1 – Sources of Real Estate Prices in 43 Countries.

The real estate series are taken from the Datastream and the Global Property Guide.

No	Country	Real Estate Price Indices	Source Name
1	Australia	House price index, 8 capital cities	AusStat
2	Austria	Residential property price index, Vienna	Oesterreichische (Austria) National Bank
3	Belgium	Residential property price index, Flats	Institut National de Statistique
4	Bulgaria	Dwelling: Avg Price per Sq Meter	National Statistical Institute of Bulgaria
5	Canada	New housing price index	Canadian Statistics
6	China	Property Price Index: Bldg: CM: Residential	National Bureau of Statistics of China
7	Colombia	New housing price index	Departamento Administrativo Nacional de Estadística
8	Croatia	New Dwellings Sold Price Index: 1995=100	Republic of Croatia - Central Bureau of Statistics
9	Czech Republic	Prices of habitable area, multi-dwelling	Cesky Statisticky Urad
10	Denmark	Property Price Index: One Family Houses: All Denmark	Statistics Denmark
11	Estonia	Ave. price per sq.m. of dwellings in satisfactory condition, 2 rooms & kitchen, Tallinn	Statistikaamet
12	Finland	Dwellings in old blocks of Flat, whole country	StatFin
13	France	Index of prices of old residences, France	Institut National de la Statistique et des Etudes Economiques
14	Germany	Prices of owner-occupied flats	BulweinGesa
15	Greece	Index of prices of dwellings, other urban	Bank of Greece
16	Hong Kong	Property Price Index: 1999=100: Domestic Premise (DP)	差餉物業估價處
17	Hungary	House prices, Budapest - old condominium	Otthon Centrum
18	Indonesia	Residential property price index, new houses, major cities	Bank Indonesia
19	Ireland	Average Property Price: New	Department of the Environment, Heritage and Local Government
20	Israel	Average prices of owner occupied dwellings	Central Bureau of Statistics
21	Italy	Average price for residential, 13 urban areas	Nomisma Spa Real Estate
22	Japan	Urban Land Price Index: REI: Whole Nation: Average	財団法人 日本不動産研究所
23	Korea	House Price Index	Kookmin Bank
24	Lithuania	Ave. price of one- to two-room apartments, Vilnius	Invalda Real Estate
25	Luxemburg	Price of habitable surface	STATEC Luxembourg
26	Malaysia	House Price Index: Malaysia	Valuation and Property Services Department, Ministry of Finance
27	Malta	House Price Index	Central Bank of Malta
28	Netherlands	House price index, nationwide	Nederlandse Vereniging van Makelaars
29	New Zealand	House price index, detached houses	Reserve Bank of New Zealand
30	Norway	House Price Index: New Detached: sa	Statistisk Sentralbyra
31	Philippines	Ave. price of prime 3-bedroom condominiums, Makati CBD	Colliers International
32	Portugal	Bank evaluation on housing, mainland	Instituto Nacional de Estatística de Portugal
33	Russia	Property Price Index: Residential: Primary Sales (PS): YoY	Federal State Statistics Service (Rosstat)
34	Serbia	Avg Price of Dwellings: New Construction: Republic of Serbia	Републички Завод за Статистику
35	Singapore	Property Price Index: Private Residential (PR): All	Urban Redevelopment Authority
36	South Africa	ABSA House Price Index	ABSA
37	Spain	Housing Price Index: Free House	Instituto Nacional de Estadistica
38	Sweden	Real estate price index for 1- & 2- dwelling buildings	Statistics Sweden
39	Switzerland	Real Estate Price Index: Single Family Homes	Swiss National Bank
40	Taiwan	Sinyi Residential Property Price Index: Taiwan Area	信義企業集團
41	Thailand	Housing Price Index: Single Detached House: including Land	ธนาคารอาคารสงเคราะห์
42	United Kingdom	House Price Index: UK	Nationwide
43	United States	House Price Index: OFHEO: United States	Office of Federal Housing Enterprise Oversight

Table A.2 – Sources of Macroeconomic Variables.

The time series of the macro variables cover 1980-2006. WDI = World Development Indicators; IFS = International Financial Statistics. The variable transformation is to correct for unit-root and trend of the time series.

Variables	Definition	Data Source: Code	Transformation
Real Estate/GDP Deflator Appreciation	%change per year of real estate, house, and property prices, deflated by GDP deflator	National sources and government statistics	first differenced; de-trended
Urban Population Growth	Annual growth (%) of population in the urban areas	WDI: SP.URB.GROW	first differenced; de-trended
Capita GDP Growth	Annual growth (%) of GDP per capita (constant price year 2000 US$)	WDI: NY.GDP.PCAP.KD.ZG	first differenced; de-trended
Inflation	GDP deflator (%)	WDI: NY.GDP.DEFL.KD.ZG	first differenced; de-trended
Financial Depth	Domestic credit provided by banking sector (% of GDP)	WDI: FS.AST.DOMS.GD.ZS	percentage change; de-trended
Institution	Measure of law and order, 0-12 scale (higher=better)	International Country Risk Guide	percentage change; de-trended
Real Interest	Annual real interest rates (%)	WDI: FR.INR.RINR	first differenced; de-trended
Current Account Deficits/GDP	End of year current account of deficits to GDP (%)	WDI: BN.CAB.XOKA.GD.ZS	percentage change; de-trended
Stock Market/GDP Deflator Appreciation	%change per year of the stock market indices, deflated by GDP deflator	Datastream; WDI	none (for reference only)
Nominal Interest (3-month)	US Treasury Bill Rate Constant Maturity (%)	IFS	none (for reference only)
	Japan Financing Bill Rate (%)	IFS	none (for reference only)
	London Interbank Offer Rates (pound sterling, %)	IFS	none (for reference only)
GDP Size	GDP (constant year-2000 trillion US$)	WDI: NY.GDP.MKTP.KD	average: 1980-1989

Table 1 – Summary Statistics and Unit Root Tests.

The statistics are for the period 1980-2005 for the current account deficits/GDP, and 1990-2005 for the real estate/(GDP deflator) appreciation, % per year. Local GDP deflator is chosen over the consumer price index to maximize the sample size and allow for the changing expenditure patterns across countries. The Mackinnon approximate p-value is from the Augmented Dickey-Fuller test for unit-root with trend. The cumulative appreciation sums for the period 2001-2005 the Real Estate/(GDP deflator) Appreciation for each country.

Country	Current Accout Deficits/GDP (percent)				Cumulative Deficits (percent)	Real Estate/GDP Deflator Appreciation (percent)				Cumulative Appreciation (percent)
	obs.	avg.	s.d.	p-value	from 2001 to 2005	obs.	avg.	s.d.	p-value	from 2001 to 2005
Australia	26	4.3	1.0	.031	25.8	16	4.7	7.6	.153	37.3
Austria	26	.8	1.8	.573	-5.1	16	2.6	8.0	.295	15.0
Belgium	25	-2.5	2.9	.977	-14.8	15	4.2	4.3	.866	42.9
Bulgaria	26	3.0	4.8	.266	41.8	12	-20.1	101.3	.010	90.1
Canada	26	1.0	2.3	.433	-9.2	16	.1	4.3	.000	19.6
China	23	-1.4	2.4	.098	-16.0	7	-1.8	3.1	.678	-13.1
Colombia	26	2.1	3.2	.356	7.5	9	-4.5	7.8	.001	5.5
Croatia	13	5.2	5.0	.164	34.7	11	-1.0	6.6	.022	-10.6
Czech Republic	13	4.0	2.3	.182	24.9	10	.5	7.8	.013	9.5
Denmark	25	-.2	2.7	.516	-13.9	13	6.4	5.0	.883	39.3
Estonia	14	7.4	4.7	.506	60.2	9	15.2	22.5	.009	108.9
Finland	25	-1.5	5.0	.866	-30.0	16	-.3	11.2	.207	32.9
France	26	-.2	1.3	.949	1.7	16	2.7	8.9	.002	50.3
Germany	26	-1.1	2.3	.929	-17.9	16	-1.0	1.5	.303	-4.6
Greece	24	4.8	2.8	.913	41.0	12	3.6	4.9	.017	24.6
Hong Kong	8	-7.5	3.4	.004	-49.7	12	-.1	16.5	.178	38.0
Hungary	24	4.5	3.6	.080	35.7	5	7.5	8.1	.100	35.9
Indonesia	24	.9	3.4	.092	-8.4	12	-9.5	18.4	.100	-10.9
Ireland	25	1.6	4.2	.967	4.1	16	7.0	5.8	.311	38.1
Israel	25	2.1	3.6	.348	-6.3	8	.0	8.3	.009	-2.4
Italy	25	.3	1.6	.840	4.5	16	1.3	5.6	.377	26.8
Japan	26	-2.5	1.2	.132	-17.4	16	-3.5	4.5	.000	-26.3
Korea	26	-.6	4.3	.191	-9.7	16	-1.8	8.9	.001	25.9
Lithuania	13	7.1	3.3	.641	37.7	7	14.4	16.3	.275	96.4
Luxembourg	11	-10.2	1.7	.001	-53.1	13	1.7	3.0	.347	7.8
Malaysia	25	-.8	8.9	.364	-48.3	5	-.1	2.6	.986	-4.3
Malta	25	2.6	5.1	.106	15.9	15	6.8	5.8	.177	30.0
Netherlands	26	-3.9	2.2	.407	-33.3	16	5.4	5.3	.111	10.6
New Zealand	26	5.7	2.7	.403	33.0	14	5.0	6.0	.663	48.0
Norway	26	-5.5	6.4	.406	-71.9	16	1.0	5.0	.030	8.7
Phillipines	25	2.7	3.2	.145	-4.3	10	-6.9	9.4	.000	3.9
Portugal	26	4.6	4.7	.657	41.4	4	.0	2.2	.000	.1
Russia	12	-7.3	5.6	.718	-47.2	8	-22.8	30.2	.001	-68.4
Serbia	6	6.1	2.1	.081	8.8	6	-14.6	31.0	.439	-11.5
Singapore	25	-9.2	11.0	.153	-90.7	16	4.1	17.8	.027	8.5
South Africa	26	.3	2.9	.279	13.7	6	11.8	8.7	.950	74.2
Spain	26	2.3	2.4	.948	28.1	10	6.0	5.1	.982	49.0
Sweden	25	-.9	3.3	.754	-27.2	16	2.8	7.5	.148	36.3
Switzerland	26	-7.3	4.7	.185	-72.1	16	-2.1	4.0	.162	7.3
Taiwan	21	-5.7	3.7	.777	-34.0	14	-2.0	5.3	.023	10.9
Thailand	26	1.8	5.8	.449	-5.9	14	-.7	4.9	.012	6.1
United Kingdom	26	1.3	1.9	.759	10.4	16	3.0	9.6	.355	49.6
United States	26	2.6	1.9	.954	27.9	16	2.8	3.5	.018	31.3

Table 2 – Unit Root Tests.

The null hypothesis is non-stationarity for the augmented Dickey-Fuller test and the Phillips-Perron test. For the Kwiatkowski-Phillips-Schmidt-Shin test, the null is stationarity: a rejection of stationarity under the Kwiatkowski-Phillips-Schmidt-Shin test is reported as a non rejection of the unit root. The null hypothesis is non-stationarity for the Levin-Lin-Chu (2002) test and the Im-Pesaran-Shin (2003) test. For the Nyblom-Harvey (2000) test, the test statistic can be considered as the generalization of the Kwiatkowski-Phillips-Schmidt-Shin test, and a failure to reject the null hypothesis of zero common stochastic trends is an indication that the series do not form a cointegrated combination. The test statistics correspond to specifications with time trend. Because the sample must be a balanced panel in order to perform the existing panel test procedures, the sample is restricted to 12 years (1993-2004) and 25 countries (19 OECD and 6 Non-OECD). ***, **, * signifies 1, 5, and 10 level of significance.

	Real Estate/GDP Deflator Appreciation			Current Account Deficits/GDP		
Testing Procedures	Whole Sample	OECD	Non-OECD	Whole Sample	OECD	Non-OECD
			percent of rejecting unit roots:			
Individual Country Series						
Augmented Dickey-Fuller	44.2	40.0	50.0	7.0	8.0	5.6
Phillips-Perron	44.2	36.0	55.6	9.3	8.0	11.1
Kwiatkowski-Phillips-Schmidt-Shin	97.7	100.0	94.4	100.0	100.0	100.0
			test statistics:			
Panel of Series						
Levin-Lin-Chu (2002)	-18.296 ***	-12.073 ***	-11.299 ***	-12.002 ***	-10.196 ***	-4.496 *
Im-Pesaran-Shin (2003)	-2.783 ***	-2.586 *	-3.014 **	-2.138	-2.189	-1.769
Nyblom-Harvey (2000)	1.556	1.556 ***	.580 *	1.556	1.556 ***	.561 *

Table 3 – Univariate t-tests.

The sample period is 1990-2005. The t-tests are on the hypothesis that the national real estate markets are correlated through the current account patterns. In the first step, we remove the effects of a country's own current account deficits on its real estate/(GDP deflator) appreciation series by running a linear regression of the real estate/(GDP deflator) appreciation on the contemporaneous current account deficits to GDP:

$$\left(\frac{\text{Real Estate}}{\text{GDP Deflator}}\text{appreciation}\right)_{i,t} = \phi_1 + \phi_2\left(\frac{\text{Current Account Deficits}}{\text{GDP}}\right)_{i,t} + \psi_{i,t}$$

Then we compare the correlation matrices of the raw appreciation of real estate prices and of the regression residuals. In the last step, we conduct a paired t-test of the off-diagonal elements in the raw appreciation and the residual correlation matrices to determine whether the difference in the means of correlations is significant. A standard deviation of variable is in parenthesis.

	All Countries	Non-OECD	OECD	OECD v.s. Non-OECD
Means of Correlations:				
Appreciation of Real Estate Prices	.089	.027	.147	.158
	(.382)	(.361)	(.366)	(.438)
Residuals of the Appreciation	.024	-.030	.058	.116
after removing the effects of CA Deficits	(.377)	(.366)	(.337)	(.446)
t-test on the equality of means of correlations:				
t-value	6.367	3.776	5.804	1.646
p-value	.000	.000	.000	.102
Variance Reduction (%)	2.700			

Table 4 – Sample Correlations.

Dictated by the construction of lag structure and data availability, there are 354 observations (41 countries) for the panel estimation.

			Correlation with:							
		Obs	Real Estate / GDP Deflator Appreciation	a)	b)	c)	d)	e)	f)	g)
	Explanatory Variable (Lagged Annual Observation)									
a)	Urban Population Growth	354	.036	1.000						
b)	Capita GDP Growth	354	.130	-.118	1.000					
c)	Inflation	354	.363	.009	-.117	1.000				
d)	Financial Depth	354	-.368	.018	-.221	-.119	1.000			
e)	Institution	354	-.138	.017	.006	-.098	.065	1.000		
f)	Real Interest	354	-.717	.002	.005	-.773	.314	.137	1.000	
g)	Current Account Deficits	354	.192	.012	.030	.207	-.103	-.066	-.277	1.000

Table 5 – Benchmark Estimation.

The dynamic equation for the appreciation of real estate prices ($y_{i,t}$; %change per year of real estate prices/(GDP deflator)) is

$$y_{i,t} = \alpha y_{i,t-1} + \gamma' x_{i,t-1} + \beta'(L) z_{i,t-1} + \theta' \left[x_{i,t-1} \times z_{i,t-1} \right] + \lambda_t + \eta_i + \upsilon_{i,t}$$

where x={Urban Population Growth, Capita GDP Growth, Inflation, Financial Depth, Institution, Real Interest}; z=Current Account Deficits/GDP; $\beta(L)$ a vector of polynomials in the lag operator; λ_t a time effect common to all countries; η_i a permanent but unobservable country-specific effect; $\upsilon_{i,t}$ an error term. The 'Dynamic Panel' regressions (columns 1-5) use Arellano and Bond (1991)'s GMM estimators. The 'Fixed Effects' regressions use 'least squares dummy variable' (LSDV) estimation. The variables are corrected for unit root; first-differenced, de-trended). The sample period is 1990 to 2005. Robust standard errors are in parentheses. ***, **, * signifies 1, 5, and 10 level of significance.

Coefficient Estimates of		Dynamic Panel Estimation										Fixed Effects				Pooled OLS	
Explanatory Variables	**Lag**	5-lag		4-lag		3-lag		2-lag		1-lag		5-lag		3-lag		5-lag	
Lagged Real Estate/GDP Deflator Appreciation	1	-.49	(.10) ***	-.50	(.10) ***	-.50	(.10) ***	-.41	(.10) ***	-.43	(.10) ***	-.60	(.10) ***	-.63	(.10) ***	-.56	(.13) ***
Urban Population Growth	1	2.53	(1.53) *	2.47	(1.53)	2.44	(1.52)	2.43	(1.56)	2.43	(1.55)	1.70	(1.64)	1.65	(1.66)	1.53	(1.23)
Capita GDP Growth	1	.75	(.31) **	.75	(.31) **	.75	(.31) **	.57	(.31) *	.56	(.31) *	.57	(.30) *	.64	(.30) **	.53	(.51)
Inflation	1	-.33	(.04) ***	-.33	(.04) ***	-.34	(.04) ***	-.31	(.04) ***	-.31	(.04) ***	-.21	(.04) ***	-.24	(.04) ***	-.18	(.07) **
Financial Depth	1	-4.90	(7.35)	-4.59	(7.34)	-4.52	(7.33)	-6.56	(7.49)	-7.10	(7.41)	4.87	(7.04)	4.35	(7.08)	2.75	(9.45)
Institution	1	-15.62	(11.24)	-14.53	(11.17)	-14.25	(11.15)	-16.40	(11.41)	-17.04	(11.30)	-16.58	(9.36) *	-13.69	(9.33)	-16.59	(12.03)
Real Interest	1	-2.65	(.22) ***	-2.64	(.22) ***	-2.63	(.22) ***	-2.62	(.23) ***	-2.55	(.22) ***	-1.75	(.23) ***	-1.80	(.23) ***	-1.77	(.75) **
CA Deficits	1	1.02	(.28) ***	.98	(.28) ***	.94	(.27) ***	.77	(.27) ***	.81	(.27) ***	.85	(.24) ***	.76	(.24) ***	.77	(.37) **
	2	.57	(.16) ***	.49	(.14) ***	.45	(.13) ***	.23	(.13) *			-.10	(.16)	-.18	(.16)	-.05	(.24)
	3	.64	(.15) ***	.56	(.13) ***	.52	(.12) ***					.59	(.12) ***	.44	(.11) ***	.63	(.25) **
	4	.18	(.14)	.09	(.12)							.33	(.13) **			.38	(.15) **
	5	.14	(.14)									.22	(.13) *			.27	(.12) **
Inflation*CA Deficits	1	.01	(.00) ***	.01	(.00) ***	.01	(.00) ***	.01	(.00) ***	.01	(.00) ***	.04	(.00) ***	.03	(.00) ***	.04	(.01) ***
Financial Depth*CA Deficits	1	12.76	(2.67) ***	13.18	(2.63) ***	13.21	(2.63) ***	12.25	(2.69) ***	14.03	(2.47) ***	42.46	(5.47) ***	39.03	(5.33) ***	43.02	(16.37) ***
Institution*CA Deficits	1	-8.52	(3.10) ***	-8.85	(3.08) ***	-8.86	(3.08) ***	-7.11	(3.13) **	-8.66	(2.98) ***	-4.70	(2.80) *	-5.78	(2.78) **	-4.37	(2.95)
p-value/R-Square		.00		.00		.00		.00		.00		.73		.72		.74	
Observations		354		354		354		354		354		354		354		354	
Countries		41		41		41		41		41		41		41		41	

Table 6 – Additional Results.

The top left panel applies panel Tobit regression to the sample censoring negative appreciation of the real estate prices (including only %change per year of real estate prices/(GDP deflator) greater than zero). The bottom two panels ignore the short- to medium-run dynamics and lagged effects of the current account deficits. The 'Average Change' sample uses n-year average %change per year of the explanatory variables. The `Cumulative Change' sample uses n-year cumulative %change per year of the explanatory variables. The sample period is 1990 to 2005. Standard errors are in parentheses. ***, **, * signifies 1, 5, and 10 level of significance.

Lagged Explanatory	5-lag		4-lag		3-lag		2-lag		5-lag		4-lag		3-lag		2-lag	
Appreciation/Depreciation			"Appreciation of Real Estate Prices" > 0								"Appreciation of Real Estate Prices" < 0					
of Real Estate/GDP Deflator							Panel Tobit Estimation									
Lagged Real Estate/GDP Deflator Appreciation	-.32	(.09) ***	-.32	(.09) ***	-.32	(.09) ***	-.32	(.09) ***	-.42	(.10) ***	-.45	(.08) ***	-.45	(.08) ***	-.46	(.08) ***
Urban Population Growth	.77	(1.23)	.77	(1.24)	.76	(1.24)	.77	(1.24)	1.90	(1.82)	1.53	(1.49)	1.53	(1.49)	1.55	(1.50)
Capita GDP Growth	-.70	(.24) ***	-.70	(.24) ***	-.70	(.24) ***	-.70	(.24) ***	-.24	(.47)	-.39	(.29)	-.38	(.29)	-.33	(.27)
Inflation	-.08	(.04) **	-.08	(.04) **	-.08	(.04) **	-.08	(.04) **	-1.94	(.76) **	-2.39	(.16) ***	-2.38	(.15) ***	-2.34	(.14) ***
Financial Depth	-.73	(5.37)	-.86	(5.38)	-.87	(5.39)	-.89	(5.38)	-3.50	(6.77)	-3.65	(5.89)	-3.62	(5.88)	-3.40	(5.89)
Institution	-5.16	(6.74)	-4.79	(6.76)	-4.74	(6.75)	-4.64	(6.75)	-1.45	(10.29)	-1.79	(8.30)	-1.83	(8.29)	-1.54	(8.37)
Real Interest	-.27	(.21)	-.27	(.21)	-.27	(.21)	-.26	(.21)	-3.06	(.46) ***	-3.32	(.23) ***	-3.31	(.22) ***	-3.30	(.22) ***
CA Deficits (-1)	.20	(.18)	.18	(.18)	.18	(.17)	.18	(.17)	.24	(.28)	.15	(.24)	.15	(.23)	.18	(.23)
CA Deficits (-2)	.40	(.11) ***	.39	(.11) ***	.39	(.11) ***	.38	(.11) ***	.05	(.35)	.14	(.25)	.14	(.25)	.16	(.25)
CA Deficits (-3)	.05	(.14)	.04	(.14)	.04	(.14)			.24	(.49)	-.06	(.11)	-.06	(.10)		
CA Deficits (-4)	.04	(.13)	.02	(.13)					.22	(.33)	-.01	(.10)				
CA Deficits (-5)	.09	(.10)							.22	(.26)						
Inflation*CA Deficits	.02	(.00) ***	.02	(.00) ***	.02	(.00) ***	.02	(.00) ***	.06	(.02) ***	.07	(.01) ***	.07	(.01) ***	.07	(.01) ***
Financial Depth*CA Deficits	5.66	(4.38)	5.27	(4.39)	5.14	(4.34)	5.16	(4.33)	11.59	(12.52)	4.14	(5.78)	4.30	(5.50)	4.70	(5.47)
Institution*CA Deficits	-.45	(2.09)	-.60	(2.10)	-.62	(2.10)	-.62	(2.10)	-4.36	(3.88)	-2.70	(2.25)	-2.69	(2.25)	-3.00	(2.22)
p-value	.00		.00		.00		.00		.00		.00		.00		.00	
Observations	354		354		354		354		354		354		354		354	
Countries	41		41		41		41		41		41		41		41	
Average/Cumulative Changes				Average Changes								Cumulative Changes				
of the Explanatory Variable									Dynamic Panel Estimation							
Lagged Real Estate/GDP Deflator Appreciation	-.26	(.04) ***	-.20	(.05) ***	-.08	(.05)	-.45	(.06) ***	-.27	(.04) ***	-.20	(.05) ***	-.08	(.05)	-.45	(.06) ***
Urban Population Growth	-.42	(5.55)	-.19	(6.00)	-3.07	(4.41)	.58	(2.21)	-.08	(1.10)	-.03	(1.50)	-1.01	(1.47)	.29	(1.10)
Capita GDP Growth	-2.64	(1.76)	-1.09	(1.37)	-.78	(.97)	.37	(.54)	-.53	(.35)	-.27	(.34)	-.26	(.32)	.18	(.27)
Inflation	-.46	(.13) ***	-.78	(.11) ***	-.78	(.09) ***	-.62	(.06) ***	-.10	(.03) ***	-.19	(.03) ***	-.26	(.03) ***	-.31	(.03) ***
Financial Depth	-57.25	(34.00) *	-14.92	(28.60)	8.96	(21.06)	4.26	(13.09)	-11.01	(6.74)	-3.60	(7.14)	3.01	(7.00)	2.13	(6.54)
Institution	-13.59	(37.63)	.12	(33.82)	-6.96	(25.16)	-9.14	(16.40)	-2.75	(7.46)	-.04	(8.46)	-2.37	(8.39)	-4.61	(8.20)
Real Interest	-9.53	(.74) ***	-7.91	(.71) ***	-5.85	(.52) ***	-4.80	(.31) ***	-1.94	(.15) ***	-1.98	(.18) ***	-1.95	(.17) ***	-2.40	(.15) ***
CA Deficits	-.18	(.92)	-1.93	(.70) ***	-1.06	(.77)	.13	(.42)	-.03	(.18)	-.48	(.17) ***	-.36	(.26)	.06	(.21)
Inflation*CA Deficits	.21	(.03) ***	.35	(.04) ***	.25	(.02) ***	.07	(.01) ***	.01	(.00) ***	.02	(.00) ***	.03	(.00) ***	.02	(.00) ***
Financial Depth*CA Deficits	118.71	(17.51) ***	52.37	(8.46) ***	6.65	(3.33) **	-.89	(1.15)	4.76	(.69) ***	3.27	(.53) ***	.74	(.37) **	-.22	(.29)
Institution*CA Deficits	84.41	(20.00) ***	24.06	(12.99) *	26.96	(9.46) ***	17.17	(3.76) ***	3.45	(.79) ***	1.51	(.81) *	3.00	(1.05) ***	4.29	(.94) ***
p-value	.00		.00		.00		.00		.00		.00		.00		.00	
Observations	354		354		354		354		354		354		354		354	
Countries	41		41		41		41		41		41		41		41	

Table 7 – Sign-Preserving Trend Current Accounts and GDP Size Interactions.

Countries may run current account deficits/surpluses for an extended period, followed by a brief reversal. To account for this trend pattern, the current accounts can be de-trended using the sign-preserving trend: $\text{sgn}\left(CA_{i,t-1}\right)\times trend; \text{sgn}\left(CA_{i,t-1}\right)=\frac{CA_{i,t-1}}{\left|CA_{i,t-1}\right|}$. The GDP Size is the average over 1980-1989. The sample period for the estimation is 1990 to 2005. Standard errors are in parentheses. ***, **, * signifies 1, 5, and 10 level of significance.

Coefficient Estimates of		Sign-Preserving Trend Current Accounts										GDP Size Interactions				No Variable Transformation	
Explanatory Variables	Lag	5-lag		4-lag		3-lag		2-lag		1-lag		Normal Trend		Sign-Preserving Trend		5-lag	
Lagged Real Estate/GDP Deflator Appreciation	1	-.51	(.10) ***	-.51	(.10) ***	-.51	(.10) ***	-.41	(.10) ***	-.43	(.10) ***	-.48	(.10) ***	-.49	(.10) ***	.03	(.02)
Urban Population Growth	1	2.46	(1.57)	2.40	(1.57)	2.38	(1.57)	2.46	(1.60)	2.46	(1.59)	2.55	(1.54) *	2.32	(1.52)	.03	(1.06)
Capita GDP Growth	1	.81	(.31) **	.81	(.31) **	.81	(.31) **	.65	(.32) **	.63	(.32) **	.70	(.31) **	.63	(.31) **	1.10	(.19) ***
Inflation	1	-.33	(.04) ***	-.33	(.04) ***	-.33	(.04) ***	-.30	(.04) ***	-.30	(.04) ***	-.33	(.04) ***	-.33	(.04) ***	-.04	(.06)
Financial Depth	1	-7.15	(7.52)	-6.63	(7.53)	-6.51	(7.51)	-8.59	(7.68)	-9.20	(7.61)	-4.34	(7.38)	-4.04	(7.32)	.06	(.04)
Institution	1	-16.29	(11.51)	-15.14	(11.46)	-14.96	(11.44)	-16.21	(11.73)	-16.93	(11.62)	-15.38	(11.29)	-13.08	(11.20)	-3.96	(1.37) ***
Real Interest	1	-2.76	(.23) ***	-2.75	(.22) ***	-2.75	(.22) ***	-2.73	(.23) ***	-2.66	(.23) ***	-2.64	(.22) ***	-2.63	(.22) ***	.70	(.12) ***
CA Deficits	1	.93	(.29) ***	.89	(.29) ***	.86	(.29) ***	.74	(.29) **	.85	(.29) ***	1.43	(.42) ***	1.83	(.48) ***	-1.03	(.94)
	2	.53	(.15) ***	.44	(.13) ***	.41	(.13) ***	.27	(.13) **			.65	(.21) ***	.48	(.20) **	-.54	(.19) ***
	3	.64	(.14) ***	.55	(.13) ***	.52	(.13) ***					.79	(.18) ***	.78	(.19) ***	.21	(.20)
	4	.19	(.14)	.09	(.13)							.27	(.17)	.28	(.18)	-.26	(.20)
	5	.19	(.14)									.20	(.17)	.24	(.19)	-.03	(.19)
Inflation*CA Deficits	1	.01	(.00) ***	.01	(.00) ***	.01	(.00) ***	.01	(.00) ***	.01	(.00) ***	.01	(.00) ***	.01	(.00) ***	.07	(.02) ***
Financial Depth*CA Deficits	1	10.22	(2.79) ***	10.87	(2.74) ***	10.87	(2.73) ***	9.24	(2.77) ***	11.47	(2.55) ***	13.77	(2.83) ***	15.33	(2.80) ***	.00	(.00)
Institution*CA Deficits	1	-5.24	(3.33)	-6.01	(3.27) *	-5.98	(3.27) *	-3.19	(3.27)	-5.14	(3.12) *	-8.50	(3.13) ***	-7.73	(3.12) **	.09	(.18)
GDP Size*CA Deficits	1											-.36	(.24)	-.68	(.34) **		
	2											-.17	(.19)	-.13	(.26)		
	3											-.29	(.19)	-.38	(.26)		
	4											-.16	(.21)	-.20	(.32)		
	5											-.10	(.22)	-.15	(.33)		
p-value		.00		.00		.00		.00		.00		.00		.00		.00	
Observations		354		354		354		354		354		354		354		354	
Countries		41		41		41		41		41		41		41		41	

Figure 1 – Sample Density of Real Estate/(GDP deflator) Appreciation.
The figure provides the cross-sectional sample distribution. The density estimates are based on Epanechnikov kernel function

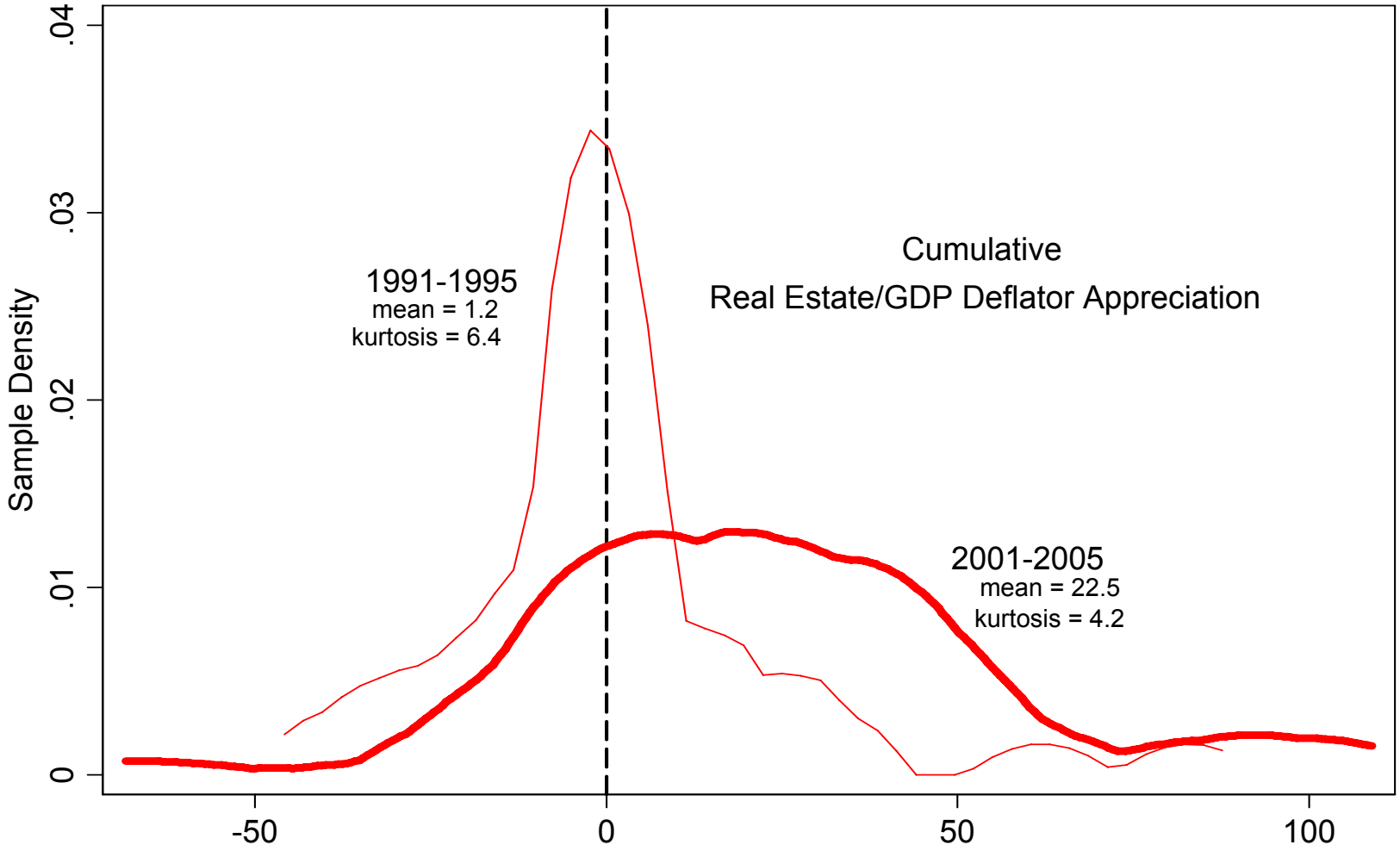

Figure 2 – Real Estate /(GDP deflator) Appreciation and Current Account Deficits/GDP.
In the top panel, each bar depicts a cross-country average of the "appreciation of real estate prices" = %change per year of real estate prices/(GDP deflator). In the bottom panel, each bar depicts a cross-country average of current account deficits/GDP. The sample includes USA (solid lines; □), 24 OECD ex-USA (solid lines; o) and 18 Non-OECD (dash lines; x) countries.

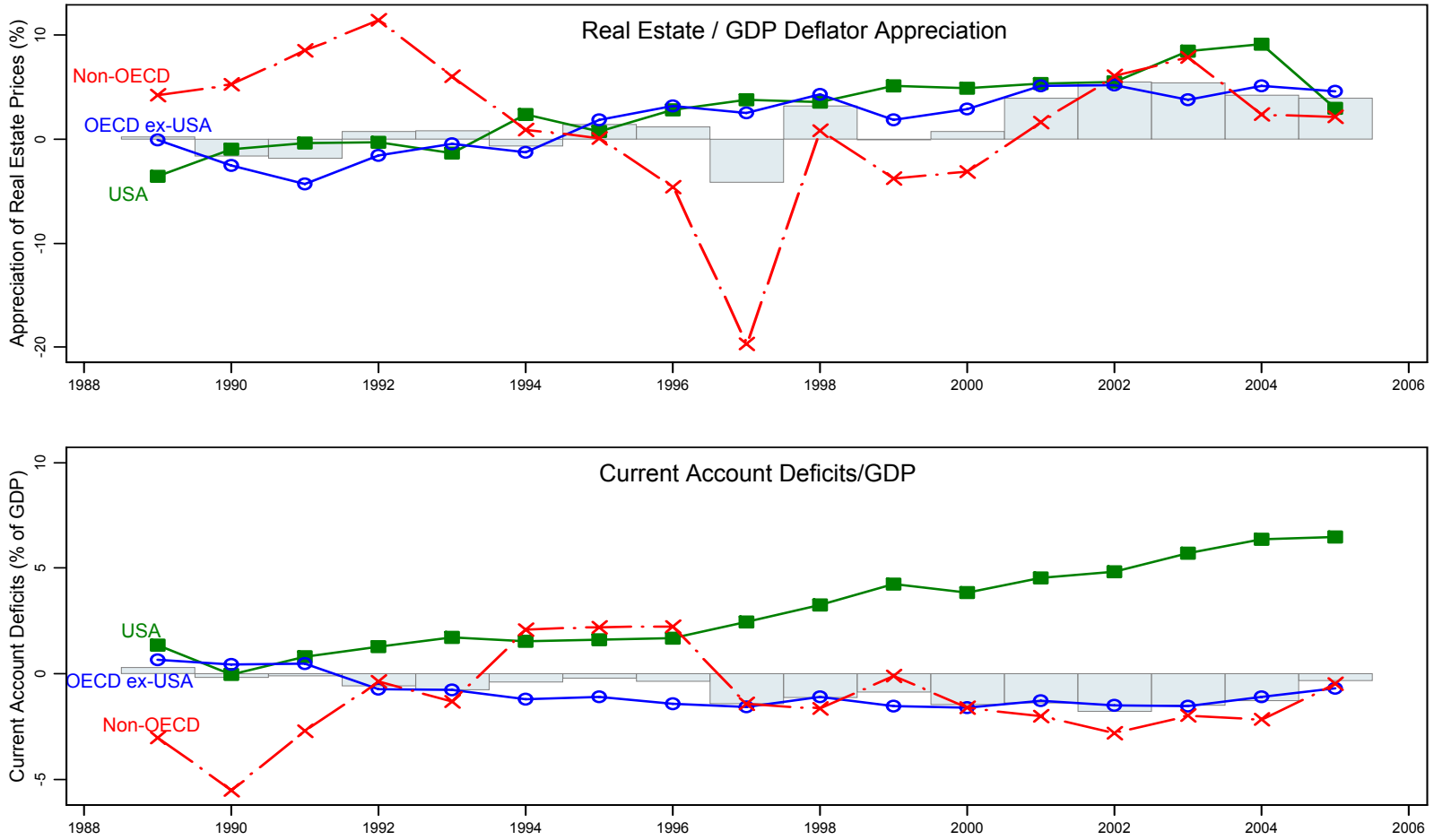

Figure 3 – Dispersion of the Real Appreciation: Real Estate Markets and Stock Markets.
In the top panel, each bar depicts standard deviation of the "appreciation of real estate prices" = %change per year of real estate prices/(GDP deflator). In the bottom panel, each bar depicts standard deviation of the %change per year of stock prices/(GDP deflator). The sample includes 25 OECD (solid lines; o) and the 18 Non-OECD (dash lines; x) countries.

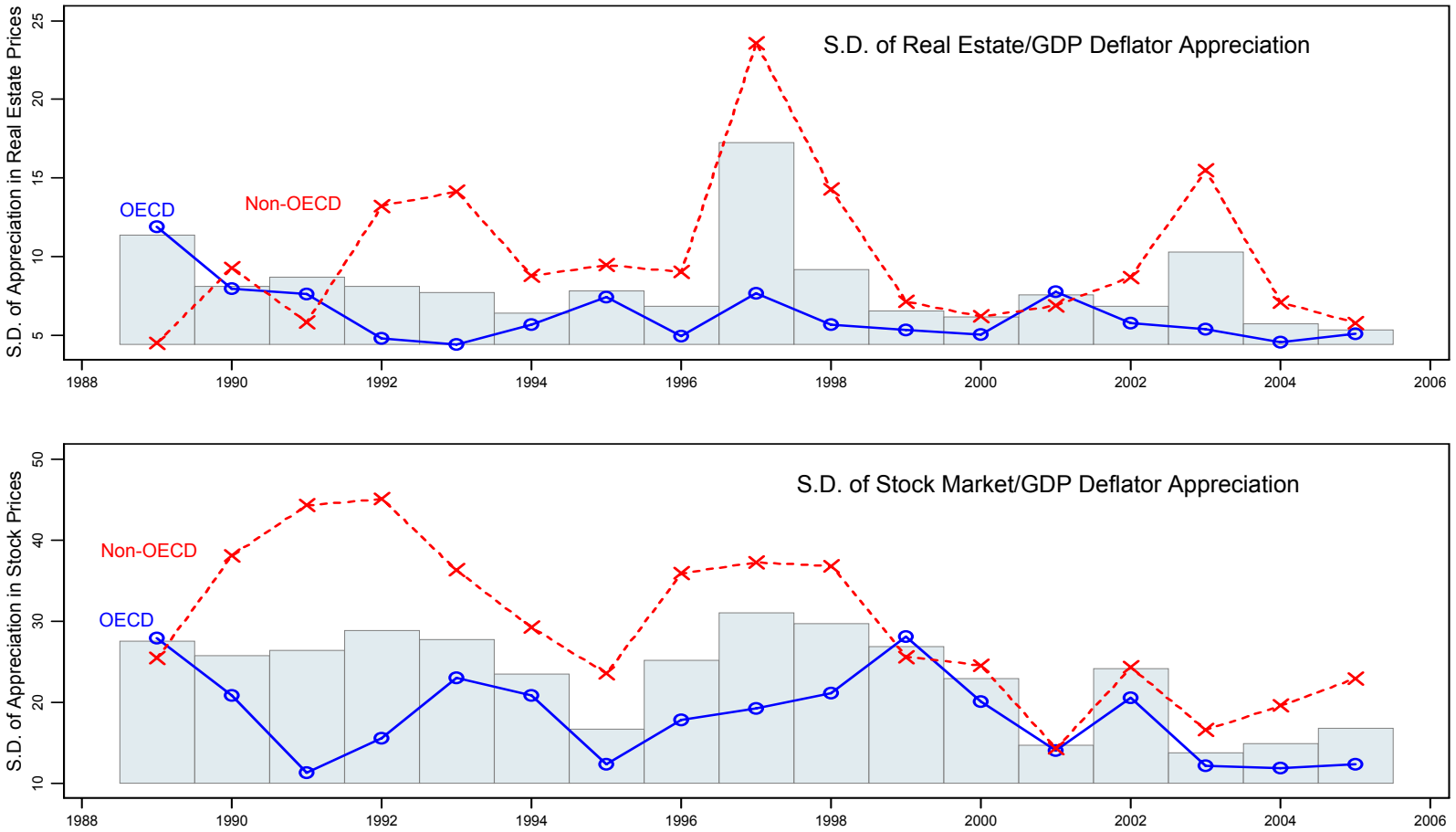

Figure 4 – Correlations Between Current Account Deficits/GDP and Real Estate /(GDP deflator) Appreciation.
In the top panel, each bar depicts cross-country correlations between current account deficits (% of GDP) and appreciation of real estate prices (% change per year of real estate prices/(GDP deflator)). The sample includes 25 OECD (solid lines; o) and the 18 Non-OECD (dash lines; x) countries. The bottom panel plots the 3-month market interest rates.

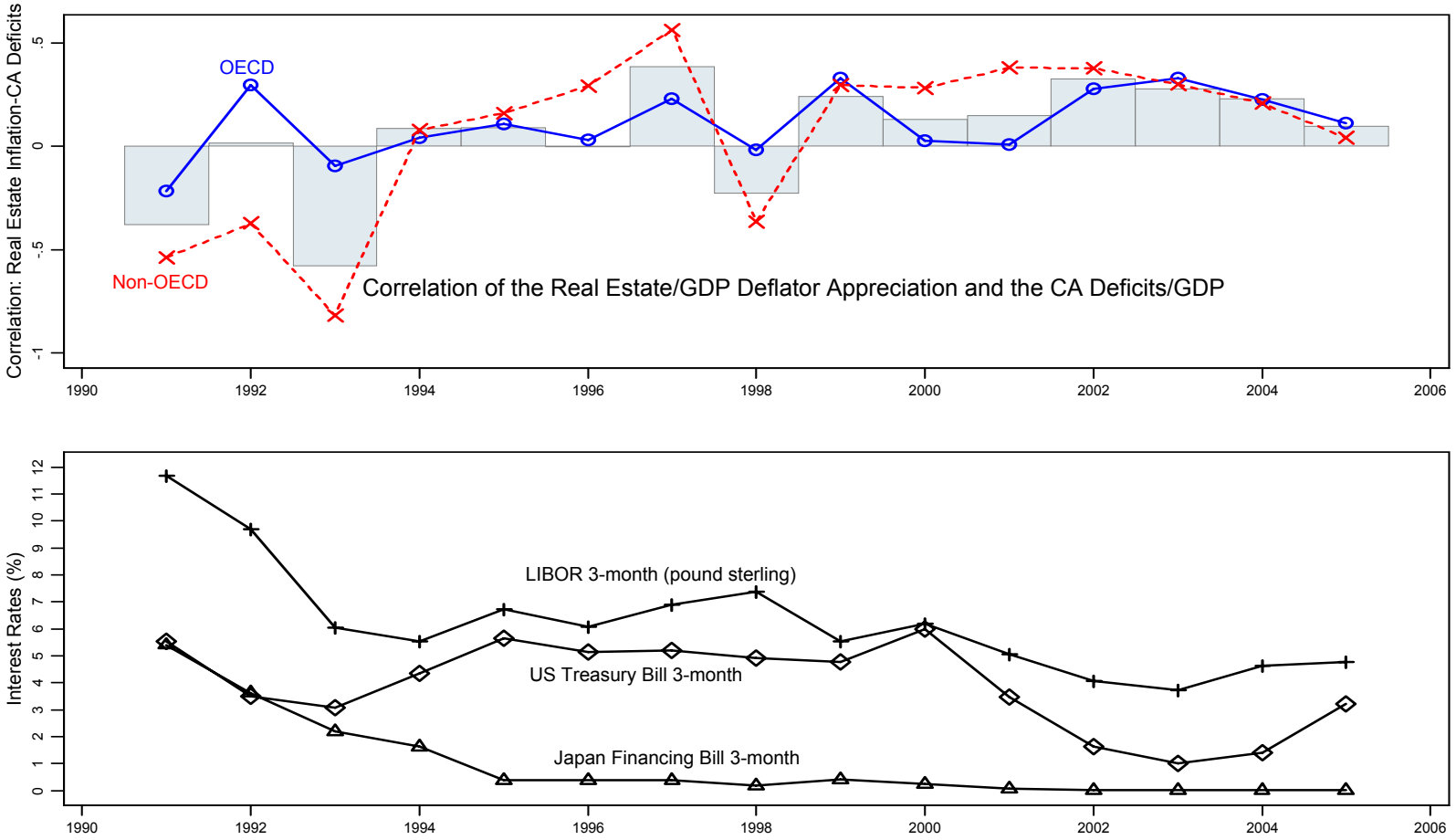

Figure 5 – Country Size and the Correlations between Real Estate/(GDP deflator) Appreciation and Current Account Deficits/GDP. This figure plots for each country on the horizontal axis the GDP Size (constant year-2000 trillion US$), averaged over the period 1980-1989, against the correlations between the real estate appreciation and the current account deficits during 1990-2005. The bottom panel excludes large countries: U.S., Japan, Germany, U.K., France, and Italy. Robust standard errors are in parentheses.

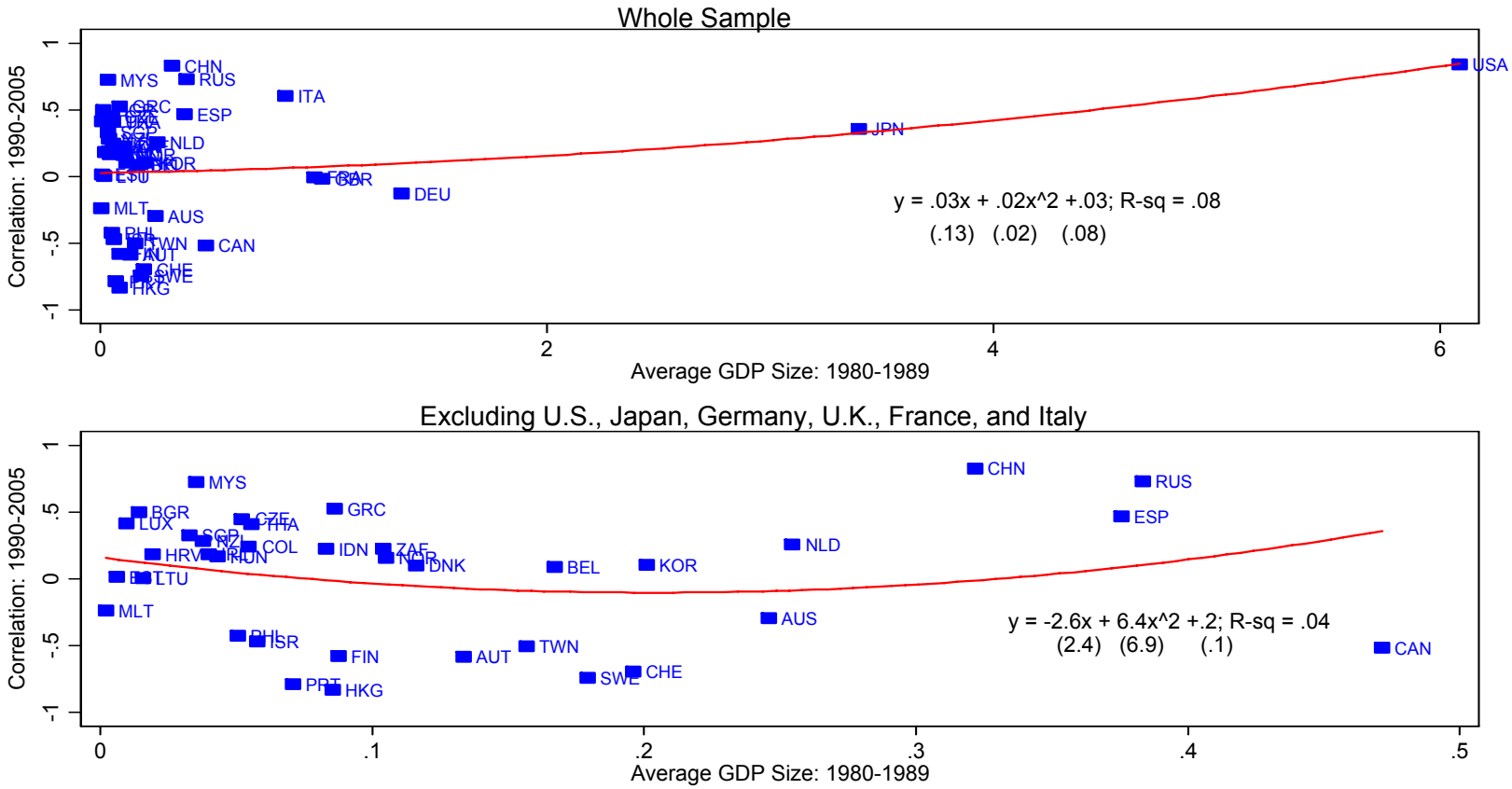

Figure 6 – Sample Distribution of the Current Account Deficits/GDP. The figure depicts the sample distribution of current account deficits to GDP of the 354 observations (41 countries) included in the panel data estimation. The sample period is 1990-2005.

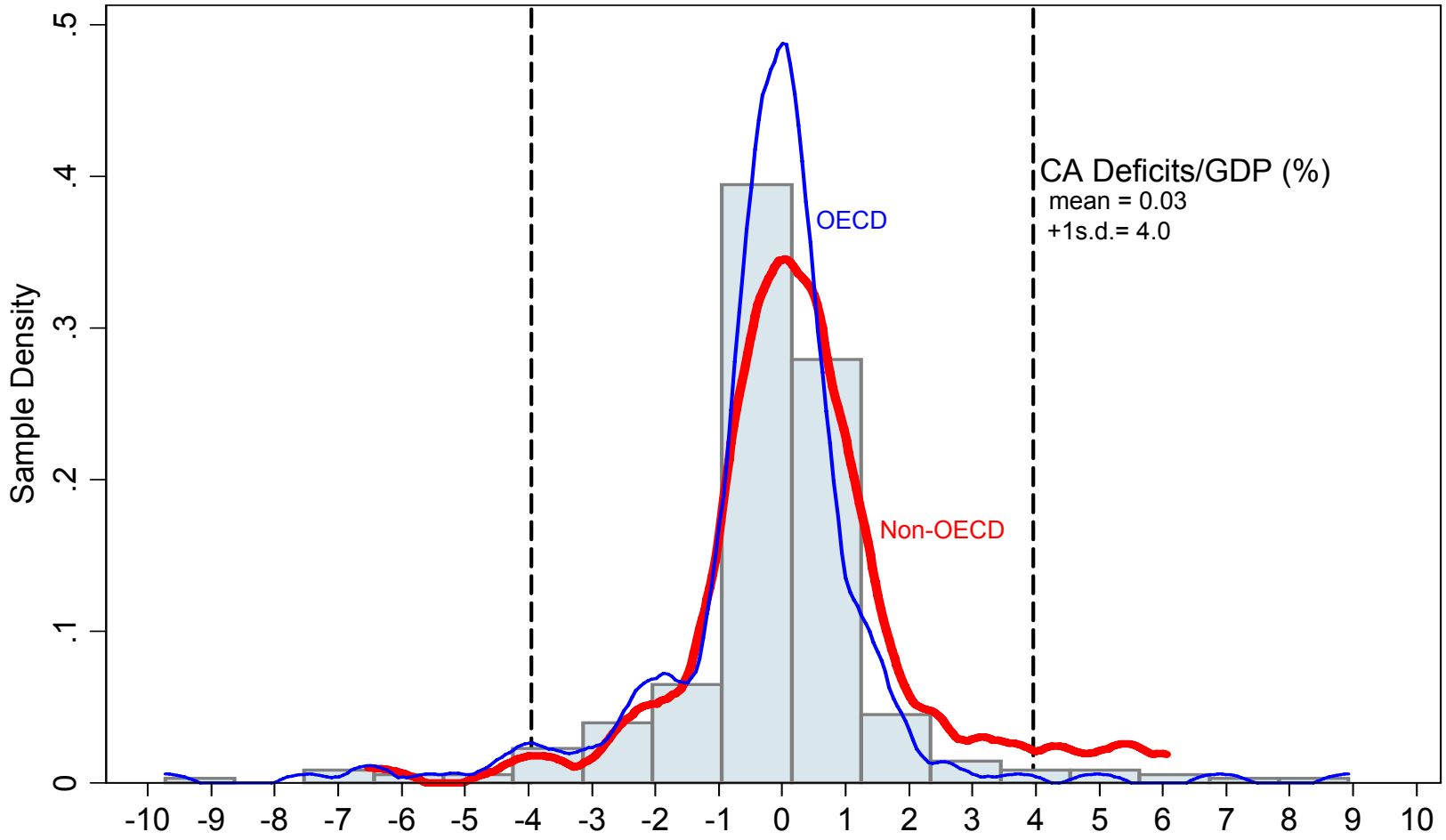

Figure 7 – Real Estate /(GDP deflator) Appreciation and Macroeconomic Variables.
Based on the 'Dynamic Panel' estimation with lagged 5 years (Table 5, first column). Each bar represents the estimated response of the appreciation of real estate prices ($y_{i,t}$; %change per year of real estate prices/(GDP deflator)), calculated for each macroeconomic variable ($x_{i,t}$; $z_{i,t}$) by multiplying a one standard deviation increase (σ) of the variable with its estimated coefficient (γ, β, θ). For instance, a 10.03% CA Deficits shock is the outcome of (a one s.d. of CA Deficits = 4.0)x(coefficients of its lags) = 4.0x(1.02+0.57+0.64+0.18+0.14) ≈ 10 percent. For the economic significance of the interaction between Financial Depth*CA Deficits: (one s.d. of Financial Depth*CA Deficits = .14) x 12.76(its coefficient estimate) = .14*12.76 ≈ 1.79 percent. The sample comprises 41 countries from 1990-2005. The dynamic equation for the appreciation of real estate prices ($y_{i,t}$) is

$$y_{i,t} = \alpha y_{i,t-1} + \gamma' x_{i,t-1} + \beta'(L) z_{i,t-1} + \theta' \left[x_{i,t-1} \times z_{i,t-1} \right] + \lambda_t + \eta_i + \upsilon_{i,t}$$

where x={Urban Population Growth, Capita GDP Growth, Inflation, Financial Depth, Institution, Real Interest}; z=Current Account Deficits/GDP; $\beta(L)$ a vector of polynomials in the lag operator; λ_t a time effect common to all countries; η_i a permanent but unobservable country-specific effect; $\upsilon_{i,t}$ an error term. All variables are stationary (no unit root; first-differenced and de-trended).