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International Financial Integration and National Price Levels: The Role of the Exchange Rate Regime

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International Financial Integration and National Price Levels: The Role of the Exchange Rate Regime

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Abstract: How does international financial integration affect national price levels? Panel evidence for 54 industrialized and emerging countries shows that a larger ratio of foreign assets and liabilities to GDP, our measure of international financial integration, increases the national price level under fixed and intermediate exchange rate regimes and lowers the price level under floating exchange rates. This paper formulates a two-country open economy sticky-price model under either segmented or complete asset markets that is able to replicate these stylized facts. It is shown that the effect of financial integration, i.e. moving from segmented to complete asset markets, is regime-dependent. Under managed exchange rates, financial integration raises the national price level. Under floating exchange rates, however, financial integration lowers national price levels. Thus, the paper proposes a novel argument to rationalize systematic deviations from PPP.

Keywords: international financial integration, exchange rate regime, national price level, PPP, foreign asset position

JEL classification: F21, F36, F41

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1 Introduction

Over the last two decades, international financial market integration has increased dramatically. How does ongoing financial integration affect national price levels? And which role does exchange rate policy play in this process? Most of the debate on the consequences of globalization focuses on the effect of trade integration on inflation. It is argued that increased goods market integration leads to a decline in inflation due to fiercer competition, a more efficient allocation of production and a disciplining effect on policy makers, e.g. Bernanke (2007) and Borio and Filardo (2007).

The literature has not discussed the effect of exchange rate policy on national price levels across countries in the process of financial integration.[2] This paper aims to close this gap. The importance of focusing on national price levels rather than on inflation rates stems from the fact that from a welfare perspective the level of prices matters much more than the rate of price increases. In an integrated world emerging economies help to hold down inflation in industrialized countries not because their goods prices are falling but because their goods are relatively cheaper. This paper shows that the extent to which national prices are low depends on both the degree of financial market integration and the exchange rate regime.

Figure (1) empirically illustrates the relationship between the (log of the) internationally comparable national price level and the degree of international financial integration, measured by the stock of foreign assets and liabilities for 54 industrialized and emerging countries between 1970 and 2004. There is a clear positive relationship between these two variables. Countries that are more financially integrated in the world economy exhibit a higher national price level. While trade integration arguably lowers prices, financial integration seems to raise the price level.

The paper makes two contributions: First, we present panel evidence for 54 industrialized and emerging countries that establishes a new stylized fact: The effect of international financial integration on national price levels depends on the exchange rate regime. Given that the majority of observations in figure (1) reflect de facto managed exchange rates, the figure disguises the important regime-dependent relationship.[3] Second, we extend an otherwise standard two-country open economy model, e.g. Devereux and Engel (2003), Obstfeld and Rogoff (2000a) and Sutherland (2005), by allowing for different degrees of international financial integration to capture the regime-dependent relationship between international financial market integration and the national price level.[4] In a related paper, Broda (2006) sheds light on the role of the exchange

[2] A large amount of literature investigates the effect of financial integration on growth and macroeconomic volatility. See Kose et al. (2006) for a recent survey on financial globalisation.

[3] To empirically classify exchange rate regimes, we rely on the de facto classifications recently provided by the literature. Hence, we do not rely on the exchange rate regime that is officially announced to the IMF.

[4] Engel (2001), Sutherland (2004) and Tille (2005) utilise a similar model structure to analyse financial market

rate regime choice for deviations in national price levels. He finds that the national price level is systematically higher in the case of fixed exchange rates than in floating regimes. However, he points towards difficulties to trace these observable differences back to underlying economic forces. We will extend this analysis and offer a rationale for Broda's observation based on the role of financial integration. According to our findings, the process of international financial integration affects the price level differently in fixed and flexible exchange rate regimes.

The empirical evidence shows that moving from segmented to complete international asset markets, i.e. moving to international financial integration, lowers national price levels for those countries that let their exchange rate float. In pegged or intermediate exchange rate regimes, however, closer financial integration raises national price levels. These effects are most evident for OECD countries and are less clear-cut for developing countries. In this paper the degree of international financial integration is measured by the country's gross foreign asset position.

The theoretical model which focuses on a fixed and floating exchange rate regime is able to explain the empirical findings.[5] The model shows that the higher domestic consumption and the stronger the terms of trade, the lower will be the national price level. The level of consumption and the terms of trade depends on the degree of international integration as well the country's exchange rate policy. International financial market integration is interpreted as moving from segmented to complete asset markets. Financial market integration matters since households benefit from the integration of international financial markets by increasing their consumption in complete compared to segmented financial markets due to the insurance value of internationally traded assets. However, to utilize the insurance provided by international capital markets domestic households have to transfer purchasing power abroad, which lowers the country's terms of trade. The exchange rate regime-dependent influence of financial integration on the price level is the result of a risk premium demanded by sticky-price good producers and its interaction with consumption and the terms of trade.

Under fixed exchange rate regimes, sticky price goods producers would prefer to adjust their prices whenever the economy is hit by an economic disturbance. However, they cannot do so and therefore require a risk premium as compensation. The higher the risk premium, the higher are goods prices and the lower is consumption. When asset markets are internationally integrated, households can insure themselves against consumption risk by utilizing an international financial market hedge. In order to use the financial market hedge and to enjoy relatively higher consump-

integration in the context of producer and consumer currency pricing or to assess how the structure of asset markets affects the gains from policy coordination between countries.

[5] In the floating exchange rate regime the monetary authority follows a policy of targeting a subset of CPI inflation, which consists of home produced goods prices. The rule parallels the optimal rule of price stability that results from closed economy sticky-price models, e.g. King and Wolman (1999) and Woodford (2003).

tion in complete financial markets, the domestic country has to compensate the foreign country for providing insurance by transferring purchasing power abroad. This transfer of purchasing power is reflected by the relatively lower terms of trade in complete financial markets. The presence of the risk premium diminishes the relative consumption gains in complete financial markets and amplifies the purchasing power transfer in form of lower terms of trade to continue to keep consumption relatively higher in complete asset markets. Consequently, the national price level will be higher in complete compared to segmented international financial markets.

A floating exchange rate regime, which allows for domestic price stability, prevents sticky-price goods producers from demanding risk premiums. Agents can therefore increase their consumption in complete financial markets without utilizing the financial market hedge to be compensated for the risk premium. Consequently, the transfer of purchasing power necessary to obtain a relatively higher consumption level in complete financial markets is smaller. Hence, the relative consumption gain from financial market integration is higher than the transfer of additional purchasing power abroad to finance the relatively higher consumption in complete financial markets. It follows that the national price level will be lower in complete than in segmented financial markets. Consequently, the empirical findings are reproduced: In the process of international financial integration, the national price level rises only in the case of managed exchange rates. In the case of floating exchange rates, by contrast, the process of financial integration lowers the national price level.

The remainder of the paper is organized as follows: Section 2 provides an explanation of the econometric methodology and establishes the stylized facts. Section 3 presents a model that is used in section 4 to replicate the empirical findings. Section 5 summarizes the main results.

2 Price levels, exchange rate regimes, and financial integration: empirical evidence

This section presents evidence on the relationship between a country's price level and its exchange rate regime in the process of international financial integration based on a panel of 54 countries (see table 1). It is shown that moving from segmented to complete international asset markets, i.e. moving towards higher international financial integration, lowers national price levels for those countries that let their exchange rate float. In pegged or intermediate exchange rate regimes, however, closer financial integration raises national price levels.

2.1 Measurement issues

Three crucial points pertain to measurement issues: First, the measurement of the price level deserves particular attention. Second, assessing the degree of international financial integration is not straightforward. Third, the identification of a country's exchange rate regime is complicated by the fact that the official exchange rate regime the country reports to the IMF need not correspond to the country's de facto policy. We discuss each of these issues in turn.

National price level (NPL): We use the same data definition as in Broda (2006). The data is taken from the Penn World Tables (PWT) 6.2 and, alternatively, from the World Development Indicators (WDI) database of the World Bank. The data is computed using the same methodology across countries. This means that, in contrast to real exchange rate data, the NPL in this study is comparable across countries, see Summers and Heston (1991). These data sources collect prices of different goods and services for a selected number of countries. Drawing on this sample of prices, PPP indices for each country relative to the US are constructed, defining a country's NPL as the PPP index of that country divided by it's foreign exchange rate. The NPL for country i is

$$NPL_i = \frac{1}{s_{i,US}} \sum_j \omega_j \frac{p_{i,j}}{p_{us,j}}, \tag{1}$$

where $s_{i,US}$ is the exchange rate between country i's currency and the U.S. dollar. The weight of good j is denoted by ω_j and p_{ij} are national goods prices.

International Financial Integration (FIN): The key explanatory variable measuring the degree of international financial integration using the gross foreign asset position relative to GDP as constructed by Lane and Milesi-Ferretti (2001a, 2003, 2007). For country i at date t the measure FIN_{it} is given by the sum of foreign assets FA_{it} and foreign liabilities FL_{it} over GDP

$$FIN_{it} = \frac{FA_{it} + FL_{it}}{GDP_{it}}. \tag{2}$$

This variable closely corresponds to the theoretical notion of international financial integration in terms of the availability of (state-contingent) assets. Furthermore, Kose et al. (2006a) argue that this quantity-based measure of international financial market integration, based on actual flows and stocks, provides the best available measure of a country's integration within international financial markets.

Exchange rate regime classification: A recent literature documents that the exchange rate regime a central bank officially announces not necessarily corresponds to actual policy. Even under officially freely floating exchange rates, central banks regularly intervene in foreign exchange markets. For this reason, we do not rely on the de jure classification provided by the IMF's Annual Report on Exchange Arrangements, but draw on the de facto classifications provided by Levy-Yeyati and Sturzenegger (2003, 2005) and Reinhart and Rogoff (2004). For each classification, we distinguish between a peg (Fix), a floating exchange rate (Float) and an intermediate regime (INT).[6] For the purpose of this paper, the classification of Reinhart and Rogoff, henceforth RR, is more relevant, since its puts more weight on actual exchange rate volatility.[7] Levy-Yeyati and Sturzenegger, henceforth LYS, also include changes in reserve holdings, which essentially scales down the weight of exchange rate fluctuations.

2.2 A first look at the data

In a first attempt to gauge the relationship between financial integration and the national price level for different exchange rate regimes, figures (2) and (3) present the combinations of these two variables in a set of scatter plots. Under managed exchange rate regimes, i.e. under pegs and intermediate regimes, a clear positive relationship emerges. Countries that are more financially integrated have higher price levels. Under floating exchange rates, this relationship flattens substantially under the LYS classification and turns negative for the RR classification. Hence, this rough evidence indeed suggests a nominal exchange rate regime-dependent pattern of interdependence. Note that, as stated above, the RR classification is more relevant in this context as it puts more weight on actual exchange rate volatility in the classification of de-facto regimes than the LYS classification. We use formal econometric testing to identify this regime dependent nature and appropriately control for other explanatory variables.

2.3 The estimation strategy

We estimate the following regression using Panel OLS

$$\begin{aligned} \log NPL_{it} &= \beta_0 \times FIN_{it} + \beta_1 \left\{(FIX_{it} + INT_{it}) \times FIN_{it}\right\} + \\ &\quad \beta_2 \left\{FLO_{it} \times FIN_{it}\right\} + \Gamma' X_{it} + \varepsilon_{it}. \end{aligned} \tag{3}$$

The vector X_{it} contains a set of control variables with coefficient vector Γ. All regressions allow for fixed (time) effects. We apply the two alternative classifications explained above to distinguish three different exchange rate regimes. The dummy variables FIX_{it}, INT_{it} and FLO_{it} have a value of one if the country exhibits a fixed exchange rate, an intermediate degree of exchange rate management or a freely floating exchange rate, respectively, and zero otherwise. Note that we include both the level of FIN_{it} and its interaction with the exchange rate regime dummy. Our main hypothesis suggests that $\beta_0 + \beta_1 > 0$ and $\beta_0 + \beta_2 < 0$. That is, financial integration

[6] An additional appendix available upon request contains, among other things, a detailed table with the number of observations available under each classification for four different samples.

[7] See Aghion et al. (2009) for this point.

has a positive effect on the NPL under pegged and intermediate exchange rate regimes and has a negative effect under floating exchange rates. We test this hypothesis using a standard χ^2 distributed Wald test statistic.[8] To check the robustness of the results, we allow the effects of fixed and intermediate regimes to be different. We estimate

$$\begin{aligned} \log NPL_{it} &= \beta_0 \times FIN_{it} + \beta_1 \{(FIX_{it} \times FIN_{it}\} + \beta_2 \{INT_{it} \times FIN_{it}\} \\ &\quad \beta_3 \{FLO_{it} \times FIN_{it}\} + \Gamma' X_{it} + \varepsilon_{it}. \end{aligned} \tag{4}$$

We also include an extensive set of various control variables which is mirrored in the vector

$$\begin{aligned} X'_{it} &= (\log GDP_{it}, OPEN_{it}, \log SIZE_{it}, OPEN_{it} \times \log GDP_{it}, \\ &\qquad DUR_{it}, CREDIT_{it}, FIX_{it}, INT_{it}, FLO_{it}). \end{aligned} \tag{5}$$

The most important is the log of per-capita GDP (GDP) as taken from the PWT. This variable captures the well-known Balassa-Samuelson connection of productivity differentials between tradable and non-tradable goods and the overall price level. Thus, we expect GDP to enter the equation with a positive sign. The degree of trade openness ($OPEN$), measured by the ratio of exports plus imports to GDP, is also taken from the PWT. As mentioned earlier, it is frequently argued that countries which are more exposed to trade should exhibit lower price levels. Thus we expect $OPEN$ to have a negative sign. The country size ($SIZE$) is measured by the (log) population reported by the PWT. We include a measure of the level of the development of the domestic financial system ($CREDIT$). This measure is given by the log of the ratio of private credit to GDP obtained from Beck, Demirguc-Kunt, and Levine (2000). We control for the fact that in many developing countries the exchange rate regime exhibits a very unstable pattern. Therefore, we construct a measure of the duration (DUR) of a given exchange rate regime (in years). It corresponds to a time trend in the price level that experiences a break whenever the exchange rate regime changes.[9] The exchange rate regime dummies (FIX, INT, FLO) are also included in the list of control variables to assess whether the exchange rate regime has a level effect on the price level besides the interaction with financial integration. Finally, the interaction term $OPEN \times \log(GDP)$ is included in analogy to Broda (2006) and can be motivated by the assumption that a high propensity to trade should pull a country's price level upwards.[10] Some

[8] As Aghion et al. (2009) note in a similar set-up, the endogenous nature of the exchange rate regime is less of an issue with an interaction term than with single variables. The reason is that the endogeneity of the exchange rate regime choice could bias the coefficient on the exchange rate regime in a linear regression. Assume that the exchange rate regime choice coincides with other policies associated with a higher price level. It follows that this can only bias the interaction coefficients to the extent that the correlation between these policies and the exchange rate regime choice varies significantly with the degree of financial integration.

[9] This indicator roughly corresponds to Broda's (2006) index of exchange rate regime shifts.

[10] See Kravis and Lipsey (1987) for this argument.

of the non-OECD countries, notably China, accumulate large external positions while maintaining a restricted capital account. To account for those cases, we include Chinn and Ito's (2007) measure of capital account openness ($KAOPEN$) in those regressions.[11]

The set of countries comprises all OECD and major emerging market countries. However, we leave Luxembourg, Hong Kong, and Singapore out as these off-shore financial centers hold exceptionally high net foreign asset positions. To account for the possibility of nonlinearity in the relationship between financial integration and NPLs, we follow Lane and Milesi-Ferretti (2001b and 2004) and split the sample into OECD and non-OECD countries. They argue that the size of the foreign asset positions as well as its composition might depend nonlinearly on the level of economic development.

We use annual data for the period 1990-2004 for 54 countries. Before 1990, the dynamics of the gross foreign asset position, our measure of financial integration, were essentially flat.[12] Figure (4) depicts the average degree of financial integration for all three country groups. Apparently, financial integration increased dramatically in the post-1990 period. Therefore, we base our main specification on data ranging from 1990 to 2004, but also report results for the 1970-2004 period. The graph also confirms that OECD and Non-OECD countries exhibit a different pace of financial integration that justifies to split the sample accordingly.

We discover the unconditional relationship between the NPL and the degree of international financial integration, that is, we do not condition on the prevailing exchange rate system. Table (2) reports the results from regressing NPL on FIN and other major explanatory variables. The degree of international financial integration enters with a significant positive coefficient. Thus, countries that have more access to international financial assets exhibit a higher price level. It turns out that all control variables are significant and have the expected sign. Countries with a higher per capita income and a higher level of domestic financial development have higher price levels. On the other hand, more open countries and larger countries tend to have smaller price levels. The interaction term $OPEN \times GDP$ enters with a positive sign indicating that the price-effect of GDP is stronger the more open the economy. With respect to the control variables the findings are completely in line with Broda (2006), among others.

[11] The regressions based on price level data from the WDI data base include a step-dummy for membership in the European Monetary Union (EMU) from 1999 onwards. This accounts for the apparent large structural break in the data for EMU member countries.

[12] Kose et al. (2006b) estimate a panel using the same data set on foreign assets and liabilities. They refer to the post-1987 period as the "globalization period".

2.4 The role of the exchange rate regime

We now turn to the effect different exchange rate regimes have on national prices in the process of international financial market integration. The baseline results are reported in table (3). All major control variables remain significant and have the expected sign. Most importantly the level of financial integration enters positively, while the interaction terms with prevailing exchange rate regime indicate important regime-dependent effects. The Wald tests confirm this finding: For both the LYS and the RR classification we find a positive price effect of integration under managed exchange rates and a significant negative effect under floating exchange rates. Technically, $\beta_0 + \beta_1 > 0$ for fixed and intermediate exchange rates and $\beta_0 + \beta_1 < 0$ for floating exchange rates. Thus, we can corroborate our main hypothesis for both exchange rate classification schemes. Under the RR classification for PWT data, for example, a 10 percentage points larger share of gross foreign assets increase the NPL by 0.27 percent under fixed and intermediate exchange rate regimes and lowers the price level by three percent under floating exchange rates. The regressions based on the price level data from the WDI data set support these numbers.

In many transition countries, data availability and data quality for the early 1990s is a source of concern. Therefore, we also estimate a regression excluding all transition countries. The results, which are presented in table (4), lend further support to our main hypothesis.

In tables (5) and (6) we separate OECD countries from Non-OECD countries. Interestingly, the data indeed suggests that developed and emerging countries exhibit different response patterns as suggested by Lane and Milesi-Ferretti (2001b and 2004). The price level in OECD countries, for example, reacts less to GDP and to $CREDIT$, our measure of domestic financial development, than in the larger set of countries. OECD countries, on the contrary, respond more to the measure of trade openness and its interaction with income. International financial integration has a larger price impact in the OECD sample than in the large sample. Under the LYS classification, for example, the coefficient on FIN is 0.033 for all countries but 0.059 for OECD countries. Our theoretical hypothesis gains strong empirical support in the OECD sample. Moving from a financially closed economy to a fully open capital account raises the NPL under pegged and intermediate exchange rate regimes and lowers the price level under floating exchange rates. For the Non-OECD countries, we find limited evidence in favor of a negative price effect of financial integration under floating exchange rates and only insignificant or negative price effects under managed exchange rate regimes.

All specifications include the de-facto exchange rate regime dummies as separate control variables. Interestingly, we find that the level effect of floating regimes is mostly larger than the (often negative) effect of a fixed exchange rate regime. This stands in contrast to the findings of Broda (2006). These dummies, however, capture only the level effect unconditional on the degree of financial intermediation. The Broda-finding survives if the positive effect of financial integration under fixed exchange rate regimes outweighs the level effect of FIX. In fact, these results show that Broda's (2006) result can be disentangled into an effect of the exchange rate regime that is unconditional on financial integration and the impact of the exchange rate arrangement conditional on the degree of integration. While the former effect is mostly negative, the latter is positive and can dominate the former.

Since our sample comprises various short-lived exchange rate regimes, we report a separate set of results for those regimes, that have a minimum duration of three years.[13] Table (7) confirms our main result indicating that it is not due to exchange rate regime instabilities. Finally, tables (8) and (9) document the results for the long sample period ranging from 1970 to 2004 for the large set of countries and for the OECD sample. The degree of financial integration enters positively in both cases. Under managed exchange rate, we find a significantly positive price impact of financial integration. For floating exchange rates, this effect becomes negative under the LYS and the RR classification. However, the negative effects lacks statistical significance for the large set of countries. These results improve if we restrict the sample to OECD countries. Under both de facto classification schemes, the price effect is statistically significant and negative under flexible exchange rates. Only for the RR classification, however, do we also find a statistically significant positive effect under managed exchange rate regimes. Table (10) reports the results based on the estimation of (4), i.e. with explicitly allowing the intermediate regime to have a separate effect. It turns out that the effect of financial integration on the price level changes its sign for floating exchange rate regimes. In other word, bundling fixed and intermediate exchange rate regimes together is an innocuous simplification.

To control for the possibility that the results reflect a process of price convergence of countries with relatively low NPLs we allow in tables (11) and (12) for initial price levels and levels of financial integration of country i in the sample. More precisely, we estimate two specifications that include either NPL or FIN of a base year, i.e. 1990. The results are presented in tables (11) and (12). All previous findings remain qualitatively and quantitatively unchanged for given values of NPL_{1990} and FIN_{1990}.[14] In sum, we find strong evidence in support of our main theoretical hypothesis for the post-1990 sample in which financial integration gained momentum. Based on the available de facto exchange rate classification schemes we find that NPLs are higher for those countries that actively manage their exchange rate and lower for those countries that

[13] In his case we drop the DUR_{it} index.

[14] Results from Dynamic Panel OLS, which are not reported here for brevity but are also contained in the additional appendix, support the main findings.

let their currency float freely.

3 The model

In this section we present a model that is able to replicate the empirical results derived in the previous section. We extend a stochastic two-economy model, which is based on Devereux and Engel (2003), Obstfeld and Rogoff (2000a) and Sutherland (2005), to allow for different degrees of financial integration and their relationship to the exchange rate regime.

Agents of the home country, H, and foreign country, F, produce traded goods. Home agents are indexed by numbers in the interval $[0,1]$ and foreign agents reside on $[0,\mathcal{P}^*]$, where $\mathcal{P}^*$ corresponds to the population size of the foreign country. The share of the home population in the world population equals $\mathcal{P} = 1/(1+\mathcal{P}^*) > 0$. Agents in the domestic economy consume a basket consisting of home and foreign produced goods. There is a continuum of flexible-price goods denoted by 1 with $C_{J,1}$, $J = H, F$, and a continuum of sticky-price goods denoted by 2 with $C_{J,2}$. Households consume both the flexible and sticky price goods. Each household i provides labour supply to producers of flexible and fixed price goods. Producers of type 1 goods supply their products to a market where prices are set flexibly and set their prices each period on the basis of full information about current demand and cost conditions. Fixed-price goods are supplied in a market where prices are set prior to the realization of shocks. It follows that producers meet the demand at the pre-set price. Thus, when the fixed goods price is chosen, exogenous changes realized in the current period are not known. Fixed-price goods producers set up prices for the home and export market. The proportion of flexible-price firms equals $0 < \alpha < 1$ so that $(1-\alpha)$ is the measure of price rigidity in the economy. Foreign country conditions, indicated by an asterisk, are defined analogously. There is one period. If international capital markets are not segmented, households trade in a world market in state-contingent assets at the beginning of the period *after* monetary policy rules are set, knowing that the state-dependent security payoffs occur at the realized exchange rate. Producers in the fixed-price sector set their prices before supply shocks, production and consumption are realized. Households decide about money balances and consumption while firms supply the goods that consumers demand once uncertainty is revealed.

3.1 Preferences and prices

Preferences of the representative home agent i in state s are given by

$$U = \sum_s \pi_s \left(\ln C(i)_s + \chi \ln \left(\frac{M(i)_s}{P_s} \right) - K L(i)_s \right). \tag{6}$$

Utility is a function of consumption index $C(i)$, real money balances, $M(i)/P$, and of disutility of work effort, $KL(i)$. The consumption index equals

$$C(i)_s = \left(n^{\frac{1}{\eta}} C(i)_{H,s}^{\frac{\eta-1}{\eta}} + (1-n)^{\frac{1}{\eta}} C(i)_{F,s}^{\frac{\eta-1}{\eta}}\right)^{\frac{\eta}{\eta-1}}, \text{ where } C(i)_{J_s} = \frac{C(i)_{J,1}^{\alpha} C(i)_{J,2}^{1-\alpha}}{\alpha^{\alpha}(1-\alpha)^{1-\alpha}}, \quad (7)$$

in which case the home consumer price index becomes

$$P_s = \left(nP_{H,s}^{1-\eta} + (1-n) P_{F,s}^{1-\eta}\right)^{\frac{1}{1-\eta}}, \text{ with } P_J = P_{J,1}^{\alpha} P_{J,2}^{1-\alpha}. \quad (8)$$

The parameter η reflects the elasticity of substitution between home and foreign goods with respect to relative price changes. For $\eta > 1$, home and foreign goods are substitutes. Consequently, price changes lead to expenditure switching effects towards the relatively cheaper good. The parameter $n = 1-(1-\mathcal{P})\gamma$, measures the overall share of home goods in the home consumption basket (see Sutherland, 2005). Trade openness is measured by the parameter $0 < \gamma < 1$. This formulation accounts for the empirical consumption bias towards tradeable goods produced locally. Households give a higher weight to local than to foreign goods and PPP does not hold. The consumption and price indices for the flexible-price composite goods are defined as $C(i)_{H,1_s} = \left(\left(\frac{1}{\alpha}\right)^{\frac{1}{\theta}} \int_0^{\alpha} C_{H,1_s}(i,z)^{\frac{\theta-1}{\theta}} dz\right)^{\frac{\theta}{\theta-1}}$ and $C(i)_{F,1_s} = \left(\left(\frac{1}{\mathcal{P}^*\alpha}\right)^{\frac{1}{\theta}} \int_0^{\alpha\mathcal{P}^*} C_{F,1_s}(i,z)^{\frac{\theta-1}{\theta}} dz\right)^{\frac{\theta}{\theta-1}}$, with $P_{H,1_s} = \left(\frac{1}{\alpha}\int_0^{\alpha} P_{H,1_s}(z)^{1-\theta} dz\right)^{\frac{1}{1-\theta}}$ and $P_{F,1_s} = \left(\frac{1}{\alpha\mathcal{P}^*}\int_0^{\alpha\mathcal{P}^*} P_{F,1_s}(z)^{1-\theta} dz\right)^{\frac{1}{1-\theta}}$, respectively. Similar conditions hold for the fixed-price composites. The elasticity of substitution between any two heterogeneous goods is reflected by $\theta > 1$. The shift parameter in money demand is χ. The parameter K can be seen as a random shift in the marginal disutility of work effort with a mean value of $E_{-1}(\ln K) = 0$ and a variance σ_k^2, where E_{-1} is the expectation operator across states of nature s and $\ln K\, \epsilon[-\varepsilon, \varepsilon]$. A negative supply shock, a rise in K, causes the household to produce less in a given amount of time. Total labour effort is given by

$$\begin{aligned} L(i)_s &= \int_0^{\alpha} L_{H,1}(z)_s\, dz + \int_{\alpha}^{1} L_{H,2}(z)_s\, dz, \text{ with} \quad (9)\\ Y_{H,k}(z)_s &= L_{H,k}(z)_s = \int_0^1 C_{H,k}(i,z)_s di + \int_0^{\mathcal{P}^*} C_{H,k}^*(i,z)_s di,\ k = 1,2. \end{aligned}$$

The demand functions for flexible price goods (and similarly for the fixed-price goods) are $\frac{C_{H,1}(i,z)_s}{C_s} = n\left(\frac{P_{H,1}(z)_s}{P_{H,1_s}}\right)^{-\theta} \frac{P_{H_s}}{P_{H,1s}} \frac{P_s^{\eta}}{P_{H_s}^{\eta}}$ and $\frac{C_{F,1}(i,z)_s}{C_s} = \frac{(1-n)}{\mathcal{P}^*}\left(\frac{P_{F,1}(z)_s}{P_{F,1_s}}\right)^{-\theta} \frac{P_{F_s}}{P_{F,1s}} \frac{P_s^{\eta}}{P_{F_s}^{\eta}}$. Foreign agents' preferences and resource constraints have a similar form, except that K^* and L^* may differ from K and L. It is assumed that K and K^* are uncorrelated. Foreign agents hold their own money, M^*, and their general price level equals $P_s^* = \left(n^* P_{F_s}^{*1-\eta} + (1-n^*) P_{H,s}^{*1-\eta}\right)^{\frac{1}{1-\eta}}$, with $n^* = 1-\mathcal{P}\gamma$.

3.2 Households

The home agent i has a budget constraint specific to the state s, where $\Sigma\Gamma_s$ denotes the financial assets term, W_s the nominal wage rate and Π_s total profits received by households:

$$\Pi(i)_s + W_s L(i)_s + P_s \Sigma\Gamma(i)_s = P_s C(i)_s + M(i)_s - M_0 + T(i)_s \text{, with} \tag{10}$$

$$\begin{aligned} \Pi(i)_s &= \int_0^{\alpha} P_{H,1_s}(z) C_{H,1_s}(i,z) dz + \int_{\alpha}^{1} P_{H,2_s}(z) C_{H,2_s}(i,z) dz \\ &+ S_s [\int_0^{\alpha\mathcal{P}^*} P^*_{H,1_s}(z) C^*_{H,1_s}(i,z) dz + \int_{\alpha\mathcal{P}^*}^{\mathcal{P}^*} P^*_{H,2_s}(z) C^*_{H,2_s}(i,z) dz] - W_s L(i)_s . \end{aligned} \tag{11}$$

The equilibrium taxes by the government are given by $T_s = -(M_s - M_0)$. The equilibrium revenue from producing goods equals

$$REV_s = \Pi_s + W_s L_s = n \left(\frac{P_{H_s}}{P_s}\right)^{1-\eta} P_s C_s + (1-n) S_s \left(\frac{P^*_{H_s}}{P^*_s}\right)^{1-\eta} P^*_s C^*_s . \tag{12}$$

The nominal exchange S defines the number of domestic currency units per unit of foreign currency. The optimality conditions for consumption, real balances and labour effort for agent i are derived from the objective function (6) and the budget constraint (10) and equal in equilibrium

$$\frac{M_s}{P_s} = \chi C_s \quad \text{and} \quad \frac{W_s}{P_s} = K C_s . \tag{13}$$

The foreign country has similar first order conditions. The money supply in each country is determined by the policy rule of the national monetary authorities. The feedback parameters δ^K_{fms}, $\delta^{K^*}_{fms}$, $\delta^{*K^*}_{fms}$, and δ^{*K}_{fms} depend on the financial market structure, fms, and the precise exchange rate rule specified below. Money supply is

$$M_s = M_0 K^{\delta^K_{fms}} K^{*\delta^{K^*}_{fms}} \quad \text{and} \quad M^*_s = M^*_0 K^{*\delta^{*K^*}_{fms}} K^{\delta^{*K}_{fms}} . \tag{14}$$

3.3 Firms

Firms are monopolistically competitive and are price setters for good z. Flexible price producers set prices after shocks have been realized and monetary policy has been set. For flexible goods prices it holds that $P^*_{H,1_s}(z) = \frac{P_{H,1}(z)}{S_s}$ and $P_{F,1_s}(z) = P^*_{F,1_s}(z) S_s$. From the profit maximization of firms it follows that flexible price producers require prices that equal

$$P_{H,1s} = \Phi K P_s C_s \quad \text{and} \quad P^*_{F,1s} = \Phi K^* P^*_s C^*_s , \quad \text{where } \Phi = \theta/(\theta-1), \tag{15}$$

in equilibrium. Under flexible prices producers set prices so that the marginal costs, $\frac{K}{P_{H,1s}}$, from a price reduction are proportional to the marginal utility from income, $\frac{C_s^{-1}}{P_s}$. Firms in the fixed price sector determine optimal prices before the realization of the shocks takes place. They set up separate prices for sales at home and abroad. The domestic price of home product z is $P_{H,2s}(z)$, the ex ante price in domestic currency of home products to be sold abroad is $\breve{P}_{H,2s}(z)$. After shocks are realized, the foreign price is adjusted with respect to the nominal exchange rate such that the ex post price in foreign currency of the home produced good is $P^*_{H,s}(z) = \frac{\breve{P}_{H,s}(z)}{S_s}$, while $P_{F,s}(z) = \breve{P}^*_{F,s}(z)\, S_s$ is the ex-post price of the foreign good in home currency. Using composite demands and (13) it follows that the maximization of expected discounted profits leads to the equilibrium price demanded by the fixed price producer in the domestic market:

$$P_{H,2s} = \frac{E_{-1}\left(P_{H,1}\frac{P_H C_H}{PC}\right)}{E_{-1}\left(\frac{P_H C_H}{PC}\right)} \quad \text{and} \quad P^*_{F,2s} = \frac{E_{-1}\left(P^*_{F,1}\frac{P^*_F C^*_F}{P^* C^*}\right)}{E_{-1}\left(\frac{P^*_F C^*_F}{P^* C^*}\right)}. \tag{16}$$

For example, the expected marginal gains from sales, $P_{H,2s}E_{-1}\left(C^{-1}\cdot\frac{P_H C_H}{P}\right)$, equate the marginal costs, i.e. the expected value of the flexible price $P_{H,1}$ adjusted by the marginal gains from sales $E_{-1}\left(P_{H,1}C^{-1}\cdot\frac{P_H C_H}{P}\right)$. The equilibrium export prices are

$$P^*_{H,2s} = \frac{E_{-1}\left(P_{H,1}\frac{SP^*_H C^*_H}{PC}\right)}{S_s E_{-1}\left(\frac{SP^*_H C^*_H}{PC}\right)} \quad \text{and} \quad P_{F,s} = \frac{S_s E_{-1}\left(P^*_{F,1}\frac{P_F C_F}{SP^* C^*}\right)}{E_{-1}\left(\frac{P_F C_F}{SP^* C^*}\right)}. \tag{17}$$

When firms set their prices for the export market they have to account for uncertain nominal exchange rate movements. The expected prices contain a risk premium which depends on variances and covariances of the variables displayed in the equations above. The risk premium reflects the fact that prices need to be set before shocks are realized. Producers would prefer to adjust their prices whenever the economy is hit by economic disturbances K and K^*. We distinguish four different risk premiums: premiums for prices set by domestic firms in the home country ($\mathcal{R}_{p_H}$) and the foreign country ($\mathcal{R}_{\breve{p}_H}$) and premiums for prices set by foreign firms in the home ($\mathcal{R}_{\breve{p}^*_F}$) and the foreign country ($\mathcal{R}_{p^*_F}$). These risk premiums play an important role in the relationship between the NPL, international financial market integration and exchange rate regime choice. The next section illustrates the international financial market structure and its impact on the NPL.

3.4 International asset markets

Incomplete financial markets are represented by financial autarky where ex ante trade in state-contingent assets is not possible. When financial markets are integrated, in turn, a full set of contingent assets is available. This allows households to diversify idiosyncratic risk such that consumption risk sharing is possible. Financial market integration corresponds to a movement from segmented towards complete financial markets.

3.4.1 Segmented financial markets

If there is no ex ante trade in state-contingent assets, $\Sigma\Gamma_s = 0$ in any state of nature, international financial markets are segmented, denoted by *seg*. Home and foreign households can neither borrow nor lend and the current account is in balance. The nominal value of the domestic goods consumed abroad $\mathcal{P}^* S_s P^*_{Hs} C^*_{Hs}$ equals the amount of foreign goods consumed at home in nominal terms, $P_{Fs} C_{Fs}$. Thus, there is balanced trade across countries

$$P_s C_s = REV_s \ , \quad P^*_s C^*_s = REV^*_s, \quad \text{and } \frac{C_s}{C^*_s} = \left(\frac{S_s P^*_{Hs}}{P_{Fs}}\right)^{1-\eta} \left(\frac{S_s P^*_s}{P_s}\right)^{\eta}. \tag{18}$$

Relative consumption needs to equal the relative prices, i.e. the real exchange rate, $\frac{S_s P^*_s}{P_s}$ and the terms of trade, $ToT = \frac{S_s P^*_{Hs}}{P_{Fs}}$. The responsiveness of the real exchange rate [terms of trade] is affected by η. The higher η, the less [more] accentuated need to be shifts in the real exchange rate [terms of trade] for a given change in the relative consumption pattern.

3.4.2 Complete financial markets

Under complete financial markets, defined as *comp*, attention will be confined to the case where asset trade takes place *after* policy decisions are made (see Senay and Sutherland, 2007). Assets are traded for each state s of the world, reflected by the term $\Sigma\Gamma_s = (B_{H,s} REV_s + B_{F,s} S_s REV^*_s)/P_s - \sum_{\mathcal{S}} \Big((q_{H,\mathcal{S}} B_{H,\mathcal{S}} + q^*_{F,\mathcal{S}} B_{F,\mathcal{S}}) S_{\mathcal{S}} P^*_{\mathcal{S}}/P_{\mathcal{S}}\Big)$. The same applies in the foreign country. The quantity of securities of country H equal $B_{H,\mathcal{S}}$ and $B_{F,\mathcal{S}}$, respectively, while the pay-offs equal $(B_{H,s} REV_s + B_{F,s} S_s REV^*_s)$. The prices for one unit of securities paying off in country H currency are $q_{H,\mathcal{S}}$ and $q^*_{F,\mathcal{S}}$. State-contingent assets are in zero net supply. The appendix shows that the risk-sharing condition ensures

$$\frac{C_s}{C^*_s} = \frac{q_{Hs}}{q^*_{Fs}} \frac{S_s P^*_s}{P_s}. \tag{19}$$

If, for example, $q_H/q^*_F < 1$ it must hold that $C_s^{-1}/P_s > C_s^{*-1}/S_s P^*_s$ for (19) to be valid ex ante. An additional unit of consumption is more valuable to the domestic household. The domestic household needs to compensate the foreign household for providing insurance to the domestic economy when $q_H/q^*_F < 1$ via higher purchasing power so that $S_s P^*_s > P_s$. This basic insurance mechanism becomes important later.

4 Prices and international financial integration

4.1 National price level

This section derives the implication of international asset market integration for the NPL

$$NPL = \frac{P}{SP^{*}}. \tag{20}$$

In line with the empirical section the NPL is expressed in expected terms. Since the model outlined above is not log-linear it becomes necessary to solve the model by a second order approximation around a non-stochastic steady state with $\bar{K} = \bar{K}^{*}$. We define $E_{-1}(\mathsf{x}) = E_{-1}\left(\ln\left(\frac{X}{\bar{X}}\right)\right)$ and $E_{-1}\left(\frac{X-\bar{X}}{\bar{X}}\right) \approx E_{-1}(\mathsf{x}) + \frac{\sigma_x^2}{2} + O(\varepsilon)^3$. The appendix shows that the approximated expected NPL equals[15]

$$E_{-1}(\mathsf{npl}^{fms}) = -E_{-1}((\mathsf{c} - \mathsf{c}^{*} + \mathsf{tot} - (\mathsf{p}_H^{*} - \mathsf{p}_F))^{fms}), \tag{21}$$

where terms of order $O(\varepsilon)^3$ are ignored. The expected NPL is lower, the higher domestic relative to foreign consumption and the higher are the adjusted terms of trade. Thus, the higher the purchasing power, either reflected by higher consumption or higher terms of trade, the lower is the NPL. To assess how financial markets affect the NPL it is instructive to analyze foreign and domestic consumption and relative goods price levels in more detail. Therefore, it is necessary to specify the behavior of the foreign country's monetary authority, which determines the foreign goods price and consumption level. To simplify matters, the paper will focus on the impact of international financial integration for a small open economy (i.e. $\mathcal{P}^{*} \to \infty$ and $n^{*} \to 1$).

4.1.1 Foreign consumption

Regardless of the financial market structure, expected consumption abroad is

$$E_{-1}\left(\mathsf{c}^{*fms}\right) = E_{-1}(\mathsf{rev}^{*} - \mathsf{p}^{*}) = -(1-\alpha)\,\mathcal{R}_{p_{F,2}^{*}}, \text{ for } n^{*} \to 1. \tag{22}$$

Taking a second-order approximation of the foreign pricing equation (16) it follows that

$$\mathcal{R}_{p_{F,2}^{*}} = \mathcal{R}_{\breve{p}_{F,2}^{*}} = \frac{E_{-1}[(\mathsf{p}_{F,1}^{*})^2]}{2} = \frac{\sigma_{p_{F,1}^{*}}^2}{2}. \tag{23}$$

Foreign consumption is decreasing in the variability of flexible goods prices, $\sigma_{p_{F,1}^{*}}^2$. Then from (22) and (23) consumption, which is also the welfare metric (w^{*}) in the foreign country, given (6), can be simply expressed as

$$E_{-1}(\mathsf{c}^{*}) = E_{-1}(\mathsf{w}^{*}) = -(1-\alpha)\frac{\sigma_{p_{F,1}^{*}}^2}{2}, \tag{24}$$

[15] See appendix 6.2.

regardless of the financial market structure.[16] From (24) it follows that a monetary policy rule that stabilizes foreign prices is a natural benchmark for the foreign economy. To ensure such a target, the foreign economy sets its money supply so that movements of the foreign price level equate to zero,

$$\mathsf{m}_s^* = -\mathsf{k} + O(\varepsilon)^2, \text{ with } \mathsf{p}_{Fs}^* = \alpha(\mathsf{m}_s^{*fms} + \mathsf{k}^*) + O(\varepsilon)^2. \tag{25}$$

The feedback coefficients are $\delta_{seg}^{*K^*} = \delta_{comp}^{*K^*} = 1$, and $\delta_{seg}^{*K} = \delta_{comp}^{*K} = 0$. The foreign monetary policy rule ensures that $\sigma^2_{p^*_{F,1}}$ and, hence, the risk premium $\mathcal{R}_{p^*_{F,2}}$ and $\mathcal{R}_{\check{p}^*_{F,2}}$ equal zero.

4.1.2 Domestic consumption

On this basis, the domestic consumption can now be assessed. The appendix shows that expected consumption in segmented international financial markets equals

$$E_{-1}(\mathsf{c}^{seg}) = E_{-1}(\mathsf{rev} - \mathsf{p})^{seg}. \tag{26}$$

Expected consumption increases, the higher is the real value of domestic revenue. In complete international financial markets it holds that

$$E_{-1}(\mathsf{c}^{comp}) = E_{-1}(\mathsf{rev} - \mathsf{p})^{comp} + \frac{E_{-1}\left[\left((\mathsf{rev} - \mathsf{rev}^* - \mathsf{s})^{comp}\right)^2\right]}{2}. \tag{27}$$

In complete financial markets, expected consumption increases not only in the real revenue but also in the variability of revenue between the home and foreign country. When the revenues between the home and foreign country are not perfectly correlated, the two countries are able to provide insurance among each other. An increase in the relative revenue term represents a rise in the insurance value. This causes expected consumption to increase in complete financial markets. In segmented financial markets there is no such insurance benefit. This availability of insurance in complete financial markets will be relevant when evaluating consumption under different financial market structures. Accounting for (8), (12) and the different financial market conditions, expected consumption is

$$\begin{aligned} E_{-1}(\mathsf{c}^{seg}) \quad = \quad & -\frac{(1-\alpha)(\Delta-(1-n))}{\Delta}\mathcal{R}_{p_{H,2}}^{seg} - \frac{(1-\alpha)(1-\eta)^2(1-n)}{\Delta}\sigma_{tot,p_{H,1}}^{seg} \\ & + \frac{(1-n)(\eta-1)(n\Delta+(\eta-1)(1-n)n)\frac{\sigma^2_{tot^{seg}}}{2}}{\Delta} \text{ and} \end{aligned} \tag{28}$$

$$\begin{aligned} E_{-1}(\mathsf{c}^{comp}) \quad = \quad & -\frac{(1-\alpha)(\Delta-(1-n))}{\Delta}\mathcal{R}_{p_{H,2}}^{comp} + \frac{(1-\alpha)(1-\eta)^2(1-n)}{\Delta}\sigma_{tot,p_{H,1}}^{comp} \\ & + \frac{(1-n)(\eta-1)(n\Delta+(\eta-1)(1-n)(1+2n))\frac{\sigma^2_{tot^{comp}}}{2}}{\Delta}, \end{aligned} \tag{29}$$

[16] See appendix 6.3.

respectively, where $\Delta = 1 - (1-\eta)(1+n)$ as well as $\mathcal{R}^{seg}_{\breve{p}_{H,2}} = \mathcal{R}^{seg}_{p_{H,2}} - (1-\eta)\,\sigma^{seg}_{tot,p_{H,1}}$ and $\mathcal{R}^{comp}_{\breve{p}_{H,2}} = \mathcal{R}^{comp}_{p_{H,2}} + (1-\eta)\,\sigma^{comp}_{tot,p_{H,1}}$ holds.[17] Expected consumption is affected by the variability of the terms of trade, $\sigma^2_{tot^{fms}}$, the risk premium demanded by sticky price good firms, $\mathcal{R}^{seg}_{p_{H,2}}$, and the covariance between terms of trade and flexible goods prices, $\sigma^{fms}_{tot,p_{H,1}} \geq 0$.

The variability of the terms of trade brings about relative price changes, which raise the purchasing power of domestic households. This is reflected in a higher level of expected consumption. In other words, when home and foreign goods are substitutes, $\eta > 1$, households would like to switch between goods for a given relative price change. Relative price changes are generated by the volatility of the terms of trade, which allow to keep the price of the consumption basket at the desired level. Thus, $\sigma^2_{tot^{fms}}$ increases expected consumption when $\eta > 1$. It follows from (21) that the NPL falls. This effect will be amplified in complete financial markets where a higher impact of the terms of trade variability also reflects the benefits of insurance. Consequently, consumption will be relatively higher in complete than segmented financial markets.

A higher risk premium increases domestic prices, which takes away purchasing power from households. This has a negative effect on expected consumption and, therefore increases the NPL. To see this in more detail consider

$$\mathcal{R}^{fms}_{p_{H,2}} = \frac{E_{-1}[[(\mathsf{p}_{H,1} + (\mathsf{p}_H - \mathsf{p}) + (\mathsf{c}_H - \mathsf{c}))^2 - ((\mathsf{p}_H - \mathsf{p}) + (\mathsf{c}_H - \mathsf{c}))^2]^{fms}]}{2},$$

$$\mathcal{R}^{fms}_{p_{H,2}} = \frac{\sigma^2_{p^{fms}_{H,1}}}{2} + (1-\eta)(1-n)\,\sigma^{fms}_{tot,p_{H,1}}, \tag{30}$$

where a second-order approximation of (16) has been taken. The risk premium increases with the volatility of flexible goods prices, $\sigma^2_{p^{fms}_{H,1}}$. Fixed-price producers would like to adjust their prices as the variability of flexible goods prices increases due to the supply shock K. However, they are not allowed to do so and require a higher risk premium to be compensated. From the perspective of the firm the variability in the terms of trade and domestic flexible goods prices induces only variability in demand. Firms dislike the variability in demand and would like to be compensated. They require a higher risk premium when $\sigma^{fms}_{tot,p_{H,1}} > 0$.

The financial market structure also affects expected consumption and, hence, the NPL via the covariance between terms of trade and flexible goods prices. In segmented financial markets a higher covariance only induces a higher variability of income, which causes expected consumption to decline. In complete financial markets it provides a hedge against the uncertain occurrence of supply disturbances so that expected consumption is larger the higher is the covariance. Terms of trade tend to be high when domestic goods prices are high. Higher terms of trade imply higher purchasing power so that expected consumption increases in complete financial markets.

[17] See appendix 6.3.

Note from (19) that in any case higher domestic consumption under complete financial markets requires the transfer of purchasing power abroad. This transfer of purchasing power is reflected in the adjusted terms of trade.

4.1.3 Adjusted terms of trade

The NPL is higher, the lower are the adjusted terms of trade, i.e. the lower is the domestic purchasing power. The adjusted terms of trade are

$$E_{-1}\left(\left(\mathsf{tot}-\left(\mathsf{p}_H^*-\mathsf{p}_F\right)\right)^{seg}\right) = -(1-\alpha)\left(\frac{1-\Delta}{\Delta}\mathcal{R}^{seg}_{p_{H,2}}-\frac{(1-\eta)^2}{\Delta}\sigma^{seg}_{tot,p_{H,1}}\right) - \frac{n(1-n)(1-\eta)^2}{\Delta}\frac{\sigma^2_{ToT^{seg}}}{2} \text{ and} \tag{31}$$

$$E_{-1}\left(\left(\mathsf{tot}-\left(\mathsf{p}_H^*-\mathsf{p}_F\right)\right)^{comp}\right) = -(1-\alpha)\left(\frac{1-\Delta}{\Delta}\mathcal{R}^{comp}_{p_{H,2}}+\frac{(1-\eta)^2}{\Delta}\sigma^{comp}_{tot,p_{H,1}}\right) - \frac{n(1-n)(1-\eta)^2+(1-\eta)(1-n)(1-\Delta)}{\Delta}\frac{\sigma^2_{tot^{comp}}}{2}, \tag{32}$$

respectively.[18] In complete financial markets the covariance between the terms of trade and flexible goods prices leads to lower adjusted terms of trade. This is due to the fact that in complete financial markets the domestic country has to compensate the foreign country for providing insurance by transferring purchasing power abroad. The higher foreign purchasing power is reflected by the relatively lower adjusted terms of trade in complete compared to segmented financial markets. The transfer of purchasing power is also possible via the terms of trade variability. Thus, for a given terms of trade volatility or covariance between the terms of trade and flexible goods prices the adjusted terms of trade are higher in segmented than in complete markets.

4.2 National price levels and the exchange rate regime

Depending on the country's exchange rate policy the monetary authority can affect the variability of the terms of trade, domestic goods prices and, therefore, expected consumption and the adjusted terms of trade. When the monetary authority leaves the nominal exchange rate free to float it utilizes the monetary instrument to stabilize domestic goods prices, $\sigma^2_{p_{H,1}} = 0$ (see Table (13)). As a consequence, the terms of trade are highly volatile and the risk premium on domestic goods prices $\mathcal{R}^{fms}_{p_{H,2}}$ equals zero. Given an exchange rate peg, the home monetary authority adjusts domestic money supply (see table (13)) in order to maintain the exchange rate

[18] For derivations see appendix 6.3 and 6.4.

at a target rate $\bar{S}$, so that $\sigma_s^2 = 0$. It follows that the terms of trade volatility is reduced while the variability of domestic goods prices is amplified. For a given policy rule, the main ex post realized values of the model can be summarized as in table (13).

On this basis, we can assess the effects of the different exchange rate arrangements on NPL in the process of financial market integration. Under a floating exchange rate regime, the NPL in segmented and complete financial markets are

$$\begin{aligned} E_{-1}\left(\mathsf{npl}_{Float}^{seg}\right) &= -\frac{(1-n)n\,(\eta-1)\,\eta\frac{\sigma_{s^{seg}}^2}{2}}{\Delta}, \text{ and} \\ E_{-1}\left(\mathsf{npl}_{Float}^{comp}\right) &= -\frac{(1-n)n\,(\eta-1)\,(\eta+(1-\Delta))\,\frac{\sigma_{s^{comp}}^2}{2}}{\Delta}, \end{aligned} \tag{33}$$

respectively. Under a float, the NPL depends only the variability of the nominal exchange rate.

Under a peg, the different financial market structures imply that

$$\begin{aligned} E_{-1}\left(\mathsf{npl}_{Peg}^{seg}\right) &= (1-\alpha)n\left(\frac{\mathcal{R}_{p_{H,2}}^{seg}}{\Delta}-\frac{\alpha\,(1-\eta)^2}{\Delta}\sigma_{p_{H,1}^{seg}}^2\right)-\frac{\alpha^2(1-n)n\,(\eta-1)\,\eta}{2\Delta}\sigma_{p_{H,1}^{seg}}^2 \\ E_{-1}\left(\mathsf{npl}_{Peg}^{comp}\right) &= (1-\alpha)n\left(\frac{\mathcal{R}_{p_{H,2}}^{comp}}{\Delta}+\frac{\alpha\,(1-\eta)^2}{\Delta}\sigma_{p_{H,1}^{comp}}^2\right)-\frac{\alpha^2(1-n)n\,(\eta-1)\,(\eta+(1-\Delta))}{2\Delta}\sigma_{p_{H,1}^{comp}}^2, \end{aligned} \tag{34}$$

where $\mathcal{R}_{p_{H,2}}^{fms} = \frac{\sigma_{p_{H,1}^{fms}}^2}{2} + \alpha\,(1-\eta)\,(1-n)\,\sigma_{p_{H,1}^{fms}}^2$. Table (13) expresses the variability of the nominal exchange rate and domestic goods prices in detail. On the basis of table (13) and equations (33)-(34) we state the following proposition:

Proposition 1 *The expected national price level under*

(i) a fixed exchange rate regime increases in the process of financial market integration.

(ii) a floating exchange rate regime declines in the process of financial market integration.

Proof. To establish the claim made in part one of proposition 1, note from equation (34) that the difference between the national price levels under complete and segmented financial markets is

$$E_{-1}\left(\mathsf{npl}_{Peg}^{comp}\right) - E_{-1}\left(\mathsf{npl}_{Peg}^{seg}\right) > 0, \tag{35}$$

for $\eta > 1$, $0 < \alpha < 1$ and $0 < n < 1$. Figure (6) establishes the proposition graphically.

To establish part two consider equation (33), which allows to state the following relationship

$$E_{-1}\left(\mathsf{npl}_{Float}^{comp}\right) - E_{-1}\left(\mathsf{npl}_{Float}^{seg}\right) < 0, \tag{36}$$

for $\eta < \frac{1+n+2n^2+(1+2n+5n^2)^{\frac{1}{2}}}{n(1+n)}$ and $0 < n < 1$. Figure (7) establishes the proposition graphically.
■

The following corollary summarizes our main finding:

Corollary 1 *The equilibrium national price level increases [decreases] when financial markets become more integrated with the inflexibility [flexibility] of the nominal exchange rate. Consequently,* $E_{-1}\left(\mathsf{npl}^{comp}_{Peg} - \mathsf{npl}^{seg}_{Peg}\right) > 0$ $[E_{-1}\left(\mathsf{npl}^{comp}_{Float} - \mathsf{npl}^{seg}_{Float}\right) < 0]$.

Figure (5) illustrates the impact of financial market integration on the NPL. The positive relationship between international financial integration and the NPL under fixed exchange rate regimes is the result of a risk premium, which is demanded by sticky price goods producers. The higher the risk premium, the higher are goods prices and the lower is consumption. When asset markets are internationally integrated, households can hedge against consumption risk, which increases consumption. However, this requires a transfer of purchasing power abroad so that the terms of trade decline in complete compared to segmented financial markets.

Figure (5) depicts the difference between the expected consumption levels in segmented and complete financial markets and shows that $E_{-1}(\mathsf{c}^{comp}_{Peg}) - E_{-1}(\mathsf{c}^{seg}_{Peg}) > 0$ (see the dashed line of Figure (5)). In order to utilize financial market hedges, the domestic country has to compensate the foreign country for providing insurance by transferring purchasing power abroad. This transfer of purchasing power is reflected by the relatively lower adjusted terms of trade in complete financial markets (see the dashed line with dots of Figure (5)). The presence of the risk premium diminishes the consumption gains in complete financial markets. To still ensure the relatively higher consumption in complete international asset markets a higher purchasing power transfer is required. Consequently, the NPL will be higher in complete compared to segmented financial markets, as represented by the solid line of Figure (5) and proposition 1*(i)*.

A floating exchange rate regime, which allows for domestic price stability, prevents sticky-price goods producers from demanding risk premiums. Agents can exploit the benefits of international financial market integration and increase their relative consumption, $E_{-1}(\mathsf{c}^{comp}_{Float}) - E_{-1}(\mathsf{c}^{seg}_{Float}) > 0$ (see the dashed line of Figure (5)) without utilizing the financial market hedge to be compensated for the risk premiums. Consequently, the transfer of purchasing power for the relatively higher consumption level does not need to be that high. The relative consumption gain from financial market integration is higher than the transfer of additional purchasing power abroad. It follows that the NPL will be lower in complete than in segmented financial markets (see the solid line of Figure (5) and proposition 1*(ii)*).

Figures (6) and (7) graphically illustrate the influence of international financial market integration on the NPL for varying elasticities of substitution η and degrees of trade openness, $(1-n)$. Given the two figures, it is noteworthy at this point to consider the available empirical estimates for the elasticity of substitution between home and foreign goods. Obstfeld and Rogoff (2000b) survey some of the literature and quote estimates of between 1.2 and 21.4 for individual goods. Studies that utilize the elasticity of traded goods based on aggregate data provide values of around 1.5 (see Backus, Kehoe and Kydland (1995), Chari, Kehoe and Mc Gratten (2002) and Whalley (1985)). Based on these aggregate estimates, our model replicates the empirical facts generated in the previous section.

5 Conclusions

This paper investigates the effects of international financial integration on NPLs. In particular, we shed light on the role of the exchange rate regime for the relationship between price levels and financial integration. A two country open economy model with nominal rigidities is employed to derive the main hypothesis: The effect of financial integration on NPLs depends on the exchange rate regime. Under floating exchange rates, deeper financial integration lowers the price level. Under managed exchange rates, on the contrary, financial integration raises the price level. Extensive evidence based on a panel of 54 industrialized and emerging countries supports this result. For the overall set of countries and, in particular, for the subset of OECD countries, we find strong evidence of a regime-dependent effect of financial integration on the NPL. For floating exchange rates, the price level decreases in the degree of financial integration. For managed exchange rates, the price level increases. As a by-product, the paper proposes a rationale for the well-documented systematic deviations from PPP. To the extent that countries exhibit different degrees of international financial integration, their price levels differ when expressed in a common currency.

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6 Appendix: The model

6.1 Risk sharing condition (equation (19))

To derive equation (19) notice that from the equilibrium budget constraint, it follows that consumption levels in state s are equal to

$$C=\frac{q_H(\frac{REV/(SP^*)}{1+\mathcal{P}^*}+\frac{\mathcal{P}^*REV^*/(P^*)}{1+\mathcal{P}^*})SP^*}{(\frac{q_H}{1+\mathcal{P}^*}+\frac{\mathcal{P}^*q_F^*}{1+\mathcal{P}^*})P}\text{ and }C^*=\frac{q_F^*(\frac{REV/(SP^*)}{1+\mathcal{P}^*}+\frac{\mathcal{P}^*REV^*/(P^*)}{1+\mathcal{P}^*})}{(\frac{q_H}{1+\mathcal{P}^*}+\frac{\mathcal{P}^*q_F^*}{1+\mathcal{P}^*})}. \tag{37}$$

The no-arbitrage conditions imply the security prices across different states of natures

$$q_{Hs}=\frac{E_{-1}\left(\frac{\frac{REV}{SP^*}}{(\frac{REV/(SP^*)}{1+\mathcal{P}^*}+\frac{\mathcal{P}^*REV^*/(P^*)}{1+\mathcal{P}^*})}\right)}{E_{-1}\left((\frac{REV/(SP^*)}{1+\mathcal{P}^*}+\frac{\mathcal{P}^*REV^*/(P^*)}{1+\mathcal{P}^*})^{-1}\right)}\text{ and }q_{Fs}^*=\frac{E_{-1}\left(\frac{\frac{REV^*}{P^*}}{(\frac{REV/(SP^*)}{1+\mathcal{P}^*}+\frac{\mathcal{P}^*REV^*/(P^*)}{1+\mathcal{P}^*})}\right)}{E_{-1}\left((\frac{REV/(SP^*)}{1+\mathcal{P}^*}+\frac{\mathcal{P}^*REV^*/(P^*)}{1+\mathcal{P}^*})^{-1}\right)}. \tag{38}$$

Utilizing (37) and (38), the risk sharing condition equates to

$$\frac{C_s}{C_s^*}=\frac{q_{Hs}}{q_{Fs}^*}\frac{S_sP_s^*}{P_s},$$

which is equation (19) in the main text.

6.2 National price level condition (equation (21))

From the money demand equation (13), it follows that expected consumption equals $E_{-1}(\mathsf{c})=-E_{-1}(\mathsf{p})$ for $E_{-1}(\mathsf{m})=0$. The terms of trade are defined in section 2.4.1. Consequently, the NPL (20) can be written as

$$E_{-1}\left(\mathsf{npl}^{fms}\right)=-E_{-1}\left((\mathsf{c}-\mathsf{c}^*+(\mathsf{ToT}-(\mathsf{p}_H^*-\mathsf{p}_F)))^{fms}\right),$$

which is equation (21) in the main text.

6.3 Expected consumption (equations (24), (28) and (29))

Given the definition of the price indices, equation (8), the following is true under the different financial market structures:

$$E_{-1}\left(\mathsf{p}^{fms}\right)=([(1-\alpha)E_{-1}(n\mathsf{p}_{H,2}+(1-n)\mathsf{p}_{F,2})+(1-n)E_{-1}(\alpha\mathsf{s}+n(1-\eta)\frac{(\mathsf{ToT})^2}{2})]^{fms}).$$

A similar condition holds in the foreign country. For the expectational prices, the following risk premiums are derived:

$$\begin{aligned}E_{-1}\left(\mathsf{p}_{H,2}^{fms}\right)&=\mathcal{R}_{p_{H,2}}^{fms}\text{ and }E_{-1}\left(\mathsf{p}_{H,2}^{*fms}\right)=\mathcal{R}_{\breve{p}_{H,2}}^{fms}-E_{-1}\left(\mathsf{s}^{fms}\right)\text{ as well as}\\ E_{-1}\left(\mathsf{p}_{F,2}^{*fms}\right)&=\mathcal{R}_{p_{F,2}^*}^{fms}\text{ and }E_{-1}\left(\mathsf{p}_{F,2}^{fms}\right)=\mathcal{R}_{\breve{p}_{F,2}^*}^{fms}+E_{-1}\left(\mathsf{s}^{fms}\right),\end{aligned}$$

whereby and $\mathcal{R}^{seg}_{\breve{p}_{H,2}} = \mathcal{R}^{seg}_{p_{H,2}} - (1-\eta)\,\sigma^{seg}_{tot,p_{H,1}}$ and $\mathcal{R}^{comp}_{\breve{p}_{H,2}} = \mathcal{R}^{comp}_{p_{H,2}} + (1-\eta)\,\sigma^{comp}_{tot,p_{H,1}}$ holds, see also (42) below. The volatility of the terms of trade is defined as

$$\frac{E_{-1}[(\mathsf{ToT}^{fms})^2]}{2} = \frac{\sigma^2_{ToT^{fms}}}{2} = \frac{\sigma^2_{p_H^{fms}} + \sigma^2_{p_F^{*fms}} + \sigma^2_{s^{fms}} - 2\left(\sigma^{fms}_{s,p_H} + \sigma^{fms}_{p_F^*,p_H} - \sigma^{fms}_{p_F^*,s}\right)}{2}.$$

From the relative money demand (13) and the determination of relative consumption levels under segmented markets (18) one can establish

$$E_{-1}\left(\mathsf{s}^{seg}\right) = \frac{(1-\alpha)\begin{pmatrix} (1-\Delta)\left(\mathcal{R}^{seg}_{p^*_{F,2}} - \mathcal{R}^{seg}_{p_{H,2}}\right) \\ +(1-\eta)\left(n^*\left(\mathcal{R}^{seg}_{p_{H,2}} - \mathcal{R}^{seg}_{\breve{p}_{H,2}}\right) - n\left(\mathcal{R}^{seg}_{p^*_{F,2}} - \mathcal{R}^{seg}_{\breve{p}^*_{F,2}}\right)\right)\end{pmatrix} + (1-\eta)^2\left(n^*\left(1-n^*\right) - n\left(1-n\right)\right)\frac{(\mathsf{ToT}^{seg})^2}{2}}{\Delta}. \quad (39)$$

In complete financial markets, it follows from (13) and (19) that

$$\begin{aligned} E_{-1}\left(\mathsf{s}^{seg}\right) &= \frac{(1-\alpha)\begin{pmatrix} (1-\Delta)\left(\mathcal{R}^{comp}_{p^*_{F,2}} - \mathcal{R}^{comp}_{p_{H,2}}\right) \\ +(1-\eta)\left(n^*\left(\mathcal{R}^{comp}_{p_{H,2}} - \mathcal{R}^{comp}_{\breve{p}_{H,2}}\right) - n\left(\mathcal{R}^{comp}_{p^*_{F,2}} - \mathcal{R}^{comp}_{\breve{p}^*_{F,2}}\right)\right)\end{pmatrix}}{\Delta} \quad (40) \\ &+ \frac{(1-\eta)^2\left(\left(2n^*+1\right)\left(1-n^*\right) - \left(2n+1\right)\left(1-n\right)\right)\frac{(\mathsf{ToT}^{comp})^2}{2}}{\Delta}. \end{aligned}$$

The above expressions can be used to derive expected consumption for the two countries for $E_{-1}(\mathsf{c}) = -E_{-1}(\mathsf{p})$, whereas

$$\mathcal{R}^{fms}_{p_{H,2}} = \frac{E_{-1}[[(\mathsf{p}_{H,1} + (\mathsf{p}_H - \mathsf{p}) + (\mathsf{c}_H - \mathsf{c}))^2 - ((\mathsf{p}_H - \mathsf{p}) + (\mathsf{c}_H - \mathsf{c}))^2]^{fms}]}{2},$$

$$\mathcal{R}^{fms}_{\breve{p}_{H,2}} = \frac{E_{-1}[[(\mathsf{p}_{H,1} + (\mathsf{s} + \mathsf{p}^*_H - \mathsf{p}) + (\mathsf{c}^*_H - \mathsf{c}))^2 - ((\mathsf{s} + \mathsf{p}^*_H - \mathsf{p}) + (\mathsf{c}^*_H - \mathsf{c}))^2]^{fms}]}{2}, \text{ with}$$

$$\mathcal{R}^{fms}_{p_{H,2}} = \frac{\sigma^2_{p^{fms}_{H,1}}}{2} + (1-\eta)(1-n)\,\sigma^{fms}_{tot,p_{H,1}}, \quad (41)$$

$$\mathcal{R}^{seg}_{\breve{p}_{H,2}} = \mathcal{R}^{seg}_{p_{H,2}} - (1-\eta)\,\sigma^{seg}_{tot,p_{H,1}}, \quad \text{and} \quad \mathcal{R}^{comp}_{\breve{p}_{H,2}} = \mathcal{R}^{comp}_{p_{H,2}} + (1-\eta)\,\sigma^{comp}_{tot,p_{H,1}}, \quad (42)$$

To obtain (24) note that equilibrium labour supply can be written as

$$L = \left(C_H + \mathcal{P}^* C^*_H\right).$$

Multiplying by K and taking expectations results in

$$\begin{aligned} E_{-1}(KL) &= \Phi^{-1}E_{-1}\left(\frac{n\left(\frac{P_{H_s}}{P_s}\right)^{1-\eta} P_s C_s + (1-n)\,S_s\left(\frac{P^*_{H_s}}{P^*_s}\right)^{1-\eta} P^*_s C^*_s}{PC}\right) \\ E_{-1}(KL) &= \Phi^{-1}E_{-1}\left(\frac{REV}{PC}\right). \end{aligned}$$

For $n^* \to 1$, it follows that $P^*C^* = P_F^* Y_F^* = REV^*$ so that

$$\begin{aligned} E_{-1}(KL) &= E_{-1}\left[\frac{REV}{SP^*} C^{*-1} \frac{\frac{P^*C^*}{P^*}}{\frac{REV}{SP^*}}\right] \\ E_{-1}(KL) &= 1, \end{aligned} \tag{43}$$

and similarly for the foreign country, so that welfare can be written as

$$E_{-1}\left(\mathsf{w}^{fms}\right) = E_{-1}(\mathsf{c}^{fms}) \text{ and } E_{-1}\left(\mathsf{w}^{*fms}\right) = E_{-1}(\mathsf{c}^{*fms}), \tag{44}$$

in which case terms of order $O(\varepsilon)^3$ are ignored.

6.4 Expected adjusted terms of trade (equations (31) and (32))

The adjusted terms of trade can be derived from equations (39)-(40).

6.5 Table (14)

The realized deviations of the endogenous variables are conditional on the financial market structure, fms. To see this, a first order approximation around the deterministic symmetric equilibrium for $\bar{K} = \bar{K}^*$ is taken. Note that terms of order $O(\varepsilon)^2$ and higher are ignored in the solution. Financial markets come into play via relative consumption and the nominal exchange rate. From (18) and (19), we derive relative consumption as equal to

$$(\mathsf{c}_s - \mathsf{c}_s^*)^{seg} = -(\Delta - (2 - n - n^*))\,\mathsf{ToT}_s^{seg}, \;\; (\mathsf{c}_s - \mathsf{c}_s^*)^{comp} = -(n + n^* - 1)\,\mathsf{ToT}_s^{comp}, \tag{45}$$

up to a first order expansion, whereby $\Delta = 1 - (1-\eta)(n^* + n)$.[19] The different financial market structures imply that consumption differentials need to be adjusted via the terms of trade, ToT_s^{fms}. The terms of trade adjustment is a vehicle of wealth distribution. To ensure the relatively higher domestic consumption, the home economy has to produce more goods under the different financial market structures,

$$\mathsf{l}_s^{seg} = \mathsf{y}_{Hs}^{seg} = -(1-n)\,\mathsf{ToT}_s^{seg} + \mathsf{c}_s^{seg}, \;\; \mathsf{l}_s^{comp} = \mathsf{y}_{Hs}^{comp} = -(1-n)\,\Delta \mathsf{ToT}_s^{comp} + \mathsf{c}_s^{comp}, \tag{46}$$

which follows from the resource constraints at home, equation (9), in conjunction with (45). The terms of trade are low when the domestic goods price [nominal exchange rate] is low [high],

$$\mathsf{ToT}_s^{fms} = \mathsf{p}_{Hs} - \mathsf{p}_{Fs}^* - \mathsf{s}_s^{fms}. \tag{47}$$

Terms of trade are affected by the financial market structure via the nominal exchange rate, s_s^{fms}. From (18), (19) and the relative money demand the nominal exchange rate becomes

$$\mathsf{s}_s^{seg} = \frac{1 - \alpha(1-\Delta)}{\Delta}(\mathsf{m}_s - \mathsf{m}_s^*)^{seg} - \frac{\alpha(1-\Delta)}{\Delta}(\mathsf{k} - \mathsf{k}^*) \text{ and } \mathsf{s}_s^{comp} = (\mathsf{m}_s - \mathsf{m}_s^*)^{comp}. \tag{48}$$

[19] To ensure that $\Delta > 0$, it is assumed that η is at least greater than $1/(1+n)$.

From the money supply relationship (13), consumption is affected by movements of the terms of trade and money supply,

$$\mathsf{c}_s = \mathsf{m}_s^{fms} + (1-n)\,\mathsf{ToT}_s^{fms} - \mathsf{p}_{Hs} \text{ and } \mathsf{c}_s^{*fms} = \mathsf{m}_s^{*fms} - (1-n^*)\,\mathsf{ToT}_s^{fms} - \mathsf{p}_{Fs}^{*}. \tag{49}$$

Realized domestic [foreign] consumption increases [decreases] the higher the terms of trade, due to higher [smaller] purchasing power, and the higher is the domestic [foreign] money supply.

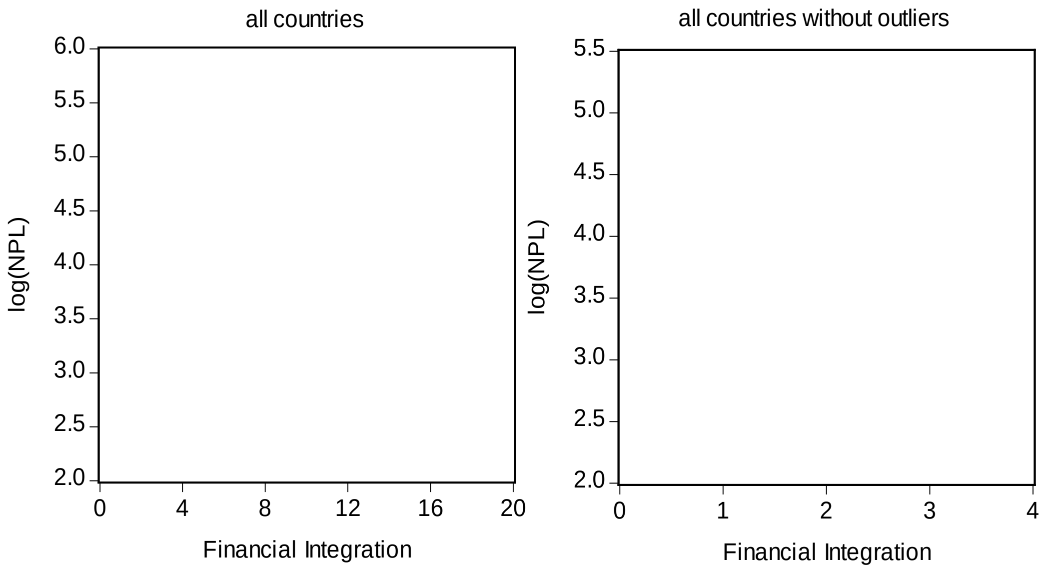

Figure 1: National price levels (NPL) from Penn World Tables against international financial integration measured by the stock for foreign assets and liabilities, 1970-2004

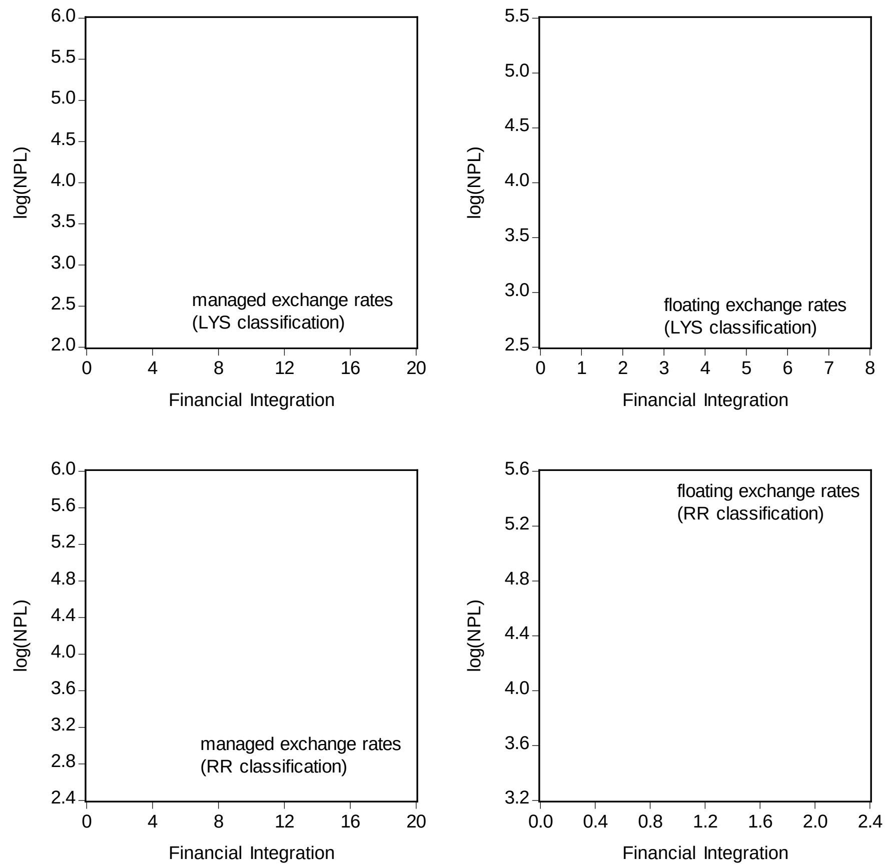

Figure 2: National price levels (PWT data) against international financial integration for different exchange rate regimes, 1970-2004

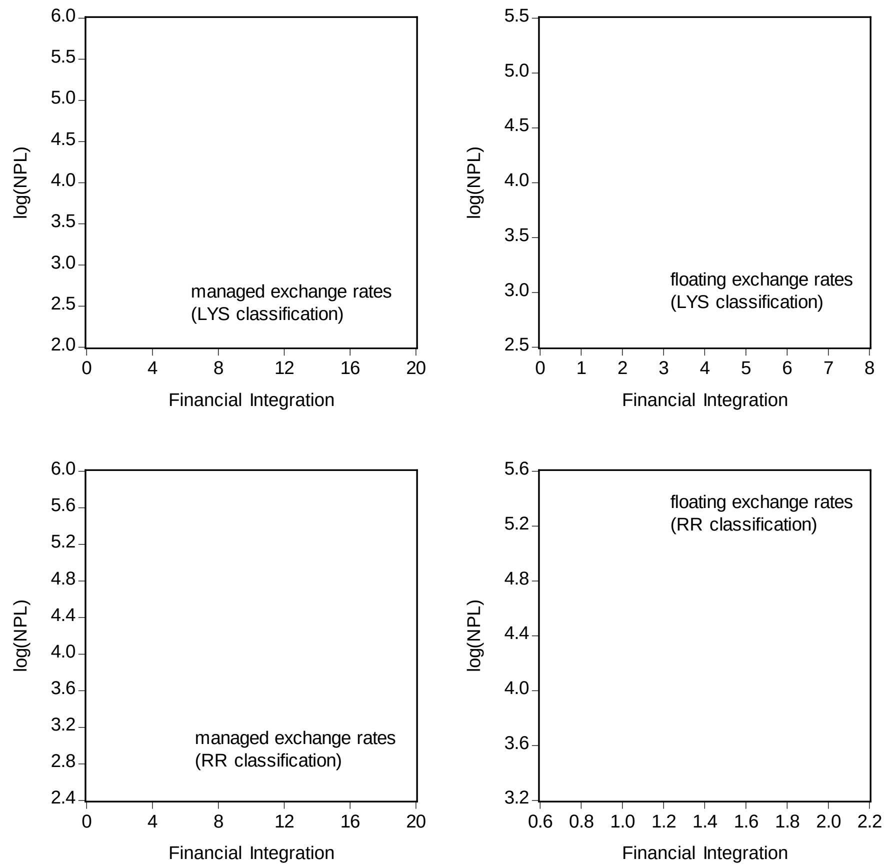

Figure 3: National price levels (PWT data) against international financial integration for different exchange rate regimes, 1990-2004

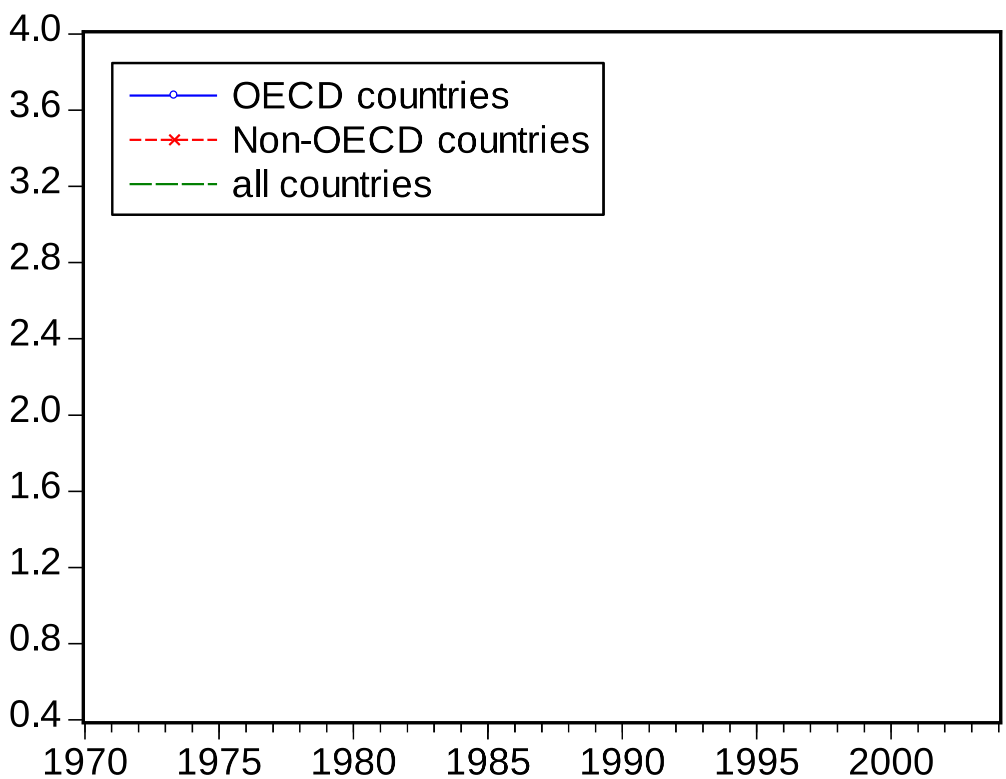

Figure 4: Average degree of international financial integration as measured by the sum of foreign assets and liabilities in % of GDP

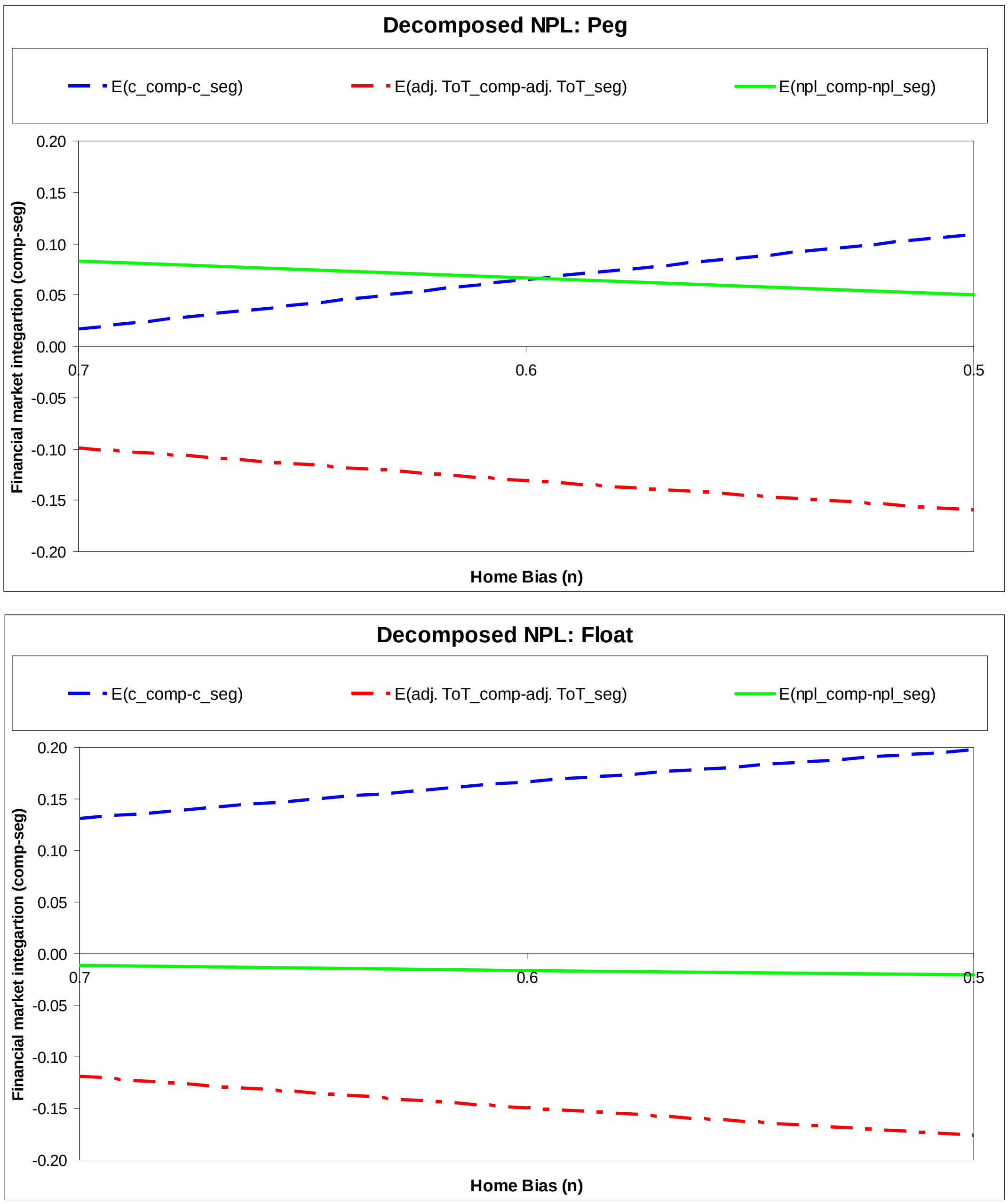

Figure 5: Decomposition of the national price level under a fixed and floating exchange rate regime. The decomposed national price level reflects the impact complete and segmented international financial markets have on the components of the national price level. The figure is calibrated for $\eta = 1.5$ and $\alpha = 0.75$.

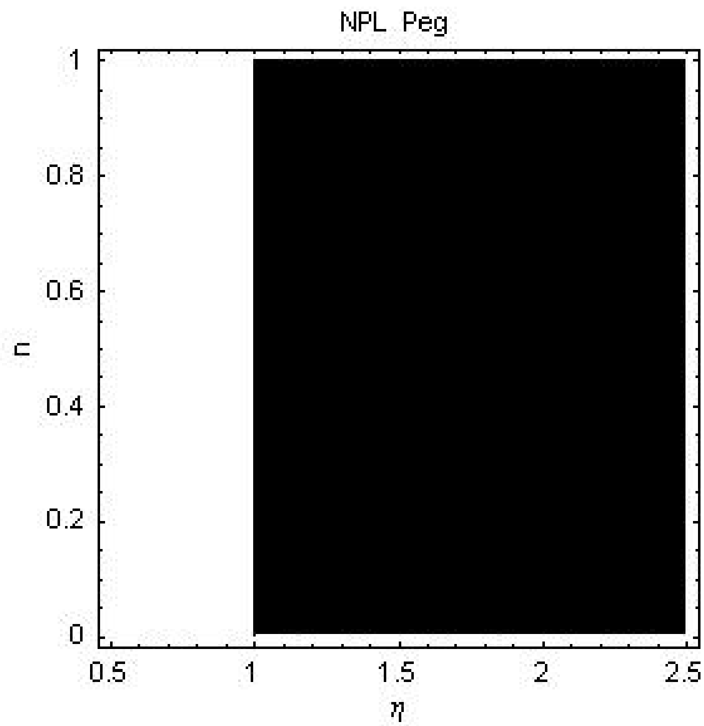

Figure 6: National price level of a fixed exchange rate regime. The white (black) region represents combinations of n and η, for which the national price level is higher (lower) in segmented than complete international financial markets.

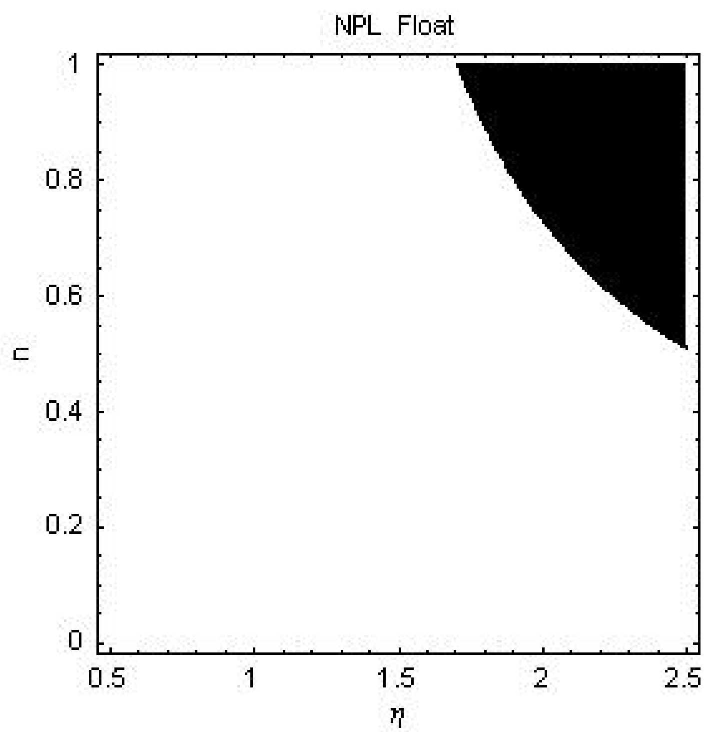

Figure 7: National price level of a floating exchange rate regime. The white (black) region represents combinations of n and η, for which the national price level is higher (lower) in segmented than complete international financial markets.

Table 1: Countries in the sample

country	subsamples OECD	subsamples Non-Transition	country	subsamples OECD	subsamples Non-Transition
Argentina		+	Japan	+	+
Australia	+	+	Korea (South)	+	+
Austria	+	+	Latvia		
Belgium	+	+	Lithuania		
Bolivia		+	Malaysia		+
Brazil		+	Malta		+
Bulgaria			Mexico	+	+
Canada	+	+	Netherlands	+	+
Chile		+	New Zealand	+	+
China (P.R.)		+	Norway	+	+
Columbia		+	Paraguay		+
Cyprus		+	Peru		+
Czech Republic	+		Philippines		+
Denmark	+	+	Poland	+	
Ecuador		+	Portugal	+	
Estonia			Romania		
Finland	+	+	Russia		
France	+	+	Slovakia	+	
Germany	+	+	Slovenia		
Greece	+	+	South Africa		+
Hungary	+		Spain	+	+
Iceland	+	+	Switzerland	+	+
India		+	Thailand		+
Indonesia		+	Turkey	+	+
Ireland	+	+	United Kingdom	+	+
Israel		+	United States	+	+
Italy	+	+	Venezuela		+

Table 2: Preliminary results, all countries, 1990-2004

	I	II	III	IV	V	VI
			Penn World Tables (PWT) data			
const	-2.627^{***} (0.097)	-2.509^{***} (0.101)	-2.305^{***} (0.113)	-1.797^{***} (0.138)	0.390^{*} (0.227)	0.467^{***} (0.137)
GDP	0.723^{***} (0.010)	0.709^{***} (0.011)	0.709^{***} (0.012)	0.689^{***} (0.012)	0.549^{***} (0.016)	0.532^{***} (0.011)
FIN		0.013^{***} (0.003)	0.040^{***} (0.004)	0.041^{***} (0.004)	0.023^{***} (0.003)	0.019^{***} (0.001)
OPEN			-0.003^{***} (0.0003)	-0.004^{***} (0.0003)	-0.019^{***} (0.001)	-0.018^{***} (0.001)
SIZE				-0.028^{***} (0.003)	-0.121^{***} (0.008)	-0.117^{***} (0.005)
$OPEN \times GDP$					0.001^{***} (0.0001)	0.001^{***} (0.000)
CREDIT						0.063^{**} (0.026)
R^2	0.718	0.750	0.797	0.800	0.836	0.842
obs.	823	809	809	809	809	744
			Word Development Indicators (WDI) data			
const	-2.150^{***} (0.158)	-1.974^{***} (0.152)	-1.846^{***} (0.145)	-1.451^{***} (0.243)	-1.662^{***} (0.133)	-1.247^{***} (0.211)
GDP	0.292^{***} (0.017)	0.269^{***} (0.017)	0.265^{***} (0.017)	0.249^{***} (0.020)	0.262^{***} (0.013)	0.226^{***} (0.018)
FIN		0.021^{***} (0.004)	0.033^{***} (0.004)	0.034^{***} (0.005)	0.036^{***} (0.006)	0.020^{***} (0.004)
OPEN			-0.001^{***} (0.0001)	-0.002^{***} (0.0001)	-0.0006 (0.001)	-0.0005 (0.0008)
SIZE				-0.021^{***} (0.006)	-0.012^{***} (0.004)	-0.027^{***} (0.006)
$OPEN \times GDP$					-0.0001 (0.000)	-0.0002^{***} (0.000)
CREDIT						0.190^{***} (0.027)
R^2	0.349	0.358	0.377	0.382	0.382	0.435
obs.	808	807	794	794	794	729

Notes: The dependent variable is the national price level. Standard errors are given in parenthesis and are clustered at the country level. All regressions include time specific fixed-effects. A significance level of 1%, 5%, and 10% is indicated by ***, **, and *, respectively.

Table 3: Results for all countries, 1990-2004

sample: 1990 - 2004	I	II	III	IV
	PWT data		WDI data	
	FX regime classification		FX regime classification	
	LYS	RR	LYS	RR
financial integration				
FIN (β_0)	0.033^{***}	0.019^{***}	-0.033^{***}	0.015^{***}
	(0.007)	(0.004)	(0.011)	(0.006)
$(FIX + INT) \times FIN$ (β_1)	-0.016^{**}	0.008	0.052^{***}	0.013
	(0.007)	(0.005)	(0.017)	(0.006)
$FLO \times FIN$ (β_2)	-0.060^{***}	-0.318^{***}	0.022	-0.335^{***}
	(0.007)	(0.092)	(0.018)	(0.081)
Wald Test				
$\beta_0 + \beta_1$	0.017^{***}	0.027^{***}	0.019^{***}	0.029^{***}
$\beta_0 + \beta_2$	-0.027^{***}	-0.300^{***}	-0.011	-0.352^{***}
control variables				
GDP	0.492^{***}	0.518^{***}	0.234^{***}	0.230^{***}
	(0.016)	(0.013)	(0.023)	(0.016)
$OPEN$	-0.019^{***}	-0.019^{***}	0.000	-0.001^{*}
	(0.0008)	(0.0007)	(0.001)	(0.0008)
$OPEN \times GDP$	0.001^{***}	0.001^{***}	-0.0002^{**}	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
$CREDIT$	0.054^{**}	0.032	0.165^{***}	0.152^{***}
	(0.025)	(0.020)	(0.028)	(0.021)
$SIZE$	-0.127^{***}	-0.119^{***}	-0.038^{***}	-0.029^{***}
	(0.005)	(0.006)	(0.011)	(0.007)
DUR	0.008^{***}	0.000	0.007^{***}	-0.002
	(0.0007)	(0.001)	(0.001)	(0.001)
FIX	0.013	0.026	-0.126^{***}	-0.243^{***}
	(0.029)	(0.019)	(0.026)	(0.057)
INT	-0.037	0.076^{***}	0.040	0.098^{***}
	(0.040)	(0.020)	(0.045)	(0.026)
FLO	0.060^{***}	0.523^{***}	0.008	0.582^{***}
	(0.016)	(0.129)	(0.019)	(0.126)
R^2	0.848	0.846	0.466	0.512
obs.	744	744	729	729

Notes: The dependent variable is the national price level. Standard errors are given in parenthesis and are clustered at the country level. All regressions include time specific fixed-effects. The Wald test evaluates whether the reported sum of the coefficients is significantly different from zero. A significance level of 1%, 5%, and 10% is indicated by ***, **, and *, respectively.

Table 4: Results for all countries excluding transition countries, 1990-2004

sample: 1990 - 2004	I	II	III	IV
	PWT data		WDI data	
	FX regime classification		FX regime classification	
	LYS	RR	LYS	RR
financial integration				
FIN (β_0)	0.013^{**}	0.019^{***}	-0.050^{***}	0.010^{*}
	(0.006)	(0.004)	(0.011)	(0.006)
$(FIX + INT) \times FIN$ (β_1)	0.008	0.005	0.065^{***}	0.020^{**}
	(0.005)	(0.005)	(0.018)	(0.010)
$FLO \times FIN$ (β_2)	-0.031^{***}	-0.323^{***}	0.032^{*}	-0.347^{***}
	(0.005)	(0.094)	(0.019)	(0.082)
Wald Test				
$\beta_0 + \beta_1$	0.021^{***}	0.024^{***}	0.015^{*}	0.030^{***}
$\beta_0 + \beta_2$	-0.018^{***}	-0.304^{***}	-0.018^{*}	-0.337^{***}
control variables				
GDP	0.573^{***}	0.590^{***}	0.249^{***}	0.232^{***}
	(0.010)	(0.010)	(0.026)	(0.018)
$OPEN$	-0.014^{***}	-0.014^{***}	0.001	-0.002^{***}
	(0.001)	(0.001)	(0.001)	(0.0007)
$OPEN \times GDP$	0.001^{***}	0.001^{***}	-0.0002^{**}	0.000
	(0.000)	(0.000)	(0.0001)	0.000
$CREDIT$	-0.046^{*}	-0.064^{**}	0.138^{***}	0.152^{***}
	(0.027)	(0.028)	(0.033)	(0.025)
$SIZE$	-0.090^{***}	-0.090^{***}	-0.034^{***}	-0.030^{***}
	(0.006)	(0.006)	(0.011)	(0.007)
DUR	0.007^{***}	-0.001	0.007^{***}	-0.002
	(0.001)	(0.001)	(0.001)	(0.001)
FIX	-0.044	-0.040^{*}	-0.163^{***}	-0.341^{***}
	(0.030)	(0.022)	(0.025)	(0.070)
INT	-0.048	0.022	0.044	0.096^{***}
	(0.032)	(0.029)	(0.052)	(0.070)
FLO	-0.018	0.465^{***}	0.005	0.561^{***}
	(0.024)	(0.124)	(0.022)	(0.037)
R^2	0.872	0.870	0.427	0.501
obs.	611	611	596	596

Notes: The dependent variable is the national price level. Standard errors are given in parenthesis and are clustered at the country level. All regressions include time specific fixed-effects. The Wald test evaluates whether the reported sum of the coefficients is significantly different from zero. A significance level of 1%, 5%, and 10% is indicated by ***, **, and *, respectively.

Table 5: Results for OECD countries, 1990-2004

sample: 1990 - 2004	I	II	III	IV
	PWT data		WDI data	
	FX regime classification		FX regime classification	
	LYS	RR	LYS	RR
financial integration				
FIN (β_0)	0.059^{***}	0.020^{***}	-0.018	-0.008
	(0.010)	(0.005)	(0.019)	(0.010)
$(FIX + INT) \times FIN$ (β_1)	-0.044^{***}	0.014^{***}	0.042^{*}	0.052^{***}
	(0.009)	(0.005)	(0.023)	(0.015)
$FLO \times FIN$ (β_2)	-0.071^{***}	-0.346^{***}	-0.022	-0.424^{***}
	(0.008)	(0.098)	(0.022)	(0.104)
Wald Test				
$\beta_0 + \beta_1$	0.015***	0.034***	0.024**	0.045***
$\beta_0 + \beta_2$	-0.012**	-0.326***	-0.039***	-0.432***
control variables				
GDP	0.329^{***}	0.401^{***}	0.355^{***}	0.322^{***}
	(0.017)	(0.018)	(0.027)	(0.016)
$OPEN$	-0.023^{***}	-0.022^{***}	0.005	-0.003^{*}
	(0.002)	(0.002)	(0.004)	(0.002)
$OPEN \times GDP$	0.002^{***}	0.001^{***}	-0.0008^{**}	0.000
	(0.0001)	(0.0002)	(0.0003)	(0.000)
$CREDIT$	0.019	-0.06	0.231^{***}	0.204^{***}
	(0.039)	(0.036)	(0.041)	(0.049)
$SIZE$	-0.129^{***}	-0.129^{***}	-0.073^{***}	-0.072^{***}
	(0.015)	(0.015)	(0.022)	(0.011)
DUR	0.012^{***}	0.001	0.003^{*}	-0.003
	(0.001)	(0.001)	(0.002)	(0.003)
FIX	0.065^{**}	-0.029	-0.165^{**}	-0.654^{***}
	(0.025)	(0.025)	(0.071)	(0.118)
INT	0.104^{**}	-0.032	-0.059	-0.034
	(0.051)	(0.042)	(0.162)	(0.058)
FLO	0.060^{**}	0.532^{***}	0.230^{***}	0.709^{***}
	(0.024)	(0.137)	(0.039)	(0.158)
R^2	0.807	0.780	0.358	0.515
obs.	404	404	404	404

Notes: The dependent variable is the national price level. Standard errors are given in parenthesis and are clustered at the country level. All regressions include time specific fixed-effects. The Wald test evaluates whether the reported sum of the coefficients is significantly different from zero. A significance level of 1%, 5%, and 10% is indicated by ***, **, and *, respectively.

Table 6: Results for Non-OECD countries, 1990-2004

sample: 1990 - 2004	I	II	III	IV
	PWT data		WDI data	
	FX regime classification		FX regime classification	
	LYS	RR	LYS	RR
financial integration				
$FIN\ (\beta_0)$	-0.032^{**}	-0.042^{*}	0.007	0.008
	(0.014)	(0.023)	(0.006)	(0.008)
$(FIX + INT) \times FIN\ (\beta_1)$	-0.027	0.032	0.015	0.008
	(0.022)	(0.022)	(0.018)	(0.009)
$FLO \times FIN\ (\beta_2)$	-0.087	0.019	-0.079^{**}	-0.034^{*}
	(0.053)	(0.081)	(0.034)	(0.020)
Wald Test				
$\beta_0 + \beta_1$	-0.059^{**}	-0.010	0.022	0.0004
$\beta_0 + \beta_2$	-0.120^{**}	-0.060	-0.072^{**}	-0.026
control variables				
GDP	0.469^{***}	0.477^{***}	0.251^{***}	0.244^{***}
	(0.041)	(0.044)	(0.012)	(0.012)
$OPEN$	-0.008^{***}	-0.008^{***}	-0.0004	0.0005
	(0.002)	(0.002)	(0.0007)	(0.0005)
$OPEN \times GDP$	0.0004^{**}	0.0003^{*}	-0.000	-0.0001^{**}
	(0.0002)	(0.0002)	(0.000)	(0.000)
$CREDIT$	0.183^{***}	0.191^{***}	0.084^{***}	0.129^{***}
	(0.028)	(0.035)	(0.015)	(0.018)
$SIZE$	-0.106^{***}	-0.097^{***}	0.004	0.013^{***}
	(0.016)	(0.017)	(0.004)	(0.004)
DUR	-0.010^{***}	-0.002^{*}	0.007^{***}	-0.003^{***}
	(0.003)	(0.001)	(0.002)	(0.0008)
$KAOPEN$	0.050^{***}	0.052^{***}	0.036^{***}	0.031^{***}
	(0.007)	(0.010)	(0.003)	(0.003)
FIX	0.005	-0.114^{**}	-0.063^{**}	0.078^{***}
	(0.037)	(0.057)	(0.026)	(0.015)
INT	-0.001	0.026	0.037	0.120^{***}
	(0.055)	(0.037)	(0.029)	(0.016)
FLO	0.112^{*}	-0.118	0.044	-0.137^{***}
	(0.067)	(0.107)	(0.054)	(0.029)
R^2	0.7321	0.732	0.678	0.705
obs.	309	309	294	294

Notes: The dependent variable is the national price level. Standard errors are given in parenthesis and are clustered at the country level. All regressions include time specific fixed-effects. The Wald test evaluates whether the reported sum of the coefficients is significantly different from zero. A significance level of 1%, 5%, and 10% is indicated by ***, **, and *, respectively.

Table 7: Results for all countries excluding unstable regimes, 1990-2004

sample: 1990 - 2004	I	II	III	IV
	PWT data		WDI data	
	FX regime classification		FX regime classification	
	LYS	RR	LYS	RR
financial integration				
$FIN\ (\beta_0)$	-0.098^{**}	0.012	-0.004	0.007
	(0.052)	(0.009)	(0.069)	(0.010)
$(FIX + INT) \times FIN\ (\beta_1)$	0.128^{***}	0.016^{*}	0.034	0.028^{**}
	(0.051)	(0.009)	(0.067)	(0.013)
$FLO \times FIN\ (\beta_2)$	0.061	-0.450^{***}	-0.015	-0.701^{***}
	(0.051)	(0.127)	(0.068)	(0.157)
Wald Test				
$\beta_0 + \beta_1$	0.029^{***}	0.028^{***}	0.036^{***}	0.035^{***}
$\beta_0 + \beta_2$	-0.037^{***}	-0.438^{***}	-0.018^{**}	-0.697^{***}
control variables				
GDP	0.617^{***}	0.587^{***}	0.359^{***}	0.163^{***}
	(0.017)	(0.014)	(0.040)	(0.034)
$OPEN$	-0.016^{***}	-0.012^{***}	0.007^{**}	-0.003^{***}
	(0.002)	(0.0007)	(0.003)	(0.001)
$OPEN \times GDP$	0.001^{***}	0.001^{***}	-0.001^{***}	0.000
	(0.0002)	(0.000)	(0.000)	(0.000)
$CREDIT$	-0.022	0.033	0.093^{***}	0.167^{***}
	(0.032)	(0.034)	(0.030)	(0.045)
$SIZE$	-0.079^{***}	-0.079^{***}	0.021^{**}	-0.076^{***}
	(0.014)	(0.007)	(0.009)	(0.018)
FIX	-0.229^{***}	-0.143^{**}	-0.068	-0.454^{***}
	(0.070)	(0.060)	(0.087)	(0.110)
INT	-0.241^{***}	-0.114^{*}	0.093	-0.072
	(0.061)	(0.060)	(0.077)	(0.087)
FLO	-0.126^{*}	0.555^{***}	0.103	0.995^{***}
	(0.066)	(0.173)	(0.098)	(0.246)
R^2	0.863	0.880	0.443	0.479
obs.	354	443	354	443

Notes: The dependent variable is the national price level. Standard errors are given in parenthesis and are clustered at the country level. All regressions include time specific fixed-effects. The Wald test evaluates whether the reported sum of the coefficients is significantly different from zero. A significance level of 1%, 5%, and 10% is indicated by ***, **, and *, respectively.

Table 8: Results for all countries, 1970-2004

sample: 1970 - 2004	I	II	III	IV
	PWT data		WDI data	
	FX regime classification		FX regime classification	
	LYS	RR	LYS	RR
financial integration				
$FIN\ (\beta_0)$	0.048^{***} (0.009)	0.034^{***} (0.005)	-0.002 (0.011)	0.019^{***} (0.005)
$(FIX + INT) \times FIN\ (\beta_1)$	-0.018^{**} (0.008)	0.010 (0.008)	0.033^{**} (0.014)	0.031^{***} (0.012)
$FLO \times FIN\ (\beta_2)$	-0.056^{***} (0.009)	-0.060 (0.066)	0.009 (0.015)	-0.350^{***} (0.035)
Wald Test:				
$\beta_0 + \beta_1$	0.029^{***}	0.043^{***}	0.031^{***}	0.050^{***}
$\beta_0 + \beta_2$	-0.008	-0.027	0.006	-0.331^{***}
control variables				
GDP	0.454^{***} (0.012)	0.466^{***} (0.012)	0.155^{***} (0.019)	0.134^{***} (0.021)
$OPEN$	-0.013^{***} (0.002)	-0.011^{***} (0.002)	-0.0002 (0.0006)	-0.002^{***} (0.000)
$OPEN \times GDP$	0.0008^{***} (0.0001)	0.0007^{***} (0.0001)	-0.0002^{***} (0.000)	0.000 (0.000)
$CREDIT$	0.092^{***} (0.020)	0.083^{***} (0.017)	0.185^{***} (0.021)	0.147^{***} (0.021)
$SIZE$	-0.088^{***} (0.009)	-0.084^{***} (0.009)	-0.050^{***} (0.008)	-0.058^{***} (0.007)
DUR	0.011^{***} (0.001)	0.002^{***} (0.001)	0.009^{***} (0.001)	0.002 (0.001)
FIX	0.014 (0.030)	0.064^{***} (0.023)	-0.079^{***} (0.026)	-0.286^{***} (0.042)
INT	-0.010 (0.035)	0.034^{*} (0.020)	0.005 (0.037)	-0.032 (0.041)
FLO	0.050^{***} (0.020)	0.202^{***} (0.076)	0.036 (0.028)	0.585^{***} (0.054)
R^2	0.799	0.796	0.312	0.356
obs.	1468	1468	1267	1267

Notes: The dependent variable is the national price level. Standard errors are given in parenthesis and are clustered at the country level. All regressions include time specific fixed-effects. The Wald test evaluates whether the reported sum of the coefficients is significantly different from zero. A significance level of 1%, 5%, and 10% is indicated by ***, **, and *, respectively.

Table 9: Results for OECD countries, 1970-2004

sample: 1970 - 2004	I	II	III	IV
	PWT data		WDI data	
	FX regime classification		FX regime classification	
	LYS	RR	LYS	RR
financial integration				
FIN (β_0)	0.028^{***}	0.010^{**}	0.059^{***}	0.009
	(0.007)	(0.005)	(0.022)	(0.008)
$(FIX + INT) \times FIN$ (β_1)	-0.024^{***}	0.014^{***}	-0.016	0.070^{***}
	(0.005)	(0.004)	(0.021)	(0.019)
$FLO \times FIN$ (β_2)	-0.050^{***}	-0.137^{***}	0.047^{**}	-0.376^{***}
	(0.005)	(0.060)	(0.019)	(0.047)
Wald Test				
$\beta_0 + \beta_1$	0.004	0.024^{***}	0.043^{***}	0.079^{***}
$\beta_0 + \beta_2$	-0.022^{***}	-0.126^{**}	0.012	-0.367^{***}
control variables				
GDP	0.362^{***}	0.391^{***}	0.219^{***}	0.177^{***}
	(0.013)	(0.014)	(0.035)	(0.034)
$OPEN$	-0.022^{***}	-0.021^{***}	0.007^{**}	-0.002
	(0.002)	(0.002)	(0.003)	(0.003)
$OPEN \times GDP$	0.002^{***}	0.002^{***}	-0.001^{***}	-0.0001
	(0.0002)	(0.0001)	(0.0002)	(0.0002)
$CREDIT$	0.039	0.043^{*}	0.205^{***}	0.153^{***}
	(0.026)	(0.025)	(0.035)	(0.042)
$SIZE$	-0.134^{***}	-0.134^{***}	-0.072^{***}	-0.098^{***}
	(0.011)	(0.012)	(0.013)	(0.014)
DUR	0.013^{***}	-0.000	0.005^{***}	0.0004
	(0.001)	(0.001)	(0.002)	(0.003)
FIX	0.029^{**}	-0.010	-0.020	-0.599^{***}
	(0.015)	(0.022)	(0.054)	(0.081)
INT	0.098^{***}	-0.049^{*}	0.025	-0.185^{***}
	(0.033)	(0.027)	(0.083)	(0.053)
FLO	0.046^{**}	0.278^{***}	0.198^{***}	0.620^{***}
	(0.022)	(0.072)	(0.035)	(0.072)
R^2	0.763	0.747	0.250	0.359
obs.	861	861	748	748

Notes: The dependent variable is the national price level. Standard errors are given in parenthesis and are clustered at the country level. All regressions include time specific fixed-effects. The Wald test evaluates whether the reported sum of the coefficients is significantly different from zero. A significance level of 1%, 5%, and 10% is indicated by ***, **, and *, respectively.

Table 10: Results for all countries, 1990-2004, three FX regimes

sample: 1990 - 2004	I	II	III	IV
	PWT data		WDI data	
	FX regime classification		FX regime classification	
	LYS	RR	LYS	RR
financial integration				
FIN (β_0)	0.034^{***} (0.007)	0.019^{***} (0.004)	-0.031^{***} (0.011)	0.022^{***} (0.006)
$FIX \times FIN$ (β_1)	-0.017^{**} (0.009)	0.003 (0.005)	0.052^{***} (0.017)	-0.009 (0.009)
$INT \times FIN$ (β_2)	-0.012^{*} (0.007)	0.014^{*} (0.007)	0.060^{***} (0.019)	0.035^{*} (0.020)
$FLO \times FIN$ (β_3)	-0.060^{***} (0.007)	-0.318^{***} (0.093)	0.020 (0.018)	-0.366^{***} (0.088)
Wald Test				
$\beta_0 + \beta_1$	0.016^{***}	0.022^{***}	0.021^{***}	0.012
$\beta_0 + \beta_2$	0.022^{***}	0.033^{***}	0.029^{***}	0.056^{***}
$\beta_0 + \beta_3$	-0.026^{***}	-0.299^{***}	-0.011	-0.344^{***}
control variables				
GDP	0.491^{***} (0.017)	0.516^{***} (0.014)	0.236^{***} (0.023)	0.226^{***} (0.019)
$OPEN$	-0.019^{***} (0.001)	-0.019^{***} (0.001)	-0.0001 (0.0008)	-0.002^{***} (0.0007)
$OPEN \times GDP$	0.001^{***} (0.000)	0.001^{***} (0.000)	-0.0001^{*} (0.000)	0.000 (0.000)
$CREDIT$	0.053^{**} (0.025)	0.030^{***} (0.019)	0.164^{***} (0.028)	0.135^{***} (0.017)
$SIZE$	-0.127^{***} (0.005)	-0.120^{***} (0.006)	-0.036^{***} (0.011)	-0.033^{***} (0.007)
DUR	0.008^{***} (0.001)	0.000 (0.001)	0.007^{***} (0.001)	-0.003 (0.002)
FIX	0.017 (0.031)	0.041^{*} (0.022)	-0.114^{***} (0.027)	-0.162^{***} (0.043)
INT	-0.048 (0.051)	0.069^{***} (0.021)	0.015 (0.048)	0.072^{***} (0.023)
FLO	0.060^{***} (0.016)	0.529^{***} (0.128)	0.010 (0.019)	0.624^{***} (0.139)
R^2	0.847	0.846	0.465	0.516
obs.	744	744	729	729

Notes: The dependent variable is the national price level. Standard errors are given in parenthesis and are clustered at the country level. All regressions include time specific fixed-effects. The Wald test evaluates whether the reported sum of the coefficients is significantly different from zero. A significance level of 1%, 5%, and 10% is indicated by ***, **, and *, respectively.

Table 11: Results for all countries with initial value of national price level, 1990-2004

sample: 1990 - 2004	I	II	III	IV
	PWT data		WDI data	
	FX regime classification		FX regime classification	
	LYS	RR	LYS	RR
financial integration				
FIN (β_0)	0.009	0.009***	−0.042***	0.013**
	(0.006)	(0.003)	(0.012)	(0.006)
$(FIX + INT) \times FIN$ (β_1)	−0.001	0.001	0.061***	0.012
	(0.006)	(0.004)	(0.018)	(0.009)
$FLO \times FIN$ (β_2)	−0.036***	−0.305***	0.036**	−0.362***
	(0.008)	(0.084)	(0.018)	(0.081)
Wald Test				
$\beta_0 + \beta_1$	0.008***	0.010***	0.018***	0.026***
$\beta_0 + \beta_2$	-0.027***	-0.296***	-0.007	-0.348***
control variables				
GDP	0.293***	0.303***	0.162***	0.176***
	(0.002)	(0.025)	(0.027)	(0.015)
$OPEN$	−0.015***	−0.015***	0.001*	0.000
	(0.001)	(0.001)	(0.0008)	(0.000)
$OPEN \times GDP$	0.001***	0.001***	−0.0002***	−0.0001**
	(0.000)	(0.000)	(0.000)	(0.000)
$CREDIT$	0.030	0.008	0.133***	0.125***
	(0.024)	(0.021)	(0.027)	(0.023)
$SIZE$	−0.113***	−0.108***	−0.034***	−0.026***
	(0.007)	(0.007)	(0.010)	(0.006)
DUR	0.006***	−0.0005	0.005***	−0.0022
	(0.001)	(0.0006)	(0.001)	(0.001)
NPL_{1990}	0.317***	0.322***	0.123***	0.095***
	(0.035)	(0.035)	(0.012)	(0.011)
R^2	0.892	0.892	0.499	0.542
obs.	744	744	729	729

Notes: The dependent variable is the national price level. Standard errors are given in parenthesis and are clustered at the country level. All regressions include time specific fixed-effects and the exchange rate regime dummies separately. The Wald test evaluates whether the reported sum of the coefficients is significantly different from zero. A significance level of 1%, 5%, and 10% is indicated by ***, **, and *, respectively.

Table 12: Results for all countries with initial value of financial integration, 1990-2004

sample: 1990 - 2004	I	II	III	IV
	PWT data		WDI data	
	FX regime classification		FX regime classification	
	LYS	RR	LYS	RR
financial integration				
FIN (β_0)	-0.033^{**}	0.002	-0.072^{***}	0.005
	(0.015)	(0.005)	(0.018)	(0.007)
$(FIX + INT) \times FIN$ (β_1)	0.026^{**}	-0.006	0.075^{***}	0.005
	(0.011)	(0.006)	(0.021)	(0.008)
$FLO \times FIN$ (β_2)	-0.070^{***}	-0.329^{***}	0.022	-0.353^{***}
	(0.012)	(0.089)	(0.019)	(0.081)
Wald Test				
$\beta_0 + \beta_1$	-0.007	-0.004	0.002	0.010^{***}
$\beta_0 + \beta_2$	-0.104^{***}	-0.327^{***}	-0.050^{***}	-0.348^{***}
control variables				
GDP	0.538^{***}	0.541^{***}	0.249^{***}	0.237^{***}
	(0.013)	(0.012)	(0.023)	(0.017)
$OPEN$	-0.014^{***}	-0.016^{***}	0.003^{***}	0.000
	(0.001)	(0.001)	(0.001)	(0.001)
$OPEN \times GDP$	0.001^{***}	0.001^{***}	-0.000^{***}	-0.000^{***}
	(0.000)	(0.000)	(0.000)	(0.000)
$CREDIT$	0.014	-0.006	0.148^{***}	0.134^{***}
	(0.022)	(0.022)	(0.026)	(0.020)
$SIZE$	-0.094^{***}	-0.103^{***}	-0.021^{**}	-0.021^{***}
	(0.005)	(0.006)	(0.011)	(0.007)
DUR	0.008^{***}	-0.001	0.008^{***}	-0.002
	(0.001)	(0.001)	(0.001)	(0.001)
FIN_{1990}	0.133^{***}	0.090^{***}	0.079^{***}	0.050^{***}
	(0.018)	(0.012)	(0.009)	(0.006)
R^2	0.866	0.858	0.495	0.538
obs.	743	743	728	728

Notes: The dependent variable is the national price level. Standard errors are given in parenthesis and are clustered at the country level. All regressions include time specific fixed-effects and the exchange rate regime dummies separately. The Wald test evaluates whether the reported sum of the coefficients is significantly different from zero. A significance level of 1%, 5%, and 10% is indicated by ***, **, and *, respectively.

Table 13: Summary of the realized endogenous variables

	Segmented Markets	Complete Markets
	$\mathsf{ToT}^{seg} = \left(\mathsf{p}_{Hs} - \mathsf{p}_{Fs}^{*} - \mathsf{s}_{s}\right)^{seg}$	$\mathsf{ToT}^{comp} = \left(\mathsf{p}_{Hs} - \mathsf{p}_{Fs}^{*} - \mathsf{s}_{s}\right)^{comp}$
Float	$\frac{(\mathsf{k}-\mathsf{k}^{*})}{\Delta}$	$\mathsf{k} - \mathsf{k}^{*}$
Peg	$\alpha \frac{(\mathsf{k}-\mathsf{k}^{*})}{1-\alpha(1-\Delta)}$	$\alpha\left(\mathsf{k} - \mathsf{k}^{*}\right)$
	$\mathsf{s}^{seg} = \frac{(1-\alpha(1-\Delta))(\mathsf{m}_{s}-\mathsf{m}_{s}^{*})^{seg}-\alpha(1-\Delta)(\mathsf{k}-\mathsf{k}^{*})}{\Delta}$	$\mathsf{s}^{comp} = \left(\mathsf{m}_{s} - \mathsf{m}_{s}^{*}\right)^{comp}$
Float	$-\frac{(\mathsf{k}-\mathsf{k}^{*})}{\Delta}$	$-\left(\mathsf{k} - \mathsf{k}^{*}\right)$
Peg	0	0
	$\mathsf{p}_{H,1}^{seg} = \alpha\left(\mathsf{m}_{s}^{seg} + \mathsf{k}\right)$	$\mathsf{p}_{H,1}^{comp} = \alpha\left(\mathsf{m}_{s}^{comp} + \mathsf{k}\right)$
Float	0	0
Peg	$\frac{(\mathsf{k}-\mathsf{k}^{*})}{1-\alpha(1-\Delta)}$	$\left(\mathsf{k} - \mathsf{k}^{*}\right)$
	$\mathsf{c}^{seg} = \left(\mathsf{m}_{s} + (1-n)\,\mathsf{ToT}_{s} - \mathsf{p}_{Hs}\right)^{seg}$	$\mathsf{c}^{comp} = \left(\mathsf{m}_{s} + (1-n)\,\mathsf{ToT}_{s} - \mathsf{p}_{Hs}\right)^{comp}$
Float	$-\frac{(\Delta-(1-n))\mathsf{k}+(1-n)\mathsf{k}^{*}}{\Delta}$	$-n\mathsf{k} - (1-n)\,\mathsf{k}^{*}$
Peg	$-\frac{\alpha(n-(1-\Delta))\mathsf{k}+(1-n\alpha)\mathsf{k}^{*}}{1-\alpha(1-\Delta)}$	$-\mathsf{k}^{*} - n\alpha\left(\mathsf{k} - \mathsf{k}^{*}\right)$
	$\mathsf{l}^{seg} = \mathsf{y}_{H}^{seg} = \left(-(1-n)\,\mathsf{ToT}_{s} + \mathsf{c}_{s}\right)^{seg}$	$\mathsf{l}^{comp} = \mathsf{y}_{H}^{comp} = \left(-(1-n)\,\Delta\mathsf{ToT}_{s} + \mathsf{c}_{s}\right)^{comp}$
Float	$-\mathsf{k}$	$-\Theta\mathsf{k} - (1-\Theta)\,\mathsf{k}^{*}$
Peg	$-\frac{\alpha\Delta\mathsf{k}+(1-\alpha)\mathsf{k}^{*}}{1-\alpha(1-\Delta)}$	$-\alpha\Theta\mathsf{k} - (1-\alpha\Theta)\,\mathsf{k}^{*}$
	$\mathsf{m}^{seg} = \delta_{seg}^{K}\mathsf{k} + \delta_{seg}^{K^{*}}\mathsf{k}^{*}$	$\mathsf{m}^{comp} = \delta_{comp}^{K}\mathsf{k} + \delta_{comp}^{K^{*}}\mathsf{k}^{*}$
Float	$\delta_{seg}^{K} - 1$ $\delta_{seg}^{K^{*}} = 0$	$\delta_{comp}^{K} - 1$ $\delta_{comp}^{K^{*}} = 0$
Peg	$\delta_{seg}^{K} = -\frac{\alpha(\Delta-1)}{1-\alpha(1-\Delta)}$ $\delta_{seg}^{K^{*}} = -\frac{1}{1-\alpha(1-\Delta)}$	$\delta_{comp}^{K} = 0$ $\delta_{comp}^{K^{*}} = -1$
	$\Theta = \Delta(1-n) + n > 0$	

Note: Terms of order $O(\varepsilon)^{2}$ and higher are ignored.

7 Additional appendix (not for publication)

7.1 Additional empirical results

To check the robustness of the results with respect to the time-series properties of the variables, we allow for non-stationarity and possible cointegration and estimate the model using Dynamic OLS following, among others, Mark and Sul (2003). This amounts to estimating an augmented equation which includes one lead and one lag of all explanatory variables. For this purpose, we restrict the sample to include only those exchange rate regimes that lasted for a minimum of three years to guarantee that the contemporaneous observation and both the lead and the lag are taken to the same underlying exchange rate regime. Table (14) contains the estimates obtained from using Dynamic Panel OLS to estimate the model. Both $\beta_0 + \beta_1$ and $\beta_0 + \beta_1$ have the correct sign and are in almost all cases significantly different from zero. Again, financial integration lowers prices under floats and raises prices under managed exchange rates.

Table 14: Results for all countries using Dynamic OLS, 1990-2004

sample: 1990 - 2004	I	II	III	IV
	PWT data		WDI data	
	FX regime classification		FX regime classification	
	LYS	RR	LYS	RR
financial integration				
FIN (β_0)	-0.114^{*}	0.003	0.043	0.012
	(0.067)	(0.012)	(0.094)	(0.013)
$(FIX + INT) \times FIN$ (β_1)	0.138^{**}	0.012	-0.012	0.022
	(0.065)	(0.013)	(0.092)	(0.016)
$FLO \times FIN$ (β_2)	0.077	-0.546^{***}	-0.058	-0.887^{***}
	(0.067)	(0.124)	(0.093)	(0.170)
Wald Test				
$\beta_0 + \beta_1$	0.020^{***}	0.015^{**}	0.031^{**}	0.034^{***}
$\beta_0 + \beta_2$	-0.037^{**}	-0.543^{***}	-0.015	-0.874^{***}
control variables				
GDP	0.567^{***}	0.583^{***}	0.407^{***}	0.174^{***}
	(0.039)	(0.033)	(0.036)	(0.031)
$OPEN$	-0.013^{***}	-0.011^{***}	0.011^{***}	-0.005^{***}
	(0.002)	(0.002)	(0.003)	(0.002)
$OPEN \times GDP$	0.001^{***}	0.001^{***}	-0.001^{***}	0.0002
	(0.000)	(0.000)	(0.000)	(0.0002)
$CREDIT$	0.033	0.044	0.126^{**}	0.179^{***}
	(0.045)	(0.037)	(0.060)	(0.047)
$SIZE$	-0.065^{***}	-0.074^{***}	0.042^{*}	-0.081^{***}
	(0.018)	(0.013)	(0.023)	(0.018)
R^2	0.897	0.890	0.416	0.506
obs.	311	428	311	428

Notes: As above.

Table 15: Number of exchange rate regime observations, 1990-2004

Sample	FX regime	Classification		
		de jure	LYS	RR
all countries	Fix	174	209	142
	Intermediate	213	59	311
	Float	217	154	55
OECD countries	Fix	75	143	87
	Intermediate	128	20	174
	Float	135	108	50
Non-OECD countries	Fix	99	66	55
	Intermediate	85	39	137
	Float	82	46	5
No transition countries	Fix	124	179	121
	Intermediate	186	55	274
	Float	209	138	55