Australian National University

Working Papers in
Trade and Development

Valuation Effects, Risk Sharing, and Consumption Smoothing

Marcel Schröder
Australian National University & Lebanese American University

February 2015
Working Paper No. 2015/03

Arndt-Corden Department of Economics
Crawford School of Public Policy
ANU College of Asia and the Pacific

This Working Paper series provides a vehicle for preliminary circulation of research results in the fields of economic development and international trade. The series is intended to stimulate discussion and critical comment. Staff and visitors in any part of the Australian National University are encouraged to contribute. To facilitate prompt distribution, papers are screened, but not formally refereed.

Copies may be obtained at WWW Site
http://www.crawford.anu.edu.au/acde/publications/

Valuation effects, risk sharing, and consumption smoothing*

Marcel Schröder †

February 2015

Abstract

In theory, valuation effects (changes in net external assets of a country arising from movements in exchange rates or asset returns) are an important channel of international risk sharing as they facilitate external adjustment. However, the effects can also be economically destabilizing in the presence of frictions in the international financial system. Despite the growing significance of valuation effects in an era of financial globalization, the nature and extent of their macroeconomic effect has not yet been systematically examined, especially in relation to emerging market economies (EMEs). The study examines the macroeconomic impact of valuation effects for 53 countries from 1980–2010. Valuation effects seem to operate as a risk sharing channel in high income countries. For EMEs the results depend on how valuation effects correlate with domestic consumption growth. There is weak evidence that valuation effects act as a risk sharing channel only if the correlation is negative, and are destabilizing otherwise.

Keywords: Valuation effects, Net foreign assets, Risk sharing, Financial globalization
JEL codes: E21, E32, F32, F36

*I would like to thank Prema-chandra Athukorala, Paul Burke, Ippei Fujiwara, Bob Gregory, Peter Montiel, and seminar participants at the Australian National University and the University of Queensland.

†Arndt-Corden Department of Economics, Australian National University and Department of Economics, Lebanese American University. *E-mail*: marcel.schroder@lau.edu.lb. *Tel.* +961 09547254 (Ext. 2573).

Valuation effects, risk sharing, and consumption smoothing

1 Introduction

The net foreign asset position limits the present value of future current account deficits. The current account is often used as an approximate measure of periodic changes in net external assets. However, a number of recent studies show that "valuation effects" resulting from changes in asset prices or exchange rates act as a separate impetus driving the net foreign asset position (Tille, 2003; Obstfeld, 2004; Blanchard et al., 2005; Lane and Milesi-Ferretti, 2007; Gourinchas and Rey, 2007; Gourinchas, 2008). The magnitude of valuation effects is proportional to gross asset and liability positions. The proliferation in asset trade over the past two decades has therefore led to a significant increase in the size of valuation adjustments.

Economic theory suggests that the valuation channel plays an important role in international consumption risk sharing. The two-country model of Devereux and Sutherland (2010) illustrates this point. If the home and foreign country are symmetric and choose their international portfolios optimally so that risk sharing is complete, they equally share a unit negative endowment shock in the home country in the sense that consumption in both countries declines by half a unit. The latter represents home's (foreign's) current account deficit (surplus). Provided the shock fully dissipates after the period, home (foreign) at the same time experiences an "unpredictable" valuation gain (loss) that exactly offsets the current account balance, leaving the net foreign asset position unchanged.[1] The crucial role of the valuation channel is thus to bring about external adjustment.

However, there are reasons to suspect that the valuation channel is economically destabilizing, especially for emerging market economies (EMEs). This is the case if valuation adjustments occur in a pro-cyclical fashion, thereby amplifying the propagation of shocks. The most prominent example for pro-cyclicality is the case when countries cannot borrow in their own currencies. Gourinchas (2008) shows that, when net debt is dollarized, a currency depreciation (triggered for example by a negative demand shock) increases net liabilities valued in local currency. The valuation component captures this capital loss. In this scenario, the valuation channel is destabilizing because, despite the shock, the equilibrium value of external net debt does not change and this requires trade balance surpluses to reduce international indebtedness to its long-run value. Pro-cyclical valuation effects due to "original sin" are well known to be a problem especially for EMEs since Eichengreen and Hausmann (1999) and Eichengreen et al. (2003).

There are only a few studies that investigate valuation effects in the context of consumption risk sharing. For instance, Balli et al. (2012) show that valuation effects have indeed become an empirically

[1] The current account balance and the valuation channel need not necessarily exactly offset each other. For instance, if shocks are persistent, the valuation channel exceeds the current account balance in absolute value so as to ensure an optimal sharing of shocks across the two countries. See Devereux and Sutherland (2010).

important channel through which countries that are part of the European Monetary Union (EMU), EU, or the OECD share their risks. The only study that empirically examines the risk sharing properties of valuation effects in EMEs is that of Bracke and Schmitz (2011). However, they restrict their analysis to portfolio equity, which represents only a small share of a typical emerging country's international portfolio. Interestingly, they conclude that the valuation effects that emanate from portfolio equity do not satisfy the necessary risk sharing characteristics in EMEs.

Therefore, despite the growing significance of valuation effects in an era of financial globalization, the nature and extent of their macroeconomic effect has not yet been systematically examined, especially in relation to EMEs. The purpose of this paper is to investigate empirically whether valuation effects are destabilizing, or are one of the operative channels of risk sharing. My analysis mostly focuses on EMEs but includes high income countries as well. The period covered is 1980-2010 and the country sample consists of 18 high income countries and 35 EMEs.

I first examine whether the valuation channel is part of the international risk sharing mechanism. Acknowledging that international risk sharing is far from perfect allows me to test this indirectly: if valuation effects represent flow payments related to risk sharing, then an increase in the size of the valuation channel (measured as the standard deviation of valuation effects) driven by financial integration should be associated with improved risk sharing outcomes across countries (Gourinchas, 2008). My econometric results suggest that this association holds for the group of high income countries. But there is no significant evidence that the same relationship holds for the group of EMEs. The latter result is thus in line with Kose et al. (2009), Bai and Zhang (2012), and others who find that financial integration has not had a material impact on the EMEs' ability to offload their income risk to the rest of the world.

I then subdivide EMEs into two groups: one for countries where the correlation between valuation effects and domestic consumption growth is negative (NC), and another for which it is positive (PC). I argue that the sign of this correlation contains information about the nature of the valuation channel in EMEs. In particular, the model of Devereux and Sutherland (2010) implies that the covariance between consumption growth and valuation adjustments, when measured over longer time horizons, should be negative in economies that are more frequently subjected to shocks relative to the rest of the world. Assuming that macroeconomic volatility measures the frequency of shocks, the covariance between consumption growth and valuation effects should therefore be negative in EMEs. Pro-cyclical or destabilizing valuation effects, on the other hand, imply a positive correlation in these countries. Overall, however, there is only weak evidence of a functioning valuation channel in EMEs. The correlation coefficients are negative in only 21 out of 35 EMEs and rarely statistically different from zero. On the other hand, there has been a slight improvement in the degree of risk sharing for the set of NC-economies during the era of financial globalization. For PC-economies, the findings are much clearer: the greater the size of valuation effects, the worse the extent of risk sharing becomes. For this group, the extent of risk sharing has substantially deteriorated over the last 15 years and is almost non-existent in 2010.

Motivated by the above findings, I proceed to test explicitly whether valuation effects inflict welfare costs through volatility in consumption in PC-economies. I also examine whether some inefficiencies in the valuation channel remain in high income and NC-countries. For the PC-group, the estimated valuation-effect volatility elasticity of consumption variability is about 0.10. The average PC-country has experienced a threefold increase in the size of the valuation channel over the last three decades. My results thus suggest that valuation effects have, on average, led to a 20 percent amplification in consumption volatility in PC-economies.

For NC-countries, however, there is no evidence of an adverse impact of valuation effects on consumption smoothing. If anything, an increase in the size of the valuation channel is associated with slightly more stable consumption paths. I also find this to be the case for high income countries.

The rest of the paper is structured as follows. Section 2 defines and provides stylized facts of valuation effects. Section 3 examines the link between risk sharing and valuation effects. Section 4 analyzes the impact of the valuation channel and consumption smoothing. The final section concludes.

2 Definition and stylized facts of valuation effects

This section defines and provides some stylized facts about valuation effects. As discussed, the current account is traditionally viewed to measure the change in a country's net foreign asset position. In reality, however, there are two reasons why the current account is an imprecise estimate of the evolution of net external assets. The first is capital transfers (debt relief programs or migrants' transfers) and discrepancies between the current account and the financial account, commonly called errors and omissions. Lane and Milesi-Ferretti (2007) refer to positive (negative) values of errors and omissions as unrecorded capital inflows (outflows), but they note that errors and omissions could also reflect mismeasured trade flows (or a mixture). Therefore, to the extent that data on stocks do not capture errors and omissions (Lane and Milesi-Ferretti, 2007), the period change in net foreign assets equals the sum of the current account balance (CA), the capital account balance (CAP), and errors and omissions (EOM):

$$\Delta NFA_t = CA_t + CAP_t + EOM_t. \tag{1}$$

The second reason is that valuation effects arising from asset price or exchange rate changes are an important driver of net foreign assets, as documented by a number of studies (Tille, 2003; Obstfeld, 2004; Blanchard et al., 2005; Lane and Milesi-Ferretti, 2007; Gourinchas and Rey, 2007). To illustrate, consider the following accumulation equation as discussed by Gourinchas (2008). Define NFA_{t+1} as the economy's net foreign asset position at the end of period t. That is, the difference between gross assets (A_{t+1}) and gross liabilities (L_{t+1}). The period change in net foreign assets is given by:

$$A_{t+1} - L_{t+1} = NFA_{t+1} = R_t\, NFA_t + NX_t + CAP_t + EOM_t, \tag{2}$$

where the terms R_t and NX_t refer to the gross net portfolio return and the balance on goods, services,

and net transfers, respectively. Adding and subtracting the net investment income balance NI_t, we have

$$\begin{aligned} NFA_{t+1} - NFA_t &= (R_t - 1)NFA_t - NI_t + \underbrace{NX_t + NI_t}_{CA_t} + CAP_t + EOM_t \\ &= \underbrace{[(R_t - 1)NFA_t - NI_t]}_{VAL_t} + CA_t + CAP_t + EOM_t \\ &= VAL_t + CA_t + CAP_t + EOM_t. \end{aligned} \tag{3}$$

The change in the NFA is equivalent to the sum of the current account balance, capital transfers, errors and omissions, and a valuation component. Here, the last is equal to the total net return on the net foreign asset portfolio minus income, dividends, and earnings distributed.

Eq. 4 can be used to compute valuation terms indirectly:

$$VAL_t = \Delta NFA_t - CA_t - CAP_t - EOM_t. \tag{4}$$

Data on net foreign asset positions come from the External Wealth of Nations Mark II (EWN II) database developed by Lane and Milesi-Ferretti (2007). Observations on the current account, capital account, and errors and omissions are sourced from the IMF's Balance of Payments Statistics. Each variable is scaled by GDP. My analysis includes most countries for which it is possible to obtain at least 20 observations.[2] My final sample then comprises 53 economies, which I classify into 18 high income countries and 35 EMEs.[3] Since the EWNII database starts in 1970, valuation effects can be calculated at annual frequency over the period 1971-2010.

We can now have a closer look at trends and patterns of valuation effects. Although previous studies have done this extensively, their focus is constrained to industrialized countries. Table 1 reports a number of characteristics of valuation effects for each of the 53 countries in the sample, extending the analysis of Devereux and Sutherland (2010) to EMEs. Defining $VR = \text{var}(VAL)/\text{var}(NFA)$ as the share of the variation in net foreign assets explained by valuation effects, it turns out that this fraction is rarely below 80 percent for most countries and often close to 100 percent. This means that the current account only accounts for a small fraction of the total variation in international portfolios. Devereux and Sutherland (2010) find that valuation effects are not serially correlated in OECD countries. AR(1) regressions show that this pattern holds for most countries. The coefficients on lagged VAL_t are statistically indistinguishable from zero.[4] Finally, valuation terms tend to be centered on zero in most countries, although there are a number of exceptions, especially among EMEs.

Overall, the stylized facts of valuation effects for high income countries seem thus to carry over to EMEs. Devereux and Sutherland (2010) refer to these stylized facts as "first order" in nature, whereas

[2] In this study I do not consider Sub-Saharan African countries (except Botswana), other low income countries such as Papua New Guinea and major oil producers (Iran). The motivation behind this decision is that these countries are not integrated with world financial markets. I also exclude from the sample small countries with population size of below 1 million.

[3] See Table 1 below for a complete list of countries.

[4] The AR(1) regression specification is $VAL_t = \beta_0 + \beta_1 VAL_{t-1} + \epsilon_t$.

Table 1: Properties of valuation effects.

	$\rho(VAL, CA)$	$\rho(VAL, \Delta y)$	$\rho(VAL, \Delta c)$	Mean(VAL)	sd(VAL)	VR	AR(1)
Argentina (E)	0.40**	-0.16	-0.26	0.02	0.09	0.81	-0.33*
Australia (H)	0.10	-0.15	-0.11	0.00	0.06	0.88	-0.04
Austria (H)	-0.13	-0.09	0.29*	0.00	0.03	0.84	0.12
Bangladesh (E)	-0.27	-0.27	-0.14	-0.01	0.02	0.66	-0.18
Bolivia (E)	0.07	0.38**	0.06	0.02	0.08	0.45	0.36*
Botswana (E)	-0.12	-0.16	-0.01	-0.03	0.11	1.13	-0.18
Brazil (E)	-0.28	-0.20	-0.23	0.00	0.06	1.07	-0.14
Canada (H)	-0.09	0.23	0.00	0.00	0.04	0.75	0.13
Chile (E)	-0.17	-0.25	-0.26	0.01	0.06	0.90	-0.14
China (E)	-0.03	-0.20	-0.15	0.00	0.02	0.33	-0.18
Colombia (E)	0.12	-0.30*	-0.29*	0.00	0.02	0.42	0.20
Denmark (H)	0.36**	-0.24	-0.31	0.00	0.05	0.71	0.17
Egypt (E)	0.54	-0.35**	-0.10	-0.02	0.06	0.48	0.11
Finland (H)	0.06	-0.20	-0.10	-0.01	0.21	1.05	0.29
France (H)	0.07	0.12	0.13	-0.01	0.05	0.87	-0.19
Germany (H)	-0.42***	-0.04	0.15	-0.01	0.03	0.76	0.20
Guatemala (E)	0.00	-0.28	-0.26	0.03	0.03	0.69	0.05
Honduras (E)	0.09	0.15	0.28*	0.00	0.04	0.47	-0.10
Hungary (E)	0.29	-0.07	-0.23	-0.01	0.08	0.66	0.24
India (E)	-0.16	-0.47	-0.22	0.00	0.04	1.12	-0.38
Indonesia (E)	-0.14	0.25	0.07	-0.03	0.07	0.65	-0.03
Israel (E)	0.00	-0.01	0.09	0.00	0.04	0.42	-0.17
Italy (H)	-0.21	-0.02	-0.11	0.00	0.03	1.09	0.20
Jamaica (E)	-0.01	-0.08	-0.28	0.02	0.10	0.88	-0.16
Japan (H)	0.07	-0.18	-0.20	0.00	0.03	0.73	-0.23
Jordan (E)	0.05	-0.23	-0.16	-0.02	0.16	0.89	-0.08
Korea (E)	-0.35**	0.12	0.19	-0.02	0.06	1.04	-0.23
Malaysia (E)	-0.40***	0.04	0.01	-0.03	0.07	0.69	0.25
Mexico (E)	-0.43***	-0.11	-0.08	0.00	0.04	1.34	-0.12
Morocco (E)	-0.43***	-0.03	-0.14	0.00	0.06	0.95	0.52***
Netherlands (H)	-0.05	-0.12	-0.08	-0.02	0.08	0.92	-0.31*
New Zealand (H)	-0.16	-0.08	-0.13	-0.01	0.11	1.00	0.19
Norway (H)	-0.12	-0.16	-0.19	0.00	0.06	0.45	-0.14
Pakistan (E)	-0.35**	-0.13	0.26	0.00	0.03	0.72	0.17
Paraguay (E)	0.00	0.26	0.28	-0.02	0.25	1.06	-0.12***
Peru (E)	-0.18	-0.07	-0.07	0.01	0.04	0.67	0.04
Philippines (E)	-0.34**	0.19	0.07	0.00	0.04	0.87	0.13
Poland (E)	-0.23	-0.06	0.04	-0.01	0.05	0.87	-0.04
Portugal (H)	0.03	0.07	0.14	-0.01	0.07	0.75	0.04
Singapore (E)	0.02	-0.34**	-0.49***	0.04	0.21	0.74	-0.04
South Africa (E)	-0.22	0.06	0.00	0.00	0.06	1.03	-0.27**
Spain (H)	0.16	-0.11	-0.13	-0.01	0.06	0.81	-0.04
Sri Lanka (E)	-0.39	-0.09	-0.16	0.00	0.04	0.90	0.24
Sweden (H)	-0.22	-0.11	0.02	-0.01	0.04	0.93	0.17
Switzerland (H)	-0.02	-0.11	0.02	-0.01	0.13	1.17	-0.03
Syrian Arab Republic (E)	-0.21	0.11	0.23	-0.01	0.13	1.20	0.11
Thailand (E)	-0.27	0.01	0.16	-0.01	0.06	0.77	-0.07
Tunisia (E)	0.18	0.18	-0.04	-0.03	0.06	0.81	-0.07
Turkey (E)	-0.24	-0.08	-0.13	-0.01	0.06	1.08	-0.42*
United Kingdom (H)	0.05	0.05	0.09	0.00	0.06	0.85	-0.25
United States (H)	-0.35**	-0.10	-0.10	0.01	0.03	0.87	-0.06
Uruguay (E)	-0.02	-0.53***	-0.46***	0.01	0.04	1.57	-0.04
Venezuela (E)	0.06	0.12	0.15	-0.01	0.05	0.49	0.03

Notes: (H) and (E) denote high income and EME, respectively. $\rho(VAL, CA)$ refers to the correlation between valuation effects and the current account. $\rho(VAL, \Delta y)$ is the correlation between valuation effects and real GDP growth. $\rho(VAL, \Delta c)$ denotes the correlation between domestic consumption growth and valuation adjustments. Mean(VAL) is the average valuation effect over the sample period. The standard deviation of valuation effects is denoted by sd(VAL). VR is the ratio of the variance of the valuation term over the variance of the change in the net foreign asset position. Column "AR(1)" reports the AR(1) coefficient of the regression $VAL_t = \beta_0 + \beta_1 VAL_{t-1} + \epsilon_t$. ***, **, * denote the level of statistical significance at 1, 5, and 10 percent.

Gourinchas (2008) calls these "unpredictable" (transitory) valuation effects. The unpredictable component of valuation effects is of first order and reflects the flow payment associated with the sharing of output risk across countries. However, a number of studies such as Gourinchas et al. (2010) and Forbes (2010) show that the US benefits from substantial excess returns of gross assets over gross liabilities, which implies the existence of "predictable" valuation effects as well. The predictable component arises from the excess return of a country's international portfolio due to differences in country risk premiums, which, in theory, allows a "safe haven-country" to operate under a persistent current account deficit. Indeed, Gourinchas and Rey (2007) find that a predictable excess return on the US's net foreign asset portfolio contributes 27 percent to the cyclical external adjustment. While significant for the US, the predictable component of valuation effects is of second order and typically "very small" compared to the unpredictable element in dynamic stochastic equilibrium models (Devereux and Sutherland, 2010). In the following, I will not distinguish between predictable and unpredictable valuation effects.[5]

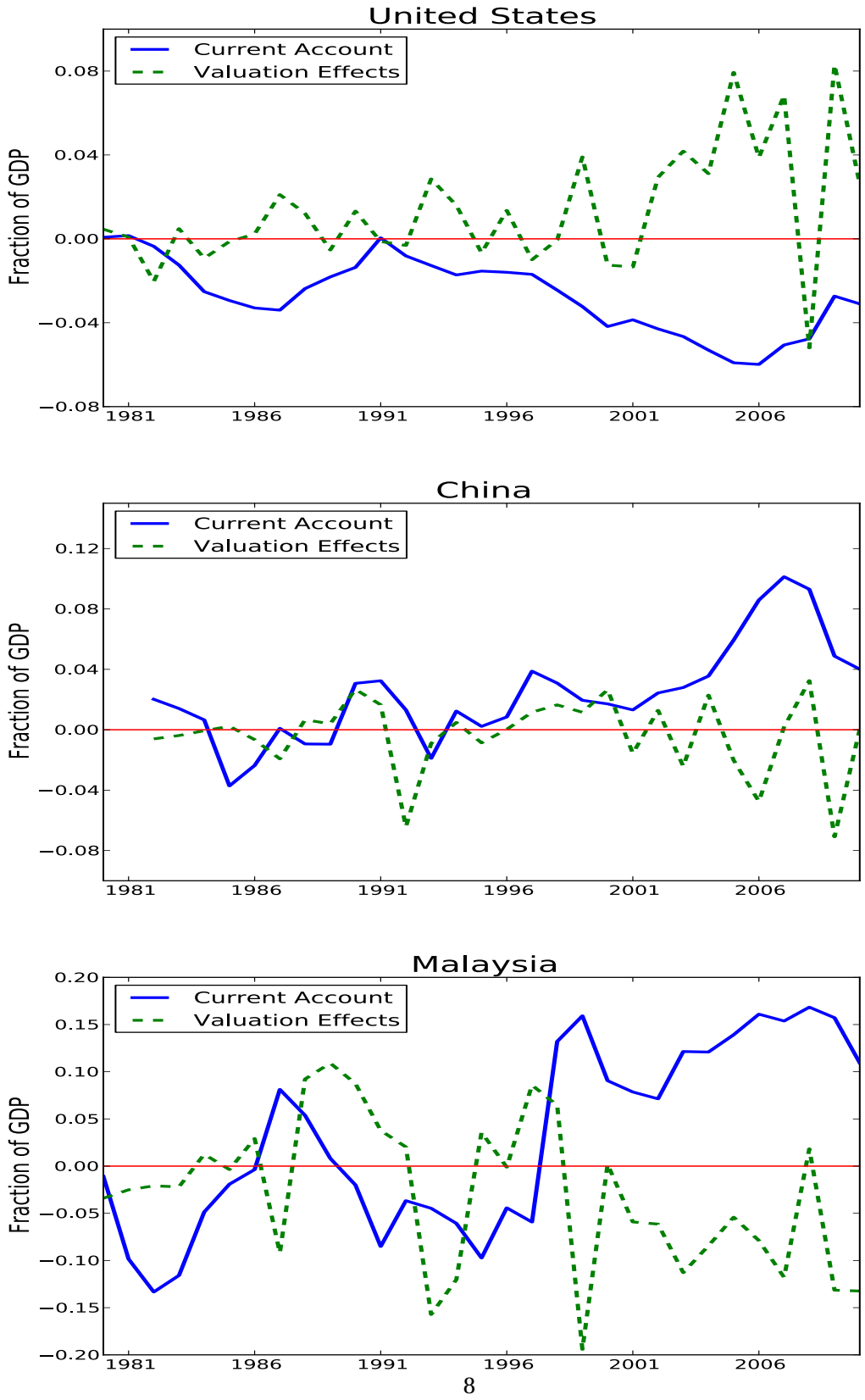
Figure 1 reports the yearly valuation adjustment and the current account balance relative to GDP for China, Malaysia, and the US. The common pattern for these three countries is that valuation effects have been of negligible size until the mid 1980s. Since then their magnitude has been steadily increasing. As the example of Malaysia illustrates, wealth transfers via the valuation channel can be large. For instance, following the Asian Financial Crisis, Malaysia experienced a valuation loss that amounted to 20 percent of GDP. This valuation loss was the result of a large nominal exchange rate devaluation (in excess of 30 percent) coupled with substantial foreign currency denominated net debt holdings. As predicted by the portfolio balance model, Malaysia subsequently needed to run a current surplus in order to repay the additional debt incurred through this valuation loss. In Malaysia's case we can observe this pattern in the data. The described example showcases how valuation effects can be destabilizing.

The China-US story comes closer to the scenario of valuation effects being a channel of international risk sharing, as described in Devereux and Sutherland (2010). China's net foreign asset portfolio is long in US dollars and short in domestic equity, whereas the US's international portfolio is long in foreign (Chinese) equity and short in US dollars (Gourinchas, 2008; Lane and Milesi-Ferretti, 2007; Lane and Shambaugh, 2010). Therefore, the combination of a depreciating dollar from 2002 onwards and an excess return on foreign equity has led to substantial valuation gains for the US on the one hand, and valuation losses for China on the other. As is apparent from Figure 1, those valuation adjustments have, at least in part, offset the current account balances. During this period, China experienced an unprecedented economic expansion, which was shared with foreign investors, including the US.[6] From the discussion so far we can thus deduce that the theorized sign of the correlation between the current account and the valuation component is negative, regardless of whether valuation effects are stabilizing or destabilizing. Empirically, the negative correlation between valuation effects and the current

[5] In any case, note that it is not necessary to differentiate between unpredictable and predictable valuation effects for the purpose of examining the nature and extent of the macroeconomic effect of the valuation channel.

[6] As mentioned, the US is "special", so a significant proportion of these valuation gains would have been attributable to the predictable component.

Figure 1: Current account and valuation component for selected countries, 1980-2010.



Source: Compiled from Lane and Milesi-Ferretti (2007) and IMF BOP statistics.

account seems to hold not only in high income countries, but also in the vast majority of EMEs (see Table 1).

In addition, it is particularly worth emphasizing how the amplitude of valuation effects and the index of financial integration, defined as the sum of gross assets and liabilities over GDP, move in the same direction. To illustrate this point, I measure valuation-term volatility as the rolling standard deviation of valuation effects using a window of 10 years.[7] Figure 2 reports yearly cross-sectional averages of valuation-term volatility and the index of financial integration for the full sample and for samples of high income countries and EMEs. These plots clearly show the co-movement between gross asset positions and volatility of valuation adjustments, irrespective of the sample under consideration. The reason is that when a country holds large stocks of assets and liabilities relative to output, even moderate exchange rate movements or asset price changes have a substantial effect on the net external position. As a result of financial globalization, in high income and EMEs alike, the size of the valuation channel in 2010 is at least three times lager relative to 1980.

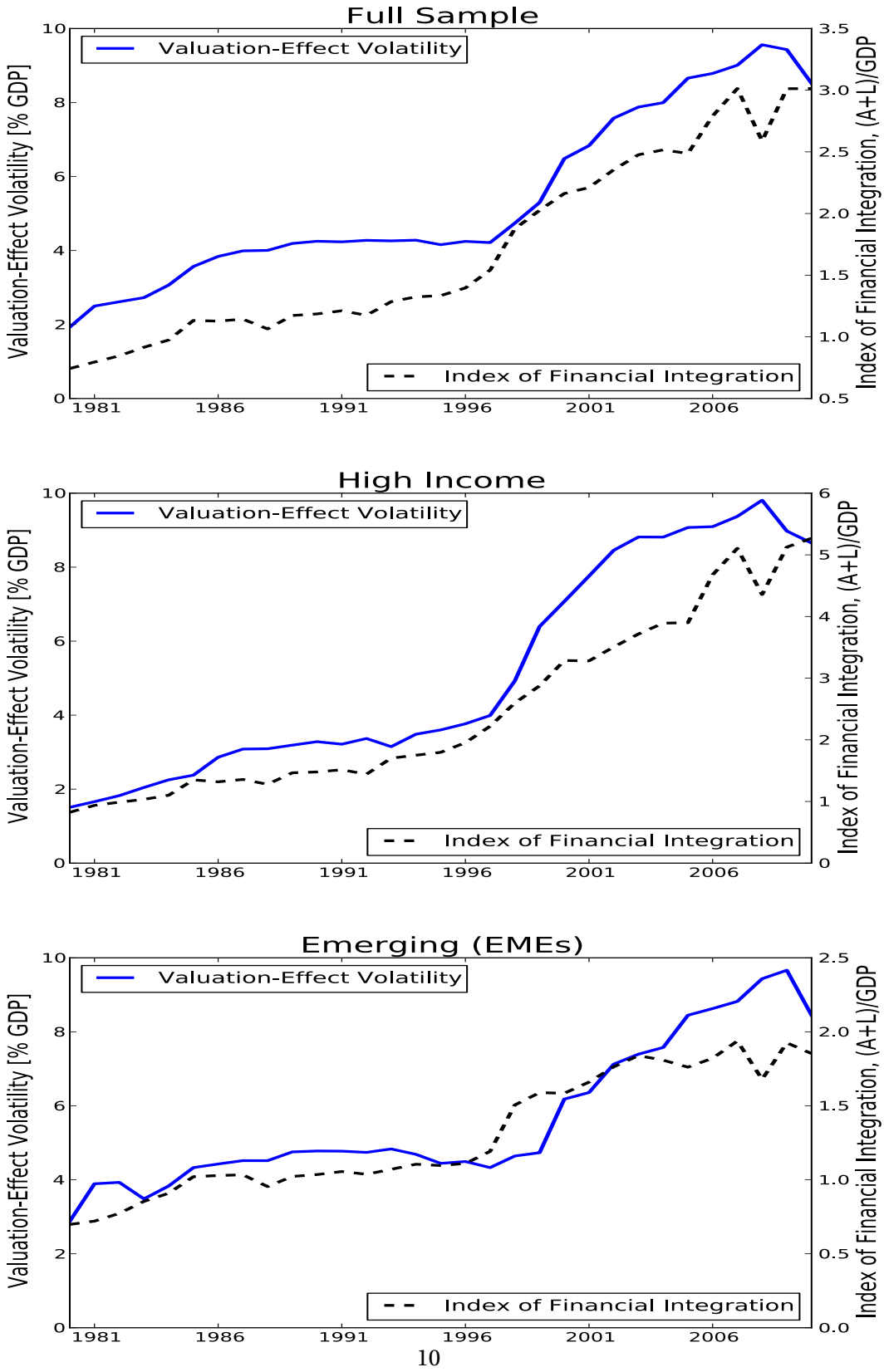
3 Valuation effects and risk sharing

This section investigates whether valuation effects satisfy the properties necessary to conclude that the valuation channel facilitates external adjustment in a risk sharing context. The stylized facts discussed in the last section are useful in giving us some idea about the general characteristics and behavior of valuation adjustments, but not the risk sharing properties. There are two ways of examining the functioning of the valuation channel: a direct and an indirect test.

To motivate the direct approach, consider again the example described in the introduction in which the home country experiences an unexpected valuation gain so as to facilitate external adjustment following a negative endowment shock. This suggests that the valuation adjustment is negatively correlated with consumption growth in the country that is subjected to the shock, and positively in the one that is not. Unless shocks always occur in the same country, the sign of this correlation measured over a longer time horizon is thus ambiguous. Intuitively, however, the correlation should be negative (positive) in the country that it is more (less) frequently subjected to shocks. Let us make the simplifying assumption that macroeconomic (output) volatility (approximately) measures the frequency of shocks in practice. Since this metric is very similar across high income countries the ambiguity remains. However, this approach allows us to make clear statements about the sign of the correlation and its meaning in the case of EMEs, given the fact that aggregate instability is significantly higher in these countries relative to their high income counterparts. Therefore, in EMEs, the covariance between valuation effects and consumption growth should be negative if valuation adjustments reflect the flow payments associated with risk sharing. In addition, the model of Devereux and Sutherland (2010) implies that the correlation coefficient should be increasing (in absolute value) in the frequency of shocks. On the

[7] This means that the estimated standard deviation in period t is the standard deviation computed over the years $t-9$ to t.

Figure 2: Valuation-effect volatility and index of financial integration, 1980-2010.



Note: Volatility measured as the rolling standard deviation over 10-year periods.
Source: Compiled from Lane and Milesi-Ferretti (2007) and IMF BOP statistics.

other hand, if valuation effects are pro-cyclical and therefore destabilizing, the covariance is positive.

Table 1 reports the correlations of valuation adjustments with consumption growth [$\rho(VAL, \Delta c)$] for the 53 countries in the sample.[8] The correlation is negative in some high income countries and positive in others. As argued, this was expected and we cannot infer much from this. More interestingly though, $\rho(VAL, \Delta c)$ is of the expected negative sign in only slightly more than half of the non-high income countries (21 out of 35). Furthermore, the correlation coefficients for most countries are often close to zero and statistically insignificant at the individual country level, save for a few exceptions (Colombia, Singapore, and Uruguay). In the other 14 EMEs, the positive correlations suggest that instead of facilitating external adjustment, valuation effects are of a destabilizing nature in these countries. I split the sample of EMEs based on the sign of $\rho(VAL, \Delta c)$ into two groups, one for which the correlation is negative (NC) (21 countries) and the other for which it is positive (PC) (14 countries). This yields correlation coefficients that are statistically significant at the 1 percent level, but remain on the small side (-0.17 and 0.14, respectively). In summary, the results of the direct approach only provide weak evidence of a functioning valuation channel in EMEs and are best supplemented with the indirect testing method discussed below.

As theory suggests, the indirect approach we can derive by interpreting valuation effects as the outcome of consumption risk sharing while also taking into account that risk sharing is far from perfect in practice. This implies that, all else equal, an increase in the size of the valuation channel should be associated with improved risk sharing outcomes across countries (Gourinchas, 2008). The magnitude of the valuation channel refers to the standard deviation of valuation effects, which Devereux and Sutherland (2010) show to be a function of the following variables:

$$\sigma(VAL) = F\left(\underset{(+)}{\frac{A+L}{GDP}}, \underset{(+)}{\sigma_Y}, \underset{(+)}{\phi_Y}\right), \tag{5}$$

where (A+L)/GDP denotes the index of financial integration, while σ_Y and ϕ_Y represent the size and persistence of output shocks, respectively.

Assuming that the persistence of shocks has been unchanged over time and taking into account that the size of shocks has been decreasing due to the Great Moderation, it follows that the observed increase in the size of the valuation channel (cf. Figure 2) must have been driven by the proliferation in asset trade over the last few decades. This means that if there is an association between an increase in $\sigma(VAL)$ and better risk sharing, then there is also one with the latter and financial globalization. Based on the results of previous studies such as Kose et al. (2009) and the results of the above direct testing method for the functioning of the valuation channel, we would expect this to be the case for high income countries and the set of NC-economies, but not PC-countries.

[8] I obtain data on consumption growth rates from Penn World Tables 7.1.

3.1 Empirical model

The framework I use for conducting the indirect approach is similar to previous empirical studies of international risk sharing (Lewis, 1996; Kose et al., 2009). In particular, markets are complete and there are J countries, where country j is populated by θ_j identical and infinitely lived agents with a constant relative risk aversion (CRRA) utility function over consumption (c_{jt}). Country j's expected utility function is:

$$U_0^j = \mathbb{E}_0 \left\{ \sum_{t=0}^{\infty} \beta^t \, \frac{c_{jt}^{1-\gamma}}{1-\gamma} \right\}. \tag{6}$$

I assume that the coefficient of risk aversion (γ) and discount factors (β) are equal across countries. To find the optimal allocation of cross-country consumption, let us solve the social planner problem of maximizing utility over the J countries subject to the world resource constraint:

$$\sum_{j=1}^{J} \theta_j \, c_{jt} \leq \sum_{j=1}^{J} \theta_j \, y_{jt} = f(\zeta_t), \tag{7}$$

where output, y_{jt}, is stochastic and governed by a vector of country-specific endowment shocks, ζ_t (Baxter, 2012). The first-order condition with respect to consumption for the j-th country at time t is:

$$\beta^t \, \kappa_j \, c_{jt}^{-\gamma} = \theta_j \, \lambda_t, \tag{8}$$

where κ_j is the weight the planner designates on country j. Taking the ratio of the first order conditions at time t to $t-1$ for countries j and i yields the following expression:

$$\frac{\beta \, c_{jt}^{-\gamma}}{c_{j,t-1}^{-\gamma}} = \frac{\beta \, c_{it}^{-\gamma}}{c_{i,t-1}^{-\gamma}} = \frac{\lambda_t}{\lambda_{t-1}}. \tag{9}$$

This equation says that discounted marginal utility growth rates are equalized across countries. This implies that consumption growth in a specific country should not differ from the world consumption growth rate. In addition, individual-country consumption growth should be unrelated to idiosyncratic risk (Obstfeld, 1994; Lewis, 1996). The regression framework for empirically testing this hypothesis takes the following form:

$$\Delta \, ln \, c_{it} - \Delta \, ln \, C_t^W = \alpha + \beta (\Delta \, ln \, y_{it} - \Delta \, ln \, Y_t^W) + \epsilon_{it}, \tag{10}$$

where α is a constant and C^W and Y^W refer to world consumption and output per capita, respectively. The second term on the right-hand side represents the measure for country-specific risk: domestic GDP per capita growth demeaned by aggregate world output per capita growth under the assumption that the latter captures uninsurable common shocks (Lewis, 1996). Country idiosyncratic risk is as-

sumed to be exogenous. The stationary mean zero error term, ϵ_{it}, captures measurement errors in consumption.

The null hypothesis of complete risk sharing is $\beta = 0$. But this hypothesis is typically rejected. In this case, estimates of $\beta > 0$ have the natural interpretation of measuring the proportion of uninsured country idiosyncratic risk. As the extent of international risk sharing improves, this proportion should become smaller. Consequently, the lower the estimate of β, the higher the degree of international risk sharing. A simple measure for the degree of risk sharing is thus (1-β), where a value of 1 indicates perfect risk sharing, and 0 no risk sharing (Sørensen et al., 2007; Kose et al., 2009).

I use the above concept to indirectly test whether valuation effects are the outcome of risk sharing. If so, the observed increase in the size of the valuation channel should be associated with better risk sharing. To investigate this formally, I use a similar approach to Sørensen et al. (2007) and estimate the following panel regression:

$$\Delta ln\, c_{it} - \Delta ln\, C_t^W = \alpha + \beta_0(\Delta ln\, y_{it} - \Delta ln\, Y_t^W)$$

$$+ \beta_1(\Delta ln\, y_{it} - \Delta ln\, Y_t^W) \times VOLVAL_{it} + \epsilon_{it}, \tag{11}$$

where $VOLVAL$ is the valuation-effect volatility, which serves as the measure for the size of the valuation channel. I define volatility as the rolling standard deviation over 10-year windows. In this setting, the estimate of (1-β_0) indicates the average degree of risk sharing of the group of countries included over the time period under study, whereas (1-β_0-$\beta_1 \times VOLVAL_{jt}$) measures country j's extent of risk sharing at time t (Sørensen et al., 2007; Kose et al., 2009). Consequently, larger fluctuations in valuation effects would be associated with better risk sharing outcomes when β_1 is negative. I do not include country fixed effects because these might partially pick up differences between a specific country's consumption growth rate and the world growth rate (Flood et al., 2012). I also do not control for year-specific effects since common fluctuations are already controlled for. Either way, these decisions do not affect my results.

3.2 Data

Section 2 has described the procedure and data sources used to calculate valuation effects. Since I define volatility as the rolling standard deviation using 10-year windows, the estimated standard deviation in period t is the standard deviation computed over the years $t-9$ to t. The sample period covers the years 1980-2010. I obtain the time series on real consumption and real GDP from Penn World Tables (PWT) 7.1. The PWT-data is balanced for the 53 countries under study so that computing "world" consumption and output growth rates is straightforward.[9]

[9]Here, the "world" comprises the sample of 53 countries.

3.3 Results

As a starting exercise, I estimate Eq. 10 for the full sample of countries and then separately both for the set of high income countries and the EMEs. This allows us to gauge the average degree of risk sharing over the sample period for the group of countries in question. Table 2, Panel A, Columns 1-3 reports the results. As expected, the null hypothesis of complete risk sharing ($\beta = 0$) is rejected for every country group. In addition, the estimated extent of risk sharing, (1-β), is limited across the board $-$ 0.37 for the set of high income countries (Column 2) and 0.20 for the group of EMEs. To specifically test whether there is a link between the magnitude of the valuation channel and risk sharing, I estimate Eq. 11 for the same country-groups. Table 2 Panel B, Columns 1-3 presents the results. The point estimate of the interaction is negative and statistically significant only for the set of high income countries (Column 2). In particular, the magnitude of the coefficient attached to the interaction term (-0.02) suggests that every percentage point increase in the standard deviation of valuation effects (measured in terms of GDP) would be associated with an improvement in the extent of risk sharing of 0.02. For the group of EMEs the coefficient attached to the interaction term is close to zero and fails to achieve statistical significance, suggesting that there is no link between the size of the valuation channel and risk sharing (Column 3). As mentioned at the beginning of this section, these results were expected.

Table 2: Main results — Valuation effects and risk sharing.

Independent variable	(1)	(2)	(3)	(4)	(5)
	Full	High Income	Emerging	Emerging, $\rho(VAL, \Delta c_{it}) < 0$	Emerging, $\rho(VAL, \Delta c_{it}) > 0$
Panel A: Output					
$\Delta ln\, y_{it} - \Delta ln\, Y_t^W$	0.79 (0.04)***	0.63 (0.04)***	0.80 (0.05)***	0.80 (0.07)***	0.80 (0.05)***
Observations	1445	521	924	546	378
N	53	18	35	21	14
R^2	0.56	0.57	0.56	0.57	0.55
Panel B: Output and interaction					
$\Delta ln\, y_{it} - \Delta ln\, Y_t^W$	0.83 (0.06)***	0.76 (0.04)***	0.83 (0.07)***	0.93 (0.06)***	0.74 (0.06)***
$\Delta ln\, y_{it} - \Delta ln\, Y_t^W$ ×Valuation-Effect Volatility	-0.01 (0.01)	-0.02(0.004)***	-0.01 (0.01)	-0.02 (0.008)**	0.01 (0.002)***
Observations	1445	521	924	546	378
N	53	18	35	21	14
R^2	0.56	0.60	0.56	0.58	0.55
Panel C: Robustness to outliers					
$\Delta ln\, y_{it} - \Delta ln\, Y_t^W$	0.83 (0.06)***	0.76 (0.04)***	0.82 (0.06)***	0.92 (0.08)***	0.74 (0.06)***
$\Delta ln\, y_{it} - \Delta ln\, Y_t^W$ ×Valuation-Effect Volatility	-0.01 (0.01)	-0.02(0.004)***	0.00 (0.01)	-0.016 (0.016)	0.01 (0.002)***
Observations	1445	521	894	516	378
N	53	18	34	20	14
R^2	0.56	0.60	0.57	0.58	0.55

Notes: The dependent vairable is $\Delta ln\, c_{it} - \Delta ln\, C_t^W$. ***, **, * denote the level of statistical significance at 1, 5, and 10 percent. Clustered standard errors are in parentheses. Each regression includes a constant. Valuation-effect volatility is defined as the rolling standard deviation over 10-year windows. Columns 5 and 7 include emerging and developing economies only. Columns 7 and 8 restrict the sample to high income countries. Sample period: 1980-2010.

In the following I test whether the lack of association between the degree of risk sharing and valuation-effect fluctuations in EMEs can be explained by the observation that valuation effects in some of these countries do not possess the necessary properties in the sense of risk sharing. Specifically, recall that I argue at the beginning of this section that for valuation effects to reflect flow payments related to risk sharing, they should be negatively correlated with domestic consumption growth in EMEs. I therefore split the sample of EMEs based on the sign of $\rho(VAL, \Delta c)$. I then separately re-estimate Eq. 11 for the countries for which the correlation is positive (PC) (21 countries) and negative (NC) (14 countries). Panel B Columns 4 and 5 report the results. For the set of NC-economies, the estimation result changes significantly. The point estimate of the interaction term is now negative and statistically significant at the 5 percent level (Column 5). This suggests that for the NC-group an increase in valuation-effect fluctuations is associated with better risk sharing. However, the degree of risk sharing for this group remains limited. The average during the sample period is 0.07 and, based on the magnitude of the coefficient on the interaction term, improves by 0.02 for every percentage point increase in the rolling standard deviation of valuation effects. The estimation result in Column 4 thus seems to corroborate the earlier formulated hypothesis that valuation effects need to be negatively correlated with consumption growth in EMEs in order to facilitate external adjustment. For the sample of PC-economies on the other hand, the coefficient attached to the interaction term is significantly positive, meaning that an increase in the size of the valuation channel is associated with worse risk sharing outcomes. The latter is akin to saying that financial globalization worsens risk sharing, since the magnitude of the valuation channel is proportional to gross asset and liability positions (the common *de facto* measure for financial globalization).

A concern related to the above estimates is that outliers might drive the results for the NC-group. This could be the case for Singapore which is not representative of the average NC- country characteristics since it is a financial hub and one of the only countries displaying a strong and statistically significant correlation between valuation adjustments and consumption growth. I therefore re-estimate Eq. 11 for the set of NC countries, but with Singapore excluded. Panel C, Column 4 reports the result. The coefficient on the interaction term is still negative, but drops by about one quarter in absolute value and fails to achieve statistical significance at conventional levels. This result is thus more in line with those of the direct approach in the sense that there is, at best, weak evidence that valuation effects satisfying the risk sharing properties. Therefore, Singapore as an outlier was indeed driving the previous result for the NC-group.

3.4 Evolution of the degree of risk sharing

In light of last the section's findings, it is interesting to explicitly estimate the evolution of the degree of risk sharing for the sets of high income, NC, and PC-countries. The model in Eq. 11 allows the extent of risk sharing to vary only through the size of the valuation channel. I follow Kose et al. (2009) and

estimate Eq. 10 over 10-year rolling panels over the period 1971-2010.[10]

Figure 3 plots the evolution of (1-β) of the panel-estimates over the period 1980-2010. The graphs show that risk sharing has declined for all three country groups up until 1990. Since then the extent of risk sharing has greatly improved in high income countries (from 0.2 to about 0.6), which is not surprising given the results of the previous section. The NC-group has also experienced an increase in the degree of risk sharing after the turning point of 1990. However, this improvement is small in comparison to the high-income group. Also, the extent of risk sharing in 2010 is no better than it was in the 1980s. Nonetheless, this finding provides some evidence that risk sharing has improved during the era of financial globalization for some EMEs; the finding is consistent with the earlier results that there is some weak evidence of a functioning valuation channel in NC-economies. For the set of PC-economies the situation is the opposite. The extent of risk sharing has further deteriorated after 1990 and is only slightly above 0.1 in 2010.

However, one issue with the approach used in this section is that changes in the variance of ($\Delta ln\, y_{it} - \Delta ln\, Y_t^W$) over time might dilute the estimates of β (Kose et al., 2009; Flood et al., 2012).[11] Indeed, in all three country groups, fluctuations in the country-specific output component have been on a steady decline since the 1980s (graph not shown). This development biases the estimates of β upward, which puts the results for the PC-group into perspective, but strengthens further the finding that risk sharing improved in high income and NC-economies.

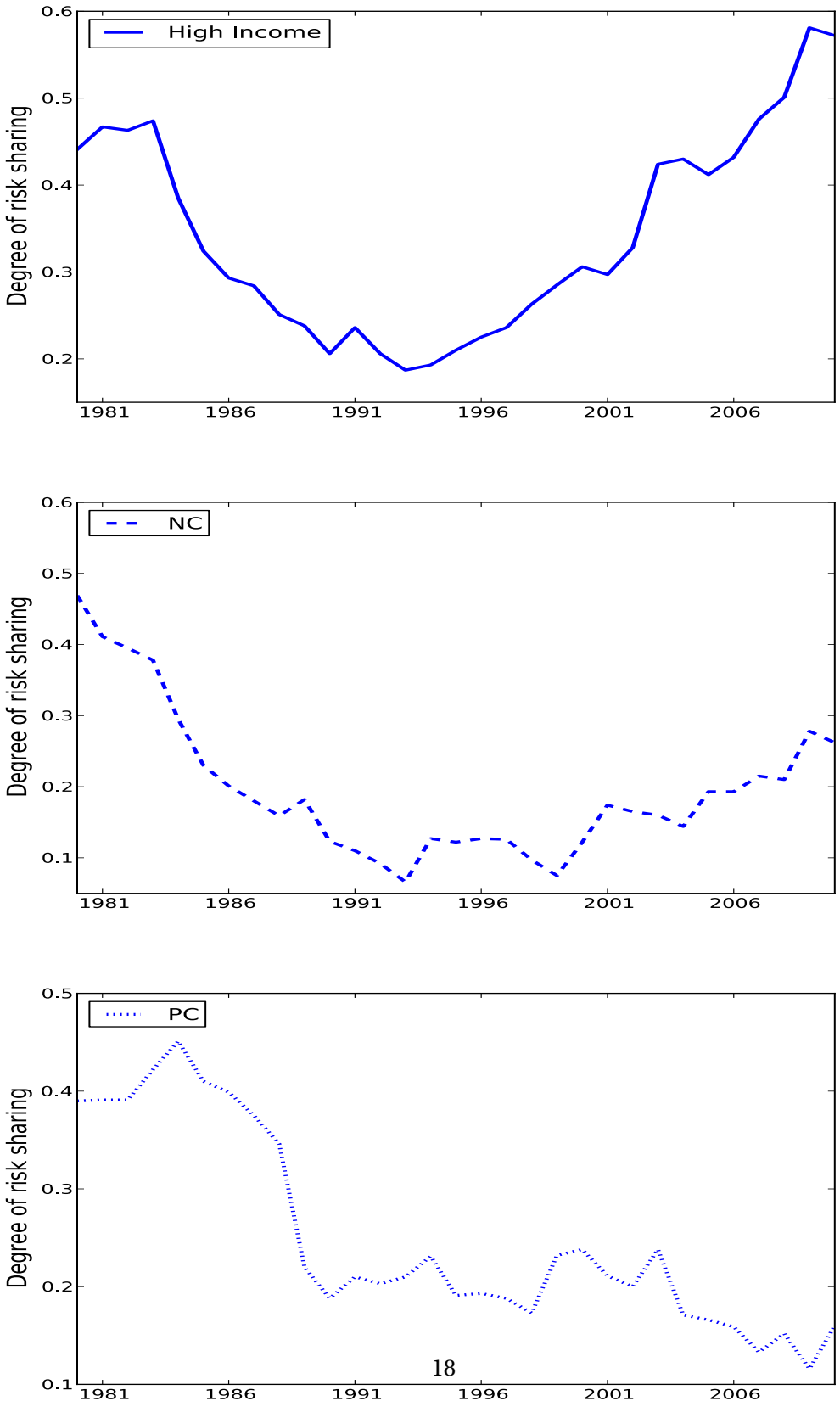
4 Valuation effects and consumption smoothing

The results of the previous section suggest that an increase in the magnitude of the valuation channel is associated with worse risk sharing in those EMEs where the covariance between consumption growth and valuation effects is positive. Throughout this section I operate under the simplifying assumption that improved risk sharing leads to consumption smoothing. This implies that the valuation channel may inflict welfare costs through volatility in consumption for risk-averse agents in PC-countries. Whether valuation effects are destabilizing in NC-economies is *a priori* ambiguous. On the one hand, the previous section's analysis generated some weak evidence in favor of the view that the valuation channel operates in those countries. On the other, based on the latter evidence alone, we cannot rule out the possibility that valuation effects are destabilizing even in NC-countries. The purpose of this section is to probe the above empirically. For completeness, I also include high income countries in this section's analysis.

[10] Another approach would be to estimate Eq. 10 year-by-year and then smooth out the βs by computing rolling means over 10-year windows. The results of this approach are similar to those obtained by using rolling panels. The latter method is, however, the preferable one since the cross-sections of the various country groups are small in this study.

[11] This follows from: $\beta = \frac{\text{cov}(\Delta ln\, c_{it} - \Delta ln\, c_t^W,\, \Delta ln\, y_{it} - \Delta ln\, y_t^W)}{\text{var}(\Delta ln\, y_{it} - \Delta ln\, y_t^W)}$.

Figure 3: Evolution of the degree of risk sharing, 1980-2010.



4.1 Model

I adopt the following specification to test whether valuation effects are destabilizing for the set of PC-countries:

$$LVOLC_{it} = \beta_1 LVOLVAL_{it} + \beta_2 LVOLG_{it} + \gamma X_{it} + \alpha_i + \theta_t + \lambda_i t + u^{\dagger}_{it}, \tag{12}$$

where the dependent variable $LVOLC$ is a measure of consumption volatility, $LOVOLVAL$ is the magnitude of the valuation channel, $LVOLG$ is fluctuations in the growth rate of real GDP, and X_{it} contains a set of other control variables, including a constant. My model also includes fixed effects (α_i), country-specific linear time trends ($\lambda_i t$), and year dummies to capture common shocks (θ_t). Finally, $u^{\dagger}_{it}$ is the idiosyncratic error term that is assumed to be indepdendent across countries.

Under the simplifying assumption that improved risk sharing leads to consumption smoothing, the above model can also be used to indirectly test for the functioning of the valuation channel. The latter would be the case if an increase in the size of the valuation channel is associated with more stable consumption paths, that is, β_1 turning out to be negative and significant. A positively and significantly estimated coefficient attached to $LVOLVAL$ would, on the other hand, suggest that valuation effects are destabilizing.

To ensure the validity of these interpretations, the model needs to control for any effect of valuation effects on consumption volatility that occur through risk sharing. In particular, this is the case for the size of shocks. To see why, for simplicity assume that we live in a world of market completeness, optimally-chosen country portfolios and therefore perfect risk sharing across countries. If, for instance, the home economy is subjected to larger shocks than before, individual-country consumption necessarily becomes more volatile, even if risk sharing is complete. As a result, larger wealth transfers through the valuation channel are required to bring about external adjustment which in turn ensures that consumption growth rates remain equalized across countries. The described mechanism is at work, even if international consumption risk sharing is far from complete, and it becomes more relevant as the degree of risk sharing improves. Therefore, to properly channel out the impact of valuation effects on consumption volatility, I include the volatility of real GDP growth in the model to control for the size of shocks.

Nonetheless, there is one important caveat inherent in the above specification. The assumption that improved risk sharing implies consumption smoothing may not always hold in practice. For example, a country with a low volatility in its endowment stream may start sharing risk with another country that is subject to higher endowment volatility. In this case, the relationship between valuation-effect and consumption volatility would be positive, but it would be wrong to conclude that the valuation channel is destabilizing. In practice, however, this scenario is unlikely to be relevant for EMEs. First, there is little evidence of improved risk sharing outcomes for the emerging country group. Second, even if there was, the average emerging country would share its income risk with high income countries, which, as empirical regularity tells us, are less subject to macroeconomic instability. For high income countries, the stated concern may well be valid. Therefore, β_1 is perhaps best interpreted as

the upper bound estimate of the impact of valuation effect volatility on consumption uncertainty.

As for the other control variables, the volatility of inflation is used to capture the uncertainty that consumers face with respect to their future real income. Moreover, the model adds nominal exchange rate volatility as a control variable. Higher nominal exchange rate volatility inherently magnifies the valuation channel. However, fluctuations in the nominal exchange rate may independently affect consumption patterns, for example through facilitating the adjustment process following external shock (Edwards and Levy Yeyati, 2005). Finally, I control for trade openness, which is motivated by the finding of di Giovanni and Levchenko (2009) that the removal of trade restrictions has a positive and economically significant impact on aggregate volatility. I proxy trade openness, (as is standard in the empirical literature), through the ratio of total exports plus imports to GDP, under the assumption that removing trade restrictions leads to higher trade volumes, all else equal. Table A.1 in the Appendix summarizes the details on data sources and definitions.

4.2 Method

As a first step, I examine the time series properties of the variables. If the individual time series are cross-sectionally dependent, first generation panel unit root tests such as Maddala and Wu (1999) or Im et al. (2003) can lead to invalid inferences. Performing the cross-section dependence (CD) test of Pesaran (2004) reveals that the null hypothesis of cross-section independence is rejected at the 1 percent level (results not reported). Pesaran (2007) shows that an augmentation of standard individual-specific ADF regressions with cross-section averages of lagged levels and first differences of the data series under consideration can deal with this problem. This procedure results in cross-sectionally augmented ADF statistics (CADF) for each panel individual. Averaging of the group-specific CADF-statistics allows a modified version of the t-bar statistic in Im et al. (2003) to be constructed. Pesaran (2007) tabulates asymptotic critical values under the unit root null. Importantly, the CADF test has satisfactory small sample properties, even for T as small as 10 (Pesaran, 2007). Table 3 reports the test results for different lag lengths.[12] The null of nonstationarity cannot be rejected for each of the variables.

The next steps involve estimating the long-run relationship between the variables and testing for cointegration. The method adopted in this section is the panel dynamic OLS (DOLS) estimator developed by Mark and Sul (2003). The DOLS method adds leads and lags of first differenced independent variables to the OLS regression. Asymptotically, the DOLS estimates are robust to measurement error and simultaneity and omitted variable bias (Phillips and Durlauf, 1986). In addition, DOLS outperforms other panel cointegration estimators such as fully modified OLS (FMOLS) (Kao and Chiang, 2000; Wagner and Hlouskova, 2009).

The DOLS specification of the model with m leads and lags of first differenced regressors takes the following form:

[12] All CADF regressions include heterogeneous time trends.

Table 3: Unit root tests: Pesaran (2007).

Panel A: Variables in levels						
lags	LVOLC	LVOLVAL	LVOLG	LVOLINFL	LVOLXR	OPEN
0	1.6	1.9	4.0	6.1	3.7	2.2
1	-0.3	0.3	1.6	3.5	-0.9	2.4
2	-0.2	2.3	4.1	5.1	0.4	3.4
3	-1.1	4.4	3.5	4.6	-2.4***	4.6

Panel B: Variables in first differences						
lags	LVOLC	LVOLVAL	LVOLG	LVOLINFL	LVOLXR	OPEN
0	-26.7***	-17.8***	-17.0***	-12.2***	-7.3***	-19.5***
1	-16.1***	-10.5***	-8.7***	-6.3***	-4.4***	-10.5***
2	-7.5***	-4.5***	-3.2***	-1.9**	-0.7	-3.8***

Notes: This table reports the Zt-bar statistic under the null hypothesis that all series are nonstationary. ***, **, * denote the level of statistical significance at 1, 5, and 10 percent. All ADF regressions for variables in levels include a constant and a trend. ADF regressions for variales in first differences include a constant.

$$LVOLC_{it} = \alpha_i + \theta_t + \lambda_i\, t + \beta'\, x_{it} + u^{\dagger}_{it},$$
$$u^{\dagger}_{it} = \sum_{-m}^{m} \delta'_i \Delta x_{i,t+m} + u_{it}, \tag{13}$$

where x_{it} includes the control variables and $[1, -\beta']$ is the cointegrating vector between $LVOLC$ and the independent variables.[13] In Mark and Sul's (2003) version of panel DOLS, the cointegrating vector is homogenous across individuals, while country fixed effects (α_i), group-specific linear time trends ($\lambda_i\, t$), and individual-specific short-run dynamics ($\delta'_i\, \Delta x_{i,t+m}$) account for group-specific heterogeneity.[14] Common time fixed effects (θ_t) allow for some degree of cross-section dependence, but $u^{\dagger}_{it}$ is assumed to be independent across countries. To ensure that this assumption holds, I resort to Pesaran's (2004) CD test. The idiosyncratic error term is denoted by u_{it}.

Finally, cointegration requires that the residuals are stationary. To examine this property, I employ the Ztbar (IPS) test of Im et al. (2003).

[13] All my empirical results use m=1 as suggested by Mark and Sul (2003).

[14] Heterogeneous deterministic trends may also capture the effect of determinants of macroeconomic volatility for which reliable data are not available, especially at annual frequencies (e.g. institutional quality).

4.3 Results

I first estimate the model as specified in Eq. 12 for the sample of EMEs. Table 4, Column 1 presents the estimation result.[15,16] The coefficient attached to valuation-effect volatility is positive and statistically significant at the 1 percent level. The magnitude of the coefficient (0.06) suggests that a doubling of the size of the valuation channel increases volatility in consumption paths by about 6 percent. This result thus seems to confirm the concern that valuation effects inflict welfare costs in EMEs.

[15] All specifications include time fixed effects initially but they turned out to be statistically insignificant. The final model thus contains fixed effects and country-specific time trends. Including the latter reduces the information criteria significantly.

[16] For all specifications, diagnostic testing on the residuals using Pesaran's (2004) CD test suggests that the hypothesis of cross-section independence in the residuals cannot be rejected at the 10 percent level (results not reported). Furthermore, the null of no cointegration can be rejected at the 1 percent level based on the IPS test. In the following, no further reference to this will be made unless the null of no cointegration cannot be rejected.

Table 4: Valuation effects and consumption smoothing.

Independent variable	(1)	(2)	(3)	(4)	(5)
	Emerging	Emerging	Emerging, $\rho(VAL, \Delta c_{it}) < 0$	Emerging, $\rho(VAL, \Delta c_{it}) > 0$	High Income
Valuation Effect-Volatility	0.06 (0.02)**	0.09 (0.04)***	0.01 (0.04)	0.12 (0.05)***	0.06 (0.06)
Real GDP Growth-Volatility	0.93 (0.03)***	0.94 (0.03)***	0.93 (0.05)***	0.86 (0.05)***	0.78 (0.07)***
Inflation Volatility	0.12 (0.01)***	0.12 (0.02)***	0.14 (0.02)***		0.11 (0.05)***
Nominal Exchange Rate-Volatility	-0.06 (0.01)***	-0.06 (0.01)***	-0.07 (0.02)***	-0.03 (0.02)**	-0.10 (0.04)***
Trade Openness	0.35 (0.07)***	0.36 (0.07)***		0.63 (0.11)***	
$\rho(VAL, \Delta c_{it}) < 0$ ×Valuation-Effect Volatility		-0.09 (0.05)*			
Observations	735	735	438	322	429
N	34	34	20	14	18
IPS (p-value)	0.00	0.00	0.04	0.00	0.00

Notes: The dependent variable is consumption growth volatility. ***, **, * denote the level of statistical significance at 1, 5, and 10 percent. Standard errors are in parentheses. IPS refers to the Im et al. (2003) unit root test performed on the residuals under the unit root null. Singapore is excluded from the sample of EMEs.

It is sensible to believe, however, that the EMEs are not a homogenous group in terms of how valuation effects affect consumption uncertainty. In particular, we would expect valuation effects to be considerably more destabilizing in PC-countries than in NC-economies because they are pro-cyclical in the former and countercyclical in the latter. To incorporate these possible differences in the model, in the following I include as an additional regressor a dummy variable for NC-countries, which is interacted with valuation effect fluctuations. Column 2 reports the result for this new specification. This result suggests that the impact of valuation effects on consumption uncertainty is indeed heterogenous across EMEs. The magnitude of the estimated coefficient attached to the size of the valuation channel is 0.09 and significant at the 1 percent level; this suggests that a twofold increase in valuation effect fluctuations magnifies consumption volatility by about 9 percent in PC-countries. Conversely, valuation effects do not seem to have a material effect on consumption volatility in NC-countries: the point estimate of the interaction term is -0.09 and significant at the 10 percent level. For comparison, I estimate the baseline model (Eq. 12) separately for the NC and PC groups. The estimation result changes very little compared to the previous one in the sense that valuation effects seem to be destabilizing only in PC but not NC economies (Columns 3 and 4).[17]

Finally, it is worthwhile investigating how an increase in the size of the valuation channel affects consumption volatility in high income countries. I thus re-estimate the baseline model, restricting the sample to high income countries. Column 5 shows the result. The point estimate of valuation effect fluctuations is positive but statistically indistinguishable from zero. Does this result contradict the finding of the last section that an increase in the magnitude of the valuation channel is associated with better risk sharing? The answer is no. While we would have expected valuation effect volatility to be negatively associated with consumption fluctuations, as mentioned at the beginning of this section, this needs not necessarily be the case, e.g. when the average high income country enters risk sharing arrangements with countries that are subjected to larger shocks than itself. For this reason, the framework used in Section 3.1 to test for the functioning of the valuation channel is preferable to the one of this section, as the latter cannot incorporate the scenario just described.

In the following I probe the sensitivity of the above results to defining volatility as the rolling standard deviation over 10-year windows. To this end I use 5- and 7-year windows for calculating rolling standard deviations. I first re-do the analysis for the sample of EMEs using 7-year windows and the specification that includes the interaction term for NC-economies (cf. Table 4, Column 2). The rolling standard deviations are calculated over 7-year windows. Table 5, Column 1 reports the result. The point estimate of valuation effect volatility is significant at the 1 percent level and suggests that a twofold increase in the size of valuation effects amplifies consumption growth volatility by about 13 percent, which is very similar to the previously estimated 9 percent. Another slight difference is that for NC-economies an increase in the magnitude of the valuation channel seems to be associated with more stable consumption paths. But based on the magnitude of the coefficient attached to the interaction

[17] I only report the most parsimonious specification, meaning that if a regressor other than valuation effect-volatility turns out to be statistically insignificant, it is dropped.

Table 5: Robustness: Alternative window lengths.

Independent variable	(1)	(2)	(3)	(4)
	Emerging	High Income	Emerging	High Income
Valuation Effect-Volatility	0.13 (0.03)***	-0.13 (0.05)***	0.13 (0.06)**	-0.10 (0.05)**
Real GDP Growth-Volatility	0.64 (0.05)***	0.72 (0.03)***	0.56 (0.06)***	0.54 (0.06)***
Inflation Volatility	0.06 (0.02)***		0.09 (0.03)***	
Nominal Exchange Rate-Volatility		-0.06 (0.01)***		0.10 (0.05)**
Trade Openness	0.39 (0.17)**	-0.99 (0.33)***	0.73 (0.22)***	-1.38 (0.33)***
$\rho(VAL, \Delta c_{it}) < 0$ ×Valuation-Effect Volatility	-0.18 (0.06)***		-0.10 (0.08)	
Observations	840	464	914	507
N	34	18	34	18
IPS (p-value)	0.07	0.04	0.03	0.00

Notes: The dependent variable is consumption growth volatility. ***, **, * denote the level of statistical significance at 1, 5, and 10 percent. Standard errors are in parentheses. IPS refers to the Im et al. (2003) unit root test performed on the residuals under the unit root null. In Columns 1 and 2 (3 and 4), volatility is defined as the rolling standard deviation over 7- (5-) year windows. Singapore is excluded from the sample of EMEs.

term (-0.18, significant at the 1 percent level), this effect is rather small: consumption volatility decreases by 5 percent as fluctuations in valuation effects double. This result can again be seen as weak evidence of a functioning valuation channel in NC-countries. However, the latter finding does not carry over to using 5-year windows for calculating the rolling standard deviations (Table 5, Column 3). The coefficient on the interaction term is smaller in magnitude than the one attached to valuation effect volatility. This corroborates the previous findings in this paper that the evidence regarding the operation of the valuation channel in NC-economies is at best weak. As for the PC-group, Column 3 adds further support to the notion that valuation effects are destabilizing in these countries. The estimated valuation effect-volatility elasticity is again 0.13 and significant at the 1 percent level.

Another interesting difference compared to the main results is that a larger valuation channel is related to more stable consumption paths in high income countries (Columns 2 and 4). Regardless of window length, the coefficient on valuation effect-volatility is estimated negatively and significant at least at the 5 percent level. These results thus further strengthen the earlier finding that the valuation channel operates effectively in high income countries.

In summary, the estimated valuation-effect volatility elasticity of consumption variability across the various specifications is about 0.10. The average PC-country has experienced a threefold increase in the size of the valuation channel over the last three decades.[18] My results thus suggest that greater valuation effects have, on average, led to a significant increase in consumption volatility in PC-economies of about 20 percent.

[18] In this regard there is not much difference between PC and NC-economies. Therefore, see Table 1 for the evolution of valuation-effect volatility. Notice, however, that many countries such as Indonesia, Malaysia, and Thailand have experienced a quadrupling in the size of valuation adjustments since the early 1980s.

5 Conclusion

This study has empirically examined the link between the observed increase in the size of "valuation effects" and risk sharing. Recent models of portfolio choice suggest that valuation effects are an important channel of the international risk sharing mechanism in that they help bring about external adjustment (Devereux and Sutherland, 2010). The indirect approach to test this is by examining whether an increase in the size of the valuation channel is associated with improved risk sharing. My econometric results suggest that this relationship indeed holds for high income countries. For emerging and developing countries the results are mixed. Theory implies that the relationship between valuation adjustments and risk sharing for these countries depends on the sign of the correlation between domestic consumption growth and valuation effects. For the set of EMEs where this correlation is negative, I find some, albeit weak, evidence that risk sharing improves as the scope of the valuation channels increases. However, the opposite seems to be the case in economies for which consumption growth and valuation effects co-vary positively: the greater the size of valuation adjustments, the worse the extent of risk sharing becomes. Consequently, the degree of risk sharing in those countries has deteriorated sharply over the last two decades.

Motivated by these findings, this paper has also estimated the extent to which the valuation channel amplifies consumption volatility in EMEs, where valuation effects are pro-cyclical with respect to domestic consumption growth (PC-economies). The econometric results suggest that the observed tripling of the size of the valuation channel for the average PC-country has, on average, led to an increase in consumption volatility of about 20 percent in these economies. Future work could address the question whether the factors driving the differences between NC and PC countries are related to the composition of these countries' international portfolios (original sin for example), or structural.

Appendix

Table A.1: Data Appendix Table — Data sources and definitions.

Variable	Description	Source
Consumption Growth Volatility	Ten-year rolling standard deviation of the growth rate of real private consumption per capita. Calculated as the product of PPP converted GDP per capita consumption share times real PPP converted GDP per capita.	PWT 7.1
Valuation-Effect Volatility	Ten-year rolling standard deviation of valuation terms scaled by GDP. Valuation effects are calculated indirectly using Eq. 4.	Lane and Milesi-Ferretti (2007) and IMF BOP Statistics
GDP per capita growth volatility	Ten-year rolling standard deviation of real PPP converted GDP per capita.	PWT 7.1
Inflation Volatility	Ten-year rolling standard deviation of the inflation rate measured as the annual percentage growth rate of the ratio of GDP in local current currency.	WDI
Nominal Exchange Rate Volatility	Ten-year rolling standard deviation of the nominal exchange rate (domestic currency per US dollar).	PWT 7.1
Trade Openness	Constructed as the ratio of the sum of the total value of exports (X) plus the total value of imports (M) relative to GDP (at constant prices).	PWT 7.1

References

Bai, Y. and J. Zhang (2012). Financial integration and international risk sharing. *Journal of International Economics 86*(1), 17–32.

Balli, F., S. Kalemli-Ozcan, and B. E. Sørensen (2012). Risk sharing through capital gains. *Canadian Journal of Economics 45*(2), 472–492.

Baxter, M. (2012). International risk-sharing in the short run and in the long run. *Canadian Journal of Economics 45*(2), 376–393.

Blanchard, O., F. Giavazzi, and F. Sa (2005). International investors, the U.S. current account, and the dollar. *Brookings Papers on Economic Activity 36*(1), 1–66.

Bracke, T. and M. Schmitz (2011). Channels of international risk-sharing: capital gains versus income flows. *International Economics and Economic Policy 8*(1), 45–78.

Devereux, M. B. and A. Sutherland (2010). Valuation effects and the dynamics of net external assets. *Journal of International Economics 80*(1), 129–143.

di Giovanni, J. and A. A. Levchenko (2009). Trade openness and volatility. *The Review of Economics and Statistics 91*(3), 558–585.

Edwards, S. and E. Levy Yeyati (2005). Flexible exchange rates as shock absorbers. *European Economic Review 49*(8), 2079–2105.

Eichengreen, B. and R. Hausmann (1999). Exchange rates and financial fragility. NBER Working Papers 7418, National Bureau of Economic Research, Inc.

Eichengreen, B., R. Hausmann, and U. Panizza (2003). Currency mismatches, debt intolerance and original sin: Why they are not the same and why it matters. Working Paper 10036, National Bureau of Economic Research.

Flood, R. P., N. P. Marion, and A. Matsumoto (2012). International risk sharing during the globalization era. *Canadian Journal of Economics 45*(2), 394–416.

Forbes, K. J. (2010). Why do foreigners invest in the United States? *Journal of International Economics 80*(1), 3–21.

Gourinchas, P.-O. (2008). Valuation effects and external adjustment: A review. In K. Cowan, S. Edwards, R. O. Valdés, N. L. S. Editor), and K. Schmid (Eds.), *Current Account and External Financing*, Volume 12 of *Central Banking, Analysis, and Economic Policies Book Series*, Chapter 6, pp. 195–236. Central Bank of Chile.

Gourinchas, P.-O. and H. Rey (2007). International financial adjustment. *Journal of Political Economy 115*(4), 665–703.

Gourinchas, P.-O., H. Rey, and N. Govillot (2010). Exorbitant privilege and exorbitant duty. IMES Discussion Paper Series 10-E-20, Institute for Monetary and Economic Studies, Bank of Japan.

Im, K. S., M. H. Pesaran, and Y. Shin (2003). Testing for unit roots in heterogeneous panels. *Journal of Econometrics 115*(1), 53–74.

Kao, C. and M.-H. Chiang (2000). On the estimation and inference of a cointegrated regression in panel data. *Advances of Econometrics: Nonstationary Panels, Panel Cointegration and Dynamic Panels, 15*, 179–222.

Kose, M. A., E. S. Prasad, and M. E. Terrones (2009). Does financial globalization promote risk sharing? *Journal of Development Economics 89*(2), 258–270.

Lane, P. R. and G. M. Milesi-Ferretti (2007). The external wealth of nations mark II: Revised and extended estimates of foreign assets and liabilities, 1970-2004. *Journal of International Economics 73*(2), 223–250.

Lane, P. R. and J. C. Shambaugh (2010). Financial exchange rates and international currency exposures. *American Economic Review 100*(1), 518–40.

Lewis, K. K. (1996). What can explain the apparent lack of international consumption risk sharing? *Journal of Political Economy 104*(2), 267–97.

Maddala, G. S. and S. Wu (1999). A comparative study of unit root tests with panel data and a new simple test. *Oxford Bulletin of Economics and Statistics 61*(S1), 631–652.

Mark, N. C. and D. Sul (2003). Cointegration vector estimation by panel DOLS and long-run money demand. *Oxford Bulletin of Economics and Statistics 65*(5), 655–680.

Obstfeld, M. (1994). Are industrial-country consumption risks globally diversified? NBER Working Papers 4308, National Bureau of Economic Research, Inc.

Obstfeld, M. (2004). External adjustment. *Review of World Economics (Weltwirtschaftliches Archiv) 140*(4), 541–568.

Pesaran, M. H. (2004). General diagnostic tests for cross section dependence in panels. CESifo Working Paper Series 1229, CESifo Group Munich.

Pesaran, M. H. (2007). A simple panel unit root test in the presence of cross-section dependence. *Journal of Applied Econometrics 22*(2), 265–312.

Phillips, P. C. B. and S. N. Durlauf (1986). Multiple time series regression with integrated processes. *The Review of Economic Studies 53*(4), pp. 473–495.

Sørensen, B. E., Y.-T. Wu, O. Yosha, and Y. Zhu (2007). Home bias and international risk sharing: Twin puzzles separated at birth. *Journal of International Money and Finance 26*(4), 587 – 605.

Tille, C. (2003). The impact of exchange rate movements on U.S. foreign debt. *Current Issues in Economics and Finance 9*(1), 1–7.

Wagner, M. and J. Hlouskova (2009). The performance of panel cointegration methods: Results from a large scale simulation study. *Econometric Reviews 29*(2), 182–223.

Working Papers in Trade and Development
List of Papers (as at 2015)

12/01 BUDY P RESOSUDARMO, ANI A NAWIR, IDA AJU P RESOSUDARMO and NINA L SUBIMAN, 'Forest Land use Dynamics in Indonesia'

12/02 SHUHEI NISHITATENO, 'Global Production Sharing in the Japanese Automobile Industry: A Comparative Analysis'

12/03 HAL HILL, 'The Best of Times and the Worst of Times: Indonesia and Economic Crises'

12/04 PREMA-CHANDRA ATHUKORALA, 'Disaster, Generosity and Recovery: Indian Ocean Tsunami'

12/05 KYM ANDERSON, 'Agricultural Trade Distortions During the Global Financial Crisis'

12/06 KYM ANDERSON and MARKUS BRUCKNER, 'Distortions to Agriculture and Economic Growth in Sub-Saharan Africa'

12/07 ROBERT SPARROW, ELLEN VAN DE POEL, GRACIA HANDIWIDJAJA, ATHIA YUMNA, NILA WARDA and ASEP SURYAHADI, 'Financial Consequences of Ill Health and Informal Coping Mechanisms in Indonesia'

12/08 KYM ANDERSON, 'Costing Global Trade Barriers, 1900 to 2050'

12/09 KYM ANDERSON, WILL MARTIN and DOMINIQUE VAN DER MENSBRUGGHE, 'Estimating Effects of Price-distorting Policies Using Alternative Distortions Databases'

12/10 W. MAX CORDEN, 'The Dutch Disease in Australia: Policy Options for a Three-Speed Economy' (revised version of Trade & Development Working Paper 2011/14)

12/11 KYM ANDERSON, 'Policy Responses to Changing Perceptions of the Role of Agriculture in Development'

12/12 PREMA-CHANDRA ATHUKORALA and SHAHBAZ NASIR, 'Global Production Sharing and South-South Trade'

12/13 SHUHEI NISHITATENO, 'Global Production Sharing and the FDI–Trade Nexus: New Evidence from the Japanese Automobile Industry'

12/14 PREMA-CHANDRA ATHUKORALA, 'Sri Lanka's Trade Policy: Reverting to Dirigisme?'

12/15 PREMA-CHANDRA ATHUKORALA and SISIRA JAYASURIYA, 'Economic Policy Shifts in Sri Lanka: The Post-conflict Development Challenge'

12/16 PREMA-CHANDRA ATHUKORALA and JUTHATHIP JONGWANICH, 'How Effective are Capital Controls? Evidence from Malaysia'

12/17 HAL HILL and JAYANT MENON, 'Financial Safety Nets in Asia: Genesis, Evolution, Adequacy, and Way Forward'

12/18 KYM ANDERSON, GORDON RAUSSER and JOHAN SWINNEN, 'Political Economy of Public Policies: Insights from Distortions to Agricultural and Food Markets'

13/01 KYM ANDERSON, 'Agricultural Price Distortions: Trends and Volatility, Past and Prospective'

13/02 PREMA-CHANDRA ATHUKORALA and SWARNIM WAGLÉ, 'Export Performance in Transition: The Case of Georgia'

13/03 JAYANT MENON and THIAM HEE NG, 'Are Government-Linked Corporations Crowding out Private Investment in Malaysia?'

13/04 RAGHBENDRA JHA, HARI K. NAGARAJAN & KOLUMUM R. NAGARAJAN, 'Fiscal Federalism and Competitive Bidding for Foreign Investment as a Multistage Game'

13/05 PREMA-CHANDRA ATHUKORALA, 'Intra-Regional FDI and Economic Integration in South Asia: Trends, Patterns and Prospects'.

13/06 JAYANT MENON, 'Can FTAs Support the Growth or Spread of International Production Networks in Asia?'

13/07 PETER WARR and ARIEF ANSHORY YUSUF, 'World Food Prices and Poverty in Indonesia'.

13/08 PETER WARR & ARIEF ANSHORY YUSUF, 'Fertilizer Subsidies and Food Self-Sufficiency in Indonesia'.

13/09 MIA AMALIA, BUDY P. RESOSUDARMO, & JEFF BENNETT, 'The Consequences of Urban Air Pollution for Child Health: What does self reporting data in the Jakarta metropolitan area reveal?'

13/10 PREMA-CHANDRA ATHUKORALA, 'Global Production Sharing and Trade Patterns in East Asia'.

13/11 KYM ANDERSON, MAROS IVANIC & WILL MARTIN, 'Food Price Spikes, Price Insulation, and Poverty'.

13/12 MARCEL SCHRÖDER, 'Should Developing Countries Undervalue Their Currencies?'.

13/13 PREMA-CHANDRA ATHUKORALA, 'How India Fits into Global Production Sharing: Experience, Prospects and Policy Options'.

13/14 PETER WARR, JAYANT MENON and SITTHIROTH RASPHONE, 'Public Services and the poor in Laos'.

13/15 SAMBIT BHATTACHARYYA and BUDY R. RESOSUDARMO, 'Growth, Growth Accelerations and the Poor: Lessons from Indonesia'

13/16 PREMA-CHANDRA ATHUKORALA and ARCHANUN KOPHAIBOON, 'Trade and Investment Patterns in Asia: Implications for Multilateralizing Regionalism'

13/17 KYM ANDERSON and ANNA STRUTT, 'Emerging Economies, Productivity Growth, and Trade with Resource-Rich Economies by 2030'

13/18 PREMA-CHANDRA ATHUKORALA and ARCHANUN KOHPAIBOON, 'Global Production Sharing, Trade Patterns and Industrialization in Southeast Asia'

13/19 HAL HILL, 'Is There a Southeast Asian Development Model?'

14/01 RAMESH CHANDRA PAUDEL, 'Economic Growth in Developing Countries: Is Landlockedness Destiny?

14/02 ROSS McLEOD, 'The ill-fated currency board proposal for Indonesia'

14/03 ALIN HALIMATUSSADIAH, BUDY P. RESOSUDARMO AND DIAH WIDYAWATI, 'Social Capital to Induce a Contribution to Environmental Collective Action in Indonesia: An Experimental Method'

14/04 SHUHEI NISHITATENO and PAUL J. BURKE, 'The motorcycle Kuznets curve'

14/05 PREMA-CHANDRA ATHUKORALA, 'Sri Lanka's Post-conflict Development Challenge: Learning from the Past'

14/06 PREMA-CHANDRA ATHUKORALA, 'Industrialisation through State-MNC Partnership: Lessons from the Malaysia's National Car Project'

14/07 DELWAR HOSSAIN, 'Differential Impacts of Foreign Capital and Remittance Inflows on Domestic Savings in the Developing Countries: A Dynamic Heterogeneous Panel Analysis'

14/08 NOBUAKI YAMASHITA, TOSHIYUKI MATSUURA *and* KENTARO NAKAJIMA, 'Agglomeration effects of inter-firm backward and forward linkages: evidence from Japanese manufacturing investment in China'

14/09 SHUHEI NISHITATENO, 'Network Effects on Trade in Intermediate Goods: Evidence from the Automobile Industry'

14/10 KYM ANDERSON and ANNA STRUTT, 'Implications for Indonesia of Asia's Rise in the Global Economy'

14/11 KYM ANDERSON and ANNA STRUTT, 'Food security policy options for China: Lessons from other countries'

14/12 HAL HILL and JAYANT MENON, 'Cambodia: Rapid Growth in an Open, Post-Conflict Economy'

14/13 ALOYSIUS G. BRATA, PIET RIETVELD, HENRI L.F. DE GROOT, BUDY P. RESOSUDARMO and WOUTER ZANT, 'Living with the Merapi volcano: risks and disaster microinsurance'

14/14 HANS G. JENSEN and KYM ANDERSON, 'Grain price spikes and beggar-thy-neighbor policy responses: A global economywide analysis'

14/15 KYM ANDERSON, 'Contributions of the GATT/WTO to global economic welfare: Empirical evidence'.

14/16 PREMA-CHANDRA ATHUKORALA, 'Global Production Sharing and Asian Trade Patterns: Implications for the Regional Comprehensive Economic Partnership (RCEP)'.

14/17 PREMA-CHANDRA ATHUKORALA and RAVEEN EKANAYAKE, 'Repositioning in the Global Apparel Value Chain in the Post-MFA Era: Strategic Issues and Evidence from Sri Lanka'.

14/18 PAUL J.BURKE and SHUHEI NISHITATENO, 'Gasoline Prices and Road Fatalities: International Evidence'

14/19 PIERRE VAN DER ENG, 'International Food Aid to Indonesia, 1950s-1970s'.

14/20 KIEN TRUNG NGUYEN, 'The impact of trade and investment liberalization on the wage skill premium: evidence from Vietnam'

14/21 DAVID VINES, 'Cooperation between countries to ensure global economic growth: a role for the G20?'

14/22 PREMA-CHANDRA ATHUKORALA and FAHAD KHAN, 'Global Production Sharing and the Measurement of Price Elasticities in International Trade'

14/23 JAYANTHI THENNAKOON and KYM ANDERSON, 'Could the proposed WTO Special Safeguard Mechanism protect farmers from low international prices?'

14/24 DITYA A. NURDIANTO and BUDY P. RESOSUDARMO, 'ASEAN Community and Climate Change'

14/25 FAHAD HASSAN KHAN, ‘From Revenues to Democracy?’

14/26 RAMESH C. PAUDEL, ‘Export Performance in Developing Countries: A comparative perspective’

15/01 HOM M PANT, ‘A generic approach to investment modelling in recursive dynamic CGE models’

15/02 PIYASIRI WICKRAMASEKARA, ‘Mainstreaming migration in development agendas: Assessment of South Asian countries‘

15/03 MARCEL SCHRODER, ‘Valuation effects, risk sharing, and consumption smoothing’