

Not for Publication Appendix to: “What Drives US Foreign Borrowing? Evidence on External Adjustment to Transitory and Permanent Shocks”

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Appendix to: “What Drives US Foreign Borrowing? Evidence on External Adjustment to Transitory and Permanent Shocks”

Abstract

This not for publication appendix accompanying the paper “What Drives US Foreign Borrowing? Evidence on External Adjustment to Transitory and Permanent Shocks” contains three main sections. Section A provides a detailed description of the data used in our paper. Section B details the empirical implications of our assumptions, and the log-linear approximation of the intertemporal budget constraint allowing for deterministic trends in all the variables. Section C presents results from robustness exercises and some extensions of the analysis in the paper.

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A Data Description

This section briefly describes the variables employed in the analysis. For all variables except net foreign liabilities, our source is the FRED II Database of the Federal Reserve Bank of the Saint Louis.

CONSUMPTION C_t

Total Consumption is measured as real personal consumption expenditure (PCECC96). The quarterly series are seasonally adjusted at annual rates, in billions of chain-weighted 2000 dollars. Non-durables and Services Consumption is computed by combining consumption expenditures on non-durables goods and consumption expenditure on services. Real measures are combined using a Fisher chain-aggregation formula that replicates the procedure used by the Bureau of Economic Analysis in producing the original series.

NET OUTPUT Z_t

Nominal Net Output is defined as $Z_t^n \equiv Y_t^n - I_t^n - G_t^n$, whereas Y_t^n is the nominal gross domestic product (GDP) and G_t^n is nominal government consumption expenditures & gross investment (GCEC). When we employ consumption expenditure on nondurable goods and services, the nominal investment series I_t^n is obtained as nominal gross private domestic investment (GPDI) + change in private inventories (CBI) + nominal personal consumption expenditure on durable goods (PCDGC). When employing total consumption expenditure, the nominal investment series I_t^n is obtained as nominal gross private domestic investment (GPDI) + change in private inventories (CBI). The nominal series are expressed in real terms using the appropriate consumption deflator.

POPULATION

Our measure of population obtained by sampling the last month value for each quarter, from the monthly Civilian Noninstitutional Population series [CNP16OV].

PRICE DEFLATOR

When we use total consumption as the appropriate measure of consumption, we deflate nominal variables by using the personal consumption expenditure chain-type deflator (2000=100), seasonally adjusted (PCECTPI), as a proxy of the unobserved price deflator corresponding to our measure of consumption. When we employ consumption on nondurables and services, we use the implicit deflator of consumption on nondurables and services (i.e. the ratio of nominal to the corresponding real series).

A.I Constructing Quarterly Stocks of Gross Positions

In order to build our series of quarterly gross (nominal) foreign assets, we employ annual and quarterly data on flows for four broad asset categories: Equity, FDI, Portfolio Debt and Other Portfolio Investment; and annual data on stocks of assets for each of these categories from Lane and Milesi-Ferretti (2007). The annual and quarterly data on flows are obtained from IMF's International Financial Statistics database. the quarterly flows we employ, available from 1972:Q4 on, are:

- Flow of Equity Assets: Equity Securities, Code: 11178BKDZF.../ Flow of Equity Liabilities: Equity Securities, Code: 11178BMDZF..
- Flow of Debt Assets: Debt Securities, Code: 11178BLDZF.../ Flow of Debt Liabilities: Debt Securities, Code: 11178BNDZF..

- Flow of FDI Assets: Direct Investment Abroad, Code: 11178BDDZF.../ Flow of Debt Liabilities: Debt Securities, Code: 11178BNDZF...
- Flow of Other Portfolio Investment Assets: Other Investment Assets, Code: 11178BHDZF.../ Flow of FDI Liabilities: Dir. invest. in rep. econ., N.I.E., Code: 11178BEDZF...

Quarterly series are obtained as follows. Let S_τ^i denote the stock of assets of type i at the end of the year τ , F_τ^i denote the yearly flow of assets in category i , and DS_τ^i denote the yearly valuation effect. The total valuation effect on a yearly basis (for the year τ) is calculated as: $DS_\tau^i = S_\tau^i - S_{\tau-1}^i - F_\tau^i$. Similarly, let S_t^i denote the value at the end of quarter t of assets of type i , and F_t^i denote the quarterly flow of assets in category i . The quarterly stocks are obtained as:

$$S_{t+1}^i = S_t^i + F_{t+1}^i + (F_{t+1}^i / F_\tau^i) DS_\tau^i.$$

Note that the end of fourth quarter stock S_{t+4}^i equals S_τ^i , so that

$$S_\tau = S_{t+4}^i = (F_{t+4}^i + F_{t+3}^i + F_{t+2}^i + F_{t+1}^i) + S_t^i + \left(\frac{F_{t+4}^i + F_{t+3}^i + F_{t+2}^i + F_{t+1}^i}{F_\tau^i} \right) DS_\tau^i = F_\tau^i + S_{\tau-1}^i + DS_\tau^i.$$

A.II Constructing Quarterly Returns

In order to construct returns on the net foreign asset portfolio, we first need to obtain measures for the nominal returns on the asset and liability portfolios, $r_t^{a,n}$ and $r_t^{l,n}$. We construct these, as weighted averages of the returns on four broad categories of assets: equity, debt, foreign direct investment, and other portfolio investment. For example total return on gross assets, for each country is constructed as:

$$r_t^{a,n} = w_t^{a,e} r_t^{a,e} + w_t^{a,fdi} r_t^{a,fdi} + w_t^{a,d} r_t^{a,d} + w_t^{a,o} r_t^{a,o},$$

where $r_t^{a,i}$ denotes the nominal (domestic currency) total return on asset category i (equity, FDI, debt or other) and $w_t^{a,i}$, denotes the time varying weights, of the ratio of each category of assets to the gross asset position for each country. Nominal returns on gross liabilities are constructed in a similar manner. The nominal returns are converted into real (domestic currency) returns subtracting the quarterly inflation rate, based on the Nondurables and Services consumption deflator.

The currency composition of debt assets is obtained from the IMF's Coordinated Portfolio Investment Survey (CPIS) Table 2 for 2001. The maturity decomposition for returns on debt is based, for debt assets, on Tables 1.2.A and 1.2.B of IMF's CPIS, obtained as average maturity shares for all reporting periods. For debt liabilities, the maturity decomposition is based on Tables 5.2.A and 5.2.B of CPIS, once again, obtained as an average, for all reporting periods.

Finally, we should stress here that for long-term debt, we estimate the quarterly, holding-period return from the changes in yields (assuming that the yield equals the coupon and using the formula (10.1.19) in Campbell *et al.* (1997), p. 408)

$$r_{n,t+1} = y_{n,t} - (D_n - 1)(y_{n-1,t+1} - y_{n,t}), \quad (\text{A.II.1})$$

where $r_{n,t+1}$ is the quarterly holding-period log return on a n -period coupon bond purchased at time t and sold at time $t + 1$; $y_{n,t}$ is the bond's log yield to maturity; and D_n is Macaulay's duration

for the coupon bond, given by:

$$D_n = \frac{1 - (1 + Y_{n,t})^{-n}}{1 - (1 + Y_{n,t})^{-1}},$$

with $Y_{n,t}$ denoting the yield. Note that (A.II.1) shows that the holding-period return is a positive function of the beginning-of-period yield and a negative function of the change in the yield over the holding period, given the bond's duration (the elasticity of the bond's price with respect to its yield).

Assets

Equity Total Return: Equity total returns from the rest of the world. The country weights are constructed from IMF's CPIS Table 1.1 for 2001. The country weights represent about 82% of total equity holdings by US investors. For each country, a series for total stock return is constructed, denominated in US dollars, employing the MSCI Share Price Index or the Datastream Total Return Index. As for some countries stock market data are not available (e.g. Finland, Korea, Mexico, Brazil, Singapore and Taiwan, before 1988), the weights are adjusted accordingly. The weights are reported in Panel A of Table A.1.

Long-Term Debt: Weighted average of holding period return on foreign long-term bonds. The currency weights have been constructed based on CPIS Table 2, for 2001. This covers about 93% of long-term positions. The currency weights are reported in Panel B of Table A.1. Total quarterly holding period returns are calculated from the changes in yields (see (A.II.1)), obtained from IFS, which are converted into US dollars using end of period nominal exchange rates from IFS/Eurostat. The Euro-denominated yields before 1990 are calculated as the average yield for Germany, France and Italy (IFS) and after 1990, we use Euro-zone average long-term government bond yield.

Short-Term Debt (Other Portfolio Investment): Weighted average holding period return on foreign short term bonds. The currency weights are constructed based on CPIS Table 2 for 2001. This covers about 99% of short-term positions. The currency weights are reported in Panel C of Table A.1. Returns in Euros are calculated as the average return from Germany (Call Money Rate), France (TBill Rate, 3 months), Italy (Money Market Rate), and Netherlands (Call Money Rate) prior to 1990. After 1990, we employ the Euro-zone 3-Month Average Money Market Rate (ECB). Short term local currency returns are converted into US dollars using end of period nominal exchange rates obtained from IFS/Eurostat.

Debt: Weighted average of total return on long-term bonds and total return on short-term bonds. The maturity decomposition is 82% long-term, and 18% short-term, from Tables 1.2.A and 1.2.B of CPIS, obtained as average maturity shares for all reporting periods.

Foreign Direct Investment: Returns constructed using different weights based on FDI database from OECD for three years: 1983, 1993, and 2003, using FDI historical cost positions. These weights are then used for the following sub-periods: 1973-1987, 1988-1996, and 1997-2004. For each sub-period we cover about 72%, 80% and 82% of US FDI. The relevant weights are reported in Panel D of Table A.1. Whenever data for some countries are unavailable the weights are adjusted accordingly. For each country, total stock return (in US dollars) is computed using the corresponding MSCI Share Price Index, or using the corresponding Datastream Total return Index.

Liabilities

Equity Total Return: Equity total returns to the rest of the world. Total stock return is constructed, employing the MSCI Share Price Index, denominated in local currency (base year 1969).

Long-Term Debt: Quarterly holding period return on US long-term bonds. Total quarterly holding period returns are calculated from the changes in yields (see (A.II.1)). Yields are obtained from IFS (11161...ZF...), corresponding to 10-year constant maturity bonds.

Short-Term Debt (Other Portfolio Investment): Holding period return on US short-term bonds. Yields are obtained from IFS (11160C...ZF...) corresponding to the TBill rate (3 month).

Debt: Weighted average of total return on long-term bonds and total return on short-term bonds. The maturity decomposition is 83% long-term, and 17% short-term, from Tables 5.2.A and 5.2.B of CPIS, obtained as an average for all reporting periods.

Foreign Direct Investment: Returns are identical to those on equity.

B Analytical framework

In this section we discuss the empirical implications of the assumptions we employ in the paper, and give a detailed presentation of the log-linearization of the intertemporal budget constraint, allowing different variables to have different trends. Regarding our assumptions, we give a detailed account and discussion of what they imply for our empirical analysis, and how they give rise to the cointegrating relations we uncover in the data. Regarding the approximation of the intertemporal budget constraint, in our derivation we show that it is possible to obtain two approximate expressions (one being a simple linear transformation of the other), similar to either the current account and/or the capital account.

B.I The Case of Different Trends

Implicit in log-linearizing a model around a well defined non-stochastic steady-state, is the assumption that all the variables share the same deterministic trending behavior, i.e. they grow at the same rate. In our derivation, we relax the assumption of a unique common *deterministic* trend. Here we discuss the motivation for our generalization, as well as the implications for our empirical analysis. We then explain how one may derive a log-linear approximation of the intertemporal budget constraint around different deterministic trends.

Why different deterministic trends? We motivate our approach by the need to account for the effects of liberalization and removals of capital controls, which have arguably induced a large expansion of cross-border holding of assets. In addition, it is worth referring also to a recent contribution by Hahn and Lee (2006), making the point that, while the intertemporal budget constraint

$$E_t \sum_{i=0}^{\infty} R_{t,t+i} Z_{t+i} = (1 + r_t) (\mathcal{L}_t - \mathcal{A}_t) + E_t \sum_{i=0}^{\infty} R_{t,t+i} C_{t+i}, \quad (\text{B.I.1})$$

does have to hold for each individual household, in the aggregate, the great ratios C_t/Z_t , $\mathcal{A}_t/Z_t$ and $\mathcal{L}_t/Z_t$ may have different trends when households are heterogeneous and the structure of household heterogeneity drifts slowly over time. This is an example of a shifting economic structure

similar, or even related, to our empirical assumptions. Disregarding these (deterministic) trends in estimating the cointegrating relations implied by the budget constraint is likely to lead to biased results.

These considerations emphasize the importance of recognizing that in each economic model, the long-run mean of the great ratios is ultimately a function of deep parameters. If these parameters change gradually, it appears plausible that the great ratios could be individually trending. While it is beyond the scope of our analysis to identify the exact economic forces that may induce such trends in the above ratios, the omission of such trends from an econometric model may have severe consequences for the number of cointegrating relations that are picked up by cointegration tests.

Next, we explain the implications of allowing the above ratios to trend deterministically over time, and derive a log-linear approximation of the intertemporal budget constraint in the presence of deterministic trends or even structural breaks.¹

B.I.1 Assumptions and Cointegrating Implications

Consider the sequence of period-by-period budget constraints for a nation, given by:

$$[\mathcal{A}_{t+i+1} - \mathcal{L}_{t+i+1}] = \mathcal{Y}_{t+i} - \mathcal{C}_{t+i} - \mathcal{G}_{t+i} - \mathcal{I}_{t+i} + (1 + r_{t+i}) [\mathcal{A}_{t+i} - \mathcal{L}_{t+i}] \quad (\text{B.I.2})$$

where $\mathcal{A}_{t+i}$ is the (value of the) stock gross assets and $\mathcal{L}_{t+i}$ the (value of the) stock gross liabilities at the beginning of period $t + i$, $\mathcal{Y}_{t+i}$ denotes output, $\mathcal{C}_{t+i}$ denotes private consumption, $\mathcal{G}_{t+i}$ is government spending on final goods and services, $\mathcal{I}_{t+i}$ investment, and r_{t+i} is the ex-post real rate of return earned by the country on its net foreign assets. Defining net output as $\mathcal{Z} = \mathcal{Y} - \mathcal{G} - \mathcal{I}$, we may right the above budget constraint as

$$[\mathcal{A}_{t+i+1} - \mathcal{L}_{t+i+1}] = \mathcal{Z}_{t+i} - \mathcal{C}_{t+i} + (1 + r_{t+i}) [\mathcal{A}_{t+i} - \mathcal{L}_{t+i}]. \quad (\text{B.I.3})$$

To allow for different deterministic trends in our variables, we rewrite each variable $\mathcal{W}_t$ distinguishing between a deterministic trend, $\exp(\gamma_{w,t})$, and a non-deterministic-trend component, W_t , i.e. $\mathcal{W}_t = W_t \exp(\gamma_{w,t})$, where the mean of W_t may be non-zero. The term $\exp(\gamma_{w,t})$ captures the evolution of the deterministic trend component of the series, which is orthogonal to (uncorrelated with) the stochastic part of the series, W_t . Under this notational convention, the constraint reads:

$$\begin{aligned} A_{t+i+1} \exp(\gamma_{a,t+i+1}) - L_{t+i+1} \exp(\gamma_{l,t+i+1}) &= Z_{t+i} \exp(\gamma_{z,t+i}) - C_{t+i} \exp(\gamma_{c,t+i}) + \\ (1 + r_{t+i}) [A_{t+i} \exp(\gamma_{a,t+i}) - L_{t+i} \exp(\gamma_{l,t+i})], \quad i = 0, 1, \dots; A_t, L_t : \text{given} \end{aligned} \quad (\text{B.I.4})$$

where A_{t+i} is the (purely stochastic part of the) stock gross assets and L_{t+i} the (purely stochastic part of the) stock gross liabilities at the beginning of period $t + i$, Z_{t+i} denotes (the purely the stochastic part of) net output, C_{t+i} denotes (the purely the stochastic part of) consumption and r_{t+i} is the real rate of return on the *NFA* portfolio, which may vary over time. Furthermore, $\gamma_{w,t+i}$ denotes the deterministic trend component of variable $w = A, L, Z, C$ in period $t + i$. Note that this trend need not be linear a linear function of time (e.g. $\gamma_{w,t+i}$ is not necessarily equal to $\gamma_w \times (t + i)$). In this way,

¹In order to identify permanent and transitory shocks in our work, it suffices to assume that (log) consumption, net output, gross assets and liabilities are cointegrated around some deterministic trends – not necessarily linear. However, the interpretation of our findings will be clearer, once we employ the assumptions we discuss below.

we can in principle accommodate a wide range of deterministic functions. Under our specification, note further that

$$\Delta \hat{w}_{t+i} \equiv \Delta \ln \mathcal{W}_{t+i} \equiv \Delta \ln W_{t+i} + \Delta \gamma_{w,t+i} \text{ for } w \in \{A, L, Z, C\},$$

where $\Delta \ln W_{t+i}$ are zero mean variables, so $E(\Delta \hat{w}_{t+i}) = \Delta \gamma_{w,t+i}$ would be the growth rate of each variable of interest.

As in our paper, let $R_{t,s} = \left[\prod_{j=t+1}^s (1 + r_j) \right]^{-1}$, with $R_{t,t} = 1$ denote the discount factor. We will make use the following assumption:

Assumption B.1 (a) *The NFA portfolio returns r_{t+i} are a stationary processes, with mean $E(r_{t+i}) = r$ and bounded second moments independent of time.*

(b) *The growth rates of all the variables, $\Delta \hat{w}_{t+i}$ for $w \in \{A, L, Z, C\}$, have means $E(\Delta \hat{w}_{t+i}) = \Delta \gamma_{w,t+i}$ and have bounded second moments independent of time, around these mean values.*

(c) *The deterministic trend components $\gamma_{w,t+k}$ converge asymptotically to the same value*

$$\lim_{k \rightarrow +\infty} \gamma_{w,t+k} = \gamma_{\infty,t}, \quad (\text{B.I.5})$$

such that $r = E(r_{t+i}) > E(\Delta \hat{w}_{t+i}) = \Delta \gamma_{\infty,t}$ for $w \in \{A, L, Z, C\}$.²

(d) *The transversality condition*

$$\lim_{k \rightarrow \infty} E_t \{ R_{t,t+k} [A_{t+k+1} \exp(\gamma_{a,t+k+1}) - L_{t+i+1} \exp(\gamma_{l,t+k+1})] \} = 0, \quad (\text{B.I.6})$$

holds.³

Assumption B.1(a) states that the returns on the NFA portfolio are a stationary process. On the other hand, **Assumption B.1(b)** states that the growth rates of consumption, net output, gross assets and liabilities may not be constant over time, i.e. growth rates may have non-constant means. But around these trend-growth rates ($E(\Delta \hat{w}_{t+i})$) the actual growth rates are stationary, that is $\Delta \hat{w}_{t+i} - E(\Delta \hat{w}_{t+i})$ are zero mean stationary processes. Using this assumption we may accommodate variables (the growth rates) that are stationary around mean values, which can in turn change over time. To see this more clearly, consider three cases.

1. Let $\gamma_{w,t+i} = \gamma_w$, be a constant. Under this specification, $\Delta \hat{w}_{t+i}$ is a zero mean stationary process: trend-growth rate is zero. Any variable $\hat{w}_t \equiv \ln \mathcal{W}_t$ may still contain a stochastic trend (e.g. a random walk component), but its mean growth rate is zero. Such a specification is not suitable for analyzing our four variables of interest, which clearly trend upwards over time.

²Note that here we assume that returns are stationary. It could be possible that these series experience changes in their means, associated for instance with changes in productivity. We may easily accommodate this by assuming that $\bar{r}_{t+i} = E(r_{t+i}) > E(\Delta \hat{w}_{t+i})$. However in our data we find no evidence of such changes in the mean. Hence, we continue to work with $r = E(r_{t+i})$ as our maintained assumption.

³Note this means that

$$\lim_{k \rightarrow \infty} E_t \{ R_{t,t+k} [\mathcal{A}_{t+k+1} - \mathcal{L}_{t+i+1}] \} = 0,$$

so that the expected present value of net foreign assets goes to zero in the limit.

2. Let $\gamma_{w,t+i} = \gamma_w(t+i)$. Then $\Delta\hat{w}_{t+i}$ is a stationary processes with average growth rate being $E(\Delta\hat{w}_{t+i}) = \gamma_w$. This is a fairly standard specification. Once again, any variable $\hat{w}_t \equiv \ln \mathcal{W}_t$ may or may not display random-walk like behavior, yet it will have a drift, corresponding to its mean growth rate. A special case of interest, commonly discussed by the literature, consists of assuming a common trend growth rate, $\gamma_{w,t+i} = \gamma(t+i)$. All variables in the model may still contain stochastic trends, but their deterministic growth rate is the same: $E(\Delta\hat{w}_{t+i}) = \gamma$.
3. Let $\gamma_{w,t+i}$ be some deterministic function of time. In this instance, the average growth rate, $E(\Delta\hat{w}_{t+i})$, is allowed to change over time. Different variables $\hat{w}_t \equiv \ln \mathcal{W}_t$, may grow at different rates, during different time periods. This would be the appropriate specification in an environment where the average growth rate changes (possibly more than once) after specific, non stochastic events.⁴ [Assumption B.1\(b\)](#) nonetheless requires that, around these changing trend-growth rates, the growth rates of the variables included in the analysis are stationary.

[Assumption B.1\(c\)](#) allows different variables to have different trends in the sample, but it imposes the condition that in the limit, all variables eventually grow at the same rate, $\Delta\gamma_{\infty,t}$, along a balanced-growth path. We view the restriction imposed by this assumption as mild, as it rules out situations where the rate of growth of gross assets and liabilities permanently exceeds the rate of growth of consumption and output. Imposing this assumption from the outset (the balanced growth assumption holds both in- and out-of-sample) essentially brings us back to the *standard case*, where all variables are assumed to grow at the same, constant rate: that is $\gamma_{w,t} = \gamma t$. Instead, we view [Assumption B.1\(c\)](#) as an assumption that is only satisfied in the limit. In addition, we assume that the economy settles down to a balanced growth path, along which the long-term growth rate of the economy is lower than the steady-state rate of return – a common equilibrium condition in many growth models.

Furthermore, [Assumption B.1\(c\)](#) allows for considerable empirical flexibility. In standard representative agent models, the presence of a deterministic trend *does* imply the violation of the agent's budget constraint. For the purpose of our study, we have argued that these trends can proxy for the effects of capital market liberalization and the removal of capital controls. Yet, one can appeal also to more general arguments. In any empirical analysis of the dynamics of aggregate consumption, net output, gross assets and liabilities positions (and consequently the current account), relies on data aggregated over heterogeneous individuals. As mentioned above, when heterogeneity among consumers changes slowly over time, it may induce deterministic time trends in the aggregate variables. Relevant instances include changes in demography, income distribution, as well as the degree of participation in financial markets.

On the other hand, if gross assets and liabilities grow at the same rate in all time periods ($\gamma_{a,t} = \gamma_{l,t}$ for all t), or if $\lim_{k \rightarrow +\infty} \gamma_{w,t+k+1} = 0$ for $w = a, l$, [Assumption B.1\(d\)](#) essentially boils down to the usual transversality condition $\lim_{k \rightarrow \infty} E_t\{R_{t,t+k}(A_{t+k+1} - L_{t+k+1})\} = 0$. Furthermore, if we assume that the differential growth rate of the two variables vanishes in the limit, i.e. $\lim_{k \rightarrow +\infty} (\gamma_{a,t+k+1} - \gamma_{l,t+k+1}) = 0$, that is, if in the limit gross assets and liabilities grow at the same deterministic rate ($\Delta\gamma_{\infty,t}$), the above conditions imply that the long-term growth rate of gross assets and liabilities is lower than the steady-state rate of return (see [Assumption B.1\(c\)](#)). We

⁴This is referred to as a *structural break* in the time series jargon (see e.g. [Perron, 1989](#)). These changes could be associated, for instance, with changes in the trend rate of productivity growth.

should stress that this does not need to hold within sample. What condition (B.I.6) requires is that the return on the *NFA* portfolio exceeds the growth rates of gross assets and liabilities in the limit.⁵

Under [Assumption B.1](#), we first normalize the period budget constraint by the limiting deterministic trend component, $\gamma_{\infty,t}$, then exploit the transversality condition, to rewrite the intertemporal budget constraint, after repeated substitutions, as follows:

$$\begin{aligned} & E_t \sum_{i=0}^{\infty} R_{t,t+i} Z_{t+i} \exp(\bar{\gamma}_{z,t+i}) \\ &= (1+r_t) [L_t \exp(\bar{\gamma}_{l,t}) - A_t \exp(\bar{\gamma}_{a,t})] + E_t \sum_{i=0}^{\infty} R_{t,t+i} C_{t+i} \exp(\bar{\gamma}_{c,t+i}). \end{aligned} \quad (\text{B.I.7})$$

Here $\bar{\gamma}_{w,t+i} \equiv \gamma_{w,t+i} - \gamma_{\infty,t}$ denotes the deviation of the deterministic trend component of each variable, $\gamma_{w,t+i}$, from its limiting value, $\gamma_{\infty,t}$.⁶ Let us define $\Phi_t \equiv \sum_{i=0}^{\infty} R_{t,t+i} C_{t+i} \exp(\bar{\gamma}_{c,t+i})$ and $\Psi_t \equiv \sum_{i=0}^{\infty} R_{t,t+i} Z_{t+i} \exp(\bar{\gamma}_{z,t+i})$. Then (B.I.7) may be written as

$$E_t \Psi_t = (1+r_t) [L_t \exp(\bar{\gamma}_{l,t}) - A_t \exp(\bar{\gamma}_{a,t})] + E_t \Phi_t$$

To proceed, we make the following assumption:

Assumption B.2 (a) *The process Φ_t/Ψ_t is stationary, with bounded moments, independent of time, so the expectation term $E(\Phi_t/\Psi_t)$ exists and is finite.*

(b) *The processes $A_t \exp(\bar{\gamma}_{a,t})/\Psi_t$ and $L_t \exp(\bar{\gamma}_{l,t})/\Psi_t$ are stationary, and have bounded moments independent of time, so the expectation terms $E[A_t \exp(\bar{\gamma}_{a,t})/\Psi_t]$ and $E[L_t \exp(\bar{\gamma}_{l,t})/\Psi_t]$ exist and are finite.*

(c) *The processes $Z_t \exp(\bar{\gamma}_{z,t})/\Psi_t$ and $C_t \exp(\bar{\gamma}_{c,t})/\Phi_t$ are stationary with bounded moments, so the expectation terms $E[Z_t \exp(\bar{\gamma}_{z,t})/\Psi_t]$ and $E[C_t \exp(\bar{\gamma}_{c,t})/\Phi_t]$ exist and are finite.*

[Assumption B.2\(a\)](#) states that the ratio of the present discounted value of consumption to the present discounted value of net output is a stationary process, regardless of the potentially differential trending behavior of consumption and net output. A direct implication of this is that (log) consumption and (log) net output should be cointegrated with coefficients (1, -1) along potentially time-varying deterministic trends. In the same vein, [Assumption B.2\(b\)](#) states that the ratio of gross assets (regardless of its trending behavior) to the present value of (trending) net output, and the ratio of gross liabilities (with its trend) to the present value of (trending) net output, are stationary processes, with well-defined, finite moments. Similarly, a direct implication of this assumption is that (log) gross assets and (log) gross liabilities should be cointegrated with (log) net output, with coefficients (1, -1), around some deterministic trend functions. Finally, [Assumption B.2\(c\)](#) states that the ratio of current net output and consumption to their respective present values should be stationary. Note that this follows directly from [Assumption B.1](#), where we have assumed that rates of return are stationary and growth rates are also stationary processes.

⁵For instance, in steady-state terms, we have that

$$\lim_{k \rightarrow \infty} \left(\frac{1}{1+r} \right)^{t+k} [A_{ss} \exp(\gamma_{a,t+k+1}) - L_{ss} \exp(\gamma_{l,t+k+1})] = 0,$$

which holds when $(1+r)^{t+k} > \exp(\gamma_{a,t+k+1})$ and $(1+r)^{t+k} > \exp(\gamma_{l,t+k+1})$.

⁶Note that by [Assumption B.1\(c\)](#), $\bar{\gamma}_{w,t+i}$ converges to zero asymptotically.

To see more clearly the cointegrating implications of this assumption, consider first [Assumption B.2\(c\)](#). Note that we can express Φ_t as

$$\begin{aligned}\Phi_t &= C_t \exp(\bar{\gamma}_{c,t}) + \sum_{i=1}^{\infty} R_{t,t+i} C_{t+i} \exp(\bar{\gamma}_{c,t+i}) \\ &= C_t \exp(\bar{\gamma}_{c,t}) + (1 + r_{t+1})^{-1} \Phi_{t+1},\end{aligned}$$

so

$$\begin{aligned}\Phi_{t+1} &= (1 + r_{t+1}) (\Phi_t - C_t \exp(\bar{\gamma}_{c,t})), \\ \text{or} \quad : \quad \frac{\Phi_{t+1}}{\Phi_t} &= (1 + r_{t+1}) \left(1 - \frac{C_t \exp(\bar{\gamma}_{c,t})}{\Phi_t} \right).\end{aligned}$$

Log-linearizing the last expression around $E(C_t \exp(\bar{\gamma}_{c,t})/\Phi_t)$ we have (see e.g. [Campbell and Mankiw, 1989](#); [Campbell et al., 1997](#)):

$$\Delta \phi_{t+1} \approx \kappa_{C\Phi} + r_{t+1} + \left(1 - \frac{1}{\rho_{C\Phi}} \right) (c_t + \bar{\gamma}_{c,t} - \phi_t), \quad (\text{B.I.8})$$

where $\rho_{C\Phi}$ and $\kappa_{C\Phi}$ are defined as:

$$\rho_{C\Phi} \equiv 1 - \exp(E[c_t + \bar{\gamma}_{c,t} - \phi_t])$$

with $\rho_{C\Phi} < 1$, and

$$\begin{aligned}\kappa_{C\Phi} &= \log(1 - \exp(E[c_t + \bar{\gamma}_{c,t} - \phi_t])) + \frac{\exp(E[c_t + \bar{\gamma}_{c,t} - \phi_t])}{1 - \exp(E[c_t + \bar{\gamma}_{c,t} - \phi_t])} E[c_t + \bar{\gamma}_{c,t} - \phi_t] \\ &= \log(\rho_{C\Phi}) + \left(\frac{1 - \rho_{C\Phi}}{\rho_{C\Phi}} \right) \log(1 - \rho_{C\Phi}).\end{aligned}$$

Making use of the identity $\Delta \phi_{t+1} = \Delta(c_{t+1} + \bar{\gamma}_{c,t+1}) + (c_t + \bar{\gamma}_{c,t} - \phi_t) - (c_{t+1} + \bar{\gamma}_{c,t+1} - \phi_{t+1})$ in the LHS of (B.I.8), we obtain a difference equation in the $\log C_t \exp(\bar{\gamma}_{c,t})/\Phi_t$ ratio. Solving forward and imposing the terminal condition

$$\lim_{T \rightarrow \infty} \rho_{C\Phi}^T (c_{t+T} + \bar{\gamma}_{c,t+T} - \phi_{t+T}) \rightarrow 0 \quad (\text{B.I.9})$$

we may write

$$(c_t + \bar{\gamma}_{c,t} - \phi_t) \simeq \frac{\rho_{C\Phi} \kappa_{C\Phi}}{1 - \rho_{C\Phi}} + \sum_{i=1}^{\infty} \rho_{C\Phi}^i (r_{t+i} - \Delta(c_{t+i} + \bar{\gamma}_{c,t+i})) \quad (\text{B.I.10})$$

$$= \frac{\rho_{C\Phi} \kappa_{C\Phi}}{1 - \rho_{C\Phi}} + \sum_{i=1}^{\infty} \rho_{C\Phi}^i (r_{t+i} - \Delta(c_{t+i} + \gamma_{c,t+i})) \quad (\text{B.I.11})$$

$$= \frac{\rho_{C\Phi} \kappa_{C\Phi}}{1 - \rho_{C\Phi}} + \sum_{i=1}^{\infty} \rho_{C\Phi}^i (r_{t+i} - \Delta \hat{c}_{t+i}), \quad (\text{B.I.12})$$

where the second equality follows from the fact that $\Delta \bar{\gamma}_{c,t+i} = (\gamma_{c,t+i} - \gamma_{\infty,t}) - (\gamma_{c,t+i-1} - \gamma_{\infty,t}) =$

$\Delta\gamma_{c,t+i}$. Note an important implication of this condition. Since we have

$$\rho_{C\Phi} = 1 - \exp(\mathbb{E}[c_t + \bar{\gamma}_{c,t} - \phi_t]) \simeq 1 - \mathbb{E}\left(\frac{C_t \exp(\bar{\gamma}_{c,t})}{\sum_{i=0}^{\infty} R_{t,t+i} C_{t+i}}\right) < 1,$$

to the extent that $(c_t + \bar{\gamma}_{c,t} - \phi_t)$ is a stationary process, the limit term (B.I.9) will go to zero, at least in expectation (see [Campbell *et al.*, 1997](#)).

In the same vein, we have

$$\Psi_t = Z_t \exp(\bar{\gamma}_{z,t}) + (1 + r_{t+1})^{-1} \Psi_{t+1}$$

and using similar steps, we obtain

$$z_t + \bar{\gamma}_{z,t} - \psi_t \simeq \frac{\rho_{Z\Psi} \kappa_{Z\Psi}}{1 - \rho_{Z\Psi}} + \sum_{i=1}^{\infty} \rho_{Z\Psi}^i (r_{t+i} - \Delta(z_{t+i} + \bar{\gamma}_{z,t+i})) \quad (\text{B.I.13})$$

$$= \frac{\rho_{Z\Psi} \kappa_{Z\Psi}}{1 - \rho_{Z\Psi}} + \sum_{i=1}^{\infty} \rho_{Z\Psi}^i (r_{t+i} - \Delta(z_{t+i} + \gamma_{z,t+i})) \quad (\text{B.I.14})$$

$$= \frac{\rho_{Z\Psi} \kappa_{Z\Psi}}{1 - \rho_{Z\Psi}} + \sum_{i=1}^{\infty} \rho_{Z\Psi}^i (r_{t+i} - \Delta\hat{z}_{t+i}), \quad (\text{B.I.15})$$

where $\kappa_{Z\Psi}$ and $\rho_{Z\Psi}$ are defined similarly to the above log-linearization parameters, that is:

$$\rho_{Z\Psi} \equiv 1 - \exp(\mathbb{E}[z_t + \bar{\gamma}_{z,t} - \psi_t])$$

and

$$\begin{aligned} \kappa_{Z\Psi} &= \log(1 - \exp(\mathbb{E}[z_t + \bar{\gamma}_{z,t} - \psi_t])) + \frac{\exp(\mathbb{E}[z_t + \bar{\gamma}_{z,t} - \psi_t])}{1 - \exp(\mathbb{E}[z_t + \bar{\gamma}_{z,t} - \psi_t])} \mathbb{E}[z_t + \bar{\gamma}_{z,t} - \psi_t] \\ &= \log(\rho_{Z\Psi}) + \left(\frac{1 - \rho_{Z\Psi}}{\rho_{Z\Psi}}\right) \log(1 - \rho_{Z\Psi}). \end{aligned}$$

Now taking logs of Φ_t/Ψ_t and substituting from (B.I.10) and (B.I.13) we have that (disregarding linearization constants)

$$\begin{aligned} \phi_t - \psi_t &\approx c_t - z_t - (\bar{\gamma}_{zt} - \bar{\gamma}_{ct}) + \sum_{i=1}^{\infty} \rho_{C\Phi}^i (r_{t+i} - \Delta\hat{c}_{t+i}) - \sum_{i=1}^{\infty} \rho_{Z\Psi}^i (r_{t+i} - \Delta\hat{z}_{t+i}) \\ &= c_t - z_t - (\gamma_{zt} - \gamma_{ct}) + \sum_{i=1}^{\infty} \rho_{C\Phi}^i (r_{t+i} - \Delta\hat{c}_{t+i}) - \sum_{i=1}^{\infty} \rho_{Z\Psi}^i (r_{t+i} - \Delta\hat{z}_{t+i}) \\ &= c_t - z_t - (\gamma_{zt} - \gamma_{ct}) + \xi_{c,t} \end{aligned}$$

where $\xi_{c,t} \equiv \sum_{i=1}^{\infty} \rho_{C\Phi}^i (r_{t+i} - \Delta\hat{c}_{t+i}) - \sum_{i=1}^{\infty} \rho_{Z\Psi}^i (r_{t+i} - \Delta\hat{z}_{t+i})$ is clearly a stationary process by [Assumption B.1](#). Then, since by [Assumption B.2\(a\)](#), the process $\phi_t - \psi_t$ is stationary, (log) consumption and (log) net output should be cointegrated with coefficients $(1, -1)$ around some deterministic trend function, $(\gamma_{zt} - \gamma_{ct})$.

In a similar fashion, since $A_t \exp(\bar{\gamma}_{a,t})/\Psi_t$ and $L_t \exp(\bar{\gamma}_{l,t})/\Psi_t$ are stationary by [Assumption B.2\(b\)](#), we may express

$$\begin{aligned} a_t + \bar{\gamma}_{at} - \psi_t &= a_t - z_t - (\bar{\gamma}_{zt} - \bar{\gamma}_{at}) - \sum_{i=1}^{\infty} \rho_{Z\Psi}^i (r_{t+i} - \Delta\hat{z}_{t+i}) \\ &= a_t - z_t - (\gamma_{zt} - \gamma_{at}) - \sum_{i=1}^{\infty} \rho_{Z\Psi}^i (r_{t+i} - \Delta\hat{z}_{t+i}) \end{aligned}$$

and

$$\begin{aligned} l_t + \bar{\gamma}_{lt} - \psi_t &= l_t - z_t - (\bar{\gamma}_{zt} - \bar{\gamma}_{lt}) - \sum_{i=1}^{\infty} \rho_{Z\Psi}^i (r_{t+i} - \Delta \hat{z}_{t+i}) \\ &= l_t - z_t - (\gamma_{zt} - \gamma_{lt}) - \sum_{i=1}^{\infty} \rho_{Z\Psi}^i (r_{t+i} - \Delta \hat{z}_{t+i}) \end{aligned}$$

a direct implication of which is that gross assets and gross liabilities should cointegrate with net output, again with coefficients $(1, -1)$ around some deterministic trend functions, $(\gamma_{zt} - \gamma_{at})$ and $(\gamma_{zt} - \gamma_{lt})$ respectively.

These cointegrating restrictions — the fact that consumption, gross assets and liabilities should cointegrate with net output with particular coefficients — are necessary conditions for the log-linear approximation of the intertemporal budget constraint to be valid. We should nevertheless observe that, even if these restrictions were not satisfied in the data (we do provide evidence that they hold in our analysis), the existence of one cointegrating relation between the four variables of interest would be sufficient, *per se*, in order to be able to identify permanent and transitory shocks in the data — the economic meaning of the exercise would however be severely undermined.

A desirable feature of our assumptions thus far is that they are consistent with the notion of a balanced growth path (see e.g. King *et al.*, 1991): there are particular linear combinations of the (logs of) variables, that annihilate the common stochastic trend, thereby making relevant ratios stationary around some deterministic trend functions. By way of example, assume that $\gamma_{w,t}$ takes the form $\gamma_{wt} = \gamma t$, that is, all variables share a common deterministic growth rate. Our assumptions then imply that $c_t - z_t$, $a_t - z_t$ and $l_t - z_t$ are stationary, potentially non-zero mean variables. That is the cointegrating relations of the form $(1, -1)$ eliminate both the common stochastic trend (e.g. technology) and the deterministic trend.⁷

Before proceeding with the log-linearization of the intertemporal budget constraint, it is appropriate to discuss, if only briefly, how these assumptions relate to our econometric methodology. As mentioned above, the inclusion of deterministic trends in our model – apart from capturing the average growth rates of variables – are meant to proxy for a series of changes that we are unable to control for explicitly. Specifically, they proxy for growing financial market integration, increasing capital market liberalization, increasing degree of capital market deepening, as well as changes in asset market participation, changes in demographics etc. These factors arguably play a key role in the faster growth of gross positions relative to consumption and net output. It is important to emphasize here that, to the extent that these factors are well approximated by the deterministic trends, they will not carry any direct weight in the dynamic effects of the permanent and transitory shocks we identify. This is so because by construction deterministic trends are orthogonal (uncorrelated) with the stochastic part of the variables of interest.

From the Granger Representation Theorem it follows that, under the maintained hypothesis that the growth rates in $\mathbf{x}_t$ are covariance stationary around some deterministic terms, $\Upsilon \mathbf{D}_t$, there exists a multivariate Wold representation of the form

$$\Delta \mathbf{x}_t = \Upsilon \mathbf{D}_t + \mathbf{C}(L) \mathbf{u}_t = \Upsilon \mathbf{D}_t + \sum_{j=0}^{+\infty} \mathbf{C}_j \mathbf{u}_{t-j}, \quad (\text{B.I.16})$$

⁷Note also that similar results would obtain even if we had assumed that the common growth rate is time-varying. For instance, letting $\gamma_{wt} = \gamma_t$, it still holds that $c_t - z_t$, $a_t - z_t$ and $l_t - z_t$ are stationary variables.

where $\mathbf{C}(L) = \sum_{j=0}^{\infty} \mathbf{C}_j L^j$ is a 4×4 matrix polynomial in the lag operator, $\mathbf{D}_t$ denotes all deterministic variables (constants, trends etc.) and Υ the coefficients of these variables. The quantities of interest, namely the impulse response functions and variance decompositions, are obtained from the stochastic part of the process, $\mathbf{C}(L) \mathbf{u}_t = \sum_{j=0}^{+\infty} \mathbf{C}_j \mathbf{u}_{t-j}$, and are not influenced in any way by the deterministic part, $\Upsilon \mathbf{D}_t$. As these quantities are ultimately estimated from VAR counterparts, the only issue that remains open is the possibility of misspecification: If the ‘wrong’ deterministic terms are included in the empirical specification, one cannot exclude the possibility that the MA coefficients $\mathbf{C}_j$ will be estimated with error. However, the same critique applies to any type of misspecification, including VAR dynamics, and the variables included in the analysis.

B.I.2 The Log-Linearized Intertemporal Budget Constraint

Let us now turn to the approximation of the intertemporal budget constraint. As we saw above, we may express the IBC as $E_t \Psi_t = (1 + r_t) [L_t \exp(\bar{\gamma}_{l,t}) - A_t \exp(\bar{\gamma}_{a,t})] + E_t \Phi_t$. We may then write

$$\left(1 - \frac{(1 + r_t) [L_t \exp(\bar{\gamma}_{l,t}) - A_t \exp(\bar{\gamma}_{a,t})]}{E_t \Psi_t} \right) = \frac{E_t \Phi_t}{E_t \Psi_t}.$$

Taking logs (and ignoring Jensen’s inequality terms we have)

$$E_t \log \left(1 - \frac{(1 + r_t) [L_t \exp(\bar{\gamma}_{l,t}) - A_t \exp(\bar{\gamma}_{a,t})]}{\Psi_t} \right) \approx E_t (\phi_t - \psi_t), \quad (\text{B.I.17})$$

with the RHS being the expectation of a stationary variable, as discussed above. The LHS of (B.I.17) can be approximated by taking a first-order Taylor approximation around the mean of the $A_t \exp(\bar{\gamma}_{a,t}) / \Psi_t$ and $L_t \exp(\bar{\gamma}_{l,t}) / \Psi_t$ ratios (see [Campbell and Mankiw, 1989](#); [Campbell et al., 1997](#)).⁸ Making use of [Assumption B.2\(b\)](#), we have:

$$\begin{aligned} & E_t \log \left(1 - \frac{(1 + r_t) [L_t \exp(\bar{\gamma}_{l,t}) - A_t \exp(\bar{\gamma}_{a,t})]}{\Psi_t} \right) \\ & \approx E \left[\log \left(1 - \frac{(1 + r_t) [L_t \exp(\bar{\gamma}_{l,t}) - A_t \exp(\bar{\gamma}_{a,t})]}{\Psi_t} \right) \right] \\ & - \left(\frac{\{ \exp(E[l_t + \bar{\gamma}_{l,t} - \psi_t]) - \exp(E[a_t + \bar{\gamma}_{a,t} - \psi_t]) \}}{1 - E[1 + r_t] \exp(E[l_t + \bar{\gamma}_{l,t} - \psi_t]) + E[1 + r_t] \exp(E[a_t + \bar{\gamma}_{a,t} - \psi_t])} \right) (r_t - E[r_t]) \end{aligned}$$

⁸Note that it is more convenient to write:

$$\frac{(1 + r_t) [L_t \exp(\bar{\gamma}_{l,t}) - A_t \exp(\bar{\gamma}_{a,t})]}{\Psi_t} \equiv (1 + r_t) [\exp(l_t + \bar{\gamma}_{l,t} - \psi_t) - \exp(a_t + \bar{\gamma}_{a,t} - \psi_t)]$$

$$\begin{aligned}
& - \left(\frac{\mathbb{E}[1 + r_t] \exp(\mathbb{E}[l_t + \bar{\gamma}_{l,t} - \psi_t])}{1 - \mathbb{E}[1 + r_t] \exp(\mathbb{E}[l_t + \bar{\gamma}_{l,t} - \psi_t]) + \mathbb{E}[1 + r_t] \exp(\mathbb{E}[a_t + \bar{\gamma}_{a,t} - \psi_t])} \right) \\
& \quad \times ((l_t + \bar{\gamma}_{l,t} - \psi_t) - \mathbb{E}[l_t + \bar{\gamma}_{l,t} - \psi_t]) \\
& + \left(\frac{\mathbb{E}[1 + r_t] \exp(\mathbb{E}[a_t + \bar{\gamma}_{a,t} - \psi_t])}{1 - \mathbb{E}[1 + r_t] \exp(\mathbb{E}[l_t + \bar{\gamma}_{l,t} - \psi_t]) + \mathbb{E}[1 + r_t] \exp(\mathbb{E}[a_t + \bar{\gamma}_{a,t} - \psi_t])} \right) \\
& \quad \times ((a_t + \bar{\gamma}_{a,t} - \psi_t) - \mathbb{E}[a_t + \bar{\gamma}_{a,t} - \psi_t]) \tag{B.I.18} \\
& = \mathbb{E} \left[\log \left(1 - \frac{L_t \exp(\bar{\gamma}_{l,t}) - A_t \exp(\bar{\gamma}_{a,t})}{\Psi_t} \right) \right] \\
& + \left(\frac{\{\exp(\mathbb{E}[l_t + \bar{\gamma}_{l,t} - \psi_t]) - \exp(\mathbb{E}[a_t + \bar{\gamma}_{a,t} - \psi_t])\}}{1 - \mathbb{E}[1 + r_t] \exp(\mathbb{E}[l_t + \bar{\gamma}_{l,t} - \psi_t]) + \mathbb{E}[1 + r_t] \exp(\mathbb{E}[a_t + \bar{\gamma}_{a,t} - \psi_t])} \right) \mathbb{E}[r_t] \\
& + \left(\frac{\mathbb{E}[1 + r_t] \exp(\mathbb{E}[l_t + \bar{\gamma}_{l,t} - \psi_t])}{1 - \mathbb{E}[1 + r_t] \exp(\mathbb{E}[l_t + \bar{\gamma}_{l,t} - \psi_t]) + \mathbb{E}[1 + r_t] \exp(\mathbb{E}[a_t + \bar{\gamma}_{a,t} - \psi_t])} \right) \mathbb{E}[l_t + \bar{\gamma}_{l,t} - \psi_t] \\
& - \left(\frac{\mathbb{E}[1 + r_t] \exp(\mathbb{E}[a_t + \bar{\gamma}_{a,t} - \psi_t])}{1 - \mathbb{E}[1 + r_t] \exp(\mathbb{E}[l_t + \bar{\gamma}_{l,t} - \psi_t]) + \mathbb{E}[1 + r_t] \exp(\mathbb{E}[a_t + \bar{\gamma}_{a,t} - \psi_t])} \right) \mathbb{E}[a_t + \bar{\gamma}_{a,t} - \psi_t] \\
& - \left(\frac{\mathbb{E}[1 + r_t] \exp(\mathbb{E}[l_t + \bar{\gamma}_{l,t} - \psi_t])}{1 - \mathbb{E}[1 + r_t] \exp(\mathbb{E}[l_t + \bar{\gamma}_{l,t} - \psi_t]) + \mathbb{E}[1 + r_t] \exp(\mathbb{E}[a_t + \bar{\gamma}_{a,t} - \psi_t])} \right) \mathbb{E}_t(l_t + \bar{\gamma}_{l,t} - \psi_t) \\
& + \left(\frac{\mathbb{E}[1 + r_t] \exp(\mathbb{E}[a_t + \bar{\gamma}_{a,t} - \psi_t])}{1 - \mathbb{E}[1 + r_t] \exp(\mathbb{E}[l_t + \bar{\gamma}_{l,t} - \psi_t]) + \mathbb{E}[1 + r_t] \exp(\mathbb{E}[a_t + \bar{\gamma}_{a,t} - \psi_t])} \right) \mathbb{E}_t(a_t + \bar{\gamma}_{a,t} - \psi_t) \tag{B.I.19}
\end{aligned}$$

Defining

$$\rho_d \equiv 1 - \mathbb{E}[1 + r_t] \exp(\mathbb{E}[l_t + \bar{\gamma}_{l,t} - \psi_t]) + \mathbb{E}[1 + r_t] \exp(\mathbb{E}[a_t + \bar{\gamma}_{a,t} - \psi_t]), \tag{B.I.20}$$

we can rewrite (B.I.19) as

$$\begin{aligned}
& \mathbb{E}_t \log \left(1 - \frac{(1+r_t)(L_t \exp(\bar{\gamma}_{l,t}) - A_t \exp(\bar{\gamma}_{a,t}))}{\Psi_t} \right) \\
& \approx \kappa_d + \left(1 - \frac{1}{\rho_d} \right) \frac{1}{\mathbb{E}[1+r_t]} r_t \\
& \left[\left(1 - \frac{1}{\rho_d} \right) - \frac{\mathbb{E}[1+r_t] \exp(\mathbb{E}[a_t + \bar{\gamma}_{a,t} - \psi_t])}{\rho_d} \right] (l_t + \bar{\gamma}_{l,t}) + \\
& + \left[\left(1 - \frac{1}{\rho_d} \right) + \frac{\mathbb{E}[1+r_t] \exp(\mathbb{E}[l_t + \bar{\gamma}_{l,t} - \psi_t])}{\rho_d} \right] (a_t + \bar{\gamma}_{a,t}) - \left(1 - \frac{1}{\rho_d} \right) \mathbb{E}_t \psi_t, \tag{B.I.21}
\end{aligned}$$

where

$$\begin{aligned}
\kappa_d &= \log(\rho_d) + \left(\frac{\{\exp(\mathbb{E}[l_t + \bar{\gamma}_{l,t} - \psi_t]) - \exp(\mathbb{E}[a_t + \bar{\gamma}_{a,t} - \psi_t])\}}{\rho_d} \right) \mathbb{E}[r_t] \\
& \left(\frac{\mathbb{E}[1+r_t] \exp(\mathbb{E}[l_t + \bar{\gamma}_{l,t} - \psi_t])}{\rho_d} \right) \mathbb{E}[l_t + \bar{\gamma}_{l,t} - \psi_t] \\
& - \left(\frac{\mathbb{E}[1+r_t] \exp(\mathbb{E}[a_t + \bar{\gamma}_{a,t} - \psi_t])}{\rho_d} \right) \mathbb{E}[a_t + \bar{\gamma}_{a,t} - \psi_t].
\end{aligned}$$

Hence the log-linearized intertemporal budget constraint can be written as

$$\begin{aligned}
& \left[\left(1 - \frac{1}{\rho_d} \right) - \frac{\mathbb{E}[1+r_t] \exp(\mathbb{E}[a_t + \bar{\gamma}_{a,t} - \psi_t])}{\rho_d} \right] (l_t + \bar{\gamma}_{l,t}) \\
& + \left[\left(1 - \frac{1}{\rho_d} \right) + \frac{\mathbb{E}[1+r_t] \exp(\mathbb{E}[l_t + \bar{\gamma}_{l,t} - \psi_t])}{\rho_d} \right] (a_t + \bar{\gamma}_{a,t}) \\
& - \left(1 - \frac{1}{\rho_d} \right) \mathbb{E}_t \psi_t + \left(1 - \frac{1}{\rho_d} \right) \frac{1}{\mathbb{E}[1+r_t]} r_t \approx \mathbb{E}_t (\phi_t - \psi_t), \tag{B.I.22}
\end{aligned}$$

or by defining

$$\begin{aligned}\rho_l &\equiv \frac{-\mathbb{E}[1+r_t] \exp(\mathbb{E}[l_t + \bar{\gamma}_{l,t} - \psi_t])}{\rho_d} \\ &\equiv \left[\left(1 - \frac{1}{\rho_d}\right) - \frac{\mathbb{E}[1+r_t] \exp(\mathbb{E}[a_t + \bar{\gamma}_{a,t} - \psi_t])}{\rho_d} \right], \text{ and}\end{aligned}\quad (\text{B.I.23a})$$

$$\begin{aligned}\rho_a &\equiv \frac{\mathbb{E}[1+r_t] \exp(\mathbb{E}[a_t + \bar{\gamma}_{a,t} - \psi_t])}{\rho_d} \\ &\equiv \left[\left(1 - \frac{1}{\rho_d}\right) + \frac{\mathbb{E}[1+r_t] \exp(\mathbb{E}[l_t + \bar{\gamma}_{l,t} - \psi_t])}{\rho_d} \right],\end{aligned}\quad (\text{B.I.23b})$$

we obtain:

$$\rho_l (l_t + \bar{\gamma}_{l,t}) + \rho_a (a_t + \bar{\gamma}_{a,t}) - \left(1 - \frac{1}{\rho_d}\right) \mathbb{E}_t \psi_t + \left(1 - \frac{1}{\rho_d}\right) \frac{1}{\mathbb{E}[1+r_t]} r_t \approx \mathbb{E}_t (\phi_t - \psi_t). \quad (\text{B.I.24})$$

Notice that

$$\begin{aligned}&\rho_l + \rho_a + \frac{1}{\rho_d} \\ &= \left[\left(1 - \frac{1}{\rho_d}\right) - \frac{\mathbb{E}[1+r_t] \exp(\mathbb{E}[a_t + \bar{\gamma}_{a,t} - \psi_t])}{\rho_d} \right] \\ &\quad + \left[\left(1 - \frac{1}{\rho_d}\right) + \frac{\mathbb{E}[1+r_t] \exp(\mathbb{E}[l_t + \bar{\gamma}_{l,t} - \psi_t])}{\rho_d} \right] + \frac{1}{\rho_d} \\ &= 2 \left(1 - \frac{1}{\rho_d}\right) + \frac{1}{\rho_d} - \frac{\mathbb{E}[1+r_t] \exp(\mathbb{E}[a_t + \bar{\gamma}_{a,t} - \psi_t])}{\rho_d} + \frac{\mathbb{E}[1+r_t] \exp(\mathbb{E}[l_t + \bar{\gamma}_{l,t} - \psi_t])}{\rho_d} \\ &= 2 \left(1 - \frac{1}{\rho_d}\right) + \frac{1}{\rho_d} - \frac{-\mathbb{E}[1+r_t] \exp(\mathbb{E}[l_t + \bar{\gamma}_{l,t} - \psi_t]) + \mathbb{E}[1+r_t] \exp(\mathbb{E}[a_t + \bar{\gamma}_{a,t} - \psi_t])}{\rho_d} \\ &= 2 \left(1 - \frac{1}{\rho_d}\right) + \frac{1}{\rho_d} - \left(1 - \frac{1}{\rho_d}\right) \\ &= \left(1 - \frac{1}{\rho_d}\right) + \frac{1}{\rho_d} \\ &= 1,\end{aligned}$$

condition which imposes certain restrictions on the parameters ρ_j , $j = l, a, d$.

B.I.3 Two Approximate Expressions

In this subsection we explain how it is possible derive from the approximate expression of the intertemporal budget constraint, two approximate expressions: one that assimilates to the current account and one that assimilates to the capital account.

We start by employing the restriction $\rho_l + \rho_a + (1/\rho_d) = 1$, to rewrite the approximate expression of the IBC (B.I.24) as

$$\rho_l (l_t + \bar{\gamma}_{l,t}) + \rho_a (a_t + \bar{\gamma}_{a,t}) - (\rho_l + \rho_a) \mathbb{E}_t \psi_t + \left(1 - \frac{1}{\rho_d}\right) \frac{1}{\mathbb{E}[1+r_t]} r_t \approx \mathbb{E}_t (\phi_t - \psi_t). \quad (\text{B.I.25})$$

Substituting (B.I.10) and (B.I.13) – and disregarding linearization constants – we obtain

$$\begin{aligned}
& \rho_l (l_t + \bar{\gamma}_{l,t}) + \rho_a (a_t + \bar{\gamma}_{a,t}) + \left(1 - \frac{1}{\rho_d}\right) \frac{1}{\mathbb{E}[1 + r_t]} r_t \\
& - (\rho_l + \rho_a) \mathbb{E}_t \left\{ z_t + \bar{\gamma}_{z,t} - \sum_{i=1}^{\infty} \rho_{Z\Psi}^i (r_{t+i} - \Delta(z_{t+i} + \bar{\gamma}_{z,t+i})) \right\} \\
& \approx \mathbb{E}_t \left\{ c_t + \bar{\gamma}_{c,t} - \sum_{i=1}^{\infty} \rho_{C\Phi}^i (r_{t+i} - \Delta(c_{t+i} + \bar{\gamma}_{c,t+i})) \right. \\
& \quad \left. - \left(z_t + \bar{\gamma}_{z,t} - \sum_{i=1}^{\infty} \rho_{Z\Psi}^i (r_{t+i} - \Delta(z_{t+i} + \bar{\gamma}_{z,t+i})) \right) \right\} \tag{B.I.26}
\end{aligned}$$

or

$$\begin{aligned}
& \frac{1}{\rho_d} z_t - c_t + \rho_l l_t + \rho_a a_t + \left(\frac{1}{\rho_d} \bar{\gamma}_{z,t} - \bar{\gamma}_{c,t} + \rho_l \bar{\gamma}_{l,t} + \rho_a \bar{\gamma}_{a,t} \right) + \left(1 - \frac{1}{\rho_d} \right) \frac{1}{\mathbb{E}[1 + r_t]} r_t \\
& = \frac{1}{\rho_d} z_t - c_t + \rho_l l_t + \rho_a a_t + \left(\frac{1}{\rho_d} \gamma_{z,t} - \gamma_{c,t} + \rho_l \gamma_{l,t} + \rho_a \gamma_{a,t} \right) + \left(1 - \frac{1}{\rho_d} \right) \frac{1}{\mathbb{E}[1 + r_t]} r_t \\
& \approx \mathbb{E}_t \left\{ \frac{1}{\rho_d} \sum_{i=1}^{\infty} \rho_{Z\Psi}^i (r_{t+i} - \Delta z_{t+i} - \Delta \bar{\gamma}_{z,t+i}) - \sum_{i=1}^{\infty} \rho_{C\Phi}^i (r_{t+i} - \Delta c_{t+i} - \Delta \bar{\gamma}_{c,t+i}) \right\} \tag{B.I.27}
\end{aligned}$$

$$\begin{aligned}
& = \mathbb{E}_t \left\{ -\frac{1}{\rho_d} \sum_{i=1}^{\infty} \rho_{Z\Psi}^i \Delta z_{t+i} + \sum_{i=1}^{\infty} \rho_{C\Phi}^i \Delta c_{t+i} - \sum_{i=1}^{\infty} \left(\rho_{C\Phi}^i - \frac{1}{\rho_d} \rho_{Z\Psi}^i \right) r_{t+i} \right. \\
& \quad \left. + \sum_{i=1}^{\infty} \rho_{C\Phi}^i \Delta \gamma_{c,t+i} - \frac{1}{\rho_d} \sum_{i=1}^{\infty} \rho_{Z\Psi}^i \Delta \gamma_{z,t+i} \right\} \tag{B.I.28}
\end{aligned}$$

$$= \mathbb{E}_t \left\{ -\frac{1}{\rho_d} \sum_{i=1}^{\infty} \rho_{Z\Psi}^i \Delta \hat{z}_{t+i} + \sum_{i=1}^{\infty} \rho_{C\Phi}^i \Delta \hat{c}_{t+i} - \sum_{i=1}^{\infty} \left(\rho_{C\Phi}^i - \frac{1}{\rho_d} \rho_{Z\Psi}^i \right) r_{t+i} \right\}, \tag{B.I.29}$$

where $\Delta \hat{w}_{t+i} \equiv \Delta w_{t+i} + \Delta \bar{\gamma}_{w,t+i} \equiv \Delta w_{t+i} + \Delta \gamma_{w,t+i} \equiv \Delta \ln \mathcal{W}_{t+i}$ for $w = z, c$.

The left-hand side of (B.I.27) includes all the variables that define the current account according to national accounts, but these variables are in logs, while there are also some parameters involved.⁹ An approximate expression resembling the current account can then be defined as:

$$\widetilde{\mathcal{CA}}_t \equiv \frac{1}{\rho_d} z_t - c_t + \rho_l l_t + \rho_a a_t + \left(\frac{1}{\rho_d} \gamma_{z,t} - \gamma_{c,t} + \rho_l \gamma_{l,t} + \rho_a \gamma_{a,t} \right) + \left(1 - \frac{1}{\rho_d} \right) \frac{1}{\mathbb{E}[1 + r_t]} r_t \tag{B.I.30}$$

$$\begin{aligned}
& \rho_l = 1 - \frac{1}{\rho_d} - \rho_a \quad \frac{1}{\rho_d} z_t - c_t + \left(1 - \frac{1}{\rho_d} \right) l_t + \rho_a (a_t - l_t) + \left(\frac{1}{\rho_d} \gamma_{z,t} - \gamma_{c,t} + \rho_l \gamma_{l,t} + \rho_a \gamma_{a,t} \right) \\
& \quad + \left(1 - \frac{1}{\rho_d} \right) \frac{1}{\mathbb{E}[1 + r_t]} r_t \tag{B.I.31}
\end{aligned}$$

⁹The current account is defined as $\mathcal{CA}_t \equiv Z_t - C_t + r_t (\mathcal{A}_t - \mathcal{L}_t)$, while our approximate expressions reads

$$\widetilde{\mathcal{CA}}_t = \frac{1}{\rho_d} z_t - c_t + \left(1 - \frac{1}{\rho_d} \right) l_t + \rho_a (a_t - l_t) + \left(1 - \frac{1}{\rho_d} \right) \frac{1}{\mathbb{E}[1 + r_t]} r_t + \left(\frac{1}{\rho_d} \gamma_{z,t} - \gamma_{c,t} + \rho_l \gamma_{l,t} + \rho_a \gamma_{a,t} \right).$$

$$\begin{aligned} &\equiv (1 - \rho_a - \rho_l) z_t - c_t + \rho_l l_t + \rho_a a_t + ((1 - \rho_a - \rho_l) \gamma_{z,t} - \gamma_{c,t} + \rho_l \gamma_{l,t} + \rho_a \gamma_{a,t}) \\ &\quad + \left(1 - \frac{1}{\rho_d}\right) \frac{1}{E[1 + r_t]} r_t \end{aligned} \quad (\text{B.I.32})$$

$$\begin{aligned} &\equiv (z_t - c_t - (\gamma_{c,t} - \gamma_{z,t})) + \rho_a (a_t - z_t - (\gamma_{z,t} - \gamma_{a,t})) + \rho_l (l_t - z_t - (\gamma_{z,t} - \gamma_{l,t})) \\ &\quad + \left(1 - \frac{1}{\rho_d}\right) \frac{1}{E[1 + r_t]} r_t \end{aligned} \quad (\text{B.I.33})$$

$$\begin{aligned} &\equiv -(c_t - z_t - (\gamma_{z,t} - \gamma_{ct})) + \rho_a (a_t - z_t - (\gamma_{z,t} - \gamma_{a,t})) + \rho_l (l_t - z_t - (\gamma_{z,t} - \gamma_{l,t})) \\ &\quad + \left(1 - \frac{1}{\rho_d}\right) \frac{1}{E[1 + r_t]} r_t \end{aligned} \quad (\text{B.I.34})$$

for which we can define a present value relation, namely

$$\begin{aligned} \widetilde{CA}_t &\approx E_t \left\{ -\frac{1}{\rho_d} \sum_{i=1}^{\infty} \rho_{Z\Psi}^i \Delta z_{t+i} + \sum_{i=1}^{\infty} \rho_{C\Phi}^i \Delta c_{t+i} - \sum_{i=1}^{\infty} \left(\rho_{C\Phi}^i - \frac{1}{\rho_d} \rho_{Z\Psi}^i \right) r_{t+i} \right. \\ &\quad \left. + \sum_{i=1}^{\infty} \rho_{C\Phi}^i \Delta \gamma_{c,t+i} - \frac{1}{\rho_d} \sum_{i=1}^{\infty} \rho_{Z\Psi}^i \Delta \gamma_{z,t+i} \right\} \end{aligned} \quad (\text{B.I.35})$$

$$\widetilde{CA}_t \approx E_t \left\{ -\frac{1}{\rho_d} \sum_{i=1}^{\infty} \rho_{Z\Psi}^i \Delta \hat{z}_{t+i} + \sum_{i=1}^{\infty} \rho_{C\Phi}^i \Delta \hat{c}_{t+i} - \sum_{i=1}^{\infty} \left(\rho_{C\Phi}^i - \frac{1}{\rho_d} \rho_{Z\Psi}^i \right) r_{t+i} \right\}. \quad (\text{B.I.36})$$

This expression shows that a $\widetilde{CA}$ deficit arises when (i) net output is temporarily low but is expected to rise in the future; (ii) the returns on the *NFA* portfolio are expected to increase in the future (provided $\rho_{C\Phi}^i - (1/\rho_d)\rho_{Z\Psi}^i > 0$); (iii) consumption is expected to fall in the future; or some combination of the three. So, in addition to the standard intertemporal model, a current account deficit may result if it is expected that returns to (net) foreign wealth are going to be higher in the future. Note that, differently from the standard intertemporal trade model, we do not make use of the households' optimality conditions dictating the optimal intertemporal consumption allocation (but requiring further maintained assumptions on preferences), to eliminate consumption from the left-hand side of the expression.

To obtain the second approximate expression, substituting (B.I.10) and (B.I.13) in (B.I.22) – and disregarding linearization constants – we find that

$$\begin{aligned} &c_t - \frac{1}{\rho_d} z_t - \rho_l l_t - \rho_a a_t + \left(\bar{\gamma}_{c,t} - \frac{1}{\rho_d} \bar{\gamma}_{z,t} - \rho_l \bar{\gamma}_{l,t} - \rho_a \bar{\gamma}_{a,t} \right) - \left(1 - \frac{1}{\rho_d} \right) \frac{1}{E[1 + r_t]} r_t = \\ &c_t - \frac{1}{\rho_d} z_t - \rho_l l_t - \rho_a a_t + \left(\gamma_{c,t} - \frac{1}{\rho_d} \gamma_{z,t} - \rho_l \gamma_{l,t} - \rho_a \gamma_{a,t} \right) - \left(1 - \frac{1}{\rho_d} \right) \frac{1}{E[1 + r_t]} r_t \approx \\ &E_t \left\{ \sum_{i=1}^{\infty} \rho_{C\Phi}^i (r_{t+i} - \Delta c_{t+i} - \Delta \bar{\gamma}_{c,t+i}) - \frac{1}{\rho_d} \sum_{i=1}^{\infty} \rho_{Z\Psi}^i (r_{t+i} - \Delta z_{t+i} - \Delta \bar{\gamma}_{z,t+i}) \right\} \end{aligned} \quad (\text{B.I.37})$$

$$= E_t \left\{ - \sum_{i=1}^{\infty} \rho_{C\Phi}^i \Delta c_{t+i} + \frac{1}{\rho_d} \sum_{i=1}^{\infty} \rho_{Z\Psi}^i \Delta z_{t+i} + \sum_{i=1}^{\infty} \rho_{C\Phi}^i r_{t+i} - \frac{1}{\rho_d} \sum_{i=1}^{\infty} \rho_{Z\Psi}^i r_{t+i} \right. \\ \left. - \sum_{i=1}^{\infty} \rho_{C\Phi}^i \Delta \gamma_{c,t+i} + \frac{1}{\rho_d} \sum_{i=1}^{\infty} \rho_{Z\Psi}^i \Delta \gamma_{z,t+i} \right\} \quad (\text{B.I.38})$$

$$= E_t \left\{ - \sum_{i=1}^{\infty} \rho_{C\Phi}^i \Delta c_{t+i} + \frac{1}{\rho_d} \sum_{i=1}^{\infty} \rho_{Z\Psi}^i \Delta z_{t+i} + \sum_{i=1}^{\infty} \left(\rho_{C\Phi}^i - \frac{1}{\rho_d} \rho_{Z\Psi}^i \right) r_{t+i} \right. \\ \left. - \sum_{i=1}^{\infty} \rho_{C\Phi}^i \Delta \gamma_{c,t+i} + \frac{1}{\rho_d} \sum_{i=1}^{\infty} \rho_{Z\Psi}^i \Delta \gamma_{z,t+i} \right\} \quad (\text{B.I.39})$$

$$= E_t \left\{ - \sum_{i=1}^{\infty} \rho_{C\Phi}^i \Delta \hat{c}_{t+i} + \frac{1}{\rho_d} \sum_{i=1}^{\infty} \rho_{Z\Psi}^i \Delta \hat{z}_{t+i} + \sum_{i=1}^{\infty} \left(\rho_{C\Phi}^i - \frac{1}{\rho_d} \rho_{Z\Psi}^i \right) r_{t+i} \right\}. \quad (\text{B.I.40})$$

In this instance, we may define an approximate expression that resembles the capital account as:

$$\widetilde{KA}_t \equiv c_t - \frac{1}{\rho_d} z_t - \rho_l l_t - \rho_a a_t + \left(\gamma_{c,t} - \frac{1}{\rho_d} \gamma_{z,t} - \rho_l \gamma_{l,t} - \rho_a \gamma_{a,t} \right) - \left(1 - \frac{1}{\rho_d} \right) \frac{1}{E[1+r_t]} r_t \quad (\text{B.I.41})$$

$$\equiv (c_t + \gamma_{c,t}) - \left(\frac{1}{\rho_d} + \rho_l + \rho_a \right) (z_t + \gamma_{z,t}) - \rho_l (l_t - z_t + (\gamma_{l,t} - \gamma_{z,t})) - \rho_a (a_t - z_t + (\gamma_{a,t} - \gamma_{z,t})) \\ - \left(1 - \frac{1}{\rho_d} \right) \frac{1}{E[1+r_t]} r_t \quad (\text{B.I.42})$$

$$\equiv (c_t - z_t - (\gamma_{z,t} - \gamma_{c,t})) - \rho_l (l_t - z_t - (\gamma_{z,t} - \gamma_{l,t})) - \rho_a (a_t - z_t - (\gamma_{z,t} - \gamma_{a,t})) \\ - \left(1 - \frac{1}{\rho_d} \right) \frac{1}{E[1+r_t]} r_t \quad (\text{B.I.43})$$

for which we can also write a present value relation, namely¹⁰

$$\widetilde{KA}_t \approx E_t \left\{ - \sum_{i=1}^{\infty} \rho_{C\Phi}^i \Delta c_{t+i} + \frac{1}{\rho_d} \sum_{i=1}^{\infty} \rho_{Z\Psi}^i \Delta z_{t+i} + \sum_{i=1}^{\infty} \left(\rho_{C\Phi}^i - \frac{1}{\rho_d} \rho_{Z\Psi}^i \right) r_{t+i} \right. \\ \left. - \sum_{i=1}^{\infty} \rho_{C\Phi}^i \Delta \gamma_{c,t+i} + \frac{1}{\rho_d} \sum_{i=1}^{\infty} \rho_{Z\Psi}^i \Delta \gamma_{z,t+i} \right\}, \quad (\text{B.I.44})$$

$$E_t \left\{ - \sum_{i=1}^{\infty} \rho_{C\Phi}^i \Delta \hat{c}_{t+i} + \frac{1}{\rho_d} \sum_{i=1}^{\infty} \rho_{Z\Psi}^i \Delta \hat{z}_{t+i} + \sum_{i=1}^{\infty} \left(\rho_{C\Phi}^i - \frac{1}{\rho_d} \rho_{Z\Psi}^i \right) r_{t+i} \right\} \quad (\text{B.I.45})$$

This last expression — symmetrically to the definition of $\widetilde{CA}_t$ — shows that capital account surpluses arise when (i) net output is temporarily low and is expected to increase; (ii) returns on the *NFA* portfolio are predicted to increase in the future; (iii) consumption is temporarily high and is expected to fall in the future; or some combination of the three.

B.II Discussion, Refinements and Building Intuition

The framework presented in the previous section is quite general. It can accommodate a rich array of theoretical structures, and allow for quite flexible empirical strategies. The fact that each of our

¹⁰Observe that this expression may be obtained by multiplying (B.I.27)–(B.I.29) by -1 . In this sense $\widetilde{KA}_t = -\widetilde{CA}_t$.

variables is allowed to grow at a different deterministic time-varying rate, $\gamma_{w,t}$, indicates that our cointegration implications remain valid even in the presence of deterministic structural breaks of the kind usually considered in the empirical literature (see e.g. Perron, 1989).¹¹ All that is required for our empirical analysis is that the cointegration implications spelled out in Assumption B.2 to hold — which may be evaluated empirically.

For our results, we can simplify the above derivations, and obtain somewhat sharper implications, by making an additional assumption. Specifically, in our empirical application we assume that:

Assumption B.3 (Empirical in-sample Approximation) *The deterministic trend components $\gamma_{w,t}$ may be expressed (in-sample) as linear functions of time*

$$\gamma_{w,t} = \gamma_w \times t, \quad (\text{B.II.46})$$

for $w = c, z, a, l$.

This assumption is to be viewed as an in-sample approximation, where all the variables grow at different rates. This also simplifies statistical inference. In order for Assumption B.1(c) to hold in the limit, it would be necessary – sometime in the future – that these trend parameters change, so that $\gamma_w = \gamma$ in the limit, hence implying some sort of “structural break”. It is worth re-iterating that breaks in deterministic trends do not impact on our results, as we are mainly interested in the stochastic components of the series we study (the stochastic trend and cyclical components). This is why the above assumption is particularly convenient, as it amounts to a parsimonious way in controlling for deterministic components, while sharply focusing on the impact of permanent and transitory shocks, on consumption, net output, gross assets and liabilities and consequently examine the behavior of the net foreign assets position and the current account dynamics that stem from such shocks.

Although the linear time trend is merely a crude approximation of growing financial market integration and increasing capital market liberalization, its inclusion in the analysis may be quite important in order to describe the equilibrium relationships among aggregate consumption, net output, gross assets and liabilities positions. As long as there exist exogenous factors that are approximated by deterministic components, these deterministic components belong in the empirical analysis.

Indeed, econometrically, the exclusion of such trends from the outset in an empirical analysis might lead to misspecification of the cointegrating relations being estimated. Suppose that a time trend is unduly excluded from the cointegrating relation. Then the estimated coefficients would primarily capture the relation among the individual deterministic time trends, instead of the common stochastic trend, at least asymptotically, because the time trend asymptotically dominates the stochastic trend. Therefore, the estimates of the cointegrating vectors would be biased.¹²

Under Assumption B.3 we may re-define:

$$\rho_d \equiv 1 - E[1 + r_t] \exp(E[l_t + \bar{\gamma}_l t - \psi_t]) + E[1 + r_t] \exp(E[a_t + \bar{\gamma}_a t - \psi_t]),$$

¹¹There is still an issue of whether the approximation error is small or large. We return to this issue below.

¹²See Hamilton (1994) for a discussion.

$$\rho_a \equiv \left(1 - \frac{1}{\rho_d}\right) + \frac{\mathbb{E}[1 + r_t] \exp(\mathbb{E}[l_t + \bar{\gamma}_l t - \psi_t])}{\rho_d}, \text{ and}$$

$$\rho_l \equiv \left(1 - \frac{1}{\rho_d}\right) - \frac{\mathbb{E}[1 + r_t] \exp(\mathbb{E}[a_t + \bar{\gamma}_a t - \psi_t])}{\rho_d},$$

where $\bar{\gamma}_w \equiv \gamma_w - \gamma$, with γ being the limiting growth rate. It then follows that (letting $\bar{\gamma}_w \equiv \gamma_z - \gamma_w$ for $w = c, a, l$ to ‘simplify’ notation)

$$\begin{aligned} \widetilde{CA}_t &\equiv \frac{1}{\rho_d} z_t - c_t + \rho_l l_t + \rho_a a_t + \left(\frac{1}{\rho_d} \gamma_z - \gamma_c + \gamma_l + \gamma_a\right) t + \left(1 - \frac{1}{\rho_d}\right) \frac{1}{\mathbb{E}[1 + r_t]} r_t \\ &\equiv -(c_t - z_t - \bar{\gamma}_c t) + \rho_a (a_t - z_t - \bar{\gamma}_a t) + \rho_l (l_t - z_t - \bar{\gamma}_l t) + \left(1 - \frac{1}{\rho_d}\right) \frac{1}{\mathbb{E}[1 + r_t]} r_t. \end{aligned} \quad (\text{B.II.47})$$

Hence, the present value relation for $\widetilde{CA}_t$, becomes¹³

$$\begin{aligned} \widetilde{CA}_t &\approx \mathbb{E}_t \left\{ -\frac{1}{\rho_d} \sum_{i=1}^{\infty} \rho_{Z\Psi}^i \Delta z_{t+i} + \sum_{i=1}^{\infty} \rho_{C\Phi}^i \Delta c_{t+i} - \sum_{i=1}^{\infty} \left(\rho_{C\Phi}^i - \frac{1}{\rho_d} \rho_{Z\Psi}^i \right) r_{t+i} \right. \\ &\quad \left. + \sum_{i=1}^{\infty} \rho_{C\Phi}^i \gamma_c - \frac{1}{\rho_d} \sum_{i=1}^{\infty} \rho_{Z\Psi}^i \gamma_z \right\}, \text{ or:} \end{aligned} \quad (\text{B.II.48})$$

$$\widetilde{CA}_t \approx \mathbb{E}_t \left\{ -\frac{1}{\rho_d} \sum_{i=1}^{\infty} \rho_{Z\Psi}^i \Delta \hat{z}_{t+i} + \sum_{i=1}^{\infty} \rho_{C\Phi}^i \Delta \hat{c}_{t+i} - \sum_{i=1}^{\infty} \left(\rho_{C\Phi}^i - \frac{1}{\rho_d} \rho_{Z\Psi}^i \right) r_{t+i} \right\}. \quad (\text{B.II.49})$$

Note in addition that under [Assumptions B.1, B.2](#) and [B.3](#), it follows that

$$\begin{aligned} c_t - z_t - (\gamma_z - \gamma_c) t &\equiv c_t - z_t - \bar{\gamma}_c t, \\ a_t - z_t - (\gamma_z - \gamma_a) t &\equiv a_t - z_t - \bar{\gamma}_a t, \\ l_t - z_t - (\gamma_z - \gamma_l) t &\equiv l_t - z_t - \bar{\gamma}_l t, \end{aligned}$$

and r_t

are stationary processes, hence

$$\begin{aligned} \widetilde{CA}_t &= -(c_t - z_t - \bar{\gamma}_c t) + \rho_a (a_t - z_t - \bar{\gamma}_a t) + \rho_l (l_t - z_t - \bar{\gamma}_l t) \\ &\quad + \left(1 - \frac{1}{\rho_d}\right) \frac{1}{\mathbb{E}[1 + r_t]} r_t \sim I(0). \end{aligned} \quad (\text{B.II.50})$$

It is easy to verify that the parameters $(1/\rho_d)$, ρ_l and ρ_a cannot be identified separately, given the implications of the balanced growth assumption. This further implies that we will not be able to estimate a relationship like (B.II.49)–(B.II.50), which essentially is a linear combination of $(c_t - z_t)$, $(a_t - z_t)$, $(l_t - z_t)$ and r_t and a linear function of time, without further assumptions. Thus, the parameter restriction that $(1/\rho_d) + \rho_l + \rho_a = 1$ cannot be tested.

A crude alternative, which we explore in an extension of our work, is to obtain these parameters based on the sample averages of the three cointegrating relations and *NFA* portfolio returns and assuming particular parameter values for $\rho_{Z\Psi}$. With this parameter value at hand, we can subse-

¹³Note that $\Delta \gamma_{w,t+i} = \gamma_w(t+i) - \gamma_w(t+i-1) = \gamma_w$

quently determine ρ_a and ρ_l and construct a measure $\widetilde{CA}_t$. By making further assumptions about the value of $\rho_{C\Phi}$ we can also address issues in the quality of the approximation (B.II.49).

B.III Related literature

As we already discussed in the paper, our work contributes to the literature focusing on the empirical implications of the intertemporal budget constraint, see e.g. [Engel and Rogers \(2006\)](#), and is closely related to [Gourinchas and Rey \(2007a\)](#). In this subsection, we present a brief overview of the similarities and differences in our work, and the work by these authors.

B.III.1 Similarities and Differences with Engel and Rogers (2006)

The starting point of [Engel and Rogers \(2006\)](#), like ours, is the intertemporal budget constraint (see their eq. (1)).¹⁴

$$E_t \sum_{i=0}^{\infty} R_{t,t+i} Z_{t+i} = (1 + r_t) (\mathcal{L}_t - \mathcal{A}_t) + E_t \sum_{i=0}^{\infty} R_{t,t+i} C_{t+i}.$$

However, to sharpen their analysis, these authors address explicitly the optimization problem of the national representative households, making assumption about preferences — a step that we deliberately avoid in our approach.

At the time when they wrote their paper, Engel and Rogers observed that the share of US output in world output had been trending upwards since the 1990s. As this share cannot grow without bounds, they argued, at some point in the future the share must stabilize along some long-run growth path. This is analogous to our [Assumption B.1\(c\)](#) under which, the growth rates of each variable is allowed to differ, but at some point in time all variables in our model are assumed to grow at the same rate.

In the empirical implementation of their model, Engel and Rogers estimate an intertemporal model (expressed in output shares), positing that agents expect the share of US output in world output to grow over some years, then converge to some higher long-run level – hence making an implicit assumption about how and when the trend would end. In our work, we also allow all variables to grow at different rates, hence the ratios of consumption and gross positions to net output are allowed to follow upward linear (or non-linear) trends. We also implicitly assume that the differential trend is going to vanish, but this may occur at some date outside our sample. We should observe that the evolution of our terms $\exp(\gamma_{at} - \gamma_{zt})$, $\exp(\gamma_{lt} - \gamma_{zt})$ — the growth rates of gross assets and liabilities relative to net output — would capture the degree to which the US net output share evolves over time — provided that $\exp(\gamma_{at})$ and/or $\exp(\gamma_{lt})$ capture the growth rate of the rest of the world net output.

A key message from the work by [Engel and Rogers \(2006\)](#) is that the external imbalance of the U.S. can be reconciled with optimal intertemporal decisions driven by (expectations of) a permanent (within sample) increase in US output growth, i.e. a rising net output share. In our empirical analysis, we find evidence for the basic mechanism underlying their model/argument: we find that consumption adjusts swiftly to permanent shocks raising US net output in the long run, generating a current account deficit. In this respect, nonetheless, it is worth pointing out a modeling difference

¹⁴In the comparison, it is useful to keep in mind a difference: unlike [Engel and Rogers \(2006\)](#) we explicitly consider gross assets and liabilities separately, whereas these authors focus on the *NFA* position of the US.

between our approach and that of [Engel and Rogers \(2006\)](#). These authors use observable variables (e.g. net output share, interest rates, output forecasts etc.) to assess whether the observed time-series of the current account can be reconciled with optimal consumption smoothing. Conversely, in our work we focus on the macro response to *unobservable shocks*, characterized by their persistence, to analyze the behavior of consumption, net output, gross assets and liabilities positions, as well as on the current account.

B.III.2 Similarities and Differences with Gourinchas and Rey (2007a)

Our work is also closely related to that of [Gourinchas and Rey \(2007a\)](#), henceforth GR. In particular, these authors start from the accounting identity

$$[\mathcal{A}_{t+1} - \mathcal{L}_{t+1}] = (1 + r_{t+1}) (\mathcal{A}_t - \mathcal{L}_t + \mathcal{Z}_t - \mathcal{C}_t) \quad (\text{B.III.51})$$

$$\mathcal{NFA}_{t+1} = (1 + r_{t+1}) (\mathcal{NFA}_t + \mathcal{Z}_t - \mathcal{C}_t) \quad (\text{B.III.52})$$

$$= (1 + r_{t+1}) (\mathcal{NFA}_t + \mathcal{X}_t - \mathcal{M}_t) \quad (\text{B.III.53})$$

where the last equality follows from the national accounting identity $\mathcal{Y}_t = \mathcal{C}_t + \mathcal{G}_t + \mathcal{I}_t + \mathcal{X}_t - \mathcal{M}_t$. Instead, we work with the period budget constraint

$$\mathcal{NFA}_{t+1} = (1 + r_t) \mathcal{NFA}_t + \mathcal{Z}_t - \mathcal{C}_t.$$

Note the different timing convention. First, in our framework r_t denotes end of period t returns, corresponding to r_{t+1} in (B.III.52). Second, we work with end of period gross positions, whereas these authors work with beginning of period gross positions. One can solve (B.III.52) or (B.III.53) forward and impose a transversality condition — as we do — and arrive at an IBC of the form:

$$\begin{aligned} E_t \sum_{i=0}^{\infty} R_{t,t+i} \mathcal{Z}_{t+i} + \mathcal{NFA}_t &= E_t \sum_{i=0}^{\infty} R_{t,t+i} \mathcal{C}_{t+i}, \\ E_t \sum_{i=0}^{\infty} R_{t,t+i} \mathcal{X}_{t+i} + \mathcal{NFA}_t &= E_t \sum_{i=0}^{\infty} R_{t,t+i} \mathcal{M}_{t+i}, \end{aligned}$$

which is similar to the IBC we work with. However, GR prefer to develop their framework moving from (B.III.53), and imposing a similar limit condition, after approximating (B.III.53).

To facilitate the comparison between our work and GR, we now reconsider our analyses step by step, using the accounting identity (B.III.52)–(B.III.53). While GR divide (B.III.53) by ‘household wealth’ (in practice, by household net worth), we use net output. Using these alternative variables for normalization we can write:

$$\tilde{\mathcal{A}}_{t+1} - \tilde{\mathcal{L}}_{t+1} = R_{t+1}/\Gamma_{z,t+1} (\tilde{\mathcal{A}}_t - \tilde{\mathcal{L}}_t + 1 - \tilde{\mathcal{C}}_t) \quad (\text{B.III.54})$$

$$\hat{\mathcal{A}}_{t+1} - \hat{\mathcal{L}}_{t+1} = R_{t+1}/\Gamma_{W,t+1} (\hat{\mathcal{A}}_t - \hat{\mathcal{L}}_t + \hat{\mathcal{X}}_t - \hat{\mathcal{M}}_t) \quad (\text{B.III.55})$$

In the above equations, let a tilde over variables denote ratios to net output; a hat over variables denote ratios to household wealth. To these, we then add:

$$\bar{\mathcal{A}}_{t+1} - \bar{\mathcal{L}}_{t+1} = \bar{R}_{t+1}/\bar{\Gamma}_{W,t+1} (\bar{\mathcal{A}}_t - \bar{\mathcal{L}}_t + \bar{\mathcal{X}}_t - \bar{\mathcal{M}}_t) \quad (\text{B.III.56})$$

where bars over variables denote the ‘trend economy’, as defined by GR.

Assumption 2 in GR states that the trend components $\bar{Q}_t$ admit a common, possibly time varying growth rate: $\bar{Q}_t = \bar{Q}\mu_t$. Note that this assumption in our context would amount to positing that the variables in our system could grow at different rates, i.e. $W_t = W_t \exp(\gamma_{w,t})$, so that the ratios $\tilde{C}_t$, $\tilde{A}_t$ and $\tilde{L}_t$ could grow over time. Our decomposition would then imply that one cannot find other ratios which become stationary/constant within sample (this would hold only in the limit); instead, in the context of GR's work, there are some other ratios that are indeed constant: for instance the ratio of (trend) gross positions $\bar{A}_t/\bar{L}_t = \bar{Q}_A\mu_t/\bar{Q}_L\mu_t = \bar{Q}_A/\bar{Q}_L$ is constant in the GR trend economy, whereas in our context stationarity would require imposing further assumptions.¹⁵

Next the *Assumption 3* in GR, that $\lim_{t \rightarrow \infty} \mu_t = 1$ and that $\bar{R}_{t+1} \rightarrow R$, $\bar{\Gamma}_{t+1} \rightarrow \Gamma$, such that $R > \Gamma$, is similar to our [Assumption B.1](#), especially part (c). This guarantees that the ratios of variables to household wealth remain constant in their trend economy, while in our work [Assumption B.1\(c\)](#) guarantees that the ratios $\tilde{C}_t$, $\tilde{A}_t$, and $\tilde{L}_t$ stabilize in the limit. In addition, [Assumption B.1\(c\)](#) guarantees that the mean return is larger than the mean growth rate of all the variables in the system, once the economy settles to a situation where all the variables grow at the same, possibly time-varying growth rate.

Assumption 1 in GR states that $\varepsilon_t^q = \ln(Q_t/\bar{Q}_t)$ for $Q \in (\mathcal{X}, \mathcal{M}, \mathcal{A}, \mathcal{L})$, $\varepsilon_t^{\Delta w} = \ln(\Gamma_t/\bar{\Gamma}_t)$ and $\hat{r}_t = \ln(R_t/\bar{R}_t)$ are stationary and small. In our context, these correspond to [Assumption B.1\(a\)](#) (returns are stationary); [Assumption B.1\(b\)](#) (the growth rates of the scaling variable — actually each variable in our system — are stationary); and [Assumption B.2](#) (by means of which ε_t^q and the (logs of the) ratios $\tilde{C}_t$, $\tilde{A}_t$, and $\tilde{L}_t$ are assumed to be stationary).

A key difference between the empirical work by GR and ours is that we allow from the start for both deterministic and stochastic trends in variables, to be estimated jointly by the data. A key advantage of our approach is that, while being theoretically consistent with a number of models, it does not eliminate stochastic trends underpinning cointegration analysis. On the other hand, [Gourinchas and Rey \(2007a\)](#) also allow for deterministic trends in their work (e.g. μ_t). However, they employ low frequency filters to obtain the cyclical components of their series (e.g. ε_t^q), thereby eliminating the common stochastic trends from their empirical analysis. This does not occur in our analysis since the cyclical components of $\ln(\tilde{C}_t)$, $\ln(\tilde{A}_t)$, and $\ln(\tilde{L}_t)$ are obtained by the cointegrating relations between consumption, gross assets and liabilities with net output. Indeed the ability to analyze explicitly the common stochastic trend, i.e. the permanent shocks, is key to our analysis, as the intertemporal trade model makes a sharp distinction in the current account response to permanent and temporary shocks.

C Robustness Results and Extensions

C.I Robustness Analysis

C.I.1 Results Using Baseline Data and Sample

In order to assess the robustness of the results reported in the paper, we carry out a series of robustness checks. The first is varying the number of lags in the VAR systems. Our results remain unaffected by this variations. Specifically our cointegration results, reported in [Table A.2](#) provide evidence in favor of three cointegrating relations in the data. We have also coupled this finding,

¹⁵Note however that the ratio $\mathcal{A}_t/\mathcal{L}_t$ becomes stationary in our context, but only in the limit.

with evidence from unit root and stationarity tests (in Table A.3). In this case, we assess whether log differences of the variables of interest (the ‘great ratios’), namely $c_t - z_t$, $a_t - z_t$ and $l_t - z_t$ can be characterized as trend-stationary – as in our Assumption B.2 and B.3. We then experiment with estimating the cointegrating relations employing Johansen (1995)’s FIML and Stock and Watson (1993)’s DOLS, and found that these are close to those reported in the paper. More importantly, we find that the restrictions on the cointegrating vectors (in the form $[1, -1]$) are not rejected when varying the number of leads/lags in the DOLS procedure, once we employ empirical p -values. We then perform our variance decompositions (see Table B.1), our variance-covariance decompositions (see Table B.2) and impulse response analysis (see Figures A.1 and A.2) and find that our results remain robust to variations in the lag-length.

As a second robustness check, we identify permanent and transitory shocks in our system, by requiring that they are orthogonal from the outset. To see this more clearly, the approach we take in the paper (following Gonzalo and Ng (2001)) is to identify the permanent and transitory shocks by using the matrix

$$\mathbf{G} = \begin{bmatrix} \alpha'_{\perp} \\ \beta' \end{bmatrix}$$

so that permanent and transitory shocks are defined as

$$\eta_t = \begin{bmatrix} \eta_t^P \\ \eta_t^T \end{bmatrix} = \mathbf{G} \mathbf{u}_t = \begin{bmatrix} \alpha'_{\perp} \mathbf{u}_t \\ \beta' \mathbf{u}_t \end{bmatrix} \text{ with } \text{Var}(\eta_t) = \mathbf{G} \Omega \mathbf{G}'.$$

In this instance, permanent and transitory innovations to the system are allowed to be correlated. If we require that these are orthogonal – we do so in our impulse response analysis – then identification is achieved by means of a simple Cholesky decomposition of $\text{Var}(\eta_t)$, $\mathbf{H}$. As explained in Gonzalo and Ng (2001), $\mathbf{H}^{-1} \mathbf{G}$ achieves a permanent transitory decomposition, with shocks that are orthogonal. Letting $\mathbf{B}(L) = \mathbf{C}(L) \mathbf{G}^{-1}$, $\tilde{\mathbf{B}}(L) = \mathbf{C}(L) \mathbf{G}^{-1} \mathbf{H}$, $\mathbf{e}_t = \mathbf{G} \mathbf{u}_t$ and $\eta_t = \mathbf{H}^{-1} \mathbf{G} \mathbf{u}_t$, the transformed Wold representation is

$$\Delta \mathbf{x}_t = \Upsilon \mathbf{D}_t + \mathbf{C}(L) \mathbf{G}^{-1} \mathbf{G} \mathbf{u}_t = \Upsilon \mathbf{D}_t + \mathbf{B}(L) \eta_t = \Upsilon \mathbf{D}_t + \mathbf{C}(L) \mathbf{G}^{-1} \mathbf{H} \mathbf{H}^{-1} \mathbf{G} \mathbf{u}_t = \Upsilon \mathbf{D}_t + \tilde{\mathbf{B}}(L) \mathbf{e}_t.$$

An alternative way to identify permanent and transitory shocks which we also explore in our context is along the lines of King *et al.* (1991) and Mellander *et al.* (1992). In particular, we define again the permanent disturbances (permanent shocks) as: $\eta_t^P = \alpha'_{\perp} \mathbf{u}_t$. Then by requiring that the permanent and transitory shocks be orthogonal to each other, we can define the transitory shocks as: $\eta_t^T = \alpha' \Omega^{-1} \mathbf{u}_t$. Letting

$$\tilde{\mathbf{G}} = \begin{bmatrix} \alpha'_{\perp} \\ \alpha' \Omega^{-1} \end{bmatrix}$$

the transformed (permanent and transitory) shocks are given by¹⁶

$$\eta_t = \begin{bmatrix} \eta_t^P \\ \eta_t^T \end{bmatrix} = \begin{bmatrix} \alpha'_\perp \mathbf{u}_t \\ \alpha' \Omega^{-1} \mathbf{u}_t \end{bmatrix} = \check{\mathbf{G}} \mathbf{u}_t \quad (\text{C.I.57})$$

$$\text{with Var}(\eta_t) = \begin{bmatrix} \alpha'_\perp \Omega \alpha_\perp_{(n-r) \times (n-r)} & \mathbf{0}_{(n-r) \times r} \\ \mathbf{0}_{r \times (n-r)} & \alpha' \Omega^{-1} \alpha_{r \times r} \end{bmatrix} = \check{\mathbf{G}} \Omega \check{\mathbf{G}}'. \quad (\text{C.I.58})$$

Note that in this way one achieves both a rotation from reduced-form shocks to permanent and transitory shocks, and an orthogonalization. Letting $\mathbf{B}(L) = \mathbf{C}(L) \check{\mathbf{G}}^{-1}$, and $\eta_t = \check{\mathbf{G}} \mathbf{u}_t$, the transformed Wold representation is

$$\Delta \mathbf{x}_t = \Upsilon \mathbf{D}_t + \mathbf{C}(L) \check{\mathbf{G}}^{-1} \check{\mathbf{G}} \mathbf{u}_t = \Upsilon \mathbf{D}_t + \mathbf{B}(L) \eta_t. \quad (\text{C.I.59})$$

We find that making use of this alternative identification scheme, our findings are nearly identical to those discussed above. Results from our variance decompositions are summarized in Table B.3 and our impulse responses in Figures A.3 and A.4. In particular, any difference that arises between the two identification schemes shows up beyond the third decimal point.

Then, in order to account empirically for the endogeneity of returns – thus far left unmodelled explicitly – we include them in the VAR analysis. In order to economize on degrees of freedom, we only include the return differential $r_t^a - r_t^l$. As this variable is stationary, the dimension of the cointegrating space rises by one, so now $r = 4$ and there are four transitory shocks in our system. That is, we employ the three cointegrating relations reported in Panel B of Table 1 in the paper, and append $r_t^a - r_t^l$ as an extra cointegrating relation. We then perform a series of experiments, by varying the lag-length, and employing the two identification schemes just discussed and find that our main conclusions remain largely unaffected. Results from our baseline identification (as in Gonzalo and Ng, 2001) are summarized in Table B.4 and Figures A.5 and A.6. Results when we employ the identification scheme of King *et al.* (1991) and Mellander *et al.* (1992) are summarized in Table B.5 and Figures A.7 and A.8.

C.I.2 Extending the Sample and Allowing for Non-Linear Trends

The analysis reported in our paper focuses on the period 1973–2004, using quarterly gross positions derived from the data in Lane and Milesi-Ferretti (2007). We can then assess how robust our results are to different measures of gross positions and more importantly to data that cover a different period, by employing the series constructed by Gourinchas and Rey (2007a,b). These data are based on different data sources, and on different methodologies to calculate valuation-adjusted stocks. In this particular robustness experiment, we are able to derive new interesting results.

Using this dataset, we start by examining whether the data support the existence of three cointegrating relations. Table B.6 reports our tests for various lag specifications, which in general support the existence of one cointegrating relation. When we couple these tests with unit root tests of the

¹⁶Further requiring that permanent and transitory shocks are also orthogonal amongst themselves and that they have unit variance, we can use alternatively

$$\hat{\mathbf{G}} = \begin{bmatrix} (\alpha'_\perp \Omega^{-1} \alpha'_\perp)^{-1/2} \alpha'_\perp \\ (\alpha' \Omega^{-1} \alpha)^{-1/2} \alpha' \Omega^{-1} \end{bmatrix}.$$

‘great ratios’ in Table B.7 we find that $c_t - z_t$ may indeed be characterized as a trend-stationary series, in accordance with Assumption B.3, whereas $a_t - z_t$ and $l_t - z_t$ cannot. Hence the ratios of gross assets and liabilities to net output violate Assumption B.3.

There is however a straightforward generalization of our approach, which allow us to apply our methodology nonetheless. Consistent with the logic of our analysis of deterministic trends, we conjecture the presence of a within- sample break in these trends (fully consistent with Assumption B.2), prior to the beginning of the large increase in cross-border asset holding with market liberalization. We test this hypothesis employing the Zivot and Andrews (1992) unit root test, which determines the deterministic break-points — if any — endogenously. Most interestingly, it turns out that there is a deterministic trend break in the assets to (net) output ratio occurring in 1974:Q1 and a break in the liabilities ratio occurring in 1970:Q1. These dates precede somewhat the official liberalization initiatives in the US, Germany, the UK and Japan in the seventies. Yet they are placed at the time in which Bretton Woods arrangements were already under strain, with large speculative capital flows pointing to a *de facto* relaxation of controls across borders. This finding is important in light of our methodology, as it underscores the notion that deterministic trends may be non-linear — essentially piece-wise linear. Although the type of non-linear trends considered does not cover the full range of alternatives — this is so for econometric reasons¹⁷ — it serves to illustrate that what such phenomena can be accommodated in the framework we suggest in this paper.

In what follows we allow for deterministic trend breaks in the cointegrating space. We start by re-estimating the cointegrating relations, and assessing whether they conform with the symmetry assumption, being of the form $[1, -1]$ (see Table B.8), while allowing for different growth rates in different parts of the sample. We find that this is indeed the case – the symmetry hypothesis is not rejected by the data. We then repeat our variance decomposition exercises, and find evidence similar to those reported in our paper (see Table B.9 when employing our baseline identification; Table B.10 when allowing for permanent and transitory shocks to be correlated; and Table B.11 when using the identification scheme of King *et al.* (1991) and Mellander *et al.* (1992)). We also find similar patterns of impulse responses to the permanent shock (see Figures A.9 to A.12). We then explore further how including the return differential in our analysis, $r_t^a - r_t^l$, changes our conclusions. Our findings (see Tables B.12 and B.13; and Figures A.13 to A.16) show that our main conclusions are similar to those discussed in the paper and above.

C.I.3 Using Total Consumption instead of Nondurables and Services Consumption

In another robustness check, we replace nondurables and services consumption, with total consumption. We first test for the number of cointegrating relations in our system (Table B.14). The evidence in favor of three cointegrating relations are rather weak in this case. We then assess whether the ‘great ratios’ can be considered as stationary (B.15), and while the Phillips and Perron (1988) in some cases do not reject the unit root null, the stationarity tests of Kwiatkowski *et al.* (1992) consistently do not reject the null of trend-stationarity. On balance, we accept the existence of three cointegrating relations (trend-stationary ratios) and repeated all our experiments regarding variance decompositions and impulse response analysis. These are summarized in Tables B.17 to B.21 and Figures A.17 to A.24. Our main conclusions remain unaffected. The only difference that

¹⁷To the best of our knowledge, any meaningful econometric analysis of integrated variables requires that the deterministic trends be linear or piece-wise linear, allowing for at most two shifts (e.g. trend-breaks) in the sample analyzed.

emerges is that the transitory component in consumption is now much more pronounced, especially when the adjustment coefficients in the consumption equation, α_c , are set to their estimated values, rather than restricted to zero. Their contribution is noteworthy, especially at short horizons. When we include the return differential in the analysis, we obtain similar results.

C.II Extensions of Our Work

C.II.1 The Approximate Current Account Expression, $\widetilde{CA}_t$, and the Approximation Errors

In this subsection we discuss how to obtain estimates of the approximate current account expression, $\widetilde{CA}_t$, and how we assess the magnitude of the approximation errors, from our log-linearized intertemporal budget constraint. We emphasize from the start that the intertemporal budget constraint

$$E_t \sum_{i=0}^{\infty} R_{t,t+i} Z_{t+i} = (1 + r_t) [\mathcal{L}_t - \mathcal{A}_t] + E_t \sum_{i=0}^{\infty} R_{t,t+i} C_{t+i},$$

involves two unobservable variables, namely the present value of net output, $\sum_{i=0}^{\infty} R_{t,t+i} Z_{t+i}$, and the present value of consumption, $\sum_{i=0}^{\infty} R_{t,t+i} C_{t+i}$. Hence, strictly speaking, the accuracy of the approximation cannot be directly addressed — for instance the same holds in [Campbell and Mankiw \(1989\)](#) and [Lettau and Ludvigson \(2001, 2004\)](#), whereas the analysis involves unobservable human capital variables, or more in general unobservable total wealth.¹⁸

In principle, one possible approach would consist of positing a specific functional form for preferences of the home country (the US), make some further assumptions regarding functional forms of the preferences for rest of the world (ROW), and the source of uncertainty, and solve for the equilibrium paths of consumption, returns etc.¹⁹ Even so, however, the intertemporal budget constraint would require us to solve the model over the infinite horizon. Accuracy would then be assessed at the cost of a large loss of generality in our results.

As we are primarily concerned with the relative importance of permanent and transitory variations for consumption, net output and the current account, we have opted for an *alternative*, more practical approach, to assess the magnitude of approximation errors. Specifically, we obtain a series for the approximate expression $\widetilde{CA}_t$ (or $\widetilde{KA}_t$) by assigning a numerical value to $\rho_{Z\Psi}$, which we then use to quantify ρ_d, ρ_a, ρ_l , from the data. Conditional on $\rho_{Z\Psi}$ — and assuming that $\rho_{C\Phi}$ is roughly equal — we measure the approximation errors simply by the difference of the two sides of (B.I.36).

We have chosen this practical approach for three reasons. *First*, the bulk of our results are about the fact that transitory variations dominate the fluctuations in gross asset and liability positions, and consequently the change in the net foreign asset position (the current account). These empirical results hold regardless of whether or not (B.I.36) is an accurate approximation of the intertemporal budget constraint. All we need is [Assumption B.2](#) to hold, that is, the variables we use in our analysis are cointegrated with coefficients $(1, -1)$ around some deterministic trend functions. We do provide evidence that these assumptions hold in the data. *Second*, as we discussed in the previous paragraph, a practical approach means that we do not burden our analysis with auxiliary assumptions, which make our derivations less general. *Third*, we should observe that, even if the approximation was bad, one could still assess whether it has any empirical content, by examining

¹⁸Furthermore, our intertemporal budget constraint is highly non-linear, which might make approximation errors large.

¹⁹A further complication here is that we also need to solve for the equilibrium portfolios, for which, in many cases, one may obtain accurate, but only approximate solutions (see [Devereux and Sutherland, 2010](#)).

whether $\widetilde{CA}_t$ has any predictive power for future values of net output growth, consumption growth and future NFA portfolio returns.

As a first step, we need an approximate expression for NFA portfolio returns r_t . Let $w_{at} \equiv \mathcal{A}_t/(\mathcal{A}_t - \mathcal{L}_t)$ and $w_{lt} \equiv \mathcal{L}_t/(\mathcal{A}_t - \mathcal{L}_t)$ such that $w_{at} = 1 + w_{lt}$. Then we may define portfolio returns as

$$(1 + r_t) = (1 + w_{lt})(1 + r_{a,t}) - w_{lt}(1 + r_{l,t}) \quad (\text{C.II.60})$$

Note that $(1 + r_t)$ is increasing in $r_{a,t}$ and decreasing in $r_{l,t}$. We further assume that $E(r_a) = E(r_l)$.²⁰ Hence, an approximate expression for (C.II.60) around unconditional means is

$$\begin{aligned} 1 + r_t &\simeq (1 + r) + (r_t - r) \\ &\simeq (1 + r) + (1 + w_l)(r_{a,t} - r) - w_l(r_{l,t} - r) \\ &\quad + (1 + r)(w_{lt} - w_l) - (1 + r)(w_{lt} - w_l) \\ r_t &\simeq (1 + w_l)r_{a,t} - w_lr_{l,t} \end{aligned}$$

So all we need is an estimate of $w_l \equiv E(w_{lt})$.

This can easily be obtained from our estimated cointegrating relations. Note that

$$\begin{aligned} w_{lt} &= \frac{\mathcal{L}_t}{\mathcal{A}_t - \mathcal{L}_t} = \frac{1}{(\mathcal{A}_t/\mathcal{L}_t) - 1} = \frac{1}{\exp(\ln \mathcal{A}_t - \ln \mathcal{L}_t) - 1} = \frac{1}{\exp[(\ln \mathcal{A}_t - \ln \mathcal{Z}_t) - (\ln \mathcal{L}_t - \ln \mathcal{Z}_t)] - 1} \\ &= \frac{1}{\exp([a_t - z_t - (\gamma_{z,t} - \gamma_{a,t})] - [l_t - z_t - (\gamma_{z,t} - \gamma_{l,t})]) - 1} \\ &= \frac{1}{\exp([a_t - z_t - \bar{\gamma}_a t] - [l_t - z_t - \bar{\gamma}_l t]) - 1}. \end{aligned}$$

So

$$\begin{aligned} w_l &\equiv E(w_{lt}) = E\left(\frac{1}{\exp([a_t - z_t - (\gamma_{z,t} - \gamma_{a,t})] - [l_t - z_t - (\gamma_{z,t} - \gamma_{l,t})]) - 1}\right), \\ &= E\left(\frac{1}{\exp([a_t - z_t - \bar{\gamma}_a t] - [l_t - z_t - \bar{\gamma}_l t]) - 1}\right) \end{aligned}$$

which exists as $E(\exp([a_t - z_t - \bar{\gamma}_a t] - [l_t - z_t - \bar{\gamma}_l t]))$ is the mean of a stationary variable.

Next, consider the parameters

$$\begin{aligned} \rho_d &\equiv [1 - E[1 + r_t] \exp(E[l_t + \bar{\gamma}_{l,t} - \psi_t])] + E[1 + r_t] \exp(E[a_t + \bar{\gamma}_{a,t} - \psi_t]) \\ \rho_a &\equiv \frac{E[1 + r_t] \exp(E[a_t + \bar{\gamma}_{a,t} - \psi_t])}{\rho_d} \\ \rho_l &\equiv -\frac{E[1 + r_t] \exp(E[l_t + \bar{\gamma}_{l,t} - \psi_t])}{\rho_d}. \end{aligned} \quad (\text{C.II.61})$$

²⁰This assumption is in-line with our data, as we cannot reject the null hypothesis that the return differential is a zero-mean variable.

Note that

$$\begin{aligned}
a_t + \bar{\gamma}_{a,t} - \psi_t &= a_t + \bar{\gamma}_{a,t} - z_t - \bar{\gamma}_{z,t} + \frac{\rho_{Z\Psi}\kappa_{Z\Psi}}{1 - \rho_{Z\Psi}} + \sum_{i=1}^{\infty} \rho_{Z\Psi}^i (r_{t+i} - \Delta\hat{z}_{t+i}) \\
&= a_t - z_t - (\gamma_{z,t} - \gamma_{a,t}) + \frac{\rho_{Z\Psi}\kappa_{Z\Psi}}{1 - \rho_{Z\Psi}} + \sum_{i=1}^{\infty} \rho_{Z\Psi}^i (r_{t+i} - \Delta\hat{z}_{t+i}) \\
&= a_t - z_t - \bar{\gamma}_a t + \frac{\rho_{Z\Psi}\kappa_{Z\Psi}}{1 - \rho_{Z\Psi}} + \sum_{i=1}^{\infty} \rho_{Z\Psi}^i (r_{t+i} - \Delta\hat{z}_{t+i})
\end{aligned}$$

and

$$\begin{aligned}
l_t + \bar{\gamma}_{l,t} - \psi_t &= l_t - z_t - (\gamma_{z,t} - \gamma_{l,t}) + \frac{\rho_{Z\Psi}\kappa_{Z\Psi}}{1 - \rho_{Z\Psi}} + \sum_{i=1}^{\infty} \rho_{Z\Psi}^i (r_{t+i} - \Delta\hat{z}_{t+i}) \\
&= l_t - z_t - \bar{\gamma}_l t + \frac{\rho_{Z\Psi}\kappa_{Z\Psi}}{1 - \rho_{Z\Psi}} + \sum_{i=1}^{\infty} \rho_{Z\Psi}^i (r_{t+i} - \Delta\hat{z}_{t+i}).
\end{aligned}$$

So once we pin down a value for $\rho_{Z\Psi}$, since r_{t+i} and $\Delta\hat{z}_{t+i}$ are stationary processes, $E[a_t + \bar{\gamma}_{a,t} - \psi_t]$ and $E[l_t + \bar{\gamma}_{l,t} - \psi_t]$ can be readily calculated as

$$\begin{aligned}
&E[a_t - z_t - (\gamma_{z,t} - \gamma_{a,t})] + \frac{\rho_{Z\Psi}\kappa_{Z\Psi}}{1 - \rho_{Z\Psi}} + \sum_{i=1}^{\infty} \rho_{Z\Psi}^i (E(r_{t+i}) - E(\Delta\hat{z}_{t+i})) \\
&= E[a_t - z_t - \bar{\gamma}_a t] + \frac{\rho_{Z\Psi}\kappa_{Z\Psi}}{1 - \rho_{Z\Psi}} + \frac{\rho_{Z\Psi}}{1 - \rho_{Z\Psi}} (E(r_{t+i}) - E(\Delta\hat{z}_{t+i}))
\end{aligned}$$

and

$$\begin{aligned}
&E[l_t - z_t - (\gamma_{z,t} - \gamma_{l,t})] + \frac{\rho_{Z\Psi}\kappa_{Z\Psi}}{1 - \rho_{Z\Psi}} + \frac{\rho_{Z\Psi}}{1 - \rho_{Z\Psi}} (E(r_{t+i}) - E(\Delta\hat{z}_{t+i})) \\
&= E[l_t - z_t - \bar{\gamma}_l t] + \frac{\rho_{Z\Psi}\kappa_{Z\Psi}}{1 - \rho_{Z\Psi}} + \frac{\rho_{Z\Psi}}{1 - \rho_{Z\Psi}} (E(r_{t+i}) - E(\Delta\hat{z}_{t+i})).
\end{aligned}$$

Since we cannot resort to any type of evidence to estimate $\rho_{Z\Psi} \equiv 1 - \exp(E[z_t + \bar{\gamma}_{z,t} - \psi_t])$, we set this equal to 0.99. We have also experimented with different values for $\rho_{Z\Psi}$, concluding that our results are not sensitive to the value of this parameter. Then, we estimate ρ_d , ρ_a and ρ_l from

$$\begin{aligned}
\rho_d &= \left[1 - E(1 + r_t) \exp \left(E[l_t - z_t - \bar{\gamma}_l t] + \frac{\rho_{Z\Psi}\kappa_{Z\Psi}}{1 - \rho_{Z\Psi}} + \frac{\rho_{Z\Psi}}{1 - \rho_{Z\Psi}} (E(r_{t+i}) - E(\Delta\hat{z}_{t+i})) \right) \right. \\
&\quad \left. + E(1 + r_t) \exp \left(E[a_t - z_t - \bar{\gamma}_a t] + \frac{\rho_{Z\Psi}\kappa_{Z\Psi}}{1 - \rho_{Z\Psi}} + \frac{\rho_{Z\Psi}}{1 - \rho_{Z\Psi}} (E(r_{t+i}) - E(\Delta\hat{z}_{t+i})) \right) \right] \\
\rho_a &= \frac{E(1 + r_t) \exp \left(E[a_t - z_t - \bar{\gamma}_a t] + \frac{\rho_{Z\Psi}\kappa_{Z\Psi}}{1 - \rho_{Z\Psi}} + \frac{\rho_{Z\Psi}}{1 - \rho_{Z\Psi}} (E(r_{t+i}) - E(\Delta\hat{z}_{t+i})) \right)}{\rho_d} \\
\rho_l &= \frac{-E(1 + r_t) \exp \left(E[l_t - z_t - \bar{\gamma}_l t] + \frac{\rho_{Z\Psi}\kappa_{Z\Psi}}{1 - \rho_{Z\Psi}} + \frac{\rho_{Z\Psi}}{1 - \rho_{Z\Psi}} (E(r_{t+i}) - E(\Delta\hat{z}_{t+i})) \right)}{\rho_d}
\end{aligned}$$

Based on these estimates, we then obtain an estimate of the time series for $\widetilde{CA}_t$ in (B.I.34).

What is the magnitude of the approximation errors? Note that having assigned values to $\rho_{Z\Psi}$, ρ_d , ρ_a and ρ_l , there is still one free parameter free in (B.I.36), namely $\rho_{C\Phi}$. In order to proceed, we assume

that $\rho_{C\Phi}$ is roughly equal to $\rho_{Z\Psi}$. Hence, (B.I.36) now becomes

$$\widetilde{CA}_t \approx E_t \left\{ -\frac{1}{\rho_d} \sum_{i=1}^{\infty} \rho_{Z\Psi}^i \Delta \hat{z}_{t+i} + \sum_{i=1}^{\infty} \rho_{Z\Psi}^i \Delta \hat{c}_{t+i} - \sum_{i=1}^{\infty} \left(\rho_{Z\Psi}^i - \frac{1}{\rho_d} \rho_{Z\Psi}^i \right) r_{t+i} \right\}. \quad (\text{C.II.62})$$

Then, we may define the (empirical) approximation error as

$$\varepsilon_{t+1}^{CA} \equiv \widetilde{CA}_{t+1} - \frac{1}{\rho_d} \Delta \hat{z}_{t+1} + \Delta \hat{c}_{t+1} - \left(1 - \frac{1}{\rho_d} \right) r_{t+1} - \frac{1}{\rho_{Z\Psi}} \widetilde{CA}_t.$$

Figure F.1 reports this approximation error (in the third column), together with (demeaned) $\widetilde{CA}_t$ and the (demeaned) “flow term” $\frac{1}{\rho_d} \Delta \hat{z}_{t+1} - \Delta \hat{c}_{t+1} + \left(1 - \frac{1}{\rho_d} \right) r_{t+1}$. What is apparent from the figure is that this error terms is quite small relative to both $\widetilde{CA}_t$ and the “flow term”. To get a clearer idea, we note here that the approximation error is between 43 (when $\rho_{Z\Psi} = 0.99$) and 23 (when $\rho_{Z\Psi} = 0.98$) times less volatile than $\widetilde{CA}_t$ and between 33 (when $\rho_{Z\Psi} = 0.99$) and 17 (when $\rho_{Z\Psi} = 0.98$) times less volatile than the term $\frac{1}{\rho_d} \Delta \hat{z}_{t+1} - \Delta \hat{c}_{t+1} + \left(1 - \frac{1}{\rho_d} \right) r_{t+1}$ — see Table B.22.

A series for the RHS of (B.I.36) enables us to assess its empirical content by means of set of predictive, long-horizon regressions. Table B.23 reiterates our long-horizon predictive regression results, discussed in the paper, including also results for the return differential, $r_t^a - r_t^l$. Table B.24 reports similar results, using only the approximate current account expression $\widetilde{CA}_t$ (i.e. without controlling for $\Delta c_t, \Delta z_t, \Delta a_t$ and Δl_t), which once again show that consumption growth rate is unpredictable at all horizons, *NFA* returns and the return differential are only weakly predictable up to horizons of 8 quarters out, and only net output growth rate is predictable even at horizons of 16 quarters out.

C.II.2 The Housing Market and Correlations of Transitory Components with Returns

Housing Market: Correlations of Housing prices and Current Account Measures In the paper, we have a short discussion regarding the role of the housing market for current account dynamics, where we argue that the existing negative correlation between real housing prices and the current account is detectable only when one uses measures of the current account obtained from Balance of Payments statistics, rather than employing the change in *NFA*. In Figure F.2 we report the cross-correlation functions — along with confidence intervals — of various measures of housing prices with the official current account data, and with our theory-consistent measure, ΔNFA_{t+1} . We find that real housing prices are negatively correlated with official current account data, at all leads and lags considered, however these correlations are indistinguishable from zero, when we employ the change in the net foreign asset position as the relevant measure of the current account.

Transitory Components of Gross Positions and Returns In Table 4 in the paper, we report the correlations of the transitory components of gross assets and liabilities with their respective returns. Figure F.3 presents the transitory components of gross assets and liabilities positions along with their (4-quarter moving average of) returns.

This figure makes it apparent that, first, transitory swings in gross positions are persistent and quantitatively large, especially during the 1990's. Second, the cyclical components in the stocks of foreign assets and liabilities are highly correlated with returns. In other words, the swings in stocks

of foreign assets and liabilities match those in returns, thereby indicating that a great deal of the transitory variation in gross positions is associated to (transitory) variation in returns.

C.II.3 Global vs. Country-Specific Shocks

An issue which our study leaves open is whether the shocks we identify are global or country specific — our empirical methodology, similar to other CA studies, does not allow us to make definitive statements, as we do not explicitly model the rest of the world (ROW). An empirical assessment using proxy variables for the ROW in the VAR would loosen the relation of our empirical model with the theoretical framework spelled out above, and arguably contaminate our results. The alternative of modeling many countries together, and assuming that the global shock is a common factor (see e.g. Gregory and Head, 1999; Kose *et al.*, 2003, 2008), would also be problematic, raising issues in how to include gross positions in the analysis (assets of one country are liabilities for the rest of the world).

Yet, we can provide some evidence in support of our claim that a US sample in part shelter us from the problem, as most shocks to this country will have a strong asymmetric component. First, in part of our study, we have assumed that the permanent shock is orthogonal to the transitory shocks (which are not identified separately). Our key finding is that output responds more sluggishly than consumption, producing an external deficit. As our results are robust to alternative orthogonalization methods (Gonzalo and Ng, 2001; King *et al.*, 1991; Mellander *et al.*, 1992), this result *per se* suggests that the identified permanent shock is not likely to be global and symmetric, but rather dominated by an asymmetric (country-specific) component. For the permanent shock, we can provide further supporting evidence by calculating its correlations with the Euro-area net output and consumption growth. We find these correlations to be significantly smaller than the correlations with US growth rates — see Table B.25.

Extending the same exercise to the case of transitory shocks is not straightforward, as these are not identified separately. However, we could make a *de facto* statement, using the argument in Glick and Rogoff (1995) and Hoffmann (2001, 2003). According to the restrictions explored by these authors, transitory shocks are likely to be country-specific, if they have strong effects on the current account. Our results indeed show that transitory shocks are the dominant source of fluctuations in gross positions and in the changes in *NFA* positions, i.e. the current account. Again, this is evidence of a strong asymmetric, country-specific component.

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Figures

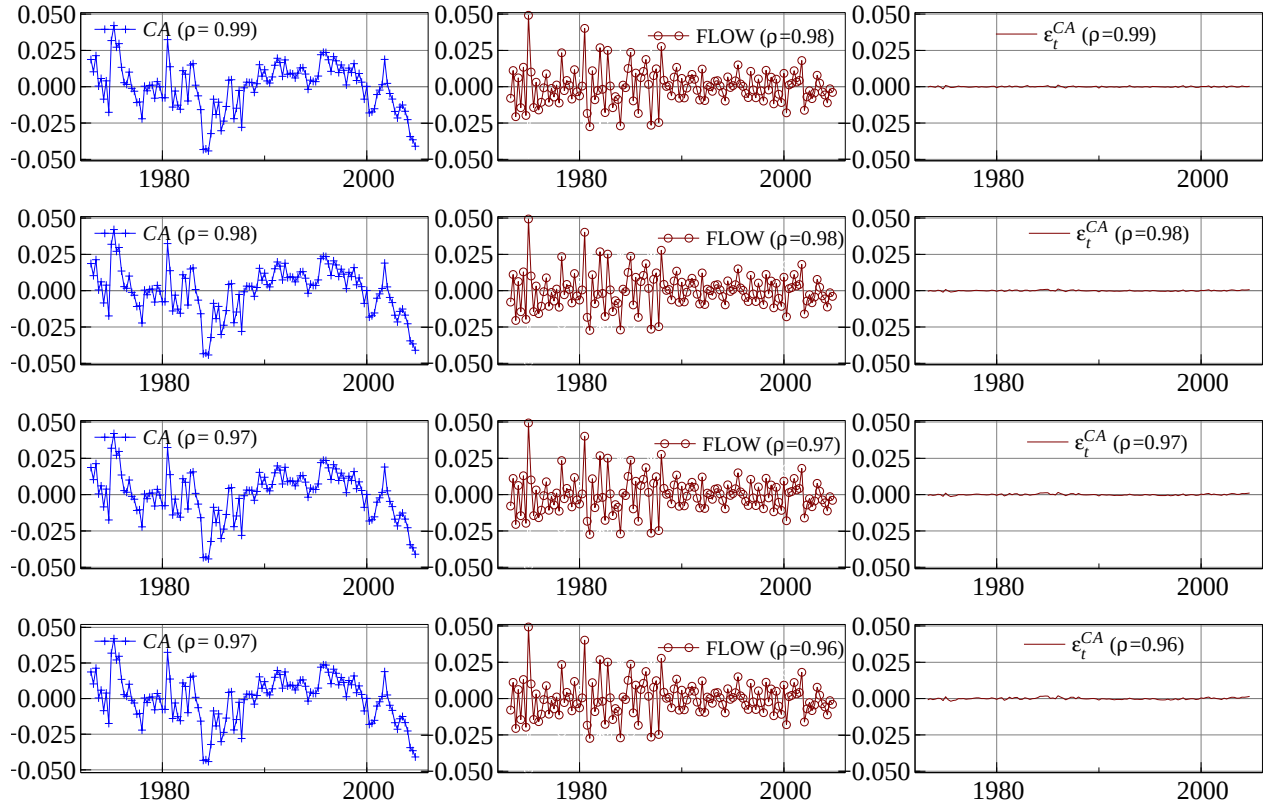


Figure F.1 Time Series plots of $\widetilde{CA}_t$, and the empirical approximation error.

Notes: The figure displays time series plots of $\widetilde{CA}_t$, the flow term, $\frac{1}{\rho_d} \Delta \hat{z}_{t+1} + \Delta \hat{c}_{t+1} + \left(1 - \frac{1}{\rho_d}\right) r_{t+1}$, and the approximation error, $\widetilde{CA}_{t+1} - \frac{1}{\rho_d} \Delta \hat{z}_{t+1} + \Delta \hat{c}_{t+1} + \left(1 - \frac{1}{\rho_d}\right) r_{t+1} - \frac{1}{\rho_{Z\Psi}} \widetilde{CA}_t$, defined for different values of $\rho_{Z\Psi}$. The sample covers the first quarter of 1973 to the fourth quarter of 2004.

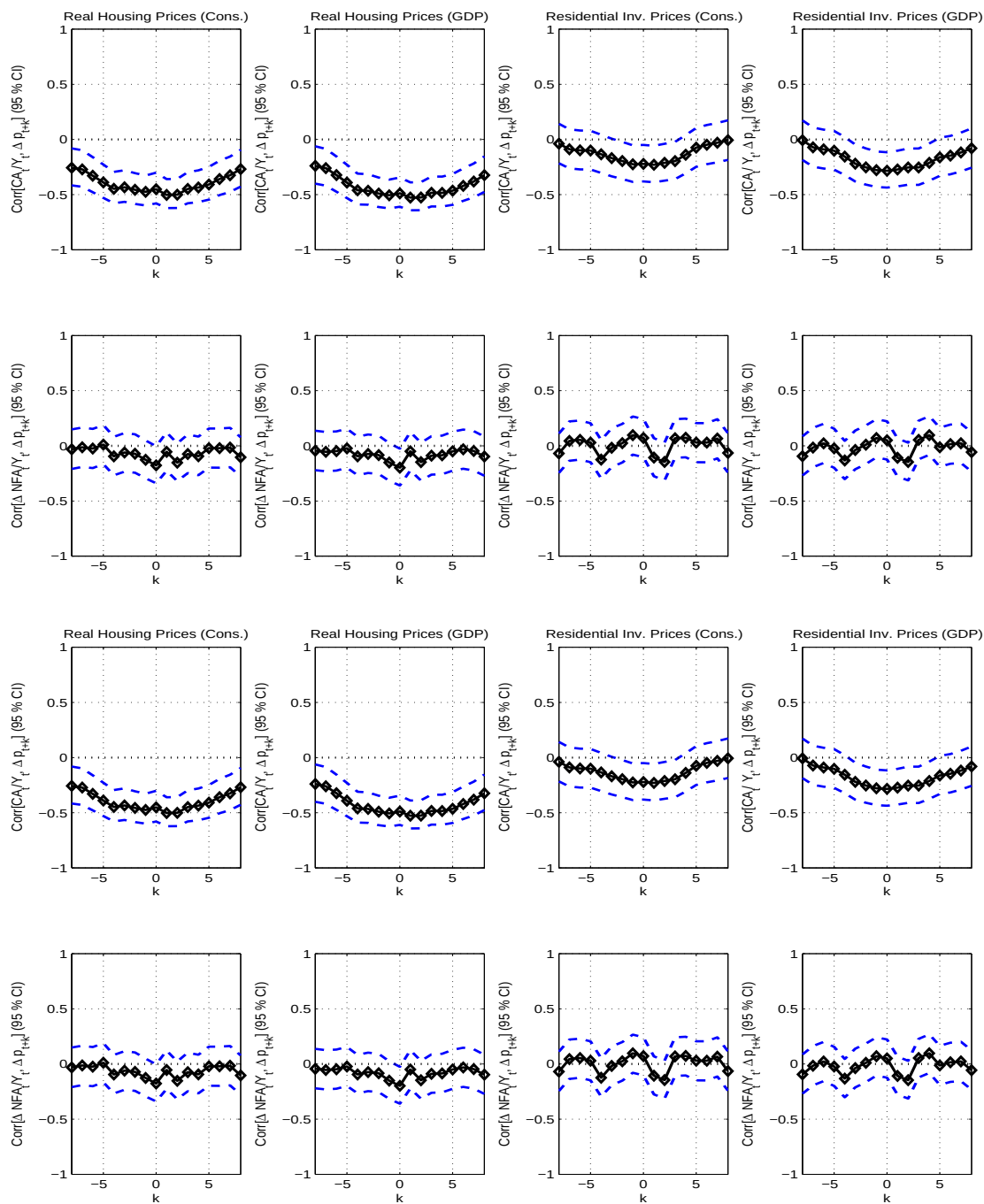


Figure F.2 Cross-Autocorrelation Functions: Housing Prices and Current Account

Notes: The figure displays the cross-autocorrelation functions of measures of the percentage change of (real) housing prices with the current account and the change in net foreign assets, for $k = -8, \dots, 0, \dots, 8$ leads and lags. The first two rows show results for the full sample (1973-2004) and the last two rows show results for a sample running from the first quarter of 1990 to the fourth quarter of 2004. Dashed lines indicate confidence intervals. The first two columns show results using housing prices (form OECD) deflated with the consumption deflator and the GDP deflator respectively. The last two columns show results using the residential investment price index as the measure of housing prices.

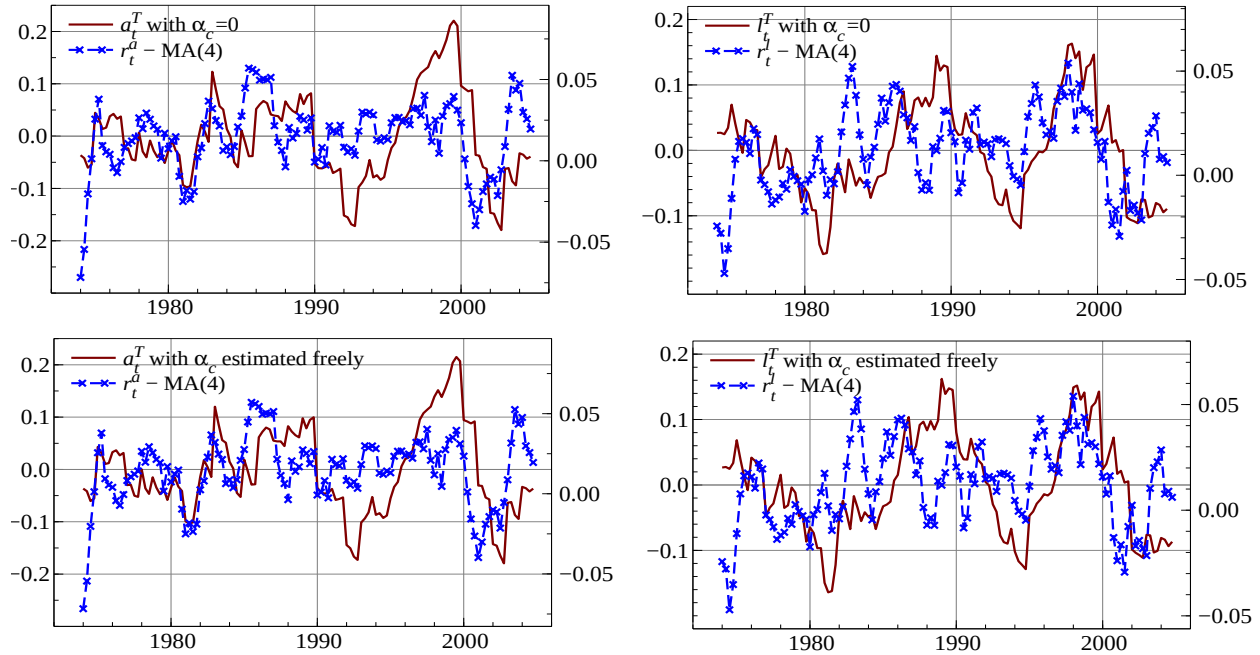


Figure F.3 Transitory Components of Assets and Liabilities and Returns.

Notes: The Left Panel reports the transitory component of (log real per-capita) gross assets and a four quarter moving average of quarterly real returns on gross assets. The Right Panel reports the transitory component of (log real per-capita) gross liabilities and a four quarter moving average of quarterly real returns on gross liabilities. The figures on the first row let α_c be equal to their estimated values, whereas figures in the second row are obtained setting $\alpha_c = 0$. The cyclical components have been obtained by means of a multivariate Beveridge-Nelson decomposition from the cointegrated VAR. The estimation period is: 1973:Q1-2004:Q4, and the underlying VEqCM is of order one.

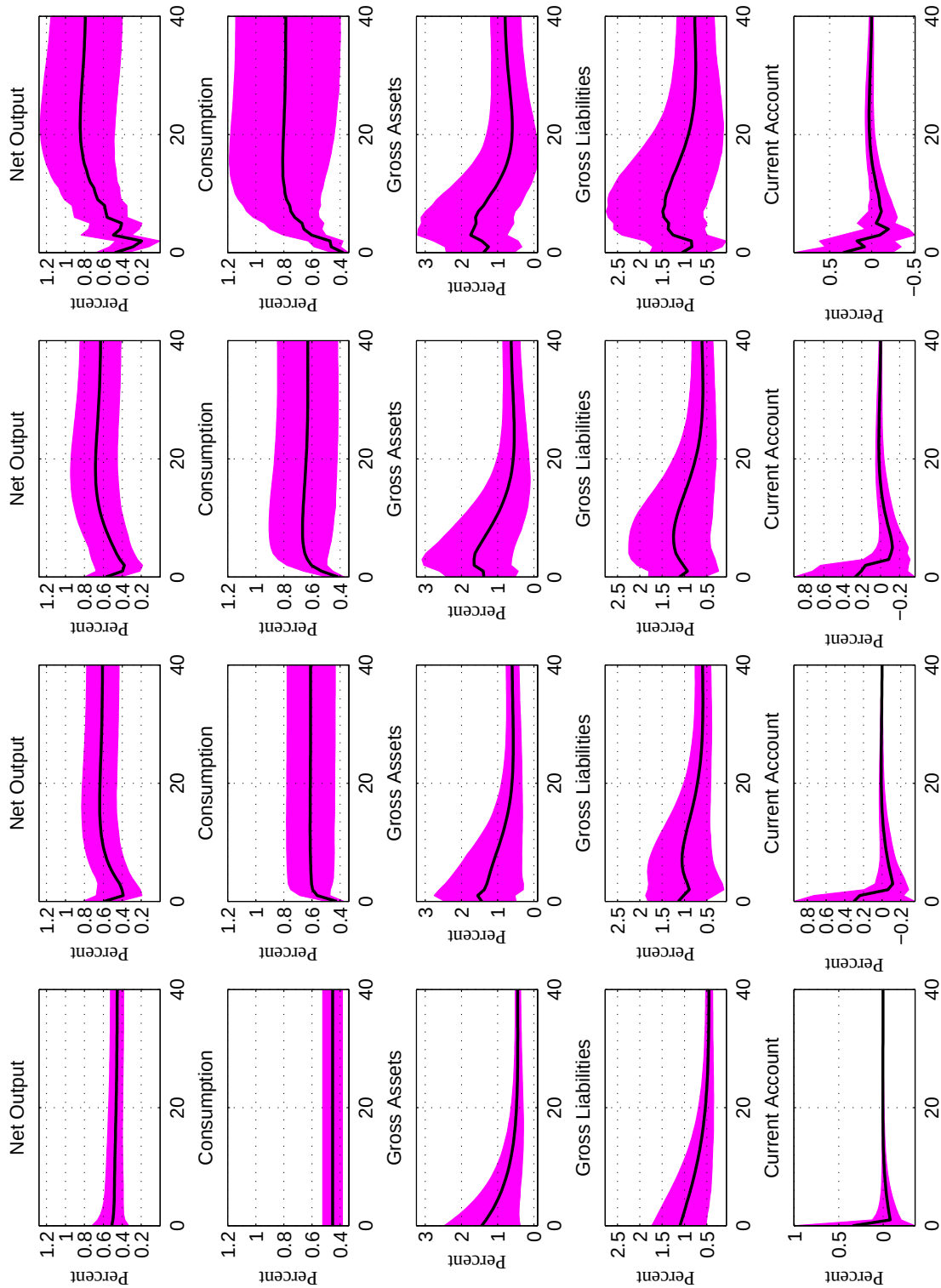


Figure A.1. Impulse Responses to the Permanent Shock with $\alpha_c = 0$, using Orthogonalization of [Gonzalo and Ng \(2001\)](#).

Notes: Results are based on VARs of different orders. The first column reports results from a VAR(1), the second from a VAR(2), the third from a VAR(3), and the fourth from a VAR(4), setting $\alpha_c = 0$, while the orthogonalization follows [Gonzalo and Ng \(2001\)](#). The sample runs from the first quarter of 1973 to the fourth quarter of 2004.

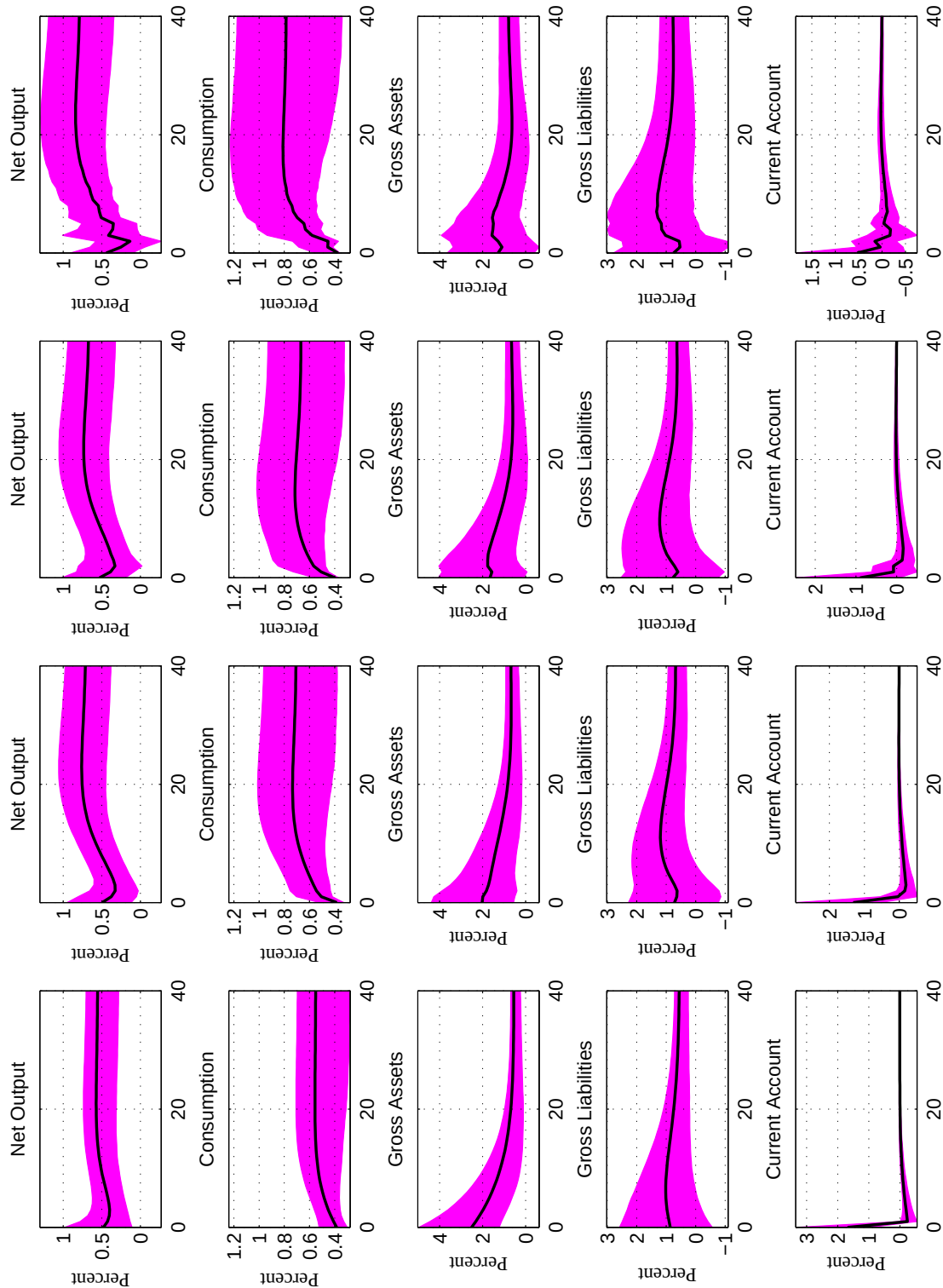


Figure A.2. Impulse Responses to the Permanent Shock with $\alpha_c \neq 0$ using the Orthogonalization of [Gonzalo and Ng \(2001\)](#).

Notes: Results are based on VARs of different orders. The first column reports results from a VAR(1), the second from a VAR(2), the third from a VAR(3), and the fourth from a VAR(4), with α_c estimated freely, while the orthogonalization follows [Gonzalo and Ng \(2001\)](#). The sample runs from the first quarter of 1973 to the fourth quarter of 2004.

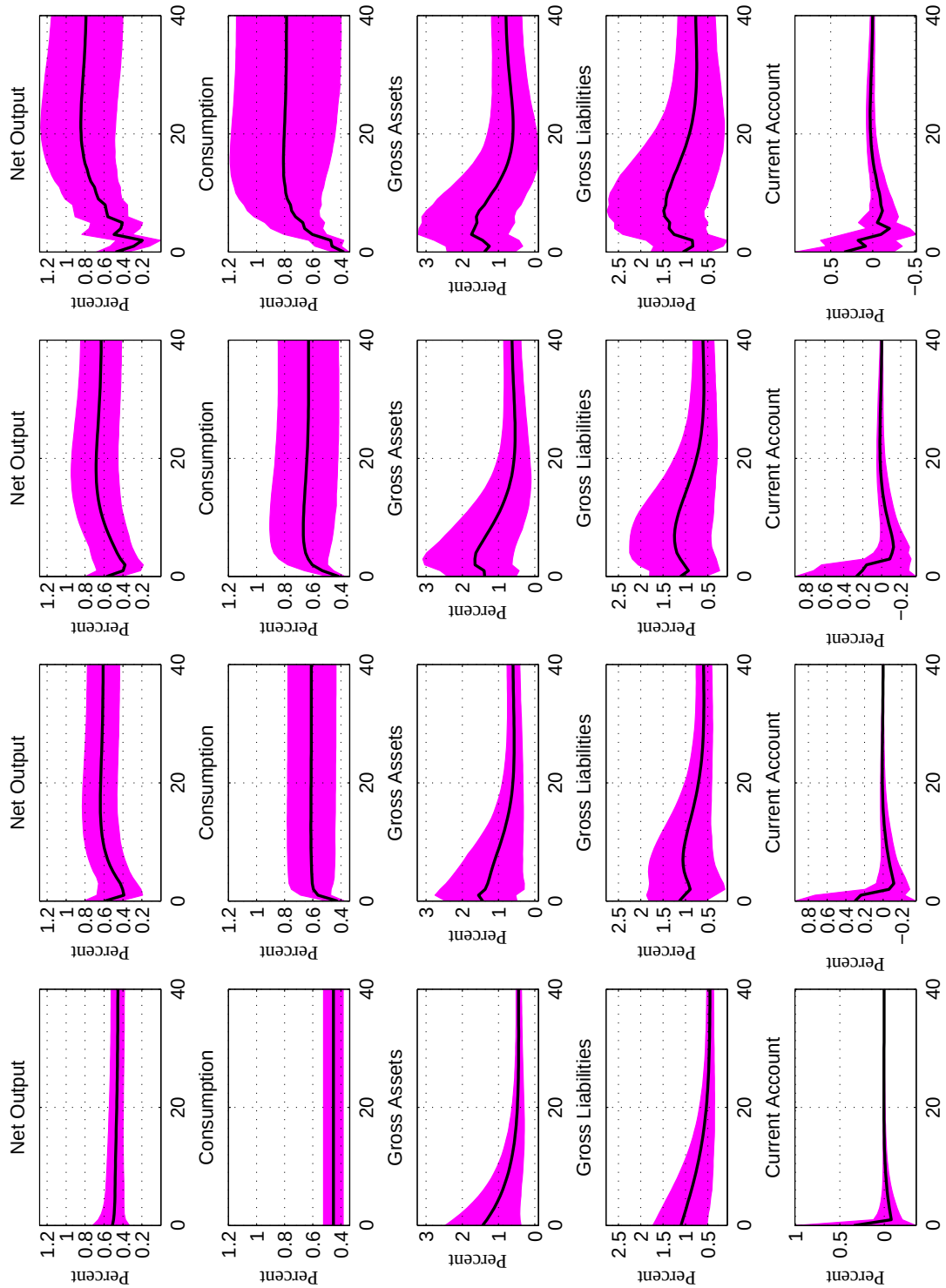


Figure A.3. Impulse Responses to the Permanent Shock with $\alpha_c = 0$, using the orthogonalization of [King *et al.* \(1991\)](#); [Mellander *et al.* \(1992\)](#).

Notes: Results are based on VARs of different orders. The first column reports results from a VAR(1), the second from a VAR(2), the third from a VAR(3), and the fourth from a VAR(4), setting $\alpha_c = 0$. The identification of shocks (orthogonalization of permanent and transitory innovations) is similar to that of [King *et al.* \(1991\)](#); [Mellander *et al.* \(1992\)](#). The sample runs from the first quarter of 1973 to the fourth quarter of 2004.

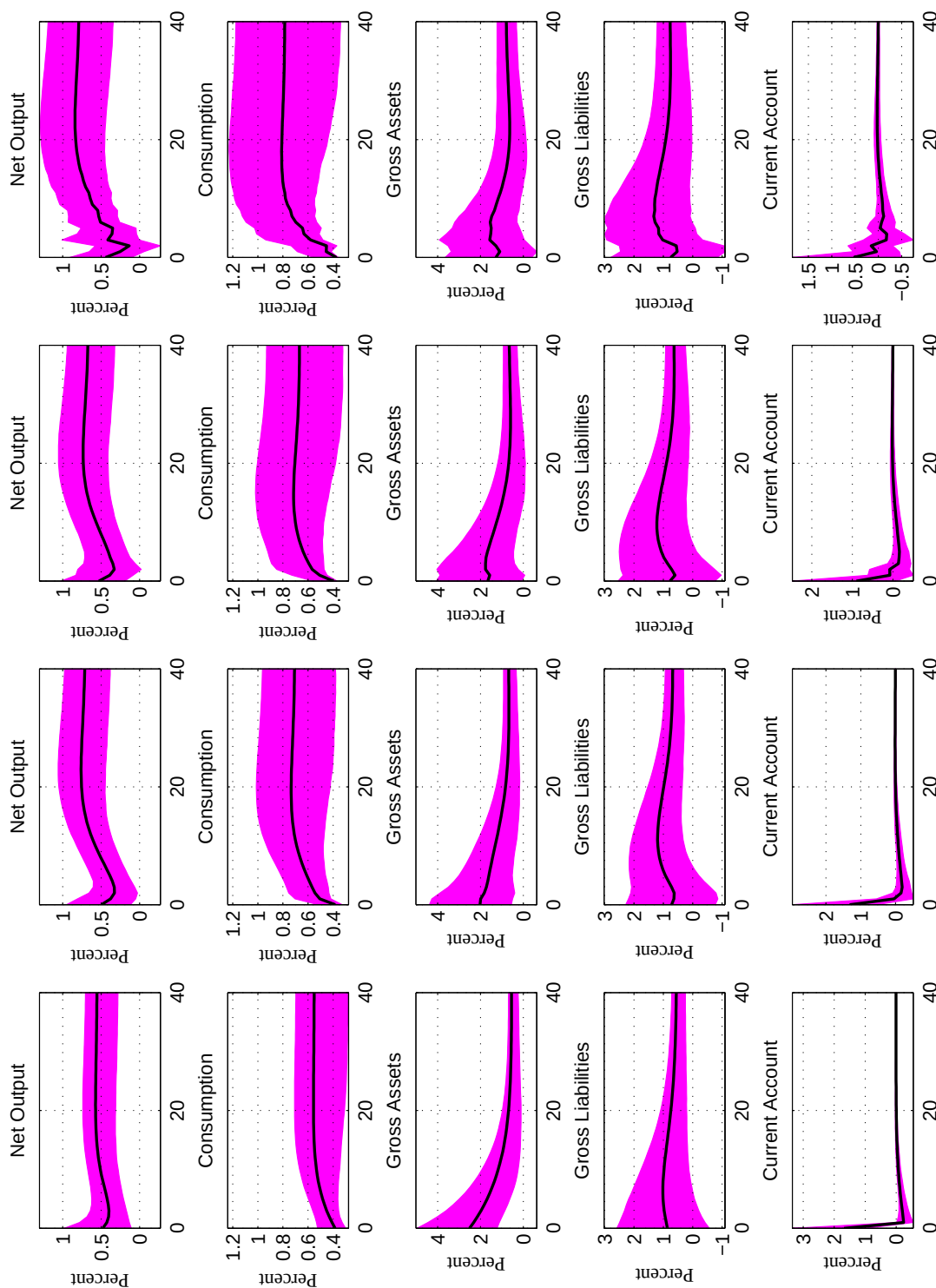


Figure A.4. Impulse Responses to the Permanent Shock with $\alpha_c \neq 0$, using the orthogonalization of [King *et al.* \(1991\)](#); [Mellander *et al.* \(1992\)](#).

Notes: Results are based on VARs of different orders. The first column reports results from a VAR(1), the second from a VAR(2), the third from a VAR(3), and the fourth from a VAR(4), with α_c estimated freely. The identification of shocks (orthogonalization of permanent and transitory innovations) is similar to that of [King *et al.* \(1991\)](#); [Mellander *et al.* \(1992\)](#). The sample runs from the first quarter of 1973 to the fourth quarter of 2004.

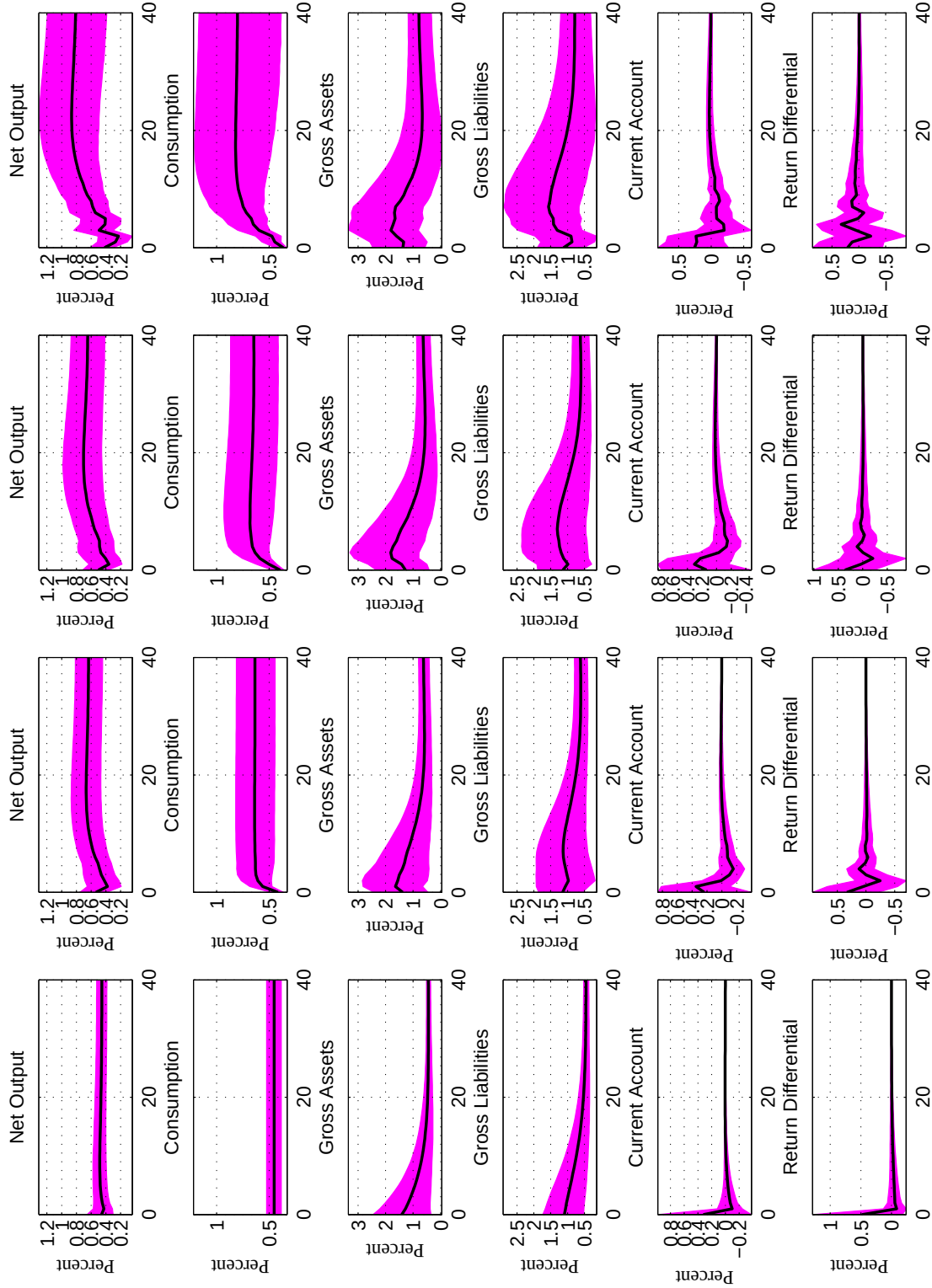


Figure A.5. Impulse Responses to the Permanent Shock with $\alpha_c = 0$, using $r_t^a - r_t^l$ and the orthogonalization of [Gonzalo and Ng \(2001\)](#).

Notes: Results are based on VARs of different orders, which also include the return differential, setting $\alpha_c = 0$, while the orthogonalization follows [Gonzalo and Ng \(2001\)](#). The sample runs from the first quarter of 1973 to the fourth quarter of 2004.

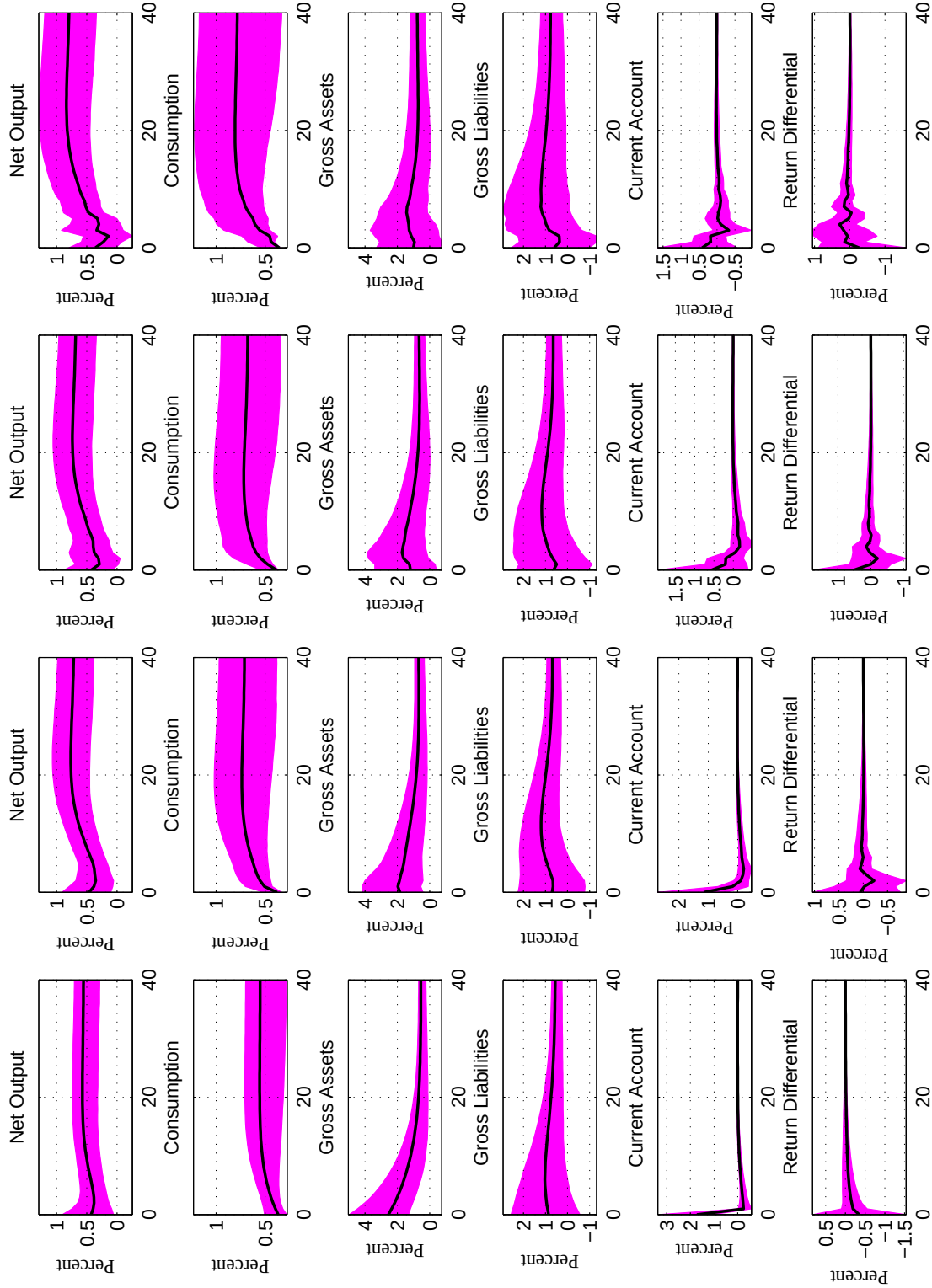


Figure A.6. Impulse Responses to the Permanent Shock with $\alpha_c \neq 0$, using $r_t^a - r_t^l$ and the orthogonalization of [Gonzalo and Ng \(2001\)](#).

Notes: Results are based on VARs of different orders, which also include the return differential, employing α_c estimated freely, while the orthogonalization follows [Gonzalo and Ng \(2001\)](#). The sample runs from the first quarter of 1973 to the fourth quarter of 2004.

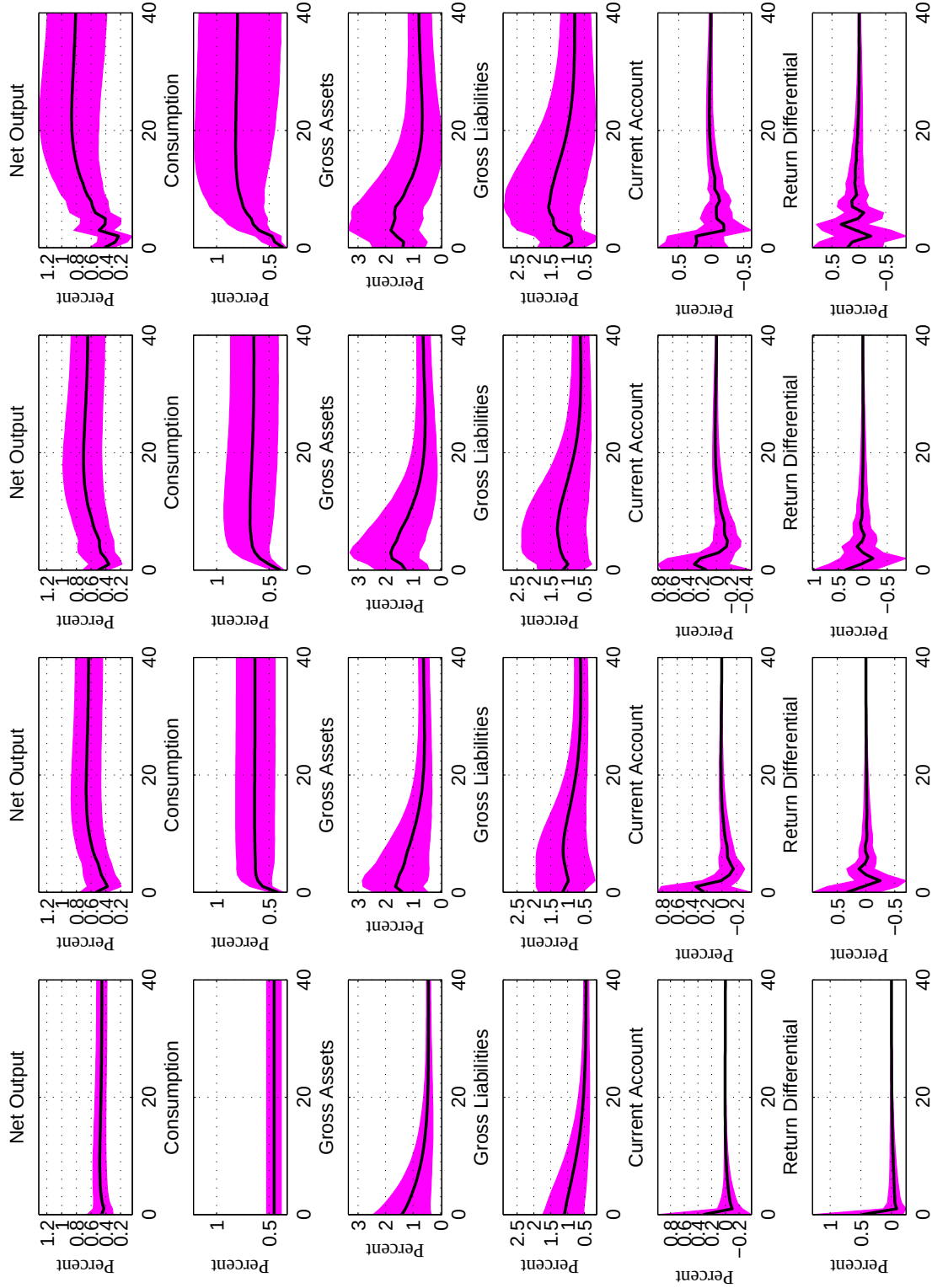


Figure A.7. Impulse Responses to the Permanent Shock with $\alpha_c = 0$, using $r_t^a - r_t^l$ and the orthogonalization of [King *et al.* \(1991\)](#); [Mellander *et al.* \(1992\)](#).

Notes: Results are based on VARs of different orders, which also include the return differential, setting $\alpha_c = 0$. The identification of shocks (orthogonalization of permanent and transitory innovations) is similar to that of [King *et al.* \(1991\)](#); [Mellander *et al.* \(1992\)](#). The sample runs from the first quarter of 1973 to the fourth quarter of 2004.

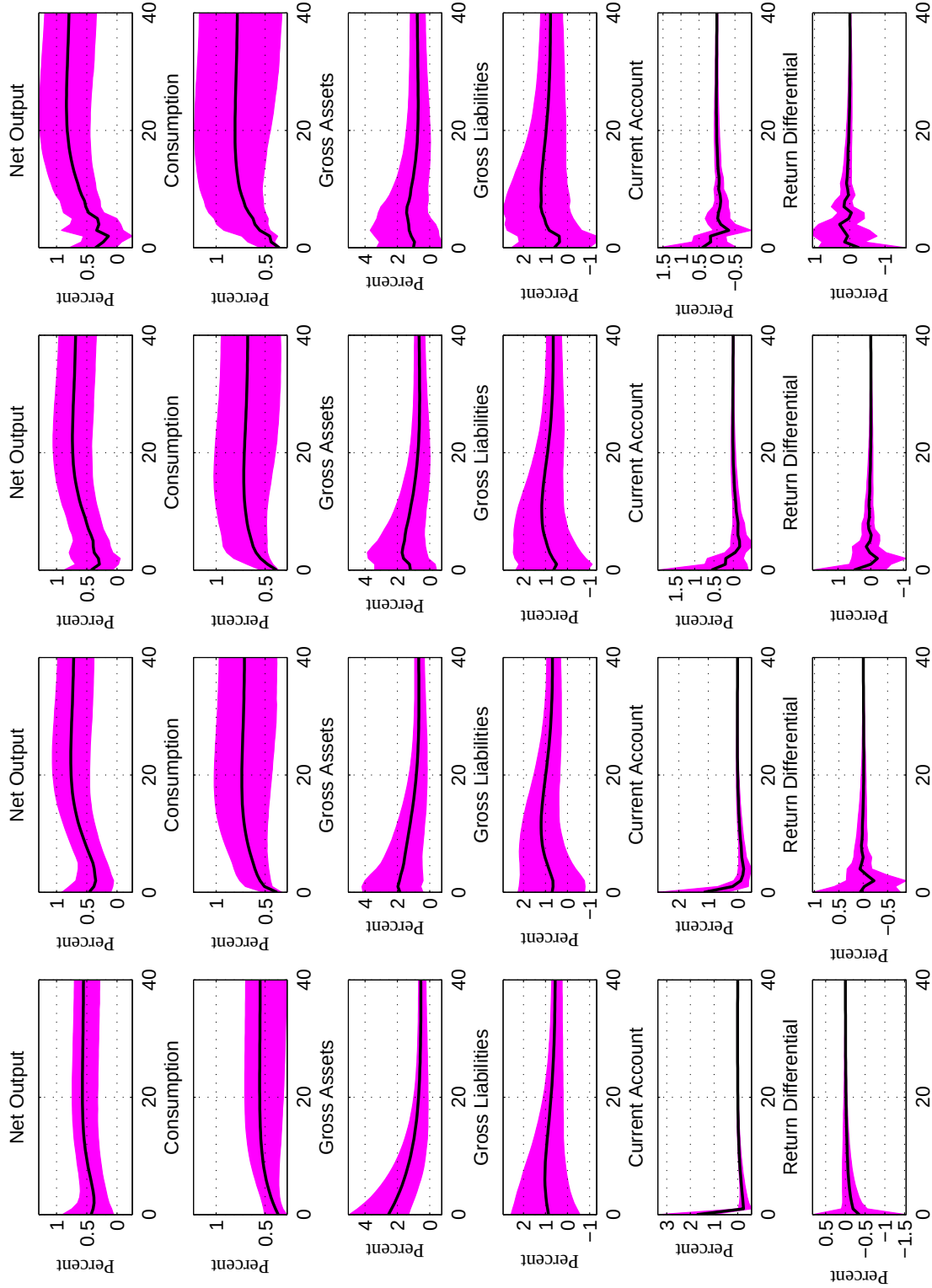


Figure A.8. Impulse Responses to the Permanent Shock $\alpha_c \neq 0$, using $r_t^a - r_t^l$ and the orthogonalization of [King *et al.* \(1991\)](#); [Mellander *et al.* \(1992\)](#).

Notes: Results are based on VARs of different orders, which also include the return differential, letting α_c estimated freely. The identification of shocks (orthogonalization of permanent and transitory innovations) is similar to that of [King *et al.* \(1991\)](#); [Mellander *et al.* \(1992\)](#). The sample runs from the first quarter of 1973 to the fourth quarter of 2004.

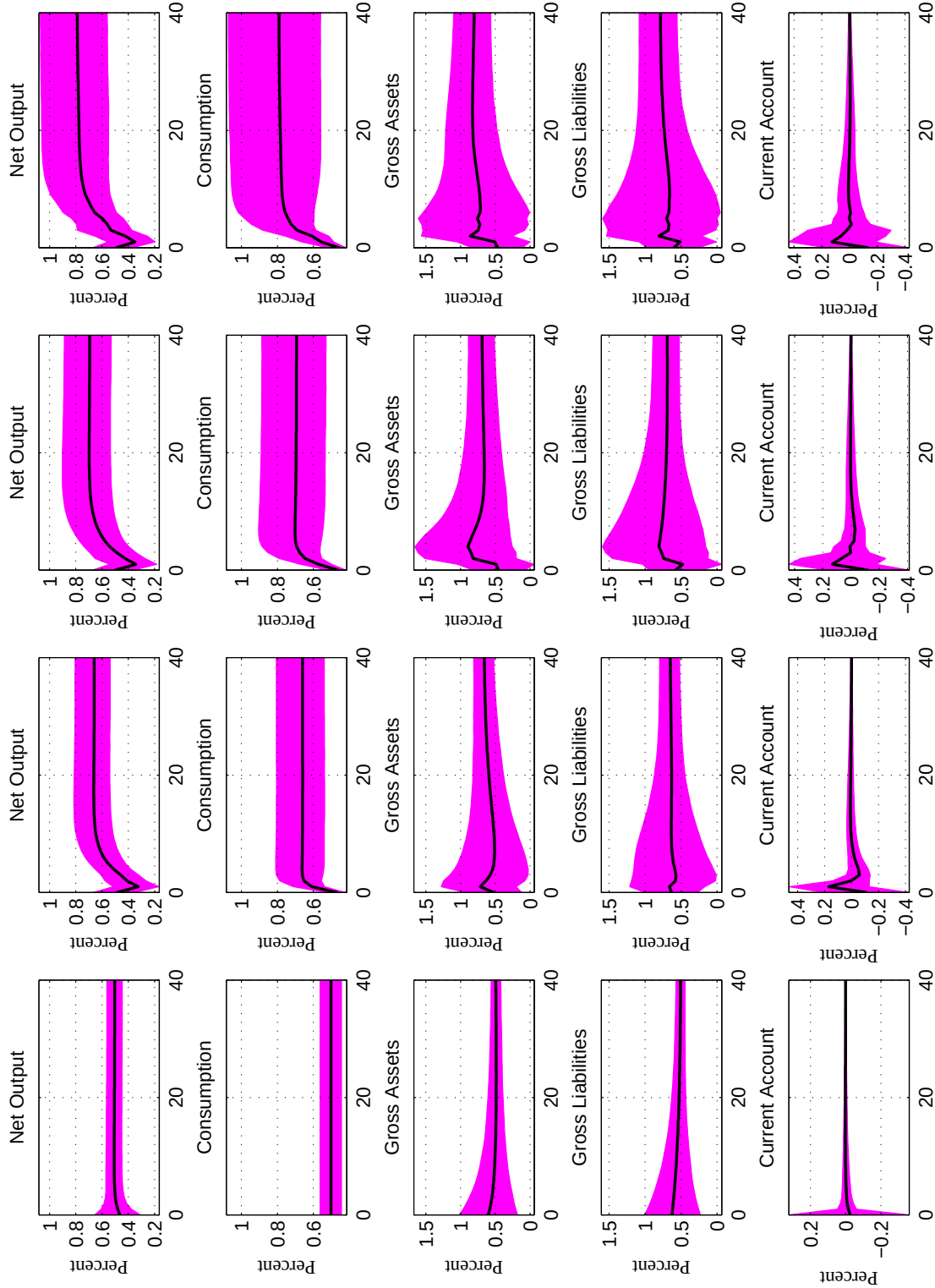


Figure A.9. Impulse Responses to the Permanent Shock with $\alpha_c = 0$, using GR data & the orthogonalization of [Gonzalo and Ng \(2001\)](#).

Notes: Results are based on VARs of different orders. The first column reports results from a VAR(1), the second from a VAR(2), the third from a VAR(3), and the fourth from a VAR(4), setting $\alpha_c = 0$, while the orthogonalization follows [Gonzalo and Ng \(2001\)](#). The sample runs from the first quarter of 1952 to the first quarter of 2004.

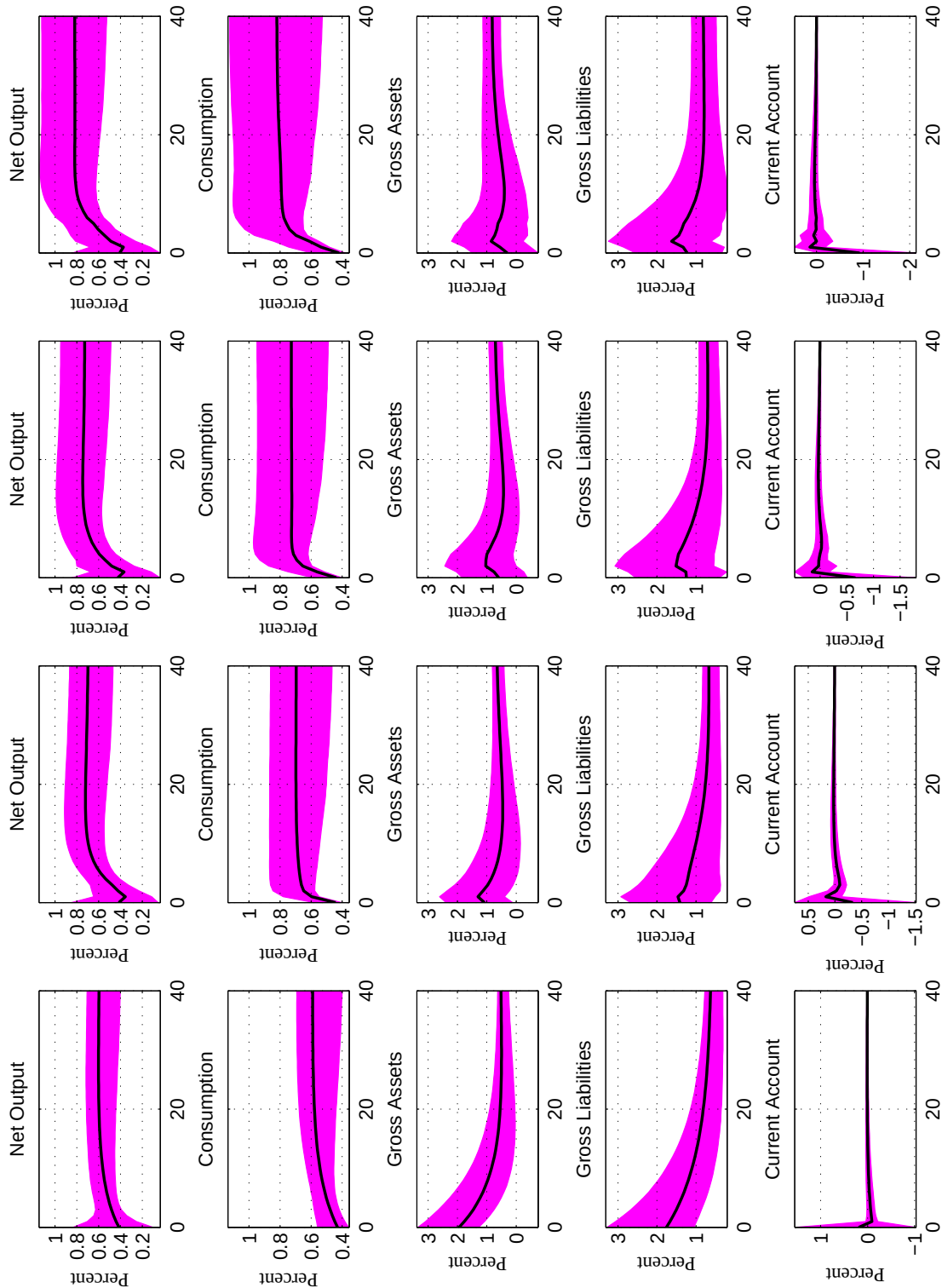


Figure A.10. Impulse Responses to the Permanent Shock with $\alpha_c \neq 0$, using GR data & the orthogonalization of [Gonzalo and Ng \(2001\)](#).

Notes: Results are based on VARs of different orders. The first column reports results from a VAR(1), the second from a VAR(2), the third from a VAR(3), and the fourth from a VAR(4), with α_c estimated freely, while the orthogonalization follows [Gonzalo and Ng \(2001\)](#). The sample runs from the first quarter of 1952 to the first quarter of 2004.

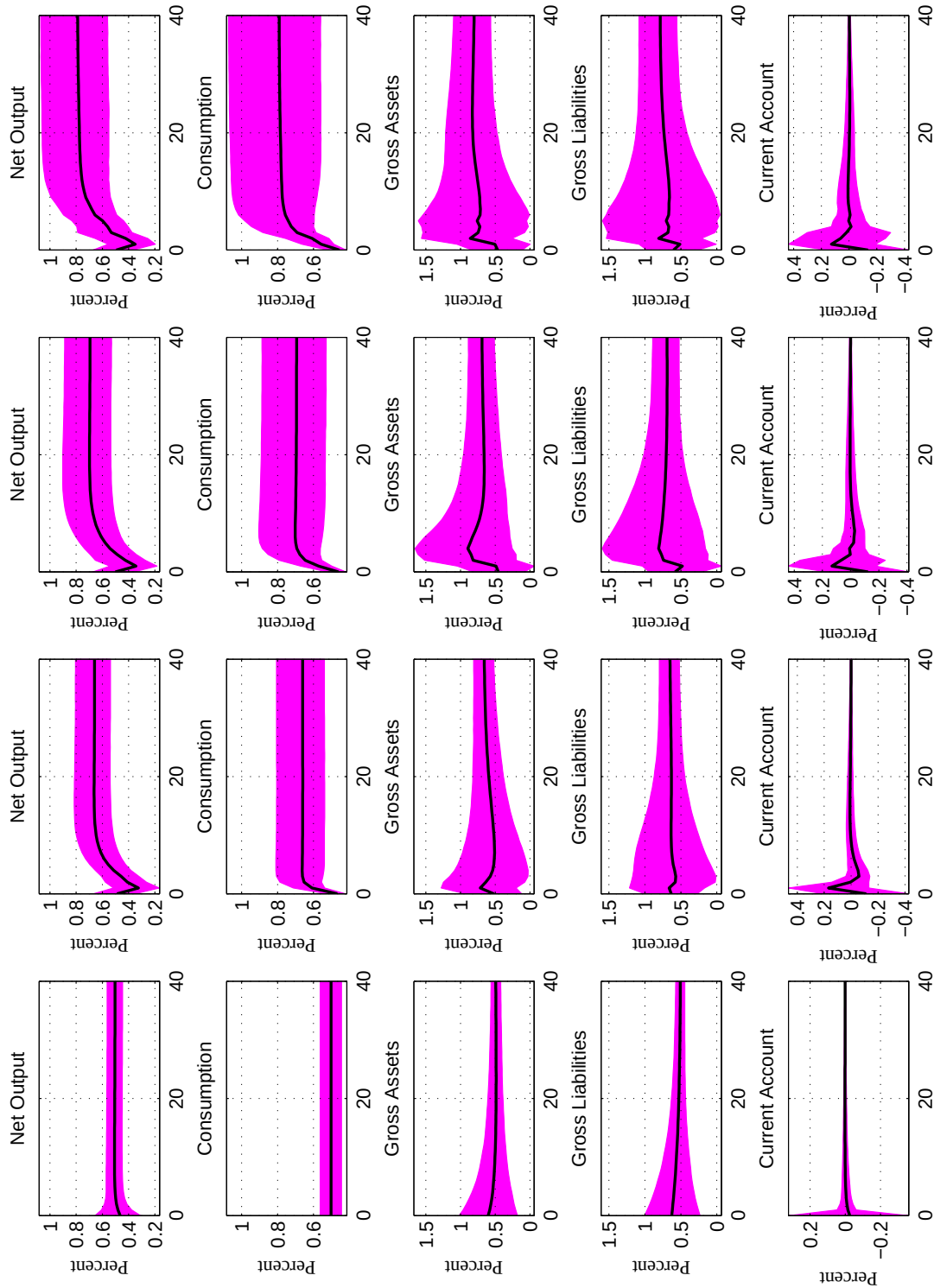


Figure A.11. Impulse Responses to the Permanent Shock with $\alpha_c = 0$, using GR data & the orthogonalization of [King *et al.* \(1991\)](#); [Mellander *et al.* \(1992\)](#).

Notes: Results are based on VARs of different orders. The first column reports results from a VAR(1), the second from a VAR(2), the third from a VAR(3), and the fourth from a VAR(4), setting $\alpha_c = 0$. The identification of shocks (orthogonalization of permanent and transitory innovations) is similar to that of [King *et al.* \(1991\)](#); [Mellander *et al.* \(1992\)](#). The sample runs from the first quarter of 1952 to the first quarter of 2004.

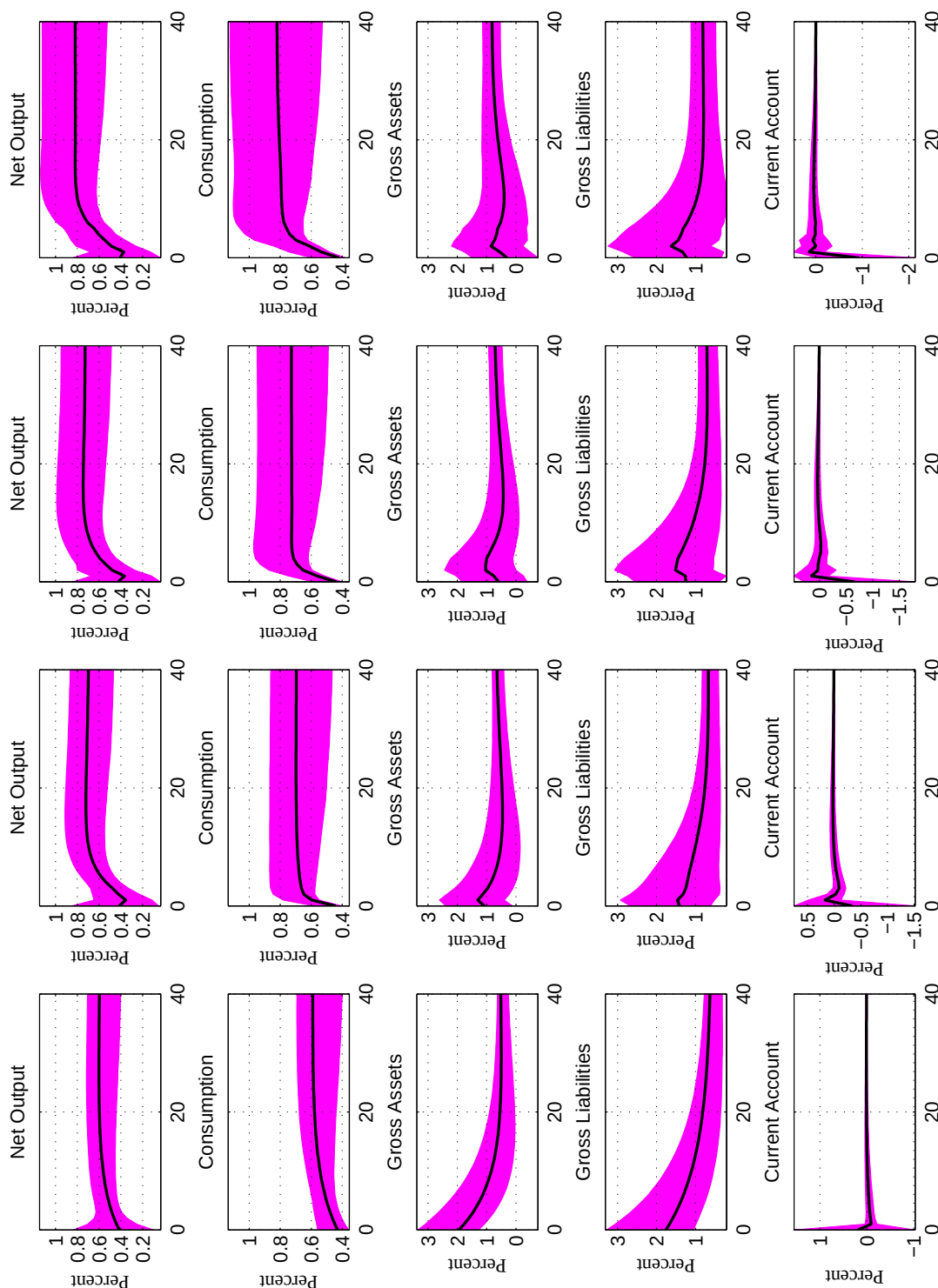


Figure A.12. Impulse Responses to the Permanent Shock with $\alpha_c \neq 0$, using GR data & the orthogonalization of [King *et al.* \(1991\)](#); [Mellander *et al.* \(1992\)](#).

Notes: Results are based on VARs of different orders. The first column reports results from a VAR(1), the second from a VAR(2), the third from a VAR(3), and the fourth from a VAR(4), with α_c estimated freely. The identification of shocks (orthogonalization of permanent and transitory innovations) is similar to that of [King *et al.* \(1991\)](#); [Mellander *et al.* \(1992\)](#). The sample runs from the first quarter of 1952 to the first quarter of 2004.

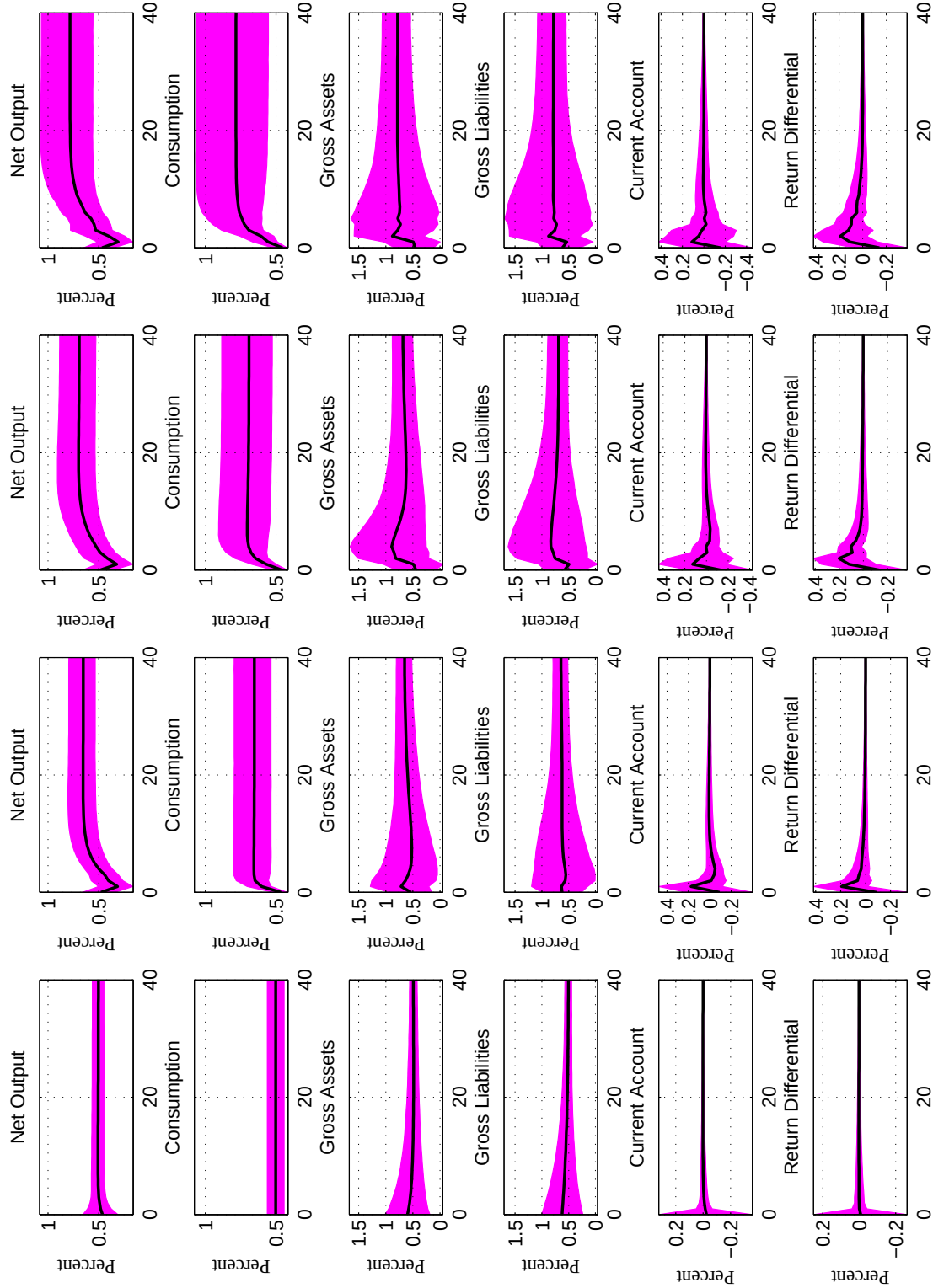


Figure A.13. Impulse Responses to the Permanent Shock with $\alpha_c = 0$, using $r_t^a - r_t^l$ GR data, and the orthogonalization of [Gonzalo and Ng \(2001\)](#).

Notes: Results are based on VARs of different orders, which also include the return differential, setting $\alpha_c = 0$, while the orthogonalization follows [Gonzalo and Ng \(2001\)](#). The sample runs from the first quarter of 1952 to the first quarter of 2004.

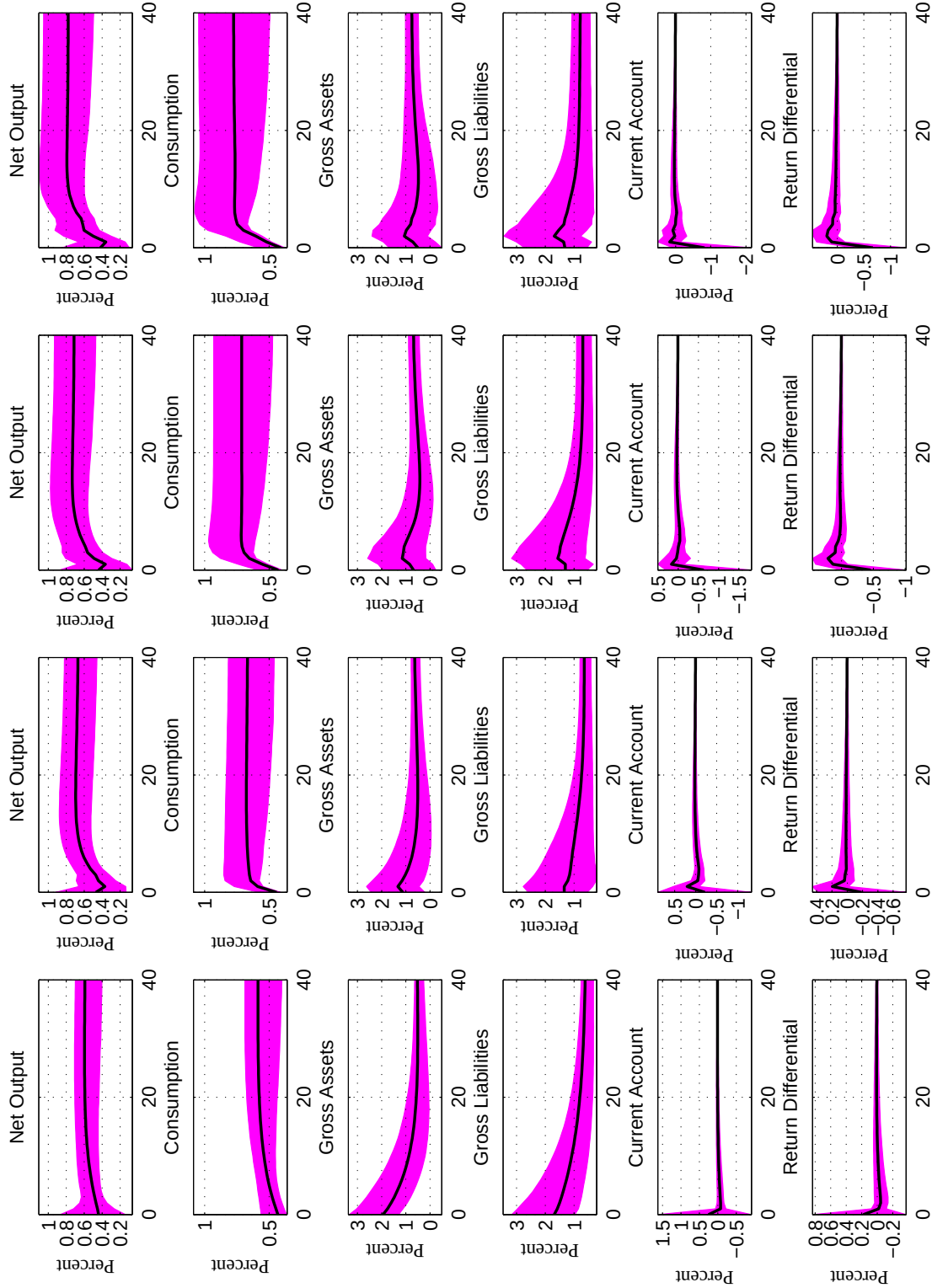


Figure A.14. Impulse Responses to the Permanent Shock with $\alpha_c \neq 0$, using $r_t^a - r_t^l$ GR data, and the orthogonalization of [Gonzalo and Ng \(2001\)](#).

Notes: Results are based on VARs of different orders, which also include the return differential, with α_c estimated freely, while the orthogonalization follows [Gonzalo and Ng \(2001\)](#). The sample runs from the first quarter of 1952 to the first quarter of 2004.

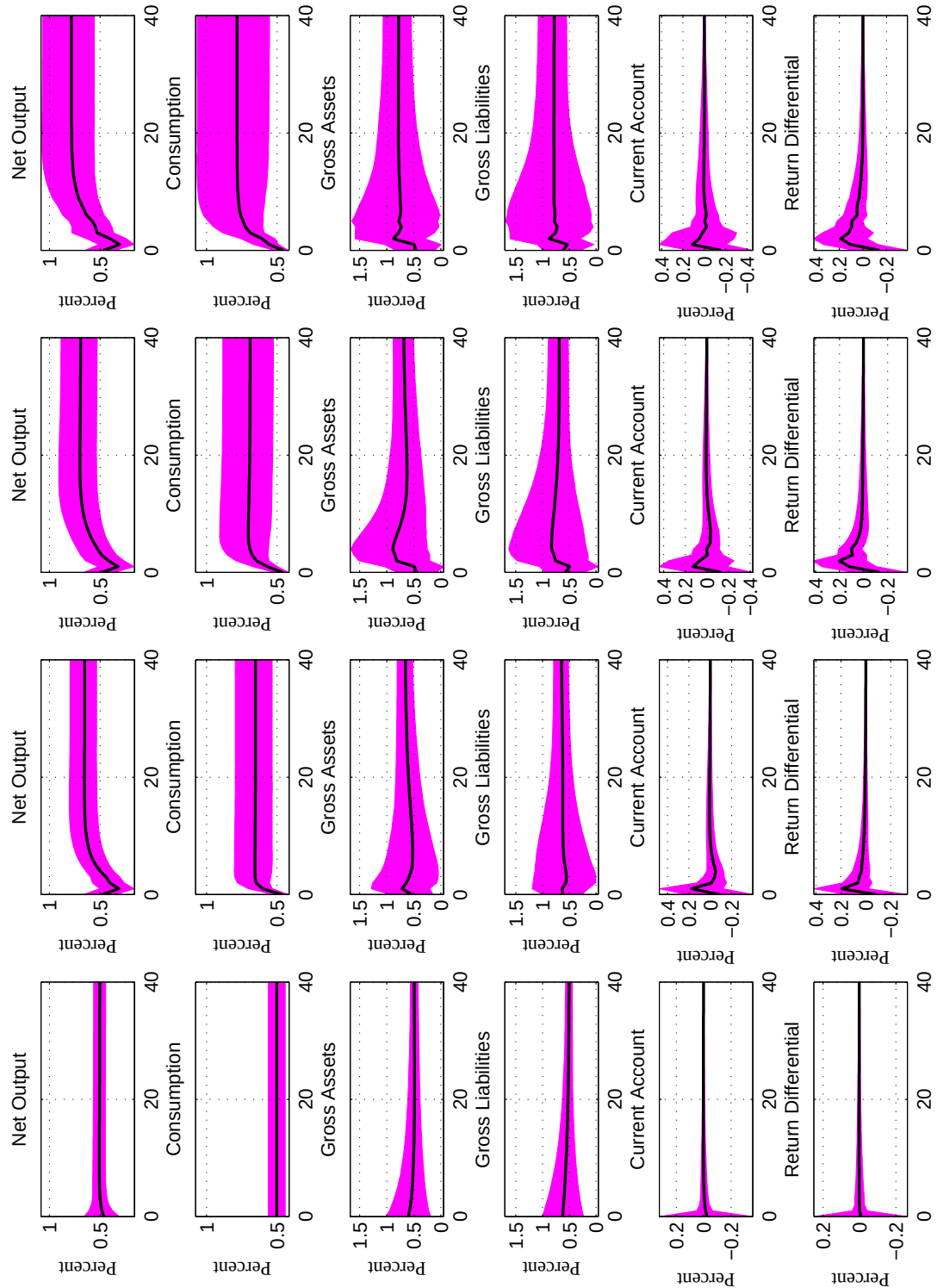


Figure A.15. Impulse Responses to the Permanent Shock with $\alpha_c = 0$, using $r_t^a - r_t^l$, GR data, and the orthogonalization of [King et al. \(1991\)](#); [Mellander et al. \(1992\)](#).

Notes: Results are based on VARs of different orders, which also include the return differential, setting $\alpha_c = 0$. The identification of shocks (orthogonalization of permanent and transitory innovations) is similar to that of [King et al. \(1991\)](#); [Mellander et al. \(1992\)](#). The sample runs from the first quarter of 1952 to the first quarter of 2004.

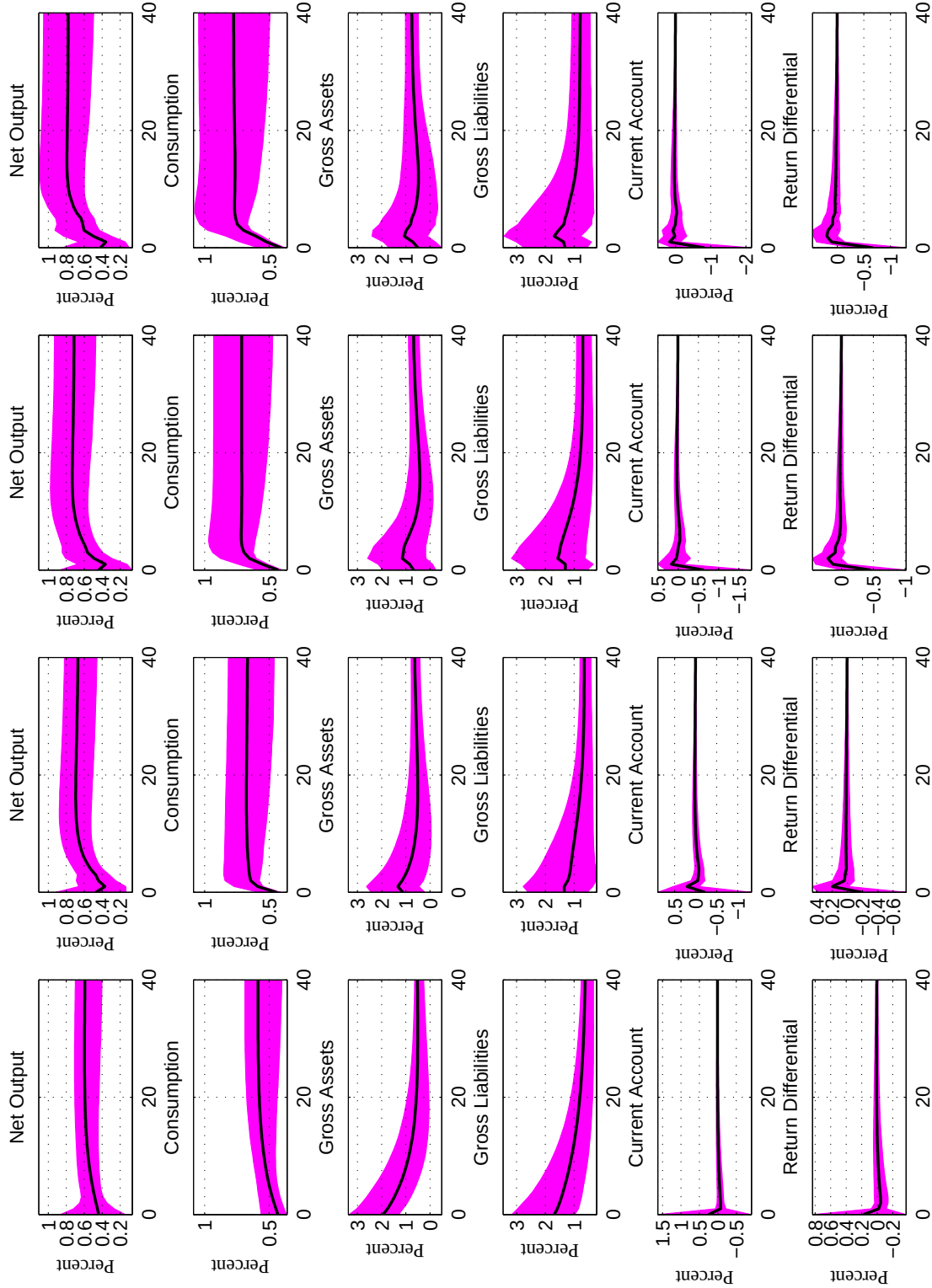


Figure A.16. Impulse Responses to the Permanent Shock with $\alpha_c \neq 0$, using $r_t^a - r_t^l$ GR data, and the orthogonalization of [King *et al.* \(1991\)](#); [Mellander *et al.* \(1992\)](#).

Notes: Results are based on VARs of different orders, which also include the return differential, with α_c estimated freely. The identification of shocks (orthogonalization of permanent and transitory innovations) is similar to that of [King *et al.* \(1991\)](#); [Mellander *et al.* \(1992\)](#). The sample runs from the first quarter of 1952 to the first quarter of 2004.

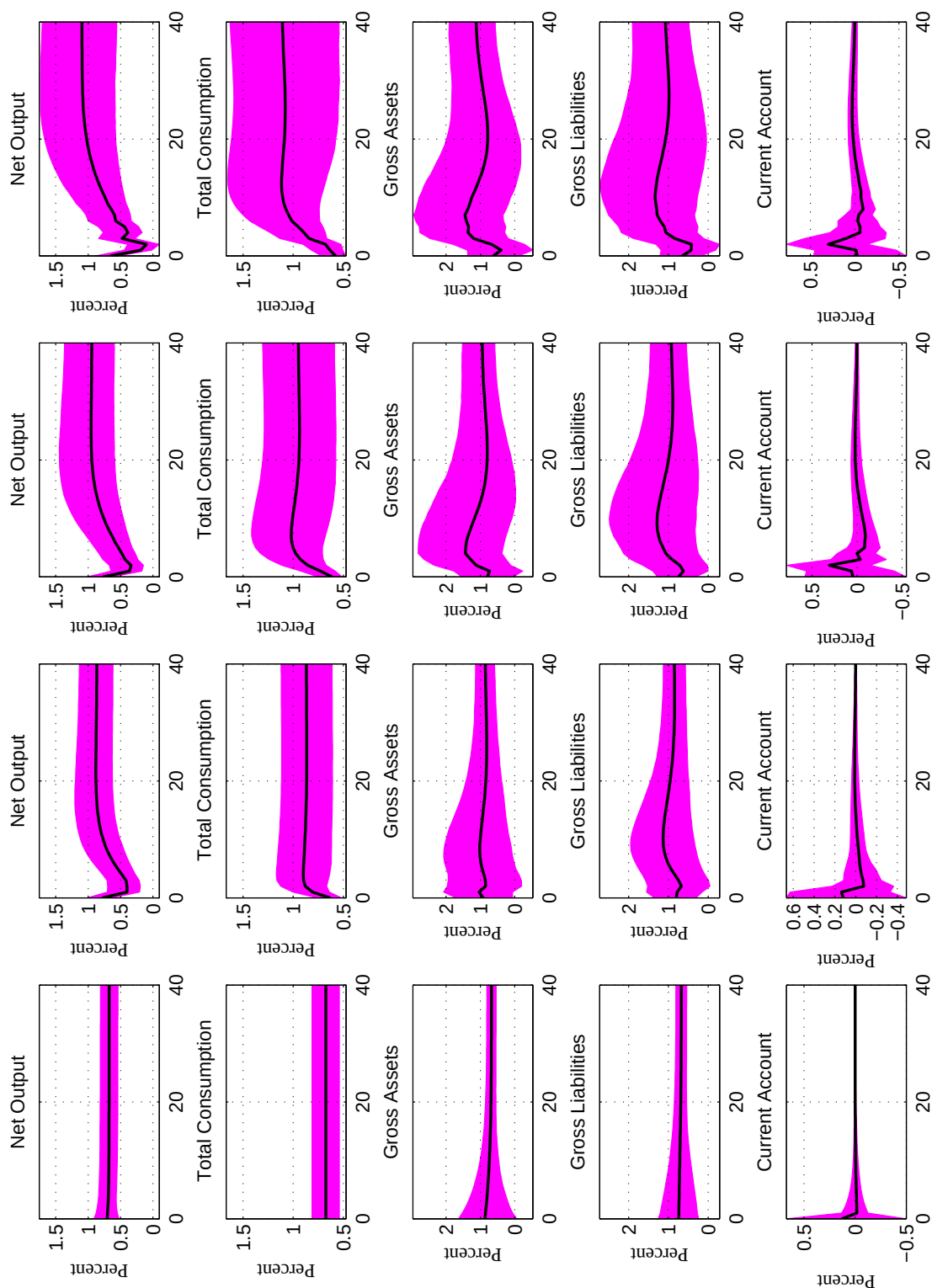


Figure A.17. Impulse Responses to the Permanent Shock with $\alpha_c = 0$, using total consumption, and the orthogonalization of [Gonzalo and Ng \(2001\)](#).

Notes: Results are based on VARs of different orders, with the measure of consumption employed being total consumption, setting $\alpha_c = 0$, while the orthogonalization follows [Gonzalo and Ng \(2001\)](#). The sample runs from the first quarter of 1973 to the fourth quarter of 2004.

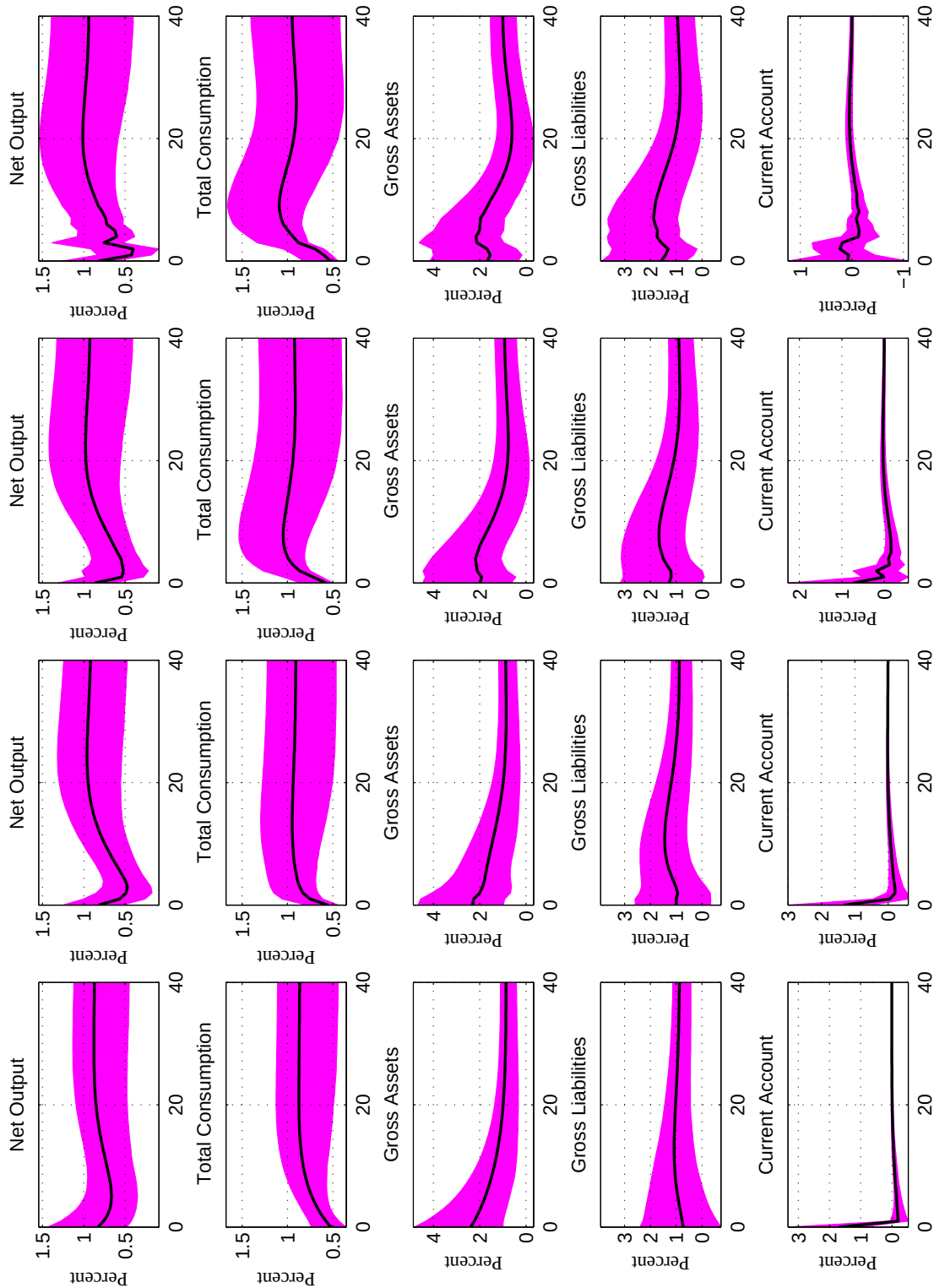


Figure A.18. Impulse Responses to the Permanent Shock with $\alpha_c \neq 0$, using total consumption, and the orthogonalization of [Gonzalo and Ng \(2001\)](#).

Notes: Results are based on VARs of different orders, with the measure of consumption employed being total consumption and with α_c estimated freely, while the orthogonalization follows [Gonzalo and Ng \(2001\)](#). The sample runs from the first quarter of 1973 to the fourth quarter of 2004.

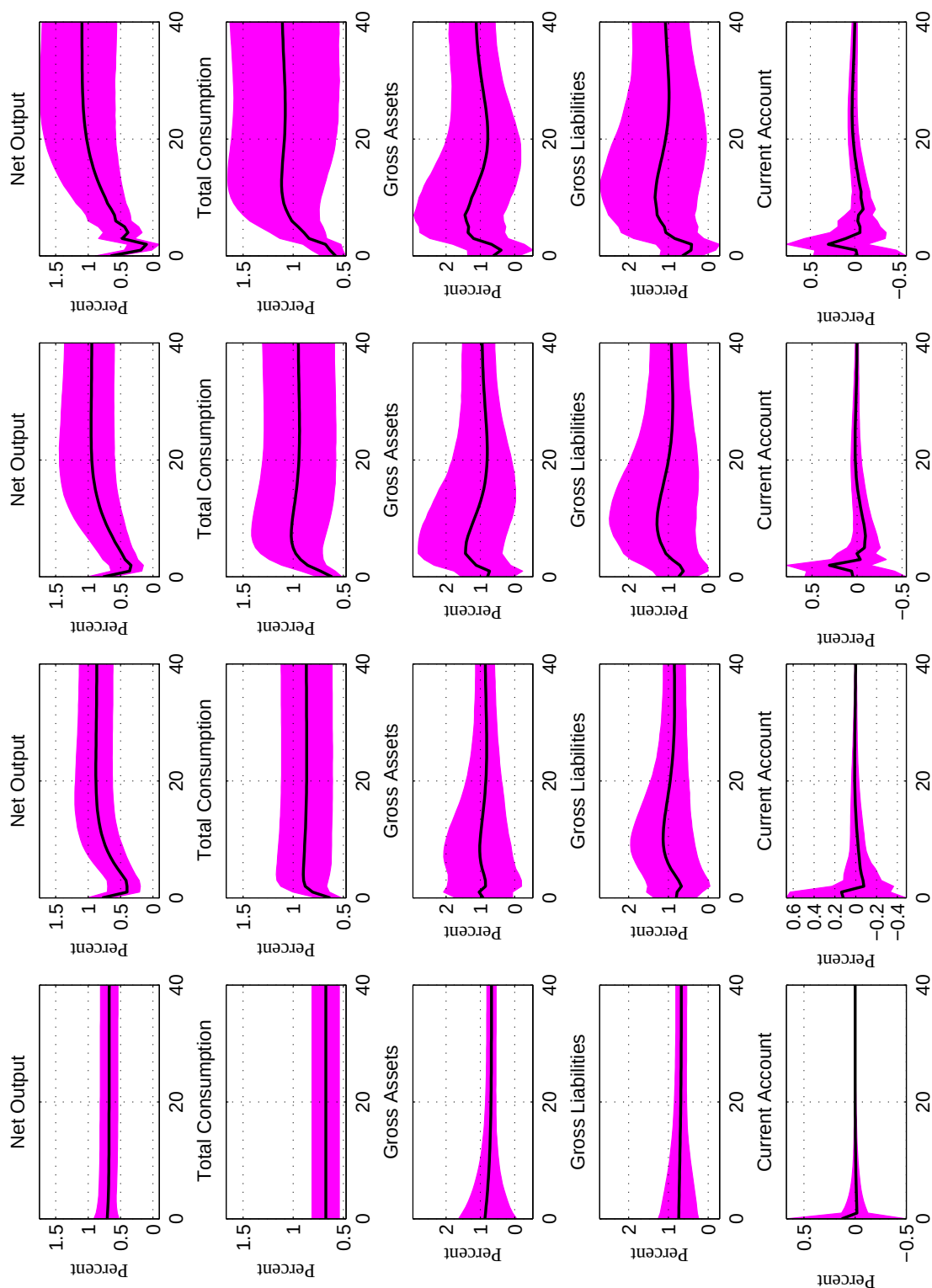


Figure A.19. Impulse Responses to the Permanent Shock with $\alpha_c = 0$, using total consumption, and the orthogonalization of [King et al. \(1991\)](#); [Mellander et al. \(1992\)](#).

Notes: Results are based on VARs of different orders, with the measure of consumption employed being total consumption, setting $\alpha_c = 0$, while the orthogonalization follows [King et al. \(1991\)](#); [Mellander et al. \(1992\)](#). The sample runs from the first quarter of 1973 to the fourth quarter of 2004.

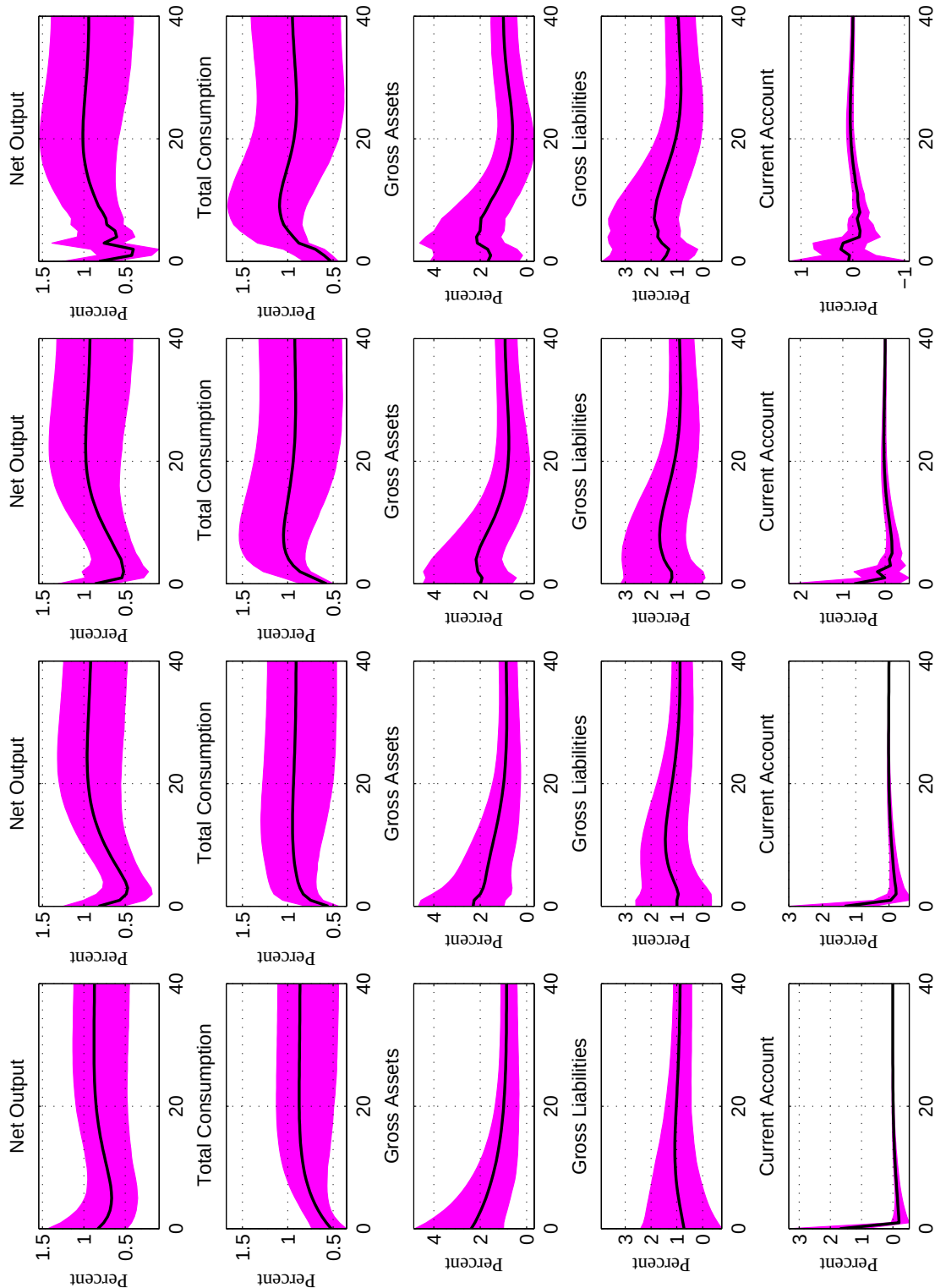


Figure A.20. Impulse Responses to the Permanent Shock with $\alpha_c \neq 0$, using total consumption, and the orthogonalization of [King *et al.* \(1991\)](#); [Mellander *et al.* \(1992\)](#).

Notes: Results are based on VARs of different orders, with the measure of consumption employed being total consumption and with α_c estimated freely, while the orthogonalization follows [King *et al.* \(1991\)](#); [Mellander *et al.* \(1992\)](#). The sample runs form the first quarter of 1973 to the fourth quarter of 2004.

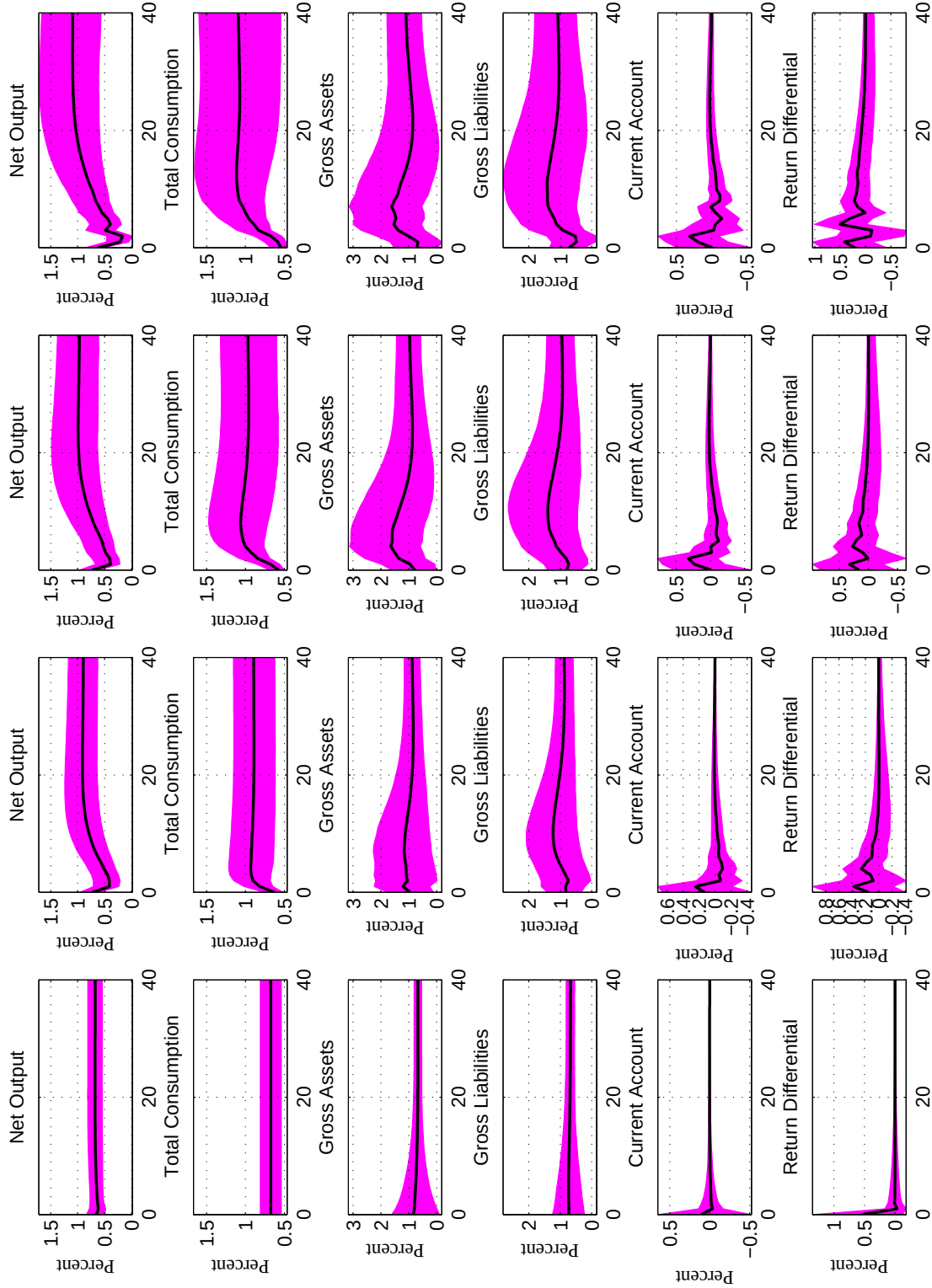


Figure A.21. Impulse Responses to the Permanent Shock with $\alpha_c = 0$, using $r_t^a - r_t^l$, total consumption and the orthogonalization of [Gonzalo and Ng \(2001\)](#).

Notes: Results are based on VARs of different orders, with the measure of consumption employed being total consumption. The VARs also include the return differential, setting $\alpha_c = 0$, while the orthogonalization follows [Gonzalo and Ng \(2001\)](#). The sample runs from the first quarter of 1973 to the fourth quarter of 2004.

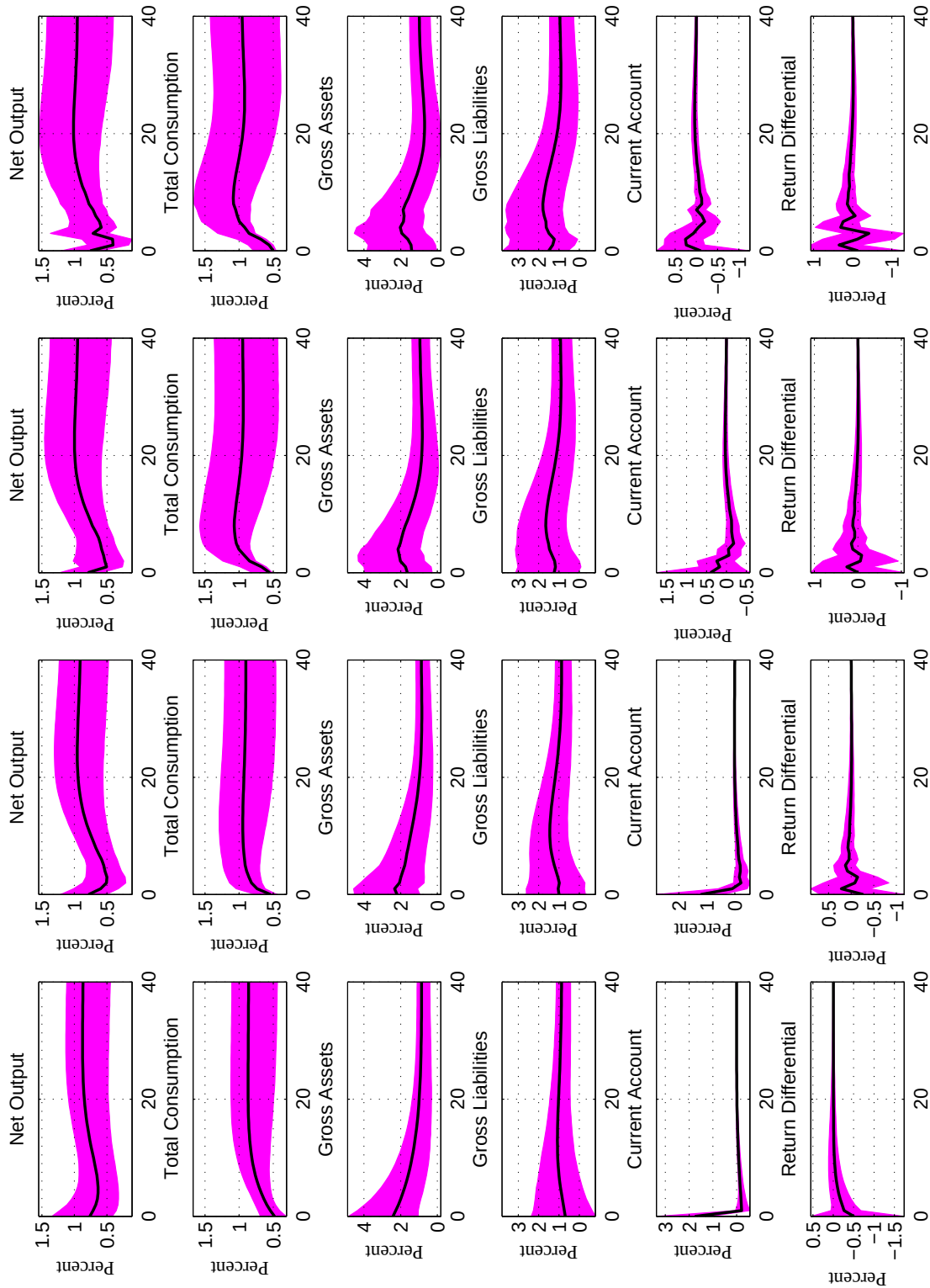


Figure A.22. Impulse Responses to the Permanent Shock with $\alpha_c \neq 0$, using $r_t^a - r_t^l$, total consumption and the orthogonalization of [Gonzalo and Ng \(2001\)](#).

Notes: Results are based on VARs of different orders, with the measure of consumption employed being total consumption. The VARs also include the return differential, employing α_c estimated freely, while the orthogonalization follows [Gonzalo and Ng \(2001\)](#). The sample runs from the first quarter of 1973 to the fourth quarter of 2004.

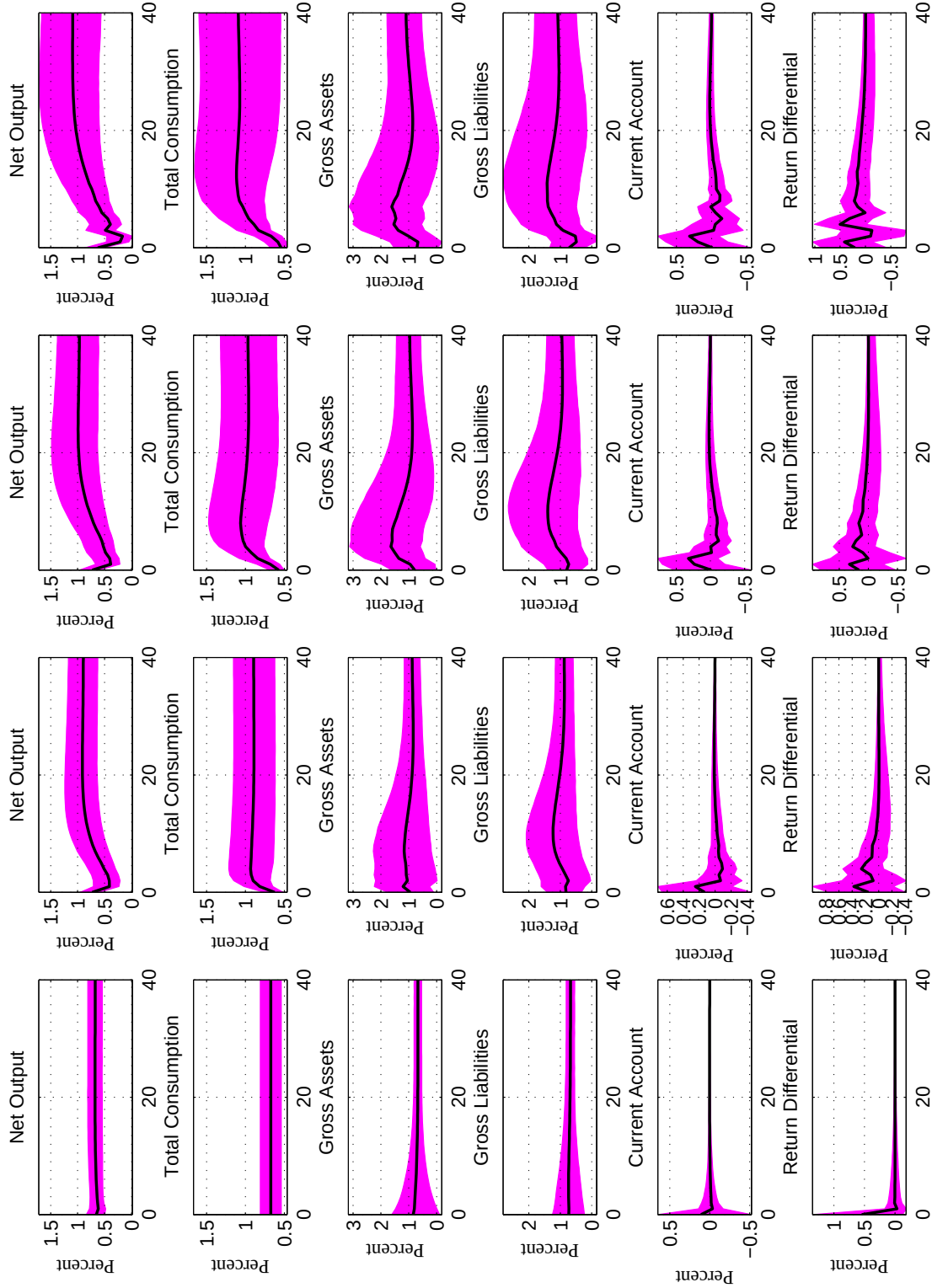


Figure A.23. Impulse Responses to the Permanent Shock with $\alpha_c = 0$, using $r_t^a - r_t^l$ total consumption and the orthogonalization of [King *et al.* \(1991\)](#); [Mellander *et al.* \(1992\)](#).

Notes: Results are based on VARs of different orders, with the measure of consumption employed being total consumption. The VARs also include the return differential, setting $\alpha_c = 0$, while the orthogonalization follows [King *et al.* \(1991\)](#); [Mellander *et al.* \(1992\)](#). The sample runs from the first quarter of 1973 to the fourth quarter of 2004.

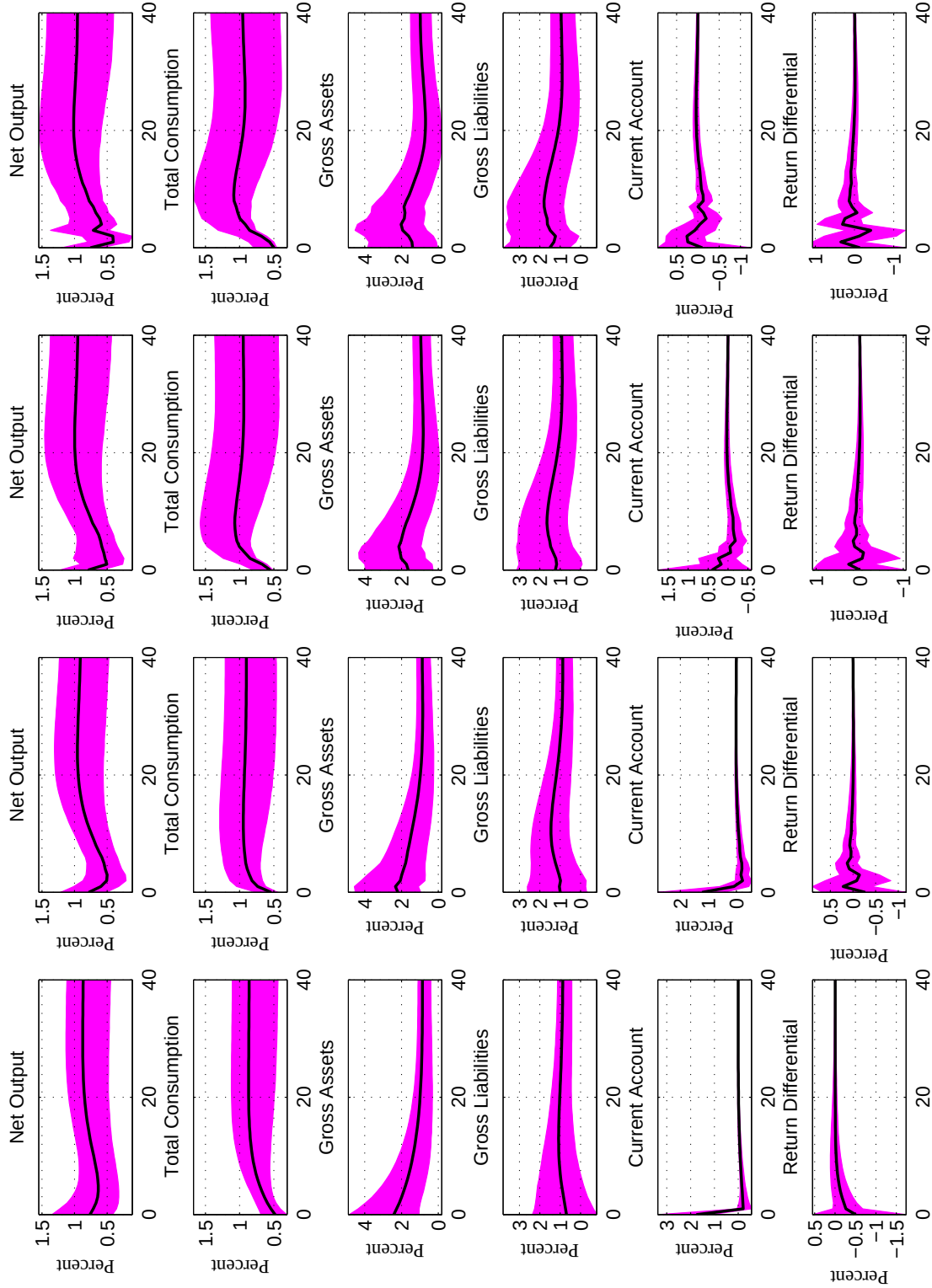


Figure A.24. Impulse Responses to the Permanent Shock with $\alpha_c \neq 0$, using $r_t^a - r_t^l$ total consumption and the orthogonalization of [King *et al.* \(1991\)](#); [Mellander *et al.* \(1992\)](#).

Notes: Results are based on VARs of different orders, with the measure of consumption employed being total consumption. The VARs also include the return differential, employing α_c estimated freely, while the orthogonalization follows [King *et al.* \(1991\)](#); [Mellander *et al.* \(1992\)](#). The sample runs from the first quarter of 1973 to the fourth quarter of 2004.

Tables

Table A.1: UNITED STATES, Country-Weights for Assets, Total Returns

Panel A: Country-Weights Equity Assets			
Country	Prior 1988	Post 1988	Series
United Kingdom	30.57%	26.62%	MSCI Share Price Index w/ Gross Div, US\$ (base 1969)
Japan	14.91%	12.98%	MSCI Share Price Index w/ Gross Div, US\$ (base 1969)
Netherlands	9.85%	8.58%	MSCI Share Price Index w/ Gross Div, US\$ (base 1969)
France	9.80%	8.53%	MSCI Share Price Index w/ Gross Div, US\$ (base 1969)
Canada	7.83%	6.81%	MSCI Share Price Index w/ Gross Div, US\$ (base 1969)
Switzerland	6.60%	5.75%	MSCI Share Price Index w/ Gross Div, US\$ (base 1969)
Germany	6.31%	5.49%	MSCI Share Price Index w/ Gross Div, US\$ (base 1969)
Finland	0.00%	3.90%	MSCI Share Price Index w/ Gross Div, US\$ (base 1987)
Australia	3.24%	2.82%	MSCI Share Price Index w/ Gross Div, US\$ (base 1969)
Italy	2.94%	2.56%	MSCI Share Price Index w/ Gross Div, US\$ (base 1969)
Spain	2.83%	2.47%	MSCI Share Price Index w/ Gross Div, US\$ (base 1969)
Hong Kong	2.63%	2.29%	MSCI Share Price Index w/ Gross Div, US\$ (base 1969)
Korea	0.00%	2.25%	MSCI Share Price Index w/ Gross Div, US\$ (base 1987)
Ireland	2.48%	2.16%	Datastream, Total Return Index, US\$ (TOTMKBX(RI))
Mexico	0.00%	2.00%	MSCI Share Price Index w/ Gross Div, US\$ (base 1987)
Brazil	0.00%	1.66%	MSCI Share Price Index w/ Gross Div, US\$ (base 1987)
Singapore	0.00%	1.63%	MSCI Share Price Index w/ Gross Div, US\$ (base 1987)
Taiwan	0.00%	1.49%	MSCI Share Price Index w/ Gross Div, US\$ (base 1969)
Panel B: Currency Weights, Long-Term Debt Assets			
Currency	Weight (%)	Source	
U.S. Dollar	71.98%	Yields on U.S. government 10-year constant maturity bonds (IFS)	
Euro	18.98%	Yields on Euro government 10-year constant maturity bonds (IFS/Eurostat)*	
U.K. Pound	3.53%	Government Bond Yield (IFS)	
Japanese Yen	5.41%	Government Bond Yield (IFS)	
Swiss Franc	0.09%	Government Bond Yield (IFS)	
Panel C: Currency Weights, Short-Term Debt/Other Investment Assets			
Currency	Weight (%)	Source	
U.S. Dollar	92.09%	Treasury Bill Rate (IFS)	
Euro	5.08%	Money Market Rate (IFS/ECB)†	
U.K. Pound	2.09%	Treasury Bill Rate (IFS)	
Japanese Yen	0.74%	Call Money Rate (IFS)	
Swiss Franc	0.00%	Money Market Rate (IFS)	

Table A.1 (UNITED STATES) Cont'd

Panel D: Foreign Direct Investment Country-Weights, Assets				
Country	1973-1987	1988-1996	1997-2004	Series
United Kingdom	18.52%	24.76%	19.71%	MSCI Share Price Index w/ Gross Div, US\$ (base 1969)
Canada	29.72%	15.85%	13.91%	MSCI Share Price Index w/ Gross Div, US\$ (base 1969)
Germany	10.27%	8.35%	5.80%	MSCI Share Price Index w/ Gross Div, US\$ (base 1969)
Switzerland	9.45%	7.49%	6.25%	MSCI Share Price Index w/ Gross Div, US\$ (base 1969)
Brazil	0.00%	3.80%	2.16%	MSCI Share Price Index w/ Gross Div, US\$ (base 1987)
Australia	6.04%	4.32%	2.96%	MSCI Share Price Index w/ Gross Div, US\$ (base 1969)
Japan	5.13%	7.05%	5.31%	MSCI Share Price Index w/ Gross Div, US\$ (base 1969)
France	4.43%	5.51%	3.46%	MSCI Share Price Index w/ Gross Div, US\$ (base 1969)
Netherlands	4.43%	4.74%	12.94%	MSCI Share Price Index w/ Gross Div, US\$ (base 1969)
Belgium-Luxembourg	3.78%	3.92%	6.70%	Datastream, Total Return Index, US\$ (TOTMKBX(RI))
Italy	2.99%	2.89%	2.20%	MSCI Share Price Index w/ Gross Div, US\$ (base 1969)
Mexico	0.00%	3.45%	4.45%	MSCI Share Price Index w/ Gross Div, US\$ (base 1987)
Hong Kong	2.06%	2.28%	3.20%	MSCI Share Price Index w/ Gross Div, US\$ (base 1969)
Ireland	1.65%	2.04%	4.01%	Datastream, Total Return Index, US\$ (TOTMIR\$(RI))
Spain	1.53%	1.52%	2.76%	MSCI Share Price Index w/ Gross Div, US\$ (base 1969)
Singapore	0.00%	2.01%	4.16%	MSCI Share Price Index w/ Gross Div, US\$ (base 1987)

Notes for Table A.1: The table reports the weights used in constructing total returns for each subcategory of assets for the U.S., as well as the source and the series used in computing these returns.

* This corresponds to the average yield on 10-year government bonds for Germany, France, Italy and the Netherlands up to 1989 (obtained from IFS). From 1990 it corresponds to the Euro Area average long-term bond yield (obtained from Eurostat).

† This corresponds to the average Call Money Rate (Germany and Netherlands), Treasury Bill Rate (France) and Money Market Rate (Italy) prior to 1990 (obtained from IFS). After 1990, it corresponds to the Euro-Area 3-Month Average Money Market Rate (obtained from the ECB).

Table A.2: Cointegration Test Statistics

$H_0 : r$	$n - r$	$k = 1$		$k = 2$		$k = 3$		$k = 4$	
		$Q(r n)$	$Q(r r+1)$	$Q(r n)$	$Q(r r+1)$	$Q(r n)$	$Q(r r+1)$	$Q(r n)$	$Q(r r+1)$
$r = 0$	4	80.516	34.378	75.062	30.909	71.032	29.042	67.073	25.583
Asymp. p -value		[0.001]	[0.026]	[0.004]	[0.070]	[0.011]	[0.113]	[0.026]	[0.254]
Emp. p -value		[0.002]	[0.000]	[0.013]	[0.000]	[0.039]	[0.001]	[0.122]	[0.030]
$r \leq 1$	3	46.138	22.830	44.153	20.307	41.991	18.512	41.490	20.985
Asymp. p -value		[0.023]	[0.118]	[0.037]	[0.226]	[0.062]	[0.339]	[0.069]	[0.192]
Emp. p -value		[0.036]	[0.000]	[0.071]	[0.017]	[0.128]	[0.091]	[0.185]	[0.045]
$r \leq 2$	2	23.307	14.411	23.846	15.279	23.478	17.193	20.505	16.277
Asymp. p -value		[0.101]	[0.228]	[0.087]	[0.179]	[0.096]	[0.101]	[0.201]	[0.134]
Emp. p -value		[0.142]	[0.033]	[0.124]	[0.025]	[0.139]	[0.003]	[0.314]	[0.009]
$r \leq 3$	1	8.896	8.896	8.567	8.567	6.285	6.285	4.228	4.228
Asymp. p -value		[0.187]	[0.187]	[0.209]	[0.209]	[0.425]	[0.425]	[0.709]	[0.709]
Emp. p -value		[0.248]	[0.248]	[0.268]	[0.268]	[0.518]	[0.518]	[0.773]	[0.773]

NOTES for Table A.2: $Q(r|n)$ denotes the trace statistic, i.e. $Q(r|n) = -T \sum_{i=r+1}^n \ln(1 - \hat{\lambda}_i)$ and $Q(r|r+1)$ denotes the maximum eigenvalue statistic i.e. $Q(r|r+1) = -T \ln(1 - \hat{\lambda}_{r+1})$ as defined in Johansen (1995). The table reports test statistics for $k = 1, \dots, 4$ lags in the VAR. The asymptotic p -values reported are calculated using the methods in MacKinnon et al. (1999). The bootstrap p -values are based on a Monte Carlo Bootstrap Simulation with 10000 replications. The sample spans the first quarter of 1973 to the fourth quarter of 2004.

Table A.3: Unit Root Tests on "Great Ratios" (Non Durables and Services Consumption)

x_t	$c_t - z_t$	$a_t - z_t$	$l_t - z_t$	$CV_{0.90}$	$CV_{0.95}$	$CV_{0.99}$
PP_1	-4.343	-3.454	-3.181	-3.148	-3.446	-4.032
[p -value]	[0.004]	[0.049]	[0.093]			
PP_2	-4.090 (1.58)	-3.057 (1.24)	-2.827 (1.22)	3.148	-3.446	-4.032
[p -value]	[0.008]	[0.121]	[0.190]			
$KPSS_1$	0.137	0.050	0.061	0.119	0.146	0.216
$KPSS_2$	0.111 (11.40)	0.054 (22.70)	0.095 (27.00)	0.119	0.146	0.216

Notes for Table A.3: The table reports two variants of the unit root tests of Phillips and Perron (1988) and the stationarity tests of Kwiatkowski *et al.* (1992) when employing nondurables and services consumption. Both test include a constant and time trend in the estimated equation. In the first (PP_1 and $KPSS_1$) the bandwidth parameter is set to 8, and in the second (PP_2 and $KPSS_2$) the bandwidth (the number reported in the parenthesis) is chosen using Andrews (1991)'s automatic bandwidth selection. The PP test examines the null of a unit root against the alternative of trend-stationarity of the ratios. The KPSS test examines the null of trend-stationarity against the alternative of a unit root. The asymptotic p -values for the PP test are calculated using the method of MacKinnon (1996).

Table A.4: Cointegrating Relations Estimates

Panel A: DOLS Estimates and Wald tests (1973-2004 Sample)										
lags/leads	$k = 1$		$k = 2$		$k = 3$		$k = 4$		$k = 5$	
	β_i	θ_i	β_i	θ_i	β_i	θ_i	β_i	θ_i	β_i	θ_i
$c_t - \hat{\beta}_c z_t - \hat{\theta}_c t$ [t -stats]	0.589 [11.358]	0.0021 [10.174]	0.612 [11.183]	0.0020 [9.145]	0.624 [11.393]	0.0019 [8.846]	0.636 [11.036]	0.0019 [8.143]	0.646 [10.437]	0.0018 [7.341]
$c_t - z_t - \hat{\theta}_c t$ [t -stats]	—	0.0005 [8.523]	—	0.0005 [9.886]	—	0.0004 [11.973]	—	0.0004 [10.175]	—	0.0004 [9.749]
Wald-test $\mathcal{W}(1)$	63.051		50.255		46.997		39.802		32.683	
[Asymp. p -value]/[Emp. p -value]	[0.000]	[0.221]	[0.000]	[0.249]	[0.000]	[0.261]	[0.000]	[0.273]	[0.000]	[0.299]
$a_t - \hat{\beta}_a z_t - \hat{\theta}_a t$ [t -stats]	1.368 [2.866]	0.0121 [6.466]	1.253 [2.412]	0.0125 [6.136]	1.121 [2.206]	0.0131 [6.506]	1.114 [2.091]	0.0131 [6.174]	1.108 [1.949]	0.0131 [5.744]
$a_t - z_t - \hat{\theta}_a t$ [t -stats]	—	0.0135 [46.023]	—	0.0135 [44.333]	—	0.0135 [46.349]	—	0.0135 [44.705]	—	0.0135 [43.000]
Wald-test $\mathcal{W}(1)$	0.595		0.236		0.057		0.045		0.036	
[Asymp. p -value]/[Emp. p -value]	[0.440]	[0.790]	[0.627]	[0.865]	[0.812]	[0.933]	[0.831]	[0.941]	[0.849]	[0.949]
$l_t - \hat{\beta}_l z_t - \hat{\theta}_l t$ [t -stats]	2.327 [6.048]	0.0125 [8.325]	2.426 [6.044]	0.0121 [7.689]	2.442 [6.229]	0.0121 [7.797]	2.449 [6.301]	0.0121 [7.803]	2.439 [6.010]	0.0121 [7.438]
$l_t - z_t - \hat{\theta}_l t$ [t -stats]	—	0.0176 [76.483]	—	0.0177 [73.416]	—	0.0177 [75.954]	—	0.0178 [76.756]	—	0.0178 [75.123]
Wald-test $\mathcal{W}(1)$	11.897		12.622		13.526		13.900		12.574	
[Asymp. p -value]/[Emp. p -value]	[0.001]	[0.220]	[0.000]	[0.221]	[0.000]	[0.217]	[0.000]	[0.220]	[0.000]	[0.253]
Joint Wald-test $\mathcal{W}(3)$	127.828		124.728		123.197		119.280		102.671	
[Asymp. p -value]/[Emp. p -value]	[0.000]	[0.247]	[0.000]	[0.238]	[0.000]	[0.229]	[0.000]	[0.232]	[0.000]	[0.276]

Table A.4 Continued

Panel B: Johansen's FIML Estimates of Cointegrating Relations and Likelihood Ratio Tests (1973-2004 Sample)									
lags	$k = 1$		$k = 2$		$k = 3$		$k = 4$		$k = 5$
	β_i	θ_i	β_i	θ_i	β_i	θ_i	β_i	θ_i	θ_i
$c_t - \hat{\beta}_c z_t - \hat{\theta}_c t$	0.393	0.0029	0.091	0.0041	0.191	0.0037	0.266	0.0034	0.272
[t -stats]	[3.882]	[7.479]	[0.647]	[7.464]	[1.441]	[7.068]	[2.436]	[7.795]	[1.737]
$c_t - z_t - \hat{\theta}_c t$	—	0.0006	—	0.0005	—	0.0005	—	0.0005	—
[t -stats]	—	[8.127]	—	[6.412]	—	[6.581]	—	[8.260]	—
LR-test $\mathcal{LR}(1)$	3.446		6.714		10.688		10.753		4.221
[Asymp. p -value]/[Emp. p -value]	[0.063]	[0.134]	[0.010]	[0.066]	[0.001]	[0.040]	[0.001]	[0.051]	[0.040]
$a_t - \hat{\beta}_a z_t - \hat{\theta}_a t$	1.270	0.0122	1.727	0.0105	2.081	0.0090	1.779	0.0105	2.369
[t -stats]	[2.158]	[5.348]	[3.345]	[5.208]	[4.402]	[4.874]	[3.850]	[5.748]	[4.368]
$a_t - z_t - \hat{\theta}_a t$	—	0.0132	—	0.0134	—	0.0133	—	0.0136	—
[t -stats]	—	[31.701]	—	[38.565]	—	[44.193]	—	[48.077]	—
LR-test $\mathcal{LR}(1)$	0.013		0.095		0.433		0.389		0.923
[Asymp. p -value]/[Emp. p -value]	[0.910]	[0.933]	[0.759]	[0.825]	[0.511]	[0.627]	[0.533]	[0.638]	[0.337]
$l_t - \hat{\beta}_l z_t - \hat{\theta}_l t$	4.242	0.0048	3.774	0.0067	3.634	0.0072	3.606	0.0075	3.491
[t -stats]	[8.765]	[2.588]	[10.011]	[4.537]	[10.786]	[5.414]	[9.484]	[4.983]	[7.748]
$l_t - z_t - \hat{\theta}_l t$	—	0.0176	—	0.0177	—	0.0176	—	0.0177	—
[t -stats]	—	[58.750]	—	[76.269]	—	[84.122]	—	[78.443]	—
LR-test $\mathcal{LR}(1)$	2.171		1.910		5.628		8.620		3.495
[Asymp. p -value]/[Emp. p -value]	[0.141]	[0.362]	[0.167]	[0.368]	[0.018]	[0.119]	[0.003]	[0.052]	[0.062]
Joint LR-test $\mathcal{LR}(3)$	18.690		13.914		12.942		11.872		4.244
[Asymp. p -value]/[Emp. p -value]	[0.000]	[0.008]	[0.003]	[0.048]	[0.005]	[0.088]	[0.008]	[0.161]	[0.236]
Panel C: Fully-Modified OLS Estimates of Cointegrating Relations and Wald Tests (1973-2004 Sample)									
Parameter Estimates	β_c	θ_c	β_a	θ_a	β_l	θ_l			
	0.557	0.0022	1.387	0.0120	2.178	0.0131			
[t -stats]	[9.868]	[9.972]	[3.177]	[7.064]	[5.980]	[9.254]			
Wald-test $\mathcal{W}(1)$	61.752		0.785		10.462				
[Asymp. p -value]/[Emp. p -value]	[0.000]	[0.243]	[0.375]	[0.755]	[0.001]	[0.252]			

NOTES for Table A.4: Panel A reports the estimates of the cointegrating relations employing the DOLS estimator of [Stock and Watson \(1993\)](#). Panel B reports estimates of the cointegrating relations using [Johansen \(1995\)](#)'s FIML, assuming the other two cointegrating relations are exactly identified; and Panel C reports estimates making use of the Fully-Modified OLS estimator of [Phillips and Hansen \(1990\)](#) and [Hansen \(1992\)](#). The bootstrap p -values are based on a Monte Carlo Bootstrap Simulation with 10000 replications. For the DOLS procedure these are constructed following [Chang et al. \(2006\)](#), while for the FM-OLS estimator following [Psaradakis \(2001\)](#). The sample spans the first quarter of 1973 to the fourth quarter of 2004.

Table B.1: Variance Decomposition (Orthogonalized Shocks) – Identification following **Gonzalo and Ng (2001)**: 1973-2004 with Linear Trends

Panel A: Consumption Adjustment Coefficients set to Zero ($\alpha_c = 0$)																
h_t	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4
	$\frac{\Delta c_{t+h} - E_t \Delta c_{t+h}}{\eta_t^P}$				η_t^T				$\frac{\Delta z_{t+h} - E_t \Delta z_{t+h}}{\eta_t^P}$				$\frac{\Delta a_{t+h} - E_t \Delta a_{t+h}}{\eta_t^P}$			
1	1.000	1.000	1.000	1.000	0.000	0.000	0.000	0.000	0.171	0.257	0.256	0.206	0.829	0.743	0.744	0.794
2	1.000	0.998	0.997	0.995	0.000	0.002	0.003	0.005	0.215	0.245	0.264	0.199	0.785	0.755	0.736	0.801
3	1.000	0.997	0.984	0.969	0.000	0.003	0.016	0.031	0.259	0.267	0.266	0.174	0.741	0.733	0.734	0.826
4	1.000	0.997	0.977	0.950	0.000	0.003	0.023	0.050	0.302	0.299	0.295	0.217	0.698	0.701	0.705	0.783
8	1.000	0.997	0.974	0.936	0.000	0.003	0.026	0.064	0.436	0.459	0.441	0.367	0.564	0.541	0.559	0.633
12	1.000	0.998	0.979	0.946	0.000	0.002	0.021	0.054	0.526	0.584	0.563	0.522	0.474	0.416	0.437	0.478
16	1.000	0.999	0.983	0.957	0.000	0.001	0.017	0.043	0.590	0.669	0.652	0.634	0.410	0.331	0.348	0.366
20	1.000	0.999	0.986	0.965	0.000	0.001	0.014	0.035	0.638	0.726	0.714	0.708	0.362	0.274	0.286	0.292
40	1.000	0.999	0.993	0.983	0.000	0.001	0.007	0.017	0.770	0.850	0.845	0.856	0.230	0.150	0.155	0.144
h_t	$\frac{\Delta a_{t+h} - E_t \Delta a_{t+h}}{\eta_t^T}$				η_t^P				$\frac{\Delta l_{t+h} - E_t \Delta l_{t+h}}{\eta_t^T}$				$\frac{CA_{t+h}^* - E_t CA_{t+h}^*}{\eta_t^P}$			
1	0.878	0.878	0.885	0.880	0.131	0.142	0.139	0.127	0.869	0.858	0.861	0.873	0.015	0.015	0.009	0.016
2	0.875	0.858	0.875	0.881	0.137	0.134	0.122	0.109	0.863	0.866	0.878	0.891	0.016	0.016	0.014	0.017
3	0.872	0.853	0.848	0.863	0.142	0.129	0.127	0.104	0.858	0.871	0.873	0.896	0.016	0.016	0.017	0.020
4	0.869	0.846	0.825	0.836	0.147	0.133	0.140	0.132	0.853	0.867	0.860	0.868	0.016	0.016	0.018	0.021
8	0.857	0.813	0.765	0.761	0.167	0.176	0.205	0.226	0.833	0.824	0.795	0.774	0.016	0.016	0.023	0.027
12	0.845	0.787	0.735	0.719	0.185	0.220	0.255	0.286	0.815	0.780	0.745	0.714	0.016	0.016	0.025	0.030
16	0.835	0.769	0.718	0.698	0.202	0.252	0.290	0.329	0.798	0.748	0.710	0.671	0.016	0.016	0.025	0.030
20	0.826	0.756	0.707	0.687	0.216	0.276	0.314	0.359	0.784	0.724	0.686	0.641	0.016	0.016	0.025	0.030
40	0.788	0.703	0.661	0.627	0.270	0.349	0.378	0.440	0.730	0.651	0.622	0.560	0.016	0.016	0.026	0.031

Table B.1 Continued

Panel B: Consumption Adjustment Coefficients set to their Estimated Values ($\alpha_c \neq 0$)																
	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4
h	$\frac{\Delta c_{t+h} - E_t \Delta c_{t+h}}{\eta_t^P}$				η_t^T				$\frac{\Delta z_{t+h} - E_t \Delta z_{t+h}}{\eta_t^P}$				η_t^T			
1	0.750	0.838	0.933	0.982	0.250	0.162	0.067	0.018	0.150	0.180	0.219	0.177	0.850	0.820	0.781	0.823
2	0.782	0.849	0.932	0.972	0.218	0.151	0.068	0.028	0.173	0.190	0.234	0.166	0.827	0.810	0.766	0.834
3	0.809	0.862	0.914	0.931	0.191	0.138	0.086	0.069	0.197	0.198	0.228	0.139	0.803	0.802	0.772	0.861
4	0.832	0.872	0.904	0.903	0.168	0.128	0.096	0.097	0.223	0.213	0.241	0.164	0.777	0.787	0.759	0.836
8	0.893	0.905	0.911	0.883	0.107	0.095	0.089	0.117	0.331	0.308	0.336	0.289	0.669	0.692	0.664	0.711
12	0.926	0.930	0.928	0.899	0.074	0.070	0.072	0.101	0.437	0.434	0.449	0.438	0.563	0.566	0.551	0.562
16	0.945	0.946	0.942	0.917	0.055	0.054	0.058	0.083	0.528	0.551	0.554	0.555	0.472	0.449	0.446	0.445
20	0.957	0.958	0.953	0.931	0.043	0.042	0.047	0.069	0.598	0.640	0.636	0.638	0.402	0.360	0.364	0.362
40	0.979	0.980	0.976	0.966	0.021	0.020	0.024	0.034	0.771	0.824	0.812	0.818	0.229	0.176	0.188	0.182
$\underline{h}$	$\frac{\Delta a_{t+h} - E_t \Delta a_{t+h}}{\eta_t^T}$				$\frac{\Delta l_{t+h} - E_t \Delta l_{t+h}}{\eta_t^P}$				η_t^T				$\frac{CA_{t+h}^* - E_t CA_{t+h}^*}{\eta_t^P}$			
1	0.629	0.758	0.834	0.899	0.080	0.057	0.066	0.064	0.920	0.943	0.934	0.936	0.366	0.366	0.107	0.040
2	0.618	0.745	0.832	0.904	0.091	0.053	0.055	0.051	0.909	0.947	0.945	0.949	0.365	0.365	0.103	0.039
3	0.608	0.738	0.809	0.890	0.102	0.054	0.059	0.048	0.898	0.946	0.941	0.952	0.365	0.365	0.102	0.041
4	0.598	0.726	0.786	0.868	0.114	0.061	0.070	0.070	0.886	0.939	0.930	0.930	0.365	0.365	0.103	0.043
8	0.565	0.670	0.717	0.797	0.163	0.119	0.137	0.154	0.837	0.881	0.863	0.846	0.365	0.365	0.110	0.047
12	0.540	0.626	0.676	0.754	0.207	0.191	0.201	0.212	0.793	0.809	0.799	0.788	0.365	0.365	0.113	0.050
16	0.523	0.597	0.651	0.730	0.244	0.252	0.251	0.256	0.756	0.748	0.749	0.744	0.365	0.365	0.113	0.050
20	0.511	0.577	0.637	0.716	0.272	0.297	0.287	0.289	0.728	0.703	0.713	0.711	0.364	0.364	0.113	0.050
40	0.474	0.523	0.591	0.651	0.351	0.398	0.366	0.381	0.649	0.602	0.634	0.619	0.364	0.364	0.113	0.051

NOTES for Table B.1: The table reports the fraction of the variance in the h step-ahead forecast error of the variable listed at the head of each column that is attributable to innovations in the permanent shock, η_t^P , and the transitory shocks, η_t^T , using different number of lags in the VAR. Horizons are in quarters and the underlying VEqCM allows for linear trends in the cointegrating relations. Panel A reports results imposing the restriction that the adjustment coefficients of consumption are statistically insignificant ($\alpha_c = 0$), while Panel B reports results using the estimated adjustment coefficients of consumption ($\alpha_c \neq 0$). The identification method follows [Gonzalo and Ng \(2001\)](#), where at a first step a rotation from reduced form into permanent/transitory innovations is performed in which shocks are allowed to be correlated (with $\eta_t^P = \alpha'_\perp \mathbf{u}_t$ and $\eta_t^T = \beta' \mathbf{u}_t$); and at a second step shocks are further identified by a simple Cholesky decomposition of $\text{Var}(\eta_t) = \mathbf{G}\mathbf{G}'$. The current account proxy CA_t^* is defined as $NFA_{t+1} - NFA_t$, where $NFA_t \equiv [\exp(a_t) - \exp(l_t)]$. The sample spans the first quarter of 1973 to the fourth quarter of 2004.

Table B.2: Variance Decomposition (Unorthogonalized Shocks) – Identification following **Gonzalo and Ng (2001)**: 1973-2004 with Linear Trends

Panel A: Consumption Adjustment Coefficients set to Zero ($\alpha_c = 0$)																																
$\underline{h}$	η_t^P				η_t^r				η_t^P								η_t^r				η_t^P, η_t^r											
	k=1	k=2	k=3	k=4	$\Delta_{c,t+h} - E_t \Delta_{c,t+h}$				k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	$\Delta_{z,t+h} - E_t \Delta_{z,t+h}$				k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4				
1	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.14	0.17	0.17	0.15	0.89	0.97	0.96	0.93	-0.04	-0.13	-0.13	-0.13	-0.04	-0.13	-0.08					
2	1.00	1.00	0.99	0.99	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.18	0.12	0.14	0.11	0.85	0.92	0.90	0.88	-0.03	-0.04	-0.04	-0.04	-0.03	-0.04	0.00					
3	1.00	1.00	0.95	0.93	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.04	0.22	0.13	0.12	0.08	0.81	0.89	0.84	0.84	-0.03	-0.02	0.05	0.05	-0.03	-0.02	0.07					
4	1.00	0.99	0.93	0.88	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.07	0.26	0.15	0.14	0.10	0.78	0.86	0.84	0.86	-0.03	-0.02	0.03	0.05	-0.03	-0.02	0.05					
8	1.00	0.99	0.92	0.84	0.00	0.00	0.00	0.02	0.06	0.00	0.01	0.06	0.37	0.32	0.29	0.23	0.66	0.74	0.79	0.85	-0.03	-0.07	-0.07	-0.07	-0.03	-0.07	-0.07					
12	1.00	0.99	0.93	0.85	0.00	0.00	0.00	0.02	0.05	0.00	0.01	0.05	0.46	0.47	0.43	0.38	0.56	0.58	0.65	0.69	-0.02	-0.06	-0.08	-0.08	-0.02	-0.06	-0.07					
16	1.00	0.99	0.94	0.88	0.00	0.00	0.00	0.02	0.04	0.00	0.01	0.05	0.52	0.57	0.53	0.50	0.48	0.46	0.52	0.54	0.00	-0.03	-0.04	-0.04	0.00	-0.03	-0.04					
20	1.00	0.99	0.95	0.90	0.00	0.00	0.00	0.01	0.03	0.00	0.01	0.04	0.57	0.64	0.60	0.58	0.43	0.37	0.42	0.43	0.01	-0.01	-0.02	-0.02	0.01	-0.01	-0.01					
40	1.00	1.00	0.97	0.95	0.00	0.00	0.00	0.01	0.02	0.00	0.00	0.02	0.72	0.80	0.78	0.77	0.27	0.20	0.22	0.21	0.01	0.00	0.00	0.00	0.01	0.00	0.02					
$\underline{h}$					$\Delta_{a,t+h} - E_t \Delta_{a,t+h}$												$\Delta_{l,t+h} - E_t \Delta_{l,t+h}$															
1	0.01	0.01	0.01	0.01	0.88	0.92	0.92	0.92	0.92	0.11	0.07	0.07	0.02	0.02	0.02	0.01	0.81	0.85	0.86	0.87	0.17	0.14	0.14	0.13	0.12	0.14	0.13	0.12				
2	0.01	0.02	0.01	0.01	0.91	0.86	0.86	0.84	0.84	0.08	0.12	0.13	0.15	0.02	0.01	0.01	0.78	0.84	0.86	0.88	0.20	0.15	0.15	0.13	0.12	0.20	0.15	0.12				
3	0.01	0.02	0.02	0.01	0.93	0.86	0.80	0.78	0.78	0.05	0.12	0.18	0.20	0.02	0.01	0.01	0.75	0.81	0.86	0.88	0.23	0.18	0.18	0.13	0.11	0.23	0.18	0.11				
4	0.01	0.02	0.03	0.03	0.96	0.88	0.78	0.73	0.73	0.03	0.10	0.19	0.25	0.02	0.01	0.02	0.72	0.79	0.83	0.84	0.26	0.20	0.20	0.15	0.14	0.26	0.20	0.15				
8	0.02	0.04	0.07	0.07	1.04	0.94	0.78	0.68	0.68	-0.06	0.01	0.14	0.25	0.03	0.04	0.05	0.65	0.69	0.72	0.70	0.32	0.27	0.27	0.23	0.24	0.32	0.27	0.24				
12	0.03	0.07	0.10	0.10	1.08	0.99	0.82	0.67	0.67	-0.11	-0.06	0.08	0.22	0.04	0.07	0.09	0.63	0.66	0.66	0.62	0.33	0.27	0.25	0.27	0.27	0.33	0.27	0.25				
16	0.04	0.09	0.12	0.13	1.10	1.01	0.83	0.67	0.67	-0.14	-0.10	0.05	0.21	0.05	0.10	0.11	0.62	0.66	0.65	0.59	0.33	0.25	0.24	0.28	0.33	0.25	0.24	0.28				
20	0.04	0.10	0.14	0.15	1.10	1.01	0.83	0.66	0.66	-0.15	-0.11	0.04	0.20	0.06	0.12	0.14	0.62	0.66	0.65	0.56	0.32	0.22	0.22	0.27	0.32	0.22	0.22	0.27				
40	0.09	0.17	0.20	0.23	1.06	0.94	0.77	0.60	0.60	-0.15	-0.11	0.03	0.17	0.11	0.20	0.22	0.59	0.62	0.60	0.50	0.30	0.18	0.18	0.24	0.30	0.18	0.18	0.24				
$\underline{h}$					$C A_{t+h}^* - E_t C A_{t+h}^*$																											
1	0.00	0.00	0.00	0.00	3.33	3.26	3.21	3.39	3.39	-2.33	-2.26	-2.21	-2.39	-2.33	-2.26	-2.21	-2.39	-2.33	-2.26	-2.21	-2.39											
2	0.00	0.01	0.01	0.00	3.49	3.18	3.16	3.29	3.29	-2.49	-2.20	-2.17	-2.30	-2.49	-2.20	-2.17	-2.30	-2.49	-2.20	-2.17	-2.30											
3	0.00	0.02	0.05	0.05	3.62	3.36	3.06	3.19	3.19	-2.62	-2.37	-2.11	-2.23	-2.62	-2.37	-2.11	-2.23	-2.62	-2.37	-2.11	-2.23											
4	0.00	0.02	0.06	0.03	3.72	3.51	3.21	2.53	2.53	-2.72	-2.53	-2.26	-1.55	-2.72	-2.53	-2.26	-1.55	-2.72	-2.53	-2.26	-1.55											
8	0.00	0.00	0.02	0.01	3.65	3.39	3.16	3.19	3.19	-2.65	-2.39	-2.18	-2.20	-2.65	-2.39	-2.18	-2.20	-2.65	-2.39	-2.18	-2.20											
12	0.00	0.00	0.00	0.01	2.74	1.88	1.30	1.09	1.09	-1.74	-0.88	-0.30	-0.10	-1.74	-0.88	-0.30	-0.10	-1.74	-0.88	-0.30	-0.10											
16	0.00	0.02	0.03	0.03	1.56	0.66	0.53	0.57	0.57	-0.56	0.32	0.44	0.39	-0.56	0.32	0.44	0.39	-0.56	0.32	0.44	0.39											
20	0.00	0.03	0.06	0.05	0.80	0.70	0.71	0.49	0.49	0.20	0.26	0.23	0.46	0.20	0.26	0.23	0.46	0.20	0.26	0.23	0.46											
40	0.00	0.00	0.03	0.03	1.86	1.79	0.57	0.54	0.54	-0.86	-0.79	0.40	0.43	-0.86	-0.79	0.40	0.43	-0.86	-0.79	0.40	0.43											

Table B.2 Continued

Panel B: Consumption Adjustment Coefficients set to their Estimated Values ($\alpha_c \neq 0$)																				
$\underline{h}$	η_t^P				η_t^T				η_t^P				η_t^T				η_t^P, η_t^T			
	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4
					$\Delta_{\alpha_t+h} - E_t \Delta_{\alpha_t+h}$								$\Delta_{\alpha_t+h} - E_t \Delta_{\alpha_t+h}$							
1	1.53	1.24	1.08	0.99	1.33	0.74	0.27	0.05	-1.86	-0.97	-0.35	-0.04	0.22	0.17	0.16	0.14	1.10	1.01	0.96	0.91
2	1.50	1.21	1.06	0.97	1.16	0.67	0.26	0.06	-1.66	-0.88	-0.32	-0.04	0.27	0.13	0.14	0.10	1.17	0.92	0.89	0.86
3	1.46	1.18	1.01	0.90	1.01	0.60	0.27	0.11	-1.47	-0.79	-0.27	-0.01	0.33	0.13	0.12	0.08	1.24	0.93	0.84	0.83
4	1.42	1.17	0.98	0.85	0.89	0.55	0.27	0.13	-1.31	-0.72	-0.25	0.02	0.39	0.16	0.13	0.09	1.30	0.97	0.89	0.88
8	1.29	1.12	0.95	0.81	0.54	0.37	0.20	0.14	-0.83	-0.49	-0.15	0.05	0.55	0.33	0.28	0.21	1.32	1.13	1.01	0.94
12	1.20	1.07	0.93	0.83	0.36	0.25	0.14	0.11	-0.56	-0.32	-0.08	0.06	0.65	0.50	0.42	0.36	1.14	1.03	0.93	0.81
16	1.14	1.04	0.93	0.85	0.26	0.18	0.11	0.09	-0.40	-0.22	-0.04	0.06	0.70	0.61	0.53	0.47	0.95	0.82	0.76	0.66
20	1.11	1.02	0.93	0.87	0.20	0.14	0.08	0.07	-0.31	-0.15	-0.02	0.06	0.74	0.67	0.60	0.55	0.80	0.65	0.61	0.53
40	1.04	0.99	0.96	0.93	0.09	0.06	0.04	0.04	-0.14	-0.06	0.00	0.03	0.83	0.81	0.77	0.75	0.45	0.32	0.31	0.26
$\underline{h}$					$\Delta_{\alpha_t+h} - E_t \Delta_{\alpha_t+h}$								$\Delta_{\alpha_t+h} - E_t \Delta_{\alpha_t+h}$							
1	0.02	0.01	0.01	0.01	0.73	0.80	0.86	0.90	0.26	0.18	0.13	0.09	0.02	0.02	0.02	0.01	0.98	0.97	0.93	0.90
2	0.02	0.02	0.01	0.01	0.74	0.74	0.79	0.83	0.24	0.24	0.19	0.17	0.03	0.01	0.01	0.01	0.95	0.94	0.92	0.90
3	0.02	0.02	0.02	0.01	0.75	0.73	0.73	0.77	0.23	0.24	0.24	0.22	0.03	0.01	0.01	0.01	0.91	0.91	0.92	0.91
4	0.02	0.02	0.04	0.02	0.77	0.73	0.70	0.71	0.21	0.24	0.26	0.26	0.03	0.02	0.02	0.02	0.88	0.89	0.91	0.87
8	0.03	0.05	0.07	0.07	0.80	0.73	0.67	0.66	0.17	0.22	0.25	0.28	0.04	0.04	0.05	0.06	0.78	0.79	0.80	0.74
12	0.04	0.08	0.10	0.10	0.81	0.74	0.68	0.64	0.15	0.18	0.21	0.26	0.06	0.08	0.09	0.10	0.72	0.71	0.72	0.67
16	0.05	0.10	0.12	0.12	0.81	0.74	0.69	0.63	0.14	0.16	0.19	0.24	0.07	0.11	0.11	0.13	0.69	0.68	0.69	0.63
20	0.06	0.12	0.14	0.14	0.80	0.73	0.68	0.62	0.13	0.15	0.18	0.24	0.08	0.14	0.14	0.16	0.67	0.66	0.67	0.60
40	0.12	0.20	0.21	0.22	0.76	0.67	0.63	0.57	0.13	0.13	0.16	0.21	0.15	0.23	0.22	0.26	0.61	0.59	0.61	0.53
$\underline{h}$					$CA_{t+h}^* - E_t CA_{t+h}^*$															
1	0.00	0.00	0.00	0.00	3.33	3.26	3.21	3.39	-2.33	-2.26	-2.21	-2.39								
2	0.00	0.02	0.01	0.00	3.49	2.85	2.99	3.25	-2.49	-1.87	-2.00	-2.25								
3	0.00	0.02	0.05	0.04	3.62	2.98	2.71	3.04	-2.62	-2.00	-1.76	-2.08								
4	0.00	0.02	0.06	0.03	3.72	3.15	2.83	2.42	-2.72	-2.17	-1.88	-1.45								
8	0.00	0.01	0.02	0.01	3.63	3.21	2.97	3.12	-2.63	-2.22	-1.99	-2.13								
12	0.00	0.00	0.00	0.01	2.66	2.05	1.46	1.14	-1.66	-1.05	-0.46	-0.15								
16	0.00	0.02	0.03	0.03	1.48	0.77	0.58	0.61	-0.48	0.21	0.39	0.36								
20	0.00	0.04	0.05	0.05	0.77	0.59	0.60	0.51	0.23	0.37	0.35	0.44								
40	0.00	0.00	0.02	0.02	1.69	2.11	0.78	0.60	-0.69	-1.11	0.21	0.37								

NOTES for Table B.2: The table reports the fraction of the variance in the h step-ahead forecast error of the variable listed at the head of each column that is attributable to innovations in the permanent shock, η_t^P , the transitory shocks, η_t^T , and two times the covariance between η_t^P and η_t^T . Panel A reports results imposing the restriction that the adjustment coefficients of consumption are statistically insignificant ($\alpha_c = 0$), while Panel B reports results using the estimated adjustment coefficients of consumption ($\alpha_c \neq 0$). The identification method follows [Gonzalo and Ng \(2001\)](#), where a rotation from reduced form into permanent/transitory innovations is performed, in which shocks are allowed to be correlated (with $\eta_t^P = \alpha'_1 u_t$ and $\eta_t^T = \beta' u_t$). Horizons are in quarters, and the underlying VECM allows for linear trends in the cointegrating relations. The sample spans the first quarter of 1973 to the fourth quarter of 2004.

Table B.3: Variance Decomposition (Orthogonalized Shocks) – Identification following King *et al.* (1991); Mellander *et al.* (1992); 1973-2004 with Linear Trends

Panel A: Consumption Adjustment Coefficients set to Zero ($\alpha_c=0$)																				
h_t	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4				
	$\frac{\Delta c_{t+h} - E_t \Delta c_{t+h}}{\eta_t^P}$								η_t^T				$\frac{\Delta z_{t+h} - E_t \Delta z_{t+h}}{\eta_t^P}$				$\frac{\Delta a_{t+h} - E_t \Delta a_{t+h}}{\eta_t^P}$			
1	1.000	1.000	1.000	1.000	0.000	0.000	0.000	0.000	0.171	0.257	0.256	0.206	0.829	0.743	0.744	0.794	0.122	0.122	0.115	0.120
2	1.000	0.998	0.997	0.995	0.000	0.002	0.003	0.005	0.215	0.245	0.264	0.199	0.785	0.755	0.736	0.801	0.125	0.142	0.125	0.119
3	1.000	0.997	0.984	0.969	0.000	0.003	0.016	0.031	0.259	0.267	0.266	0.174	0.741	0.733	0.734	0.826	0.128	0.147	0.152	0.137
4	1.000	0.997	0.977	0.950	0.000	0.003	0.023	0.050	0.302	0.299	0.295	0.217	0.698	0.701	0.705	0.783	0.131	0.154	0.175	0.164
8	1.000	0.997	0.974	0.936	0.000	0.003	0.026	0.064	0.436	0.459	0.441	0.367	0.564	0.541	0.559	0.633	0.143	0.187	0.235	0.239
12	1.000	0.998	0.979	0.946	0.000	0.002	0.021	0.054	0.526	0.584	0.563	0.522	0.474	0.416	0.437	0.478	0.155	0.213	0.265	0.281
16	1.000	0.999	0.983	0.957	0.000	0.001	0.017	0.043	0.590	0.669	0.652	0.634	0.410	0.331	0.348	0.366	0.165	0.231	0.282	0.302
20	1.000	0.999	0.986	0.965	0.000	0.001	0.014	0.035	0.638	0.726	0.714	0.708	0.362	0.274	0.286	0.292	0.174	0.244	0.293	0.313
40	1.000	0.999	0.993	0.983	0.000	0.001	0.007	0.017	0.770	0.850	0.845	0.856	0.230	0.150	0.155	0.144	0.212	0.297	0.339	0.373
h_t	$\frac{\Delta a_{t+h} - E_t \Delta a_{t+h}}{\eta_t^T}$				η_t^P				$\frac{\Delta l_{t+h} - E_t \Delta l_{t+h}}{\eta_t^T}$				η_t^P				$\frac{CA_{t+h}^* - E_t CA_{t+h}^*}{\eta_t^T}$			
1	0.878	0.878	0.885	0.880	0.131	0.142	0.139	0.127	0.869	0.858	0.861	0.873	0.016	0.016	0.010	0.017	0.984	0.988	0.990	0.983
2	0.875	0.858	0.875	0.881	0.137	0.134	0.122	0.109	0.863	0.866	0.878	0.891	0.016	0.016	0.015	0.017	0.984	0.981	0.985	0.983
3	0.872	0.853	0.848	0.863	0.142	0.129	0.127	0.104	0.858	0.871	0.873	0.896	0.016	0.016	0.018	0.021	0.984	0.981	0.982	0.979
4	0.869	0.846	0.825	0.836	0.147	0.133	0.140	0.132	0.853	0.867	0.860	0.868	0.016	0.016	0.018	0.021	0.984	0.979	0.982	0.979
8	0.857	0.813	0.765	0.761	0.167	0.176	0.205	0.226	0.833	0.824	0.795	0.774	0.017	0.017	0.024	0.028	0.983	0.977	0.976	0.972
12	0.845	0.787	0.735	0.719	0.185	0.220	0.255	0.286	0.815	0.780	0.745	0.714	0.017	0.017	0.026	0.031	0.983	0.976	0.974	0.969
16	0.835	0.769	0.718	0.698	0.202	0.252	0.290	0.329	0.798	0.748	0.710	0.671	0.017	0.017	0.026	0.031	0.983	0.976	0.974	0.969
20	0.826	0.756	0.707	0.687	0.216	0.276	0.314	0.359	0.784	0.724	0.686	0.641	0.017	0.017	0.026	0.031	0.983	0.976	0.974	0.969
40	0.788	0.703	0.661	0.627	0.270	0.349	0.378	0.440	0.730	0.651	0.622	0.560	0.017	0.017	0.026	0.032	0.983	0.976	0.974	0.968

Table B.3 Continued

Panel B: Consumption Adjustment Coefficients set to their Estimated Values ($\alpha_c \neq 0$)																					
h	$\Delta_{C_{t+h}} - E_t \Delta_{C_{t+h}}$				η_t^T				η_t^P				$\Delta_{z_{t+h}} - E_t \Delta_{z_{t+h}}$				η_t^T	$\frac{\Delta_{a_{t+h}} - E_t \Delta_{a_{t+h}}}{\eta_t^P}$			
	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4					
1	0.750	0.838	0.933	0.982	0.250	0.162	0.067	0.018	0.150	0.180	0.219	0.177	0.850	0.820	0.781	0.823	0.371	0.242	0.166	0.101	
2	0.782	0.849	0.932	0.972	0.218	0.151	0.068	0.028	0.173	0.190	0.234	0.166	0.827	0.810	0.766	0.834	0.382	0.255	0.168	0.096	
3	0.809	0.862	0.914	0.931	0.191	0.138	0.086	0.069	0.197	0.198	0.228	0.139	0.803	0.802	0.772	0.861	0.392	0.262	0.191	0.110	
4	0.832	0.872	0.904	0.903	0.168	0.128	0.096	0.097	0.223	0.213	0.241	0.164	0.777	0.787	0.759	0.836	0.402	0.274	0.214	0.132	
8	0.893	0.905	0.911	0.883	0.107	0.095	0.089	0.117	0.331	0.308	0.336	0.289	0.669	0.692	0.664	0.711	0.435	0.330	0.283	0.203	
12	0.926	0.930	0.928	0.899	0.074	0.070	0.072	0.101	0.437	0.434	0.449	0.438	0.563	0.566	0.551	0.562	0.460	0.374	0.324	0.246	
16	0.945	0.946	0.942	0.917	0.055	0.054	0.058	0.083	0.528	0.551	0.554	0.555	0.472	0.449	0.446	0.445	0.477	0.403	0.349	0.270	
20	0.957	0.958	0.953	0.931	0.043	0.042	0.047	0.069	0.598	0.640	0.636	0.638	0.402	0.360	0.364	0.362	0.489	0.423	0.363	0.284	
40	0.979	0.980	0.976	0.966	0.021	0.020	0.024	0.034	0.771	0.824	0.812	0.818	0.229	0.176	0.188	0.182	0.526	0.477	0.409	0.349	
h	$\Delta_{a_{t+h}} - E_t \Delta_{a_{t+h}}$				η_t^P				η_t^T				$\frac{CA_{t+h}^* - E_t CA_{t+h}^*}{\eta_t^P}$				η_t^T				
	1	0.629	0.758	0.834	0.899	0.080	0.057	0.066	0.064	0.920	0.943	0.934	0.936	0.373	0.373	0.109	0.041	0.627	0.766	0.891	0.959
	2	0.618	0.745	0.832	0.904	0.091	0.053	0.055	0.051	0.909	0.947	0.945	0.949	0.372	0.372	0.106	0.040	0.628	0.774	0.894	0.960
	3	0.608	0.738	0.809	0.890	0.102	0.054	0.059	0.048	0.898	0.946	0.941	0.952	0.371	0.371	0.105	0.042	0.629	0.774	0.895	0.958
	4	0.598	0.726	0.786	0.868	0.114	0.061	0.070	0.070	0.886	0.939	0.930	0.930	0.371	0.371	0.106	0.044	0.629	0.772	0.894	0.956
	8	0.565	0.670	0.717	0.797	0.163	0.119	0.137	0.154	0.837	0.881	0.863	0.846	0.372	0.372	0.113	0.048	0.628	0.768	0.887	0.952
	12	0.540	0.626	0.676	0.754	0.207	0.191	0.201	0.212	0.793	0.809	0.799	0.788	0.372	0.372	0.116	0.051	0.628	0.767	0.884	0.949
	16	0.523	0.597	0.651	0.730	0.244	0.252	0.251	0.256	0.756	0.748	0.749	0.744	0.371	0.371	0.116	0.051	0.629	0.767	0.884	0.949
	20	0.511	0.577	0.637	0.716	0.272	0.297	0.287	0.289	0.728	0.703	0.713	0.711	0.371	0.371	0.116	0.051	0.629	0.767	0.884	0.949
	40	0.474	0.523	0.591	0.651	0.351	0.398	0.366	0.381	0.649	0.602	0.634	0.619	0.371	0.371	0.116	0.052	0.629	0.767	0.884	0.948

NOTES for Table B.3: The table reports the fraction of the variance in the h step-ahead forecast error of the variable listed at the head of each column that is attributable to innovations in the permanent shock, η_t^P , and the transitory shocks, η_t^T , using different number of lags in the VAR. Panel A reports results imposing the restriction that the adjustment coefficients of consumption are statistically insignificant ($\alpha_c = 0$), while Panel B reports results using the estimated adjustment coefficients of consumption ($\alpha_c \neq 0$). The identification method follows King *et al.* (1991) as extended in Mellander *et al.* (1992), where the rotation from reduced form into permanent/transitory innovations and the orthogonalization of the shocks is achieved in one step (letting $\eta_t^P = \alpha'_1 \mathbf{u}_t$ and $\eta_t^T = \alpha'_2 \Omega^{-1} \mathbf{u}_t$). Horizons are in quarters, and the underlying VEqCM allows for linear trends in the cointegrating relations. The sample spans the first quarter of 1973 to the fourth quarter of 2004.

Table B.4: Variance Decomposition (Orthogonalized Shocks) – Robustness including Return Differential in the Analysis and Identification following **Gonzalo and Ng (2001)**: 1973-2004 with Linear Trends

Panel A: Consumption Adjustment Coefficients set to Zero ($\alpha_c=0$)																
	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4
$\underline{h}$	$\eta_t^P \frac{\Delta c_{t+h} - E_t \Delta c_{t+h}}{\eta_t^T}$								$\eta_t^P \frac{\Delta z_{t+h} - E_t \Delta z_{t+h}}{\eta_t^T}$							
1	1.000	1.000	1.000	1.000	0.000	0.000	0.000	0.000	0.146	0.224	0.214	0.170	0.854	0.776	0.786	0.830
2	1.000	0.991	0.986	0.989	0.000	0.009	0.014	0.011	0.171	0.215	0.223	0.167	0.829	0.785	0.777	0.833
3	1.000	0.992	0.972	0.962	0.000	0.008	0.028	0.038	0.212	0.246	0.242	0.156	0.788	0.754	0.758	0.844
4	1.000	0.992	0.969	0.947	0.000	0.008	0.031	0.053	0.254	0.287	0.278	0.203	0.746	0.713	0.722	0.797
8	1.000	0.995	0.966	0.934	0.000	0.005	0.034	0.066	0.399	0.453	0.429	0.356	0.601	0.547	0.571	0.644
12	1.000	0.997	0.972	0.946	0.000	0.003	0.028	0.054	0.499	0.583	0.555	0.520	0.501	0.417	0.445	0.480
16	1.000	0.997	0.978	0.957	0.000	0.003	0.022	0.043	0.569	0.671	0.647	0.636	0.431	0.329	0.353	0.364
20	1.000	0.998	0.982	0.965	0.000	0.002	0.018	0.035	0.621	0.730	0.711	0.712	0.379	0.270	0.289	0.288
40	1.000	0.999	0.991	0.984	0.000	0.001	0.009	0.016	0.760	0.855	0.845	0.861	0.240	0.145	0.155	0.139
$\underline{h}$	$\eta_t^P \frac{\Delta a_{t+h} - E_t \Delta a_{t+h}}{\eta_t^T}$								$\eta_t^P \frac{\Delta l_{t+h} - E_t \Delta l_{t+h}}{\eta_t^T}$							
1	0.117	0.118	0.105	0.123	0.883	0.882	0.895	0.877	0.130	0.145	0.146	0.145	0.870	0.855	0.854	0.855
2	0.119	0.150	0.128	0.134	0.881	0.850	0.872	0.866	0.136	0.142	0.133	0.123	0.864	0.858	0.867	0.877
3	0.122	0.163	0.166	0.161	0.878	0.837	0.834	0.839	0.142	0.139	0.142	0.119	0.858	0.861	0.858	0.881
4	0.125	0.175	0.190	0.184	0.875	0.825	0.810	0.816	0.148	0.146	0.156	0.148	0.852	0.854	0.844	0.852
8	0.136	0.216	0.255	0.259	0.864	0.784	0.745	0.741	0.169	0.195	0.222	0.249	0.831	0.805	0.778	0.751
12	0.147	0.246	0.290	0.304	0.853	0.754	0.710	0.696	0.188	0.244	0.276	0.313	0.812	0.756	0.724	0.687
16	0.157	0.266	0.310	0.329	0.843	0.734	0.690	0.671	0.204	0.280	0.314	0.359	0.796	0.720	0.686	0.641
20	0.166	0.280	0.322	0.342	0.834	0.720	0.678	0.658	0.218	0.307	0.340	0.393	0.782	0.693	0.660	0.607
40	0.204	0.333	0.367	0.405	0.796	0.667	0.633	0.595	0.271	0.380	0.405	0.479	0.729	0.620	0.595	0.521

Panel A: Consumption Adjustment Coefficients set to Zero ($\alpha_c=0$)																
	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4				
$\underline{h_t}$	$\frac{C_{t+h}^* - E_t C_{t+h}^*}{\eta_t^P}$								$\frac{(r_{t+h}^a - r_{t+h}^l) - E_t (r_{t+h}^a - r_{t+h}^l)}{\eta_t^T}$							
1	0.013	0.013	0.003	0.010	0.987	0.992	0.997	0.990	0.014	0.008	0.010	0.003	0.986	0.992	0.990	0.997
2	0.014	0.014	0.015	0.017	0.986	0.977	0.985	0.983	0.014	0.008	0.010	0.005	0.986	0.992	0.990	0.995
3	0.015	0.015	0.021	0.024	0.985	0.978	0.979	0.976	0.014	0.011	0.011	0.007	0.986	0.989	0.989	0.993
4	0.015	0.015	0.020	0.028	0.985	0.977	0.980	0.972	0.014	0.010	0.011	0.007	0.986	0.990	0.989	0.993
8	0.015	0.015	0.027	0.032	0.985	0.972	0.973	0.968	0.015	0.011	0.011	0.014	0.985	0.989	0.989	0.986
12	0.015	0.015	0.029	0.036	0.985	0.971	0.971	0.964	0.015	0.011	0.011	0.016	0.985	0.989	0.989	0.984
16	0.015	0.015	0.029	0.036	0.985	0.971	0.971	0.964	0.015	0.011	0.011	0.016	0.985	0.989	0.989	0.984
20	0.015	0.015	0.029	0.036	0.985	0.971	0.971	0.964	0.015	0.011	0.011	0.017	0.985	0.989	0.989	0.983
40	0.015	0.015	0.030	0.037	0.985	0.971	0.970	0.963	0.015	0.011	0.011	0.017	0.985	0.989	0.989	0.983
Panel B: Consumption Adjustment Coefficients set to their Estimated Values ($\alpha_c \neq 0$)																
	$\frac{\Delta_{c,t+h} - E_t \Delta_{c,t+h}}{\eta_t^P}$								$\frac{\Delta_{z,t+h} - E_t \Delta_{z,t+h}}{\eta_t^T}$							
$\underline{h_t}$	η_t^P								η_t^T							
1	0.698	0.855	0.940	0.946	0.302	0.145	0.060	0.054	0.125	0.168	0.155	0.124	0.875	0.832	0.845	0.876
2	0.745	0.860	0.912	0.942	0.255	0.140	0.088	0.058	0.147	0.180	0.156	0.121	0.853	0.820	0.844	0.879
3	0.780	0.871	0.885	0.896	0.220	0.129	0.115	0.104	0.172	0.196	0.161	0.103	0.828	0.804	0.839	0.897
4	0.808	0.882	0.878	0.863	0.192	0.118	0.122	0.137	0.198	0.216	0.183	0.116	0.802	0.784	0.817	0.884
8	0.880	0.914	0.885	0.836	0.120	0.086	0.115	0.164	0.311	0.317	0.292	0.234	0.689	0.683	0.708	0.766
12	0.918	0.936	0.906	0.859	0.082	0.064	0.094	0.141	0.423	0.444	0.414	0.389	0.577	0.556	0.586	0.611
16	0.939	0.951	0.925	0.883	0.061	0.049	0.075	0.117	0.518	0.559	0.524	0.511	0.482	0.441	0.476	0.489
20	0.952	0.961	0.939	0.904	0.048	0.039	0.061	0.096	0.591	0.647	0.609	0.598	0.409	0.353	0.391	0.402
40	0.978	0.981	0.969	0.953	0.022	0.019	0.031	0.047	0.768	0.827	0.799	0.797	0.232	0.173	0.201	0.203

Table B.4 Continued

Panel B: Consumption Adjustment Coefficients set to their Estimated Values ($\alpha_c \neq 0$)																	
	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	
h	$\frac{\Delta a_{t+h}^P}{\Delta a_{t+h}^T - E_t \Delta a_{t+h}^T}$								$\frac{\Delta l_{t+h}^P}{\Delta l_{t+h}^T - E_t \Delta l_{t+h}^T}$								
	η_t^P								η_t^T								
	1	0.383	0.209	0.091	0.067	0.617	0.791	0.909	0.933	0.080	0.054	0.045	0.042	0.920	0.946	0.955	0.958
	2	0.396	0.238	0.104	0.070	0.604	0.762	0.896	0.930	0.091	0.053	0.037	0.030	0.909	0.947	0.963	0.970
	3	0.407	0.250	0.137	0.083	0.593	0.750	0.863	0.917	0.102	0.056	0.044	0.027	0.898	0.944	0.956	0.973
	4	0.417	0.263	0.162	0.094	0.583	0.737	0.838	0.906	0.115	0.063	0.055	0.043	0.885	0.937	0.945	0.957
	8	0.451	0.320	0.230	0.156	0.549	0.680	0.770	0.844	0.165	0.120	0.114	0.115	0.835	0.880	0.886	0.885
	12	0.476	0.366	0.276	0.200	0.524	0.634	0.724	0.800	0.210	0.191	0.175	0.169	0.790	0.809	0.825	0.831
	16	0.493	0.396	0.304	0.230	0.507	0.604	0.696	0.770	0.247	0.252	0.225	0.215	0.753	0.748	0.775	0.785
	20	0.505	0.416	0.322	0.249	0.495	0.584	0.678	0.751	0.275	0.297	0.262	0.251	0.725	0.703	0.738	0.749
40	0.540	0.470	0.374	0.324	0.460	0.530	0.626	0.676	0.355	0.398	0.349	0.356	0.645	0.602	0.651	0.644	
$\underline{h}$	$\frac{CA_{t+h}^*}{CA_{t+h}^* - E_t CA_{t+h}^*}$								$\frac{(r_{t+h}^a - r_{t+h}^l)}{r_t^P} - E_t (r_{t+h}^a - r_{t+h}^l)$								
	η_t^P								η_t^T								
	1	0.386	0.386	0.046	0.026	0.614	0.816	0.954	0.974	0.007	0.000	0.019	0.005	0.993	1.000	0.981	0.995
	2	0.384	0.384	0.048	0.029	0.616	0.821	0.952	0.971	0.009	0.000	0.019	0.007	0.991	1.000	0.981	0.993
	3	0.384	0.384	0.051	0.033	0.616	0.826	0.949	0.967	0.011	0.003	0.019	0.006	0.989	0.997	0.981	0.994
	4	0.384	0.384	0.051	0.045	0.616	0.824	0.949	0.955	0.012	0.003	0.018	0.007	0.988	0.997	0.982	0.993
	8	0.385	0.385	0.058	0.044	0.615	0.820	0.942	0.956	0.014	0.004	0.019	0.014	0.986	0.996	0.981	0.986
	12	0.384	0.384	0.061	0.046	0.616	0.818	0.939	0.954	0.014	0.004	0.019	0.016	0.986	0.996	0.981	0.984
	16	0.384	0.384	0.061	0.047	0.616	0.817	0.939	0.953	0.014	0.004	0.019	0.016	0.986	0.996	0.981	0.984
	20	0.384	0.384	0.061	0.046	0.616	0.818	0.939	0.954	0.015	0.004	0.019	0.017	0.985	0.996	0.981	0.983
40	0.384	0.384	0.061	0.047	0.616	0.818	0.939	0.953	0.015	0.004	0.019	0.017	0.985	0.996	0.981	0.983	

NOTES for Table B.5: The underlying VEqCM allows for linear trends in the cointegrating relations, but not in the return differential. See also notes for Table B.2.

Table B.5: Variance Decomposition (Orthogonalized Shocks) – Robustness including Return Differential in the Analysis and Identification following [King et al. \(1991\)](#); [Mellander et al. \(1992\)](#): 1973-2004 with Linear Trends

Panel A: Consumption Adjustment Coefficients set to Zero ($\alpha_c = 0$)												
	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4
$\underline{h}$	η_t^P				η_t^T				$\frac{\Delta c_{t+h} - E_t \Delta c_{t+h}}{\Delta z_{t+h} - E_t \Delta z_{t+h}}$			
1	1.000	1.000	1.000	1.000	0.000	0.000	0.000	0.000	0.146	0.224	0.214	0.170
2	1.000	0.991	0.986	0.989	0.000	0.009	0.014	0.011	0.171	0.215	0.223	0.167
3	1.000	0.992	0.972	0.962	0.000	0.008	0.028	0.038	0.212	0.246	0.242	0.156
4	1.000	0.992	0.969	0.947	0.000	0.008	0.031	0.053	0.254	0.287	0.278	0.203
8	1.000	0.995	0.966	0.934	0.000	0.005	0.034	0.066	0.399	0.453	0.429	0.356
12	1.000	0.997	0.972	0.946	0.000	0.003	0.028	0.054	0.499	0.583	0.555	0.520
16	1.000	0.997	0.978	0.957	0.000	0.003	0.022	0.043	0.569	0.671	0.647	0.636
20	1.000	0.998	0.982	0.965	0.000	0.002	0.018	0.035	0.621	0.730	0.711	0.712
40	1.000	0.999	0.991	0.984	0.000	0.001	0.009	0.016	0.760	0.855	0.845	0.861
$\underline{h}$	η_t^P				η_t^T				$\frac{\Delta l_{t+h} - E_t \Delta l_{t+h}}{\Delta l_{t+h} - E_t \Delta l_{t+h}}$			
1	0.117	0.118	0.105	0.123	0.883	0.882	0.895	0.877	0.130	0.145	0.146	0.145
2	0.119	0.150	0.128	0.134	0.881	0.850	0.872	0.866	0.136	0.142	0.133	0.123
3	0.122	0.163	0.166	0.161	0.878	0.837	0.834	0.839	0.142	0.139	0.142	0.119
4	0.125	0.175	0.190	0.184	0.875	0.825	0.810	0.816	0.148	0.146	0.156	0.148
8	0.136	0.216	0.255	0.259	0.864	0.784	0.745	0.741	0.169	0.195	0.222	0.249
12	0.147	0.246	0.290	0.304	0.853	0.754	0.710	0.696	0.188	0.244	0.276	0.313
16	0.157	0.266	0.310	0.329	0.843	0.734	0.690	0.671	0.204	0.280	0.314	0.359
20	0.166	0.280	0.322	0.342	0.834	0.720	0.678	0.658	0.218	0.307	0.340	0.393
40	0.204	0.333	0.367	0.405	0.796	0.667	0.633	0.595	0.271	0.380	0.405	0.479

Table B.5 Continued

Panel A: Consumption Adjustment Coefficients set to Zero ($\alpha_c = 0$)												
	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4
$\underline{h}$	$\frac{C_{t+h}^* - E_t C_{t+h}^*}{\eta_t^P}$								$\frac{(r_{t+h}^a - r_{t+h}^i) - E_t (r_{t+h}^a - r_{t+h}^i)}{\eta_t^T}$			
	0.014	0.014	0.003	0.010	0.986	0.992	0.997	0.990	0.014	0.008	0.010	0.003
1	0.014	0.014	0.003	0.010	0.986	0.992	0.997	0.990	0.014	0.008	0.010	0.003
2	0.015	0.015	0.015	0.017	0.985	0.976	0.985	0.983	0.014	0.008	0.010	0.005
3	0.015	0.015	0.021	0.024	0.985	0.977	0.979	0.976	0.014	0.011	0.011	0.007
4	0.015	0.015	0.021	0.028	0.985	0.976	0.979	0.972	0.014	0.010	0.011	0.007
8	0.015	0.015	0.028	0.033	0.985	0.971	0.972	0.967	0.015	0.011	0.011	0.014
12	0.015	0.015	0.030	0.037	0.985	0.971	0.970	0.963	0.015	0.011	0.011	0.016
16	0.015	0.015	0.030	0.037	0.985	0.971	0.970	0.963	0.015	0.011	0.011	0.016
20	0.015	0.015	0.030	0.037	0.985	0.971	0.970	0.963	0.015	0.011	0.011	0.017
40	0.015	0.015	0.031	0.038	0.985	0.971	0.969	0.962	0.015	0.011	0.011	0.017
Panel B: Consumption Adjustment Coefficients set to their Estimated Values ($\alpha_c \neq 0$)												
	$\frac{\Delta_{c,t+h} - E_t \Delta_{c,t+h}}{\eta_t^P}$								$\frac{\Delta_{z,t+h} - E_t \Delta_{z,t+h}}{\eta_t^T}$			
$\underline{h}$	η_t^P								η_t^T			
	0.698	0.855	0.940	0.946	0.302	0.145	0.060	0.054	0.125	0.168	0.155	0.124
1	0.698	0.855	0.940	0.946	0.302	0.145	0.060	0.054	0.125	0.168	0.155	0.124
2	0.745	0.860	0.912	0.942	0.255	0.140	0.088	0.058	0.147	0.180	0.156	0.121
3	0.780	0.871	0.885	0.896	0.220	0.129	0.115	0.104	0.172	0.196	0.161	0.103
4	0.808	0.882	0.878	0.863	0.192	0.118	0.122	0.137	0.198	0.216	0.183	0.116
8	0.880	0.914	0.885	0.836	0.120	0.086	0.115	0.164	0.311	0.317	0.292	0.234
12	0.918	0.936	0.906	0.859	0.082	0.064	0.094	0.141	0.423	0.444	0.414	0.389
16	0.939	0.951	0.925	0.883	0.061	0.049	0.075	0.117	0.518	0.559	0.524	0.511
20	0.952	0.961	0.939	0.904	0.048	0.039	0.061	0.096	0.591	0.647	0.609	0.598
40	0.978	0.981	0.969	0.953	0.022	0.019	0.031	0.047	0.768	0.827	0.799	0.797

Table B.5 Continued

Panel B: Consumption Adjustment Coefficients set to their Estimated Values ($\alpha_c \neq 0$)												
	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4
$\underline{h}$	$\frac{\Delta a_{t+h}}{\eta_t^P} - \text{E}_t \Delta a_{t+h}$				η_t^T				$\frac{\Delta l_{t+h}}{\eta_t^P} - \text{E}_t \Delta l_{t+h}$			
	η_t^P				η_t^T				η_t^P			
1	0.383	0.209	0.091	0.067	0.617	0.791	0.909	0.933	0.080	0.054	0.045	0.042
2	0.396	0.238	0.104	0.070	0.604	0.762	0.896	0.930	0.091	0.053	0.037	0.030
3	0.407	0.250	0.137	0.083	0.593	0.750	0.863	0.917	0.102	0.056	0.044	0.027
4	0.417	0.263	0.162	0.094	0.583	0.737	0.838	0.906	0.115	0.063	0.055	0.043
8	0.451	0.320	0.230	0.156	0.549	0.680	0.770	0.844	0.165	0.120	0.114	0.115
12	0.476	0.366	0.276	0.200	0.524	0.634	0.724	0.800	0.210	0.191	0.175	0.169
16	0.493	0.396	0.304	0.230	0.507	0.604	0.696	0.770	0.247	0.252	0.225	0.215
20	0.505	0.416	0.322	0.249	0.495	0.584	0.678	0.751	0.275	0.297	0.262	0.251
40	0.540	0.470	0.374	0.324	0.460	0.530	0.626	0.676	0.355	0.398	0.349	0.356
$\underline{h}$	$\frac{CA_{t+h}^*}{\eta_t^P} - \text{E}_t CA_{t+h}^*$				η_t^T				$\frac{(r_{t+h}^a - r_{t+h}^l)}{\eta_t^P} - \text{E}_t (r_{t+h}^a - r_{t+h}^l)$			
	η_t^P				η_t^T				η_t^T			
1	0.394	0.394	0.047	0.027	0.606	0.812	0.953	0.973	0.007	0.000	0.019	0.005
2	0.391	0.391	0.050	0.030	0.609	0.817	0.950	0.970	0.009	0.000	0.019	0.007
3	0.391	0.391	0.053	0.034	0.609	0.822	0.947	0.966	0.011	0.003	0.019	0.006
4	0.391	0.391	0.052	0.046	0.609	0.820	0.948	0.954	0.012	0.003	0.018	0.007
8	0.392	0.392	0.059	0.045	0.608	0.815	0.941	0.955	0.014	0.004	0.019	0.014
12	0.392	0.392	0.062	0.047	0.608	0.813	0.938	0.953	0.014	0.004	0.019	0.016
16	0.391	0.391	0.063	0.048	0.609	0.813	0.937	0.952	0.014	0.004	0.019	0.016
20	0.391	0.391	0.063	0.047	0.609	0.813	0.937	0.953	0.015	0.004	0.019	0.017
40	0.391	0.391	0.063	0.048	0.609	0.813	0.937	0.952	0.015	0.004	0.019	0.017

Table B.6: Cointegration Test Statistics using data from **Gourinchas and Rey (2007a,b)**

$H_0 : r$	$n - r$	$k = 1$		$k = 2$		$k = 3$		$k = 4$	
		$Q(r n)$	$Q(r r + 1)$	$Q(r n)$	$Q(r r + 1)$	$Q(r n)$	$Q(r r + 1)$	$Q(r n)$	$Q(r r + 1)$
$r = 0$	4	82.627	50.370	67.831	39.144	63.120	34.909	57.165	30.292
Asymp. p -value		[0.001]	[0.000]	[0.022]	[0.006]	[0.058]	[0.022]	[0.161]	[0.082]
Emp. p -value		[0.001]	[0.000]	[0.035]	[0.000]	[0.111]	[0.000]	[0.301]	[0.000]
$r \leq 1$	3	32.258	21.311	28.686	16.847	28.210	15.177	26.874	13.666
Asymp. p -value		[0.375]	[0.176]	[0.581]	[0.471]	[0.609]	[0.618]	[0.688]	[0.751]
Emp. p -value		[0.396]	[0.000]	[0.641]	[0.076]	[0.702]	[0.365]	[0.779]	[0.660]
$r \leq 2$	2	10.947	6.642	11.839	8.057	13.033	8.663	13.208	7.980
Asymp. p -value		[0.878]	[0.923]	[0.823]	[0.816]	[0.736]	[0.759]	[0.722]	[0.823]
Emp. p -value		[0.954]	[0.995]	[0.921]	[0.951]	[0.849]	[0.902]	[0.835]	[0.956]
$r \leq 3$	1	4.305	4.305	3.782	3.782	4.370	4.370	5.228	5.228
Asymp. p -value		[0.698]	[0.698]	[0.773]	[0.773]	[0.688]	[0.688]	[0.564]	[0.564]
Emp. p -value		[0.820]	[0.820]	[0.879]	[0.878]	[0.788]	[0.788]	[0.628]	[0.628]

NOTES for Table B.6: $Q(r|n)$ denotes the trace statistic, i.e. $Q(r|n) = -T \sum_{i=r+1}^n \ln(1 - \hat{\lambda}_i)$ and $Q(r|r + 1)$ denotes the maximum eigenvalue statistic i.e. $Q(r|r + 1) = -T \ln(1 - \hat{\lambda}_{r+1})$ as defined in **Johansen (1995)**. The table reports test statistics for $k = 1, \dots, 4$ lags in the VAR. The asymptotic p -values reported are calculated using the methods in **MacKinnon et al. (1999)**. The bootstrap p -values are based on a Monte Carlo Bootstrap Simulation with 10000 replications. The sample spans the first quarter of 1952 to the first quarter of 2004.

Table B.7: Unit Root Tests on "Great Ratios" – 1952-2004

x_t	$c_t - z_t$	$a_t - z_t$	$l_t - z_t$	$CV_{0.90}$	$CV_{0.95}$	$CV_{0.99}$
PP_1	-6.482	-2.230	-1.963	-3.148	-3.446	-4.032
[p -value]	[0.000]	[0.470]	[0.618]			
PP_2	-6.115 (1.82)	-2.232 (1.8)	-1.923 (1.54)			
[p -value]	[0.000]	[0.469]	[0.639]			
$KPSS_1$	0.146	0.475	0.463	0.119	0.146	0.216
$KPSS_2$	0.126 (10.1)	0.171 (97.2)	0.190 (102)	0.119	0.146	0.216
ZA	—	-4.330	-4.137	-4.110	-4.420	-4.930
TB_t	—	1974:Q1	1970:Q1			

Notes for Table B.7: The table reports the unit root and stationarity tests for the ratios of consumption to net output ($c_t - z_t$), gross assets to net output ($a_t - z_t$) and gross liabilities to net output ($l_t - z_t$). The table shows two variants of the unit root tests of Phillips and Perron (1988) and the stationarity tests of Kwiatkowski *et al.* (1992). In the first (PP_1 and $KPSS_1$) the bandwidth parameter is set to 8, and in the second (PP_2 and $KPSS_2$) the bandwidth (the number reported in the parenthesis) is chosen using Andrews (1991)'s automatic bandwidth selection. The table also reports the unit root proposed in Zivot and Andrews (1992) for the gross assets to net output ($a_t - z_t$) and gross liabilities to net output ratios ($l_t - z_t$), allowing for trend breaks in the process (but no level shifts) corresponding to their Model B (see also Perron (1989)), for which the maximum lag-length is also set to 8. The appropriate lag-length for the ZA tests was selected using the sequential procedure of Ng and Perron (1995). The table also displays the identified break date, that minimizes the corresponding t -statistic. For the ZA tests the null is that of a unit root process with drift. The PP test examines the null of a unit root against the alternative of trend-stationarity of the ratios. The KPSS test examines the null of trend-stationarity against the alternative of a unit root.

Table B.8: Cointegrating Relations Estimates using data from **Gourinchas and Rey (2007a,b)**

Panel A: Unrestricted DOLS Estimates (1952–2004 Sample)												
			$k = 1$			$k = 2$			$k = 3$			
lags/leads	β_i	θ_i	ϕ_{1i}	ϕ_{2i}	β_i	θ_i	ϕ_{1i}	ϕ_{2i}	β_i	θ_i	ϕ_{1i}	ϕ_{2i}
$c_t - \hat{\beta}_z z_t - \hat{\theta}_c t - \hat{\phi}_{1c} T_{70:1} - \hat{\phi}_{2c} T_{74:1}$ [t-stats]	0.669 [15.584]	0.0020 [7.555]	-0.0013 [-3.619]	0.0010 [3.600]	0.706 [16.235]	0.0018 [6.730]	-0.0011 [-3.118]	0.0009 [3.152]	0.726 [16.766]	0.0017 [6.419]	-0.0010 [-2.857]	0.0008 [2.842]
$c_t - \hat{\beta}_z z_t - \hat{\theta}_c t$ [t-stats]	0.763 [26.065]	0.0013 [10.979]	—	—	0.787 [27.393]	0.0012 [10.394]	—	—	0.804 [28.694]	0.0011 [10.090]	—	—
$a_t - \hat{\beta}_a z_t - \hat{\theta}_a t - \hat{\phi}_{1a} T_{70:1} - \hat{\phi}_{2a} T_{74:1}$ [t-stats]	0.941 [3.267]	-0.0010 [-0.569]	0.0014 [0.550]	0.0119 [6.220]	0.898 [3.058]	-0.0006 [-0.342]	0.0009 [0.352]	0.0122 [6.367]	0.850 [2.759]	-0.0002 [-0.108]	0.0004 [0.156]	0.0125 [6.220]
$a_t - \hat{\beta}_a z_t - \hat{\theta}_a t - \hat{\phi}_{2a} T_{74:1}$ [t-stats]	0.838 [3.870]	-0.0002 [-0.223]	—	0.0129 [25.388]	0.829 [3.822]	-0.0001 [-0.102]	—	0.0129 [25.422]	0.817 [3.633]	0.00003 [0.029]	0.0128 [24.367]	—
$l_t - \hat{\beta}_l z_t - \hat{\theta}_l t - \hat{\phi}_{1l} T_{70:1} - \hat{\phi}_{2l} T_{74:1}$ [t-stats]	2.310 [8.364]	-0.0022 [-1.268]	0.0169 [7.162]	-0.0017 [-0.927]	2.428 [8.672]	-0.0029 [-1.655]	0.0178 [7.576]	-0.0024 [-1.319]	2.503 [8.198]	-0.0033 [-1.759]	0.0186 [7.272]	-0.0030 [-1.529]
$l_t - \hat{\beta}_l z_t - \hat{\theta}_l t - \hat{\phi}_{1l} T_{70:1}$ [t-stats]	2.178 [9.635]	-0.0012 [-0.922]	0.0147 [24.545]	—	2.231 [10.091]	-0.0014 [-1.126]	0.0148 [25.466]	—	2.247 [9.279]	-0.0014 [-1.055]	0.0148 [23.312]	—
lags/leads	$k = 4$			$k = 5$								
$c_t - \hat{\beta}_z z_t - \hat{\theta}_c t - \hat{\phi}_{1c} T_{70:1} - \hat{\phi}_{2c} T_{74:1}$ [t-stats]	0.736 [16.671]	0.0017 [6.157]	-0.0010 [-2.619]	0.0007 [2.526]	0.738 [16.749]	0.0017 [6.210]	-0.0009 [-2.492]	0.0007 [2.262]	—	—	—	—
$c_t - \hat{\beta}_z z_t - \hat{\theta}_c t$ [t-stats]	0.816 [29.082]	0.0011 [9.727]	—	—	0.824 [29.435]	0.0011 [9.532]	—	—	—	—	—	—
$a_t - \hat{\beta}_a z_t - \hat{\theta}_a t - \hat{\phi}_{1a} T_{70:1} - \hat{\phi}_{2a} T_{74:1}$ [t-stats]	0.811 [2.739]	0.0001 [0.072]	0.0001 [0.053]	0.0126 [6.540]	0.742 [2.342]	0.0006 [0.315]	-0.0005 [-0.173]	0.0130 [6.260]	—	—	—	—
$a_t - \hat{\beta}_a z_t - \hat{\theta}_a t - \hat{\phi}_{2a} T_{74:1}$ [t-stats]	0.800 [3.731]	0.0002 [0.195]	—	0.0127 [25.319]	0.780 [3.404]	0.0003 [0.297]	—	0.0127 [23.416]	—	—	—	—
$l_t - \hat{\beta}_l z_t - \hat{\theta}_l t - \hat{\phi}_{1l} T_{70:1} - \hat{\phi}_{2l} T_{74:1}$ [t-stats]	2.596 [8.512]	-0.0039 [-2.074]	0.0197 [7.732]	-0.0039 [-1.991]	2.617 [8.679]	-0.0041 [-2.209]	0.0206 [8.117]	-0.0047 [-2.382]	—	—	—	—
$l_t - \hat{\beta}_l z_t - \hat{\theta}_l t - \hat{\phi}_{1l} T_{70:1}$ [t-stats]	2.257 [9.617]	-0.0014 [-1.085]	0.0148 [24.037]	—	2.212 [9.623]	-0.0012 [-0.903]	0.0147 [24.309]	—	—	—	—	—

Table B.8 Continued

Panel B: Restricted DOLS Estimates and Wald tests (1952–2004 Sample)										
lags/leads	$k = 1$		$k = 2$		$k = 3$		$k = 4$		$k = 5$	
	θ_i	ϕ_i	θ_i	ϕ_i	θ_i	ϕ_i	θ_i	ϕ_i	θ_i	ϕ_i
$c_t - z_t - \hat{\theta}_c t$ [t -stats]	0.0003 [14.408]	—	0.0004 [14.834]	—	0.0004 [15.480]	—	0.0004 [16.081]	—	0.0004 [16.645]	—
Wald-test $\mathcal{W}(3)$ [p -value]/[Emp. p -value]	93.242 [0.000]	[0.258]	75.154 [0.000]	[0.274]	64.688 [0.000]	[0.276]	55.468 [0.000]	[0.294]	51.803 [0.000]	[0.285]
$a_t - z_t - \hat{\theta}_a t - \hat{\phi}_a T_{74:q1}$ [t -stats]	-0.0010 [-3.592]	0.0132 [30.892]	-0.0009 [3.278]	0.0131 [30.920]	-0.0009 [-2.836]	0.0130 [29.655]	-0.0008 [2.620]	0.0130 [30.865]	-0.0007 [-2.297]	0.0130 [28.601]
Wald-test $\mathcal{W}(2)$ [p -value]/[Emp. p -value]	0.855 [0.652]	[0.954]	0.738 [0.691]	[0.959]	0.678 [0.712]	[0.965]	0.869 [0.647]	[0.959]	0.957 [0.620]	[0.957]
$l_t - z_t - \hat{\theta}_l t - \hat{\phi}_l T_{70:q1}$ [t -stats]	0.0052 [14.466]	0.0126 [27.014]	0.0052 [14.546]	0.0126 [27.001]	0.0053 [13.675]	0.0125 [25.307]	0.0053 [13.202]	0.0125 [24.277]	0.0053 [13.242]	0.0125 [24.403]
Wald-test $\mathcal{W}(2)$ [p -value]/[Emp. p -value]	25.555 [0.000]	[0.300]	28.733 [0.000]	[0.273]	26.165 [0.000]	[0.319]	28.641 [0.000]	[0.296]	29.375 [0.000]	[0.292]
Joint Wald-test $\mathcal{W}(7)$ [p -value]/[Emp. p -value]	175.212 [0.000]	[0.380]	162.088 [0.000]	[0.369]	153.298 [0.000]	[0.356]	161.155 [0.000]	[0.297]	159.186 [0.000]	[0.289]

NOTES for Table B.8: Panel A reports the estimates of the cointegrating relations employing the DOLS estimator of [Stock and Watson \(1993\)](#). Panel B reports estimates of the restricted cointegrating relations making use again of DOLS, and reports the corresponding Wald tests statistics. The bootstrap p -values are based on a Monte Carlo Bootstrap Simulation with 10000 replications, following [Chang *et al.* \(2006\)](#). The null hypothesis is The sample spans the first quarter of 1952 to the first quarter of 2004.

Table B.9: Variance Decomposition (Orthogonalized Shocks) – Robustness with Identification following **Gonzalo and Ng (2001)**: 1952-2004 with Non-linear (Broken Linear) Trends in the Cointegrating Relations

Panel A: Consumption Adjustment Coefficients set to Zero ($\alpha_c = 0$)																
h_t	$\Delta c_{t+h} - E_t \Delta c_{t+h}$				η_t^T				$\Delta z_{t+h} - E_t \Delta z_{t+h}$				η_t^T			
	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4
1	1.000	1.000	1.000	1.000	0.000	0.000	0.000	0.000	0.143	0.174	0.191	0.189	0.857	0.826	0.809	0.811
2	1.000	0.990	0.990	0.991	0.000	0.010	0.010	0.009	0.201	0.187	0.208	0.207	0.799	0.813	0.792	0.793
3	1.000	0.986	0.973	0.970	0.000	0.014	0.027	0.030	0.260	0.226	0.248	0.241	0.740	0.774	0.752	0.759
4	1.000	0.984	0.963	0.959	0.000	0.016	0.037	0.041	0.314	0.276	0.299	0.306	0.686	0.724	0.701	0.694
8	1.000	0.985	0.954	0.943	0.000	0.015	0.046	0.057	0.476	0.481	0.491	0.515	0.524	0.519	0.509	0.485
12	1.000	0.988	0.960	0.949	0.000	0.012	0.040	0.051	0.573	0.609	0.610	0.636	0.427	0.391	0.390	0.364
16	1.000	0.990	0.967	0.957	0.000	0.010	0.033	0.043	0.639	0.687	0.684	0.708	0.361	0.313	0.316	0.292
20	1.000	0.992	0.972	0.965	0.000	0.008	0.028	0.035	0.687	0.739	0.735	0.757	0.313	0.261	0.265	0.243
40	1.000	0.996	0.986	0.983	0.000	0.004	0.014	0.017	0.813	0.860	0.858	0.874	0.187	0.140	0.142	0.126
$\Delta a_{t+h} - E_t \Delta a_{t+h}$																
h_t	η_t^T				η_t^P				$\Delta l_{t+h} - E_t \Delta l_{t+h}$				η_t^T			
1	0.962	0.970	0.976	0.975	0.048	0.052	0.044	0.048	0.952	0.948	0.956	0.952	0.000	0.000	0.003	0.004
2	0.960	0.955	0.973	0.971	0.051	0.051	0.036	0.040	0.949	0.949	0.964	0.960	0.000	0.000	0.006	0.006
3	0.959	0.951	0.956	0.951	0.054	0.050	0.046	0.052	0.946	0.950	0.954	0.948	0.000	0.000	0.007	0.007
4	0.957	0.949	0.943	0.946	0.057	0.050	0.054	0.053	0.943	0.950	0.946	0.947	0.000	0.000	0.007	0.007
8	0.947	0.941	0.903	0.922	0.069	0.064	0.081	0.067	0.931	0.936	0.919	0.933	0.000	0.000	0.007	0.007
12	0.937	0.929	0.879	0.894	0.082	0.082	0.104	0.084	0.918	0.918	0.896	0.916	0.000	0.000	0.007	0.007
16	0.926	0.914	0.858	0.863	0.096	0.101	0.127	0.106	0.904	0.899	0.873	0.894	0.000	0.000	0.007	0.007
20	0.914	0.897	0.839	0.832	0.110	0.121	0.150	0.130	0.890	0.879	0.850	0.870	0.000	0.000	0.007	0.007
40	0.858	0.801	0.742	0.699	0.178	0.216	0.250	0.252	0.822	0.784	0.750	0.748	0.000	0.000	0.007	0.007
$\Delta a_{t+h} - E_t \Delta a_{t+h}$																
h_t	η_t^T				η_t^P				$\Delta l_{t+h} - E_t \Delta l_{t+h}$				η_t^T			
1	0.962	0.970	0.976	0.975	0.048	0.052	0.044	0.048	0.952	0.948	0.956	0.952	0.000	0.000	0.003	0.004
2	0.960	0.955	0.973	0.971	0.051	0.051	0.036	0.040	0.949	0.949	0.964	0.960	0.000	0.000	0.006	0.006
3	0.959	0.951	0.956	0.951	0.054	0.050	0.046	0.052	0.946	0.950	0.954	0.948	0.000	0.000	0.007	0.007
4	0.957	0.949	0.943	0.946	0.057	0.050	0.054	0.053	0.943	0.950	0.946	0.947	0.000	0.000	0.007	0.007
8	0.947	0.941	0.903	0.922	0.069	0.064	0.081	0.067	0.931	0.936	0.919	0.933	0.000	0.000	0.007	0.007
12	0.937	0.929	0.879	0.894	0.082	0.082	0.104	0.084	0.918	0.918	0.896	0.916	0.000	0.000	0.007	0.007
16	0.926	0.914	0.858	0.863	0.096	0.101	0.127	0.106	0.904	0.899	0.873	0.894	0.000	0.000	0.007	0.007
20	0.914	0.897	0.839	0.832	0.110	0.121	0.150	0.130	0.890	0.879	0.850	0.870	0.000	0.000	0.007	0.007
40	0.858	0.801	0.742	0.699	0.178	0.216	0.250	0.252	0.822	0.784	0.750	0.748	0.000	0.000	0.007	0.007

Table B.9 Continued

Panel B: Consumption Adjustment Coefficients set to their Estimated Values ($\alpha_c \neq 0$)																								
h	$\Delta_{C_{t+h}} - E_t \Delta_{C_{t+h}}$				η_t^T				η_t^P				$\Delta_{z_{t+h}} - E_t \Delta_{z_{t+h}}$				η_t^T				$\Delta_{a_{t+h}} - E_t \Delta_{a_{t+h}}$			
	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4
1	0.753	0.906	0.905	0.857	0.247	0.094	0.095	0.143	0.113	0.124	0.138	0.128	0.887	0.876	0.862	0.872	0.397	0.128	0.040	0.011				
2	0.778	0.948	0.939	0.895	0.222	0.052	0.061	0.105	0.164	0.161	0.178	0.172	0.836	0.839	0.822	0.828	0.393	0.163	0.055	0.024				
3	0.800	0.963	0.961	0.924	0.200	0.037	0.039	0.076	0.218	0.210	0.246	0.240	0.782	0.790	0.754	0.760	0.388	0.170	0.078	0.045				
4	0.819	0.971	0.973	0.937	0.181	0.029	0.027	0.063	0.273	0.269	0.318	0.311	0.727	0.731	0.682	0.689	0.385	0.170	0.094	0.050				
8	0.874	0.983	0.988	0.962	0.126	0.017	0.012	0.038	0.451	0.508	0.560	0.573	0.549	0.492	0.440	0.427	0.376	0.165	0.123	0.059				
12	0.909	0.988	0.993	0.973	0.091	0.012	0.007	0.027	0.567	0.654	0.695	0.719	0.433	0.346	0.305	0.281	0.374	0.163	0.129	0.065				
16	0.930	0.991	0.995	0.978	0.070	0.009	0.005	0.022	0.646	0.736	0.770	0.795	0.354	0.264	0.230	0.205	0.373	0.164	0.133	0.074				
20	0.944	0.993	0.996	0.982	0.056	0.007	0.004	0.018	0.702	0.787	0.815	0.838	0.298	0.213	0.185	0.162	0.375	0.170	0.140	0.088				
40	0.973	0.996	0.998	0.991	0.027	0.004	0.002	0.009	0.836	0.890	0.906	0.922	0.164	0.110	0.094	0.078	0.403	0.239	0.223	0.214				
h	$\Delta_{a_{t+h}} - E_t \Delta_{a_{t+h}}$				$\Delta_{l_{t+h}} - E_t \Delta_{l_{t+h}}$				η_t^T				η_t^P				$C A_{t+h}^* - E_t C A_{t+h}^*$				η_t^T			
1	0.603	0.872	0.960	0.989	0.381	0.257	0.205	0.200	0.619	0.743	0.795	0.800	0.006	0.006	0.082	0.161	0.994	0.979	0.918	0.839				
2	0.607	0.837	0.945	0.976	0.387	0.253	0.197	0.206	0.613	0.747	0.803	0.794	0.008	0.008	0.085	0.162	0.992	0.974	0.915	0.838				
3	0.612	0.830	0.922	0.955	0.393	0.249	0.222	0.240	0.607	0.751	0.778	0.760	0.009	0.009	0.084	0.160	0.991	0.975	0.917	0.840				
4	0.615	0.830	0.906	0.950	0.399	0.251	0.240	0.246	0.601	0.749	0.760	0.754	0.009	0.009	0.083	0.160	0.991	0.973	0.919	0.840				
8	0.624	0.835	0.877	0.941	0.423	0.275	0.286	0.269	0.577	0.725	0.714	0.731	0.010	0.010	0.081	0.153	0.990	0.972	0.921	0.847				
12	0.626	0.837	0.871	0.935	0.445	0.303	0.314	0.290	0.555	0.697	0.686	0.710	0.011	0.011	0.079	0.151	0.989	0.972	0.921	0.849				
16	0.627	0.836	0.867	0.926	0.465	0.327	0.338	0.313	0.535	0.673	0.662	0.687	0.010	0.010	0.079	0.151	0.990	0.972	0.921	0.849				
20	0.625	0.830	0.860	0.912	0.483	0.348	0.358	0.335	0.517	0.652	0.642	0.665	0.010	0.010	0.079	0.151	0.990	0.972	0.921	0.849				
40	0.597	0.761	0.777	0.786	0.546	0.427	0.436	0.435	0.454	0.573	0.564	0.565	0.011	0.011	0.080	0.150	0.989	0.971	0.920	0.850				

NOTES for Table B.9: The table reports the fraction of the variance in the h step-ahead forecast error of the variable listed at the head of each column that is attributable to innovations in the permanent shock, η_t^P , the transitory shocks, η_t^T , and two times the covariance between η_t^P and η_t^T . Panel A reports results imposing the restriction that the adjustment coefficients of consumption are statistically insignificant ($\alpha_c = 0$), while Panel B reports results using the estimated adjustment coefficients of consumption ($\alpha_c \neq 0$). The identification method follows [Gonzalo and Ng \(2001\)](#), where a rotation from reduced form into permanent/transitory innovations is performed, in which shocks are allowed to be correlated (with $\eta_t^P = \alpha' u_t$ and $\eta_t^T = \beta' u_t$). Horizons are in quarters, and the underlying VECM allows for non-linear (broken linear/piece-wise linear) trends in the cointegrating relations. The sample spans the first quarter of 1952 to the first quarter of 2004.

Table B.10: Variance Decomposition (Unorthogonalized Shocks) – Robustness with Identification following **Gonzalo and Ng (2001)**: 1952-2004 with Non-linear (Broken Linear) Trends in the Cointegrating Relations

Panel A: Consumption Adjustment Coefficients set to Zero ($\alpha_c = 0$)																					
$\underline{h}$	η_t^P				η_t^I				η_t^P, η_t^I				η_t^I				η_t^P, η_t^I				
	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	
1	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.16	0.16	0.17	0.17	0.82	0.85	0.86	0.86	0.02	-0.02	-0.03	-0.03
2	1.00	0.98	0.98	0.98	0.00	0.01	0.01	0.01	0.00	0.21	0.15	0.17	0.17	0.75	0.82	0.83	0.83	0.04	0.03	0.00	0.00
3	1.00	0.97	0.96	0.95	0.00	0.02	0.04	0.06	0.00	0.26	0.18	0.19	0.18	0.70	0.80	0.82	0.83	0.04	0.02	-0.01	-0.01
4	1.00	0.97	0.94	0.93	0.00	0.02	0.07	0.08	0.00	0.31	0.22	0.23	0.24	0.66	0.77	0.80	0.78	0.04	0.01	-0.04	-0.01
8	1.00	0.97	0.93	0.90	0.00	0.02	0.09	0.10	0.00	0.44	0.40	0.40	0.42	0.53	0.63	0.70	0.63	0.02	-0.03	-0.10	-0.05
12	1.00	0.97	0.94	0.91	0.00	0.02	0.08	0.09	0.00	0.53	0.53	0.52	0.55	0.45	0.52	0.59	0.52	0.01	-0.04	-0.11	-0.07
16	1.00	0.98	0.95	0.93	0.00	0.01	0.06	0.07	0.00	0.60	0.61	0.60	0.63	0.39	0.43	0.49	0.44	0.01	-0.04	-0.10	-0.07
20	1.00	0.98	0.95	0.94	0.00	0.01	0.05	0.06	0.00	0.65	0.67	0.66	0.68	0.35	0.36	0.42	0.37	0.01	-0.03	-0.08	-0.06
40	1.00	0.99	0.98	0.97	0.00	0.01	0.03	0.03	0.00	0.78	0.81	0.81	0.83	0.21	0.20	0.23	0.20	0.01	-0.01	-0.04	-0.03
$\underline{h}$					$\Delta_{c_t+h} - E_t \Delta_{c_t+h}$				$\Delta_{a_t+h} - E_t \Delta_{a_t+h}$				$\Delta_{t_t+h} - E_t \Delta_{t_t+h}$								
1	0.02	0.02	0.02	0.02	0.83	0.86	0.87	0.87	0.15	0.12	0.11	0.11	0.02	0.02	0.02	0.02	0.80	0.81	0.82	0.82	
2	0.02	0.03	0.02	0.02	0.86	0.75	0.74	0.74	0.12	0.23	0.24	0.24	0.02	0.02	0.01	0.01	0.79	0.95	0.98	0.99	
3	0.02	0.03	0.03	0.03	0.89	0.73	0.71	0.70	0.09	0.25	0.26	0.27	0.02	0.02	0.02	0.02	0.79	0.99	1.04	1.05	
4	0.02	0.03	0.04	0.03	0.92	0.73	0.69	0.68	0.06	0.24	0.27	0.29	0.03	0.02	0.02	0.02	0.78	1.01	1.07	1.07	
8	0.03	0.04	0.06	0.05	1.02	0.82	0.72	0.72	-0.05	0.15	0.22	0.23	0.03	0.03	0.04	0.03	0.77	0.98	1.08	1.06	
12	0.04	0.05	0.09	0.08	1.09	0.91	0.79	0.79	-0.13	0.04	0.12	0.14	0.04	0.04	0.05	0.04	0.75	0.94	1.03	1.03	
16	0.05	0.06	0.11	0.10	1.15	0.98	0.85	0.83	-0.20	-0.04	0.04	0.07	0.05	0.05	0.07	0.05	0.74	0.91	1.00	1.00	
20	0.06	0.08	0.13	0.13	1.18	1.02	0.87	0.83	-0.24	-0.09	0.00	0.04	0.06	0.06	0.09	0.07	0.73	0.88	0.97	0.98	
40	0.11	0.16	0.21	0.25	1.20	0.97	0.81	0.74	-0.31	-0.14	-0.02	0.02	0.10	0.13	0.16	0.17	0.68	0.81	0.89	0.87	
$\underline{h}$					$CA_{t+h}^* - E_t CA_{t+h}^*$																
1	0.00	0.00	0.00	0.00	3.31	3.22	3.20	3.15	-2.31	-2.22	-2.20	-2.15	-2.31	-2.22	-2.20	-2.15	-2.31	-2.22	-2.20	-2.15	
2	0.00	0.00	0.00	0.00	3.36	3.22	3.20	3.15	-2.36	-2.23	-2.20	-2.16	-2.36	-2.23	-2.20	-2.16	-2.36	-2.23	-2.20	-2.16	
3	0.00	0.01	0.01	0.01	3.37	3.26	3.16	3.11	-2.37	-2.27	-2.17	-2.12	-2.37	-2.27	-2.17	-2.12	-2.37	-2.27	-2.17	-2.12	
4	0.00	0.00	0.01	0.01	3.36	3.29	3.20	3.10	-2.36	-2.29	-2.21	-2.10	-2.36	-2.29	-2.21	-2.10	-2.36	-2.29	-2.21	-2.10	
8	0.00	0.00	0.00	0.01	3.22	3.11	3.06	2.97	-2.22	-2.11	-2.07	-1.98	-2.22	-2.11	-2.07	-1.98	-2.22	-2.11	-2.07	-1.98	
12	0.00	0.00	0.00	0.01	2.95	2.66	2.32	2.08	-1.95	-1.66	-1.32	-1.09	-1.95	-1.66	-1.32	-1.09	-1.95	-1.66	-1.32	-1.09	
16	0.00	0.00	0.00	0.01	2.66	2.15	1.73	1.56	-1.66	-1.15	-0.73	-0.57	-1.66	-1.15	-0.73	-0.57	-1.66	-1.15	-0.73	-0.57	
20	0.00	0.00	0.00	0.02	2.38	1.70	1.33	1.30	-1.38	-0.70	-0.33	-0.31	-1.38	-0.70	-0.33	-0.31	-1.38	-0.70	-0.33	-0.31	
40	0.00	0.01	0.00	0.03	1.54	0.56	0.60	0.92	-0.54	0.43	0.40	0.06	-0.54	0.43	0.40	0.06	-0.54	0.43	0.40	0.06	

Table B.10 Continued

Panel B: Consumption Adjustment Coefficients set to their Estimated Values ($\alpha_c \neq 0$)																
h_t	η_t^P				η_t^T				η_t^P				η_t^T			
	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4
1	1.25	1.13	1.13	1.22	0.24	0.12	0.25	0.51	-0.49	-0.24	-0.39	-0.74	0.30	0.20	0.21	0.22
2	1.24	1.11	1.12	1.20	0.22	0.07	0.18	0.39	-0.47	-0.18	-0.30	-0.59	0.40	0.19	0.20	0.21
3	1.24	1.10	1.09	1.16	0.21	0.05	0.12	0.27	-0.44	-0.14	-0.20	-0.43	0.50	0.22	0.23	0.23
4	1.23	1.09	1.07	1.13	0.19	0.04	0.08	0.22	-0.42	-0.12	-0.15	-0.35	0.58	0.27	0.27	0.30
8	1.21	1.06	1.03	1.09	0.15	0.02	0.04	0.12	-0.36	-0.08	-0.07	-0.21	0.77	0.48	0.47	0.53
12	1.18	1.05	1.02	1.09	0.12	0.01	0.02	0.09	-0.30	-0.06	-0.05	-0.17	0.84	0.61	0.59	0.67
16	1.15	1.04	1.02	1.08	0.09	0.01	0.02	0.07	-0.25	-0.05	-0.04	-0.15	0.87	0.68	0.67	0.75
20	1.13	1.03	1.02	1.08	0.08	0.01	0.01	0.06	-0.21	-0.04	-0.03	-0.14	0.89	0.73	0.72	0.80
40	1.06	1.01	1.01	1.05	0.04	0.00	0.01	0.03	-0.10	-0.02	-0.02	-0.08	0.92	0.84	0.85	0.90
$\bar{h}_t$	$\Delta a_{t+h} - E_t \Delta a_{t+h}$				$\Delta c_{t+h} - E_t \Delta c_{t+h}$				$\Delta z_{t+h} - E_t \Delta z_{t+h}$				$\Delta l_{t+h} - E_t \Delta l_{t+h}$			
1	0.03	0.02	0.02	0.02	0.77	0.87	0.93	0.98	0.20	0.11	0.05	0.00	0.03	0.02	0.02	0.02
2	0.03	0.03	0.02	0.02	0.80	0.75	0.79	0.82	0.17	0.22	0.19	0.16	0.03	0.02	0.02	0.02
3	0.03	0.03	0.03	0.04	0.83	0.72	0.75	0.78	0.14	0.25	0.21	0.18	0.03	0.02	0.03	0.03
4	0.03	0.03	0.04	0.04	0.86	0.73	0.74	0.77	0.11	0.24	0.22	0.19	0.04	0.02	0.03	0.03
8	0.05	0.04	0.07	0.06	0.96	0.83	0.80	0.86	-0.01	0.13	0.12	0.08	0.05	0.03	0.05	0.04
12	0.06	0.05	0.10	0.09	1.04	0.94	0.92	1.00	-0.10	0.00	-0.02	-0.10	0.06	0.04	0.06	0.05
16	0.07	0.07	0.12	0.13	1.09	1.03	1.01	1.10	-0.16	-0.10	-0.14	-0.23	0.07	0.06	0.08	0.07
20	0.09	0.09	0.15	0.16	1.12	1.08	1.06	1.13	-0.21	-0.17	-0.20	-0.29	0.08	0.07	0.10	0.09
40	0.16	0.19	0.24	0.29	1.12	1.05	0.99	1.02	-0.28	-0.24	-0.24	-0.31	0.14	0.15	0.18	0.19
$\bar{h}_t$	$CA_{t+h}^* - E_t CA_{t+h}^*$															
1	0.00	0.00	0.00	0.00	3.31	3.22	3.20	3.15	-2.31	-2.22	-2.20	-2.15				
2	0.00	0.01	0.00	0.00	3.36	3.28	3.29	3.28	-2.36	-2.29	-2.30	-2.28				
3	0.00	0.01	0.01	0.01	3.37	3.33	3.29	3.29	-2.37	-2.33	-2.30	-2.30				
4	0.00	0.00	0.01	0.01	3.36	3.33	3.35	3.30	-2.36	-2.34	-2.35	-2.31				
8	0.00	0.00	0.00	0.01	3.19	3.10	3.16	3.19	-2.19	-2.10	-2.17	-2.20				
12	0.00	0.00	0.00	0.01	2.89	2.64	2.34	2.27	-1.89	-1.64	-1.34	-1.28				
16	0.00	0.00	0.00	0.02	2.58	2.14	1.72	1.68	-1.58	-1.14	-0.72	-0.69				
20	0.00	0.00	0.00	0.02	2.32	1.70	1.30	1.33	-1.32	-0.70	-0.30	-0.35				
40	0.00	0.01	0.00	0.03	1.62	0.57	0.89	0.57	-0.62	0.42	0.11	0.40				

NOTES for Table B.10: The table reports the fraction of the variance in the h step-ahead forecast error of the variable listed at the head of each column that is attributable to innovations in the permanent shock, η_t^P , the transitory shocks, η_t^T , and two times the covariance between η_t^P and η_t^T . Panel A reports results imposing the restriction that the adjustment coefficients of consumption are statistically insignificant ($\alpha_c = 0$), while Panel B reports results using the estimated adjustment coefficients of consumption ($\alpha_c \neq 0$). The identification method follows [Gonzalo and Ng \(2001\)](#), where a rotation from reduced form into permanent/transitory innovations is performed, in which shocks are allowed to be correlated (with $\eta_t^P = \alpha' u_t$ and $\eta_t^T = \beta' u_t$). Horizons are in quarters and the underlying VECM allows for non-linear (broken linear/piece-wise linear) trends in the cointegrating relations. The sample spans the first quarter of 1952 to the first quarter of 2004.

Table B.11: Variance Decomposition (Orthogonalized Shocks) – Robustness with Identification following King *et al.* (1991); Mellander *et al.* (1992): 1952-2004 with Non-linear (Broken Linear) Trends in the Cointegrating Relations

Panel A: Consumption Adjustment Coefficients set to Zero ($\alpha_c = 0$)																									
h_t	$\Delta c_{t+h} - E_t \Delta c_{t+h}$				η_t^T				η_t^P				$\Delta z_{t+h} - E_t \Delta z_{t+h}$				η_t^T				$\Delta a_{t+h} - E_t \Delta a_{t+h}$				
	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	
1	1.000	1.000	1.000	1.000	0.000	0.000	0.000	0.000	0.143	0.174	0.191	0.189	0.857	0.826	0.809	0.811	0.038	0.030	0.024	0.024	0.038	0.030	0.024	0.025	
2	1.000	0.990	0.990	0.991	0.000	0.010	0.010	0.009	0.201	0.187	0.208	0.207	0.799	0.813	0.792	0.793	0.040	0.045	0.027	0.029	0.040	0.045	0.027	0.029	
3	1.000	0.986	0.973	0.970	0.000	0.014	0.027	0.030	0.260	0.226	0.248	0.241	0.740	0.774	0.752	0.759	0.041	0.049	0.044	0.049	0.041	0.049	0.044	0.049	
4	1.000	0.984	0.963	0.959	0.000	0.016	0.037	0.041	0.314	0.276	0.299	0.306	0.686	0.724	0.701	0.694	0.043	0.051	0.057	0.054	0.043	0.051	0.057	0.054	
8	1.000	0.985	0.954	0.943	0.000	0.015	0.046	0.057	0.476	0.481	0.491	0.515	0.524	0.519	0.509	0.485	0.053	0.059	0.097	0.078	0.053	0.059	0.097	0.078	
12	1.000	0.988	0.960	0.949	0.000	0.012	0.040	0.051	0.573	0.609	0.610	0.636	0.427	0.391	0.390	0.364	0.063	0.071	0.121	0.106	0.063	0.071	0.121	0.106	
16	1.000	0.990	0.967	0.957	0.000	0.010	0.033	0.043	0.639	0.687	0.684	0.708	0.361	0.313	0.316	0.292	0.074	0.086	0.142	0.137	0.074	0.086	0.142	0.137	
20	1.000	0.992	0.972	0.965	0.000	0.008	0.028	0.035	0.687	0.739	0.735	0.757	0.313	0.261	0.265	0.243	0.086	0.103	0.161	0.168	0.086	0.103	0.161	0.168	
40	1.000	0.996	0.986	0.983	0.000	0.004	0.014	0.017	0.813	0.860	0.858	0.874	0.187	0.140	0.142	0.126	0.142	0.199	0.258	0.301	0.142	0.199	0.258	0.301	
h_t	$\Delta a_{t+h} - E_t \Delta a_{t+h}$				$\Delta l_{t+h} - E_t \Delta l_{t+h}$				η_t^T				η_t^P				$C A_{t+h}^* - E_t C A_{t+h}^*$				η_t^T				
	η_t^T				η_t^P				η_t^T				η_t^P				η_t^T				η_t^P				
	1	0.962	0.970	0.976	0.975	0.048	0.052	0.044	0.048	0.952	0.948	0.956	0.952	0.000	0.000	0.003	0.003	1.000	0.998	0.997	0.997	1.000	0.998	0.997	0.997
	2	0.960	0.955	0.973	0.971	0.051	0.051	0.036	0.040	0.949	0.949	0.964	0.960	0.000	0.000	0.006	0.006	1.000	0.993	0.994	0.994	1.000	0.993	0.994	0.994
	3	0.959	0.951	0.956	0.951	0.054	0.050	0.046	0.052	0.946	0.950	0.954	0.948	0.000	0.000	0.007	0.007	1.000	0.993	0.993	0.993	1.000	0.993	0.993	0.993
	4	0.957	0.949	0.943	0.946	0.057	0.050	0.054	0.053	0.943	0.950	0.946	0.947	0.000	0.000	0.007	0.007	1.000	0.992	0.993	0.993	1.000	0.992	0.993	0.993
	8	0.947	0.941	0.903	0.922	0.069	0.064	0.081	0.067	0.931	0.936	0.919	0.933	0.000	0.000	0.007	0.007	1.000	0.991	0.993	0.993	1.000	0.991	0.993	0.993
	12	0.937	0.929	0.879	0.894	0.082	0.082	0.104	0.084	0.918	0.918	0.896	0.916	0.000	0.000	0.007	0.007	1.000	0.992	0.993	0.993	1.000	0.992	0.993	0.993
	16	0.926	0.914	0.858	0.863	0.096	0.101	0.127	0.106	0.904	0.899	0.873	0.894	0.000	0.000	0.007	0.007	1.000	0.992	0.993	0.993	1.000	0.992	0.993	0.993
	20	0.914	0.897	0.839	0.832	0.110	0.121	0.150	0.130	0.890	0.879	0.850	0.870	0.000	0.000	0.007	0.007	1.000	0.992	0.993	0.993	1.000	0.992	0.993	0.993
40	0.858	0.801	0.742	0.699	0.178	0.216	0.250	0.252	0.822	0.784	0.750	0.748	0.000	0.000	0.007	0.007	1.000	0.992	0.993	0.993	1.000	0.992	0.993	0.993	

Table B.11 Continued

Panel B: Consumption Adjustment Coefficients set to their Estimated Values ($\alpha_c \neq 0$)																				
h	$\Delta C_{t+h} - E_t C_{t+h}$				η_t^T				$\Delta z_{t+h} - E_t z_{t+h}$				η_t^T				$\Delta a_{t+h} - E_t a_{t+h}$			
	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4
1	0.753	0.906	0.905	0.857	0.247	0.094	0.095	0.143	0.113	0.124	0.138	0.128	0.887	0.876	0.862	0.872	0.397	0.128	0.040	0.011
2	0.778	0.948	0.939	0.895	0.222	0.052	0.061	0.105	0.164	0.161	0.178	0.172	0.836	0.839	0.822	0.828	0.393	0.163	0.055	0.024
3	0.800	0.963	0.961	0.924	0.200	0.037	0.039	0.076	0.218	0.210	0.246	0.240	0.782	0.790	0.754	0.760	0.388	0.170	0.078	0.045
4	0.819	0.971	0.973	0.937	0.181	0.029	0.027	0.063	0.273	0.269	0.318	0.311	0.727	0.731	0.682	0.689	0.385	0.170	0.094	0.050
8	0.874	0.983	0.988	0.962	0.126	0.017	0.012	0.038	0.451	0.508	0.560	0.573	0.549	0.492	0.440	0.427	0.376	0.165	0.123	0.059
12	0.909	0.988	0.993	0.973	0.091	0.012	0.007	0.027	0.567	0.654	0.695	0.719	0.433	0.346	0.305	0.281	0.374	0.163	0.129	0.065
16	0.930	0.991	0.995	0.978	0.070	0.009	0.005	0.022	0.646	0.736	0.770	0.795	0.354	0.264	0.230	0.205	0.373	0.164	0.133	0.074
20	0.944	0.993	0.996	0.982	0.056	0.007	0.004	0.018	0.702	0.787	0.815	0.838	0.298	0.213	0.185	0.162	0.375	0.170	0.140	0.088
40	0.973	0.996	0.998	0.991	0.027	0.004	0.002	0.009	0.836	0.890	0.906	0.922	0.164	0.110	0.094	0.078	0.403	0.239	0.223	0.214
h	$\Delta a_{t+h} - E_t \Delta a_{t+h}$				$\Delta l_{t+h} - E_t \Delta l_{t+h}$				η_t^T				η_t^P				η_t^T			
1	0.603	0.872	0.960	0.989	0.381	0.257	0.205	0.200	0.619	0.743	0.795	0.800	0.006	0.006	0.082	0.160	0.994	0.979	0.918	0.840
2	0.607	0.837	0.945	0.976	0.387	0.253	0.197	0.206	0.613	0.747	0.803	0.794	0.008	0.008	0.085	0.162	0.992	0.974	0.915	0.838
3	0.612	0.830	0.922	0.955	0.393	0.249	0.222	0.240	0.607	0.751	0.778	0.760	0.009	0.009	0.084	0.160	0.991	0.974	0.916	0.840
4	0.615	0.830	0.906	0.950	0.399	0.251	0.240	0.246	0.601	0.749	0.760	0.754	0.009	0.009	0.083	0.159	0.991	0.973	0.917	0.841
8	0.624	0.835	0.877	0.941	0.423	0.275	0.286	0.269	0.577	0.725	0.714	0.731	0.010	0.010	0.081	0.153	0.990	0.971	0.919	0.847
12	0.626	0.837	0.871	0.935	0.445	0.303	0.314	0.290	0.555	0.697	0.686	0.710	0.011	0.011	0.080	0.151	0.989	0.972	0.920	0.849
16	0.627	0.836	0.867	0.926	0.465	0.327	0.338	0.313	0.535	0.673	0.662	0.687	0.011	0.011	0.079	0.151	0.989	0.972	0.921	0.849
20	0.625	0.830	0.860	0.912	0.483	0.348	0.358	0.335	0.517	0.652	0.642	0.665	0.011	0.011	0.080	0.151	0.989	0.971	0.920	0.849
40	0.597	0.761	0.777	0.786	0.546	0.427	0.436	0.435	0.454	0.573	0.564	0.565	0.011	0.011	0.080	0.150	0.989	0.971	0.920	0.850

NOTES for Table B.11: The table reports the fraction of the variance in the h step-ahead forecast error of the variable listed at the head of each column that is attributable to innovations in the permanent shock, η_t^P , and the transitory shocks, η_t^T , using different number of lags in the VAR. Panel A reports results imposing the restriction that the adjustment coefficients of consumption are statistically insignificant ($\alpha_c = 0$), while Panel B reports results using the estimated adjustment coefficients of consumption ($\alpha_c \neq 0$). The identification method follows King *et al.* (1991) as extended in Mellander *et al.* (1992), where the rotation from reduced form into permanent/transitory innovations and the orthogonalization of the shocks is achieved in one step (letting $\eta_t^P = \alpha'_\perp \mathbf{u}_t$ and $\eta_t^T = \alpha'_\perp \Omega^{-1} \mathbf{u}_t$). Horizons are in quarters and the underlying VEqCM allows for non-linear (broken linear/piece-wise linear) trends in the cointegrating relations. The sample spans the first quarter of 1952 to the first quarter of 2004.

Table B.12: Variance Decomposition (Orthogonalized Shocks) – Robustness including Return Differential in the Analysis and Identification following **Gonzalo and Ng (2001)**: 1952-2004 with Non-linear (Broken Linear) Trends in the Cointegrating Relations

Panel A: Consumption Adjustment Coefficients set to Zero ($\alpha_c=0$)																
	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4
$\underline{h}$	$\Delta c_{t+h} - E_t \Delta c_{t+h}$								$\Delta z_{t+h} - E_t \Delta z_{t+h}$							
	η_t^P				η_t^T				η_t^P				η_t^T			
1	1.000	1.000	1.000	1.000	0.000	0.000	0.000	0.000	0.143	0.168	0.183	0.176	0.857	0.832	0.817	0.824
2	1.000	0.989	0.988	0.989	0.000	0.011	0.012	0.011	0.200	0.180	0.196	0.186	0.800	0.820	0.804	0.814
3	1.000	0.983	0.971	0.969	0.000	0.017	0.029	0.031	0.259	0.218	0.235	0.219	0.741	0.782	0.765	0.781
4	1.000	0.980	0.961	0.958	0.000	0.020	0.039	0.042	0.313	0.264	0.286	0.284	0.687	0.736	0.714	0.716
8	1.000	0.979	0.954	0.943	0.000	0.021	0.046	0.057	0.474	0.460	0.474	0.495	0.526	0.540	0.526	0.505
12	1.000	0.982	0.961	0.949	0.000	0.018	0.039	0.051	0.572	0.587	0.595	0.624	0.428	0.413	0.405	0.376
16	1.000	0.985	0.968	0.958	0.000	0.015	0.032	0.042	0.638	0.666	0.674	0.700	0.362	0.334	0.326	0.300
20	1.000	0.988	0.973	0.966	0.000	0.012	0.027	0.034	0.686	0.720	0.728	0.751	0.314	0.280	0.272	0.249
40	1.000	0.994	0.986	0.983	0.000	0.006	0.014	0.017	0.812	0.848	0.855	0.871	0.188	0.152	0.145	0.129
$\underline{h}$	$\Delta a_{t+h} - E_t \Delta a_{t+h}$								$\Delta l_{t+h} - E_t \Delta l_{t+h}$							
	η_t^P				η_t^T				η_t^P				η_t^T			
1	0.038	0.031	0.023	0.025	0.962	0.969	0.977	0.975	0.048	0.050	0.044	0.052	0.952	0.950	0.956	0.948
2	0.040	0.046	0.026	0.029	0.960	0.954	0.974	0.971	0.050	0.049	0.036	0.043	0.950	0.951	0.964	0.957
3	0.043	0.049	0.043	0.050	0.957	0.951	0.957	0.950	0.053	0.047	0.047	0.059	0.947	0.953	0.953	0.941
4	0.045	0.052	0.056	0.056	0.955	0.948	0.944	0.944	0.056	0.048	0.056	0.062	0.944	0.952	0.944	0.938
8	0.054	0.061	0.095	0.079	0.946	0.939	0.905	0.921	0.068	0.060	0.086	0.081	0.932	0.940	0.914	0.919
12	0.064	0.073	0.119	0.109	0.936	0.927	0.881	0.891	0.081	0.077	0.113	0.106	0.919	0.923	0.887	0.894
16	0.075	0.089	0.137	0.139	0.925	0.911	0.863	0.861	0.094	0.095	0.138	0.135	0.906	0.905	0.862	0.865
20	0.086	0.106	0.155	0.167	0.914	0.894	0.845	0.833	0.108	0.114	0.161	0.163	0.892	0.886	0.839	0.837
40	0.141	0.203	0.248	0.291	0.859	0.797	0.752	0.709	0.175	0.208	0.260	0.282	0.825	0.792	0.740	0.718

Table B.12 Continued

Panel A: Consumption Adjustment Coefficients set to Zero ($\alpha_c = 0$)																
	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4
$\frac{h_c}{h}$	$\frac{CA_{t+h}^* - E_t CA_{t+h}^*}{\eta_t^P}$								$\frac{\left(r_{t+h}^a - r_{t+h}^l\right) - E_t \left(r_{t+h}^a - r_{t+h}^l\right)}{\eta_t^P}$							
1	0.000	0.000	0.003	0.005	1.000	0.999	0.997	0.995	0.000	0.003	0.007	0.007	1.000	0.997	0.993	0.993
2	0.000	0.000	0.006	0.007	1.000	0.993	0.994	0.993	0.000	0.015	0.011	0.011	1.000	0.985	0.989	0.989
3	0.000	0.000	0.007	0.007	1.000	0.993	0.993	0.993	0.000	0.016	0.025	0.023	1.000	0.984	0.975	0.977
4	0.000	0.000	0.007	0.007	1.000	0.993	0.993	0.993	0.000	0.017	0.027	0.027	1.000	0.983	0.973	0.973
8	0.000	0.000	0.007	0.007	1.000	0.992	0.993	0.993	0.000	0.017	0.031	0.033	1.000	0.983	0.969	0.967
12	0.000	0.000	0.007	0.007	1.000	0.992	0.993	0.993	0.000	0.018	0.031	0.033	1.000	0.982	0.969	0.967
16	0.000	0.000	0.007	0.007	1.000	0.992	0.993	0.993	0.000	0.018	0.030	0.033	1.000	0.982	0.970	0.967
20	0.000	0.000	0.007	0.007	1.000	0.992	0.993	0.993	0.000	0.018	0.030	0.033	1.000	0.982	0.970	0.967
40	0.000	0.000	0.007	0.007	1.000	0.992	0.993	0.993	0.000	0.017	0.030	0.033	1.000	0.983	0.970	0.967

Panel B: Consumption Adjustment Coefficients set to their Estimated Values ($\alpha_c \neq 0$)																
	$\frac{\Delta c_{t+h} - E_t \Delta c_{t+h}}{\eta_t^P}$								$\frac{\Delta z_{t+h} - E_t \Delta z_{t+h}}{\eta_t^P}$							
$\frac{h_c}{h}$	η_t^P								η_t^T							
1	0.762	0.918	0.889	0.830	0.238	0.082	0.111	0.170	0.129	0.163	0.150	0.142	0.871	0.837	0.850	0.858
2	0.784	0.951	0.926	0.875	0.216	0.049	0.074	0.125	0.179	0.197	0.188	0.182	0.821	0.803	0.812	0.818
3	0.803	0.962	0.955	0.916	0.197	0.038	0.045	0.084	0.233	0.245	0.261	0.257	0.767	0.755	0.739	0.743
4	0.819	0.967	0.969	0.939	0.181	0.033	0.031	0.061	0.286	0.299	0.338	0.346	0.714	0.701	0.662	0.654
8	0.871	0.975	0.987	0.973	0.129	0.025	0.013	0.027	0.455	0.514	0.569	0.596	0.545	0.486	0.431	0.404
12	0.904	0.980	0.992	0.982	0.096	0.020	0.008	0.018	0.565	0.646	0.699	0.733	0.435	0.354	0.301	0.267
16	0.925	0.984	0.994	0.986	0.075	0.016	0.006	0.014	0.641	0.723	0.772	0.803	0.359	0.277	0.228	0.197
20	0.939	0.986	0.995	0.989	0.061	0.014	0.005	0.011	0.696	0.772	0.817	0.844	0.304	0.228	0.183	0.156
40	0.970	0.993	0.998	0.994	0.030	0.007	0.002	0.006	0.830	0.878	0.906	0.923	0.170	0.122	0.094	0.077

Table B.12 Continued

Panel B: Consumption Adjustment Coefficients set to their Estimated Values ($\alpha_c \neq 0$)												
	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4
$\underline{h}$	$\frac{\Delta a_{t+h} - E_t \Delta a_{t+h}}{\eta_t^P}$				η_t^T				$\frac{\Delta l_{t+h} - E_t \Delta l_{t+h}}{\eta_t^P}$			
	η_t^P	η_t^P	η_t^P	η_t^P	η_t^T	η_t^T	η_t^T	η_t^T	η_t^P	η_t^P	η_t^T	η_t^T
1	0.398	0.139	0.053	0.029	0.602	0.861	0.947	0.971	0.354	0.234	0.226	0.236
2	0.400	0.172	0.071	0.047	0.600	0.828	0.929	0.953	0.353	0.223	0.215	0.231
3	0.399	0.178	0.098	0.077	0.601	0.822	0.902	0.923	0.356	0.217	0.239	0.266
4	0.398	0.180	0.114	0.087	0.602	0.820	0.886	0.913	0.361	0.217	0.255	0.273
8	0.392	0.181	0.144	0.094	0.608	0.819	0.856	0.906	0.384	0.239	0.302	0.287
12	0.390	0.183	0.151	0.102	0.610	0.817	0.849	0.898	0.408	0.265	0.334	0.314
16	0.389	0.187	0.154	0.110	0.611	0.813	0.846	0.890	0.429	0.290	0.361	0.342
20	0.391	0.195	0.159	0.123	0.609	0.805	0.841	0.877	0.448	0.311	0.382	0.368
40	0.418	0.263	0.234	0.229	0.582	0.737	0.766	0.771	0.515	0.390	0.458	0.464
$\frac{CA_{t+h}^* - E_t CA_{t+h}^*}{\eta_t^P}$												
$\underline{h}$	η_t^P				η_t^T				$\frac{(r_{t+h}^a - r_{t+h}^l) - E_t(r_{t+h}^a - r_{t+h}^l)}{\eta_t^P}$			
1	0.012	0.012	0.075	0.128	0.988	0.991	0.925	0.872	0.011	0.012	0.076	0.163
2	0.013	0.013	0.078	0.131	0.987	0.984	0.922	0.869	0.011	0.025	0.079	0.161
3	0.013	0.013	0.078	0.129	0.987	0.983	0.922	0.871	0.011	0.025	0.093	0.172
4	0.014	0.014	0.077	0.129	0.986	0.983	0.923	0.871	0.012	0.025	0.094	0.176
8	0.015	0.015	0.075	0.124	0.985	0.981	0.925	0.876	0.012	0.024	0.093	0.170
12	0.015	0.015	0.074	0.122	0.985	0.981	0.926	0.878	0.012	0.024	0.091	0.166
16	0.015	0.015	0.074	0.122	0.985	0.981	0.926	0.878	0.012	0.024	0.091	0.165
20	0.015	0.015	0.074	0.122	0.985	0.981	0.926	0.878	0.012	0.024	0.091	0.164
40	0.015	0.015	0.075	0.121	0.985	0.981	0.925	0.879	0.012	0.025	0.092	0.164

NOTES for Table B.12: The underlying VEqCM allows for linear trends in the cointegrating relations, but not in the return differential. See also notes for Table B.9. The sample spans the first quarter of 1952 to the first quarter of 2004.

Table B.13: Variance Decomposition (Orthogonalized Shocks) - Robustness including Return Differential in the Analysis and Identification following [King et al. \(1991\)](#); [Mellander et al. \(1992\)](#): 1952-2004 with Non-linear (Broken Linear) Trends in the Cointegrating Relations

Panel A: Consumption Adjustment Coefficients set to Zero ($\alpha_c=0$)																			
	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4			
$\underline{h}$	$\frac{\Delta c_{t+h} - E_t \Delta c_{t+h}}{\eta_t^P}$								η_t^T				$\frac{\Delta z_{t+h} - E_t \Delta z_{t+h}}{\eta_t^P}$					η_t^T	
1	1.000	1.000	1.000	1.000	0.000	0.000	0.000	0.000	0.143	0.168	0.183	0.176	0.857	0.832	0.817	0.824			
2	1.000	0.989	0.988	0.989	0.000	0.011	0.012	0.011	0.200	0.180	0.196	0.186	0.800	0.820	0.804	0.814			
3	1.000	0.983	0.971	0.969	0.000	0.017	0.029	0.031	0.259	0.218	0.235	0.219	0.741	0.782	0.765	0.781			
4	1.000	0.980	0.961	0.958	0.000	0.020	0.039	0.042	0.313	0.264	0.286	0.284	0.687	0.736	0.714	0.716			
8	1.000	0.979	0.954	0.943	0.000	0.021	0.046	0.057	0.474	0.460	0.474	0.495	0.526	0.540	0.526	0.505			
12	1.000	0.982	0.961	0.949	0.000	0.018	0.039	0.051	0.572	0.587	0.595	0.624	0.428	0.413	0.405	0.376			
16	1.000	0.985	0.968	0.958	0.000	0.015	0.032	0.042	0.638	0.666	0.674	0.700	0.362	0.334	0.326	0.300			
20	1.000	0.988	0.973	0.966	0.000	0.012	0.027	0.034	0.686	0.720	0.728	0.751	0.314	0.280	0.272	0.249			
40	1.000	0.994	0.986	0.983	0.000	0.006	0.014	0.017	0.812	0.848	0.855	0.871	0.188	0.152	0.145	0.129			
$\underline{h}$	$\frac{\Delta a_{t+h} - E_t \Delta a_{t+h}}{\eta_t^P}$								η_t^T				$\frac{\Delta l_{t+h} - E_t \Delta l_{t+h}}{\eta_t^P}$					η_t^T	
1	0.038	0.031	0.023	0.025	0.962	0.969	0.977	0.975	0.048	0.050	0.044	0.052	0.952	0.950	0.956	0.948			
2	0.040	0.046	0.026	0.029	0.960	0.954	0.974	0.971	0.050	0.049	0.036	0.043	0.950	0.951	0.964	0.957			
3	0.043	0.049	0.043	0.050	0.957	0.951	0.957	0.950	0.053	0.047	0.047	0.059	0.947	0.953	0.953	0.941			
4	0.045	0.052	0.056	0.056	0.955	0.948	0.944	0.944	0.056	0.048	0.056	0.062	0.944	0.952	0.944	0.938			
8	0.054	0.061	0.095	0.079	0.946	0.939	0.905	0.921	0.068	0.060	0.086	0.081	0.932	0.940	0.914	0.919			
12	0.064	0.073	0.119	0.109	0.936	0.927	0.881	0.891	0.081	0.077	0.113	0.106	0.919	0.923	0.887	0.894			
16	0.075	0.089	0.137	0.139	0.925	0.911	0.863	0.861	0.094	0.095	0.138	0.135	0.906	0.905	0.862	0.865			
20	0.086	0.106	0.155	0.167	0.914	0.894	0.845	0.833	0.108	0.114	0.161	0.163	0.892	0.886	0.839	0.837			
40	0.141	0.203	0.248	0.291	0.859	0.797	0.752	0.709	0.175	0.208	0.260	0.282	0.825	0.792	0.740	0.718			

Table B.13 Continued

Panel A: Consumption Adjustment Coefficients set to Zero ($\alpha_c=0$)																
	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4
$\underline{h}$	$\frac{CA_{t+h}^* - E_t CA_{t+h}^*}{\eta_t^P}$								$\frac{\left(r_{t+h}^a - r_{t+h}^l\right) - E_t\left(r_{t+h}^a - r_{t+h}^l\right)}{\eta_t^P}$							
1	0.000	0.000	0.003	0.005	1.000	0.998	0.997	0.995	0.000	0.003	0.007	0.007	1.000	0.997	0.993	0.993
2	0.000	0.000	0.006	0.007	1.000	0.993	0.994	0.993	0.000	0.015	0.011	0.011	1.000	0.985	0.989	0.989
3	0.000	0.000	0.007	0.007	1.000	0.993	0.993	0.993	0.000	0.016	0.025	0.023	1.000	0.984	0.975	0.977
4	0.000	0.000	0.007	0.007	1.000	0.993	0.993	0.993	0.000	0.017	0.027	0.027	1.000	0.983	0.973	0.973
8	0.000	0.000	0.007	0.007	1.000	0.992	0.993	0.993	0.000	0.017	0.031	0.033	1.000	0.983	0.969	0.967
12	0.000	0.000	0.007	0.007	1.000	0.992	0.993	0.993	0.000	0.018	0.031	0.033	1.000	0.982	0.969	0.967
16	0.000	0.000	0.007	0.007	1.000	0.992	0.993	0.993	0.000	0.018	0.030	0.033	1.000	0.982	0.970	0.967
20	0.000	0.000	0.007	0.007	1.000	0.992	0.993	0.993	0.000	0.018	0.030	0.033	1.000	0.982	0.970	0.967
40	0.000	0.000	0.007	0.007	1.000	0.992	0.993	0.993	0.000	0.017	0.030	0.033	1.000	0.983	0.970	0.967

Panel B: Consumption Adjustment Coefficients set to their Estimated Values ($\alpha_c\neq 0$)																
	$\frac{\Delta c_{t+h} - E_t \Delta c_{t+h}}{\eta_t^P}$								$\frac{\Delta z_{t+h} - E_t \Delta z_{t+h}}{\eta_t^P}$							
$\underline{h}$	η_t^P								η_t^T							
1	0.762	0.918	0.889	0.830	0.238	0.082	0.111	0.170	0.129	0.163	0.150	0.142	0.871	0.837	0.850	0.858
2	0.784	0.951	0.926	0.875	0.216	0.049	0.074	0.125	0.179	0.197	0.188	0.182	0.821	0.803	0.812	0.818
3	0.803	0.962	0.955	0.916	0.197	0.038	0.045	0.084	0.233	0.245	0.261	0.257	0.767	0.755	0.739	0.743
4	0.819	0.967	0.969	0.939	0.181	0.033	0.031	0.061	0.286	0.299	0.338	0.346	0.714	0.701	0.662	0.654
8	0.871	0.975	0.987	0.973	0.129	0.025	0.013	0.027	0.455	0.514	0.569	0.596	0.545	0.486	0.431	0.404
12	0.904	0.980	0.992	0.982	0.096	0.020	0.008	0.018	0.565	0.646	0.699	0.733	0.435	0.354	0.301	0.267
16	0.925	0.984	0.994	0.986	0.075	0.016	0.006	0.014	0.641	0.723	0.772	0.803	0.359	0.277	0.228	0.197
20	0.939	0.986	0.995	0.989	0.061	0.014	0.005	0.011	0.696	0.772	0.817	0.844	0.304	0.228	0.183	0.156
40	0.970	0.993	0.998	0.994	0.030	0.007	0.002	0.006	0.830	0.878	0.906	0.923	0.170	0.122	0.094	0.077

Table B.13 Continued

Panel B: Consumption Adjustment Coefficients set to their Estimated Values ($\alpha_c \neq 0$)																		
	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	$\frac{\Delta l_{t+h} - E_t \Delta l_{t+h}}{\eta_t^P}$								η_t^T	
h									η_t^T									
1	0.398	0.139	0.053	0.029	0.602	0.861	0.947	0.971	0.354	0.234	0.226	0.236	0.646	0.766	0.774	0.764		
2	0.400	0.172	0.071	0.047	0.600	0.828	0.929	0.953	0.353	0.223	0.215	0.231	0.647	0.777	0.785	0.769		
3	0.399	0.178	0.098	0.077	0.601	0.822	0.902	0.923	0.356	0.217	0.239	0.266	0.644	0.783	0.761	0.734		
4	0.398	0.180	0.114	0.087	0.602	0.820	0.886	0.913	0.361	0.217	0.255	0.273	0.639	0.783	0.745	0.727		
8	0.392	0.181	0.144	0.094	0.608	0.819	0.856	0.906	0.384	0.239	0.302	0.287	0.616	0.761	0.698	0.713		
12	0.390	0.183	0.151	0.102	0.610	0.817	0.849	0.898	0.408	0.265	0.334	0.314	0.592	0.735	0.666	0.686		
16	0.389	0.187	0.154	0.110	0.611	0.813	0.846	0.890	0.429	0.290	0.361	0.342	0.571	0.710	0.639	0.658		
20	0.391	0.195	0.159	0.123	0.609	0.805	0.841	0.877	0.448	0.311	0.382	0.368	0.552	0.689	0.618	0.632		
40	0.418	0.263	0.234	0.229	0.582	0.737	0.766	0.771	0.515	0.390	0.458	0.464	0.485	0.610	0.542	0.536		
h	$\frac{CA_{t+h}^* - E_t CA_{t+h}^*}{\eta_t^P}$								η_t^T								$\frac{(r_{t+h}^a - r_{t+h}^l) - E_t (r_{t+h}^a - r_{t+h}^l)}{\eta_t^T}$	
1	0.012	0.012	0.075	0.129	0.988	0.991	0.925	0.871	0.011	0.012	0.076	0.163	0.989	0.988	0.924	0.837		
2	0.013	0.013	0.079	0.132	0.987	0.984	0.921	0.868	0.011	0.025	0.079	0.161	0.989	0.975	0.921	0.839		
3	0.014	0.014	0.078	0.130	0.986	0.983	0.922	0.870	0.011	0.025	0.093	0.172	0.989	0.975	0.907	0.828		
4	0.014	0.014	0.077	0.130	0.986	0.983	0.923	0.870	0.012	0.025	0.094	0.176	0.988	0.975	0.906	0.824		
8	0.015	0.015	0.076	0.125	0.985	0.981	0.924	0.875	0.012	0.024	0.093	0.170	0.988	0.976	0.907	0.830		
12	0.016	0.016	0.075	0.123	0.984	0.981	0.925	0.877	0.012	0.024	0.091	0.166	0.988	0.976	0.909	0.834		
16	0.016	0.016	0.074	0.123	0.984	0.981	0.926	0.877	0.012	0.024	0.091	0.165	0.988	0.976	0.909	0.835		
20	0.016	0.016	0.075	0.122	0.984	0.981	0.925	0.878	0.012	0.024	0.091	0.164	0.988	0.976	0.909	0.836		
40	0.016	0.016	0.075	0.122	0.984	0.980	0.925	0.878	0.012	0.025	0.092	0.164	0.988	0.975	0.908	0.836		

NOTES for Table B.13: The underlying VEqCM allows for linear trends in the cointegrating relations, but not in the return differential. See also notes for Table B.11. The sample spans the first quarter of 1952 to the first quarter of 2004.

Table B.14: Cointegration Test Statistics using Total Consumption

$H_0 : r$	$n - r$	$k = 1$		$k = 2$		$k = 3$		$k = 4$	
		$Q(r n)$	$Q(r r+1)$	$Q(r n)$	$Q(r r+1)$	$Q(r n)$	$Q(r r+1)$	$Q(r n)$	$Q(r r+1)$
$r = 0$	4	78.984	34.653	74.711	34.770	72.999	35.007	65.174	26.113
Asymp. p -value		[0.002]	[0.024]	[0.005]	[0.023]	[0.007]	[0.021]	[0.039]	[0.226]
Emp. p -value		[0.003]	[0.000]	[0.013]	[0.000]	[0.031]	[0.000]	[0.173]	[0.023]
$r \leq 1$	3	44.331	24.822	39.941	17.880	37.993	16.644	39.061	21.436
Asymp. p -value		[0.036]	[0.067]	[0.096]	[0.386]	[0.142]	[0.488]	[0.115]	[0.171]
Emp. p -value		[0.055]	[0.000]	[0.181]	[0.157]	[0.305]	[0.437]	[0.274]	[0.035]
$r \leq 2$	2	19.509	12.249	22.061	14.265	21.349	14.946	17.625	12.346
Asymp. p -value		[0.252]	[0.392]	[0.139]	[0.237]	[0.165]	[0.196]	[0.370]	[0.384]
Emp. p -value		[0.345]	[0.255]	[0.191]	[0.043]	[0.247]	[0.029]	[0.519]	[0.374]
$r \leq 3$	1	7.260	7.260	7.796	7.796	6.403	6.403	5.280	5.280
Asymp. p -value		[0.318]	[0.318]	[0.269]	[0.269]	[0.411]	[0.411]	[0.557]	[0.557]
Emp. p -value		[0.405]	[0.405]	[0.335]	[0.335]	[0.520]	[0.520]	[0.637]	[0.637]

NOTES for Table B.14: $Q(r|n)$ denotes the trace statistic, i.e. $Q(r|n) = -T \sum_{i=r+1}^n \ln(1 - \hat{\lambda}_i)$ and $Q(r|r+1)$ denotes the maximum eigenvalue statistic i.e. $Q(r|r+1) = -T \ln(1 - \hat{\lambda}_{r+1})$ as defined in Johansen (1995). The table reports test statistics for $k = 1, \dots, 4$ lags in the VAR. The asymptotic p -values reported are calculated using the methods in MacKinnon et al. (1999). The bootstrap p -values are based on a Monte Carlo Bootstrap Simulation with 10000 replications. The sample spans the first quarter of 1973 to the fourth quarter of 2004.

Table B.15: Unit Root Tests on "Great Ratios" (Total Consumption)

x_t	$c_t - z_t$	$a_t - z_t$	$l_t - z_t$	$CV_{0.90}$	$CV_{0.95}$	$CV_{0.99}$
PP_1	-3.072	-3.454	-3.181	-3.148	-3.446	-4.032
[p -value]	[0.117]	[0.049]	[0.093]			
PP_2	-3.046 (0.43)	-3.057 (1.24)	-2.827 (1.22)	3.148	-3.446	-4.032
[p -value]	[0.124]	[0.121]	[0.190]			
$KPSS_1$	0.102	0.050	0.061	0.119	0.146	0.216
$KPSS_2$	0.079 (19.4)	0.054 (22.70)	0.095 (27.00)	0.119	0.146	0.216

Notes for Table B.15: The table reports two variants of the unit root tests of [Phillips and Perron \(1988\)](#) and the stationarity tests of [Kwiatkowski et al. \(1992\)](#) when employing total consumption. Both test include a constant and time trend in the estimated equation. In the first (PP_1 and $KPSS_1$) the bandwidth parameter is set to 8, and in the second (PP_2 and $KPSS_2$) the bandwidth (the number reported in the parenthesis) is chosen using [Andrews \(1991\)](#)'s automatic bandwidth selection. The PP test examines the null of a unit root against the alternative of trend-stationarity of the ratios. The KPSS test examines the null of trend-stationarity against the alternative of a unit root. The asymptotic p -values for the PP test are calculated using the method of [MacKinnon \(1996\)](#).

Table B.16: Cointegrating Relations Estimates using Total Consumption

Panel A: DOLS Estimates and Wald tests (1973-2004 Sample)										
lags/leads	$k = 1$		$k = 2$		$k = 3$		$k = 4$		$k = 5$	
	β_i	θ_i	β_i	θ_i	β_i	θ_i	β_i	θ_i	β_i	θ_i
$c_t - \hat{\beta}_c z_t - \hat{\theta}_c t$ [t -stats]	0.772 [10.043]	0.0014 [3.949]	0.801 [9.204]	0.0013 [3.108]	0.830 [9.147]	0.0011 [2.616]	0.857 [8.887]	0.0010 [2.141]	0.892 [9.143]	0.0008 [1.673]
$c_t - z_t - \hat{\theta}_c t$ [t -stats]	— —	0.0004 [6.459]	— —	0.0003 [5.844]	— —	0.0003 [5.637]	— —	0.0003 [5.022]	— —	0.0003 [4.707]
Wald-test $\mathcal{W}(1)$ [Asymp. p -value]/[Emp. p -value]	8.816 [0.003]	[0.420]	5.207 [0.022]	[0.518]	3.512 [0.061]	[0.605]	2.213 [0.137]	[0.681]	1.216 [0.270]	[0.760]
$a_t - \hat{\beta}_a z_t - \hat{\theta}_a t$ [t -stats]	1.256 [2.721]	0.0123 [5.620]	1.154 [2.313]	0.0127 [5.374]	1.059 [2.161]	0.0132 [5.629]	1.106 [2.188]	0.0129 [5.308]	1.190 [2.221]	0.0124 [4.799]
$a_t - z_t - \hat{\theta}_a t$ [t -stats]	— —	0.0135 [45.702]	— —	0.0135 [44.103]	— —	0.0135 [45.559]	— —	0.0134 [44.379]	— —	0.0133 [42.844]
Wald-test $\mathcal{W}(1)$ [Asymp. p -value]/[Emp. p -value]	0.308 [0.579]	[0.844]	0.095 [0.758]	[0.914]	0.014 [0.905]	[0.966]	0.044 [0.833]	[0.941]	0.125 [0.723]	[0.903]
$l_t - \hat{\beta}_l z_t - \hat{\theta}_l t$ [t -stats]	2.184 [5.803]	0.0121 [6.785]	2.305 [5.965]	0.0115 [6.249]	2.374 [6.432]	0.0111 [6.302]	2.429 [6.838]	0.0108 [6.345]	2.488 [6.884]	0.0105 [6.000]
$l_t - z_t - \hat{\theta}_l t$ [t -stats]	— —	0.0176 [74.419]	— —	0.0176 [71.834]	— —	0.0176 [73.480]	— —	0.0176 [74.859]	— —	0.0176 [73.884]
Wald-test $\mathcal{W}(1)$ [Asymp. p -value]/[Emp. p -value]	9.898 [0.002]	[0.258]	11.409 [0.001]	[0.241]	13.860 [0.000]	[0.209]	16.181 [0.000]	[0.186]	16.950 [0.000]	[0.184]
Joint Wald-test $\mathcal{W}(3)$ [Asymp. p -value]/[Emp. p -value]	31.055 [0.000]	[0.552]	35.149 [0.000]	[0.508]	39.474 [0.000]	[0.473]	42.879 [0.000]	[0.449]	42.418 [0.000]	[0.473]

Table B.17: Variance Decomposition (Orthogonalized Shocks) – Employing Total Consumption, with Identification following **Gonzalo and Ng (2001)**: 1973-2004 with Linear Trends in the Cointegrating Relations

Panel A: Consumption Adjustment Coefficients set to Zero ($\alpha_c = 0$)																								
h	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4								
	$\frac{P}{\eta_t} \Delta c_{t+h} - E_t \Delta c_{t+h}$								$\frac{P}{\eta_t} \Delta z_{t+h} - E_t \Delta z_{t+h}$								$\frac{P}{\eta_t} \Delta a_{t+h} - E_t \Delta a_{t+h}$							
	η_t^T								η_t^P								η_t^T							
1	1.000	1.000	1.000	1.000	0.000	0.000	0.000	0.000	0.302	0.443	0.458	0.402	0.698	0.557	0.542	0.598								
2	1.000	0.985	0.982	0.985	0.000	0.015	0.018	0.015	0.334	0.356	0.378	0.297	0.666	0.644	0.622	0.703								
3	1.000	0.982	0.956	0.948	0.000	0.018	0.044	0.052	0.366	0.334	0.331	0.221	0.634	0.666	0.669	0.779								
4	1.000	0.981	0.947	0.917	0.000	0.019	0.053	0.083	0.397	0.336	0.337	0.233	0.603	0.664	0.663	0.767								
8	1.000	0.985	0.948	0.893	0.000	0.015	0.052	0.107	0.506	0.461	0.458	0.331	0.494	0.539	0.542	0.669								
12	1.000	0.988	0.959	0.910	0.000	0.012	0.041	0.090	0.588	0.602	0.589	0.471	0.412	0.398	0.411	0.529								
16	1.000	0.991	0.968	0.929	0.000	0.009	0.032	0.071	0.649	0.700	0.688	0.586	0.351	0.300	0.312	0.414								
20	1.000	0.993	0.974	0.943	0.000	0.007	0.026	0.057	0.694	0.764	0.755	0.671	0.306	0.236	0.245	0.329								
40	1.000	0.996	0.986	0.973	0.000	0.004	0.014	0.027	0.817	0.887	0.889	0.855	0.183	0.113	0.111	0.145								
	$\frac{P}{\eta_t} \Delta a_{t+h} - E_t \Delta a_{t+h}$								$\frac{P}{\eta_t} \Delta l_{t+h} - E_t \Delta l_{t+h}$								$\frac{P}{\eta_t} CA_{t+h}^* - E_t CA_{t+h}^*$							
h	η_t^T								η_t^P								η_t^T							
1	0.956	0.950	0.961	0.975	0.060	0.071	0.063	0.049	0.940	0.929	0.937	0.951	0.002	0.002	0.000	0.000								
2	0.952	0.939	0.962	0.981	0.065	0.073	0.056	0.037	0.935	0.927	0.944	0.963	0.002	0.002	0.001	0.000								
3	0.947	0.939	0.944	0.975	0.070	0.071	0.059	0.033	0.930	0.929	0.941	0.967	0.002	0.002	0.012	0.012								
4	0.943	0.935	0.924	0.952	0.076	0.076	0.073	0.049	0.924	0.924	0.927	0.951	0.002	0.002	0.012	0.013								
8	0.924	0.904	0.853	0.874	0.100	0.130	0.147	0.128	0.900	0.870	0.853	0.872	0.002	0.002	0.015	0.014								
12	0.904	0.868	0.810	0.822	0.126	0.194	0.213	0.193	0.874	0.806	0.787	0.807	0.002	0.002	0.017	0.016								
16	0.885	0.837	0.782	0.790	0.153	0.247	0.265	0.245	0.847	0.753	0.735	0.755	0.002	0.002	0.017	0.017								
20	0.865	0.811	0.762	0.770	0.179	0.289	0.304	0.286	0.821	0.711	0.696	0.714	0.002	0.002	0.017	0.017								
40	0.782	0.709	0.665	0.656	0.291	0.414	0.422	0.419	0.709	0.586	0.578	0.581	0.002	0.002	0.018	0.018								
	η_t^T								η_t^P								η_t^T							
1	0.956	0.950	0.961	0.975	0.060	0.071	0.063	0.049	0.940	0.929	0.937	0.951	0.002	0.002	0.000	0.000								
2	0.952	0.939	0.962	0.981	0.065	0.073	0.056	0.037	0.935	0.927	0.944	0.963	0.002	0.002	0.001	0.000								
3	0.947	0.939	0.944	0.975	0.070	0.071	0.059	0.033	0.930	0.929	0.941	0.967	0.002	0.002	0.012	0.012								
4	0.943	0.935	0.924	0.952	0.076	0.076	0.073	0.049	0.924	0.924	0.927	0.951	0.002	0.002	0.012	0.013								
8	0.924	0.904	0.853	0.874	0.100	0.130	0.147	0.128	0.900	0.870	0.853	0.872	0.002	0.002	0.015	0.014								
12	0.904	0.868	0.810	0.822	0.126	0.194	0.213	0.193	0.874	0.806	0.787	0.807	0.002	0.002	0.017	0.016								
16	0.885	0.837	0.782	0.790	0.153	0.247	0.265	0.245	0.847	0.753	0.735	0.755	0.002	0.002	0.017	0.017								
20	0.865	0.811	0.762	0.770	0.179	0.289	0.304	0.286	0.821	0.711	0.696	0.714	0.002	0.002	0.017	0.017								
40	0.782	0.709	0.665	0.656	0.291	0.414	0.422	0.419	0.709	0.586	0.578	0.581	0.002	0.002	0.018	0.018								

Table B.17 Continued

Panel B: Consumption Adjustment Coefficients set to their Estimated Values ($\alpha_c \neq 0$)																				
$\underline{h}$	k=1	k=2	k=3	k=4	$\frac{\Delta c_{t+h} - E_t \Delta c_{t+h}}{\eta_t^P}$				η_t^T				$\frac{\Delta z_{t+h} - E_t \Delta z_{t+h}}{\eta_t^T}$				$\frac{\Delta a_{t+h} - E_t \Delta a_{t+h}}{\eta_t^P}$			
	1	2	3	4	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4
1	0.635	0.789	0.885	0.832	0.365	0.211	0.115	0.168	0.416	0.489	0.583	0.626	0.584	0.511	0.417	0.374	0.336	0.317	0.248	0.180
2	0.692	0.857	0.935	0.869	0.308	0.143	0.065	0.131	0.428	0.460	0.547	0.544	0.572	0.540	0.453	0.456	0.350	0.332	0.251	0.183
3	0.740	0.887	0.957	0.905	0.260	0.113	0.043	0.095	0.441	0.443	0.521	0.474	0.559	0.557	0.479	0.526	0.365	0.335	0.282	0.204
4	0.779	0.907	0.967	0.927	0.221	0.093	0.033	0.073	0.456	0.444	0.529	0.533	0.544	0.556	0.471	0.467	0.379	0.345	0.314	0.247
8	0.874	0.947	0.979	0.953	0.126	0.053	0.021	0.047	0.525	0.522	0.628	0.664	0.475	0.478	0.372	0.336	0.429	0.402	0.409	0.361
12	0.918	0.964	0.984	0.963	0.082	0.036	0.016	0.037	0.599	0.628	0.725	0.774	0.401	0.372	0.275	0.226	0.468	0.450	0.454	0.417
16	0.941	0.973	0.987	0.971	0.059	0.027	0.013	0.029	0.666	0.715	0.797	0.839	0.334	0.285	0.203	0.161	0.498	0.482	0.477	0.440
20	0.955	0.979	0.989	0.976	0.045	0.021	0.011	0.024	0.721	0.778	0.845	0.878	0.279	0.222	0.155	0.122	0.520	0.504	0.490	0.448
40	0.979	0.989	0.994	0.986	0.021	0.011	0.006	0.014	0.857	0.899	0.930	0.943	0.143	0.101	0.070	0.057	0.591	0.570	0.548	0.506
$\underline{h}$	$\frac{\Delta a_{t+h} - E_t \Delta a_{t+h}}{\eta_t^T}$				η_t^P				η_t^T				$\frac{CA_{t+h}^* - E_t CA_{t+h}^*}{\eta_t^P}$				η_t^T			
	1	2	3	4	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4
1	0.664	0.683	0.752	0.820	0.057	0.109	0.186	0.291	0.943	0.891	0.814	0.709	0.371	0.371	0.071	0.001	0.629	0.769	0.929	0.999
2	0.650	0.668	0.749	0.817	0.065	0.115	0.180	0.275	0.935	0.885	0.820	0.725	0.367	0.367	0.068	0.001	0.633	0.774	0.932	0.999
3	0.635	0.665	0.718	0.796	0.075	0.119	0.183	0.262	0.925	0.881	0.817	0.738	0.365	0.365	0.070	0.008	0.635	0.772	0.930	0.992
4	0.621	0.655	0.686	0.753	0.086	0.130	0.204	0.286	0.914	0.870	0.796	0.714	0.364	0.364	0.071	0.012	0.636	0.771	0.929	0.988
8	0.571	0.598	0.591	0.639	0.137	0.215	0.314	0.399	0.863	0.785	0.686	0.601	0.363	0.363	0.079	0.019	0.637	0.768	0.921	0.981
12	0.532	0.550	0.546	0.583	0.195	0.306	0.397	0.471	0.805	0.694	0.603	0.529	0.364	0.364	0.084	0.025	0.636	0.767	0.916	0.975
16	0.502	0.518	0.523	0.560	0.250	0.377	0.452	0.516	0.750	0.623	0.548	0.484	0.364	0.364	0.084	0.026	0.636	0.767	0.916	0.974
20	0.480	0.496	0.510	0.552	0.297	0.426	0.486	0.544	0.703	0.574	0.514	0.456	0.363	0.363	0.084	0.026	0.637	0.767	0.916	0.974
40	0.409	0.430	0.452	0.494	0.443	0.537	0.568	0.612	0.557	0.463	0.432	0.388	0.363	0.363	0.085	0.028	0.637	0.767	0.915	0.972

NOTES for Table B.17: The table reports the fraction of the variance in the h step-ahead forecast error of the variable listed at the head of each column that is attributable to innovations in the permanent shock, η_t^P , and the transitory shocks, η_t^T , using different number of lags in the VAR, and employing total consumption. Horizons are in quarters and the underlying VEqCM allows for linear trends in the cointegrating relations. Panel A reports results imposing the restriction that the adjustment coefficients of consumption are statistically insignificant ($\alpha_c = 0$), while Panel B reports results using the estimated adjustment coefficients of consumption ($\alpha_c \neq 0$). The identification method follows [Gonzalo and Ng \(2001\)](#), where at a first step a rotation from reduced form into permanent/transitory innovations is performed in which shocks are allowed to be correlated (with $\eta_t^P = \alpha'_1 \mathbf{u}_t$ and $\eta_t^T = \beta' \mathbf{u}_t$), and at a second step shocks are further identified by a simple Cholesky decomposition of $\text{Var}(\eta_t) = \mathbf{G}\mathbf{G}'$. The sample spans the first quarter of 1973 to the fourth quarter of 2004.

Table B.18: Variance Decomposition (Unorthogonalized Shocks) – Employing Total Consumption, with Identification following **Gonzalo and Ng (2001)**: 1973-2004 with Linear Trends in the Cointegrating Relations

Panel A: Consumption Adjustment Coefficients set to Zero ($\alpha_c = 0$)																				
$\hat{h}$	η_t^P				η_t^T				η_t^P				η_t^T				η_t^P, η_t^T			
	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4
$\Delta c_{t+h} - E_t \Delta c_{t+h}$																				
1	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.29	0.40	0.41	0.38	0.74	0.79	0.80	0.73
2	1.00	0.97	0.98	0.99	0.00	0.02	0.02	0.02	0.00	0.01	-0.01	-0.01	0.32	0.27	0.30	0.25	0.70	0.84	0.83	0.78
3	1.00	0.97	0.96	0.96	0.00	0.03	0.04	0.05	0.00	0.01	-0.01	-0.01	0.35	0.24	0.23	0.17	0.67	0.85	0.81	0.81
4	1.00	0.97	0.95	0.93	0.00	0.03	0.05	0.07	0.00	0.01	0.00	0.00	0.38	0.23	0.23	0.17	0.64	0.84	0.82	0.85
8	1.00	0.97	0.96	0.90	0.00	0.03	0.05	0.08	0.00	0.00	-0.01	0.02	0.48	0.38	0.37	0.26	0.55	0.69	0.72	0.82
12	1.00	0.98	0.97	0.92	0.00	0.02	0.05	0.07	0.00	0.00	-0.01	0.01	0.56	0.56	0.54	0.40	0.47	0.50	0.55	0.68
16	1.00	0.98	0.97	0.94	0.00	0.02	0.04	0.05	0.00	0.00	-0.01	0.01	0.62	0.68	0.67	0.53	0.40	0.36	0.40	0.53
20	1.00	0.98	0.98	0.96	0.00	0.02	0.03	0.04	0.00	0.00	-0.01	0.00	0.67	0.75	0.75	0.63	0.35	0.28	0.31	0.42
40	1.00	0.99	0.99	0.98	0.00	0.01	0.02	0.02	0.00	0.00	-0.01	0.00	0.80	0.88	0.90	0.84	0.21	0.13	0.13	0.18
$\Delta \alpha_{t+h} - E_t \Delta \alpha_{t+h}$																				
1	0.02	0.02	0.02	0.02	0.91	0.96	0.98	0.98	0.06	0.02	0.00	0.00	0.04	0.04	0.04	0.03	0.84	0.89	0.91	0.92
2	0.03	0.03	0.02	0.01	0.94	0.90	0.91	0.90	0.03	0.07	0.07	0.09	0.04	0.04	0.03	0.02	0.80	0.88	0.91	0.93
3	0.03	0.03	0.03	0.02	0.97	0.92	0.86	0.84	0.00	0.05	0.10	0.14	0.05	0.04	0.03	0.02	0.77	0.85	0.90	0.93
4	0.03	0.03	0.05	0.04	1.00	0.94	0.85	0.79	-0.03	0.03	0.10	0.18	0.05	0.04	0.05	0.03	0.74	0.82	0.87	0.88
8	0.05	0.06	0.12	0.11	1.08	1.04	0.87	0.74	-0.13	-0.10	0.02	0.15	0.07	0.09	0.11	0.11	0.67	0.71	0.73	0.73
12	0.06	0.09	0.16	0.16	1.12	1.10	0.89	0.71	-0.18	-0.19	-0.05	0.13	0.09	0.15	0.18	0.16	0.64	0.66	0.67	0.65
16	0.08	0.12	0.19	0.19	1.13	1.11	0.89	0.70	-0.21	-0.23	-0.08	0.11	0.11	0.20	0.23	0.21	0.63	0.64	0.64	0.61
20	0.10	0.15	0.21	0.21	1.12	1.09	0.88	0.68	-0.22	-0.24	-0.08	0.11	0.14	0.24	0.26	0.25	0.62	0.63	0.62	0.58
40	0.18	0.26	0.31	0.33	1.02	0.96	0.76	0.58	-0.20	-0.22	-0.07	0.09	0.24	0.37	0.39	0.39	0.56	0.54	0.53	0.48
$C A_{t+h}^* - E_t C A_{t+h}^*$																				
1	0.00	0.00	0.00	0.00	3.34	3.24	3.20	3.37	-2.34	-2.24	-2.20	-2.37	-2.37	-2.34	-2.24	-2.20	-2.37	-2.37	-2.34	-2.20
2	0.00	0.00	0.00	0.00	3.50	3.21	3.22	3.36	-2.50	-2.21	-2.22	-2.36	-2.36	-2.50	-2.21	-2.22	-2.36	-2.36	-2.50	-2.21
3	0.00	0.00	0.03	0.02	3.63	3.40	3.17	3.38	-2.63	-2.40	-2.20	-2.40	-2.40	-2.63	-2.40	-2.20	-2.40	-2.63	-2.40	-2.20
4	0.00	0.00	0.03	0.06	3.73	3.56	3.32	2.62	-2.73	-2.56	-2.35	-1.68	-1.68	-2.73	-2.56	-2.35	-1.68	-2.73	-2.56	-2.35
8	0.00	0.01	0.01	0.04	3.79	3.52	3.37	3.31	-2.79	-2.53	-2.37	-2.35	-2.35	-2.79	-2.53	-2.37	-2.35	-2.79	-2.53	-2.37
12	0.00	0.07	0.07	0.03	3.18	2.25	1.30	1.01	-2.18	-1.33	-0.37	-0.04	-0.04	-2.18	-1.33	-0.37	-0.04	-2.18	-1.33	-0.37
16	0.00	0.17	0.19	0.11	2.09	0.89	0.48	0.52	-1.09	-0.05	0.33	0.36	0.36	-1.09	-0.05	0.33	0.36	-1.09	-0.05	0.33
20	0.00	0.23	0.25	0.18	1.13	0.50	0.70	0.51	-0.13	0.27	0.05	0.32	0.32	-0.13	0.27	0.05	0.32	-0.13	0.27	0.05
40	0.00	0.01	0.17	0.26	3.44	1.41	0.50	0.51	-2.44	-0.42	0.34	0.23	0.23	-2.44	-0.42	0.34	0.23	-2.44	-0.42	0.34

Table B.18 Continued

Panel B: Consumption Adjustment Coefficients set to their Estimated Values ($\alpha_c \neq 0$)																
h	η_t^P				η_t^T				η_t^P				η_t^T			
	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4

NOTES for Table B.18: The table reports the fraction of the variance in the h step-ahead forecast error of the variable listed at the head of each column that is attributable to innovations in the permanent shock, η_t^P , the transitory shocks, η_t^T , and two times the covariance between η_t^P and η_t^T . The measure of consumption employed is total consumption. Panel A reports results imposing the restriction that the adjustment coefficients of consumption are statistically insignificant ($\alpha_c = 0$), while Panel B reports results using the estimated adjustment coefficients of consumption ($\alpha_c \neq 0$). The identification method follows [Gonzalo and Ng \(2001\)](#), where a rotation from reduced form into permanent/transitory innovations is performed, in which shocks are allowed to be correlated (with $\eta_t^P = \alpha'_\perp \mathbf{u}$ and $\eta_t^T = \beta'_\perp \mathbf{u}$). Horizons are in quarters, and the underlying VECM allows for linear trends in the cointegrating relations. The sample spans the first quarter of 1973 to the fourth quarter of 2004.

Table B.19: Variance Decomposition (Orthogonalized Shocks) – Identification following King *et al.* (1991); Mellander *et al.* (1992); 1973–2004 with Linear Trends

Panel A: Consumption Adjustment Coefficients set to Zero ($\alpha_c = 0$)																
h_t	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4
	$\frac{\Delta c_{t+h} - E_t \Delta c_{t+h}}{\eta_t^P}$				η_t^T				$\frac{\Delta z_{t+h} - E_t \Delta z_{t+h}}{\eta_t^P}$				$\frac{\Delta a_{t+h} - E_t \Delta a_{t+h}}{\eta_t^P}$			
1	1.000	1.000	1.000	1.000	0.000	0.000	0.000	0.000	0.302	0.443	0.458	0.402	0.698	0.557	0.542	0.598
2	1.000	0.985	0.982	0.985	0.000	0.015	0.018	0.015	0.334	0.356	0.378	0.297	0.666	0.644	0.622	0.703
3	1.000	0.982	0.956	0.948	0.000	0.018	0.044	0.052	0.366	0.334	0.331	0.221	0.634	0.666	0.669	0.779
4	1.000	0.981	0.947	0.917	0.000	0.019	0.053	0.083	0.397	0.336	0.337	0.233	0.603	0.664	0.663	0.767
8	1.000	0.985	0.948	0.893	0.000	0.015	0.052	0.107	0.506	0.461	0.458	0.331	0.494	0.539	0.542	0.669
12	1.000	0.988	0.959	0.910	0.000	0.012	0.041	0.090	0.588	0.602	0.589	0.471	0.412	0.398	0.411	0.529
16	1.000	0.991	0.968	0.929	0.000	0.009	0.032	0.071	0.649	0.700	0.688	0.586	0.351	0.300	0.312	0.414
20	1.000	0.993	0.974	0.943	0.000	0.007	0.026	0.057	0.694	0.764	0.755	0.671	0.306	0.236	0.245	0.329
40	1.000	0.996	0.986	0.973	0.000	0.004	0.014	0.027	0.817	0.887	0.889	0.855	0.183	0.113	0.111	0.145
h_t	$\frac{\Delta a_{t+h} - E_t \Delta a_{t+h}}{\eta_t^T}$				η_t^P				η_t^T				$\frac{CA_{t+h}^* - E_t CA_{t+h}^*}{\eta_t^P}$			
1	0.956	0.950	0.961	0.975	0.060	0.071	0.063	0.049	0.940	0.929	0.937	0.951	0.002	0.002	0.000	0.000
2	0.952	0.939	0.962	0.981	0.065	0.073	0.056	0.037	0.935	0.927	0.944	0.963	0.002	0.002	0.001	0.000
3	0.947	0.939	0.944	0.975	0.070	0.071	0.059	0.033	0.930	0.929	0.941	0.967	0.002	0.002	0.013	0.012
4	0.943	0.935	0.924	0.952	0.076	0.076	0.073	0.049	0.924	0.924	0.927	0.951	0.002	0.002	0.013	0.013
8	0.924	0.904	0.853	0.874	0.100	0.130	0.147	0.128	0.900	0.870	0.853	0.872	0.002	0.002	0.015	0.014
12	0.904	0.868	0.810	0.822	0.126	0.194	0.213	0.193	0.874	0.806	0.787	0.807	0.002	0.002	0.017	0.017
16	0.885	0.837	0.782	0.790	0.153	0.247	0.265	0.245	0.847	0.753	0.735	0.755	0.002	0.002	0.018	0.018
20	0.865	0.811	0.762	0.770	0.179	0.289	0.304	0.286	0.821	0.711	0.696	0.714	0.002	0.002	0.018	0.018
40	0.782	0.709	0.665	0.656	0.291	0.414	0.422	0.419	0.709	0.586	0.578	0.581	0.002	0.002	0.018	0.018

Table B.19 Continued

Panel B: Consumption Adjustment Coefficients set to their Estimated Values ($\alpha_c \neq 0$)																
h	η_t^P				η_t^T				$\Delta z_{t+h} - E_t \Delta z_{t+h}$				$\Delta a_{t+h} - E_t \Delta a_{t+h}$			
	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4
1	0.635	0.789	0.885	0.832	0.365	0.211	0.115	0.168	0.416	0.489	0.583	0.626	0.584	0.511	0.417	0.374
2	0.692	0.857	0.935	0.869	0.308	0.143	0.065	0.131	0.428	0.460	0.547	0.544	0.572	0.540	0.453	0.456
3	0.740	0.887	0.957	0.905	0.260	0.113	0.043	0.095	0.441	0.443	0.521	0.474	0.559	0.557	0.479	0.526
4	0.779	0.907	0.967	0.927	0.221	0.093	0.033	0.073	0.456	0.444	0.529	0.533	0.544	0.556	0.471	0.467
8	0.874	0.947	0.979	0.953	0.126	0.053	0.021	0.047	0.525	0.522	0.628	0.664	0.475	0.478	0.372	0.336
12	0.918	0.964	0.984	0.963	0.082	0.036	0.016	0.037	0.599	0.628	0.725	0.774	0.401	0.372	0.275	0.226
16	0.941	0.973	0.987	0.971	0.059	0.027	0.013	0.029	0.666	0.715	0.797	0.839	0.334	0.285	0.203	0.161
20	0.955	0.979	0.989	0.976	0.045	0.021	0.011	0.024	0.721	0.778	0.845	0.878	0.279	0.222	0.155	0.122
40	0.979	0.989	0.994	0.986	0.021	0.011	0.006	0.014	0.857	0.899	0.930	0.943	0.143	0.101	0.070	0.057
$C A_{t+h}^* - E_t C A_{t+h}^*$																
h	η_t^P				η_t^T				$\Delta l_{t+h} - E_t \Delta l_{t+h}$				η_t^P			
1	0.664	0.683	0.752	0.820	0.057	0.109	0.186	0.291	0.943	0.891	0.814	0.709	0.377	0.377	0.073	0.001
2	0.650	0.668	0.749	0.817	0.065	0.115	0.180	0.275	0.935	0.885	0.820	0.725	0.374	0.374	0.070	0.001
3	0.635	0.665	0.718	0.796	0.075	0.119	0.183	0.262	0.925	0.881	0.817	0.738	0.372	0.372	0.072	0.008
4	0.621	0.655	0.686	0.753	0.086	0.130	0.204	0.286	0.914	0.870	0.796	0.714	0.371	0.371	0.073	0.013
8	0.571	0.598	0.591	0.639	0.137	0.215	0.314	0.399	0.863	0.785	0.686	0.601	0.370	0.370	0.081	0.019
12	0.532	0.550	0.546	0.583	0.195	0.306	0.397	0.471	0.805	0.694	0.603	0.529	0.370	0.370	0.086	0.025
16	0.502	0.518	0.523	0.560	0.250	0.377	0.452	0.516	0.750	0.623	0.548	0.484	0.370	0.370	0.086	0.026
20	0.480	0.496	0.510	0.552	0.297	0.426	0.486	0.544	0.703	0.574	0.514	0.456	0.370	0.370	0.086	0.026
40	0.409	0.430	0.452	0.494	0.443	0.537	0.568	0.612	0.557	0.463	0.432	0.388	0.370	0.370	0.087	0.029
η_t^T																
1	0.664	0.683	0.752	0.820	0.057	0.109	0.186	0.291	0.943	0.891	0.814	0.709	0.377	0.377	0.073	0.001
2	0.650	0.668	0.749	0.817	0.065	0.115	0.180	0.275	0.935	0.885	0.820	0.725	0.374	0.374	0.070	0.001
3	0.635	0.665	0.718	0.796	0.075	0.119	0.183	0.262	0.925	0.881	0.817	0.738	0.372	0.372	0.072	0.008
4	0.621	0.655	0.686	0.753	0.086	0.130	0.204	0.286	0.914	0.870	0.796	0.714	0.371	0.371	0.073	0.013
8	0.571	0.598	0.591	0.639	0.137	0.215	0.314	0.399	0.863	0.785	0.686	0.601	0.370	0.370	0.081	0.019
12	0.532	0.550	0.546	0.583	0.195	0.306	0.397	0.471	0.805	0.694	0.603	0.529	0.370	0.370	0.086	0.025
16	0.502	0.518	0.523	0.560	0.250	0.377	0.452	0.516	0.750	0.623	0.548	0.484	0.370	0.370	0.086	0.026
20	0.480	0.496	0.510	0.552	0.297	0.426	0.486	0.544	0.703	0.574	0.514	0.456	0.370	0.370	0.086	0.026
40	0.409	0.430	0.452	0.494	0.443	0.537	0.568	0.612	0.557	0.463	0.432	0.388	0.370	0.370	0.087	0.029
η_t^T																
1	0.664	0.683	0.752	0.820	0.057	0.109	0.186	0.291	0.943	0.891	0.814	0.709	0.377	0.377	0.073	0.001
2	0.650	0.668	0.749	0.817	0.065	0.115	0.180	0.275	0.935	0.885	0.820	0.725	0.374	0.374	0.070	0.001
3	0.635	0.665	0.718	0.796	0.075	0.119	0.183	0.262	0.925	0.881	0.817	0.738	0.372	0.372	0.072	0.008
4	0.621	0.655	0.686	0.753	0.086	0.130	0.204	0.286	0.914	0.870	0.796	0.714	0.371	0.371	0.073	0.013
8	0.571	0.598	0.591	0.639	0.137	0.215	0.314	0.399	0.863	0.785	0.686	0.601	0.370	0.370	0.081	0.019
12	0.532	0.550	0.546	0.583	0.195	0.306	0.397	0.471	0.805	0.694	0.603	0.529	0.370	0.370	0.086	0.025
16	0.502	0.518	0.523	0.560	0.250	0.377	0.452	0.516	0.750	0.623	0.548	0.484	0.370	0.370	0.086	0.026
20	0.480	0.496	0.510	0.552	0.297	0.426	0.486	0.544	0.703	0.574	0.514	0.456	0.370	0.370	0.086	0.026
40	0.409	0.430	0.452	0.494	0.443	0.537	0.568	0.612	0.557	0.463	0.432	0.388	0.370	0.370	0.087	0.029

NOTES for Table B.19: The table reports the fraction of the variance in the h step-ahead forecast error of the variable listed at the head of each column that is attributable to innovations in the permanent shock, η_t^P , and the transitory shocks, η_t^T , using different number of lags in the VAR, and total consumption. Panel A reports results imposing the restriction that the adjustment coefficients of consumption are statistically insignificant ($\alpha_c = 0$), while Panel B reports results using the estimated adjustment coefficients of consumption ($\alpha_c \neq 0$). The identification method follows [King et al. \(1991\)](#) as extended in [Mellander et al. \(1992\)](#), where the rotation from reduced form into permanent/transitory innovations and the orthogonalization of the shocks is achieved in one step (letting $\eta_t^P = \alpha'_{\perp} u_t$ and $\eta_t^T = \alpha' \Omega^{-1} u_t$). Horizons are in quarters, and the underlying VEqCM allows for linear trends in the cointegrating relations. The sample spans the first quarter of 1973 to the fourth quarter of 2004.

Table B.20: Variance Decomposition (Orthogonalized Shocks) – Robustness including Return Differential, and Total Consumption in the Analysis and Identification following **Gonzalo and Ng (2001)**: 1973-2004 with Linear Trends in the Cointegrating Relations

Panel A: Consumption Adjustment Coefficients set to Zero ($\alpha_c = 0$)																					
	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4					
$\underline{h}$	$\frac{\Delta c_{t+h} - E_t \Delta c_{t+h}}{\eta_t^P}$								η_t^T				$\frac{\Delta z_{t+h} - E_t \Delta z_{t+h}}{\eta_t^P}$					η_t^T			
1	1.000	1.000	1.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.272	0.411	0.442	0.388	0.728	0.589	0.558	0.612	
2	1.000	0.984	0.980	0.982	0.000	0.016	0.020	0.018	0.284	0.335	0.381	0.294	0.716	0.665	0.619	0.706					
3	1.000	0.981	0.953	0.947	0.000	0.019	0.047	0.053	0.311	0.321	0.349	0.225	0.689	0.679	0.651	0.775					
4	1.000	0.979	0.947	0.926	0.000	0.021	0.053	0.074	0.342	0.328	0.357	0.237	0.658	0.672	0.643	0.763					
8	1.000	0.983	0.939	0.889	0.000	0.017	0.061	0.111	0.458	0.465	0.484	0.337	0.542	0.535	0.516	0.663					
12	1.000	0.987	0.951	0.904	0.000	0.013	0.049	0.096	0.550	0.611	0.617	0.483	0.450	0.389	0.383	0.517					
16	1.000	0.990	0.962	0.924	0.000	0.010	0.038	0.076	0.618	0.709	0.713	0.598	0.382	0.291	0.287	0.402					
20	1.000	0.992	0.969	0.939	0.000	0.008	0.031	0.061	0.670	0.773	0.777	0.682	0.330	0.227	0.223	0.318					
40	1.000	0.996	0.984	0.971	0.000	0.004	0.016	0.029	0.804	0.893	0.899	0.860	0.196	0.107	0.101	0.140					
$\underline{h}$	$\frac{\Delta a_{t+h} - E_t \Delta a_{t+h}}{\eta_t^P}$								η_t^T				$\frac{\Delta l_{t+h} - E_t \Delta l_{t+h}}{\eta_t^P}$					η_t^T			
1	0.041	0.055	0.041	0.033	0.959	0.945	0.959	0.967	0.058	0.074	0.073	0.061	0.942	0.926	0.927	0.939					
2	0.044	0.077	0.054	0.036	0.956	0.923	0.946	0.964	0.063	0.079	0.069	0.047	0.937	0.921	0.931	0.953					
3	0.048	0.080	0.082	0.052	0.952	0.920	0.918	0.948	0.069	0.079	0.074	0.044	0.931	0.921	0.926	0.956					
4	0.052	0.087	0.105	0.077	0.948	0.913	0.895	0.923	0.075	0.087	0.088	0.062	0.925	0.913	0.912	0.938					
8	0.069	0.129	0.191	0.163	0.931	0.871	0.809	0.837	0.100	0.149	0.168	0.151	0.900	0.851	0.832	0.849					
12	0.088	0.172	0.248	0.221	0.912	0.828	0.752	0.779	0.127	0.221	0.243	0.221	0.873	0.779	0.757	0.779					
16	0.107	0.207	0.283	0.258	0.893	0.793	0.717	0.742	0.154	0.279	0.302	0.278	0.846	0.721	0.698	0.722					
20	0.126	0.234	0.307	0.281	0.874	0.766	0.693	0.719	0.180	0.323	0.346	0.322	0.820	0.677	0.654	0.678					
40	0.210	0.334	0.399	0.390	0.790	0.666	0.601	0.610	0.291	0.446	0.463	0.456	0.709	0.554	0.537	0.544					

Table B.20 Continued

Panel A: Consumption Adjustment Coefficients set to Zero ($\alpha_c = 0$)																
	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4
$\frac{h_c}{h}$	$\frac{CA_{t+h}^* - E_t CA_{t+h}^*}{\eta_t^P}$								$\frac{\left(r_{t+h}^a - r_{t+h}^l\right) - E_t \left(r_{t+h}^a - r_{t+h}^l\right)}{\eta_t^P}$							
	η_t^T								η_t^T							
1	0.002	0.002	0.000	0.000	0.998	0.998	1.000	1.000	0.018	0.002	0.002	0.004	0.982	0.998	0.998	0.996
2	0.002	0.002	0.008	0.006	0.998	0.990	0.992	0.994	0.018	0.012	0.010	0.018	0.982	0.988	0.990	0.982
3	0.002	0.002	0.021	0.019	0.998	0.990	0.979	0.981	0.017	0.011	0.008	0.015	0.983	0.989	0.992	0.985
4	0.002	0.002	0.021	0.018	0.998	0.989	0.979	0.982	0.017	0.011	0.009	0.015	0.983	0.989	0.991	0.985
8	0.002	0.002	0.023	0.020	0.998	0.988	0.977	0.980	0.017	0.018	0.017	0.035	0.983	0.982	0.983	0.965
12	0.002	0.002	0.026	0.024	0.998	0.987	0.974	0.976	0.017	0.019	0.020	0.042	0.983	0.981	0.980	0.958
16	0.002	0.002	0.026	0.025	0.998	0.987	0.974	0.975	0.017	0.019	0.021	0.047	0.983	0.981	0.979	0.953
20	0.002	0.002	0.026	0.025	0.998	0.987	0.974	0.975	0.017	0.019	0.021	0.049	0.983	0.981	0.979	0.951
40	0.002	0.002	0.026	0.026	0.998	0.987	0.974	0.974	0.017	0.019	0.021	0.050	0.983	0.981	0.979	0.950
Panel B: Consumption Adjustment Coefficients set to their Estimated Values ($\alpha_c \neq 0$)																
	$\frac{\Delta c_{t+h} - E_t \Delta c_{t+h}}{\eta_t^P}$								$\frac{\Delta z_{t+h} - E_t \Delta z_{t+h}}{\eta_t^P}$							
$\frac{h_c}{h}$	η_t^T								η_t^T							
1	0.564	0.801	0.940	0.871	0.436	0.199	0.060	0.129	0.371	0.469	0.523	0.566	0.629	0.531	0.477	0.434
2	0.639	0.864	0.957	0.894	0.361	0.136	0.043	0.106	0.382	0.460	0.496	0.495	0.618	0.540	0.504	0.505
3	0.696	0.885	0.958	0.911	0.304	0.115	0.042	0.089	0.397	0.448	0.482	0.440	0.603	0.552	0.518	0.560
4	0.742	0.906	0.968	0.932	0.258	0.094	0.032	0.068	0.413	0.448	0.486	0.482	0.587	0.552	0.514	0.518
8	0.854	0.949	0.976	0.946	0.146	0.051	0.024	0.054	0.489	0.529	0.601	0.616	0.511	0.471	0.399	0.384
12	0.906	0.965	0.980	0.955	0.094	0.035	0.020	0.045	0.571	0.633	0.710	0.739	0.429	0.367	0.290	0.261
16	0.933	0.974	0.984	0.965	0.067	0.026	0.016	0.035	0.644	0.720	0.788	0.814	0.356	0.280	0.212	0.186
20	0.949	0.979	0.987	0.971	0.051	0.021	0.013	0.029	0.704	0.782	0.838	0.858	0.296	0.218	0.162	0.142
40	0.977	0.989	0.993	0.984	0.023	0.011	0.007	0.016	0.850	0.900	0.927	0.935	0.150	0.100	0.073	0.065

Table B.20 Continued

Panel B: Consumption Adjustment Coefficients set to their Estimated Values ($\alpha_c \neq 0$)																
	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4
$\underline{h}$	$\frac{\Delta a_{t+h} - E_t \Delta a_{t+h}}{\eta_t^P}$				η_t^T				$\frac{\Delta l_{t+h} - E_t \Delta l_{t+h}}{\eta_t^P}$				η_t^T			
1	0.345	0.300	0.175	0.132	0.655	0.700	0.825	0.868	0.051	0.110	0.174	0.266	0.949	0.890	0.826	0.734
2	0.362	0.336	0.201	0.151	0.638	0.664	0.799	0.849	0.060	0.120	0.172	0.246	0.940	0.880	0.828	0.754
3	0.377	0.337	0.238	0.176	0.623	0.663	0.762	0.824	0.070	0.125	0.178	0.235	0.930	0.875	0.822	0.765
4	0.392	0.347	0.264	0.207	0.608	0.653	0.736	0.793	0.081	0.138	0.197	0.256	0.919	0.862	0.803	0.744
8	0.442	0.407	0.361	0.305	0.558	0.593	0.639	0.695	0.133	0.221	0.298	0.358	0.867	0.779	0.702	0.642
12	0.482	0.455	0.414	0.361	0.518	0.545	0.586	0.639	0.191	0.311	0.381	0.428	0.809	0.689	0.619	0.572
16	0.511	0.486	0.442	0.389	0.489	0.514	0.558	0.611	0.247	0.381	0.437	0.476	0.753	0.619	0.563	0.524
20	0.533	0.508	0.459	0.401	0.467	0.492	0.541	0.599	0.295	0.430	0.474	0.508	0.705	0.570	0.526	0.492
40	0.602	0.572	0.525	0.471	0.398	0.428	0.475	0.529	0.441	0.538	0.563	0.587	0.559	0.462	0.437	0.413
$\underline{h}$	$\frac{CA_{t+h}^* - E_t CA_{t+h}^*}{\eta_t^P}$				η_t^T				$\frac{(r_{t+h}^a - r_{t+h}^l) - E_t (r_{t+h}^a - r_{t+h}^l)}{\eta_t^P}$				η_t^T			
1	0.401	0.401	0.023	0.002	0.599	0.795	0.977	0.998	0.016	0.006	0.000	0.002	0.984	0.994	1.000	0.998
2	0.396	0.396	0.026	0.010	0.604	0.801	0.974	0.990	0.019	0.009	0.005	0.011	0.981	0.991	0.995	0.989
3	0.395	0.395	0.033	0.019	0.605	0.802	0.967	0.981	0.022	0.008	0.004	0.010	0.978	0.992	0.996	0.990
4	0.394	0.394	0.033	0.018	0.606	0.802	0.967	0.982	0.023	0.009	0.005	0.020	0.977	0.991	0.995	0.980
8	0.393	0.393	0.040	0.024	0.607	0.798	0.960	0.976	0.025	0.010	0.007	0.028	0.975	0.990	0.993	0.972
12	0.393	0.393	0.044	0.029	0.607	0.797	0.956	0.971	0.025	0.011	0.009	0.031	0.975	0.989	0.991	0.969
16	0.393	0.393	0.045	0.030	0.607	0.797	0.955	0.970	0.025	0.011	0.010	0.032	0.975	0.989	0.990	0.968
20	0.393	0.393	0.045	0.030	0.607	0.797	0.955	0.970	0.025	0.011	0.010	0.033	0.975	0.989	0.990	0.967
40	0.393	0.393	0.046	0.031	0.607	0.797	0.954	0.969	0.025	0.011	0.010	0.033	0.975	0.989	0.990	0.967

NOTES for Table B.20: The underlying VEqCM allows for linear trends in the cointegrating relations, but not in the return differential. See also notes for Table B.18.

Table B.21: Variance Decomposition (Orthogonalized Shocks) – Robustness including Return Differential, and Total Consumption in the Analysis and Identification following [King et al. \(1991\)](#); [Mellander et al. \(1992\)](#): 1973-2004 with Linear Trends in the Cointegrating Relations

Panel A: Consumption Adjustment Coefficients set to Zero ($\alpha_c = 0$)												
	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	$\frac{\Delta z_{t+h} - E_t \Delta z_{t+h}}{\Delta l_{t+h} - E_t \Delta l_{t+h}}$			
$\underline{h}$	η_t^P				η_t^T				η_t^P			
	1.000	1.000	1.000	1.000	0.000	0.000	0.000	0.000	0.272	0.411	0.442	0.388
1	1.000	1.000	1.000	1.000	0.000	0.000	0.000	0.000	0.272	0.411	0.442	0.388
2	1.000	0.984	0.980	0.982	0.000	0.016	0.020	0.018	0.284	0.335	0.381	0.294
3	1.000	0.981	0.953	0.947	0.000	0.019	0.047	0.053	0.311	0.321	0.349	0.225
4	1.000	0.979	0.947	0.926	0.000	0.021	0.053	0.074	0.342	0.328	0.357	0.237
8	1.000	0.983	0.939	0.889	0.000	0.017	0.061	0.111	0.458	0.465	0.484	0.337
12	1.000	0.987	0.951	0.904	0.000	0.013	0.049	0.096	0.550	0.611	0.617	0.483
16	1.000	0.990	0.962	0.924	0.000	0.010	0.038	0.076	0.618	0.709	0.713	0.598
20	1.000	0.992	0.969	0.939	0.000	0.008	0.031	0.061	0.670	0.773	0.777	0.682
40	1.000	0.996	0.984	0.971	0.000	0.004	0.016	0.029	0.804	0.893	0.899	0.860
	η_t^P				η_t^T				η_t^P			
$\underline{h}$	0.041	0.055	0.041	0.033	0.959	0.945	0.959	0.967	0.058	0.074	0.073	0.061
1	0.041	0.055	0.041	0.033	0.959	0.945	0.959	0.967	0.058	0.074	0.073	0.061
2	0.044	0.077	0.054	0.036	0.956	0.923	0.946	0.964	0.063	0.079	0.069	0.047
3	0.048	0.080	0.082	0.052	0.952	0.920	0.918	0.948	0.069	0.079	0.074	0.044
4	0.052	0.087	0.105	0.077	0.948	0.913	0.895	0.923	0.075	0.087	0.088	0.062
8	0.069	0.129	0.191	0.163	0.931	0.871	0.809	0.837	0.100	0.149	0.168	0.151
12	0.088	0.172	0.248	0.221	0.912	0.828	0.752	0.779	0.127	0.221	0.243	0.221
16	0.107	0.207	0.283	0.258	0.893	0.793	0.717	0.742	0.154	0.279	0.302	0.278
20	0.126	0.234	0.307	0.281	0.874	0.766	0.693	0.719	0.180	0.323	0.346	0.322
40	0.210	0.334	0.399	0.390	0.790	0.666	0.601	0.610	0.291	0.446	0.463	0.456
	η_t^T				η_t^P				η_t^T			
$\underline{h}$	0.942	0.926	0.927	0.939	0.942	0.926	0.927	0.939	0.942	0.926	0.927	0.939
1	0.942	0.926	0.927	0.939	0.942	0.926	0.927	0.939	0.942	0.926	0.927	0.939
2	0.937	0.921	0.931	0.953	0.937	0.921	0.931	0.953	0.937	0.921	0.931	0.953
3	0.931	0.921	0.926	0.956	0.931	0.921	0.926	0.956	0.931	0.921	0.926	0.956
4	0.925	0.913	0.912	0.938	0.925	0.913	0.912	0.938	0.925	0.913	0.912	0.938
8	0.900	0.851	0.832	0.849	0.900	0.851	0.832	0.849	0.900	0.851	0.832	0.849
12	0.873	0.779	0.757	0.779	0.873	0.779	0.757	0.779	0.873	0.779	0.757	0.779
16	0.846	0.721	0.698	0.722	0.846	0.721	0.698	0.722	0.846	0.721	0.698	0.722
20	0.820	0.677	0.654	0.678	0.820	0.677	0.654	0.678	0.820	0.677	0.654	0.678
40	0.709	0.554	0.537	0.544	0.709	0.554	0.537	0.544	0.709	0.554	0.537	0.544

Table B.21 Continued

Panel A: Consumption Adjustment Coefficients set to Zero ($\alpha_c = 0$)												
	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4
$\frac{h_c}{h}$	$\frac{CA_{t+h}^* - E_t CA_{t+h}^*}{\eta_t^P}$				η_t^T				$\frac{(r_{t+h}^a - r_{t+h}^l) - E_t(r_{t+h}^a - r_{t+h}^l)}{\eta_t^P}$			
1	0.002	0.002	0.000	0.000	0.998	0.998	1.000	1.000	0.018	0.002	0.002	0.004
2	0.002	0.002	0.008	0.006	0.998	0.990	0.992	0.994	0.018	0.012	0.010	0.018
3	0.002	0.002	0.021	0.019	0.998	0.989	0.979	0.981	0.017	0.011	0.008	0.015
4	0.002	0.002	0.021	0.019	0.998	0.989	0.979	0.981	0.017	0.011	0.009	0.015
8	0.002	0.002	0.023	0.021	0.998	0.987	0.977	0.979	0.017	0.018	0.017	0.035
12	0.002	0.002	0.026	0.025	0.998	0.987	0.974	0.975	0.017	0.019	0.020	0.042
16	0.002	0.002	0.027	0.026	0.998	0.987	0.973	0.974	0.017	0.019	0.021	0.047
20	0.002	0.002	0.027	0.026	0.998	0.987	0.973	0.974	0.017	0.019	0.021	0.049
40	0.002	0.002	0.027	0.026	0.998	0.987	0.973	0.974	0.017	0.019	0.021	0.050
Panel B: Consumption Adjustment Coefficients set to their Estimated Values ($\alpha_c \neq 0$)												
	$\frac{\Delta c_{t+h} - E_t \Delta c_{t+h}}{\eta_t^P}$				η_t^T				$\frac{\Delta z_{t+h} - E_t \Delta z_{t+h}}{\eta_t^P}$			
1	0.564	0.801	0.940	0.871	0.436	0.199	0.060	0.129	0.371	0.469	0.523	0.566
2	0.639	0.864	0.957	0.894	0.361	0.136	0.043	0.106	0.382	0.460	0.496	0.495
3	0.696	0.885	0.958	0.911	0.304	0.115	0.042	0.089	0.397	0.448	0.482	0.440
4	0.742	0.906	0.968	0.932	0.258	0.094	0.032	0.068	0.413	0.448	0.486	0.482
8	0.854	0.949	0.976	0.946	0.146	0.051	0.024	0.054	0.489	0.529	0.601	0.616
12	0.906	0.965	0.980	0.955	0.094	0.035	0.020	0.045	0.571	0.633	0.710	0.739
16	0.933	0.974	0.984	0.965	0.067	0.026	0.016	0.035	0.644	0.720	0.788	0.814
20	0.949	0.979	0.987	0.971	0.051	0.021	0.013	0.029	0.704	0.782	0.838	0.858
40	0.977	0.989	0.993	0.984	0.023	0.011	0.007	0.016	0.850	0.900	0.927	0.935

Table B.21 Continued

Panel B: Consumption Adjustment Coefficients set to their Estimated Values ($\alpha_c \neq 0$)																																
	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4	k=1	k=2	k=3	k=4																
$\underline{h}$	$\frac{\Delta a_{t+h} - E_t \Delta a_{t+h}}{\eta_t^P}$								$\frac{\Delta l_{t+h} - E_t \Delta l_{t+h}}{\eta_t^P}$								η_t^T															
	η_t^P								η_t^T								η_t^T															
1	0.345	0.300	0.175	0.132	0.655	0.700	0.825	0.868	0.051	0.110	0.174	0.266	0.949	0.890	0.826	0.734																
2	0.362	0.336	0.201	0.151	0.638	0.664	0.799	0.849	0.060	0.120	0.172	0.246	0.940	0.880	0.828	0.754																
3	0.377	0.337	0.238	0.176	0.623	0.663	0.762	0.824	0.070	0.125	0.178	0.235	0.930	0.875	0.822	0.765																
4	0.392	0.347	0.264	0.207	0.608	0.653	0.736	0.793	0.081	0.138	0.197	0.256	0.919	0.862	0.803	0.744																
8	0.442	0.407	0.361	0.305	0.558	0.593	0.639	0.695	0.133	0.221	0.298	0.358	0.867	0.779	0.702	0.642																
12	0.482	0.455	0.414	0.361	0.518	0.545	0.586	0.639	0.191	0.311	0.381	0.428	0.809	0.689	0.619	0.572																
16	0.511	0.486	0.442	0.389	0.489	0.514	0.558	0.611	0.247	0.381	0.437	0.476	0.753	0.619	0.563	0.524																
20	0.533	0.508	0.459	0.401	0.467	0.492	0.541	0.599	0.295	0.430	0.474	0.508	0.705	0.570	0.526	0.492																
40	0.602	0.572	0.525	0.471	0.398	0.428	0.475	0.529	0.441	0.538	0.563	0.587	0.559	0.462	0.437	0.413																
$\underline{h}$	$\frac{CA_{t+h}^* - E_t CA_{t+h}^*}{\eta_t^P}$								η_t^T								$\frac{(r_{t+h}^a - r_{t+h}^l) - E_t (r_{t+h}^a - r_{t+h}^l)}{\eta_t^P}$								η_t^T							
1	0.409	0.409	0.024	0.002	0.591	0.790	0.976	0.998	0.016	0.006	0.000	0.002	0.984	0.994	1.000	0.998																
2	0.404	0.404	0.027	0.010	0.596	0.796	0.973	0.990	0.019	0.009	0.005	0.011	0.981	0.991	0.995	0.989																
3	0.402	0.402	0.033	0.019	0.598	0.798	0.967	0.981	0.022	0.008	0.004	0.010	0.978	0.992	0.996	0.990																
4	0.401	0.401	0.034	0.019	0.599	0.797	0.966	0.981	0.023	0.009	0.005	0.020	0.977	0.991	0.995	0.980																
8	0.400	0.400	0.041	0.025	0.600	0.793	0.959	0.975	0.025	0.010	0.007	0.028	0.975	0.990	0.993	0.972																
12	0.401	0.401	0.046	0.029	0.599	0.792	0.954	0.971	0.025	0.011	0.009	0.031	0.975	0.989	0.991	0.969																
16	0.400	0.400	0.046	0.030	0.600	0.792	0.954	0.970	0.025	0.011	0.010	0.032	0.975	0.989	0.990	0.968																
20	0.400	0.400	0.046	0.030	0.600	0.792	0.954	0.970	0.025	0.011	0.010	0.033	0.975	0.989	0.990	0.967																
40	0.400	0.400	0.047	0.032	0.600	0.792	0.953	0.968	0.025	0.011	0.010	0.033	0.975	0.989	0.990	0.967																

NOTES for Table B.21: The underlying VEqCM allows for linear trends in the cointegrating relations, but not in the return differential. See also notes for Table B.19.

Table B.22: **Relative Standrd Deviations of the Approximation Error**

	$\sigma_{\varepsilon \widetilde{CA}} / \sigma_{flow}$	$\sigma_{\varepsilon \widetilde{CA}} / \sigma_{\widetilde{CA}}$
$\rho = 0.99$	32.510	43.310
$\rho = 0.98$	32.023	42.730
$\rho = 0.97$	23.199	30.951
$\rho = 0.96$	17.701	23.606

NOTES for Table B.22: The table reports the relative standard deviations of the ‘flow’ term $\frac{1}{\rho_d} \Delta \hat{z}_{t+1} - \Delta \hat{c}_{t+1} + \left(1 - \frac{1}{\rho_d}\right) r_{t+1}$ and the approximation error $\varepsilon_{t+1}^{CA} \equiv \widetilde{CA}_{t+1} - \frac{1}{\rho_d} \Delta \hat{z}_{t+1} + \Delta \hat{c}_{t+1} - \left(1 - \frac{1}{\rho_d}\right) r_{t+1} - \frac{1}{\rho_{Z\Psi}} \widetilde{CA}_t$ relative to $\widetilde{CA}_t$, for different values of the ‘discount factor’, ρ . The sample spans the first quarter of 1973 to the fourth quarter of 2004.

Table B.23: Long-Horizon Regressions (Approximate Current Account Expression and Lagged Endogenous Variables) – Sample:1973-2004

Panel A: $\sum_{h=1}^H \Delta c_{t+h}$ regressed on						
Horizon H	Δc_t	Δz_t	Δa_t	Δl_t	$\widetilde{CA}_t$	$\bar{R}^2$
1	0.261	0.039	0.003	0.002	-0.024	0.081
[t -stat]	[2.671]	[1.119]	[0.221]	[0.121]	[-0.884]	
2	0.391	0.023	0.008	0.027	-0.046	0.092
[t -stat]	[2.465]	[0.465]	[0.412]	[0.874]	[-0.910]	
3	0.694	0.055	0.019	0.030	-0.073	0.181
[t -stat]	[3.736]	[0.842]	[0.849]	[0.653]	[-0.972]	
4	0.760	0.053	0.023	0.063	-0.107	0.187
[t -stat]	[3.267]	[0.696]	[0.915]	[1.226]	[-1.095]	
8	1.021	-0.119	0.014	0.120	-0.024	0.102
[t -stat]	[1.917]	[-0.910]	[0.283]	[1.425]	[-0.147]	
12	0.540	-0.087	0.009	0.176	0.121	0.045
[t -stat]	[0.910]	[-0.560]	[0.167]	[1.900]	[0.449]	
16	-0.285	0.020	0.017	0.180	0.024	0.003
[t -stat]	[-0.395]	[0.097]	[0.351]	[1.999]	[0.071]	
Panel B: $\sum_{h=1}^H \Delta z_{t+h}$ regressed on						
Horizon H	Δc_t	Δz_t	Δa_t	Δl_t	$\widetilde{CA}_t$	$\bar{R}^2$
1	-0.512	-0.082	0.081	-0.008	-0.268	0.158
[t -stat]	[-1.844]	[-0.829]	[2.114]	[-0.156]	[-3.542]	
2	-0.601	-0.112	0.062	0.069	-0.433	0.239
[t -stat]	[-1.615]	[-0.895]	[1.741]	[1.202]	[-3.720]	
3	-0.226	0.028	0.010	0.155	-0.585	0.285
[t -stat]	[-0.507]	[0.260]	[0.200]	[2.680]	[-4.531]	
4	-0.206	-0.051	-0.078	0.228	-0.722	0.334
[t -stat]	[-0.432]	[-0.456]	[-1.460]	[2.657]	[-5.182]	
8	0.589	-0.245	0.009	0.121	-0.756	0.305
[t -stat]	[1.227]	[-1.322]	[0.145]	[1.311]	[-3.599]	
12	1.119	-0.268	0.033	0.143	-0.668	0.225
[t -stat]	[2.070]	[-1.446]	[0.463]	[1.522]	[-2.507]	
16	0.517	0.058	0.027	0.129	-0.981	0.200
[t -stat]	[0.610]	[0.259]	[0.368]	[1.250]	[-2.667]	

Table B.23 Continued

Panel C: $\sum_{h=1}^H r_{t+h}$ regressed on						
Horizon H	Δc_t	Δz_t	Δa_t	Δl_t	$\widehat{CA}_t$	$\bar{R}^2$
1	-0.561	2.751	0.178	0.038	-2.295	0.007
[t -stat]	[-0.126]	[1.747]	[0.290]	[0.045]	[-1.896]	
2	-3.624	4.390	0.308	-0.421	-5.602	0.046
[t -stat]	[-0.456]	[2.057]	[0.228]	[-0.355]	[-3.591]	
3	0.712	4.056	0.472	-1.696	-8.090	0.106
[t -stat]	[0.074]	[2.468]	[0.428]	[-1.780]	[-4.008]	
4	6.922	3.857	0.791	-2.294	-9.008	0.129
[t -stat]	[0.783]	[2.282]	[0.756]	[-2.023]	[-4.407]	
8	23.310	3.422	-0.859	-1.027	-9.834	0.126
[t -stat]	[2.330]	[1.193]	[-0.743]	[-0.592]	[-3.160]	
12	20.042	5.101	-1.574	-0.618	-9.431	0.080
[t -stat]	[1.261]	[1.186]	[-1.044]	[-0.298]	[-1.962]	
16	10.047	5.751	-0.893	-1.174	-10.574	0.050
[t -stat]	[0.505]	[1.084]	[-0.444]	[-0.478]	[-1.619]	
Panel D: $\sum_{h=1}^H (r_{t+h}^a - r_{t+h}^l)$ regressed on						
Horizon H	Δc_t	Δz_t	Δa_t	Δl_t	$\widehat{CA}_t$	$\bar{R}^2$
1	-0.017	0.534	0.010	-0.011	-0.447	-0.004
[t -stat]	[-0.018]	[1.593]	[0.076]	[-0.060]	[-1.735]	
2	-0.777	0.893	0.047	-0.173	-1.115	0.036
[t -stat]	[-0.466]	[1.967]	[0.167]	[-0.691]	[-3.454]	
3	0.096	0.772	0.091	-0.472	-1.591	0.103
[t -stat]	[0.049]	[2.200]	[0.412]	[-2.426]	[-3.859]	
4	1.363	0.743	0.149	-0.618	-1.732	0.121
[t -stat]	[0.780]	[2.127]	[0.738]	[-2.459]	[-4.142]	
8	4.519	0.699	-0.148	-0.400	-1.907	0.109
[t -stat]	[2.227]	[1.159]	[-0.677]	[-1.104]	[-2.948]	
12	4.130	1.043	-0.335	-0.332	-1.830	0.074
[t -stat]	[1.280]	[1.110]	[-1.101]	[-0.750]	[-1.763]	
16	2.262	1.060	-0.229	-0.403	-1.979	0.037
[t -stat]	[0.540]	[0.902]	[-0.567]	[-0.793]	[-1.423]	

NOTES for Table B.23: The table reports output from long-horizon regressions of consumption growth, net output growth, NFA portfolio returns and the return differential on lagged values of consumption growth, net output growth, gross foreign asset and liabilities growth, the approximate expression for the current account: $\widehat{CA}_t = -(c_t - z_t - (\gamma_{z,t} - \gamma_{c,t})) + \rho_a (a_t - z_t - (\gamma_{z,t} - \gamma_{a,t})) + \rho_l (l_t - z_t - (\gamma_{z,t} - \gamma_{l,t})) + ((\rho_a + \rho_l) / E[1 + r_t]) r_t$. The dependent variables in the h -period regressions are $\Delta w_{t+1} + \dots + \Delta w_{t+h}$, where $w \in (c, z, r, r^a - r^l)$. For each regression, the table reports ordinary least squares (OLS) estimates of the regressors, autocorrelation robust t -statistics (using the Quadratic Spectral Kernel) in square brackets and adjusted R^2 . Significant coefficients are highlighted in bold. The sample spans the first quarter of 1973 to the fourth quarter of 2004.

Table B.24: **Long-Horizon Regressions (Approximate Current Account Expression) – Sample:1973-2004**

Horizon H	1	2	3	4	8	12	16
Dependent Variable	regressed on $\widetilde{CA}_t$						
$\sum_{h=1}^H \Delta c_{t+h}$	-0.014	-0.042	-0.062	-0.099	-0.091	0.060	-0.002
[t -stat]	[-0.544]	[-0.823]	[-0.748]	[-0.903]	[-0.569]	[0.246]	[-0.008]
$\bar{R}^2$	-0.006	0.0003	0.002	0.007	-0.003	-0.007	-0.009
$\sum_{h=1}^H \Delta z_{t+h}$	-0.290	-0.468	-0.602	-0.787	-0.853	-0.772	-0.988
[t -stat]	[-4.144]	[-4.800]	[-5.230]	[-6.170]	[-5.082]	[-3.206]	[-2.991]
$\bar{R}^2$	0.114	0.189	0.242	0.309	0.287	0.172	0.199
$\sum_{h=1}^H r_{t+h}$	-1.556	-4.269	-6.908	-7.999	-9.003	-8.497	-9.177
[t -stat]	[-1.422]	[-2.928]	[-3.603]	[-4.118]	[-3.075]	[-1.860]	[-1.595]
$\bar{R}^2$	0.008	0.049	0.109	0.120	0.087	0.055	0.057
$\sum_{h=1}^H (r_{t+h}^a - r_{t+h}^l)$	-0.301	-0.833	-1.345	-1.515	-1.695	-1.606	-1.698
[t -stat]	[-1.302]	[-2.853]	[-3.690]	[-4.158]	[-3.027]	[-1.744]	[-1.422]
$\bar{R}^2$	0.005	0.040	0.096	0.101	0.071	0.043	0.039

NOTES for Table B.24: The table reports output from long-horizon regressions. See also notes for Table B.23 The sample spans the first quarter of 1973 to the fourth quarter of 2004.

Table B.25: **Correlations of the Permanent Shock with US and EU Growth Rates**

	η_t^p with $\alpha_c \neq 0$	η_t^p with $\alpha_c = 0$
Δz_t	0.3709	0.3870
	[0.2096, 0.5126]	[0.2275, 0.5263]
Δz_t^{EU}	0.0274	0.0467
	[-0.1482, 0.2013]	[-0.1293, 0.2198]
Δc_t	0.8528	0.8648
	[0.7967, 0.8943]	[0.8129, 0.9031]
Δc_t^{eu}	0.0381	0.0709
	[-0.1377, 0.2116]	[-0.1053, 0.2428]

NOTES for Table B.25: The table reports correlations of the identified permanent shock (which is assumed to be orthogonal to the transitory innovations) with the growth rates of net output and consumption for the US and the Euro-Area. The left column shows the correlations when the adjustment coefficients of consumption are estimated freely, and the right column when the adjustment coefficients of consumption are set to zero. The sample spans the first quarter of 1973 to the fourth quarter of 2004.