A Fiscal Decomposition of Unexpected Inflation: Cross-Country Estimates and Theory*

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1. Fiscal Decompositions of Unexpected Inflation

1.1. General Setup

Consider an economy with a consumption good which households value. There is a government that manages a debt composed by nominal and real bonds, possibly with different maturities. Upon maturing, real bonds deliver one unit of consumption good, while nominal bonds deliver one unit of currency. Currency is a commodity that only the government can produce, at zero cost. Households do not value it and they cannot burn it. The price of the consumption good in terms of currency is P_t.

The government brings from period $t-1$ a schedule $\{B^n_{N,t-1}\}$ of nominal bonds and $\{B^n_{R,t-1}\}$ of real bonds, where n denotes maturity. In period t, the government pays for maturing debt $B^1_{N,t-1} + P_t B^1_{R,t-1}$ and public spending $P_t G_t$ using currency. It retires currency from circulation by charging taxes $P_t T_t$ and selling new issues of nominal $Q^n_{N,t}(B^n_{N,t} - B^{n+1}_{N,t-1})$ and real $P_t Q^n_{R,t}(B^n_{R,t} - B^{n+1}_{R,t-1})$ bonds (both can be negative). The difference between currency introduced and retired by government trading changes private sector's aggregate holdings of it, M_t. Therefore:

$$B^1_{N,t-1} + P_t B^1_{R,t-1} + P_t G_t = P_t T_t + \sum_{n=1}^{\infty} Q^n_{N,t}\left(B^n_{N,t} - B^{n+1}_{N,t-1}\right) + P_t \sum_{n=1}^{\infty} Q^n_{R,t}\left(B^n_{R,t} - B^{n+1}_{R,t-1}\right) + \Delta M_t$$

where $Q^n_{N,t}$ is the price of nominal bonds and $P_t Q^n_{R,t}$ is the price of real bonds (I state prices in currency units). I assume households do not hold currency, so $M_t = 0$.[1] The equation above can be written as

$$(1 + r^N_t)\mathcal{V}_{N,t-1} + (1 + r^R_t)(1 + \pi_t)\mathcal{V}_{R,t-1} = P_t S_t + \mathcal{V}_{N,t} + \mathcal{V}_{R,t}$$

where $S_t = T_t - G_t$ is the primary surplus, $1 + \pi_t = P_t / P_{t-1}$ is the inflation rate,

$$\mathcal{V}_{N,t} = \sum_{n=1}^{\infty} Q^n_{N,t} B^n_{N,t} \quad \text{and} \quad \mathcal{V}_{R,t} = P_t \sum_{n=1}^{\infty} Q^n_{R,t} B^n_{R,t}$$

are the end-of-period nominal values of nominal and real debt, and

$$1 + r^N_t = \frac{\sum_{n=1}^{\infty} Q^{n-1}_{N,t} B^n_{N,t-1}}{\mathcal{V}_{N,t-1}} \quad \text{and} \quad (1 + \pi_t)(1 + r^R_t) = \frac{P_t}{P_{t-1}} \frac{\sum_{n=1}^{\infty} Q^{n-1}_{R,t} B^n_{R,t-1}}{\mathcal{V}_{R,t-1}}$$

are nominal returns on holdings of the basket of nominal and real bonds.

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[1] The main implication of $M = 0$ to us is the absence of seignorage revenues. These are small for the countries in our sample.

Let $\delta_t = \mathcal{V}_{N,t}/\mathcal{V}_t$ be the relative share of nominal on overall debt, at market prices. We assume that governments keep this share constant at δ. Therefore, we can define the nominal return on the entire basket of public bonds as

$$1 + r_t^n = \delta(1 + r_t^N) + (1 - \delta)(1 + r_t^R)(1 + \pi_t). \tag{1}$$

Let $\mathcal{V}_t = \mathcal{V}_{N,t} + \mathcal{V}_{R,t}$ be the end-of-period market value of public debt. Since public debt and surpluses are not stationary in the data, I detrend both using gross domestic product Y_t. Define $V_t = \mathcal{V}_t/(P_t Y_t)$ as the real debt-to-GDP ratio and $s_t = S_t/Y_t$ as the surplus-to-GDP ratio.

If $P_t = 0$, households demand infinite goods and there is no equilibrium. So $P_t > 0$. From the last flow equation for public debt, we get:

$$\frac{1 + r_t^n}{(1 + \pi_t)(1 + g_t)} V_{t-1} = s_t + \frac{\Delta M_t}{P_t} + V_t, \tag{2}$$

where g_t is the growth rate of GDP. Equation (2) provides a law of motion for the real market value of public debt. The left-hand side contains the beginning-of-period (but after bond prices change) real market value of debt. Define $\beta_t = (1 + \pi_t)(1 + g_t)/(1 + r_t^n)$ as the *ex-post*, growth-adjusted real discount for public bonds, and $\beta_{t,t+j} = \prod_{\tau=t}^{t+j} \beta_\tau$. Since V_t satisfies (2), it also satisfies

$$\frac{V_{t-1}}{\beta_t} = \sum_{j=0}^{k} \beta_{t+1,t+j} \left(s_{t+i} + \frac{\Delta M_{t+j}}{P_{t+j}} \right) + \beta_{t+1,t+k} V_{t+k} \qquad \text{for any } k \geq 0$$

regardless of prices and choices. The key assumption I make in this paper is the following transversality condition:

$$\lim_{j \to \infty} E_t \beta_{t,t+j} V_{t+j} = 0 \text{ at every period } t. \tag{3}$$

The interpretation of (3) depends on whether the government uses nominal debt, that is, if $\delta > 0$.[1] If all debt is real, $\delta = 0$, (3) represents a no-default condition. If the limit is positive, there are paths of primary surpluses that lead public debt to explode. The government eventually defaults.

If $\delta > 0$ (the case we consider in this paper), the government has no constraint on its choice of surpluses, as long as households attribute value to currency.[2] Condition (3) becomes a no-bubble condition, which guarantees that the market value of debt equals discounted surpluses:

$$\frac{V_{t-1}}{\beta_t} = \sum_{j=0}^{\infty} E_t \left[\beta_{t+1,t+j} s_{t+j} \right]. \tag{4}$$

Equation (4) is the valuation equation of public debt. It is the condition upon which households accept to hold public bonds. Households redeem bonds for currency and can trade currency for taxes, which have real value. Therefore, the stream of surpluses provides value for currency and the public debt, and determines the price level.[3] A similar equation, stock price = discounted dividends, expresses the condition for households to hold firms' equity shares (Cochrane (2005)).

The valuation equation is a rather general equilibrium condition. It does not depend on equilibrium selection mechanisms (fiscal theory or spiral threat) and it holds in any model in which the no-bubble

[1]Typical models of intertemporal household choice do not imply (3), as the discounted sum here uses *ex-post* discounting $\beta_{t,t+j}$. They do imply instead that $E_t \Lambda_{t,t+j} V_{t+j}$ converges to zero, where Λ is the marginal rate of intertemporal substitution. *Ex-post* real returns and Λ coincide when markets are complete. Otherwise, equation (3) is not necessary for household optimality. See Bohn (1995).

[2]The government needs only to ensure that $\sum_{j=0}^{\infty} E_t \beta_{t+1,t+j} s_{t+j} > (1 + r_t^R)\mathcal{V}_{R,t-1}/Y_t$ for a positive price level.

[3]Again, the valuation equation determines the price level provided that $\delta > 0$. Note that time-t price level only shows up in the denominator of $\mathcal{V}_N$ on the left-hand side of (4):

$$\frac{V_{t-1}}{\beta_t} = (1 + r_t^N) \frac{\mathcal{V}_{N,t-1}}{P_t Y_t} + (1 + r_t^R) \frac{\mathcal{V}_{R,t-1}}{Y_t}.$$

condition (3) holds.

1.2. The Marked-to-Market Decomposition

The fiscal decomposition I study in this paper centers around the valuation equation (4). However, working with linearized equations is more tractable and allows estimates based on vector autoregressions. So I linearize (1) and (2) to find

$$r_t^n = \delta r_t^N + (1-\delta)\left(r_t^R + \pi_t\right) \tag{5}$$

$$\beta\left(v_t + \frac{s_t}{V}\right) = v_{t-1} + r_t^n - \pi_t - g_t, \tag{6}$$

where $\beta = (1+g)(1+\pi)/(1+r^n)$ and symbols without t subscripts (like V) correspond to steady-state values. To save notation, I re-define all variables above as deviations from the steady state. Additionally, I re-define growth rates r_t^n, r_t^N, r_t^R, π_t and g_t as log-growth rates. Finally, $v_t = \log(V_t) - \log(V)$.

Like before, I solve the flow equation (6) forward and impose (3).

$$v_{t-1} + r_t^n - \pi_t = \frac{\beta}{V}\sum_{j=0}^{\infty}\beta^j E_t s_{t+j} + \sum_{j=0}^{\infty}\beta^j E_t g_{t+j} - \sum_{j=1}^{\infty}\beta^j\left[E_t r_{t+j}^n - E_t\pi_{t+j}\right]$$

Above, I define $r_t = r_t^n - \pi_t$, the *ex-post* real return on holdings of public debt. The expression above is the linearized valuation equation of public debt.

Decomposition 1 (Marked-to-Market). *Take innovations on the valuation equation of public debt to find the marked-to-market fiscal decomposition of unexpected inflation.*

$$\boxed{\epsilon_{r^n,t} - \epsilon_{\pi,t} = \epsilon_{s,t} + \epsilon_{g,t} - \epsilon_{r,t}} \tag{7}$$

The terms of the decomposition are $\epsilon_{r^n,t} = \Delta E_t r_t^n$, $\epsilon_{\pi,t} = \Delta E_t \pi_t$, $\epsilon_{s,t} = (\beta/V)\sum_{j=0}^{\infty}\beta^j \Delta E_t s_{t+j}$, $\epsilon_{g,t} = \sum_{j=0}^{\infty}\beta^j\Delta E_t g_{t+j}$ *and* $\epsilon_{r,t} = \sum_{j=1}^{\infty}\beta^j(\Delta E_t r_{t+j}^n - \Delta E_t \pi_{t+j})$.

The right-hand side of (7) contains revisions of discounted surpluses. These are divided between news about surplus-to-GDP ratios $\epsilon_{s,t}$, GDP growth $\epsilon_{g,t}$ and real discount rates $\epsilon_{r,t}$. The left-hand side contains the innovation to the price of public bonds $\epsilon_{r^n,t}$ in real terms. Given bond prices (this is why I call "marked-to-market"), surprise inflation $\epsilon_{\pi,t}$ devalues public debt so that its value coincides once again with discounted surpluses. We can replace equation (5) to highlight that inflation can only devalue the *nominal* portion of public debt:

$$\epsilon_{r^n,t} - \epsilon_{\pi,t} = \delta\left(\Delta E_t r_t^N - \Delta E_t \pi_t\right) + (1-\delta)\Delta E_t r_t^R.$$

A one percentage increase in the price level devalues total debt by δ%. The $1-\delta$ share of real bonds is not devalued because, in currency units, their prices grow along with the price level.

1.3. A Public Finances Model

I present a slightly more detailed public finances model, which I later use in the estimation. It also leads to a more general decomposition of unexpected inflation. The key assumption is that the government keeps a geometric maturity structure of its debt. The geometric term structure implies a tractable relationship between the short-term interest rate, inflation and bond returns. Specifically, for the slice of nominal public debt, suppose the outstanding volume of bonds decays at a rate ω_N, so that $B_{N,t}^n = \omega_N B_{N,t}^{n-1}$. Define $Q_{N,t} = \sum_{n=1}^{\infty} Q_{N,t}^n \omega_N^{n-1}$ as the weighted-average market price of nominal bonds. Assume the same for real bonds, with decay rate of ω_R. Then, $\mathcal{V}_{N,t} = Q_{N,t}B_{N,t}^1$ and $\mathcal{V}_{R,t} = P_t Q_{R,t} B_{R,t}^1$.

The linearized returns on public bonds are

$$\begin{aligned} r_t^N &= (\omega_N \beta) q_{N,t} - q_{N,t-1} \\ r_t^R &= (\omega_R \beta) q_{R,t} - q_{R,t-1} \end{aligned} \tag{8}$$

where $q_{N,t} = \log Q_{N,t}$ and variables are expressed as deviations from average.[1] Expression (8) defines the return on holdings of public bonds. It also defines the price of the public debt portfolios given models for expected returns $E_t r_t^N$ and $E_t r_t^R$. In this paper, we assume risk premia to be constant (which englobes the expectations hypothesis). Therefore:

$$\begin{aligned} q_{N,t} &= (\omega_N \beta) E_t q_{N,t+1} - i_t &&= -\sum_{j=0}^{\infty} (\omega_N \beta)^j E_t i_{t+j} \\ q_{R,t} &= (\omega_R \beta) E_t q_{R,t+1} - (i_t - E_t \pi_{t+1}) &&= -\sum_{j=0}^{\infty} (\omega_R \beta)^j \left[E_t i_{t+j} - E_t \pi_{t+j+1} \right]. \end{aligned} \tag{9}$$

Expression (9) guarantees that all bonds have an expected nominal return equal to the short-term risk-free rate: $E_t r_{t+1}^N = E_t r_{t+1}^R + E_t \pi_{t+1} = i_t$. Let $r_t = i_t - E_t \pi_{t+1}$ be the real interest rate. We can re-write the $\epsilon_{r,t}$ term of decomposition (7) as $\sum_{j=1}^{\infty} \beta^j \Delta E_t r_{t+j}$.

The second equalities in each line above show the connection between short-term interest (nominal or real) and returns on debt holdings. News of higher interest lower public bond prices and lead to low returns. In fact, equation (9) implies that we can decompose unexpected real returns on public debt holdings (the left-hand side of decomposition (7)) as follows:

$$\begin{aligned} \epsilon_{r^n,t} - \epsilon_{\pi,t} &= -\delta \Delta E_t \pi_t - \delta \sum_{j=1}^{\infty} (\omega_N \beta)^j \Delta E_t i_t - (1-\delta) \sum_{j=1}^{\infty} (\omega_R \beta)^j \Delta E_t r_t \\ &= -\delta \sum_{j=0}^{\infty} (\omega_N \beta)^j \Delta E_t \pi_t - \sum_{j=1}^{\infty} \beta^j [\delta \omega_N^j + (1-\delta) \omega_R^j] \Delta E_t r_t \end{aligned}$$

News of real bond prices must correspond to news about future real interest (which affect the price of all bonds) or current/future inflation (which affect the price of nominal bonds only; hence the δ). The ω's in the sum corresponding to real interest differs it from $\epsilon_{r,t}$ from decomposition (7). They govern duration, or the sensitiveness of bond prices to changes in future interest. When $\omega_N = \omega_R = 0$, all bonds have a one-period maturity. Their beginning-of-period nominal value is one (nominal) or P_t (real). It does not depend on future interest. When $\omega_N = \omega_R = 1$, public debt works as if it was constituted only of consols, whose price are most sensitivive to interest rate changes.

Decomposition 2 (Total Inflation)**.** *Replace the decomposition of bond prices on the marked-to-market decomposition.*

$$\boxed{-\varepsilon_{\pi,t} = \varepsilon_{s,t} + \varepsilon_{g,t} - \varepsilon_{r,t}} \tag{10}$$

The terms of the decomposition are $\varepsilon_{\pi,t} = \delta \sum_{j=0}^{\infty} (\omega_N \beta)^j \Delta E_t \pi_{t+j}$, $\varepsilon_{s,t} = \epsilon_{s,t}$, $\varepsilon_{g,t} = \epsilon_{g,t}$ *and* $\varepsilon_{r,t} = \sum_{j=1}^{\infty} \beta^j [1 - (\delta \omega_N^j + (1-\delta) \omega_R^j)] \Delta E_t r_{t+j}$.

The marked-to-market decomposition (7) focuses on unexpected changes to current inflation *given* bond prices. Decomposition (10) recognizes that changes to bond prices coalesce from changes to perceived future inflation and real interest. The $\varepsilon_{\pi,t}$ term answers the question: given the path of real discount, how do news about the entire path of inflation affect the market value of debt? This is why I call it the *total inflation* decomposition. Like before, the terms $\varepsilon_{s,t}$ and $\varepsilon_{g,t}$ account for changes in primary surpluses. The $\varepsilon_{r,t}$ term captures the effect of discount rate on discounted surpluses *net of their effect on bond prices*. If discount rates increase, they lower discounted surpluses, which calls for higher inflation. But they also lower bond prices, which reduces the required inflation adjustment. As discussed above,

[1] In levels, the nominal return is $(B_{N,t-1}^1 + \omega_N Q_{N,t} B_{N,t-1}^1)/(Q_{N,t-1} B_{N,t-1}^1)$. The analogous is true for the real return.

the tuple $(\delta, \omega_N, \omega_R)$ determines by how much prices decline, and therefore the net impact of discount rates on total inflation.

Lastly, governments typically report the par or book value of debt. Because theory is based on the market value of debt, some adjustment is necessary. The Dallas Fed provides estimates of the market value of debt for the United States following Cox and Hirschhorn (1983) and Cox (1985).[1] I follow a similar methodology. The adjustment equation is

$$\mathcal{V}_{j,t} = \mathcal{V}^b_{j,t} \times \frac{\text{market value of bonds}}{\text{book value of bonds}} = \mathcal{V}^b_{j,t} \frac{Q_{j,t}}{Q^b_{j,t}} \quad \text{for } j = N, R$$

where $Q^b_{j,t}$ is the weighted-average book price of bonds. We can linearize this adjustment equation to

$$v_t = v^b_t + \delta(q_{N,t} - q^b_{N,t}) + (1-\delta)(q_{R,t} - q^b_{R,t}). \tag{11}$$

Let $i^b_{j,t}$ $(j = N, R)$ be the average interest rates by which book values $q^b_{j,t}$ are updated from period to period. They are not observed for most countries in a sufficiently large time span, so I use a model for it instead. With a geometric maturity structure of debt and in steady state, every period the government rolls over the volume of bonds coming to maturity. That accounts for a share $1 - \omega_j$ of total outstanding bonds. In a steady state, the government then issues the same amount of new bonds at the prevailing interest rate (i_t or $i_t - E_t\pi_{t+1}$). Therefore, the log book price of bonds and the average interest satisfy

$$\begin{aligned}
q^b_{j,t} &= (\omega_j\beta)E_t q^b_{j,t+1} - i^b_{j,t} &&= -\sum_{k=0}^{\infty}(\omega_j\beta)^k E_t i^b_{j,t+k} \\
i^b_{N,t} &= (1-\omega_N)i_t + \omega_N i^b_{N,t-1} &&= -(1-\omega_N)\sum_{k=0}^{\infty}\omega_N^k E_t i_{t+k} \\
i^b_{R,t} &= (1-\omega_R)(i_t - E_t\pi_{t+1}) + \omega_R i^b_{R,t-1} &&= -(1-\omega_R)\sum_{k=0}^{\infty}\omega_R^k (E_t i_{t+k} - E_t\pi_{t+k+1}).
\end{aligned} \tag{12}$$

I use equations in (11) and (12) to convert par value of debt data to market value.

2. Empirical Results

References

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[1]Web link: https://www.dallasfed.org/research/econdata/govdebt.

Country	ϵ_{r^n}	$-\epsilon_\pi$	$=$	ϵ_s	$+\epsilon_g$	$-\epsilon_r$
Averages	**-1.0	**-1	=	0.1	**-0.4	**-1.7
1947 (Advanced)	**-0.7	**-1	=	**-1.2	**-0.6	0.1
1960 (Advanced)	**-1.1	**-1	=	*1.0	*-0.5	**-2.6
1973 (Advanced)	**-1.4	**-1	=	-0.4	-0.3	**-1.7
1997 (Emerging)	**-0.7	**-1	=	0.2	**-0.4	**-1.5
1947 Sample (Advanced)						
United Kingdom	**-0.7	**-1	=	**-2.2	**-0.7	**1.2
United States	**-0.7	**-1	=	-0.3	**-0.5	**-0.9
1960 Sample (Advanced)						
Canada	**-2.8	**-1	=	0.3	*-1.4	**-2.8
Denmark	**-0.9	**-1	=	0.2	-0.2	**-1.9
Japan	**-0.6	**-1	=	**2.8	**-3.0	**-1.4
Norway	**-0.7	**-1	=	0.7	*3.0	**-5.4
Sweden	**-0.6	**-1	=	**0.9	**-0.9	**-1.6
1973 Sample (Advanced)						
Australia	**-2.2	**-1	=	0.2	0.1	**-3.5
New Zealand	**-1.0	**-1	=	*1.2	**-1.4	*-1.8
South Korea	**-0.6	**-1	=	**-2.4	0.2	*0.7
Switzerland	**-2.0	**-1	=	*-0.8	0.1	**-2.3
1997 Sample (Emerging)						
Brazil	**-0.7	**-1	=	**2.4	-0.1	**-4.0
Colombia	**-1,4	**-1	=	0.2	**-0.7	**-1.9
Czech Republic	*0.2	**-1	=	*0.7	**-1.3	-0.2
Hungary	**-0.8	**-1	=	0.0	-0.2	**-1.6
India	*-0.2	**-1	=	**-1.0	-0.1	-0.1
Israel	**-0.4	**-1	=	**0.8	*-0.4	**-1.8
Mexico	**-1.4	**-1	=	*-1.2	0.0	*-1.3
Poland	**-1.4	**-1	=	**1.0	*-0.3	**-3.0
South Africa	**-0.6	**-1	=	0.3	**-0.8	**-1.1
Ukraine	**-0.5	**-1	=	**-1.1	0.0	-0.3

Notes: The table reports the terms of the fiscal decomposition to the shock $\Delta E_t \pi_t = 1$. VAR coefficients fixed at the posterior distribution's mode. One asterisk indicates that 75% of the values out of 10,000 draws from the posterior had the same sign as the figure reported. Two asterisks indicate 90%.

Table 1: Marked-to-market decomposition of the shock $E\left[e_t \mid \Delta E_t \pi_t = 1\right]$

Country	ϵ_{r^n}	$-\epsilon_\pi$	$=$	ϵ_s	$+\epsilon_g$	$-\epsilon_r$
Averages	**-0.6	**-0.4	=	0.1	0.1	**-1.2
1947 (Advanced)	**-0.8	**-0.2	=	*-0.2	0.1	**-0.8
1960 (Advanced)	**-0.7	**-0.3	=	*0.5	0.4	**-1.9
1973 (Advanced)	**-0.7	**-0.3	=	-0.3	0.3	**-1.0
1997 (Emerging)	**-0.6	**-0.4	=	*0.2	*-0.1	**-1.1
1947 Sample (Advanced)						
United Kingdom	**-0.8	**-0.2	=	**-0.5	-0.1	*-0.4
United States	**-0.7	**-0.3	=	0.0	**0.2	**-1.2
1960 Sample (Advanced)						
Canada	**-0.8	**-0.2	=	*0.2	-0.1	**-1.1
Denmark	**-0.8	**-0.2	=	*0.6	*0.5	**-2.0
Japan	**-0.6	**-0.4	=	0.0	-0.2	**-0.8
Norway	**-0.6	**-0.4	=	*1.0	*1.9	**-3.9
Sweden	**-0.6	**-0.4	=	**0.7	-0.2	**-1.5
1973 Sample (Advanced)						
Australia	**-0.8	**-0.2	=	*0.5	*0.2	**-1.7
New Zealand	**-0.6	**-0.4	=	**0.8	**-0.5	**-1.3
South Korea	**-0.6	**-0.4	=	**-2.4	**1.3	0.2
Switzerland	**-0.8	**-0.2	=	-0.1	*0.2	**-1.1
1997 Sample (Emerging)						
Brazil	**-0.5	**-0.5	=	**1.4	0.1	**-2.6
Colombia	**-0.6	**-0.4	=	0.0	**-0.3	**-0.8
Czech Republic	**-0.4	**-0.6	=	-0.1	-0.3	**-0.6
Hungary	**-0.6	**-0.4	=	*0.4	-0.3	**-1.2
India	**-0.5	**-0.5	=	-0.1	*-0.2	**-0.7
Israel	**-0.7	**-0.3	=	**0.6	-0.1	**-1.5
Mexico	**-0.6	**-0.4	=	**-0.6	0.1	*-0.6
Poland	**-0.7	**-0.3	=	**0.5	-0.1	**-1.4
South Africa	**-0.7	**-0.3	=	*-0.2	0.0	**-0.8
Ukraine	**-0.5	**-0.5	=	**-0.4	*-0.1	**-0.6

Notes: The table reports the terms of the fiscal decomposition to the shock $\Delta E_t(\text{Disc Surpluses}) = -1$. VAR coefficients fixed at the posterior distribution's mode. One asterisk indicates that 75% of the values out of 10,000 draws from the posterior had the same sign as the figure reported. Two asterisks indicate 90%.

Table 2: Marked-to-market decomposition of the shock $E\left[e_t \mid \Delta E_t(\text{Disc Surpluses}) = -1\right]$

Country	$-\varepsilon_\pi$	$=$	ε_s	$+\varepsilon_g$	$-\varepsilon_r$
Averages	**-1.6	=	0.1	**-0.4	**-1.3
1947 (Advanced)	**-2.2	=	**-1.2	**-0.6	-0.3
1960 (Advanced)	**-1.9	=	*1.0	*-0.5	**-2.3
1973 (Advanced)	**-2.3	=	-0.4	-0.3	**-1.6
1997 (Emerging)	**-1.0	=	0.2	**-0.4	**-0.9
1947 Sample (Advanced)					
United Kingdom	**-2.8	=	**-2.2	**-0.7	0.1
United States	**-1.5	=	-0.3	**-0.5	**-0.7
1960 Sample (Advanced)					
Canada	**-2.6	=	0.3	*-1.4	**-1.5
Denmark	**-1.6	=	0.2	-0.2	**-1.6
Japan	**-1.5	=	**2.8	**-3.0	**-1.3
Norway	**-2.0	=	0.7	*3.0	**-5.7
Sweden	**-1.6	=	**0.9	**-0.9	**-1.5
1973 Sample (Advanced)					
Australia	**-3.1	=	0.2	0.1	**-3.4
New Zealand	**-2.3	=	*1.2	**-1.4	**-2.1
South Korea	**-2.0	=	**-2.4	0.2	0.2
Switzerland	**-2.0	=	*-0.8	0.1	**-1.3
1997 Sample (Emerging)					
Brazil	**-0.8	=	**2.4	-0.1	**-3.1
Colombia	**-0.7	=	0.2	**-0.7	-0.2
Czech Republic	**-0.5	=	*0.7	**-1.3	0.1
Hungary	**-1.4	=	0.0	-0.2	**-1.3
India	**-1.4	=	**-1.0	-0.1	*-0.4
Israel	**-0.6	=	**0.8	*-0.4	**-1.0
Mexico	**-1.4	=	*-1.2	0.0	-0.3
Poland	**-1.4	=	**1.0	*-0.3	**-2.1
South Africa	**-0.8	=	0.3	**-0.8	*-0.3
Ukraine	**-1.2	=	**-1.1	0.0	-0.1

Notes: The table reports the terms of the fiscal decomposition to the shock $\Delta E_t \pi_t = 1$. VAR coefficients fixed at the posterior distribution's mode. One asterisk indicates that 75% of the values out of 10,000 draws from the posterior had the same sign as the figure reported. Two asterisks indicate 90%.

Table 3: Total inflation decomposition of the shock $E\left[e_t \mid \Delta E_t \pi_t = 1\right]$

Country	$-\varepsilon_\pi$	=	ε_s	$+\varepsilon_g$	$-\varepsilon_r$
Averages	**-0.6	=	0.1	0.1	**-0.8
1947 (Advanced)	**-0.7	=	*-0.2	0.1	**-0.5
1960 (Advanced)	**-0.7	=	*0.5	0.4	**-1.6
1973 (Advanced)	**-0.8	=	-0.3	0.3	**-0.8
1997 (Emerging)	**-0.4	=	*0.2	*-0.1	**-0.5
1947 Sample (Advanced)					
United Kingdom	**-0.9	=	**-0.5	-0.1	*-0.3
United States	**-0.5	=	0.0	**0.2	**-0.7
1960 Sample (Advanced)					
Canada	**-0.5	=	*0.2	-0.1	**-0.6
Denmark	**-0.6	=	*0.6	*0.5	**-1.6
Japan	**-0.7	=	0.0	-0.2	**-0.5
Norway	**-0.9	=	*1.0	*1.9	**-3.8
Sweden	**-0.8	=	**0.7	-0.2	**-1.2
1973 Sample (Advanced)					
Australia	**-0.6	=	*0.5	*0.2	**-1.3
New Zealand	**-0.8	=	**0.8	**-0.5	**-1.2
South Korea	**-1.2	=	**-2.4	**1.3	0.0
Switzerland	**-0.5	=	-0.1	*0.2	**-0.6
1997 Sample (Emerging)					
Brazil	**-0.3	=	**1.4	0.1	**-1.9
Colombia	**-0.3	=	0.0	**-0.3	-0.1
Czech Republic	**-0.5	=	-0.1	-0.3	-0.2
Hungary	**-0.6	=	*0.4	-0.3	**-0.8
India	**-0.6	=	-0.1	*-0.2	**-0.3
Israel	**-0.2	=	**0.6	-0.1	**-0.7
Mexico	**-0.6	=	**-0.6	0.1	-0.1
Poland	**-0.5	=	**0.5	-0.1	**-0.9
South Africa	**-0.3	=	*-0.2	0.0	*-0.1
Ukraine	**-0.6	=	**-0.4	*-0.1	**-0.1

Notes: The table reports the terms of the fiscal decomposition to the shock $\Delta E_t(\text{Disc Surpluses}) = -1$. VAR coefficients fixed at the posterior distribution's mode. One asterisk indicates that 75% of the values out of 10,000 draws from the posterior had the same sign as the figure reported. Two asterisks indicate 90%.

Table 4: Total inflation decomposition of the shock
$E\left[e_t \mid \Delta E_t(\text{Disc Surpluses}) = -1\right]$