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Comment

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Introduction

This is a very interesting paper. It sets out to explain three stylized facts of international portfolios for industrial economies: (*a*) Portfolios are biased toward local equity. (*b*) They are long in foreign currency, short in domestic currency. (*c*) Valuation effects caused by changes in asset prices and exchange rates are such that exchange rate depreciation induces a positive transfer of wealth to the country whose currency depreciates (indeed an implication of fact [*b*]). Coeurdacier, Kollmann, and Martin (henceforth, CKM) tackle the fundamental question of how we can construct an international portfolio model that jointly reproduces these facts. Their answer combines home bias in consumption with a realistic menu of assets (bonds and equities) and multiple shocks (to productivity, preferences—capturing the introduction of new products in their preferred interpretation—and income distribution). In the process of obtaining their results, CKM illustrate a number of properties of international portfolios under complete and incomplete asset markets, with market (in)completeness depending on the number of shocks relative to the number of assets traded across countries.

The nature and number of exogenous shocks are crucial for CKM's results. In these comments, I focus on the interpretation of two of these shocks (preferences and income distribution) and its potential implications for further research in this area. I begin with income distribution.

Markup Variation, Income Distribution, and Risk Sharing

Coeurdacier, Kollmann, and Martin assume that a portion $k \in (0, 1)$ of each country's endowment is distributed to (domestic and foreign) equity holders, while the fraction $1 - k$ is distributed to domestic households as "labor" income. The fraction k is subject to shocks. A crucial question here is whether we really want to treat changes in income distribution as exogenous and its fluctuations as structural shocks. The question is important because the answer has implications not only for measurement and calibration, but also for important properties of international asset portfolios. While treating changes in income distribution as exogenous stochastic shocks is certainly a useful starting point for analysis, I believe that further progress in understanding international portfolios will come from taking the now-standard endogenous modeling of changes in profit shares into account. As the following analysis will highlight, I think that this will yield insights beyond those that can be obtained by simply studying the case of correlated exogenous shocks as in CKM.

In familiar models with monopolistic competition, Dixit-Stiglitz (1977) preferences, a fixed continuum of producers, labor as the only factor of production, and flexible prices, income distribution is determined by the elasticity of substitution between products ($\theta > 1$): labor income is the proportion $(\theta - 1)/\theta$ of GDP and dividend income is the proportion $1/\theta$. In such a setup, one could consider shocks to θ as the source of random changes in distribution, but assuming randomness in a deep parameter of preferences is certainly not an appealing structural theory of changes in income distribution. An alternative, quite natural approach (given much literature in closed and open economy macroeconomics) is to assume that prices are sticky. This assumption introduces endogenous markup variation over the business cycle, and thus endogenous changes in income distribution, and a role for monetary policy. In turn, the endogeneity of markup variation has important implications for the properties of asset portfolios.

Engel and Matsumoto (2006) have been the first to study the consequences of redistribution implied by nominal rigidity for asset portfolios in a two-country, dynamic stochastic general equilibrium (DSGE) model with productivity and monetary policy shocks. To illustrate the consequences of price stickiness as a source of changes in income distribution between profits and labor for the risk sharing properties of international portfolios, I use a sticky-price version of the two-country model with international equity trade in Ghironi, Lee, and Rebucci (2007). In that model, agents trade shares in domestic and foreign firms across borders, while bonds are held only domestically. Equity trades are subject to quadratic transaction fees, which I remove from the following analysis. Firms are monopolistically competitive and produce with linear technology using labor only. Aggregate, country-specific productivity shocks are the only source of uncertainty. Labor supply is inelastic and normalized to one, and households maximize expected intertemporal utility from consumption of a constant elasticity aggregator of sub-baskets of domestic and foreign goods. There is no trade cost, and the law of one price and purchasing power parity (PPP) hold. I refer the reader to Ghironi, Lee, and Rebucci (2007) for details and introduce only the most relevant equations for my discussion in what follows.

Output of individual home firm z is $Y_t^z = Z_t L_t^z$, where Z_t is home aggregate productivity. Define home aggregate per capita GDP in units of consumption as $y_t \equiv aRP_t Y_t^z / a = RP_t Z_t$, where RP_t is the price of the representative home good in units of consumption (equal across home firms because of symmetry[1]), $a \in (0, 1)$ is the number of home households and firms, and I used the labor market equilibrium condition $aL_t^z / a = L_t^z = 1$. World aggregate per capita GDP is $y_t^W \equiv ay_t + (1-a)y_t^* = aRP_t Z_t + (1-a)RP_t^* Z_t^*$, where stars denote foreign variables. Goods market clearing in aggregate per capita terms requires $aL_t^z / a = L_t = 1 = RP_t^{-\omega} y_t^W / Z_t$, and similarly in the foreign economy, with $\omega > 0$ denoting the elasticity of substitution between home and foreign sub-baskets of goods in consumption. We thus have a system of two equations in two unknowns that pins down home and foreign relative prices:

$$RP_t^{\omega} Z_t = aRP_t Z_t + (1-a)RP_t^* Z_t^*, \tag{1}$$

$$RP_t^{*\omega} Z_t^* = aRP_t Z_t + (1-a)RP_t^* Z_t^*. \tag{2}$$

This system pins down equilibrium relative prices regardless of nominal rigidity and implies that the terms of trade between representative home and foreign goods are given by $TOT_t = RP_t / RP_t^* = (Z_t^* / Z_t)^{1/\omega}$. A positive productivity shock in the home economy causes the terms of trade to deteriorate as increased supply of home goods lowers their relative price.[2] Given the solutions for relative prices implied by (1) and (2), home and foreign GDPs are then $y_t = RP_t Z_t$ and $y_t^* = RP_t^* Z_t^*$, respectively. In what follows, I assume that Z_t and Z_t^* follow a bivariate $AR(1)$ process in logs that is fully symmetric across countries (equal persistence and spillover parameters, and equal standard deviations of innovations).

Now, denote aggregate per capita home holdings of shares in home (foreign) firms entering period $t+1$ with $x_{t+1}(x_{t+1}^*)$. International equity market equilibrium requires $ax_{t+1} + (1-a)x_{*t+1} = a$ and $ax_{t+1}^* + (1-a)x_{*t+1}^* = 1-a$, where $x_{*t+1}(x_{*t+1}^*)$ denotes foreign aggregate per capita holdings of shares in home (foreign) firms. Ghironi, Lee, and Rebucci (2007) show that the difference between the equilibrium budget constraints of home and foreign households yields the following equation under flexible prices:

$$\frac{v_t}{1-a}(x_{t+1}-x_t)+\frac{v_t^*}{1-a}(x_{t+1}^*-x_t^*)+C_t^D \tag{3}$$
$$=\left[\left(\frac{x_t}{1-a}-\frac{a}{1-a}\right)\frac{1}{\theta}+\frac{\theta-1}{\theta}\right]y_t+\left[\left(\frac{x_t^*}{1-a}-1\right)\frac{1}{\theta}-\frac{\theta-1}{\theta}\right]y_t^*,$$

where C_t^D is the cross-country consumption differential ($C_t^D \equiv C_t - C_t^*$), $v_t(v_t^*)$ is the price of home (foreign) equity in units of consumption, and $\theta > 1$ is the elasticity of substitution between individual goods produced in each country. This equation exploits the fact mentioned previously that, under flexible prices, labor income ($w_tL_t = w_t$, where w_t is the real wage) and dividends paid by firms to shareholders (d_t) are constant proportions of GDP: $w_t = (\theta-1)y_t/\theta$ and $d_t = y_t - w_t = y_t/\theta$. Straightforward substitutions show that $x_{t+1} = x_t = x = a-(1-a)(\theta-1)$ and $x_{t+1}^* = x_t^* = x^* = (1-a)\theta$ imply $C_t^D = 0$ for every possible realization of y_t and y_t^* (i.e., for every possible realization of Z_t and Z_t^*). Thus, the portfolio $x = a-(1-a)(\theta-1)$ and $x^* = (1-a)\theta$ implements perfect risk sharing by appropriately reflecting the distribution of a country's GDP between labor income (paid to domestic households) and profits (paid to domestic and foreign shareholders) determined by the degree of firm-level monopoly power θ.

How does equation (3) change under sticky prices? When prices are sticky, the markup charged by firms is no longer constant.[3] The distribution of income between dividends and labor is now determined by $w_t = y_t/\mu_t$ and $d_t = (1-1/\mu_t-\kappa\pi_t^2/2)y_t$, where μ_t is the markup of price over marginal cost, π_t is the net good-level inflation rate, and $(\kappa\pi_t^2/2)y_t$, $\kappa \geq 0$, is the equilibrium resource cost of inflation implied by quadratic costs of price adjustment as in Rotemberg (1982) (prices are flexible if $\kappa = 0$). Price stickiness introduces variation in the distribution of income by generating changes in equilibrium markups for unchanged number of exogenous, stochastic shocks to the economy. Equilibrium markups at home and abroad are determined by:

$$\mu_t=\frac{\theta}{(\theta-1)\left(1-\frac{\kappa}{2}\pi_t^2\right)+\kappa\left\{(1+\pi_t)\pi_t-E_t\left[\Omega_{t+1}\frac{y_{t+1}}{y_t}(1+\pi_{t+1})\pi_{t+1}\right]\right\}}, \tag{4}$$

$$\mu_t^* = \frac{\theta}{(\theta - 1)\left(1 - \frac{\kappa}{2}\pi_t^{*2}\right) + \kappa\left\{(1 + \pi_t^*)\pi_t^* - E_t\left[\Omega_{t+1}^* \frac{y_{t+1}^*}{y_t^*}(1 + \pi_{t+1}^*)\pi_{t+1}^*\right]\right\}}, \quad (5)$$

where Ω_{t+1} (Ω_{t+1}^*) is the discount factor applied to future profits by home (foreign) firms:

$$\Omega_{t+1} = \beta\left[\left(\frac{C_{t+1}}{C_t}\right)^{-1/\sigma} x_t + \left(\frac{C_{t+1}^*}{C_t^*}\right)^{-1/\sigma} \frac{1 - a}{a} x_{*t}\right], \quad (6)$$

$$\Omega_{t+1}^* = \beta\left[\left(\frac{C_{t+1}}{C_t}\right)^{-1/\sigma} \frac{a}{1 - a} x_t^* + \left(\frac{C_{t+1}^*}{C_t^*}\right)^{-1/\sigma} x_{*t}^*\right]. \quad (7)$$

In equations (6) and (7), $\sigma > 0$ is the elasticity of intertemporal substitution in utility from consumption, and I assume that the firms' discount factor aggregates domestic and foreign shareholders based on their equity holdings entering the period in which the markup is determined. When there is perfect risk sharing, equity market equilibrium implies the standard stochastic discount factor $\Omega_{t+1} = \Omega_{t+1}^* = \beta(C_{t+1}/C_t)^{-1/\sigma}$.[4]

Equation (3) becomes:

$$\frac{v_t}{1 - a}(x_{t+1} - x_t) + \frac{v_t^*}{1 - a}(x_{t+1}^* - x_t^*) + C_t^D \quad (8)$$

$$= \left[\left(\frac{x_t}{1 - a} - \frac{a}{1 - a}\right)\left(1 - \frac{1}{\mu_t} - \frac{\kappa}{2}\pi_t^2\right) + \frac{1}{\mu_t}\right]y_t$$

$$+ \left[\left(\frac{x_t^*}{1 - a} - 1\right)\left(1 - \frac{1}{\mu_t^*} - \frac{\kappa}{2}\pi_t^{*2}\right) - \frac{1}{\mu_t^*}\right]y_t^*.$$

It is straightforward to verify that, in the presence of price stickiness, there is in general no *constant* equity portfolio that supports $C_t^D = 0$ regardless of the realization of Z_t and Z_t^*. If such a constant portfolio existed, it would be such that:

$$x_{t+1} = x_t = x = a - \frac{1 - a}{\mu_t\left(1 - \frac{\kappa}{2}\pi_t^2\right) - 1}, \quad (9)$$

$$x_{t+1}^* = x_t^* = x^* = 1 - a + \frac{1 - a}{\mu_t^*\left(1 - \frac{\kappa}{2}\pi_t^{*2}\right) - 1}. \quad (10)$$

But the third equality in equations (9) and (10) will generally be satisfied only with constant inflation and markups—zero inflation in each country (or a monetary policy that mimics the flexible price equilibrium) being a special case, returning $x = a - (1 - a)(\theta - 1)$ and $x^* = (1 - a)\theta$.

Is there a *time-varying* equity portfolio consistent with perfect risk sharing under sticky prices? Such a portfolio exists, and it is given by:

$$x_{t+1} = \left[1 + \frac{y_t}{v_t}\left(1 - \frac{1}{\mu_t} - \frac{\kappa}{2}\pi_t^2\right)\right]x_t + \left[\frac{1}{\mu_t} - a\left(1 - \frac{\kappa}{2}\pi_t^2\right)\right]\frac{y_t}{v_t}, \tag{11}$$

$$x_{t+1}^* = \left[1 + \frac{y_t^*}{v_t^*}\left(1 - \frac{1}{\mu_t^*} - \frac{\kappa}{2}\pi_t^{*2}\right)\right]x_t^* - (1 - a)\left(1 - \frac{\kappa}{2}\pi_t^{*2}\right)\frac{y_t^*}{v_t^*}. \tag{12}$$

According to this portfolio, agents adjust their holdings of shares entering next period in response to current variation in GDPs, markups, and equity prices. Substituting (11) and (12) into (8) yields $C_t^D = 0$ regardless of the realizations of Z_t and Z_t^* (and of monetary policy). Not surprisingly, the portfolio in (11) and (12) reduces to $x = a - (1 - a)(\theta - 1)$ and $x^* = (1 - a)\theta$ when inflation in each country is zero and we search for a constant portfolio that supports perfect risk sharing.

With the portfolio strategy in (11) and (12), agents at home and abroad can perfectly insure themselves against idiosyncratic uncertainty. Is this the optimal portfolio strategy? Perfect risk sharing is the planner's optimum in the flexible-price economy of Ghironi, Lee, and Rebucci (2007). With sticky prices, asset trading cannot completely undo the consequences of nominal rigidity, embedded in the resource costs of inflation. However, I conjecture that the perfect risk sharing outcome remains socially optimal, at least under assumptions of symmetry across countries.[5] The equilibrium of the world economy is then given by the solution to the system of equations summarized in table 5C1.1.

The system in table 5C1.1 is a system of fourteen equations in sixteen endogenous variables: RP_t, RP_t^*, y_t, y_t^*, y_t^W, C_t, μ_t, μ_t^*, x_{t+1}, x_{t+1}^*, v_t, v_t^*, π_t, π_t^*, and the nominal interest rates i_t and i_t^*.[6] The system is closed by specifying the conduct of monetary policy (nominal interest rate setting) in each country, which gives us the two additional equations that are missing from the table. For instance, we could assume (symmetric) interest rate rules that specify the path of nominal interest rates as function of inflation (in product-level or consumption prices) and output (output of the domestic good or GDP in consumption units). The policy rule function will have to be specified appropriately to ensure equilibrium existence and uniqueness. Interest rate setting may also include exogenous stochastic shocks.[7] Interestingly, in this case, the portfolio strategy in (11) and (12) would allow domestic and foreign households to achieve perfect risk sharing by trading two assets (home and foreign equities) in a

Table 5C1.1
Perfect risk sharing with sticky prices

Home relative price	$RP_t^{w} Z_t = aRP_tZ_t + (1-a)\,RP_t^* Z_t^*$
Foreign relative price	$RP_t^{*w} Z_t^* = aRP_tZ_t + (1-a)\,RP_t^* Z_t^*$
Home GDP	$y_t = RP_tZ_t$
Foreign GDP	$y_t^* = RP_t^* Z_t^*$
World GDP	$y_t^W = aRP_tZ_t + (1-a)\,RP_t^* Z_t^*$
World resource constraint	$C_t + a\frac{\kappa}{2}\pi_t^2 y_t + (1-a)\,\frac{\kappa}{2}\pi_t^{*2} y_t^* = y_t^W$
Home markup	$\mu_t = \dfrac{\theta}{(\theta-1)\left(1-\frac{\kappa}{2}\pi_t^2\right) + \kappa\left\{(1+\pi_t)\pi_t - \beta E_t\left[\left(\frac{C_{t+1}}{C_t}\right)^{-1/\sigma}\frac{y_{t+1}}{y_t}(1+\pi_{t+1})\pi_{t+1}\right]\right\}}$
Foreign markup	$\mu_t^* = \dfrac{\theta}{(\theta-1)\left(1-\frac{\kappa}{2}\pi_t^{*2}\right) + \kappa\left\{(1+\pi_t^*)\pi_t^* - \beta E_t\left[\left(\frac{C_{t+1}}{C_t}\right)^{-1/\sigma}\frac{y_{t+1}^*}{y_t^*}(1+\pi_{t+1}^*)\pi_{t+1}^*\right]\right\}}$
Home holdings of home equity	$x_{t+1} = \left[1 + \frac{y_t}{v_t}\left(1 - \frac{1}{\mu_t} - \frac{\kappa}{2}\pi_t^2\right)\right]x_t + \left[\frac{1}{\mu_t} - a\left(1-\frac{\kappa}{2}\pi_t^2\right)\right]\frac{y_t}{v_t}$
Home holdings of foreign equity	$x_{t+1}^* = \left[1 + \frac{y_t^*}{v_t^*}\left(1 - \frac{1}{\mu_t^*} - \frac{\kappa}{2}\pi_t^{*2}\right)\right]x_t^* - (1-a)\left(1-\frac{\kappa}{2}\pi_t^{*2}\right)\frac{y_t^*}{v_t^*}$
Price of home equity	$v_t = \beta E_t\left\{\left(\frac{C_{t+1}}{C_t}\right)^{-1/\sigma}\left[v_{t+1} + \left(1 - \frac{1}{\mu_{t+1}} - \frac{\kappa}{2}\pi_{t+1}^2\right)y_{t+1}\right]\right\}$
Price of foreign equity	$v_t^* = \beta E_t\left\{\left(\frac{C_{t+1}}{C_t}\right)^{-1/\sigma}\left[v_{t+1}^* + \left(1 - \frac{1}{\mu_{t+1}^*} - \frac{\kappa}{2}\pi_{t+1}^{*2}\right)y_{t+1}^*\right]\right\}$
Euler equation for home bonds	$1 = \beta E_t\left[\left(\frac{C_{t+1}}{C_t}\right)^{-1/\sigma}\frac{1+i_t}{1+\pi_{t+1}}\frac{RP_{t+1}}{RP_t}\right]$
Euler equation for foreign bonds	$1 = \beta E_t\left[\left(\frac{C_{t+1}}{C_t}\right)^{-1/\sigma}\frac{1+i_t^*}{1+\pi_{t+1}^*}\frac{RP_{t+1}^*}{RP_t^*}\right]$

world with four stochastic shocks (domestic and foreign productivity and monetary policy shocks). Appropriate adjustment of equity holdings over time would be sufficient to ensure this outcome. The reason is that monetary policy shocks would introduce an additional source of markup—and thus equity price—variation, but the portfolio strategy in (11) and (12) adjusts for changes in markups and equity prices regardless of their source to keep home and foreign consumption equal at all dates and in all states. The equilibrium level of consumption is then determined by the world resource constraint under perfect risk sharing:

$C_t = y_t^W - a(\kappa/2)\pi_t^2 y_t - (1 - a)(\kappa/2)\pi_t^{*2} y_t^*$. Monetary policy thus determines the amount of world GDP that is available for consumption net of the resource costs of inflation at home and abroad. Since monopolistic competition implies no distortion in the model (due to the assumption of inelastic labor supply) and y_t^W is determined by the first five equations in table 5C1.1, it is clear that a policy of mimicking the flexible price equilibrium by stabilizing product-level inflation at zero in each country is optimal under the portfolio strategy that induces perfect risk sharing. Other policies reduce consumption (and thus welfare) in both countries by introducing a resource cost of price changes.[8]

The previous discussion highlights the importance of structural modeling of changes in income distribution. In CKM, these changes are simply the consequences of exogenous randomness. When this is combined with just one of the other shocks in their model, it is still possible to achieve perfect risk sharing with a constant portfolio of equities and bonds due to the equality between number of assets and number of shocks. When all shocks are at work, markets are incomplete, and perfect risk sharing is no longer feasible (unless shocks are perfectly correlated). In the previous example, changes in income distribution are the consequences of markup variation due to price rigidity. Under this structural modeling of changes in distribution, it is generally no longer possible to achieve perfect risk sharing with a constant equity portfolio, as it was under flexible prices. However, there exists a time-varying equity portfolio that accomplishes perfect insurance of idiosyncratic risk across countries. Importantly, this portfolio achieves perfect risk sharing even if monetary policy is a source of additional randomness in the economy (i.e., even if there are more stochastic shocks than assets traded across countries).

Characterizing the complete solution of the system in table 5C1.1—given assumptions on Z_t and Z_t^* and the conduct of monetary policy in the two countries—is beyond the scope of these comments.[9] I will conclude this section by pointing out that nominal rigidity need not be the sole source of changes in income distribution with potentially interesting implications for optimal portfolio problems. In fact, it is possible to construct models that feature markup variation under flexible prices. Suppose, for instance, that we depart from the standard assumption of constant elasticity preferences, posit preferences of translog form, and allow for variation in the number of products (thus starting to think about new product "shocks"). The elasticity of substitution between products increases with the number of products available to consumers and is given by $1 + \lambda N_t$, where $\lambda > 0$, and $N_t \equiv N_{D,t} + N^*_{X,t}$ is the number of products available (domestically produced, $N_{D,t}$, and imported, $N^*_{X,t}$). Total dividend income generated by domestic producers will then depend on the markup charged in the domestic market (given by $1 + 1/(\lambda N_t)$) and the markup charged in the pricing of exports to the foreign economy ($1 + 1/(\lambda N^*_t)$, with $N^*_t \equiv N^*_{D,t} + N_{X,t}$).[10] Changes in the number of available products in each country thus induce fluctuations in markups and affect income distribution, with potential implications for the properties of international asset portfolios.[11] One could also combine translog preferences with price rigidity to obtain a theory of markup variation that merges the demand-side pricing complementarities induced by the translog expenditure function with the markup changes induced by imperfect price adjustment—all this while potentially maintaining aggregate productivity as the sole source of stochastic uncertainty in the model.[12]

In sum, abstracting from other sources of uncertainty, productivity shocks can be a likely source of endogenous fluctuations in income distribution with possibly important implications for the properties of international asset portfolios. For instance, in a simple world in which only home and foreign equity are traded internationally, if nominal rigidity is the source of endogenous changes in income distribution, agents can still use the two available assets to fully insure the idiosyncratic components of domestic and foreign productivity shocks by using time-varying equity portfolios. Interestingly, the same portfolio strategy would also allow agents to insure against idiosyncratic uncertainty in monetary policy. Further exploring the consequences of endogenous income distribution in richer models (and its interaction with policy and portfolio choices) is a research direction that I believe will be important to pursue for a deeper understanding of the determination of existing asset positions in the international economy.

New Product "Shocks"

Coeurdacier, Kollmann, and Martin also consider exogenous shocks that shift demand between home and foreign goods in the consumption basket. Their preferred interpretation of these shocks is "iPod" shocks associated to new product introduction. But, in reality, new product introduction is an endogenous response to economic conditions, including productivity developments. In turn, as mentioned previously, new product introduction can affect income distribution by inducing changes in flexible-price markups. There is a recent literature on the consequences of producer entry into domestic and foreign markets in DSGE models of closed and open economies.[13] In Ghironi and Melitz (2005), entry of monopolistically competitive producers is subject to sunk entry costs, to which new entrants commit before knowing their firm-specific productivity. After having entered and received their firm-level productivity draw, firms decide whether or not to sell output also in the foreign market, subject to fixed and per-unit trade costs. The presence of fixed export costs induces the firms with relatively lower firm-specific productivity to sell output only domestically, but the total number of domestic producers in each country and the range of those who export fluctuate in response to exogenous shocks. In particular, an increase in aggregate domestic productivity induces producer entry in the domestic economy, and entry is the key driver of real exchange rate appreciation in response to a completely aggregate productivity shock.

The endogeneity of product creation (like income distribution) poses questions for measurement and calibration. Most importantly for CKM's paper, it has implications for the international relative price effects of productivity shocks, and thus the risk sharing properties of different asset menus and portfolio choices. The international transmission of productivity shocks in CKM's model is centered on the standard result that favorable productivity shocks induce terms of trade depreciation by increasing the supply of domestic goods (the same mechanism is also at the core of the fixed-variety model I presented previously). This property of the terms of trade (and the real exchange rate in models in which consumption home bias is the source of PPP deviations) is central to the risk sharing properties of different portfolios. But recent evidence in Debaere and Lee (2003) and Corsetti, Dedola, and Leduc (2008) challenges this standard transmission mechanism, and it supports models with endogenous introduction of new products in response to productivity shocks that can shed additional light on the relation between these shocks and the terms of trade. As originally noted by Krugman (1989) and reiterated by Ghironi and Melitz (2005), endogenous producer entry in a more attractive business environment can cause the terms of trade to improve following positive productivity shocks by causing the cost of effective domestic labor to rise above foreign. Endogenous producer entry and product creation can thus reconcile theory with the recent evidence, but this also implies reversing a transmission mechanism that is central to several portfolio results in CKM and other literature (for given source of exogenous uncertainty). In my view, this makes the explicit consideration of endogenous producer entry all the more important in models of international portfolio choice, to fully understand the interaction between product creation, the terms of trade, and the properties of different asset portfolios.

Conclusions

This paper addresses a central issue in international macroeconomics—how to construct a model of international portfolio choice that reproduces observed stylized facts. The answer relies on a combination of home bias in consumer preferences, a realistic asset menu (bonds and equities), and (importantly) enough shocks to ensure market incompleteness. The paper provides a set of very interesting results on the interaction of these ingredients in the determination of international portfolio choices. However, two of the three shocks considered by CKM (income distribution and new products) can be explained as endogenous responses to the third (productivity) if we think about them more structurally. In turn, this has implications for the measurement of shocks, the risk sharing properties of different asset menus, and their ability to replicate stylized facts. An alternative approach would be to have market incompleteness motivated by causes other than the number of shocks relative to assets, such as financial and/or informational frictions.[14] I view this as a very interesting area for future work in models that incorporate realistic asset menus (including nominal bonds) and make it possible to explore international portfolio determination in conjunction with a role for policy.[15]

Notes

1. I assume nominal rigidity in the form of a quadratic cost of price adjustment identical across firms (Rotemberg, 1982), ensuring that all home firms choose the same price in equilibrium.

2. When $\omega = 1$, the terms of trade move one-for-one with the productivity differential, as in Cole and Obstfeld (1991) and Corsetti and Pesenti (2001).

3. I assume producer currency pricing so that the law of one price and PPP hold also in the sticky-price version of the model.

4. The assumption on discounting is consistent with Grossman and Hart (1979). Log-linearization of equations (4) and (5) yields standard New Keynesian Phillips curves for inflation in good-level prices as a function of the markup and future expected inflation (in percent deviation from steady state).

5. The complete markets allocation is optimal in Engel and Matsumoto's (2006) sticky-price model with one-period ahead price rigidity. See also footnote 9.

6. In writing the Euler equations for bond holdings in each country, I used the fact that inflation in the consumer price index is tied to inflation in the price of the representative domestic good by $1 + \pi_t^C = (1 + \pi_t) RP_{t-1}/RP_t$, and similarly abroad.

7. If so, I again assume full symmetry in the shock processes across countries (equal persistence and possible spillovers, equal standard deviations of innovations).

8. The optimal portfolio response to this policy would then be to keep shareholdings constant at the levels $x = a - (1 - a)(\theta - 1)$ and $x^* = (1 - a)\theta$, assumed to be the initial positions in the absence of shocks in the steady state with zero inflation.

9. Engel and Matsumoto (2006) fully solve their model with one-period-ahead price stickiness for the optimal portfolios. The menu of internationally traded assets includes equities and forward foreign exchange positions. Since PPP holds only in expectation in their model, the equilibrium reproduces the complete markets allocation in which the consumption differential across countries (in log-linear terms) is proportional to the real exchange rate in each period and consumption equalization holds in expected value. Sticky prices bias the optimal (constant) equity portfolios in favor of domestic equity by generating a negative correlation between labor income and profits in response to technology shocks. This finding is in line with the consequences of the redistribution shocks in CKM. See also Devereux and Sutherland (2006).

10. Absent trade costs and heterogeneity, so that all firms in each country are also exporters, $N_t = N_t^* = N_{D,t} + N_{D,t}^*$, and the flexible-price markup would be identical across markets.

11. Bilbiie, Ghironi, and Melitz (2007) show that productivity-driven fluctuations in N_t (subject to sunk producer entry costs) reproduce the cyclicality of U. S. markups remarkably well.

12. See Bilbiie, Ghironi, and Melitz (2008) for a closed-economy example.

13. See Bilbiie, Ghironi, and Melitz (2007) and Ghironi and Melitz (2005) and references therein. Philippe Martin has also contributed to this literature (Corsetti, Martin, and Pesenti, 2007).

14. Ghironi, Lee, and Rebucci's (2007) transaction fees are a reduced form approach to this source of incompleteness. For a deeper, structural modeling of endogenous market incompleteness see, for instance, Kehoe and Perri (2002).

15. Benigno (2006), Devereux and Sutherland (2006), and Engel and Matsumoto (2006) are initial steps in this direction.

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