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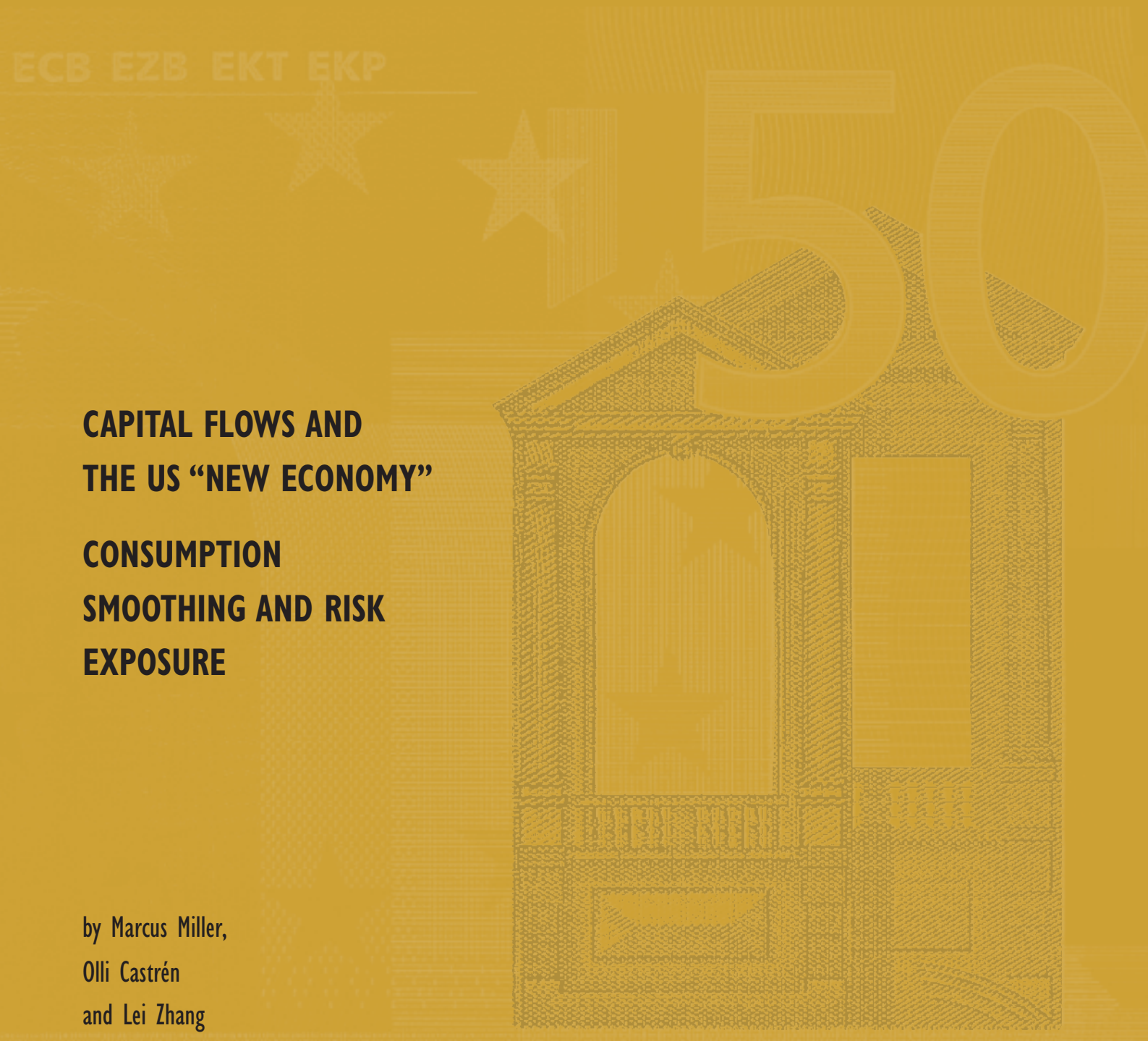

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CONSUMPTION SMOOTHING AND RISK EXPOSURE

by Marcus Miller,
Olli Castrén
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Abstract

In an analytically tractable model of the global economy, we calculate the Pareto improvement where a country experiencing a favourable supply side shock consumes more against expected future output and spreads the risk by selling shares. With capital inflows to finance the 'New Economy' significantly exceeding the current account deficit, however, we show that selling shares globally at inflated prices – due to 'irrational exuberance' and distorted corporate incentives – can generate significant international transfers when the asset bubble bursts. The analysis complements recent econometric studies which appeal to financial factors to explain why the European economy was so strongly affected by the recent US downturn.

JEL Classification: F41, F32, G15
Key words: Capital flows, moral hazard, international transmission of shocks.

Executive summary

Ex ante support for the view that asset prices in the US in the late 1990s were far higher than could be justified by economic fundamentals was provided by Shiller (2000), who used history, sample surveys and psychology to identify 'irrational exuberance' on the part of investors. *Ex post*, evidence emerging in US bankruptcy courts, where corporate officials have been indicted for misappropriation of funds and for fraud, suggests that corporate insiders had economic incentives to distort investor perceptions.

What of the international implications? Coincident with the "New Economy" productivity boom, the United States ran a significant current account deficit in the second half of the 1990s, and it also acted as a magnet for global capital flows. Indeed, Ventura (2001) suggests that the US current account deficit in the late 1990s could have been magnified by the appearance of the dot-com bubble.

The dynamic theory of the balance of payments under certainty focuses on the role of financial markets in smoothing consumption, but risk-sharing provides an additional motive for capital flows in a stochastic environment. To capture both motives for US capital inflows analytically, we use a stylised two-country, two-period general equilibrium framework with an anticipated, stochastic productivity boom in one country (the US). Furthermore, we allow the stochastic distribution perceived by investors to differ from the true distribution, having higher mean and lower variance. This discrepancy may be attributed to "irrational exuberance" due to herding behaviour (Shiller, 2000); or to "corporate moral hazard", if distorted incentives led to false accounting (Stiglitz, 2003).

It is impossible to tell with any accuracy how much distorted corporate incentives contributed to the asset price overvaluation in the US: but the jump in junk bond rates in 2001/02 may provide a clue. According to Mishkin and White (2003, p.72) "This development did not reflect any change in the stock market but rather the effects of the Enron scandal. The revelation of fraud and misleading accounting indicated that the quality of information about corporations was weaker than the markets had supposed." The increase in the US high-yield corporate bond spread over treasuries shown by the authors is the spike of about 50 basis points in late 2001. If this 0.5%

increase in spread is added to the historical equity risk premium of about 5%, ex ante stock price would be over-valued by about 10%.

Efficient risk sharing implies that consumers in the faster-growing region sell equity and buy fixed income assets that provide the same consumption in all states of the world; and this has clear implications for the *ex post* distribution of losses. Where the ending of the asset price boom involves a payoff below the mean – and a fortiori below the expected value after distortions due to irrationality and moral hazard – there may be significant wealth transfers across the world very different from those associated with debt finance. Our expected welfare calculations show that, in the absence of distortions, the gains from trade in global financial markets are positive, but small: in terms of consumption flows, they are worth only about one fiftieth of one percent of GDP to each country – a finding which is robust to parameter variations.

The implications of mispricing are more striking. Since overvaluation involves a transfer from investors worldwide to US producers, the US enjoys a gain which rises in proportion to the distortion in asset prices (with corresponding losses to foreign investors). In the case examined below, where – with no change in fundamentals – the mean value of the extra GDP added by the New Economy increases in expectation by just over one percent of GDP, the US enjoys an international transfer of almost half of that. Taking account of home bias in investors' portfolios would reduce the ratio of this unintended transfer to the efficiency gains; but even if the transfer were scaled down by a factor of ten, transfer losses would still dominate efficiency gains for the rest of the world.

We suggest finally that this analysis complements recent econometric studies of the transmission mechanism which find that financial factors are needed to explain "why the European economy was strongly affected by the downturn in the US" (Artis et al, 2003).

1. Introduction

The role of risk-sharing in the financial system is a central element in Alan Greenspan's views of "World Finance and Risk Management". In addressing the UK Treasury, he illustrated the importance of risk spreading by noting the steadiness of the US economy despite "the draining impact of a loss of 8 trillion dollars of stock market wealth", and other adverse shocks throughout 2001-02, Greenspan (2002). As the US productivity boom in the 1990s was largely equity-financed, the decline in asset valuations was mainly absorbed by shareholders, avoiding the concentration of risks in the corporate sector and banking associated with highly-leveraged financing. The international dimensions of risk-sharing -- and the 'moral hazard' aspects of asset price fluctuations -- were not stressed by the Fed Chairman. They are the focus of this paper which examines the welfare benefits offered by international financial markets for consumption-smoothing and risk-spreading; and the transfers that may occur when a stock-price bubble finally bursts.

Ex ante support for the view that asset prices in the US were far higher than could be justified by economic fundamentals was provided by Shiller (2000), who used history, sample surveys and psychology to identify 'irrational exuberance' on the part of investors. Others have argued that the conduct of monetary policy may have encouraged investors to believe they were insured against a market crash, Miller *et al* (2002). *Ex post*, evidence emerging in US bankruptcy courts, where corporate officials have been indicted for misappropriation of funds and for fraud, suggests that corporate insiders had economic incentives to distort investor perceptions. According to one observer, "stock options distorted managerial incentives, [and] consulting distorted auditors incentives"; and the case of Enron[1], for example, showed that "shareholders didn't have the information with which to judge what was going on, and there were incentives not to provide that information but to provide distorted information" Stiglitz (2003, pp. 139 and 248). Much of the blame for these corporate excesses is attributed by Stiglitz to the zeal for deregulation that began with President Reagan[2]. Subsequently, there has been a substantial shift to re-regulation under President Bush: the Sarbanes-Oxley Act, for example, seeks to reinforce truth-telling by CEOs and

[1] "One could argue that Enron put into question the reliability of corporate America." (Calvo and Talvi, 2002).
[2] He also criticises the Chairman of the Fed for failing to follow up his ' irrational exuberance' speech in 1996 by acting on interest rates or margin requirements, Stiglitz (2003, chapter 3).

CFOs who are required to certify corporate financial reports subject to criminal penalties for miscertification.

Academic evidence of distorted incentives is summarised in a recent survey of theory and evidence relating to corporate 'excesses' and financial market dynamics circulated by the ECB. Stock options, while designed to align the interest of managers and shareholders, have, in the view of the authors, "turned out to have other effects: managers had an interest in driving up the stock price of their firm to realise their gains, exercising their options and cashing in upon leaving the company. Furthermore, particularly in the US, the use of stock options helped to distort published earnings" (Maddaloni and Pain, 2004, p.13).

What of the international implications? Coincident with the "New Economy" productivity boom, the United States ran a significant current account deficit in the second half of the 1990s, and it also acted as a magnet for global capital flows. Indeed, Ventura (2001) suggests that the US current account deficit in the late 1990s could have been magnified by the appearance of the dot-com bubble. In an inter-temporal analysis, Bailey, Millard and Wells (2001, p.12), henceforth BMW, observe that "the productivity shock in the United States has appeared to lead to large capital inflows as US residents have borrowed against expected future income".[3] They highlight the strong increase in both equity and FDI flows since 1995, and note the IMF's suggestion that these net equity capital inflows may have helped explain the strength of the dollar against euro.

Table 1: Net inflows of direct and portfolio investment to the US from the EU (excl. UK)

In USD billions

US $ bn	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**
US treasury bonds & notes	7.82	42.88	43.05	5.54	-15.72	-6.09	-18.52	-18.61
US equities	-1.65	-1.75	28.79	36.31	46.04	84.86	39.42	12.53
Net direct investment	-13.7	16.89	19.0	71.74	121.8	165.5	18.71	-36.04
Memo item: current account	12.26	5.84	-0.90	-10.21	-21.63	-35.1	-32.88	-53.58

**Source: Bureau of Economic Analysis and US Treasury*

[3] Using a two-country, two-good general equilibrium model, BMW (2001) show that the productivity shock has to be mostly in the tradable sector in order to generate the US dollar appreciation in the second half of the 1990s.

Further detail of bilateral flows between Europe and the US are provided in Table 1[4],where the inflow of risk capital from the EU (excluding the UK) totals about half a trillion dollars from 1996 to 2002, much greater than the cumulated bilateral deficit on current account over that period ($62 billion).[5] The annual figures over that period also reveal that, while risk capital inflows increased, flows into fixed income bonds first declined and then turned to outflows.

The dynamic theory of the balance of payments under certainty focuses on the role of financial markets in smoothing consumption, but risk-sharing provides an additional motive for capital flows in a stochastic environment, Obstfeld and Rogoff (1996, Chapter 5). To capture both motives for US capital inflows analytically, we use a stylised two-country, two-period general equilibrium framework with an anticipated, stochastic productivity boom in one country (the US).

When Hunt and Rebucci (2003) used the IMF's new Global Economic Model to see how a permanent asymmetric productivity shock in the tradable sector can affect US real exchange rates and trade balance in the second half of the 1990s, they found that a reduction in the perceived riskiness of US assets is needed to fit the data. So, as in Debreu's original formulation[6], we allow the stochastic distribution perceived by investors to differ from the true distribution, having higher mean and lower variance. This discrepancy may be attributed to "irrational exuberance" due to herding behaviour (Shiller, 2000); or to "corporate moral hazard", if distorted incentives led to false accounting (Stiglitz, 2003).

It is impossible to tell with any accuracy how much distorted corporate incentives contributed to the asset price overvaluation in the US: but the jump in junk bond rates in 2001/02 may provide a clue. According to Mishkin and White (2003, p.72) "This development did not reflect any change in the stock market but rather the effects of the Enron scandal. The revelation of fraud and misleading accounting indicated that the quality of information about corporations was weaker than the markets had supposed." The increase in the US high-yield corporate bond spread over treasuries shown by the authors is the spike of about 50 basis points in late 2001. If this 0.5%

[4] The overall US current account deficit and multilateral patterns of finance were greatly affected by the East Asian crisis, where the flight to safety by countries in the region increased US deficit and financed by substantial accumulation of reserve assets in Asia, IMF (2003). Such seigniorage flows are not considered by BMW nor in this paper.

[5] Some of the increase in equity flows to the US towards the end of 1990s may reflect trans-Atlantic M&A activity.

increase in spread is added to the historical equity risk premium of about 5%, ex ante stock price would be over-valued by about 10%.[7] (This is about a third of the over-valuation we assume in the simulations that follow.)

Efficient risk sharing implies that consumers in the faster-growing region sell equity and buy fixed income assets that provide the same consumption in all states of the world[8]; and this has clear implications for the *ex post* distribution of losses. Where the ending of the asset price boom involves a payoff below the mean – and a fortiori below the expected value after distortions due to irrationality and moral hazard – there may be significant wealth transfers across the world very different from those associated with debt finance. Our expected welfare calculations show that, in the absence of distortions, the gains from trade in global financial markets are positive, but small: in terms of consumption flows, they are worth only about one fiftieth of one percent of GDP to each country – a finding which is robust to parameter variations.

The implications of mispricing are more striking. Since overvaluation involves a transfer from investors worldwide to US producers, the US enjoys a gain which rises in proportion to the distortion in asset prices (with corresponding losses to foreign investors). In the case examined below, where – with no change in fundamentals – the mean value of the extra GDP added by the New Economy increases in expectation by just over one percent of GDP, the US enjoys an international transfer of almost half of that. Taking account of home bias in investors' portfolios would reduce the ratio of this unintended transfer to the efficiency gains; but even if the transfer were scaled down by a factor of ten, transfer losses would still dominate efficiency gains for the rest of the world.

We suggest finally that this analysis complements recent econometric studies of the transmission mechanism which find that financial factors are needed to explain "why the European economy was strongly affected by the downturn in the US" (Artis et al, 2003).

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[6] In the "Theory of value", Debreu (1959, chapter 7.5, 7.7) solves for general equilibrium using subjective, not objective, probabilities.

[7] But note that Calvo and Talvi (2002), who also believe that "Enron revealed that informational distortions reign high in the US", associate the increase of around 350 basis points from April to October 2002 with these 'informational distortions'. On this basis, distorted incentives could have pushed share prices about two thirds above their true value, which is far greater than the 'upside distortion' we have included in the paper.

The paper proceeds as follows. In section 2 we introduce the model for consumption and optimal portfolio choice between equity and debt. In section 3 we first derive the key welfare results setting σ and ρ to unity (i.e., for the log utility model in section 2); then we check on robustness. In section 4 the model is numerically calibrated to fit the stylised facts of the US equity valuations over the 1990s and the early 2000s. Section 5 concludes.

2. Growth Expectations and International Financial Markets: a global model

To develop our analysis, we specify a two-period dynamic stochastic general equilibrium model in the tradition of Weil (1990) and Obstfeld and Rogoff (1996). Assuming representative consumers in both countries share identical preferences given by expected logarithmic utilities, we obtain equilibrium consumption allocation, asset holding, and current account positions with and without the presence of ex ante misperception as to probabilities. We compare the welfare outcomes under autarky; with complete markets; and with misperceived probabilities. To check the robustness, our results are extended (in a CEPR DP) to more generalised preferences which allow for separate treatment of parameters for inter-temporal substitution (time preference) and cross-state substitution (risk aversion).

2.1 Consumption allocation in a two-country model

Consider an economy with two-countries (home and foreign) who exchange and consume one tradable good. The economy exists for two periods. There is no uncertainty in the first period, the endowments for both home and foreign countries are given by $Y_1 = Y_1^*$, where * denotes foreign variables. In the second period, both countries expect a (non-stochastic) trend growth in output at the same rate of g. The home country in addition anticipates the arrival of the "New Economy", a positive supply shock which increases period-to-period growth by a higher rate h or by a lower rate of l. The home country's date 2 endowments are given respectively by $Y_2(1) = Y_1(1+g+h)$ and $Y_2(2) = Y_1(1+g+l)$, with their ex ante probability of π and $1-\pi$. The date 2 endowments for the foreign country are given by $Y_2^*(1) = Y_2^*(2) = Y_1^*(1+g)$.

[8] For efficient risk sharing, Debreu uses Arrow securities - each indexed to a particular time and state - instead.

Representative consumers in both countries share identical preferences. Home country's lifetime utility is given by

$$U(C_1, C_2(\bullet)) = \ln(C_1) + \beta[\pi \ln(C_2(1)) + (1-\pi)\ln(C_2(2))] \qquad (2.1)$$

where β is the time preferences, C_1 and $C_2(\bullet)$ are date 1 and date 2 consumption respectively.

Assume complete asset markets with 2 Arrow-Debreu securities. Their prices are given by $p(s) > 0$ ($s = 1,2$) measured in date 2 sure consumption goods. No-arbitrage requires

$$\sum_s p(s) = 1 \qquad (2.2)$$

The budget constraint of the home country is given by

$$C_1 + \frac{p(1)C_2(1) + p(2)C_2(2)}{1+r} = Y_1 + \frac{p(1)Y_2(1) + p(2)Y_2(2)}{1+r} \qquad (2.3)$$

where $1+r$ is the gross real interest rate measuring date 1 consumption in units of date 2 sure consumption.

The partial equilibrium allocation is obtained when the home country is maximising (2.1) subject to budget constraint (2.3) given Arrow-Debreu prices and real interest rate. Specifically, substitution of C_1 from (2.3) into (2.1) and differentiating the expected utilities with respect to $C_2(1)$ and $C_2(2)$ yield the following two first order conditions:

$$\frac{\partial U(C_1, C_2(\bullet))}{\partial C_2(1)} = \frac{1}{C_1}\frac{\partial C_1}{\partial C_2(1)} + \frac{\beta\pi}{C_2(1)} = 0 \qquad (2.4)$$

$$\frac{\partial U(C_1, C_2(\bullet))}{\partial C_2(2)} = \frac{1}{C_1}\frac{\partial C_1}{\partial C_2(2)} + \frac{\beta(1-\pi)}{C_2(2)} = 0 \qquad (2.5)$$

where $\partial C_1 / \partial C_2(1) = -p(1)/(1+r)$ and $\partial C_1 / \partial C_2(2) = -p(2)/(1+r)$.

Simple rearrangement of (2.4) and (2.5) yield

$$C_2(1) = \frac{\beta\pi}{p(1)}(1+r)C_1 \qquad (2.6)$$

$$C_2(2) = \frac{\beta(1-\pi)}{p(2)}(1+r)C_1 \qquad (2.7)$$

After substitution of (2.6) and (2.7) into budget constraint (2.3), one can obtain date 1 consumption as

$$C_1 = \frac{1}{1+\beta}\left[Y_1 + \frac{p(1)Y_2(1) + p(2)Y_2(2)}{1+r}\right] \equiv \frac{W_1}{1+\beta} \qquad (2.8)$$

where W_1 is home country's wealth. So (2.6) – (2.8) characterise partial equilibrium consumption allocation for the home country, those for the foreign country follow the similar forms.

To obtain equilibrium prices and consumption allocation, we use the following market clearing conditions

$$C_1 + C_1^* = Y_1 + Y_1^* \qquad (2.9)$$

$$C_2(s) + C_2^*(s) = Y_2(s) + Y_2^*(s), \quad s = 1,2. \qquad (2.10)$$

Denote $Y_1^W = Y_1 + Y_1^*$, and $Y_2^W(s) = Y_2(s) + Y_2^*(s)$, (2.9) and (2.10) imply

$$p(1) = \pi\beta(1+r)Y_1^W / Y_2^W(1) \qquad (2.11)$$

$$p(2) = (1-\pi)\beta(1+r)Y_1^W / Y_2^W(2) \qquad (2.12)$$

Applying no-arbitrage condition (2.2) using (2.11) and (2.12) gives the equilibrium real interest rate

$$\beta(1+r) = \frac{1/Y_1^W}{\pi / Y_2^W(1) + (1-\pi)/Y_2^W(2)} = \frac{Y_2^W(1)Y_2^W(2)}{Y_1^W[\pi Y_2^W(2) + (1-\pi)Y_2^W(1)]} \qquad (2.13)$$

Replacing $\beta(1+r)$ in (2.11) and (2.12) using (2.13) yields equilibrium Arrow-Debreu prices:

$$p(1) = \frac{\pi / Y_2^W(1)}{\pi / Y_2^W(1) + (1-\pi)/Y_2^W(2)} = \frac{\pi Y_2^W(2)}{\pi Y_2^W(2) + (1-\pi)Y_2^W(1)} \qquad (2.14)$$

$$p(2) = \frac{(1-\pi)/Y_2^W(2)}{\pi / Y_2^W(1) + (1-\pi)/Y_2^W(2)} = \frac{(1-\pi)Y_2^W(1)}{\pi Y_2^W(2) + (1-\pi)Y_2^W(1)} \qquad (2.15)$$

Although both home and foreign countries can smooth consumption and share risk with the aid of Arrow-Debreu securities, the degree of consumption smoothing and risk-sharing is exposed to aggregate uncertainty. The equilibrium real interest rate and Arrow-Debreu prices reflect such aggregate uncertainty. In particular, the real interest rate reflects the relative scarcity of aggregate endowments across time (as it is the ratio of date 1 marginal utility of consumption of aggregate endowment to the expected present value of date 2 marginal utilities of aggregate state consumption), and the Arrow-Debreu prices depend on the relative scarcity of aggregate

endowments in different states. Since $Y_2(1) > Y_2(2)$ and $Y_2^*(1) = Y_2^*(2)$, (2.13) – (2.15) imply that an increase in π increases the real interest rate and the high-state Arrow-Debreu price.

The general equilibrium consumption allocation can be derived by substituting (2.13) – (2.15) to (2.6) – (2.8). This yields

$$C_1 = \mu Y_1^W \tag{2.16}$$

$$C_2(s) = \mu Y_2^W(s), \quad s = 1, 2 \tag{2.17}$$

where

$$\mu = \frac{Y_1 / Y_1^W + \beta[\pi Y_2(1)/Y_2^W(1) + (1-\pi)Y_2(2)/Y_2^W(2)]}{1+\beta}. \tag{2.18}$$

From (2.17), one has

$$C_2(1)/C_2(2) = Y_2^W(1)/Y_2^W(2).$$

So the ratio of date 2 state-contingent consumption is independent of *ex ante* probability.

To see how a change in *ex ante* probability can affect equilibrium consumption, we need only look at how μ changes with π. It is straightforward to show that

$$\frac{\partial \mu}{\partial \pi} = \frac{\beta[Y_2(1) - Y_2(2)]Y_2^*(1)}{(1+\beta)Y_2^W(1)Y_2^W(2)} > 0 \tag{2.19}$$

as $Y_2^*(1) = Y_2^*(2)$ and $Y_2(1) - Y_2(2) > 0$. Given endowments, an increase in the probability of the higher growth state, π, increases home country's consumption in all states and times.

2.2 Asset allocation and the current account

Let $S(s)$ denote the Arrow-Debreu security for state s (which will deliver one unit of date two consumption good when s is realised). Assume there are two assets traded in the market: one is a stock on date 2 home country's "New Economy" (home country's date 2 excess output), the other is a riskless bond which has the return the same as the real interest rate. Specifically, the date 2 payoffs on one unit of stock are $\sum_s [Y_2(s) - Y_2^*(s)]S(s)$, and date 2 payoff of the bond is $(1+r)\sum_s S(s) = 1+r$. Given $Y_2(1) - Y_2^*(1) \neq Y_2(2) - Y_2^*(2)$, these two assets (each as a linear combination of the Arrow-Debreu securities) span the date 2 state space.

To implement the equilibrium consumption allocation, let home country's demand for stocks and bonds be given by ξ and ζ respectively. Date 2 budget constraints require

$$C_2(s) - Y_2(s) = \zeta(1+r) + \xi[Y_2(s) - Y_2^*(s)], \quad s = 1, 2. \tag{2.20}$$

Solving (2.19) for ξ and ζ, and incorporating (2.17) yields

$$\xi = \mu - 1 \tag{2.21}$$

$$\zeta(1+r) = (2\mu - 1)Y_2^*(1) \tag{2.22}$$

Foreign country's asset holdings are determined in a similar fashion. Let foreign country's demand for stock and bond be given by ξ^* and ζ^*, since the net demand for each class of assets has to be zero, then $\xi^* = -\xi$ and $\zeta^* = -\zeta$. For the parameter values chosen in this model, it is clear that $1/2 < \mu < 1$, so that to execute its optimal consumption plan the home country sells equity to, and buys bonds from, the foreign country. With an increase in π, (2.21) and (2.22) imply that both ξ and $\zeta(1+r)$ increase (as they vary positively with μ), i.e., the home country sells less of its equity in date 1 while the returns on bonds go up. Since (2.17) indicates that higher π leads to higher date 2 state-contingent consumption, (2.20) suggests that higher consumption is the result of both the higher interest on bonds in date 2 and of less equity sales in date 1.

Given the equilibrium consumption allocation outlined above, one can easily obtain the home country's current account position. Specifically, the home country's current account deficits are

$$CA = C_1 - Y_1 = \mu Y_1^w - Y_1 > 0 .$$

Using budget constraint (2.3) and asset allocations (2.20) – (2.22), one can show how current account deficits are financed

$$CA = C_1 - Y_1 = -\zeta - \xi \frac{\sum_s p_s [Y_2(s) - Y_2^*(s)]}{1+r} \tag{2.23}$$

Equation (2.23) simply states that the home country sells equity to finance both current account deficits and the purchase of bonds in period 1.

How does an increase in *ex ante* probability affect (2.23)? As discussed above, an increase in π increases home country's current account deficits and reduces the amount of equity sold abroad in

date 1. Using (2.22), one can show

$$\frac{\partial \zeta}{\partial \pi} = \frac{2\beta}{1+\beta} \frac{[Y_2^*(1)]^2 [Y_2(1) - Y_2(2)]}{Y_1^W [\pi Y_2^W(2) + (1-\pi) Y_2^W(1)]^2} [(2-\pi) Y_2(1) + \pi Y_2(2) + 2Y_2^*(1)] > 0.$$

So a higher π means an increase in the number of bonds purchased by the home country in date 1. From the budget constraint (2.23), with an increase in π, home country issue a smaller number of shares of equity to finance both higher current account deficits and the purchase of more bonds in date 1. This is only possible if the date 1 value of equity increases, i.e., the date 1 price of equity must increases more than needed to compensate for the reduced number of shares on issue.

2.3 Welfare measures

For the equilibrium consumption given in section 2.2, what will be the utility gain for the home country when markets are complete? Under autarky, the home country simply consumes its endowments, so its lifetime utility is given by

$$U_A(Y_1, Y_2(\bullet)) = \ln(Y_1) + \beta[\pi \ln(Y_2(1)) + (1-\pi)\ln(Y_2(2))] \qquad (2.24)$$

Given autarky welfare above, we specify the gain from consumption-smoothing and risk-sharing as

$$\Delta U_T = U(C_1, C_2(\bullet)) - U_A(Y_1, Y_2(\bullet)), \qquad (2.25)$$

where $U(C_1, C_2(\bullet))$ is the home country's life time utility under complete markets.

To see how such a utility gain can be translated into consumption, we provide the following two measures in section 3. First we assume that all the utility gain is accorded to an increase in the first period consumption (the "Potlatch" measure used in the next section), i.e.,

$$U(C_1, C_2(\bullet)) = U_A(Y_1 + \Delta C_P, Y_2(\bullet)). \qquad (2.26)$$

The second is to accord the utility gain to a "flow" of consumption in both periods:

$$U(C_1, C_2(\bullet)) = U_A(Y_1 + \Delta C_F, Y_2(\bullet) + \Delta C_F). \qquad (2.27)$$

2.4 Effects of misperception and welfare transfer

Let moral hazard and/or "irrational exuberance" be characterised as misperception, i.e., where the distribution perceived by investors differ from the true distribution, in particular, where the perceived probability, π, of higher growth in period 2 is greater than its true probability, π_O.

Denote the consumption allocation under perceived distribution by $C_t(s;\pi)$, the lifetime utility for such an allocation evaluated under the true distribution is

$$U_M(C_1(\pi), C_2(\bullet,\pi)) = \ln(C_1(\pi)) + \beta[\pi_O \ln(C_2(1,\pi)) + (1-\pi_O)\ln(C_2(2,\pi))]$$

The welfare "transfer" due to misperception is defined as

$$\Delta U_M = U_M(C_1(\pi), C_2(\bullet,\pi)) - U(C_1, C_2(\bullet)), \qquad (2.28)$$

where $U(C_1, C_2(\bullet))$ is given by (2.3) with $\pi = \pi_O$.

Proposition

Higher misperception (larger $\pi - \pi_O$) increases welfare transfer from Foreign to Home country, i.e., $\partial \Delta U_M^H / \partial \pi > 0$ and $\partial \Delta U_M^F / \partial \pi < 0$.

Proof:

Substitution of (2.16) and (2.17) into (2.28) for the Home country yields

$$\Delta U_M^H = (1+\beta)\ln[\mu(\pi)/\mu(\pi_o)].$$

From (2.19), $\mu(\pi)$ is increasing in π. So given π_o, we have $\partial \Delta U_M^H / \partial \pi > 0$. Similarly, one can show

$$\Delta U_M^F = (1+\beta)\ln[(1-\mu(\pi))/(1-\mu(\pi_o))]$$

So, $\partial \Delta U_M^F / \partial \pi < 0$.

Insight into these results is provided by Figure 1 which focuses on the risk-sharing in period two using a state-space diagram, with outcomes for the high payoff state on the vertical axis and for the low payoff state on the horizontal. From the results for log utilities, it follows that -- whatever the perceived probabilities -- the consumption plans for each country lie on the ray OT, whose slope corresponds to the ratio of world endowments. (Thus OT passes through M, the average of the autarchy endowments, shown as A and A' for Foreign and Home respectively.)

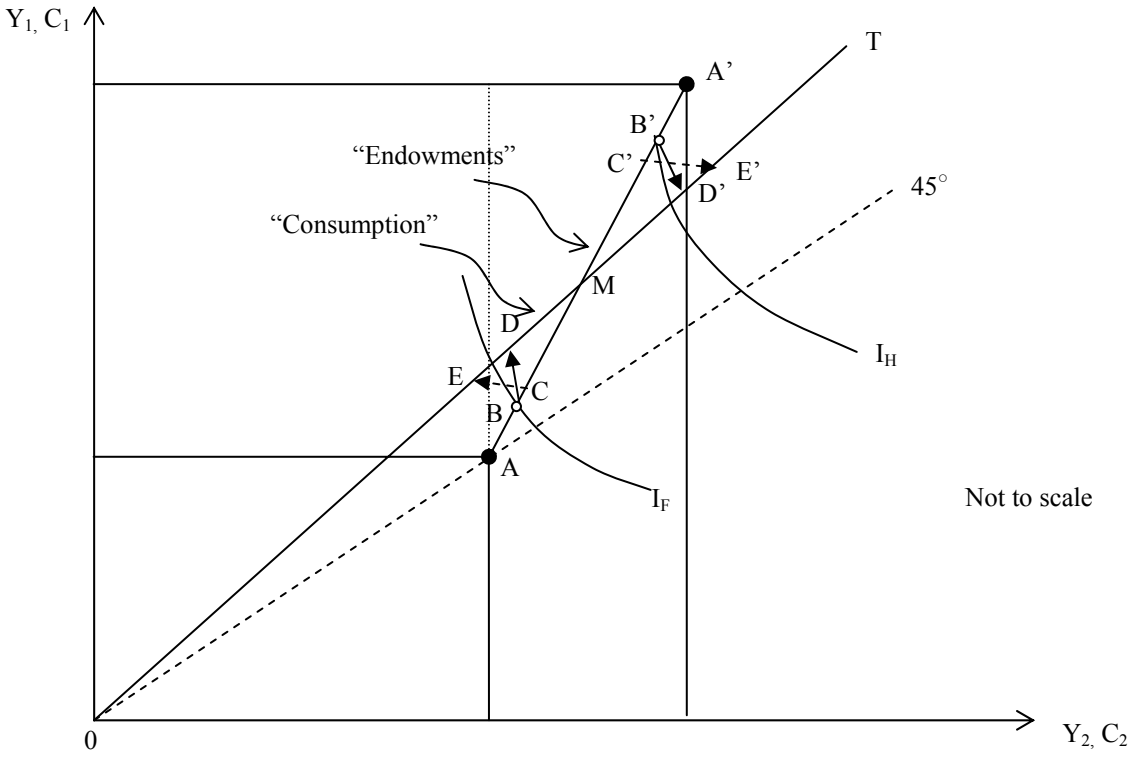

Figure 1. Equilibrium effects of distorted probabilities

How does the efficient Arrow-Debreu outcome differ from the consumption of these Autarchy endowments? Note first that the effect of the anticipated New Economy is to raise first period interest rates, as the Home country increases consumption and the Foreign country saves more. These current account imbalances in period one help to equalise entitlements in period two as is indicated by the revised 'endowment' points B and B' which lie between A and A'. In addition to this effect of inter-temporal consumption-smoothing, the diagram shows the effects of efficient risk-spreading, where the Home country trades some of its high-state consumption for consumption in the low state as indicated by the vector B'D', whose slope reflects the ratio of state prices. Conversely the Foreign country chooses point D by trading along the vector BD. That these trades are Pareto-improving is obvious as the outturns on OT lie above the (homothetic) indifference curves passing through B and B' respectively.

What would be the effect of distorted perceptions as to payoff probabilities? Could they make the Foreign country worse off than under Autarchy? First, we note that an increase in the perceived probability of the high outcome raises the interest rate in the first period, and so moves second period entitlements closer together, as shown by points C, and C'. Second, we note that the 'terms of trade' will move significantly against the Foreign country as the price of income in the high state rises in line with its increased likelihood. The effects of trading under distorted perceptions are indicated by the vectors CE and C'E' respectively whose flat slope reflects the shift in the "terms of trade". That these trades are not Pareto efficient, when evaluated using true probabilities, follows immediately from the fact that the Foreign country is trading at adverse 'terms of trade' which will lower its expected utility compared to no trade. (In the light of results from calibration, we have drawn point E as lying below the indifference curve through B.) What are the returns to the Foreign country which has boosted its saving in period one and bought assets to support the consumption plan at point E? In the low state it consumes less than its autarchy endowment which is not promising. The loss of welfare that this represents (no return on its saving) would be more than balanced by the fact that consumption will exceed the autarchy endowment in the high state, if the high state occurs with the distorted high probability. But if consumers have been significantly misled, this need not be true: the good times can occur so seldom that the Foreign country loses all the benefits of trade in assets, and is worse off than in Autarchy.

The state-space approach immediately implies what asset holdings are needed to implement the chosen consumption plans; appropriate holdings of Arrow securities (each promising one unit of output in a given state of nature in a given period) are indicated by the coordinates of the consumption points in Figure 1. It may be more useful to work with combinations of Arrow securities which also span the space of consumption, namely bonds and shares, see Figure 2 where the non-contingent payouts of the former are represented by the 45 degree line and the state-contingent payouts of the latter by holdings along the vector AA' (assuming for convenience that all the value added in the New Economy accrues in the form of profits paid out to shareholders).

To support consumption at point E for example, Foreign consumers will need to hold shares in the New Economy as indicated by AS and issue debt as indicated by the vector SD. Absent the current account surplus in period one, foreigners who share the risk of the New Economy would have to be

fully levered: with a current account surplus which effectively raises their second period endowment to point B, however, leverage is required to fund purchases from B to S[9] . In the calibrations which follow, leverage roughly doubles holdings attributable to the current account.

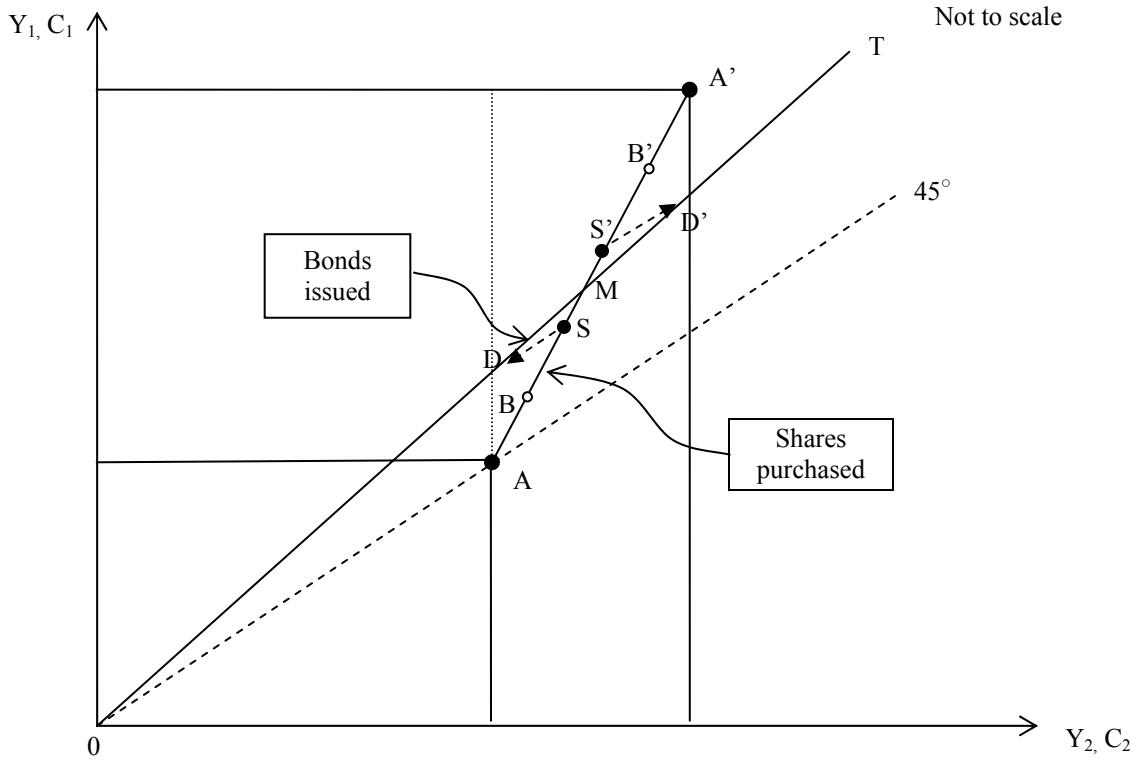

Figure 2: Asset holdings to implement consumption plans.

3. Welfare Effects

Using this model, we consider the US "New Economy" boom of the late 1990s and the early 2000s and analyse its impact on expected welfare both at home (US) and elsewhere. For the baseline, expected welfare is calculated based on the assumption that there is a complete set of markets for smoothing consumption over time and for diversifying risk, using key parameters from the Bank of

[9] Where the slope of the vector DB represents the terms of trade determined by state prices.

England study, BMW (2001)[10]. This is followed by a scenario where investors are misled about the probability of high payoffs from the "New Economy".

3.1 Three "New Economy" Scenarios

Before presenting the numerical results, we specify three scenarios.

"Autarky"
In both periods and both states, each country consumes its endowment: there is no international finance.

"Base-Line": Arrow-Debreu
As in BMW (2001), we assume that the expected boom in the US is a once-and-for-all 5.0% increase in the level of the US GDP, leaving trend growth unchanged at 2.4%. Given the stylised stochastic nature of our model, and setting the standard deviation of consumption to be consistent with that reported by Obstfeld and Rogoff (1996) for the US between 1950-1990, this expected payoff is the mean of two equi-probable outcomes, a low pay-off $Y_2(2)$ which adds 2.5% to second period growth and a high pay-off $Y_2(1)$ which adds 7.5%. Note that even though the "New Economy" succeeded in lifting the Home economy above its trend growth path, the market will still fall if it is the low payoff that is realised (falling about a half, see Table 4 below): but this downside risk ("bad luck") will have been foreseen and balanced by the upside prospect of the market rising on realising the high payoff.

"Excess Upside Probability": a stock-market bubble

This is the scenario when the probability weight attached to the high payoff is higher than warranted. This could be due to investor psychology (Shiller, 2000); or to mis-information where accountants and Chief Executive Officers have private incentives to misreport actual and expected profits (because, perhaps, the normal checks on such misreporting are missing as result of rapid and extensive deregulation). It might seem tempting to model a "moral hazard equilibrium" where these incentives to misreport are checked, not by regulation but by the actions taken by suspicious

[10] So their results can be obtained as a special case of our stochastic framework.

investors. We do not do this on the grounds that the degree of misreporting was an unexpected surprise[11], whose true dimensions are only now apparent to investors, partly as a result of proceedings in the criminal courts. (Later, we assume, for simplicity, that such moral hazard has effectively disappeared with re-regulation, e.g., the Oxley-Sarbanes Act.)

How is one to characterise the effects of an asset price bubble, including aspects of moral hazard, in a general equilibrium model? We do this by simply increasing the *perceived* probability of the high payoff of the "New Economy"; specifically it increases to 0.75, although the true probability still remains at 0.5; so the expected supply-side shock rises from 5 to 6.25 percent of GDP. In this case, if the low state payoff materialises, the market should fall should be greater (closer to 60%, see Table 4), i.e., more in line with the observed fall of the NASDAQ index (from its peak of about 5000 to less than 2000). In the meantime, decisions will have been distorted by excessively bullish expectations.

3.2. Welfare results

Welfare measures are shown in Table 2. In the top row are the lifetime welfare outcomes for the 'Old Economy', where there is no gain from trading financial assets and each country simply consumes its own endowment, which grows non-stochastically by 2.4%. Next are calibrations of three scenarios for the 'New Economy'. With Autarky, each country continues to consume its own endowment, despite the potential gains from trade in financial assets to spread the effects of the asymmetric shock. When these market opportunities are exploited, however, this yields the welfare outcomes for the Arrow-Debreu equilibrium shown next. Finally, labelled Excess Upside Probability, the utility of consumption plans made using distorted probabilities of the New Economy is assessed (but the welfare evaluation is made using the true probabilities).

Two measures are used to translate the welfare changes into consumption flows. The first, labelled "Potlatch"[12], indicates the percentage increase in consumption in the first period which would deliver an equivalent welfare change. The second, roughly half the size, labelled "Flow", indicates

[11] It is worth recalling that, in 1996/7 East Asian economies were being described as dens of "Crony Capitalism" in contrast to the US, whose Anglo-Saxon procedures for accounting and corporate governance were widely commended as a global benchmark

[12] An American word denoting an Indian winter festival, or the gift-giving at that time.

the welfare-equivalent extra consumption flow in both periods. Although the Flow measure might seem the more relevant, the figures in the second row showing the consumption gains from the New Economy without international trade in financial assets suggest that the Potlatch measure may be more appropriate when 'permanent' changes are being considered in the context of a two period model. The figure of 4.67% representing the increase in current consumption corresponding to the gains from stochastic increases in second period output whose mean value is 5%, seems a better measure of what is in reality a permanent productivity change than the "flow" figure of 2.43%. Hence the focus on the Potlatch measure in what follows.

Table 2. Expected lifetime welfare, by country.

	HOME			FOREIGN		
	Lifetime Welfare	"Potlatch" % Cons'n	"Flow" % Cons'n	Lifetime Welfare	"Potlatch" % Cons'n	"Flow" % Cons'n
"Old Economy"	9.16462			9.16462		
ΔU0	**+0.0467**	**+4.67**	**+2.43**	**0**	**0**	**0**
Autarky Equilibrium	9.21132			9.16462		
ΔU1	**+0.00020**	**+0.02**	**+0.01**	**+0.00021**	**+0.02**	**+0.01**
Arrow-Debreu Equilibrium	9.21151			9.16484		
ΔU2	**+0.0057**	**+0.57**	**+0.29**	**-0.0058**	**-0.58**	**-0.30**
Excess Upside Probability	9.21717			9.15903		
ΔU1+ΔU2	**+0.0059**	**+0.59**	**+0.31**	**-0.0056**	**-0.56**	**-0.29**

Clearly there are additional gains to be achieved by using *global financial markets* to smooth consumption over time and to spread risk of the asymmetric supply side shock internationally. How big are they? In terms of immediate consumption, the answer for the Home country is a gain of only 1/50 of 1%, see **Δ**U1 in the table (of which, approximately 2/3 is attributable to inter-temporal consumption-smoothing). With similar results for the Foreign country, the gains from international trade in financial assets are clearly positive, but rather small.

This may be disappointing, but not too surprising if one recalls that Lucas (1987) calculated the welfare gain to the US from eliminating *all* consumption fluctuations to be less than one-hundredth of one percent of consumption on a flow basis when preferences are logarithmic. Updating Lucas's

exercise to cover the period 1950-1990, Obstfeld and Rogoff (1996 p.330) calculate a welfare gain of $\rho.Var(\varepsilon)/2 = \rho\ 0.0007/2 = \rho\ 0.00035$, where ε is the annual shock to consumption, and ρ is the measure of risk aversion; for log utility, this implies a flow gain 0.035 of 1% of consumption. While the variance we choose matches that of Obstfeld and Rogoff, the potlatch gain from international risk-sharing should only be about a quarter of this figure -- as risk only occurs in the second period and it is only partially eliminated. But note that the potlatch gain shown in the table also includes the gains from inter-temporal consumption-smoothing.

What are the welfare implications of asset price overvaluation stemming, perhaps, from distorted incentives in the corporate sector? Since these involve transfers from investors worldwide to producers in the US, there are winners and losers. On balance, US enjoys a potlatch gain of almost half a percent of GDP -- i.e., more than twenty times the gains from completing financial markets: and the losses to foreign investors are of a similar magnitude, see ΔU2 in the table. It is not difficult to see why: if corporate moral hazard has lifted the expected size of the New Economy by one percentage point and foreigners acquire almost half of the shares on offer[13], then they will lose half on one percent in the final *denoument*.

Summing these changes gives the bottom line: relative to autarky, international financial markets trading with distorted probabilities deliver a gain of 0.59 of one percent of period 1 consumption in the Home country, but foreigners lose the equivalent of 0.56 of one percent of period 1 consumption, as the unanticipated transfer offsets their welfare gains from financial markets.[14]

3.3 Checking the robustness of the welfare results

How robust are these welfare conclusions? As they depend crucially on the degree of asset mispricing, we check first to see how varying perceived π changes the size of the transfer. Observe that the ratio of Home country transfer gains (0.57) to its efficiency gains of consumption stabilisation (0.02) shown in Table 2 is 28.5; and this roughly matches the excess percentage

[13] See details in next section. Note there is no home bias in the model, and there is perfect symmetry between the two countries.

[14] The finding that international transfers can more than offset efficiency gains to opening markets was also a feature of the general equilibrium model of UK entry into the European Community of Miller and Spencer (1977). In practice, however, Mrs Thatcher renegotiated the transfers!

probability attached to the high outcome, 100(0.75 – 0.25) = 25. In fact, for our global model with log utility, this proportionality holds for wide variations in expected π; so we can say that, *the ratio of transfer gains to the Home country relative to the efficiency gains offered by complete markets approximately matches the excess probability of the high outcome*. If, for example, "meta moral hazard" was to add a quarter to the asset price overvaluation due to corporate moral hazard (lifting the perceived probability of the high outcome rises to 81.25% and the excess probability to 31.25), then the transfer gains would be about 35 times welfare gains of 1/50 of one percent of US consumption, i.e., a little over 2/3 of a percent of GDP. As an important qualification, it should be emphasised that – aside from the New Economy shock – this global model is one of perfect symmetry, with only one good and no "home bias" in portfolios: so foreigners are far more exposed to asset mispricing than one would expect in reality.

The figures shown in Table 2 are robust in variations in risk aversion and intertemporal rate of substitution. Neither varying the parameter for risk aversion over the range indicated by Corsetti et al. (2003), nor lowering the rate of inter-temporal rate of substitution as suggested by Bayoumi et al (2004) and Juillard et al (2004) produced significant changes, see Miller et al (2005).

4. Economic outcomes

Leaving aside the Autarky case, we consider two scenarios, the baseline and the case excess upside probability; then we capitalise permanent flows to assess what these might imply in terms of losses as percentage of US GDP.

4.1 State contingent plans and their financing.

Baseline case

With a real interest rate of 6.5% and a US current account deficit of 1.2%, these outcomes closely match the results in BMW. What these simulations also provide are state-contingent consumption plans, and the asset positions taken to implement them. Instead of the US absorbing all the risk of the New Economy while the foreign economy enjoys consumption stability, both countries share the aggregate consumption risk. Details of the asset positions in the middle of the table reveal that, in addition to investing the current account surplus of 1.2% of GDP in risky US assets, the foreign

country levers this position by borrowing 1.1% of its GDP and acquiring almost half of the value of shares in the US "New Economy".

With a high payoff, consumption grows by about 6% in both countries; but with the low payoff, home consumption is slightly less than its endowment (104.9), while the foreign consumption is roughly equal to its own endowment (102.4).

Table 3 State contingent plans and their financing.

	P^H	P^L	R	Share holding	Debt holding	Current Account deficit	C_2^H	C_2^L
BASELINE (π=0.5)								
Global	0.464	0.475	6.5%	4.7	0		212.3	207.3
Home				2.4	1.1	+1.2	107.4	104.9
Foreign				2.3	-1.1	-1.2	104.9	102.4
EXUP (π=0.75)								
Global	0.696	0.238	7.1%	5.8	0		212.3	207.3
Home				3.0	1.4	+1.5	107.7	105.2
Foreign				2.9	-1.4	-1.5	104.6	102.1

Notes.
EXUP denotes Excess Upside Probability.
In this table Arrow-Debreu prices are discounted back to first period, so $P^H + P^L = 1/(1 + r)$.
Deficit denotes home current account deficit in period 1, as % of GDP.
Figures in bold show how the Foreign acquisition of shares is financed (approx. half by issuing debt).

"Excess Upside Probability"

Encouraged by high subjective probabilities attached to high payoffs, foreign investors provide the funding for increased US consumption in period one in exchange of shares in the "New Economy" which they continue to leverage with borrowing that doubles their stock holding. Interest rates rise to seven percent. When leveraged bets go bad, foreign residents suffer strikingly from their exposure to US markets. As the results for the low payoff in the last two columns show, foreigners consume slightly less than their own endowment in period two: i.e., they get less than nothing on their savings in period one!

4.2 Losses in the US stock markets and their international transmission

Greenspan (2002) reported that, by late 2002, the losses on the US equity market from its peak two years earlier amounted to US dollar 8 trillion. We to see the size of the market fall and the relative contribution of 'bad luck' and excess upside probability implied by crudely capitalising the flows discussed above.

Bad luck plays a key role in the Baseline scenario when the outturn lies below the mean value incorporated in market expectations. We use discounted Arrow-Debreu prices to value the market *ex ante*; but these are applied to the flows after they have been capitalised. The first two rows of Table 4 shows high and low income flows in period two and the capitalisation of profits obtained using a price earnings ratio of almost 30, see footnotes, applied to 40% of the New Economy GDP effects (allowing for a higher share of profits in this sector than in GDP as a whole). The market valuation of 55% of GDP for the Baseline case in the third row comes from summing these discounted capital values. Since US GDP in 2002 was approximately $10 trillion, this implies a perceived *ex ante* nominal valuation of the US New Economy at $5.5 trillion. But if nature selects the lower of the two possible outturns, with a capitalised value of $2.9 trillion, then losses due to "bad luck" cost about a quarter of US GDP.

The fall gets bigger if excess probability is assigned to the high outturn. If the perceived probability of the high payoff of the "New Economy" increases from 0.5 to 0.75, the *ex ante* stock valuation rises to $6.8 trillion; and the fall when the low payoff is realised becomes $3.9 trillion, over a third of US GDP (see last line of Table 4). This loss is about half the figure given by Greenspan for the whole market and corresponds broadly to the fall in the market capitalisation of the Nasdaq, as the index fell from its peak of 5000 in March 2000 to below 2000 in 2002. (If $2.6 trillion is attributable to 'bad luck', this leaves $1.3 trillion due to mispricing.)

Table 4: Stock Market Values and Estimated Losses

(Mean expected New Economy effect = 5.0% of US GDP)

		Income Flows (period 2 %GDP)	Cap'n* (period 2 %GDP)	Arrow/ Debreu Prices	Valuation (period 1 %GDP)	Dollar Values $trillion	Non-US Losses $trillion
A	**BASE**						
1	High payoff	7.5	88.2	0.464	41		
2	Low payoff	2.5	29.4	0.475	14		
3	Expected payoff	5.0			55	$5.5	
4	Actual Payoff	2.5	29.4		29	$2.9	
5 = 3-4	**Losses ("Bad luck")**					**$2.6**	**$1.3**
B	**EXUP**						
1B	High payoff	7.5	88.2	0.696	61		
2B	Low payoff	2.5	29.4	0.238	7		
3B	Expected payoff	6.25			68	$6.8	
4B	Actual Payoff	2.5	29.4		29	$2.9	
5B = 3B-4B	**Losses**					**$3.9**	**$1.9**

Notes:
** The discount rate used for capitalisation of profits (40% of income) is 3.4 = 1.5 + 4.3--2.4 in percentage points, where 1.5% is the rate of pure time preference and 2.4% the trend growth rate – as for BMW – and 4.3% is the risk premium in US stock market estimated by Cechetti et al (2000).*
All numbers as % of US GDP, unless otherwise specified. US nominal GDP in 2000 was approx. US dollar 10 trillion.
In this table Arrow-Debreu prices are discounted back to first period, so $P^H + P^L = 1/(1 + r)$

The figure of $1.9 trillion appearing at the foot of the last column indicates that, in a one-good model of two symmetric blocs and no home bias, almost half of the total loss would be absorbed by shareholders outside the US. Allowing for home bias would substantially reduce this transfer, (as is suggested by the estimated losses of half a trillion dollars on EU investments in the US reported in Castren *et al* (2003)).

Note that the exercise in this paper, which analyses the effect of an idiosyncratic asset price boom in the US, ignores both the seigniorage gains associated with the US issue of capital certain dollar liabilities and the capital losses on US owned foreign equity affected by a global decline of stock markets. The historical pattern of the US investment abroad has been to issue liquid debt liabilities and to acquire foreign equities. The second half of the 1990s, however, saw a reverse of this pattern as the US who attracted substantial equity flows from the rest of the world. As a result the US was better hedged against irrational exuberance on a global scale, as the macroeconomic balance sheet evidence presented in Lane and Milesi-Ferretti (2003, Fig 7) suggests. For US external liabilities –

which include US equity held abroad -- capital gains (excluding exchange rate effects) total 26% of US GDP cumulated over the years of the stock market boom, i.e., from 1995 to 1999; and cumulative losses over the next three years (from 2000 to 2002), when markets fell, are estimated to be 18% of GDP[15], a net gain of 8% of GDP. However, for US external assets -- which are essentially ignored in our model -- they indicate estimates of capital gains and losses over the same sub-periods of about 25% and 17% of US GDP respectively. These figures imply that, if there had been no New Economy, the US would have been a net loser from a global co-movement in asset prices.

Conclusions

In optimising models of the open economy, where current account developments reflect consumption-smoothing, an expected supply-side increase of 5% could generate a deficit of over 1% of GDP, BMW (2001). When stochastic elements are added, capital flows reflect global risk-spreading as well as the financing of inter-temporal trades. In our theoretical model, for example, it is optimal for foreigners to leverage their share-holdings to buy twice as much as needed to finance the current account deficit -- and to absorb half the market losses. Our calculations of the welfare gains to be obtained from such extensive cross border position-taking are, however, distinctly modest: a flow gain of only one fiftieth of one percent of consumption to each country, broadly in line with Lucas's well-known estimate of the benefits of consumption stabilisation. In comparison, the transfers attributable to mispricing this idiosyncratic shock bulk large. Artis *et al* (2003) find that financial factors play a role in their econometric account of why "despite some anticipations to the contrary … the European economy was strongly affected by the downturn in the US" -- a synchronisation which they note "may be temporary and a result of common shocks affecting these economies". Though highly stylised, our model of an asset bubble offers a theoretical rationale for these econometric results. The macroeconomic balance sheet evidence presented in Lane and Milesi-Ferretti (2004) points in the opposite direction. Using the estimates from their study, we can show that the cumulative capital gains and losses from 1995 to 2002 on the US external assets and liabilities are of similar magnitude. They seem to be more consistent with *global* "irrational exuberance" than with idiosyncratic risk in the US.

[15] This figure would amount to about $1.8 trillion when scaled by GDP in 2003, and seems broadly consistent with the calculations in Table 4 above.

Several qualifications need to be borne in mind when interpreting the figures. The size of the price distortion is exogenously specified, for example[16]; and shareholdings do not exhibit the 'home bias' characteristic of actual portfolios. Even if one reduces the transfers by a factor of ten, they are still larger than the market efficiency gains estimated earlier. More generally, the substantial seigniorage flows to the US as Asian countries have accumulated dollars for precautionary motives have not been considered in this Arrow-Debreu framework; nor have the substantial US holdings of foreign risk assets.

Perhaps the most important caveat is that we have taken the development (and risk characteristics) of the New Economy to be given regardless of what is assumed about the provision of finance. But what if the supply side shock was endogenous to the operation of financial markets? Without the ready availability of equity finance and venture capital, the New Economy would surely have been much slower to develop -- and might have been still-born.[17] So, broadly considered, the gains to providing adequate financial markets, both domestically and across international frontiers, could include all the profits from the New Economy itself -- which bulk much larger than the fractions of a percentage point of GDP considered in the paper. A challenging extension would be to make the New Economy endogenous. (The potential gains from developing financial markets are discussed in general terms in *Saving Capitalism* from the Capitalists, Rajan and Zingales, 2003.)

This paper does not show that financial development is bad for consumer welfare, nor is intended to do so. What it does indicate is that, in global capital markets with asymmetric shocks, asset price distortions can generate international 'transfers' which can exceed the efficiency gains of consumption-smoothing and risk-spreading. Where asset prices reflect distorted incentives, "(d)evelopment and enforcement of accounting and auditing standards, including the quality of disclosure and the frequency and means of dissemination, are desirable", Hunter et al (2003, p.xxv). ´Saving capitalism from the capitalists´ may require legal enforcement of truth-telling.

[16] A the size of the international 'transfer' (relative to the efficiency gains) is proportionate to the distortion of probabilities, one can scale the transfers up or down to fit one's priors as to the degree of distortion.
[17] In 1999, European Commission circulated a report arguing that efficient risk capital markets have significant impact on job creation, and noting that NASDAQ companies had created half a million new jobs in the US between 1990-1995.

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