E Foreign Capital

So far we have analysed a closed economy,[1] but increased demand in the capital market can also be met from increased capital funds from abroad. The weighted average approach can be readily adapted to incorporate foreign capital. The weighted average discount rate would then be: $ai + (1–a–f)r + fMC_f$, where MC_f is the marginal cost of foreign funds, f is the proportion of investment sourced from foreign funds and a the proportion that comes at the expense of domestic investment.[2]

The option of borrowing from overseas makes the supply of capital more elastic, which reduces the rise in domestic interest rates and the amount of private investment crowded out in response to increased capital demand from a government project. If the supply of foreign funds were perfectly elastic (i.e. the supply curve horizontal), the weights on i and r would be zero and the social discount rate would be the marginal cost of foreign funds (as all project costs would come from foreign borrowing with no domestic consumption or investment being crowded out).

The effects of integration of the Australian capital market with international capital markets depends on complicated details of international tax law and how Australia's borrowing affects the interest rate that foreigners charge us.

E.1 Perfectly integrated markets

The supply curve is horizontal in the case of perfectly integrated markets (or perfect capital mobility), where Australia could borrow as much as it liked at a given world interest rate (that is, Australia is a price taker). That world rate would be the marginal cost of foreign funds and depends on how foreigners are taxed.[3]

For debt financing, international tax treatment of interest payments is on a residence-based income tax structure. That is, each country taxes its own residents on their world-wide interest income (from any source) and does not tax non-

1 See appendix B.

2 Edwards (1985), Sandmo and Dreze (1971).

3 The following analysis of taxation of international capital flows is from Cohen et al. (1999, pp. 203-07).

residents. With perfect capital mobility, the supply of funds would be horizontal at the real foreign before-tax interest rate, which would be the marginal cost of foreign funds, independent of both domestic and foreign tax rates on interest income (see box E.1).

Box E.1 Cost of foreign debt in a perfectly integrated capital market with residence-based taxation

In a perfectly integrated capital market covered interest parity holds. For a marginal risk neutral investor, the nominal after-tax rate of return on Australian debt instruments equals the exogenous after-tax return on a foreign debt instrument plus the expected rate of depreciation of the Australian dollar. With residence based taxation the applicable tax rate for Australians is the Australian tax rate, while the applicable tax rate for foreigners is the foreign tax rate. This gives two parity conditions. For Australians: $\rho(1–\tau) = \rho^*(1–\tau) + \Delta s(1–\tau_g)$ where ρ^* is the exogenous foreign nominal interest rate and s is the expected log future spot dollar value of foreign exchange and so Δs is the expected rate of depreciation in the Australian dollar. τ_g is the tax rate on foreign exchange gains. Then Australians will be indifferent between investing home and abroad.

For foreigners the parity condition is: $\rho(1 – \tau^*) = \rho^*(1 – \tau^*) + \Delta s(1 – \tau_g^*)$ where τ^* is the foreign tax rate on income, τ_g^* the foreign tax rate on foreign exchange gains.

If foreign exchange gains are taxed at the same rate as other income, then before-tax interest rates will be equalised (adjusted for exchange rate changes): $\rho = \rho^* + \Delta s$

If the expected rate of depreciation equals the difference in inflation rates: $\Delta s = \pi - \pi^*$ then $\rho = \rho^* + \pi – \pi^*$ and so $\rho – \pi = \rho^*– \pi^*$ or $i = i^*$ In this case the real before-tax interest rate is determined by the real foreign before-tax interest rate and the traditional Fisher effect holds: $d\rho/d\pi = 1$. A 1 percentage point rise in the Australian inflation rate increases our nominal interest rates by 1 percentage point. The evidence on whether the Fisher effect holds is mixed (see appendix A.3). Some studies find it holds since deregulation, but others reject it. Changes in the relative price of traded and non-traded goods (including terms of trade changes) would cause the expected rate of depreciation to differ from the difference in inflation rates. Further, if large countries determine the foreign interest rate, then changes in their inflation rates would affect the before-tax world real interest rate (just as in a closed economy, see appendix A.3). If foreign and Australian inflation rates were correlated, then that it would appear as if the Fisher effect did not hold because Australian inflation rates and real interest rates would both change.

Source: Cohen et al. (1999, pp. 203-04).

For equity finance, source-based taxation is more applicable. Under pure source-based financing, income originating in a country is taxed in that country regardless of where the recipient lives. A country does not tax its residents' foreign sourced income. Real world tax laws are more complicated, with countries taxing their own residents foreign source income, but giving credit for taxes paid to foreign governments (if a tax agreement with that country is in place), which means residents pay taxes on their foreign sourced income at the higher of the two rates.

When foreigners supply equity funds, it is taxed at Australian tax rates and the revenue raised accrues to Australians. With perfect capital mobility, foreigners would supply equity funds so long as the after-tax return exceeded their after-tax return from investing at home. The cost to Australia of extra foreign equity investment would be the after-tax real foreign return (which would be below the Australian after-tax real return if Australian tax rates were lower than foreign ones).[4]

E.2 An upwards sloping supply from foreigners

If extra borrowing by Australians bids up the price that foreign lenders charge (that is, the supply of foreign funds is upwards sloping) then the marginal cost of funds is greater than the average cost. The marginal cost of foreign funds would be greater than the foreign interest rate. Further, a government project would then displace some domestic consumption and investment.[5]

The possibility of sovereign default means the supply of foreign capital to Australia slopes up, even if Australia is too small to affect the world interest rate.[6]

Sovereign default occurs when a country repudiates its debt or negotiates a partial default. For example, the government imposes exchange controls which control domestic private borrowers' repayment of foreign debt, and foreign lenders cannot take effective legal action to receive more than the government stipulated repayments.

4 One problem with this analysis is that if the Australian and foreign tax rates differ, then the equilibrium for foreign investors is not compatible with the equilibrium for Australian investors. If $\tau^* < \tau$, foreigners face a higher tax rate on their Australian investment than their home investments and foreign equity investment in Australia occurs until $(1-\tau^*)i^* = (1-\tau)i$. But Australians investing overseas would pay the same (Australian) tax rate on all investments, and would want to invest until $(1-\tau)i^* = (1-\tau)i$. The two are incompatible if $\tau \neq \tau^*$. If $\tau^* > \tau$, then Australians invest until $(1-\tau^*)i^* = (1-\tau)i$, which is incompatible with the foreigner's equilibrium, $(1-\tau^*)i^* = (1-\tau^*)i$ when tax rates differ. Further, when tax rates differ between countries, countries with high corporate tax rates may specialise in providing in supplying debt and those with lower rates supplying only equity. See Jones (2008, p. 233).

5 Edwards (1985, pp. 11-12) and Sandmo and Dreze (1971, pp. 403-04).

6 The following analysis is from Fane and Applegate (1995).

Lenders charge more to compensate for the risk of default. For example, say the world risk free rate is 3 per cent and that at current levels of Australian foreign borrowing, there is a 1 per cent annual chance of default (a once in a century event). The rate foreigners charge is 4% = 1.03/0.99 – 1.[7]

Increased borrowing by any of the country's residents increases the probability of national default and increases the cost of borrowing (the country risk premium). When one resident borrows more, it increases the interest rate other borrowers pay.

The chance of sovereign default creates other externalities from increased foreign borrowing. When a resident borrows more from overseas, it raises the probability that other domestic borrowers will be able to avoid making contracted repayments. Further, when individuals borrow more, they ignore the costs to others of the penalties imposed in the event of default. These two externalities cancel out if the sovereign borrower chooses to default when the penalty for default is less than the amount owed, leaving the increase in the cost of borrowing as borrowing increases as the only relevant externality. That is, with sovereign default, the borrowing country's risk premium is equal to the net negative externality from foreign borrowing.

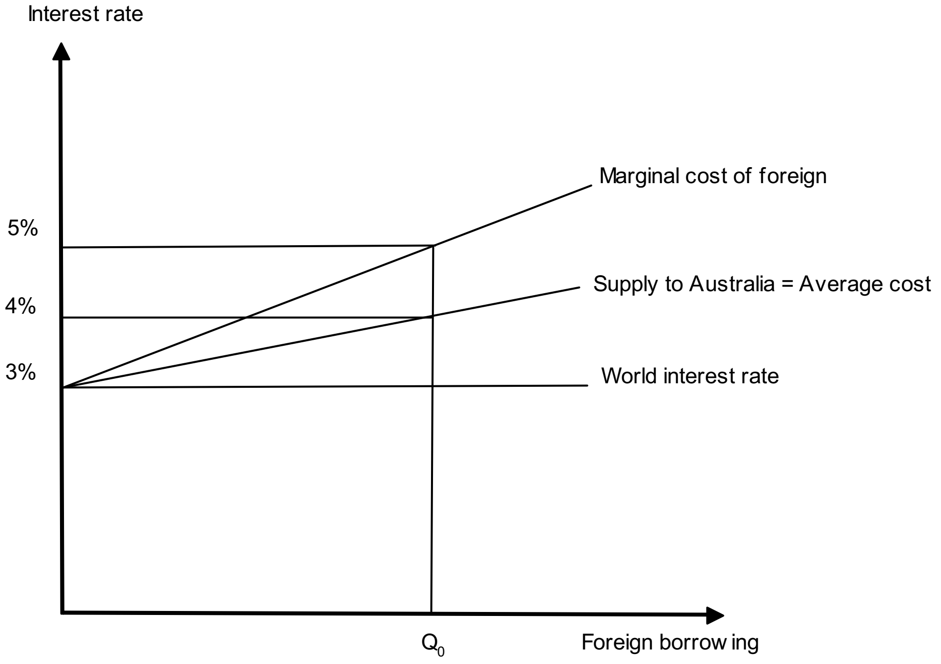
The optimal tax on foreign borrowing to take account of this externality, under perfect capital mobility, is exactly the same as the optimal tax to take advantage of monopsony power when a country faces an upwards sloping supply curve of foreign debt and there is no sovereign risk. That is, sovereign risk results in an effective upwards sloping supply curve under perfect capital mobility, just as monopsony power would. The marginal social cost of extra foreign borrowing is greater than the average cost. That is, the rate of return required to cover the cost of increased foreign borrowing is higher than the rate of interest required by foreign lenders, as it must account for the extra borrowing bidding up that rate. The marginal cost equals $i_f(1+1/e)$ where e is the elasticity of the supply of foreign capital to Australia.[8]

7 More generally, if lenders require a return of i and the probability of default on the whole debt is λ, then the interest rate charged on the loan, i', would be $(1+i) = (1+i')(1-\lambda)$. Therefore $i = i' - \lambda - i'\lambda$ and so $i' = (i + \lambda)/(1-\lambda)$. Further, if default is more likely to occur in a recession, then there would be a further premium to account for the market risk that the chance of default introduces to the payoffs.

8 Interest payments to foreigners are $i_f D$, where i_f is the interest rate charged by foreigners and D is the total amount of foreign debt. i_f increases with D. Extra borrowing increases total interest payments by $\partial i_f D/\partial D = i_f + D\partial i_f/dD = i_f(1+1/e)$ where $e = (\partial D/\partial i_f)(i_f/D)$, the elasticity of the supply of foreign capital to Australia. With linearity, the marginal cost line should have twice the slope of the supply curve. The premium in the marginal cost of funds is double the country risk premium. $i_f = aD+b$. $\partial i_f/\partial D = a$. $TC = i_f D = aD^2+bD$. $MC = dTC/dD = 2aD+b$. The effect of taxes imposed on foreigners depend on the elasticity of supply and demand for foreign capital, as in figure B.1. If foreign capital is only a small portion of total capital in Australia, then the

As illustrated in figure E.1, if the world risk free rate is 3 per cent and the lenders charge 4 per cent at current borrowing levels, assuming linearity, the elasticity of supply is 4.[9] The marginal cost of foreign borrowing is 4%(1+1/4) = 5%. Even a small probability of default can make a large difference to the marginal cost of funds.

Figure E.1 **The cost of foreign funds to Australia with a 1 per cent probability of default**



Alternatively, even a small open economy with perfect capital mobility will faced an upwards sloping supply curve of foreign funds if lenders and borrowers have different perceptions of default risk.[10]

E.3 Conclusions for the social discount rate

In a closed economy, it was concluded that the weighted average discount rate was likely to be close to the before-tax investment rate because the supply of savings was relatively inelastic compared with the demand for investment. Foreign capital investment makes the supply of capital to Australia more elastic and the weighted

demand for it is likely to be quite elastic and the burden of the taxes on it is likely to be borne by the foreign lender.

9 If the current level of foreign borrowing is Q_0, the slope of the supply curve is $Q_0/1\%$ and so the elasticity of supply is $(Q_0/1\%)*4\%/Q_0 = 4$.

10 Edwards (1985, p. 11).

average discount rate is: $ai + (1–a–f)r + fMC_f$, where MC_f is the marginal cost of foreign funds, f is the proportion of investment sourced from foreign funds and a the proportion that comes at the expense of domestic investment.

But the foreigners are likely to supply funds for debt at the before-tax interest rate. Further, the supply of foreign borrowing is likely to slope upwards, which makes the marginal cost of foreign borrowing greater than the average cost. The net effect is to leave the conclusion that the weighted average rate is close to the before-tax return unchanged. For example, if the risk free before-tax rate were 4 per cent, the after-tax risk free rate 1 per cent and 30 per cent of funds came from sources from which society earned the after-tax return and 70 per cent from sources yielding the before-tax return, then the weighted average is above 3 per cent: 0.3*1% + 0.7*4% = 3.1%. Further, because foreign equity financing has an marginal cost greater than the before-tax return and foreign debt financing greater than the before-tax return, the true weighted average rate is higher still.