

ISSN 1753-5816

School of Oriental and African Studies

University of London

---

# **DEPARTMENT OF ECONOMICS**

## **Working Papers**

*No.166*

---

### **A Theory of Capital Rationing**

Jan Toporowski

September 2010

[economics@soas.ac.uk](mailto:economics@soas.ac.uk)

<http://www.soas.ac.uk/academics/departments/economics/research/workingpapers/econ-working-papers.html>

# A THEORY OF CAPITAL RATIONING

**Jan Toporowski**

Economics Department

The School of Oriental and African Studies

University of London

This paper revisits some of the issues originally put forward by the author as the theory of capital market inflation, in the book *The End of Finance* (Toporowski 2000). The paper makes much clearer the key assumptions and relationships between the operations of the capital market dominated by institutional investors, and the balance sheets of companies. In this way, it presents a theory of how macroeconomic dynamics may be affected by disequilibrium in the capital market.

The first part of the paper examines the demand for new equity issues by institutional investors, namely insurance companies and pension funds. In the second part of the paper it is argued that the tendency of pension funds to mature may be a factor in forcing companies into debt and thus discouraging their investment and restricting their cash flow. The tendency towards forced indebtedness may be reinforced by an inelastic demand for capital by banks. The third part of the paper argues that the inelastic supply of capital in the capital market gives rise to processes of capital market inflation or deflation. The first of these may make banks more fragile. The second may contribute to deflationary processes in the macroeconomy. A fourth section argues that further instability is added by international capital market integration.

## 1. The demand for new equity

This section examines key features of the demand for new equity by institutional investors, i.e., the purchase of securities in the primary market for equity capital, over and above new issues replacing existing equity, by pension funds and insurance companies. It is understood that these institutions buy the vast bulk of new equity (common stock) issues, so that individual and bank stock purchases are negligible. The demand for such securities depends on the cash flow of pension funds and insurance companies and regulations that require them to hold bank deposits and more secure bonds, in particular government bonds, against the pension or insurance liabilities of such institutions as the due dates for paying out such liabilities approaches. The demand for new equity therefore depends on the liquidity that the institutions have *in excess* of their regulatory holdings of bank deposits and bonds.

For the sake of simplicity it is assumed that the dividend policy of companies has a substitution effect, but no portfolio effect; i.e., a company paying a higher dividend may create a higher demand for its stock, but this will be at the expense of demand for the stocks of other companies. Dividend policy therefore cannot affect the proportion of institutional cash flow allocated to buying equity, so that higher dividends will not cause institutions to substitute stocks for bonds or bank deposits in their portfolios. The buying of new equity issues by pension and insurance companies therefore depends on two factors.

The first factor is the gross cash inflow of insurance companies and pension funds. This consists of two elements. The first of these are the contributions of workers to pension schemes, and the premiums that they pay for insurance. The second are the returns of pension funds and insurance companies from their investments. As a first approximation, these two elements may be taken to be more or less proportional to employment income. Out of this, and given no cash outflows on pensions and insurance claims, a certain fraction of that gross cash inflow will be allocated to the purchase of new equity issues.

The amount of the gross cash inflow that may thus be allocated to buying new shares may be written as  $c.L_t$ .  $L_t$  represents employment income.  $c$  is some fraction of it, representing the contribution rate (i.e., the proportion of employment income that is paid into pension and insurance funds) and the proportion of that contribution that fund managers wish and are allowed by regulation to invest in equity stocks. As a second approximation it may be assumed that returns on investments that grow more rapidly or more slowly than the growth of employment income are off-set by changes in the contribution rate. In other words, if returns from investment rise more rapidly than employment income, the contribution rate to pension funds and insurance companies will be reduced to off-set this. If investment income rises more slowly, pension funds and insurance companies will raise contributions and premiums. Finally, it is assumed that, given no change in their outgoings, fund managers' preference for equity is constant.

The second factor that determines institutional demand for equity is the requirement that pension and insurance funds pay out on their insurance and pension liabilities. Such funds usually reduce their equity holdings in advance of payments of such liabilities, either because they are obliged by regulations to reduce their holdings, in favour of cash (bank deposits) or bonds as the due dates for such payments approaches, or because their managers wish to avoid the risk of being obliged to sell equity at an unfavourable price when the payments are due. In the case of insurance payments these have some variance, with large pay-outs at times of major disasters. But we may assume that insurance companies hold precautionary balances of bonds and short-term securities to defray their outgoings in respect of such disasters. The effect of more regular insurance payments on the demand for company shares may therefore be represented as a constant fraction of employment income,  $i.L_t$ .

Insurance payments may therefore be combined with the gross cash flow of institutional investors so that  $c.L_t - i.L_t = c'.L_t$ .

Pension funds, however, do not have such stable outgoings. In general, at start-up, pension funds have few liabilities, and, because they depend on the length of a

pensioner's contribution history, they rise faster than contributions. For example, in its first year the pensioners of a fund will have very small pensions from that fund because they will only have been contributing to it on average for six months. In the second year, however, the number of pensioners may be expected to double but the average contribution history will also double to one year, so that there will not only now be more pensioners, but also higher pensions to be paid out. In this way, pension funds approach maturity, i.e., the point where all their contributions must immediately be paid out in pensions. Beyond maturity a pension fund has to start selling its assets. (The argument here does not do full justice to the complexities of Defined Benefit or Defined Contribution pension schemes but as an approximation is adequate for the analysis presented here. See Toporowski 2000, part 2.)

This pension fund maturing effect on equity demand may be represented by the term  $P \cdot t^{\alpha}$  where  $t$  represents the time period from now, when  $t = 1$ ;  $P$  is a negative coefficient representing pensions liabilities requiring the pension fund to switch into bond or cash (bank deposit) assets; and  $\alpha$  is a coefficient greater than 1.  $\alpha$  therefore represents the rate at which pension funds mature. But it also depends on the value of insurance portfolios relative to pension funds. Thus in an institutional setting where insurance companies prevail, and pension funds are negligible, (perhaps because of state provision of pensions) the value of  $\alpha$  will tend to 1 and the term  $P \cdot t^{\alpha}$  will tend to be constant. Where insurance companies are negligible and pension funds absorb long-term saving,  $\alpha$  will be considerably larger than 1, and the (negative) value of  $P \cdot t^{\alpha}$  will rise exponentially.

In a given period,  $t$ , the purchase of new equity,  $E_t$  in a market dominated by pension funds and insurance companies may be represented by the expression:

$$E_t = c' \cdot L_t - P \cdot t^{\alpha} \quad (1)$$

The issue of new equity capital is undertaken by banks and non-financial companies. Insurance companies do issue capital but their capital issues do not substantially alter the

argument in this paper. For the sake of simplicity new capital issues for insurance companies may be assumed to be zero.

## 2. The forced indebtedness of companies

This section examines how the inelastic demand for (net) new equity issues may force companies into debt. For the sake of exposition, it is useful to consider first a ‘Keynesian’ steady state, i.e., a capitalist economy in which employment and employment income ( $L_t$ ) are constant because gross expenditure on fixed capital investment is constant (Kalecki 1936). In this situation, because gross expenditure on fixed investment is the same over a succession of periods, net new capital issues by non-financial companies, either to pre-finance investments that are being externally financed, or to replenish reserves drawn down by internal financing of investment, will also be the same in each of those periods.

The remaining new capital stocks will be issued by banks (or banks and insurance companies). In each successive period, the banking system makes additional new loans and therefore requires, in accordance with bank capital regulations, additional new capital. Initially, to simplify the argument, this additional new capital may be assumed to be constant over the succession of periods under consideration.

It is also convenient to start with a situation of equilibrium in the market for new equity issues so that, at least in the first period,  $t = 1$ , new capital issues by banks,  $C_b$ , plus new capital issues by non-financial companies,  $C_c$  are equal to the demand for new capital issues,  $c' \cdot L_t - P \cdot t^{\acute{a}}$  :

$$C_b + C_c = c' \cdot L_t - P \cdot t^{\acute{a}} \quad (2)$$

In the first period,  $t = 1$ , so that the second term on the right hand side of this equation reduces, in that period, to  $P^{\acute{a}}$ .

In the second period, if  $\acute{\alpha} > 1$ , because of the maturing of pension funds, the term  $P.t^{\acute{\alpha}}$  will now be greater, and the negative coefficient will mean that the desired sales of additional equities,  $C_b + C_c$  will be greater than the demand for such new issues from pension funds and insurance companies.

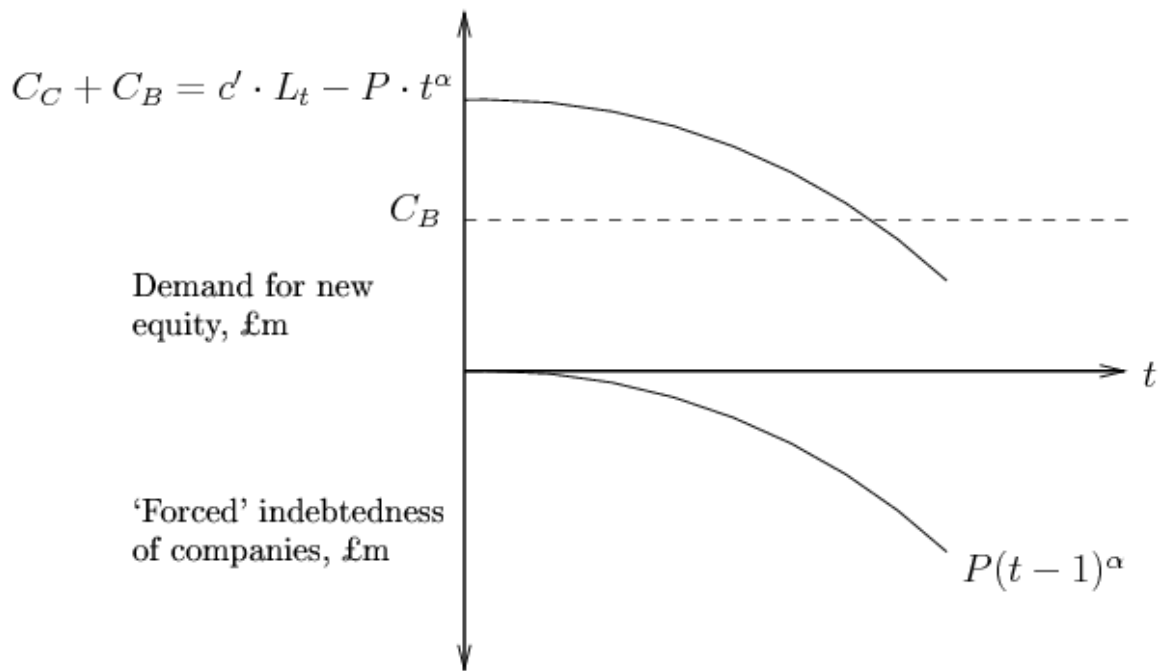
How is such a disequilibrium between supply and demand in the capital market resolved in the real world? Two considerations are crucial. One is that banks are obliged to hold a certain amount of capital in proportion to the size of their balance sheets and the riskiness of that balance sheet. By contrast, the amount of capital that non-financial companies are obliged to hold is minimal. Companies can therefore replace capital which they cannot raise by debt (bank borrowing, or the issue of debt instruments, company paper or bonds). Banks cannot do so and will therefore pay whatever price is necessary in the market to make their new capital issues.

Starting from a position of capital market equilibrium in period  $t = 1$ , the borrowing that companies are forced to undertake by their inability to raise capital is represented by

$$P.t^{\acute{\alpha}} - P^{\acute{\alpha}} \quad \text{or} \quad P(t - 1)^{\acute{\alpha}} \quad (3)$$

That is, in the first period of capital market equilibrium, this will be zero. After this, the ‘forced indebtedness’ of the companies will rise exponentially in each period by exactly the same amount by which pension funds are reducing their buying of new equity. This ‘forced indebtedness’ will not, however, be equally distributed among companies. In the real world, the largest companies usually have better connections with the investment banking community that organises new capital issues for them. The largest companies may therefore remain unaffected by the reduction in demand for new equity. It is the next tier of companies, currently financed by debt or inadequate venture capital, that will find their capital market debut frustrated by the fall in demand for new capital issues.

This is illustrated in the following diagram:



The curved line at the top of the diagram represents the supply of equity capital, decreasing exponentially from the point  $C_c + C_b$ , where this supply equals demand. The 'forced' indebtedness of companies is represented by the line  $P(t-1)^\alpha$ . This starts at zero and rises parallel with line  $c' \cdot L_t - P \cdot t^\alpha$ .

The response of companies to forced indebtedness is to postpone planned investment (Steindl 1952, pp. 119-120). A decline in capital spending by companies reduces the cash flow of the corporate sector. This in turn will lead an inability on the part of some companies to service their debts. Capital adequacy requirements would then require banks to issue more capital to set against the deterioration of banks' loan books caused by companies' difficulties in servicing their debts. The rise in bank capital issues, in its turn, will reduce even further the amount of new capital available for companies.



### 3. Capital market inflation and deflation

In the previous section it was assumed that the capital market starts off from a position of equilibrium, in which all banks, financial institutions and companies are able to find purchasers for their new capital.

In practice, the capital market is rarely in such a condition of equilibrium: that supply equals demand at all times in the market does not mean that all potential capital issuers may issue stocks at prices determined by the prospective yields of those stocks. Many, especially smaller and medium-sized firms, are unable to issue capital stocks at any price at all. From the point of view of understanding the dynamics of the major capital markets in the main financial centres of the world and the way in which those markets interact with the banking system and the real economy, it is much more illuminating to consider two situations of initial disequilibrium in the markets.

The common assumption in finance theory and macroeconomics is that the price of capital brings into equilibrium the demand and supply of capital (for example, the general equilibrium case of Tobin's 'q'). However, the demand and supply of equity capital will only be brought into equilibrium if the price of capital (the dividend payable on that capital) truly constitutes the opportunity cost of a given productive capital investment project, so that returns from such investment that are below that price will not be undertaken. Capital market inflation or deflation in fact adds to that price the 'externality' of a capital gain or loss, paid by financial investors in the market, rather than by the owners of productive capital assets financed by equity capital traded in the capital market. In this way the price of equity capital ceases to operate as the opportunity cost of any given investment project. That opportunity cost becomes the dividend yield that a given firm would have to offer, plus the prospective capital gain or loss that a stock might obtain in an inflating or deflating capital market. Low dividend yields will not encourage productive investment, if those low yields are brought about by a process of capital market inflation that raises prospective capital gains on financial investment in equities. Such a situation would merely encourage non-financial firms to devote their liquid

reserves to financial investments in equity capital, through merger and takeover activity, rather than productive investments. High dividend yields from a process of capital market deflation will be off-set by prospective capital losses, and will thereby fail to elicit increased demand for or supply of equity capital issues. In this way, capital market inflation and deflation reinforce the inelasticity of demand and supply in the equity capital market (cf. Toporowski 2008).

Where the demand and supply of equity capital are not equal, and the price system, as argued above, does not bring them into equilibrium, the capital market enters a process of inflation or deflation, according to whether there is excess demand or excess supply in the market. In a period of inflation, prices of financial assets rise and the resultant capital gains attract speculative funds. The entry of speculative funds increases the demand for equity capital issues. On the supply side, companies which had satisfied their requirement for equity capital find that they can issue additional equity cheaply; financing costs can be reduced by issuing equity to repay debt, and even if debt is not repaid, excess capital can be held as liquid assets thereby increasing the liquidity of (over-capitalised) company balance sheets and hence the stability of those balance sheets (Toporowski 2008).

Such over-capitalisation tends to be concentrated among larger corporations that have ready access to the equity capital market, rather than being spread more equally, to match capital need, among small and medium-sized enterprises. A corollary of over-capitalisation is therefore the exit of large corporations from the activity of borrowing directly from banks. This does not mean that banks may not hold the liabilities of those large corporations. But if they do so, it is as company paper bought in inflated markets at prices that hardly give banks much margin over banks' cost of funds.

The decline of bank lending to large companies has serious implications for the stability of bank balance sheets. Along with governments, which also shift towards issuing long-term securities when capital markets are inflating, large companies are the most reliable borrowers from banks. Banks therefore find their lending restricted to much less stable borrowers among other financial intermediaries (hedge funds, equity funds, derivatives

traders), households and small and medium-sized enterprises. The combination of company over-capitalisation and selective bank disintermediation lies behind key features of the second half of the 1980s and the 1990s in the U.S. and U.K.: corporations using excess capital to finance merger and takeover activity, while banks moved from one financial crisis to the next. The relative position of these two sectors was apparent in their respective credit ratings, with the largest corporations holding better credit ratings than many banks.

The situation is reversed where equity capital supply is less than demand for such securities. The deflation of the capital market means that companies which would have preferred equity finance now have to finance themselves with debt. As indicated above, at the end of section 3, forced indebtedness discourages investment, which in turn restricts the cash flow of the corporate sector. The additional debt, with restricted cash flow, reduces the quality of bank assets held in the form of lending to companies. If banks are obliged to raise additional capital in line with the deterioration of their loan books, this squeezes the amount of capital available for companies and forces them further into unwanted debt. In this way, the deflation of the capital market may initiate and reinforce deflationary processes in the economy at large.

#### **4. Open Economy Considerations**

The discussion in the previous sections identify key features of a closed economy dominated by capital markets in which the key investors are institutions such as insurance companies and pension funds holding portfolios of long term securities. International capital market integration in theory, and in a situation of fixed exchange rates, is supposed to make capital supply more elastic with respect to capital demand. In a situation of perfect integration, with fixed exchange rates, and without the dominance of long-term investing institutions, capital supply may become more elastic. But with trade in the largest capital markets being determined by those long-term investing institutions, it is likely that this would reproduce on a global scale the capital market disequilibrium described above, unless in that global capital market pension fund maturities could be

staggered to stabilise their equity demand. In practice, however, there are three further complications added where economies have open capital accounts allowing international portfolio diversification.

First of all, incomplete integration makes international capital flows less stable, with a tendency for capital flows into particular markets to reverse themselves more rapidly. This would then result in greater volatility of  $c'$  (the net demand for equity capital issues) in emerging markets without large investing institutions capable of accommodating in their portfolios the more volatile foreign capital flows. Secondly, the demand for equity capital issues would now be augmented by sovereign wealth funds. Because of their deferred liabilities, these institutions may have a more stable demand for equity capital. But their more stable demand would be off-set by the demand of very wealthy individuals whose portfolio preferences are likely to be much less stable.

Finally, in a global capital market, the burden of forced indebtedness on medium-sized companies in the advanced capitalist countries would also be borne by many businesses in developing countries and emerging markets. But the greater volatility of capital markets in emerging markets would further discourage the holding of locally-issued equity capital. In this way, forced indebtedness would bear down most heavily on businesses in developing countries. Capital market disequilibrium would thus become a constraint on the expansion of business in the developing countries.

## **Conclusion**

The supply of equity capital from long-term investing institutions, such as pension funds and insurance companies in practice makes the equity capital market less adaptable to demand for equity capital from companies. The effect of this is to force companies into debt, with adverse consequences for their willingness to invest and their cash flow. In this way, capital market disequilibrium may initiate and reinforce deflationary tendencies in the economy at large, and destabilise bank balance sheets in particular.

## References

Kalecki, M. (1936) 'Some remarks on Keynes's Theory' in J. Osiatyński (ed.) *Collected Works of Michał Kalecki, volume 1: Capitalism, Business Cycles and Full Employment* Oxford: The Clarendon Press 1990.

Steindl, J. (1952) *Maturity and Stagnation in American Capitalism* Oxford University of Statistics Monograph No. 4, Oxford: Basil Blackwell.

Toporowski, J. (2000) *The End of Finance: The Theory of Capital Market Inflation, Financial Derivatives and Pension Fund Capitalism* London: Routledge.

Toporowski, J. (2008) 'Notes on Excess Capital and Liquidity Management' *Working Paper* No. 549, Annandale-on-Hudson, New York : The Jerome Levy Economics Institute of Bard College, November 2008, pp. 1-10.