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UNIVERSITY OF CANTERBURY
CHRISTCHURCH, NEW ZEALAND

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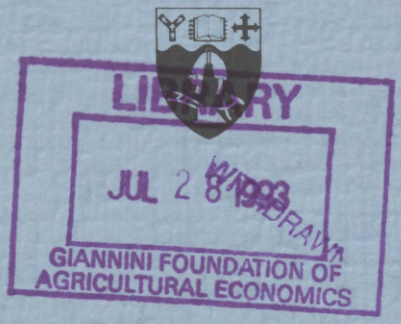

OPTIMAL BALANCED-GROWTH IMMIGRATION POLICY FOR INVESTORS AND ENTREPRENEURS

Alan E. Woodfield and Koon-Lam Shea

Discussion Paper

No. 9310

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Department of Economics, University of Canterbury
Christchurch, New Zealand

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June 1993

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A. E. Woodfield and K-L. Shea

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Koon-Lam Shea
Department of Economics
University of Hong Kong
Pokfulam Road
HONG KONG

Alan E. Woodfield
Department of Economics
University of Canterbury
Christchurch
NEW ZEALAND

Recent developments in immigration policy have included the emergence of the category of business immigrants. Typically, although not universally, countries encouraging business immigration require a minimum amount of capital to be imported, and sometimes require business immigrants to be employed in the ventures in which their capital is invested.[1] Further, a number of countries distinguish between investor and entrepreneurial immigrants in their criteria for acceptability. While it is the case that some, like Japan, permit business immigrants to operate businesses either with or without also investing in these firms, others such as Canada distinguish between investor and entrepreneurial immigrants on the basis of whether or not the migrant operates the business.

For example, Immigration Canada (1990, p.11) reports that to be able to immigrate as an entrepreneur, "a person must intend to operate a business in Canada that will employ one or more Canadian citizens or permanent residents, and be able to establish a substantial interest in that business",[2] while "to be eligible as an investor a person must have a proven track record in business, and have accumulated a personal net worth of $500,000 or more". Canadian investors are required to make investments at one of three levels, from C$150,000-500,000, depending on locational and investment horizon factors, and must contribute to the creation or continuation of employment for Canadians. The major distinction between investors and entrepreneurs appears to be whether or not the migrant is a member of the labour force; in the Canadian case, there appears to be no such requirement for investor immigrants. This distinction will be maintained in what follows.

In this paper, we first extend the analysis of Shea and Woodfield (1992a) which considers optimal entrepreneurial immigration policy in long-run balanced growth equilibrium to the case of optimal investor immigration, and then examine jointly optimal immigration policies for investors and entrepreneurs. An optimal capital requirement condition for

investors is obtained, and when compared to that for entrepreneurs, is shown to imply a relatively low requirement for investors. Steady-state comparative static results are derived, and the implications for factor pricing and income distribution are examined in the context of whether or not optimal choices of the saving rate are being made. This is important, since the distributional results are generally sensitive to the specification of the control set.

In terms of the literature, our approach is dynamic, assumes perfectly competitive markets, and concentrates on the welfare (measured by instantaneous per capita consumption) of the host country. International trade is ignored, and labour is assumed to be homogeneous. The analysis is similar to the dynamic Ricardian model of Mishan and Needleman (1968) in that it makes similar assumptions regarding technology and preferences, but, unlike these authors, permits a continuing flow of migrants over time.

The assumption of homogeneous labour distinguishes our analysis from dynamic models of the 'brain drain' due to McCulloch and Yellen (1974) and Rodriguez (1975), which assume the presence of both skilled and unskilled labour, but focus on the effects of migration on the labour-exporting country. Also, the absence of traded goods distinguishes our analysis from Saveedra-Rivado and Wooton (1983) who examine the steady state impacts on North and South economies, respectively, when, following Bhagwati and Srinivasan (1983), the North is either a labour importer or a capital exporter. None of these approaches, however, address the normative question of optimal business immigration and saving policy for the host country, which is central to the present contribution.[3]

OPTIMAL BALANCED GROWTH INVESTOR-IMMIGRANT POLICY

Suppose that the government admits investor immigrants equal to a given proportion θ of the current labour force. Let $h(\theta)$ denote the time-invariant inverse demand function for

immigration by investors, where $h' < 0$. If the capital requirement for investors is $h(\theta)$, there will be a continuous inflow of θL investor immigrants who join the population as consumers, but who do not enter the labour force.

Investors are assumed to utilize all their capital to gain citizenship, and to bring in all their available capital and to save at the same rate as the host country's citizens, once admitted. Capital inflow due to investor immigration is

$$L \int_0^{\overline{\theta}} h(\theta)\, d\theta .$$

The growth rate of the labour force $\dot{L}/L = n$, where n is the natural growth rate. The time rate of change of capital per worker is given by

$$\dot{k} = sf(k) + \int_0^{\overline{\theta}} h(\theta)\, d\theta - nk. \qquad (1)$$

In balanced growth, $\dot{k} = 0$ and k assumes a value k^* satisfying the condition

$$sf(k^*) + \int_0^{\overline{\theta}} h(\theta)\, d\theta - nk^* = 0. \qquad (2)$$

If the production function is strictly concave and the Inada boundary conditions hold, a unique and stable steady state exists, and is characterized by the condition $sf'(k^*) < n$. In the absence of immigration, the steady-state capital labour ratio k^o satisfies $sf(k^o) - nk^o = 0$. Investor immigration must raise the steady-state capital labour ratio of the host country. Per capita consumption, however, does not necessarily increase. Although output per worker

is higher in the presence of investor immigrants, there is also a larger population among whom the higher output is shared.

Now assume that the government wants to find the optimal capital requirement for investors that maximizes steady-state per capita consumption. Proposition 1 describes the optimal immigration policy and its impact on income distribution.

Proposition 1:

The optimal capital requirement for investor immigration is given by

$$h(\theta^*) = \frac{[n - sf'(k^*)]\, f(k^*)}{(1+\theta^*) f'(k^*)} ,$$

and optimal investor immigration always benefits workers and harms capitalists.

Proof: Per capita consumption, on the basis that the native-born population of the host country constitutes the labour force, is given by

$$c = \frac{(1-s)}{(1+\theta)} f(k^*) . \tag{3}$$

Differentiating (2) yields

$$\frac{dk^*}{d\theta} = \frac{h(\theta)}{n - sf'} . \tag{4}$$

Differentiating (3) with respect to θ and using (4) yields

$$\frac{dc}{d\theta} = \frac{(1-s)\,[(1+\theta) f' \frac{h(\theta)}{(n-sf')} - f]}{(1+\theta)^2} . \tag{5}$$

The first-order condition for a maximum of per capita consumption requires that the expression in square brackets in the numerator of (5) vanishes, from which the optimal

capital requirement stated in Proposition 1 follows directly. If immigration can always be prevented at zero cost, per capita consumption must increase if $\theta^* > 0$. Since any positive rate of immigration raises the capital labour ratio, concavity of f(k) along with marginal productivity factor pricing ensures the distributional results. □

It would be expected that otherwise similar countries which differed with respect to their savings rates and population growth rates would have different optimal investor immigration policies. Proposition 2 examines these issues.

Proposition 2:

Under optimal investor immigration policy, an increase in the saving rate or a reduction in the population growth rate reduces the optimal immigration rate unless the immigration rate is (nearly) perfectly elastic with respect to changes in the capital requirement.

Proof: Differentiating (2) yields

$$\frac{dk^*}{ds} = -\frac{f}{sf'-n} > 0. \tag{6}$$

$$\frac{dk^*}{dn} = \frac{k}{sf'-n} < 0. \tag{7}$$

The optimal capital requirement condition may be written as

$$(n-sf')f = (1+\theta^*)f'h(\theta^*). \tag{8}$$

Differentiating (8) with respect to k* and θ^* and solving for $d\theta^*/dk^*$ yields

$$\frac{d\theta^*}{dk^*} = \frac{nf'-s[ff''+(f')^2] - (1+\theta^*)hf''}{f'h[1-(1+\theta^*/\eta\theta^*)]}, \tag{9}$$

where $\eta = -[h(\theta^*)/\theta^*]\cdot[d\theta^*/dh(\theta^*)] > 0$ is the elasticity of the investor immigration rate with respect to the capital requirement. Together, (6) and (9) imply that

$$\frac{d\theta^*}{ds} = \frac{d\theta^*}{dk^*}\cdot\frac{dk^*}{ds} = f\left[\frac{1 - \frac{f''[sf+(1+\theta^*)h]}{f'(n-sf')}}{h[1-(1+\theta^*/\eta\theta^*)]}\right]. \tag{10}$$

Since the numerator in (10) is clearly positive, the sign of (10) depends on the sign of the denominator, which in turn depends on the sign of the term $1 - (1+\theta^*/\eta\theta^*)$. This term is negative if $\eta < 1 + \theta^*/\theta^*$. Since θ^* is (presumably) close to zero, (10) is negative as long as η is not 'too large' in a precise sense. Similarly, it can be shown that

$$\frac{d\theta^*}{dn} = \frac{d\theta^*}{dk}\cdot\frac{dk^*}{dn} = -k^*\left[\frac{1 - \frac{f''[sf'+(1+\theta^*)h]}{f'(n-sf')}}{h[1-(1+\theta^*/\eta\theta^*)]}\right]. \tag{11}$$

which is positive if $\eta < 1 + \theta^*/\theta^*$, a condition which will be assumed to be satisfied in what follows. □

The above results assume that the savings rate is exogenous. Suppose, however, that the saving rate is given by the golden rule of accumulation. The (endogenous) saving rate then depends on the rate of investor immigration.

Proposition 3:

Under the golden rule of accumulation, the distribution of income between capital and labour is invariant with respect to the rate of investor immigration.

Proof: Substitution of (2) into (3) reveals that balanced growth per capita consumption is given by

$$c = \frac{1}{1+\theta}\left[f(k^*) - nk^* + \int_0^{\bar{\theta}} h(\theta)\, d\theta\right]. \qquad (12)$$

Maximizing c with respect to the saving rate s requires that

$$\frac{dc}{ds} = \frac{1}{1+\theta}(f'-n)\frac{dk^*}{ds} = \frac{1}{1+\theta}(f'-n)\left(\frac{f}{n-sf'}\right) = 0, \qquad (13)$$

which, since $n > sf'$, in turn requires that the familiar golden rule of accumulation in the absence of immigration, viz, $f' = n$, be satisfied. Under the golden rule of accumulation, the optimum occurs at the point where the marginal product of capital equals the growth rate of the labour force, implying that investment equals profits. Investor immigration, unlike entrepreneurial immigration, leaves the labour force unchanged. Note that (a) per capita capital inflow

$$\int_0^{\bar{\theta}} h(\theta)\, d\theta$$

is independent of the capital labour ratio, so that the slope of

$$f(k^*) + \int_0^{\bar{\theta}} h(\theta)\, d\theta$$

is just the slope of f(k*), and that (b) steady-state investment per worker nk* is independent of θ, so that the slope of the investment per worker function is n, as in the case of zero investor immigration. Thus, the capital intensity under the golden rule of accumulation is

independent of the rate of investor immigration, as are factor prices and the distribution of income between capital and labour. □

Proposition 4:

The optimal saving rate under optimal investor immigration is smaller than without immigration.

Proof: Optimal saving and optimal immigration implies

$$\tilde{s}f(\tilde{k}) + \int_0^{\tilde{\theta}} h(\theta)\, d\theta = n\tilde{k}. \tag{14}$$

$$f'(\tilde{k}) = n. \tag{15}$$

$$h(\tilde{\theta}) = \frac{[n-\tilde{s}f'(\tilde{k})]\, f(\tilde{k})}{(1+\tilde{\theta})\, f'(\tilde{k})}. \tag{16}$$

Equation (15) can be solved uniquely for $\tilde{k}$, while (14) and (16), assuming a unique solution, can be solved for $\tilde{s}$ and $\tilde{\theta}$. From the proof of Proposition 3, $\tilde{k}$ equals $\hat{k}$ (the steady-state consumption-maximizing capital intensity without immigration), and is independent of θ. From (14), if $\tilde{\theta} > 0$, $\tilde{s}f(\tilde{k})$ must be less than $\hat{s}f(\hat{k})$ since

$$\int_0^{\tilde{\theta}} h(\theta)\, d\theta > 0$$

and $n\tilde{k} = n\hat{k}$. □

Now define $1 + \tilde{\theta}$ as the 'optimal investor immigration factor'.

Proposition 5:

Under the golden rule of accumulation, the optimal capital requirement for investor immigration equals the maximized level of per capita consumption, discounted by the optimal investor immigration factor.

Proof: Substituting from (15) into (16) yields

$$h(\theta) = \frac{(n-sn)\,f(\tilde{k})}{(1+\theta)\,n} \qquad (17)$$

$$= \frac{(1-s)\,f(\tilde{k})}{1+\theta} = \frac{c(\tilde{k})}{1+\theta}.$$

□

A COMPARISON WITH OPTIMAL ENTREPRENEURIAL IMMIGRATION

The model of optimal entrepreneurial immigration considered by Shea and Woodfield (1992) is very similar to that outlined above, except that entrepreneurs, unlike investors, enter the labour force. This fact, not surprisingly, causes the model to behave rather differently in some respects. These are outlined as follows.

First, let $g(\gamma)$ denote the inverse demand function for entrepreneurial immigration, where $g' < 0$. When the capital requirement is $g(\gamma)$, there will be a continuous inflow of γL immigrants over time. Per capita capital inflow is

$$\int_0^{\bar{\gamma}} g(\gamma)\,d\gamma,$$

while the rate of growth of the labour force is $n + \gamma$. The condition for balanced growth is

$$sf(k*) + \int_0^{\bar{\gamma}} g(\gamma)\, d\gamma - (n+\gamma)\, k* = 0. \qquad (18)$$

The steady state is characterized by the condition $sf'(k^*) < n + \gamma$. Unlike investor immigration, which unambiguously raises the steady state capital labour ratio, entrepreneurial immigration can either raise or lower the economy's long-run equilibrium capital intensity, depending on the sign of

$$\int_0^{\bar{\gamma}} g(\gamma)\, d\gamma - \gamma k*.$$

Consequently, entrepreneurial immigration has the capacity to either raise or lower the wage rate relative to the rate of return to capital. However, if the economy chooses the optimal capital requirement for entrepreneurs, then compared to a zero immigration situation, optimal entrepreneurial immigration turns out to unambiguously raise the wage and lower the return to capital. Further, the optimal capital requirement for entrepreneurs is the steady state capital labour ratio.

Under optimal policy for entrepreneur immigrants, an increase in the saving rate or a reduction in the population growth rate reduces the optimal immigration rate in all circumstances. This compares with Proposition 2 above, where under a sufficiently elastic response of entrepreneur immigrants to variations in the capital requirement it is possible that this result will be reversed. Further, and unlike investor immigration where factor rewards are invariant to the immigration rate under the golden rule of accumulation, a positive rate of entrepreneurial immigration raises the wage rate at the expense of the return to capital under similar conditions. Finally, as with investor immigration, the optimal saving rate under optimal entrepreneurial immigration turns out to be smaller than for the case of zero immigration.

JOINTLY OPTIMAL INVESTOR AND ENTREPRENEURIAL IMMIGRATION POLICY

In this section, we examine the conditions for optimal immigration policy where both investors and entrepreneurs are admitted simultaneously on a continuing basis. This permits an examination of the effects of the presence of one class of immigrants on optimal policy towards the other class, and the interactions of each class of immigrant in determining jointly optimal immigration policy.

The condition for balanced growth now becomes

$$sf(k^*) + \int_0^{\bar{\gamma}} g(\gamma)\, d\gamma + \int_0^{\bar{\theta}} h(\theta)\, d\theta - (n+\gamma)\, k^* = 0. \qquad (19)$$

The steady state is characterized by the condition $sf'(k^*) < (n+\gamma)$. Entrepreneurial immigration raises the steady state capital labour ratio if

$$\int_0^{\bar{\gamma}} g(\gamma)\, d\gamma > \gamma k^*,$$

ceteris paribus, otherwise it falls if the inequality sign is reversed. Investor immigration always raises equilibrium capital intensity. Figure 1 illustrates the case where, if $\gamma = 0$, $k^*_\theta > k^o$; where if $\theta = 0$, $k^*_\gamma < k^o$ and where if $\theta > 0$ and $\gamma > 0$, $k^*_{\gamma+\theta} > k^o$. Differentiating (19) with respect to γ and θ yields

$$\frac{dk^*}{d\gamma} = \frac{k^* - g(\gamma)}{sf' - (n+\gamma)}. \qquad (20)$$

$$\frac{dk^*}{d\theta} = \frac{h(\theta)}{(n+\gamma) - sf'}. \qquad (21)$$

Since

$$sf' < n + \gamma,\ dk^*/d\gamma \gtrless 0 \text{ as } k^* \lessgtr g(\gamma),$$

while $dk^*/d\theta$ is unambiguously positive. Thus, the presence of entrepreneurial immigration does not affect the previous result that an increase in the rate of investor immigration raises the capital labour ratio and the wage rate, and lowers the return to capital.

For given values of s and θ, per capita consumption given by (3) is strictly increasing in the capital labour ratio, so that maximizing consumption per capita across steady states with respect to γ requires maximizing the steady-state capital labour ratio. From (20), $dk^*/d\gamma = 0$ implies that

$$g(\gamma^*) = k^*, \tag{22}$$

in which case the following proposition holds.

Proposition 6:

The optimal capital requirement for entrepreneurs is the steady-state capital labour ratio.

This proposition, which is central in Shea and Woodfield (1992), is invariant with respect to the joint presence of investor immigration. However, the optimal value of the capital requirement for entrepreneurs is <u>not</u> invariant to the rate of investor immigration, since k^* is an increasing function of θ. The consequences of this fact are summarized in Proposition 7.

Proposition 7:

An increase in the rate of investor immigration raises the capital labour ratio, raises the wage rate and lowers the return to capital, and raises the optimal capital requirement for entrepreneurs. As a consequence, there is a reduction in the optimal rate of entrepreneurial immigration.

Next, differentiating (3) with respect to θ and using (21), yields

$$\frac{dc}{d\theta} = \frac{(1-s)\left[(1+\theta)f' \dfrac{h(\theta)}{(n+\gamma)-sf'} - f\right]}{(1+\theta)^2}, \tag{23}$$

which, when equated to zero, yields the following expression for the optimal capital requirement for investors.

$$h(\theta^*) = \frac{[(n+\gamma) - sf']f}{(1+\theta^*)f'}. \tag{24}$$

Equation (24) provides an expression for the optimal investor capital requirement similar to that contained in Proposition 1, apart from the appearance of the entrepreneurial immigration rate γ in its numerator. Analysis of the response of θ^* to changes in γ, however, provide no easily signable results and depend, inter alia, on the magnitude of γ and the sign of $k-g(\gamma)$.

Now consider the question of whether the optimal capital requirement for investor immigrants should be greater than the corresponding optimal requirement for entrepreneurs.

Proposition 8:

Investor immigrants should (almost always) face a lower capital requirement for immigration than entrepreneurial immigrants.

Proof: Jointly optimal policies require that (22) and (24) be satisfied simultaneously. Define the optimal differential capital requirement for investors by

$$d^*(\theta^*, \gamma^*) = h(\theta^*) - (\gamma^*) ,$$

$$= \frac{[(n+\gamma^*) - sf']f}{(1+\theta^*)f'} - k ,$$

$$= k^*\left\{\frac{[(n+\gamma^*) - sr]}{(1+\theta^*)\pi} - 1\right\} . \qquad (25)$$

where $r = f'(k^*)$ is the equilibrium return to capital and π is the equilibrium share of capital in national income. From (25),

$$d^* \gtreqless 0 \text{ as } \gamma^* \gtreqless (1+\theta^*)\pi - (n-sr) . \qquad (26)$$

For plausible parameter values it is virtually certain that the optimal differential capital requirement for investors is negative. The term $(1 + \theta^*)$ is likely to lie in the interval [0.3-0.4], while the term (n-sr) is likely to be less than 0.01. It would, therefore appear optimal to impose a lower capital requirement for investors than for entrepreneurs. The intuition is that with a small capital requirement for investors, the economy can exploit the resulting relatively large intramarginal inflow of capital to compensate for the fact that, unlike entrepreneurs, investors do not contribute to the economy via labour force participation. The following proposition is then obvious.

Proposition 9:

If the inverse demand functions are identical for both investor and entrepreneurial immigrants, so that $g(\gamma) = h(\theta)$, the optimal rate of investor immigration will exceed that of entrepreneurial immigration.

When jointly optimal immigration policies are followed, parametric changes in the saving rate and population growth rate lead to the same-signed responses in γ^* as when investor immigration is zero. As (22) shows, there is a one-to-one mapping from k* to γ^*, and the form of the optimal entrepreneurial immigration rule is independent of the rate of investor immigration. However, as is shown by (24), under jointly optimal immigration policies, the optimal immigration rule for investors depends, inter alia, on γ^*, and this dependence must be accounted for in evaluating the response of θ^* to changes in s and n. Differentiating (22) and (24) yields

$$d\gamma^*/dk^* = (1/g') . \tag{27}$$

$$\{(n+\gamma^*)f' - s[ff'' + (f')^2 - (1+\theta^*)hf''\} + f(d\gamma^*/dk^*)$$

$$= f'[(1+\theta^*)h'+h](d\theta^*/dk^*) . \tag{28}$$

Substituting from (27) in (28) for $d\gamma^*/dk^*$, and using (20) and (21), respectively, along with η as previously defined, yields, after some manipulation, the following responses of the optimal investor immigration rate to (a) an increase in the saving rate and (b) an increase in the population growth rate.

$$\frac{d\theta^*}{ds} = \left[\frac{1+\dfrac{f(g') - f''(sf+(1+\theta^*)h}{f'[(n+\gamma^*)-sf']}}{h[(1+\theta^*/\eta\theta^*)]}\right]. \tag{29}$$

$$\frac{d\theta^*}{dn} = -k^*\left[\frac{1 + \frac{f(g') - f''[sf + (1+\theta^*)h}{f'[(n+\gamma^*) - sf']}}{h[1-(1+\theta^*/\eta\theta^*)}\right]. \qquad (30)$$

The expression in square brackets in (29) and (30) is similar to the corresponding expression in (10) and (11), except the former contains a term $f/g'(\gamma^*)$ which is not present when there is no entrepreneurial immigration. An increase in the saving rate (or a reduction in the population growth rate) which raises k^* now raises $g(\gamma^*)$, lowering γ^*, and the response of θ^* is thereby affected due to the dependence of θ^* on γ^*. Further, when $\gamma = 0$, Proposition 2 suggested that a higher saving rate or lower population growth rate would reduce the optimal investor immigration rate unless the immigration rate is exceptionally responsive to changes in the investor capital requirement. In the presence of optimal entrepreneurial immigration, however, this condition is no longer sufficient. Even if $\gamma < 1 + \theta^*/\theta^*$, evaluation of (29) and (30) reveals that

$$\frac{d\theta^*}{ds} \gtrless 0, \quad and \quad \frac{d\theta^*}{dn} \lessgtr 0, \qquad (31)$$

$$as\ \psi = g\{f'[(n+\gamma^*) - sf'] - f''[sf + (1+\theta^*)h]\}/\gamma^* f,$$

where $\psi = -[g(\gamma^*)/\gamma^*] \cdot [d\gamma^*/dg(\gamma^*)] > 0$ is the elasticity of the entrepreneurial immigration rate with respect to a change in the capital requirement for entrepreneurs, evaluated at the optimal entrepreneurial immigration rate.

Per capita consumption in balanced growth is obtained by substituting (19) into (3) as follows.

Differentiating (19) yields

$$\frac{dk^*}{ds} = \frac{f}{(n+\gamma) - sf'} > 0 \ . \qquad (33)$$

Differentiating (32) with respect to s, and using (33), yields

$$\frac{dc}{ds} = \frac{1}{1+\theta}[f' - n(n+\gamma)]\left[\frac{f}{(n+\gamma) - sf'}\right]. \qquad (34)$$

Proposition 10: Under the golden rule of accumulation, any entrepreneurial immigration lowers the wage rate and raises the return to capital, while any investor immigration leaves factor prices unchanged.

Proof: Given that $n + \gamma > sf'$, equating (34) to zero yields the golden rule of accumulation in the presence of investor and entrepreneurial immigration, viz, that the marginal product of capital equals the sum of the natural growth rate of the labour force plus the rate of entrepreneurial immigration,

$$f'(k^*) = n + \gamma \ . \qquad (35)$$

Equation (35) shows the golden rule marginal product of capital to be independent of the rate of investor immigration. Since $f'(k^*) = n + \gamma > f'(\hat{k}) = n$, $k^* < \hat{k}$, from which the result in Proposition (10) follows. □

Finally, jointly optimal saving and immigration policies require the following to hold.

$$f'(\tilde{k}) = n = \tilde{\gamma} \ . \qquad (36)$$

$$g(\tilde{\gamma}) = \tilde{k} \ . \qquad (37)$$

$$h(\tilde{\theta}) = \frac{[(n+\tilde{\gamma}) - \tilde{s}f'(\tilde{k})]f(\tilde{k})}{(1+\tilde{\theta})f'(\tilde{k})} . \qquad (38)$$

Proposition 12:

The optimal saving rate under optimal investor and entrepreneurial immigration is smaller than without immigration.

Proof: Assuming a unique solution, (36) - (38) can be solved for $\tilde{k}$, $\tilde{\gamma}$, and $\tilde{\theta}$. The conditions for balanced growth when optimal savings and immigration policies are in place, and when optimal savings and zero immigration is occurring, are, respectively,

$$\tilde{s}f(\tilde{k}) - n\tilde{k} = \tilde{\gamma}\tilde{k} - \int_0^{\tilde{\gamma}} g(\gamma)\,d\gamma - \int_0^{\tilde{\theta}} h(\theta)\,d\theta . \qquad (39)$$

$$\hat{s}f(\hat{k}) - n\hat{k} = 0 . \qquad (40)$$

Since $g' < 0$,

$$\int_0^{\tilde{\gamma}} g(\gamma)\,d\gamma > \tilde{\gamma}\tilde{k} .$$

If θ is equal to zero, savings per worker $[\tilde{s}f(\tilde{k})]$ is less than investment per worker $(n\tilde{k})$. If $\theta > 0$, $\tilde{s}f(\tilde{k})$ is even smaller than $n\tilde{k}$. From the proof of Proposition 11, we know that $\tilde{k} < \hat{k}$. Since f(k) is concave, $\tilde{s} < \hat{s}$.

CONCLUDING REMARKS

We have shown that the long run impacts of investor and entrepreneurial immigration can be analysed using the standard neoclassical growth model and have derived optimal immigration policy for each class of migrant. In general, the optimal capital requirement will be lower for investors than for entrepreneurs. Further, optimal immigration policy always benefits workers and harms capitalists, so it appears that labour unions should support business immigration. The optimal immigration policy, however, depends on the saving rate and natural growth rate of the host country, and if other policies are implemented along with optimal immigration policy, labour unions need to be cautious in giving support since some forms of business immigration can hurt their members. For example, under the golden rule of accumulation any amount of entrepreneurial immigration will hurt their members by raising the return to capital at the expense of the wage rate, yet any amount of investor immigration will leave factor prices unchanged.

NOTES

1. A summary of these requirements for a sample of countries encouraging business immigration may be found in Shea and Woodfield (1992a).

2. There does not appear to be a specific minimum capital requirement for entrepreneurs in Canada.

3. Optimal balanced-growth immigration policy is examined in a heterogeneous-labour model in Shea and Woodfield (1992b), but this analysis does not consider optimal business immigration or savings policies.

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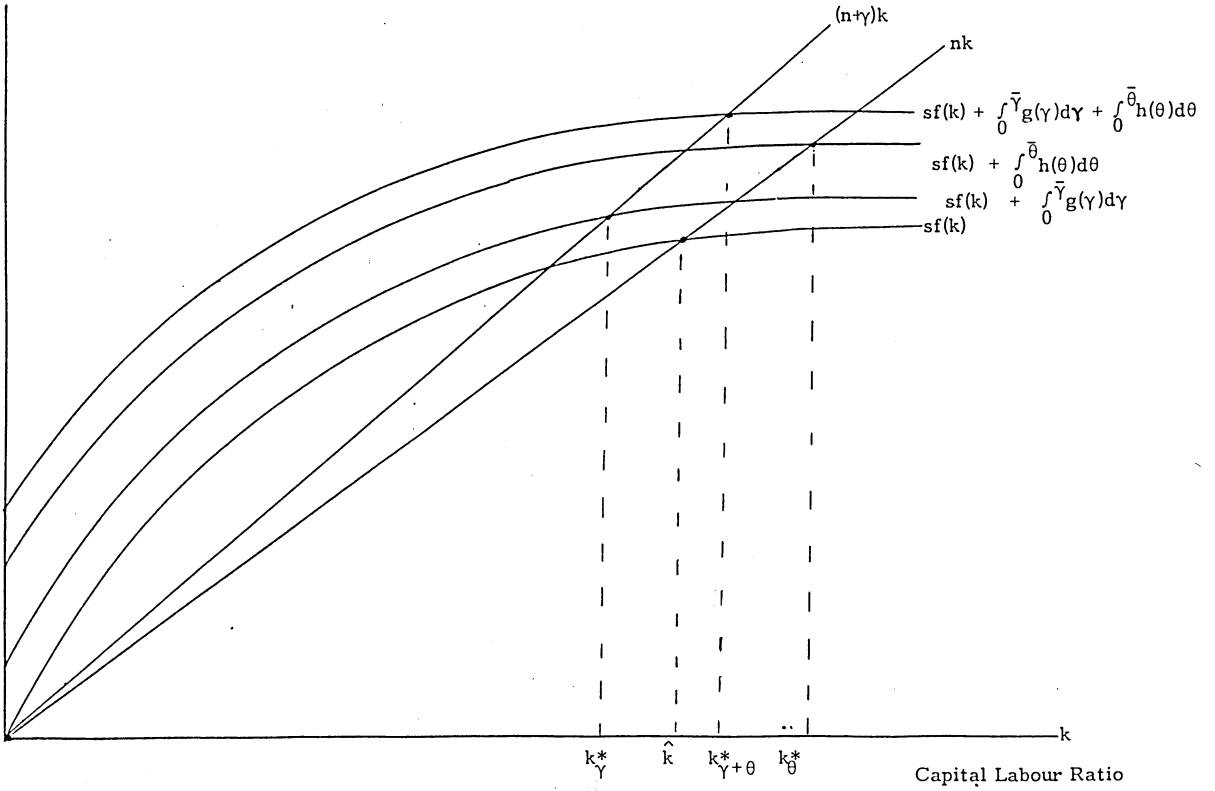
Figure 1: Alternative Steady-State Equilibria



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