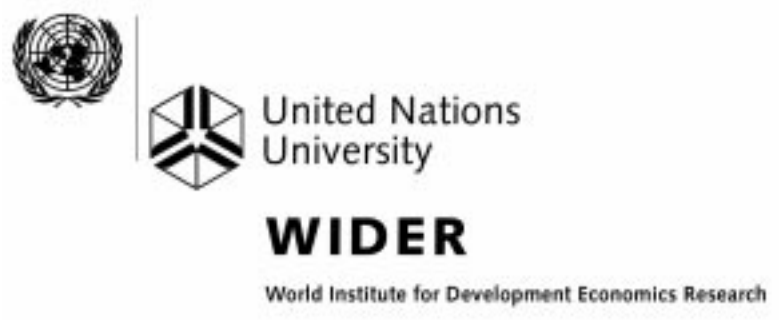

Discussion Paper No. 2001/50

Globalization, Global Public 'Bads', Rising Criminal Activity and Growth

David E. Bloom[1] and
S. Mansoob Murshed[2]

August 2001

Abstract

By globalization we mean an external shock; specifically an increased world demand for various goods (or bads) including the products and services which are illegal. We analyse the effects of these shocks on *growth* and *capital stocks* by utilizing two different models. The first examines an exogenous shock in the context of a *single* country macroeconomic Ramsey growth model. The shadow activity generally has a negative impact on productivity and the capital stock. But its effect on consumption is much more ambiguous, depending on whether it generates positive or negative revenues in the domestic economy. The other model considers a two-region *North-South* model, along the lines of the Findlay (1980) model, where it is the South that produces the criminal good, and the North that consumes it. …./…

Keywords: North-South interaction, growth, shadow activities.

JEL classification: F21, F22, F43, O41.

1 School of Public Health and Kennedy School of Government, Harvard University, 665 Huntington Avenue, Boston, Massachusetts 02115, USA; Dbloom@hsph.harvard.edu

2 UNU/WIDER, Katajanokanlaituri 6B, FIN-00160, Helsinki, Finland; Murshed@wider.unu.edu

This study has been prepared within the UNU/WIDER project on Globalization and the Obstacles to the Successful Integration of Small Vulnerable Economies which is directed by Dr Mansoob Murshed.

UNU/WIDER gratefully acknowledges the financial contribution to the project by the Ministry for Foreign Affairs of Finland.

Unlike in the first model, the production of the illicit commodity does not directly detract from the capital stock, as it only utilizes surplus labour from the hinterland. The effect on equilibrium capital stock, however, occurs via changes in the wage-rental ratio. This in turn will affect steady-state growth rates in the two regions. An increase in illicit sector activity that is mainly expropriated by warlords leads to an unambiguous loss to the South in terms of capital stock, terms of trade, and the real compensation of workers. Increased migration from South to the North raises the South's terms of trade, and there is more investment from North to South.

Acknowledgements

We are grateful to Ajay Mahal, Jaypee Sevilla, Tony Addison, Cecilia Ugaz and River Path Associates for helpful discussions and assistance.

> Globalisation isn't only about what is ‘out there’, remote and far away from the individual. It's an ‘in here’ phenomenon too, influencing intimate and personal aspects of our lives.
>
> Anthony Giddens, 1999

1 The relationship between globalization and crime

Globalization involves the accelerated international exchange of goods/services, capital, labour, and ideas or knowledge. It arises from the lowering of barriers to exchange, such as quotas, tariffs and import/export barriers, combined with technological development that has rapidly reduced the cost of transportation and communication over long distances.

Globalization is having profound effects on all the world's national economies. By offering new opportunities and incentives, it leads to new forms of organization and results in the development of different forms of political institution. An increasing number of decisions and actions taken at a local level now have to be seen in a wider transnational or truly international context.

Globalization has both positive and negative components. Most economists agree that countries that are open to the international economic system have better prospects for achieving economic growth. Openness to the flow of knowledge is also important. According to Paul Romer (1993), it is ‘ideas, not objects, that poor countries lack’. However, globalization also has costs. Readjustment is often painful in the short-term and many are concerned by the increased vulnerability of many economies to rapid out-flows of capital.

Globalization may also create longer-lasting ‘bads’, such as environmental degradation or decreased national security. Increased crime is one of the most frequently cited of these bads. Just as globalization creates new opportunities and incentives for legitimate behaviour, it also changes the framework within which criminal actions are taken: crime may increase or decrease; new forms of criminal organization may develop, as well as new initiatives designed to tackle crime.

Crime is a complex phenomenon. Globalization has an impact on crimes which are committed across borders (transnational crime), but it also an indirect impact on national crime through changes the global economy exerts on the way people think, work, and live. More narrowly, a global economic shock—or the pain of adjusting to greater openness to global economic forces—may also have an impact on national crime rates. Some crimes increase with globalization, but others may become less common. For example, smuggling of legal substances relies on tariffs or import restrictions, combined with differential prices in different markets. As barriers to trade diminish, so do the incentives to smuggle.

A distinctive feature of organized, transnational crime is how closely it shadows the legitimate transnational and international system. This type of crime can be classified according to three categories: illegal global trade, defined as activities that shadow and compete with legitimate trade; illegal politics, defined as activities that shadow and

compete with legitimate politics; and corruption of the global system, defined as activities that parasite the developing global system.

Illegal global trade includes illicit drug trafficking; import/export of stolen goods; illicit traffic in arms; trafficking in people or body parts; and theft of art and cultural objects. Some of these activities are now huge industries. Half the global trade in light weapons is thought to be illicit (Arms Trade News). Smuggling people is thought to be worth $9 billion per year (Savona 1998), while the world drug industry is now thought to be worth $500 billion (UNDCP 1994).

Illegal global politics include terrorism; aircraft hijacking; land hijacking; environmental crime; and human rights abuses. The scope of this area has changed significantly as the global system has developed. The opportunities for maximizing the effects of terrorism, for example, are magnified by a global media industry. In addition, the complexities of the global system have encouraged some states to sponsor terrorism, making some terrorist activities a form of 'diplomacy by other means'. Finally, the regulation of what is and is not considered legitimate politics has increased. Acts committed in the name of legitimate states are increasingly judged criminal by the global system. Recently, for example, the unprecedented attempt to bring former Chilean leader, General Pinochet, to trial foundered on grounds of his ill-health, with British courts accepting that he could, in principal, be prosecuted for crimes committed while head of state.

Corruption of the global system includes the theft of intellectual property; computer crime; insurance fraud; fraudulent bankruptcy; fraudulent appropriation of funds of global institutions; and infiltrations of legal businesses or money laundering. The vulnerability of the global technological system to attack is of particular concern, with a wave of recent viruses—Chernobyl, Melissa, and the Love Bug—causing considerable damage. Viruses are estimated to have cost the global economy $12.1 billion in 1999 (BBC), while Internet-based credit card fraud is also a growing problem. One US company, for example, recently recorded a one-time reserve of $4-6 million in its third quarter due to 'substantial losses' from credit card fraud believed to be the work of an organised gang of criminals (*Financial Times*).

2 Modelling crime

Criminal activities result in the production of commodities and services, just as in other sectors of the economy. Various types of crime impact on the economy differently, both in magnitude and sign. Accordingly, a variety theoretical models ranging from static to dynamic can be created, as well as models looking at the income distributional and poverty creating aspects of crime. For example, a static trade model might inform us about the terms of trade effects of crime, while dynamic models are more appropriate for growth effects. This paper is not about the theory of the economic basis for violent criminal or warlike behaviour in the presence or absence of enforceable property rights. Excellent rational choice models exist to explain these: Hirshleifer (1995) and Skaperdas (1992) are among good examples. We are concerned with crime and its consequences for growth, both in a single country and in a multi-regional North-South context. In reality, the relationship between crime and growth is not linear. Not every

illegal activity is growth retarding. Certain illegalities, such as the evasion of draconian and excessive regulation, might even benefit the economy.

By globalization we mean an external shock; specifically an increased world demand for this type of good (or bad) and service. We analyse the effects of these shocks on growth and capital stocks by utilizing two different models. The first examines an exogenous shock in the context of a single country macroeconomic Ramsey growth model in section 3. The shadow activity generally has a negative impact on productivity and the capital stock. But its effect on consumption is much more ambiguous, depending on whether it generates positive or negative revenues in the domestic economy.

In section 4 we consider a two-region North-South model, along the lines of the Findlay (1980) model, where it is the South that produces the criminal good, and the North that consumes it. Unlike in the first model, the production of the illicit commodity does not directly detract from the capital stock, as it only utilizes surplus labour from the hinterland. The effect on equilibrium capital stock, however, occurs via changes in the wage-rental ratio. This in turn will affect steady-state growth rates in the two regions. Although we speak of the 'South' the results are also applicable to transition economies of Eastern Europe and the former Soviet Union.

3 Globalization, growth and a crime shock in an open economy

In this section we present some theoretical insights on how increased criminal or shadow activities, in the wake of globalization, might impact on the macroeconomy in the long-term. The analysis that follows is based on the celebrated Ramsey (1928) growth model (see for example Blanchard and Fischer, 1989 for a contemporary exposition). The analysis requires us to model the economy via choices made by a process mimicking a representative individual. All variables are given in per capita terms and the growth in population is assumed to be constant. There is an 'infinitely' lived individual who optimises by maximizing utility at each time period *(t)* according to:

$$\text{Max } U(t) = \int_{t}^{\infty} u(A_c(t)) \exp(-it)\, dt \quad (14.1) \tag{1}$$

where utility *(U* or *u)* depends on consumption, *C;* exp is the exponential operator; and the real interest rate is, *i.* Maximization is subject to two budget constraints at time *t*:

$$\dot{D}(t) = C(t) + I(t) + iD(t) - f(k(t)) \tag{2}$$

$$\dot{k}(t) = I(t) \tag{3}$$

where we ignore depreciation and capital installation costs and let:

$$Y(t) = f(k(t)) \tag{4}$$

The stock constraint (3) tells us that the rate of capital accumulation at time t, is equal to investment *(I)* at time *t.* Equation 4, the production function for *Y* (output) written in per capita fashion, *k* is the capital-labour ratio *(K/L)*. Equation 2 is the flow constraint. It informs us that the rate of accumulation of international debt is given by the excess of consumption *(C)* plus investment *(I)* and debt servicing *(iD),* over production or output *(f(k)).* This is the exact counterpart of the current account deficit, the excess of absorption over output.

The current value Hamiltonian is:

$$H(t) = u(C(t) - \mu_1(t)\,[C(t) + I(t) + iD(t) - f(k(t)] + \mu_2(t)\, p_k\, I(t) \qquad (5)$$

where p_k is the price of capital. The two co-state variables are*:* $\mu_1\,(t)$ and $\mu_2\,(t)\, p_k$ with $\mu_1\,(t) = \mu_2\,(t)$. Maximization yields the following, among other, first order conditions:

$$\frac{\delta H(t)}{\delta C(t)} = u'(C(t)) - \mu_1(t) = 0$$

$$\frac{\delta H(t)}{\delta I(t)} = \mu_2(t)\, p_k - \mu_1(t) = 0 \qquad (6,7)$$

$$or, 1 = p_k$$

The rules about optimal consumption and investment, similar to the Ramsey rules, can be derived from the first order conditions above. Equation 6 tells us that the optimizing agent will equate the marginal utility of consumption, *u' (C (t))* to shadow price of consumption, μ_1. This means that optimal consumption is constant in every period as it depends on μ_1, which is a constant. The consumption and investment decisions are separable.

We now turn to investment. The investment Ramsey rule (7) tells us that the marginal product of capital is equated to the marginal value of foregone consumption adjusted by the price of capital (p_k). This is related to the shadow price of capital (p_k). We may write the ratio of investment to capital as a function of the shadow price of capital (p_k). This will allow us to write a differential equation in k, based on the inverse of the function described above, which takes the following form:

$$\dot{k} = I(t) = k(t)\,\varphi(\, p_k(t)) \qquad (8)$$

This informs us that investment is an increasing function of the shadow price of capital (p_k). The picture regarding investment is incomplete unless we postulate an equation determining p_k*:*

$$i = \frac{f'(k(t))}{p_k}\,; as, \dot{\mu}_1(t) = \dot{\mu}_2(t) = 0$$

or,

$$\dot{p}_k = p_k\, i - f'(k(t)) \qquad (9)$$

Equations 8 and 9 can be utilized to present the dynamics and steady state equilibrium of the system.

In order to subject the system to the effects of international crime we incorporate an additive and multiplicative shock to the production function 4:

$$Y(t) = (1 - z_0)f(k(t)) + z_1 \qquad (10)$$

where z_0 is the multiplicative element that diverts a part of the capital stock from ordinary or legal production, and z_1 is the additive or revenue component that affects income in units of Y similar to a transfer.[1]

The revenue component can be either positive (patriotic) or negative (unpatriotic).[2] If, as in the case of some countries and activities, the revenues are fully transferred abroad via money laundering, then z_1 is negative. If it generates income in the domestic economy it is positive. In reality z_1 is likely to contain both positive and negative components. The additive shock, z_1 has no effect on the marginal product of capital, and therefore no effect on investment and the capital stock. It immediately raises consumption, but not savings, by a proportionate amount. Conversely, consumption declines if revenues are negative. Adjustment in income is immediate and dramatic. In an open economy, however, the country might be able to borrow from abroad to smooth consumption. Clearly, this has implications for future indebtedness and debt servicing. In this case we would need to alter the utility function of the representative consumer to incorporate not just consumption but distaste for changes in the rate of consumption.

When the revenue effect is transitory it permanently affects consumption and saving in all future periods. Supposing the revenues are only expected to last for a limited period 0 and T. Then the increase in consumption is:

$$z_1 \int_0^T \exp(-it)\, dt = (z_1 / i)[1 - \exp(-iT)] \qquad (11)$$

If the period in question is short, then the change in consumption and saving is small. It is interesting to consider a negative but short-lived revenue effect of crime. This leads to a decline in consumption and saving. There will be a deficit in the current account of the balance of payments as there is more borrowing internationally. When the negative revenues (z_1) finally dissipate, the country will need to run a trade surplus to service debt.

We now turn to the effects of crime on production, investment and the capital stock. This occurs via the multiplicative shock. The situation is far more serious as it adversely affects investment. We postulate that these activities will reduce the effective marginal product of capital, equation 10, due to the diversion of productive investment away from normal activities towards harmful activities. The mathematical workings in terms of the phase diagram are described in the appendix, and the events related to investment

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1 In principle we should incorporate some uncertainty such that revenues are weighted by a probability of success in the criminal venture.

2 Even in this instance it might benefit the national diaspora living in foreign lands.

and capital accumulation are depicted in Figure 1 in k and p_k space. In Figure 1 the $k = 0$ schedule is a horizontal line. This tells us that the optimal capital stock is related to marginal productivity and not p_k The $p_k = 0$ line is negatively sloped as a rise in p_k increases the rate of investment, which in turn raises the capital stock *(k).* However, with a fixed interest rate and marginal productivity of capital, the capital stock is given at its optimal level, k^*, such that $p_k = 1$ in the steady state; hence *k* will decline.

When there is a negative multiplicative shock due to increased criminal activities following globalization, the economy jumps from the initial equilibrium at E_1 to the new saddle-path (SS_2) at point F. The $p_k = 0$ schedule will shift to the right, and the final equilibrium is at E_2. There is an *initial*, but not steady state, fall in the shadow price of capital. This makes the rate of investment negative between *F* and E_2 which in turn causes the capital stock to decline. The economy comes to a rest with a lower steady state capital stock at E_2. There is a growth collapse between *F* and E_2. Net output declines in the new steady state due to the combined effect of the diversion of output to crime and a lower capital stock. There is also a decline in consumption associated with lower net output.

The complete picture will entail both an additive or revenue effect and a multiplicative effect. The former impacts on consumption, whereas the latter principally affects investment. The investment effect is unambiguously negative on welfare, as the diversion of productive resources to criminal activities lowers the growth rate and the new equilibrium capital stock. The additive effect is rather unclear, as in some instances it increases income, but in other cases it lowers income via the mechanism of capital flight. Furthermore, the additive effect can have consequences for future indebtedness particularly when revenues are negative and transitory. In terms of welfare, crime does not pay, except in the case where there are positive rents.

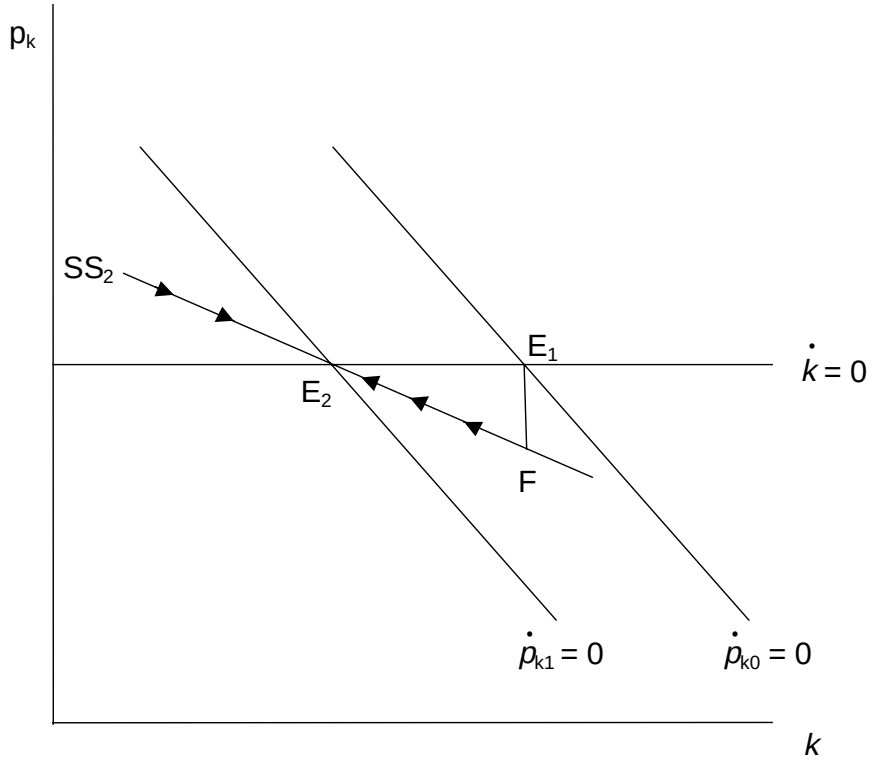
It should also be borne in mind that globalization could also reduce crime and the need to carry out illegal activities. This might occur because of the removal of distortions and restrictions on trade. In that case globalization will work as a positive productivity shock. The term z_0 in equation 1 would have a positive sign, as would z_1. In Figure 1 we would move movements in reverse, from E_2 to E_1 via *F*. The equilibrium capital stock will increase and there would also be a rise in consumption.

Finally, if we were to move to a neo-classical Solow (1956) growth model, utilized in the second model below, effects similar to the multiplicative shock above can be generated. The equilibrium steady state capital stock (k^*) is:

$$k^* = \frac{sf(k)(1-z_0)}{n} \qquad (12)$$

where *s* is the saving rate and n the growth in the effective labour force. The influence of the shadow economy lowers the equilibrium capital stock associated with the exogenously given growth in population. This is when globalization has a negative impact by raising crime. The converse would be true, as far as the equilibrium capital stock is concerned, when globalization lowers criminal and corrupt behaviour.

Figure 1
An external crime shock



A North South model

So far our analysis has been confined to single country model. It would be fruitful to examine the issue in the context of a two-region North-South growth model. For the sake of analytical convenience, the shadow or criminal product is produced in South and consumed in the North. This is clearly unrealistic, the technology of crime spills over from the North to the South. As indicated above it is not possible to address all facets of a complex issue within the confines of a single and tractable analytical model. However, we wish to stress that we are not being pejorative towards the South; after all the demand for criminal activities in our model lies in the North.

The model we outline is based on the seminal work of Findlay (1980), as well as Burgstaller and Saavedra-Rivano (1984) extension of the Findlay model allowing for capital mobility between the North and the South. The essence of both of these models lies in the asymmetry of North-South interaction, with the former wielding the greater economic power. Basically, the growth rate of the South, equal to its terms of trade adjusted profit rate has to conform to the growth rate of the North, defined as the growth in its effective labour force. This does not imply convergence to the higher income of the North, as long as there is surplus labour in the South.

The economy of the North, therefore, corresponds to a Solow (1956) one-sector growth model, with full employment, and factor rewards are determined by marginal product. Saving is out of total income. The South, unlike the North, is meant to have surplus labour with an institutionally determined real wage rate. The innovation in our model is that the ‘institution’ determining this is the shadow sector, equations 15 and 16 below.

Our justification for making this assertion is based on Lewis's (1954) notion of surplus labour. There the exogenous wage rate is meant to reflect the average product of labour in subsistence agriculture. We substitute the shadow economy for subsistence agriculture. An expansion in illicit activity due to 'globalization' will therefore impact on the South's, otherwise fixed, wage-rental ratio.

We begin with the structure of production in the North. The production function there is:

$$q_{NP} = f_{NP}(k_{NP}) \quad f'_{NP} > 0 \tag{13}$$

where q_{NP} represents per capita output of the Northern product *(NP)* as a function of the capital-labour ratio (k_{NP}) in the North. Both per capita output and the capital-labour ratio are in terms of the fully employed labour force in the North, L_N. Profit maximization gives the equilibrium wage and profit rates. The Northern profit rate, r_N, is equal to the marginal product of capital. The real wage rate, in terms of the North's good, is a residual, given by the Euler equation.

A similar process drives production decisions in the South, except that in the South the real wage rate, w_S is taken as given in the legal sector. Let us denote *legitimate* per capita output in the South as $q_{SP} = f_{SP}(k_{SP})$. Profit maximization will give us a unique capital-labour ratio (k_{SP}) and real rental rate (r_S) in Southern legitimate production given the fixity of the wage and rental rate in that sector. The real rental rate on capital in the South's production may be written as:

$$r_S = r_S^* = f'_{SP}(k_{SP}^*) \tag{14}$$

The rate of profit, however, varies with the terms of trade, P_S (the North' price is set at unity). Thus, the rate of profit in the South is the real rental rate times the terms of trade.

We turn now to the production of the shadow or illegal good which is produced exclusively in the South, for final use in the North. In our simple formulation this activity only utilizes labour. In fact, we can specify a simple mark-up pricing rule, consistent with constant returns for the production of this good, *C*, whose price is given by P_C in the South's currency units:

$$P_C = (1+x)aw_S \tag{15}$$

where the parameter $a = L_C/C$ stands for the labour input-output coefficient in this area, and x is a profit mark-up coefficient indicating the dangers of producing illegal goods and/or the risk premium associated with such an activity. It (x) can also be viewed as the coercive rent extracted by warlords or organizers of crime. Note that in (15) the shares of x and wages in total output are not determined by marginal productivity but by coercive and exogenous political factors. This particular formulation has its origins in the work of Kalecki (1971), who argues that in the normal production activity he was concerned with, x reflected the monopoly power of firms. This allows us to visualize x also as the power of warlords, gang leaders and other forces of coercion including rogue governments. Note that the formulation in (15) above does allow us to say something about distributional issues.

Our characterization above of the production differences can also be generalized for a single country. The North would be the modern sector, the South's legal production the semi-modern sector, and the criminal activity the production activity of the ghetto (whether in Bangkok, Lagos, St Petersburg, Los Angeles or Bogota) or the rural hinterland (Afghanistan or Colombia). The under privileged have two choices: stay in the ghetto or rural backwater or work in smokestack industries or services that use capital. The really modern sector would be associated with advanced technology, competitive in the economic sense, and where factors are paid their just desserts or marginal product.

Reverting back to the model, events in the shadow economy will alter the institutionally given and exogenous real wage rate in the South. Consider a rise in P_C due to globalization (an increase in demand). Totally, differentiating (15), holding a constant:

$$dP_C = (1+x)adw_S + aw_S dx \qquad (16)$$

For given technology, the rise in shadow activities, reflected by an increase in P_C can either lead to a rise in the share of x or the share of wages in the production of C. This in turn will impact on the rest of the economy in the South. A rise in x relative to w_S will cause the profit rate to rise in the South[3]; whereas an increase in wages will have the opposite effect. Either way an increase in the demand for illegal goods will impact on the exogenous wage-rental ratio in the other sector in the South. This in turn will have implications for the steady-state growth rates of the two regions. In what follows we will claim that a rise in the rent associated with the illegal sector is mainly expropriated by warlords, leading to a fall in the wage rate and a rise in the profit rate.

An alternative method of modelling criminal activity would be to postulate that it lowers the value of human capital. Here human capital would take the form of the earliest formulations, as in Romer (1986). Human capital worked like an externality, augmenting the productivity of physical capital. This would have the same effects in our model as long as it disadvantaged labour productivity.

Moving on to the outline of income, demand and capital mobility we have to bear in mind that international capital mobility requires us to distinguish between domestic product and national income. Capital owned in the North could be employed in the production in the South, for example. Per capita national income in the North is:

$$Y_N = f_{NP}(.) + r_N(k_N - k_{NP}) \qquad (17)$$

where k_N is nationally owned capital and k_{NP} is capital employed in Northern production. The second term indicates the profit earned by Northern capital that is repatriated from the South. Per capita consumption (Y_{NC}) is:

$$Y_{NC} = (1 - s_N)Y_N \qquad (18)$$

where s_N is the constant savings propensity in the North. We can also postulate that a constant fraction of consumption will fall on the illicit good.

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3 This occurs because a change in the wage rate automatically alters the rate of return on the other factor, capital, used in legal production, even though capital is not employed in the shadow economy.

In the South total income per worker *(L_S)* is:

$$Y_S = w_S + (r_S^* k_S / \lambda) + x w_S \qquad (19)$$

where $\lambda = L_S/L_N$, $k_S = K_S/L_N$ in terms of labour units in the North. Note that part of the South's income will be used to finance debt servicing or profit repatriation against Northern ownership of part of the productive capital stock in the South. Consumption per capita in the South is given by:

$$Y_{SC} = w_S + (1 - s_S)\left[(r_S^* k_S / \lambda) + x w_S\right] \qquad (20)$$

where s_S is the savings propensity in the South.

We now turn to the question of capital mobility. It is postulated that international capital mobility is perfect, and serves to equate profit rates across regions. Thus:

$$r_N = P_S r_S^* \qquad (21)$$

$$or,\ f'_{NP}(k_{NP}) = P_S r_S^* \qquad (22)$$

Assuming that the excess demand functions are Walrasian stable, and that the Marshall-Lerner conditions hold such that North-South trade is balanced, the following function relates the terms of trade to the capital-labour ratios owned in the two regions:

$$P_S = P_S(k_N(r_N), k_S(r_S)),\ k_{N1}, k_{S1} > 0 \qquad (23)$$

Both the partial derivatives in the function above will be negative. In other words, a rise in the capital stock owned by either region will cause the equilibrium terms of trade of the South to decline. This is because of the combination of

i) full employment in the North,

ii) an exogenously given real wage in the South, and

iii) perfect capital mobility given by equations 21 and 22.

The fixed wage in the South gives a unique r_S^*, given that perfect capital mobility equalizes profit rates we have a unique k_{NP} (capital-labour ratio in the production of the Northern good). As there is full employment in the North any rise in national capital stocks irrespective of the region in which it occurs leads to the re-location of capital towards production in the South. This leads to an excess supply of output in that region and the terms of trade duly decline.

In the Burgstaller and Saavedra-Rivano (1984) model with capital mobility, it is assumed that *initially*, the rate of profit is greater in the South than in the North. Once international capital mobility is introduced, and profit rates across the regions are equalized, certain disadvantaging characteristics emerge for the South in steady-state equilibrium. Due to the fact that production in the South is more profitable, the world capital stock is re-distributed such that more output is produced in the South and less in the North. The capital stock owned by the North is greater than under autarky in international capital flows. Hence the North's per capita income is greater than if there were no capital flows, and the North-South per capita income differential is widened.

This is all the more the case because part of the South's domestic product has to be devoted towards profit repatriation.

We have already noted that the North follows a pattern resembling a Solow neoclassical growth model. There is an exogenously given growth rate of the effective labour force, denoted by n. Given that a constant fraction (s_N) of total income (Y_N) is saved in the North, the evolution of its capital stock is given by:

$$\dot{k}_N = s_N Y_N - nk_N \qquad (24)$$

In the steady state, the growth of k_N is zero. Note that the rate of growth in the North, following the Solow model, is given by the exogenous growth rate of the effective labour force, *n*.

In the South saving is out of profits alone. Thus the evolution of the South's indigenously owned capital stock is its savings rate times the rate of profit. This is also the growth rate (g_S) in that region. Hence:

$$g_S = s_S P_S r_S^* \qquad (25)$$

The job of the terms of trade, given free trade, is to equate the growth rates of the two regions, in the steady state equilibrium. This happens when *n* (growth in the North) is equated to the left-hand side of (25) for the South:

$$P_S^* = \frac{n}{s_S r_s^*} \qquad (26)$$

Equation 26 conveys the central message of the model: the South's growth rate given by profitability in that region must equal the North's growth rate. To reiterate, this does not mean per capita income convergence. The steady state dynamics of the system can be investigated from the following pair of differential equations.

$$\begin{aligned} \dot{k}_N &= s_N Y_N - nk_N \equiv \Phi(k_N, k_S) \\ \dot{k}_S &= P_S s_S r_S^* k_S - nk_S \equiv \psi(k_N, k_S) \end{aligned} \qquad (27, 28)$$

The first equation (27) describes the growth of the North's (nationally owned) capital stock. The second equation (28) outlines how free trade and capital mobility equalizes world growth rates as already discussed above. See the appendix, equations (A.5) and (A.6) for the solution technique and other properties of the model, as well as Figure 2.

We are concerned with the steady-state effects on the capital stocks of the two regions of two parameter changes. The first parameter change is associated with increased globalization in the shadow economy, and the second to do with possibly increased migration from South to North. Migration is much less than what it was in the nineteenth century, and we make no effort to model the hazards and uncertainties of illegal migration to today's affluent countries.

The first type of change occurs via an alteration in the South's wage-rental ratio (which is exogenous datum for the legitimate economy). In the appendix, equations (A.7) and (A.8) present results for a rise in r_S^*, the profit rate in the South. This occurs if the

increased revenues from rising criminalized activity go relatively more to x (drug barons and so on), rather than to wages. Of course, the converse effect is easily visualized by reversing signs in (A.7) and (A.8).[4] From (A.7) note that the equilibrium capital stock in the North is unaltered. In the South, however, the capital stock owned by the South and engaged in legal production declines (A.8) following a rise in r_S^*. These results are shown at point B in Figure 2. Upon impact there is an increase in the South's terms of trade due to increased demand there, and because of the no-arbitrage condition in connection with capital mobility (a rise in r_S^* given r_N causes P_S to decline). In the long-run, however, P_S has to fall, see equation 26). Since the role of the terms of trade is to equate growth rates of the two regions, and since no crucial parameter has changed in the North, there is an inverse relation between the terms of trade and the rental rate on capital in the South. As P_S falls so does overall profitability $r_S^* P_S$, and k_S declines: see also equation 23. Recall that the grey activity does not utilize capital. Legitimate output declines in the South, as does employment in that sector. Eventually foreign direct investment or capital flows to the South will also decline. Note that the total effect on national income is not clear-cut. The shadow economy expands, but the legal sector contracts. Per capita consumption from (20) will decline, as the share of labour in national income falls. Employment falls in the legal sector but could rise in the shadow economy. There is an unambiguous loss to the South in terms of capital stock, terms of trade, and the real compensation of workers, the group that includes the poorest segment of the population.

As far as the North is concerned there is a disutility from the consumption of ‘bads’. Also it might lead to a Hicks-neutral decline in output via the diminution of human capital, a fall in q_{NP}. This could be the mechanism via which negative global negative externalities are transmitted.

The second change results in an increase in the North's effective labour force, n. Clearly we have not modelled difficulties and impediments associated with illegal immigration. From (A.9) it is apparent that the North's equilibrium capital stock declines and the South's may increase (A.10), point C in Figure 2. So legitimate economic activity rises in the South, and its terms of trade improve, see (26). This is beneficial for the South, but part of its capital stock will be owned by the North via increased capital flows from North to South, and part of this increased output will take the form of profit repatriation. Emigration from the South to the North, encourages foreign direct investment in the opposite direction. In the North, however the equilibrium wage rate declines.[5] No wonder that there is such resistance to immigration from trade unions in the North.

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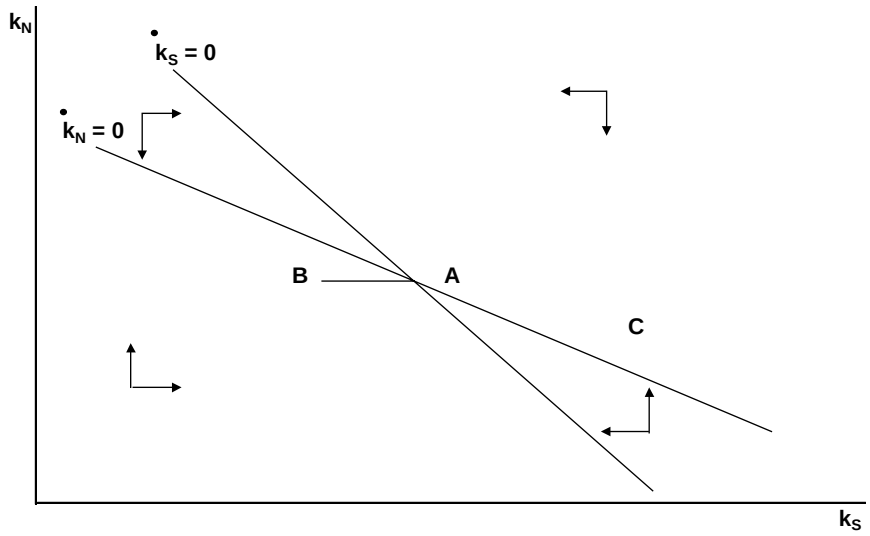
4 This would be associated with criminal or shadow activities that are less harmful and raise the real compensation of workers there, say in Thailand.

5 See equation 22 of Burgstaller and Saavedra-Rivano (1984).

Figure 2

Capital stocks in the north and south



5 Policy implications

Crime is one of the most obvious public bads that can arise from the powerful economic and social trend we call globalization. The models we have explored have a number of implications for policy-makers in the context of both developing and transitional economies.

i) When crime detracts from capital, it works like a negative productivity shock (single country model in section 1). It lowers the steady state capital stock because of output diversion. This occurs because the effective return on capital declines even if its price does not. Consumption effects are less clear cut depending on whether there are patriotic (stay at home) or unpatriotic (deposited in Swiss bank) effects. When the consumption effects are positive, one cannot make statements about welfare without reference to distributional effects: who gains what.

ii) In a Findlay-type North-South growth model (section 2) crime can be modelled as being produced by labour only, with a rent extracted by a mafia boss. The wage-rental ratio in the producing region (South) is normally institutionally given (e.g. Findlay and associates). It actually turns out that in our model, this ratio is determined in the shadow economy. Another way of doing this is to assert that criminal activities lower capital's marginal product by diminishing human capital. Let us say it lowers the wage-rental ratio, as is plausible with the drug barons expropriating most of the gains. Then there is a very serious loss for the South via falling terms of trade, capital stock, lower FDI and employment in the regular activity. There is also an increase in poverty as workers are worse off in the South. In the North there is a decline in utility from the consumption of a ‘bad’; but there could also be negative externalities akin to the converse of technical progress.

iii) Reducing the power of gang leaders and other coercive forces raises the institutional real wage rate in the South. This generates a real virtuous cycle for the South as its terms of trade and capital stock increase. Also the well being of the poor, workers in the illegal sector markedly improves. We would argue, however, that the US policies towards drug production in Colombia could be counter-productive in this respect; achieving the converse and adverse result. US aims are directed towards the physical destruction of coca plantations, combined with aid to the Colombian military. This may increase the economic power of warlords and diminish the income-share of the ordinary worker/farmer. Associated with this declining income share are other serious economic effects: declining terms of trade and capital inflows.

iv) Increased migration from South to the North raises the equilibrium capital stock and the South's terms of trade. There is also more investment from the North to the South. It increases the well being of the South. Workers in the North are worse off in terms of lower wages and/or employment in the North.

Globalization will be judged as much by its flaws, as by its successes. Policy-makers will therefore have an increasing interest in the nature of these flaws, their magnitude, the mechanisms that bring them about, and any remedial steps that are possible.

Appendix

In the steady state equilibrium $k = k^*$ and $p_k = 1$. Totally differentiating (8) and (9) around some steady state values, $k - k^*$ and $p_k - 1$, and utilizing (10) we obtain the following in matrix notation:

$$\begin{bmatrix} 0 & k^*\varphi' \\ -f''(k^*) & i \end{bmatrix} \begin{bmatrix} k-k^* \\ p_k - 1 \end{bmatrix} = \begin{bmatrix} 0 \\ z_0 - 1 \end{bmatrix} d'f(k^*) \qquad \text{(A.1)}$$

Note that $f`(k) < 0$. The trace is positive and the determinant is:

$$\Delta = f''(k^*)k^*\varphi' < 0 \quad \text{implying a saddle-path solution.} \qquad \text{(A.2)}$$

$$\frac{d[k-k^*]}{d[f'(k^*)]} = \frac{1-z_0}{f''(k^*)} < 0 \qquad \text{(A.3)}$$

$$\frac{d[p_k - 1]}{d[f'(k^*)]} = 0 \qquad \text{(A.4)}$$

It can be readily discerned that the slope of $k = 0$ is 4, and the slope of the $p_k = 0$ is negative from (A.1).

To explore the stability properties of the two equations of motion in (27) and (28) of section 2, we first substitute equations (17), (21), (23) into (27), and normalize (28) by k_S. When we evaluate the partial derivatives of (27) and (28) in matrix form, using (26):

$$\begin{bmatrix} n((s_N / s_S)-1)) + s_N P_{S1} r_S^{*}(k_N - k_{NP}) & s_N P_{S2} r_S^{*}(k_N - k_{NP}) \\ P_{S1} s_S r_S^{*} & P_{S2} s_S r_S^{*} \end{bmatrix} \begin{bmatrix} dk_N \\ dk_S \end{bmatrix} = \begin{bmatrix} -s_N (k_N - k_{NP}) P_{S2} k_{S1} & k_N \\ -s_S P_{S2} k_{S1} & 1 \end{bmatrix} \begin{bmatrix} dr_S^{*} \\ dn \end{bmatrix} \quad \text{(A.5)}$$

The trace is negative and the determinant is given by:

$$\Delta = n\, P_{S2}\, r_S^{*}(\, s_N - s_S\,) > 0, if\ \ s_S > s_N \quad \text{(A.6)}$$

From (A.5) and (A.6) it can be readily deduced that:

$$\frac{dk_N}{dr_S^{*}} = 0 \quad \text{(A.7)}$$

$$\frac{dk_S}{dr_S^{*}} = \frac{-n((s_N / s_S)-1) s_S P_{S2} k_{S1}}{\Delta} < 0 \quad \text{(A.8)}$$

where Δ is given by (A.6).

$$\frac{dk_N}{dn} = \frac{k_N P_{S2} r_S^{*}(s_S - s_N) + s_N P_{S2} r_S^{*} k_{NP}}{\Delta} < 0 \quad \text{(A.9)}$$

utilizing (A.6).

$$\frac{dk_S}{dn} = \frac{n((s_N / s_S)-1) + s_N P_{S1} r_S^{*}(k_N - k_{NP}) - s_S P_{S1} r_S^{*} k_N}{\Delta} \quad \text{(A.10)}$$

In (A.10) the sum of the last two terms will be negative because of (A.6) and as $k_N > k_N - k_{NP}$. Thus (A.10) is likely to be positive. The two schedules in Figure 2 are obtained from the left-hand side of (A.5).

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UNU World Institute for Development Economics Research (UNU/WIDER)
Katajanokanlaituri 6 B, 00160 Helsinki, Finland

Camera-ready typescript prepared by Anna Kervinen at UNU/WIDER
Printed at UNU/WIDER, Helsinki

ISSN 1609-5774
ISBN 952-455-224-8 (printed publication)
ISBN 952-455-225-6 (internet publication)