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**Reflections on the
Economic Role of the
Transformational
State**

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Reflections on the Economic Role of the Transformational State

(1) Countries attempting to transform from the bureaucratic command to the market system face a common political dilemma. The complex and difficult process of transition to the market often requires the state to play an important role in certain respects. And yet, it involves a major danger in so far as a central objective of transformation has been to escape from the past of an almost Kafkaesque bureaucratic control This dilemma of having to rely on the apparatus of the state to escape crippling economic control by the state is perhaps nowhere more apparent than in the various programmes of privatization that have been carried out in different ways. In some of the more extreme cases privatization conducted by the state bureaucracy resulted in plundering of public assets for private gains, and the privatization programme got diverted to benefiting special groups close to the state power, like some managers in public enterprises, persons well connected through the former party network etc. Such examples point to a deeper problem of the transformation process. Dismantling of state control and ownership does not automatically lead to the vacuum being filled by a well-functioning market; instead it may be filled by the rule of the mafia. Moreover, the proper functioning of the market needs the support of other institutions, especially that of the state. Between crippling state control and the supportive role of the state, the essence of successful transformation is to follow a path along which the state and the market adapt to one another in response to changing circumstances. This paper analyses how this adaptation might take place.

The problem is not altogether new. Economic historians tracing the evolutionary course of the market under capitalism did not fail to notice that the market could become the organizing principle of capitalism only when it was embedded in the regulatory mechanism of the nation-state. The latter both promoted and controlled the former in what Polanyi (1944, p. 86) described as a complex 'double movement' through time. In the course of this double movement, the very extension of the scope of the free market necessitated at each stage the imposition of new regulations by the state to ensure further growth of the market. Thus the opposition between the state and the market is historically misleading. Instead it is more useful to analyse this double movement as being governed by a kind of adaptive principle in which neither the state nor the market could become destructively dominant to cripple the other institution. The nature of the double movement may also be illustrated by a related example from the 'late industrializing' countries, either in this century or in the last. The economic role of the state in protecting 'infant' private industries through various industrial and commercial policies including tariff was based implicitly upon the same kind of principle of adaptation between the nation-state and the emerging private industries operating initially in the domestic market (List 1844; Bastable 1921). When this principle works relatively well, the infant industries grow up as healthy adults capable of competing without protection in the world market. When it fails, as in

several developing countries, infants grow up as problem adolescents who need to be protected continuously by the state. Even from this over-simplistic account it should be clear that the relation between the state and private industries needs to undergo adaptive changes in the successful cases. In contrast, the protective role of the paternalistic state towards private industry *does not* change qualitatively in the unsuccessful cases. In short, these examples from history would seem to suggest that the success of the process of transformation might depend critically on the adaptive response of the market and the state to one another under changing circumstances. And yet, it is virtually impossible to characterize in any details the nature of this adaptive response in advance. Indeed, this would involve a logical contradiction in so far as successful adaptation must emerge in the course of an interactive process between the state and the market rather than being specified beforehand. It cannot be rigidly pre-planned. Nevertheless, it may still be possible to narrow our zone of ignorance by classifying the outcomes of the likely patterns of interactions.

From the standpoint of economic theory, the interactive pattern between the private sector and the state is captured most easily in terms of generalizing the concept of 'externalities'. For instance, the supportive role of the state may operate through various 'external economies' created by the public sector which the private sector appropriates and internalizes to increase its own profitability, especially during the phase of the development of 'infant' industries. External economies generated by various state sector activities, and internalized by the private sector increase private profits either through a reduction in private production cost or through higher revenue for the private sector. For instance, better public education or communication may increase private profitability by reducing the private cost of training or communication. As an illustration, consider the remarkable recent growth of small private trade and commercial activities in many of the transformational economies. At least in part their growth has been possible from internalizing the benefits of publicly owned infrastructure without having to pay for them in full.

Nevertheless, the question as to which types of external economies are most beneficial for the economy in general, or for the private sector in particular, cannot be settled *a priori*. Because it depends on each particular stage of the adaptive process by which the private sector and the state self-organize in relation to one another. Nevertheless, in the transformational economies with almost no tradition of private industrial entrepreneurship, there can be little doubt that 'market friendliness of the state may consist largely in creating those external economies which the private sector can appropriate relatively easily. This has several implications which deserve to be spelt out.

First, the creation of potential external economies by the state which can be internalized and 'embodied' only through large investments by the private sector are unlikely to be effective in the early stages of the development of the private sector, because their diffusion would be impaired by high private risk. Second, this also emphasizes the need to view the adaptive interaction between the state and the private sector as an evolving process. During the course of the transformation, the nature of the external economies to be created by the state for private appropriation would continue to change. For instance, at some (initial) stage, it may be infrastructure like better communication and legal provision for enforcement of business contracts in addition to improving usual economic and social services. However, at another (later) state the emphasis may shift to public expenditure on research and development for the benefit of selected industries. Again, in the legal sphere the development of the stock exchange may necessitate different mixtures of regulation and deregulation at different stages. Viewed in this dynamic context, the economic role of the state, both in generating external economies and in setting the rules of the game for adaptive interaction, must keep changing over time. It deserves emphasis that this changing role does not imply an increasing role for the state in relation to the private sector. It is only when either the state or the private sector fails to adapt sufficiently to the changing circumstances that the danger of an oversized state becomes real. Thus, in defining the role of the transformational state the greatest emphasis should be place on adaptive interaction which leads to cooperation rather than either sector trying to grow at the cost of the other.

(2) The process of adaptive interaction is necessarily a complex phenomenon for at least two distinct reasons. First, the 'rules of the game', guided to some extent by the politics of the government in power, and enforced normally by the administrative apparatus of the state, may change during the course of interaction. In turn, this may imply changes in the regime of incentives embedded in particular property rights, policy posture towards inflation and unemployment, attitude towards social safety net etc. Such changes in the rules of the game from time to time also alter the context of the interactive process to make it open-ended. As a result of this open-endedness, the interactive process can be represented adequately only by a series of related models. Just as the phenomenon of oligopoly defies adequate representation by a single model, similarly interaction between the state and the market, or between the public and private sector may not be presentable in terms of a single model. This open-endedness resulting in the irreducibility of analytical description is the first aspect of complexity. Secondly, adaptation can be treated as 'structural', somewhat akin to biological processes, so long as neither sector has direct control over the external economies or diseconomies it generates. They are largely consequences following automatically from production, consumption or exchange without

deliberate action based upon 'strategic considerations'. In contrast, adaptive interaction between the sectors may involve strategic decision to cooperate or not to cooperate, depending perhaps on the changing relative position of the two sectors.

The dynamics of adaptive interaction between the public and the private sector may be illustrated by means of a model which captures some of the relevant features discussed so far (Bhaduri 1981, 1995a, 1995b).[1] In particular, the model intends to highlight how 'open-endedness' enters the argument, as well as how the dynamic processes are altered by changing from structural to strategic considerations. In short, the model is a more precise demonstration of how complexity arises in the present context.

The influence of externalities on the profit of either sector may be captured formally by postulating that each sector's profit depends on the levels of activity of both the sectors, i.e.

$$P_i = R_i (Y_1, Y_2) - C_i (Y_1, Y_2), \quad i = 1, 2 \tag{1}$$

where P_i = profit, R_i = revenue, C_i = cost, and Y_i = output of sector i. Moreover, for concreteness, let subscripts 1 and 2 stand for the state or the public and the private sector throughout the argument.

Linear approximation obtained through total differentiation of (1) yields, for the state sector,

$$dP_1 = m_{11} dY_1 + m_{21} dY_2$$

and for the private sector, $\qquad\qquad\qquad\qquad\qquad\qquad\qquad$ (2)

$$dP_2 = m_{12} dY_1 + m_{22} dY_2$$

where,

$$m_{ij} = \left(\frac{\partial R_j}{\partial Y_i} - \frac{\partial C_j}{\partial Y_i} \right).$$

Thus, the diagonal elements m_{ii} represent profitability in isolation of sector i resulting from the difference between its own marginal revenue and marginal cost, when external effects are ignored. In contrast, the off-diagonal elements m_{ij} ($i \neq j$) capture the effects of externalities on profits, e.g. m_{21} represents the positive or negative contribution to the profitability of the state sector 1 by the private sector 2, and vice versa for m_{12}.

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[1]   In the following analysis the 'state' is identified with the administration and judiciary. The non-administrative, non-judiciary part engaged in production constitutes the 'state sector', or equivalently, the public sector.

We isolate from the problem of effective demand by assuming that the degree of capacity utilization is constant. This is by no means an economically legitimate assumption. Its only justification in the present context is that it allows us to focus on 'structural adjustments' on the supply side which operate exclusively through the creation of new capacities. Thus, assuming constant incremental capital output ratios with constant degree of capacity utilization, we have for sector i

$$b_i = \frac{dY_i}{X_i}, \quad i = 1,2 \tag{3}$$

where X_i = investment in sector i.

This transforms equation (2) into

$$dP_1 = a_{11} X_1 + a_{21} X_2$$

$$dP_2 = a_{12} X_1 + a_{22} X_2 \tag{4}$$

where $a_{ij} = (m_{ij}.b_j)$.

Assuming investments X_1 and X_2 to be positive throughout[2], the rates of return on the investments of the two sectors can be defined from (4) as

$$(dP_1 / X_1) = r_1 = a_{11} + (a_{21}.x) \tag{5}$$

$$(dP_2 / X_2) = r_2 = (a_{12} / x) + a_{22}, \quad x = (X_2 / X_1)$$

where $X_1, X_2 > 0$, and the composition of investment $x = (X_2/X_1)$ is the positive ratio of private to state investment.

Note that in the presence of externalities the usual distinction holds between return generated socially per unit of investment in sector $i(\psi_i)$ and that appropriated commercially per unit of investment by the same sector (r_i). The social returns are obtained by adding along the corresponding column of coefficients on the right-hand side of (4) to obtain,

$$\psi_1 = a_{11} + a_{12}$$

$$\psi_2 = a_{21} + a_{22} \tag{6}$$

Thus the social rates of return in (6) are independent of the composition of investment x, while the corresponding commercial rates in (5) depend on it. However, it should be

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[2] Without depreciation, net equals gross investment which may be assumed to be always positive (however small) in the relevant range of analysis.

emphasized that this formulation is valid only in the simplest case of structural interaction when all the coefficients a_{ij} remain constant. If they depend on the scale of investment or are influenced by strategic considerations, significant non-linearities may be introduced through the same coefficients, leading to complexity in the analysis.

Assuming the coefficients to be constant in the simple case, the rules of the game may be defined in terms of a version of the 'neo-liberal' philosophy towards the public sector. Thus, let both the sectors be subject to the same discipline of the market, so that investment is attracted to the sector offering a higher commercial rate of return. Consequently, the dynamic of the composition of investment is governed by the equation

$$\frac{\dot{X}}{X} = \theta\,(r_2 - r_1), \quad X_2/X_1 = x > 0, \quad \theta > 0 \tag{7}$$

which, in view of (5), reduces to

$$\dot{x} = -a_{21}\,x^2 + (a_{22} - a_{11})\,x + a_{12} \tag{8}$$

where $\theta = 1$, without any loss of generality.

We may describe (8) as a 'master equation' derived from the rules of the game of equalization of sectoral rates of return, on the further assumption that the linear approximation to (1) is valid over the relevant range.[3]

To focus on externalities, assume that either sector in isolation generates positive return, i.e.

$$a_{ij} > 0, \quad i = 1, 2 \tag{9}$$

Consequently, four cases of interaction through externalities may be distinguished:

(a) When both the sectors have off-diagonal positive coefficients, i.e. a_{ij} $(i \neq j)$, have $(+,+)$ signs. This is the case when both the sectors are in a symbiotic relation of mutual cooperation contributing positively to one another's rates of return.

(b) When both the sectors are in a mutually destructive relation of competition with both the off-diagonal elements a_{ij} having negative signs $(-,-)$.

(c) When the state sector acts as a beneficial 'host' to the private sector by generating positive externalities, but the private sector acts as a harmful 'parasite' to the state sector by generating negative externalities i.e. $(-,+)$ with $a_{21} < 0$ and $a_{12} > 0$.

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[3] Note that the dynamics may be qualitatively different if higher order terms of the Taylor's series are retained so that our subsequent analysis depends crucially on the validity of linear approximation (see Poston and Stewart 1978).

(d) Finally, the obverse case of (c) with the private sector as host and the state sector as parasite giving the off-diagonal sign pattern (+,−) with $a_{21} > 0$ and $a_{12} < 0$.

This fourfold classification resembles in content, but not in the specific algebraic form, biological models of two interacting species (e.g. May 1976) which generate different patterns of coexistence or competitive extinction.

The dynamics of sectoral composition of investment reaches stationary equilibrium value in (8) when $\dot{x} = 0$, i.e.

$$-a_{21}x^2 + (a_{22} - a_{11})x + a_{12} = 0$$

So long as both externalities are of the same sign, i.e. case (a) of cooperative symbiosis or case (b) of conflictive competition, the roots of the quadratic (10) are necessarily real, and of opposite signs. This means that a meaningful economic equilibrium at $x^* > 0$ exists in both these cases. However, as the following phase diagrams 1(a) and 1(b) show, the equilibrium is stable in the case of cooperative symbiosis, but unstable in the case of conflictive competition. This conforms to common sense in so far as mutual cooperation permits the co-existence of both the sectors, by permitting the composition of investment to settle down to a stable ratio x^* in figure 1(a). In contrast, relentless competition in figure 1(b) leads to competitive extinction of one sector by the other. Interestingly, such competitive extinction is governed by the initial value of x_0, and not by considerations of sectoral profitability.[4] Thus, transition in favour of, say, a commercially more efficient private sector may not occur without the 'right' initial condition ensured by state intervention.

In cases (c) and (d) of mixed externalities (−,+) or (+,−) that entail cooperation and conflict through the host-parasite relation, real positive roots may not exist ruling out equilibrium in (10). However, for suitable parameter values both roots may be real permitting multiple equilibria.[5] As phase diagrams 1(c) and 1(d) show, whether the smaller or the larger root is stable depends on which particular sector acts as the harmful parasite towards the host. While drawing sustenance from the positive external economies generated by the host, the parasite sector harms the host in return through generating diseconomies. This analogy naturally suggests that the parasite can only grow to a certain size in relation to the host because its larger size would be unsustainable by the host. Consider as an example the state sector as the host implying $a_{12} > 0$ and the private sector as the harmful parasite, $a_{21} < 0$. In this case depicted by phase diagram 1(c), only the smaller root is

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[4]   i.e. for all $x_0 = x^*$, the ratio $x = X_2/X_1$ tends to vanish.

[5]   Note that by Descartes' rule of sign, we necessarily require the host sector to be more profitable than the parasitic sector for the existence of equilibria.

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Figure 1(a)

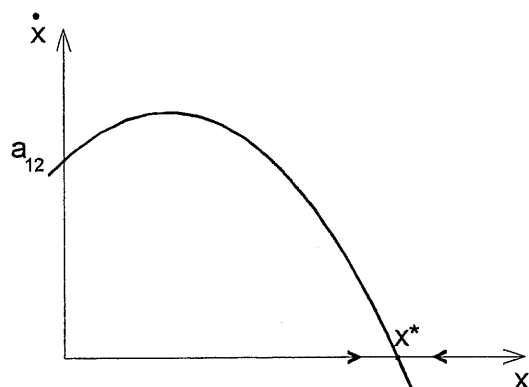**Cooperative Symbiosis between the sectors, case a (+,+)**

Figure 1(b)

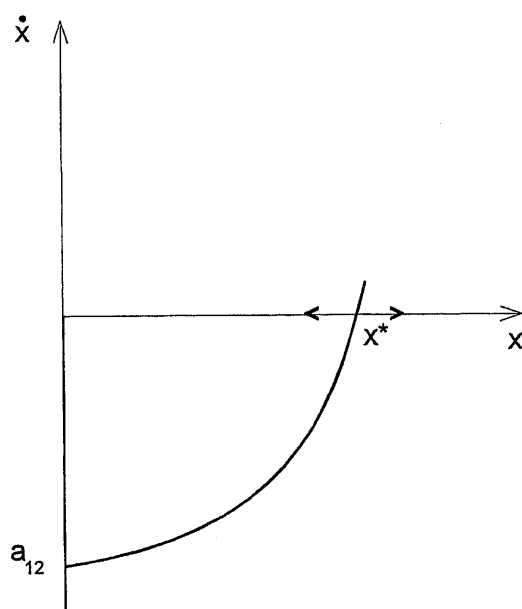**Conflictive Competition between the sectors, case b (–,–)**

Figure 1(c)

The private sector as harmful parasite ($a_{21} < 0$)
on the state sector as 'host' ($a_{12} > 0$);
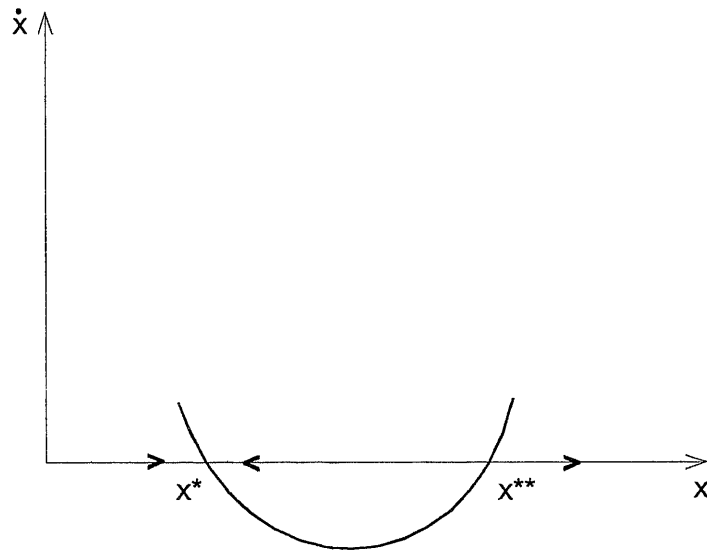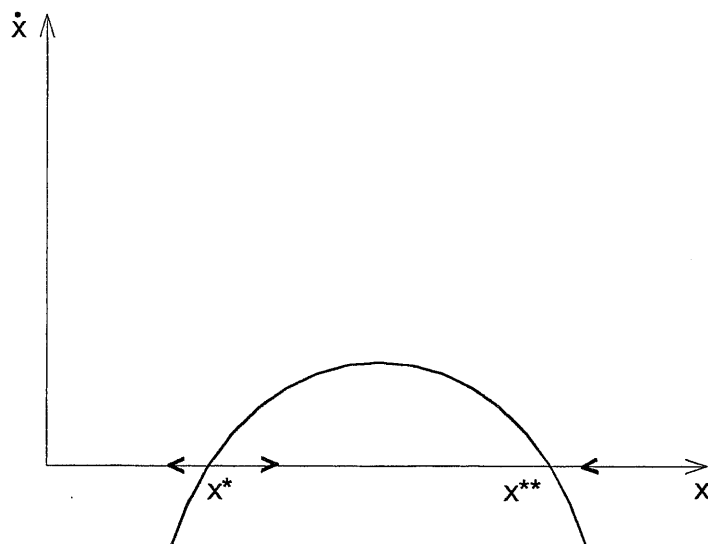**also $a_{11} > a_{22}$ for existence of solutions**

Figure 1(d)

The state sector as harmful parasite ($a_{12} < 0$)
on the private sector as 'host' ($a_{21} > 0$);
also $a_{22} > a_{11}$ for existence of solutions

stable, meaning that a relatively small parasitic private sector can be sustained by the host state sector. In the opposite case 1(d), with the private sector as host to a harmfully parasitic state sector (i.e. $a_{21} > 0$ and $a_{12} < 0$) the U-shaped curve is inverted to make the larger root stable. This implies only a relatively small parasitic state sector can be sustained by its host private sector. The relevance of this host-parasite analogy should be apparent from the recent experiences of several transforming economies where the weakening of the state or the public sector has not resulted in corresponding strengthening of the private sector.

As already pointed out the preceding model is essentially open-ended, because the rules of the game defining the context for interaction may change from time to time. As an illustration consider the case where investment in either sector is related positively to the level of profit it earns. This may be both due to considerations of profitability, and also because of the advantage of internal financing of investment in imperfect capital markets. In the simplest case this is represented by

$$X_i = \alpha_i P_i + \beta_i, \quad \alpha_i > 0, \quad i = 1, 2 \tag{11}$$

Taking time derivate of (11) and using (4), we obtain a standard pair of coupled linear differential equations in the form

$$\dot{X}_1 = \alpha_1 [a_{11} X_1 + a_{21} X_2]$$

$$\dot{X}_2 = \alpha_2 [a_{12} X_1 + a_{22} X_2] \tag{12}$$

which now replaces earlier 'master equation' (8). Equation (12) can generate fluctuations in X for conjugate complex roots as a new qualitative feature. Moreover, by suitable transformation of the variables, $\dot{X}_1/X_1 = g_1$ and $\dot{X}_2/X_2 = g_2$, and noting $\dot{x}/x = (g_2 - g_1)$, equation (12) reduces to a form similar to (8), i.e.

$$\dot{x} = -\alpha_1 a_{21} x^2 + (\alpha_2 a_{22} - \alpha_1 a_{11}) x + \alpha_2 a_{12} \tag{13}$$

Nevertheless, for more complicated investment functions than (11), or for other specified rules of the game, the resulting dynamics may be qualitatively different pointing to the inherent descriptive complexity of the problem arising from 'open-endedness'.

The other aspect of complexity which arises from strategic rather than structural interaction may be illustrated by formalizing the notion of protection of 'infant industries' in terms of our model. The economic role of the protectionist state is encapsulated by assuming that the state sector offers a constant positive level of support $b > 0$ to the private sector.

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This could come in the form of subsidized public utilities, cheaper provision of raw material inputs from the public sector etc. In contrast, the private sector acts as a harmful parasite when relatively 'small' but adapts in a cooperative fashion when relatively 'large'. Algebraically, this is represented by

$$a_{12} = b > 0$$

$$a_{21} = \omega(x - \beta), \quad \omega, \beta > 0 \tag{14}$$

and,

$$a_{11} > a_{22} > 0$$

Inserting (14) in (8) we obtain an equation in the form

$$\dot{x} = -\omega x^3 + \omega \beta x^2 - (a_{11} - a_{22})x + b = 0 \tag{15}$$

Depending on the values of the parameters, equation (15) can exhibit interesting dynamic properties like 'hysteresis' which is familiar from a variety of different models in physical sciences (e.g. see Brout 1965; Haken 1977, p. 268; Poston and Stewart 1978, ch. 14; Nicolis and Prigogine 1977 pp. 171-8; Narducci, Bandy and Gao 1984).[6] Thus, as shown by diagram 2 below, abrupt changes in the stationary equilibrium value of x may occur through marginal variation in the level of state support b at critical values b_1 and b_2. In other words, state action may be dramatically effective at those critical values but not at others.

Figure 2   **Abrupt Transition and Hysteresis in state and private sector interaction**

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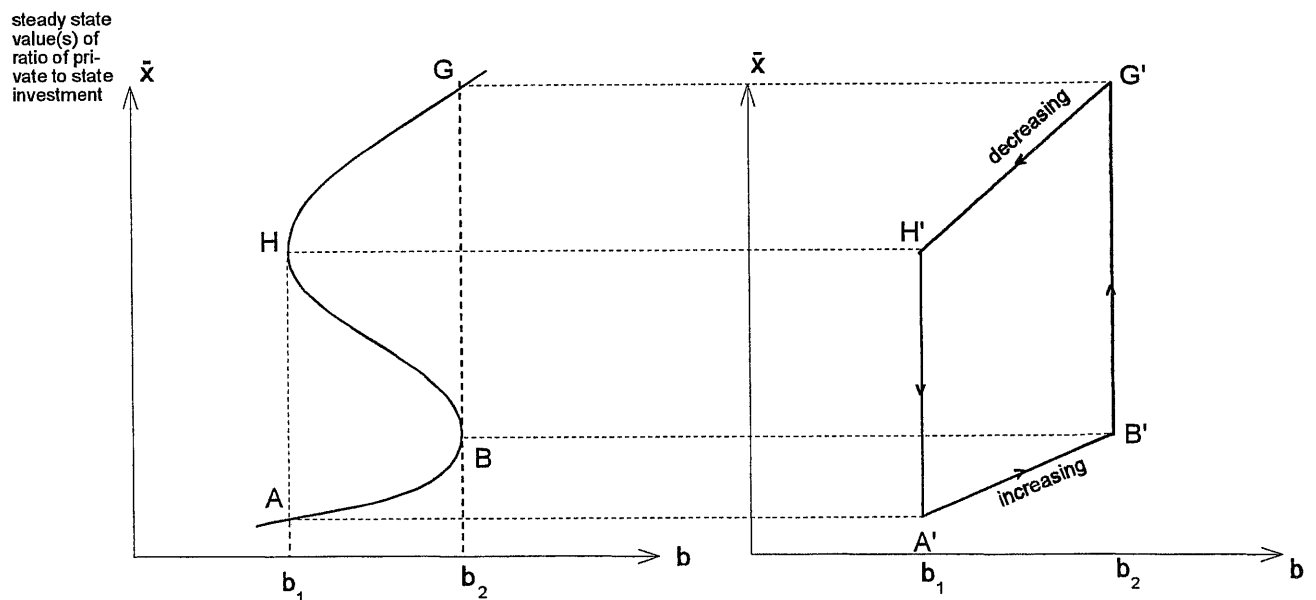
6) For instance, analogous van der Waal's equations are used to represent thermodynamic phase transition of 'real gas', or to generate 'bistability' property in some quantum optical systems. A detailed algebraic analysis of this equation can be found in Nicolis and Prigogine (1977, pp. 171-8).

This also suggests that the debate about industrial and commercial policies for promoting the domestic private sector may not be very meaningful, if it abstracts from the particular historical circumstances which determine whether the relevant initial condition is in the neighbourhood of any such critical value. For economists this phenomenon of hysteresis demonstrates in a more precise way how historical circumstances enter in determining the effectiveness of policies.[7] Since the same economic policy can produce very different results for different initial conditions, the notion of predictability should be treated with far greater caution in economics. Lying on the border of 'theory' and 'history', economic analysis cannot escape the influence of the arbitrary initial conditions inherited from history.

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[7] The role of initial historical conditions in determining economic outcomes has been emphasized, for example, by Delorme (1992, pp. 42-3).

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