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MICHAL KALECKI'S CONTRIBUTIONS TO  
THE THEORY AND PRACTICE OF SOCIALIST PLANNING

by

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Paper presented at the Conference on Michal Kalecki's economics, organised by the Faculty of Economics of Perugia University, Perugia, 22-24 April 1986. I am grateful to Alberto Chilosì, Jerzy Osiatynski, Ferdinando Targetti and, in particular, to the discussant Lynn Mainwaring for useful comments.

BADIA FIESOLANA, SAN DOMENICO (FI)

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#### SUMMARY

Five main contributions by Kalecki to the theory and practice of socialist planning are singled out and discussed: i) a comprehensive and coherent model of the organisation of the socialist economy, an alternative to the Soviet-type model or Lange-type market socialism; this is characterised by mark-up pricing related to investment finance, quantity adjustments, net value performance indicators for firms subject to employment targets and vertically grouped and, above all, workers' control; ii) emphasis on external and political limits to planners' accumulation policy, set respectively by natural growth (golden rule accumulation policy being regarded as maximum) and by political concern for short term consumption; iii) rationalisation of Soviet-type practice in the selection of investment projects, with multiple but fairly close shadow interest rates governing technical choice (not the level and structure of investment expansion); iv) an ingenious and partly successful attempt at providing a guideline for optimising consumption structure; v) a practical procedure for drawing perspective plans for investment and the long-run development of the socialist economy. These contributions are shown to be related to Polish conditions in the 1960s and to require a number of qualifications which reduce their generality without reducing their relevance either there and then or elsewhere today.

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1. Introduction

Michal Kalecki's contributions to the economics of socialism - less widely known but no less important than his pioneering contributions to the economics of capitalism - span the period 1946-1970 and are affected by the development and performance of the Polish system, as well as coloured by his views on capitalist dynamics. They consist of a coherent model of the socialist economy and its functioning, characterised by centralised economic planning and political decentralisation with a limited role for markets; a well developed theory of socialist dynamics, emphasising exogenous constraints to growth and accumulation policy, which were neglected by Polish leaders with dramatic consequences; and a number of planning procedures and guidelines of practical use, for the selection of investment projects, consumption planning and the construction of long-term plans.

Before discussing these contributions I would like to provide a perspective from personal reminiscence.

I first met Michal Kalecki in the autumn of 1962, when I started attending his lectures on growth theory at the SGPIŚ (Central School of Planning and Statistics) in Warsaw, where I had gone immediately after graduation in the previous spring. His two-hour lectures consisted of an hour of uninterrupted exposition, very formal and assertive and, like his writings, without a single word of padding or hesitation, followed by an hour of discussion with members of the audience, a small group of senior and junior staff and

a few postgraduates, all very tentative and respectful. If there were no questions Kalecki would go over the same material all over again, as if he expected not to be understood easily. It was clear that reputations were made and destroyed in these discussions and people took great care in preparing and formulating their interventions. To his views on European integration not having made any impact on economic growth, I raised, in my best Polish, a Kaleckian objection: if firms believed that their market had been enlarged by European integration they would invest and therefore collectively make their market grow faster. Out-kaleckied by a young foreigner he replied that this would be a once and for all effect, probably not very large, but conceded the point: that brief exchange was a kind of Confirmation that made the members of his group recognise my existence.

Later that year I attended a course organised at SGPiS for planners from developing countries, at which he lectured in English on growth and planning. This was a much less formal environment, with freer discussions. When I went to see him in his office in the Central Planning Commission, he looked even smaller, behind a giant desk in a huge red-carpeted and red-curtained room. From Warsaw I went to Cambridge, where my connection with him endeared me to Joan Robinson; while preparing a dissertation on investment planning in socialist economies (with Nicholas Kaldor and Maurice Dobb) I visited Warsaw and saw him again several times. He would give me appointments always at 7 a.m. at SGPiS, even in the dark and icy cold of Polish winter; I would raise points mostly arising from his work and he would pace up and down his room, with hands joined behind his back, occasionally stopping to work at the big blackboard. He did not like to be criticised, not out of intolerance or touchiness (though he was a little touchy), but because it was clear that he had already considered most of the objections, had dismissed them not as wrong but as not very serious in practice, and did not like being confronted with them again. Only once, I think, did I get him worried, by suggesting (see section 4 below) that his recommended procedure for project selection embodied three different implicit

discount rates without ever mentioning one; in practice the three values were close to each other and the whole procedure made practical sense, so he was slightly upset by my sheer impertinence but otherwise unmoved. He was mindful of other people's possible susceptibility when he criticised someone else: always firmly but kindly, as I know from experience. He was not polemical and mostly let things pass: once he told me that Sraffa's price theory neglected aggregate demand and I asked him "Did you tell him?". "No, I did not want to hurt him", came the reply. Goodness knows how much Kalecki must have been hurt by Cambridge's curt and uncaring academic habits. I translated into Italian his "Theory of growth of a socialist economy" and saw him once in Rome to discuss it. He was very pleased that the book should be published by the CP publisher, Editori Riuniti, and tremendously amused that for his book the communist printers had had to borrow Greek characters from the Vatican. Of that meeting (in spring 1965) I remember his lamenting the process of socialdemocratisation of European socialist parties.

I saw him again in May 1968 in Warsaw, where I read of the Paris événements in the Polish press which described them at first as the work of hooligans and provocateurs. Poland had had street protests and student unrest in the previous March, when a strong authoritarian and antisemitic move had affected Polish society and in particular universities, which were now being purged. Kalecki and his group had come under heavy attack, as revisionists and bourgeois. At a seminar, he told me, somebody had challenged him to say whether he was a marxist: "If you are a marxist - Kalecki had replied - then I am not". Kalecki had not yet resigned his post (which he did in September; though already retired, he could have stayed on for another year according to Polish practice). He was still in good spirits, preparing his selected papers for publication as a definitive statement of his intellectual contribution and very pleased at the prospect of Cambridge University Press publishing them. A year later in Cambridge, where he spent a term, Kalecki was

much more pessimistic about Polish developments and generally depressed. His qualms now went beyond Poland, also in view of Czech events, and were extended to existing socialist models. The trouble with socialism, he told me, is that the same kind of conformist and opportunistic people eventually come to positions of power who would be there in other societies. Cambridge did not do anything to cheer him up; indeed he had been promised a professorial salary but he was being paid only a small amount for a visiting fellowship; too proud to complain, he mentioned this to me as evidence of British decline. For the first time he made witty and biting remarks, and made jokes about the régime to me, probably a mixed sign of increasing disillusionment and of a friendlier relationship. He died in Warsaw the following April. In my subsequent visits to Warsaw I often saw his widow, Pani Ada, a formidable person who had been inseparable from him during their married life (literally, except for a week, they had always been together), and who was now devoting her life to the preservation and publication of all his work. Through her I learnt more of him, of the epigrams he used to write castigating Polish customs and morals, his silent but undying disappointment with Keynes's failure to recognise his achievement (it appears that a German version of Kalecki's theory of aggregate demand sent to Keynes in the early 'thirties' elicited a note from Richard Kahn saying that it could not be read because of language difficulties - probably a little joke, or a polite though improbable excuse, which later must have become a nagging obsession for Michal Kalecki); the frustration of not being taken seriously by mediocre politicians (he used to say that he had been influential only in Israel, where the government had done exactly the opposite of his advice). He was a great man, and he knew it, but he did not like people to say it, not out of modesty but on the contrary because the very fact that it should be necessary to say it would have detracted from his greatness and offended his pride.

## 2. Kalecki's model of the democratic planned economy

By 1942, in connection with British discussions on economic planning, Kalecki had already sketched the main features of his approach to economic planning: nationalisation of the most important enterprises (financial, industrial and public utilities), coordination and direction of their activity by a central institution of economic planning, responsible to Parliament; full public control over the banking and financial system, investment and foreign trade as well as, if possible, allocation of the main materials and products. Private enterprise would still play an important role in industrial sectors of secondary importance, in the production of consumption goods, in the distributive services. Central planning of investment would ensure full employment of labour; Workers' Councils, representing workers, technical personnel and managers of each enterprise, now freed from the threat of unemployment, would maintain support for economic planning and exercise control over the development of their enterprises. Public control from below, together with the initiatives of a socialist government from above, would protect the system from regressing towards monopoly capitalism (Kalecki, 1942).

Kalecki's international reputation and his known socialist sympathies gave him instant access to the new rulers of People's Poland: in 1946 he was already - in a brief visit and from a distance - giving advice to the Polish Minister of Reconstruction on rationing (which he regarded as equivalent to but, practically, slightly superior to income subsidies) on monetary circulation and on the 1946-47 financial plans, which he analysed at great length (see respectively Kalecki 1946a, 1946b and 1946c, first published in Kalecki 1982, and editorial comments on pp. 308-310), checking the consistency of real and financial flows and using the budget as primary instrument of macroeconomic planning. Kalecki's return to Poland in early 1955, as adviser to the Prime Minister, marked the beginning of a ten-year-long involvement in the shaping of the Polish economic system and policies: as a Vice-Chairman of the Economic Council advising the Council of Ministers

from 1957 to its disbanding in 1963; as head of the perspective plan division of the Central Planning Commission, in charge of drawing the 1961-75 plan; until increasing disagreement with the government put an end to his advisory activity in 1964. Meanwhile, and until the end of his life, he continued to make important intellectual contributions to the economics of socialism; his papers on the organisation and functioning of the socialist economy, however, are concentrated in 1955-58.

Kalecki's socialist model retains, next to a dominant centrally-planned state sector, a liberalised cooperative sector and private handicraft, as well as state small-scale production operating on similar principles: purely indicative plans in value terms, contractual cooperation with state industry and distribution network (though contracting can be made compulsory); free purchases and sales of non-contracted output in the market (though sales to the state not contracted in advance ought to take place below the market price); profit sharing (oddly enough, only applicable to technical personnel and managers and not to workers in the case of cooperatives); investment self-finance except for small-scale state enterprises where investment is also funded by local authorities; employment limits for artisans (given, as an example, of five workers excluding apprentices); local controls. Kalecki recognises the practical difficulties and the disproportionate administrative effort of attempting to control production in small-scale units characterised by large and variable assortment, and the counterproductive nature of price and other control (Kalecki, 1956a; there is no mention of agriculture in that paper, produced for the Polish Prime Minister and first published in Kalecki, 1982).

Large-scale state enterprises, on the contrary, in Kalecki's view should be given physical targets for both total employment and the larger investments in new capacity, as well as targets for the net value of production, its main assortment, the wage fund, distribution of main inputs; they should also be subject to price controls for both their purchases and sales (1956b; 1957c; 1957d; 1958a, 1958b). With respect

to employment the model is centrally planned more tightly than the traditional Soviet-type model: against strong opposition from most of his colleagues Kalecki was adamant that enterprises should not be free to set the level of employment; he knew only too well how enterprise autonomy and labour unemployment went hand-in-hand in the capitalist economy and was not prepared to leave state enterprises any discretion in this matter. "In England for so many years they paid me to liquidate unemployment, and here you want to pay me to generate it" - was his cry at the suggestion that enterprises should only be subject to a limit on their total wage fund, at a memorable session of a special Committee on enterprise organisation set up by the Council of Ministers (see editorial notes, Kalecki 1982, p. 324). In other respects, however, Kalecki's model of socialism is more "liberal" than the conventional Soviet-type model (to which the Polish actual model has adhered broadly to date).

First, Kalecki laid emphasis on the net value of output (1957d; this notion was actually implemented in Poland in the 1974 reform, see Nuti, 1977) and neither on the physical nor the gross value indicators of Soviet-type planning.

Second, he also envisaged, next to centralised investment, some decentralised investments out of own funds and interest-bearing but non-returnable loans, both to allow for enterprise initiative and to reduce the pro-investment bias associated with free investment funds (1957d).

Third, Kalecki strongly recommended the restructuring of industrial organisation along vertical lines (1957b): large-scale associations of vertically integrated enterprises largely, though not fully, self-sufficient (along the lines later adopted by the GDR, see Granick, 1970; Melzer, 1981) would cooperate in the reciprocal supply of semi-finished products and in the distribution of essential materials. Enterprises would retain autonomy as members of the association, so that each "koncern" would be responsible for a given finished product (or group of similar products)

without introducing monopolistic tendencies. Central authorities would be concerned only with the group performance in the supply of finished goods without interfering in their internal organisation. Mutual interest of member enterprises in the overall performance of the group would secure their cooperation; actual orders and incentives regulating enterprise activity would be decentralised to "koncern" level and the central authorities would only have to deal with a small number of agencies, simplifying and de-bureaucratising economic administration, especially in the distribution of centrally allocated materials. (Large-scale industrial associations were revamped in Poland in the 1974 reform but member enterprises were more tightly merged than envisaged by Kalecki and the element of vertical integration was the exception, not the norm, which emphasised horizontal concentration; see Nuti, 1977).

Fourth, Kalecki envisaged in his model - in place of economic decentralisation - generalised political decentralisation under the guise of Workers' Councils which, in every enterprise, would take decisions about the organisation of production (work conditions, overtime pay, etc.); oppose the excessive bureaucratisation and centralisation tendencies which appear when the enterprise director answers only to central powers; exercise initiative under the stimulus of material incentives (Kalecki, 1956b). At the time Oskar Lange regarded enterprise autonomy extending to prices and investment as a precondition of workers' self-management: without greater enterprise independence Workers' Councils - wrote Lange in the same issue of the Party monthly Nowe Drogi - "... would be a fiction, since they would not have 'anything to decide...'" (Lange, 1956). But Kalecki was much too concerned with the maintenance of full employment to push further enterprise autonomy, and regarded Workers' Councils as a political countervailing power holding central government in check.

Kalecki's distrust of the market and his reliance on planning have perhaps been underplayed in subsequent literature; Brus, for instance,

writes: "He did not .... oppose the idea of utilising the market-mechanism, but considered it a subordinate element in the running of an economy which should be planned centrally as far as the main lines of development were concerned" (Brus, 1977; also quoted by Sawyer, 1985). I believe the example of interwar Poland, the experience of capitalism as he knew it and his overall theoretical background led Kalecki to hold stronger views. Under no circumstances should firms be allowed to set prices, except local small-scale enterprises (see Kalecki, 1958b, with the significant title "Centralised price formation as an essential feature of the socialist economy"). Reliance on market signals leads to economic stagnation, whereas the fully employed socialist economy needs to grow via investment; purely indicative planning can lead to even worse mistakes than detailed centralised planning; profit is a synthetic indicator of performance but this is a disadvantage as well as an advantage, because there is no point in raising profits at the cost of unemployment (1956b, 1957c, 1957d, 1957a and editorial comments account of a March 1957 discussion within the Economic Model Commission, Kalecki 1982, pp. 336-339). How, then, should the time honoured question of price determination be solved in the socialist economy? just as under capitalism, by charging a mark-up on current costs, except that the mark-up should be related to the needs of investment finance (1958b; also making allowances for import-intensity, Kalecki-Polaczek 1957a, 1957b). Full costs should provide a basis also for intra-CMEA trade (Kalecki, 1962). Markets are left to determine quantities, rather than prices, and in the event of disequilibrium the adjustment process takes place through planned quantity adjustment rather than through prices. Kalecki simply did not believe in short-term substitutability in either production or consumption and this set him apart from the neoclassical tradition, even if marxian-inspired (e.g. Oskar Lange), and from the whole tradition of "market-socialism".

In brief, Michal Kalecki's model of the socialist economy is a cross between the GDR (vertical groupings subject to central planning, a liberalised private sector) and Yugoslavia (cooperative sector, self-



management) but with roles for markets, plans and self-management intermediate between the two. It is a very topical model, corresponding to what IMF officials today call "the modified centrally planned economy" (Wolf, 1985) no longer corresponding to the classical Soviet-type model but still a far cry from full fledged market socialism. It is also the furthest Gorbachev's reform can go in the USSR if it succeeds, at any rate within the foreseeable future. Kalecki was aware that the model he outlined was far from ideal, but he knew also that there is no point in replicating capitalist markets and capitalist plans - a lesson which most East European reformers less acquainted than Kalecki with "realised capitalism" still have to learn. Between piecemeal improvements and general change of principles, Kalecki favoured the first (1958a, in 1982, p. 88). He was aware that his proposed improvements would not put an end to the conflictual aspects of socialism: he was prepared to pay for Workers' Councils the price of possible disruption and growth deceleration, and only too aware, prophetically, of the strength of central opposition to their effective operation. Referring to his proposed "synthesis of central planning and workers' councils" he wrote: "We should not delude ourselves that such a system is free of contradictions and easy to steer. There is no doubt that always there will exist tendencies towards the erosion of the prerogatives of workers' councils through greater centralisation, as well as towards the weakening of central plan discipline through workers' councils. On the one hand there will be the danger of weakening workers' councils and bureaucratising the whole system of management, on the other hand workers' councils, through their pressure, can lead to situations where it is necessary to reduce the pace of growth or to become dependent on foreign aid, or where after a period of chaos 'order is restored', returning to the system of bureaucratic centralism" (Kalecki 1956c; in Kalecki 1982, p. 99; my translation).

An important element of Kalecki's approach to the formulation of a model of viable socialism, finally, is the strong weight given to actual

economic policies, as well as to systemic questions; indeed one of his 1957 articles bears the significant title "The role of the model should not be overestimated" (1957a) - a message which should be repeated ad nauseam for the benefit of all East European reformers and counter-reformers alike.

### 3. Investment and growth policies

A high and rising share of capital accumulation in national income has been the policy adopted by the Soviet Union since the inception of its First Five Year Plan (1928) and imitated by the other countries where a Soviet-type system was introduced after the war. This policy, raised to the status of official dogma as a "law of faster development of department I" (producing production goods in Marx's reproduction schemes) or priority for heavy industry or for "group A" was plausible in a country like the Soviet Union in the late 'twenties: rural, industrially undeveloped, labour-abundant, capital-constrained and practically closed yet wishing to accelerate growth. Its soundness has been well theorised by the Soviet economist Feldman (1928, 1929) under precisely these assumptions. These were not, however, the conditions of the European countries which joined the Soviet bloc, with the exception perhaps of Bulgaria and Romania. Michal Kalecki was the first outspoken opponent of this official dogma; his criticism, originally raised in a paper presented to the Second Congress of Polish economists (1956c, in Kalecki, 1984) was further developed (see for instance 1958c) and became the main theme of his "Theory of growth of the socialist economy", devoted precisely to the study of exogenous constraints limiting the feasibility and plausibility of ambitious investment policies (1963a).

In Kalecki's approach the economic growth of a full employment economy above its "natural" growth rate (determined by the growth of the labour force and technical progress) has increasing costs in terms of a lower share of consumption. These costs are lowered by international trade but reassert

themselves because of the necessity of balancing foreign trade over time and set an upper limit to the share of investment that can be gainfully undertaken. Within this limit, which is seen as a maximum, set not by political but by technical considerations, central powers can exercise their political discretion according to the strength of their political concern for current consumption and careful consideration of the actual trade-off between the share of consumption and faster growth - a trade-off which worsens with the acceleration of growth.

Kalecki's notion of maximum investment share is best analysed with the help of a simple model (similar to that of Kalecki, 1963a). Consider a socialist economy where all savings are invested or, rather, savings are generated via financial planning to match planned investment; labour is fully employed and labour reserves (e.g. agricultural under-employment) have been exhausted. There is a range of alternative production techniques whereby output is produced by labour and capital; technology is embodied in capital equipment of constant productivity and uniform lifetime. Provisionally assume that technical progress does not occur. The economy is closed (or, which is the same, foreign trade is balanced at a given level). The following symbols are introduced:

Y = national income	C = total consumption
L = labour force	n = growth rate of L
$g_n$ = natural growth rate of income = n; g = actual growth rate of income	
K = capital stock	y = labour productivity Y/L
k = capital per man K/L	v = capital/output ratio K/Y
s = share of investment in national income	
t = lifetime of equipment	

The following identities hold:

$$(3.1) \quad v \equiv K/Y = (K/L)/(Y/L) = k/y$$

$$(3.2) \quad s \equiv g.v$$

$$(3.3) \quad C \equiv (1-s)Y$$

At time 0 let the labour force be  $L_0$ . For a given technical choice that has prevailed for the previous t years, corresponding to given values of  $k_0$ ,  $y_0$ , the three identities above identify also  $v_0$ ,  $s_0$  (since  $g=g_n$  is also known) and  $C_0$ . For an unchanged technical choice after t years income  $Y_t$  and consumption  $C_t$  would be given by:

$$(3.4) \quad Y_t = Y_0 (1+g_n)^t$$

$$(3.5) \quad C_t = (1-s_0)Y_0(1+g_n)^t.$$

Suppose planners considered switching to a more capital intensive technique with parameters  $k_1$  and  $y_1$ . Of course since  $k_1 > k_0$  there must be also  $y_1 > y_0$ , otherwise the new technique is absolutely inferior and should not be considered at all; and  $v_1 > v_0$  otherwise the original technique is absolutely inferior and should have not been chosen in the first place. Define

$$(3.6) \quad p \equiv (y_1 - y_0)/y_0$$

If the economy switched to technique 1, after t years the whole capital stock would be of the new kind and the values of  $Y_t$  and  $C_t$  would not be given by 3.4 and 3.5 but by 3.4' and 3.5':

$$(3.4') \quad Y_t = Y_0 (1+g_n)^t (1+p)$$

$$(3.5') \quad C_t = (1-s_1)Y_0(1+g_n)^t(1+p)$$

At time t income with the newly adopted technique 1 would be greater than with former technique 0 by a factor of  $(1+p)$  but the share of investment would also be higher for the more capital intensive technique because of 3.2 and the fact that  $v_1 > v_0$ ; hence  $(1-s_1) < (1-s_0)$  and  $C_t$  is not necessarily higher than with the previous technique. For consumption to be higher after the switch the condition must be satisfied (from 3.5 and 3.5'):

$$(3.7) \quad (1-s_1)(1+p) > (1-s_0).$$

Otherwise, consumption is sacrificed not only throughout the transition to the new technique for  $t$  years but ever after if the new technique is maintained. While other writers (for instance Horvat, 1958) had stressed the existence of a limit to the economy's absorption capacity of investment from the viewpoint of income, beyond which investment would not raise income, Kalecki introduces a stricter limit, beyond which investment does not raise maintainable consumption levels.

Kalecki's condition 3.7 appears as a kind of golden rule of accumulation; in fact it can be proven that it is the same thing as the golden rule of accumulation familiar from Western literature on the theory of economic growth (Hahn and Matthews, 1964), except that it is a rule about maximum and not about desirable accumulation. For two techniques to be equally eligible from the viewpoint of the maximum sustainable consumption per head, the inequality 3.7 should turn into an equality, or

$$(3.8) \quad (1-s_1)(1+p)-(1-s_0) = 0$$

from which, substituting for the values of  $s$  from 3.2,

$$(3.9) \quad g_n = p/(v_1+v_1 \cdot p-v_0) \text{ is obtained.}$$

For any given wage rate, the profit rate on the switch to the more capital intensive technique - regardless of whether such a profit rate is actually monitored, calculated (which Kalecki does not) or is even a concept ideologically allowed, - is

$$(3.10) \quad r = (y_1-y_0)/(k_1-k_0)$$

from which, substituting from 3.1 and 3.6, we have:

$$(3.11) \quad r = p/(v_1+v_1 \cdot p-v_0) = g_n, \quad \text{Q.E.D.}$$

This proposition (which can be obtained from Kalecki's model but was not fully drawn out by him beyond the expression of 3.7), holds also when there is technical progress, as long as this is neutral in Kalecki's sense of the rate of progress being uniform regardless of capital intensity of output (therefore identical to Harrod-neutrality, whereby progress is uniform regardless of capital/output ratios; see Chilosi, 1971). If progress was faster the higher the capital intensity of output (Kalecki's capital-intensity-encouraging progress) it might pay to invest beyond the limits indicated by 3.7, because the benefits of higher capital intensity are underestimated by  $p$ ; whereas if productivity growth and capital intensity of output were inversely related condition 3.7 would hold a fortiori. Foreign trade does not alter the approach, though it may shift temporarily the investment costs of growth acceleration at full employment and, therefore, the attractiveness of alternative rates of accumulation.

In fact Kalecki's notion of a maximum limit to the share of accumulation should not necessarily be approached, let alone met. Kalecki introduces a supply function of savings on the part of the planners, which he calls the planners' "decisional curve" (to stress its non-technical nature) but which is simply a special form of "objective function": instead of expressing preferences about dated consumption levels, per man or overall, Kalecki's planners compare the falling growth acceleration  $dg/ds$  obtained by higher investment shares at higher levels of growth rate  $g$ , with the increasing growth acceleration which they would require to induce them to squeeze consumption further at higher growth rates. A balance is struck when the sacrifices demanded for acceleration (by the economy as a whole) are equal to the price that planners are willing to pay (see figure 1). The objective lesson of this exercise is not optimisation per se, which Kalecki stresses is a pure pedagogical device, but the notion that planners' investment policy should not only stay within the golden rule limit but also demand a greater acceleration of income for every percentage sacrifice in the share of consumption associated with it.

This lesson was quickly absorbed, popularised and developed by Kalecki's pupils (in particular, Laski 1965; Jozefiak, 1971; and many others) but was coldly received in most other circles. Polish leaders had already reacted in 1964 to Kalecki's theories and his application of those theories to Polish long-term planning by dismissing him from his advisory role. Accumulation policies throughout the 'sixties (and well into the 'seventies) remained as much based on high and rising investment shares as ever before, throughout Eastern Europe. In the Soviet Union, the book (Kalecki 1963a) was published with a misleading and patronising introduction by Academician Khatchaturov (Polish translation in Kalecki, 1984), who praised the mathematical approach while lamenting the neglect of socio-political factors (what could have been more socio-political than Kalecki's concern for the plausibility and the intelligent use of people's sacrifices?). The Polish academic establishment at first appeared to accept, or at least not to reject, Kalecki's approach, which found its way into textbooks on the economics of socialism. But in 1968 an attack was launched by party hacks in writings and at two meetings at the Central School of the Party and at SGPiS. Kalecki was accused of being a "prisoner of capital fetishism" (by W. Iskra), "smuggling bourgeois economics" (by B. Rudowicz), organizing a "cult of his theory and personality" among his followers (by D. Sokolow), plagiarism of Harrod and Domar (though Kalecki had long acknowledged the connection and stressed the differences), excessive formalism, neglect of the human factor and other inanities (by J. Gorski, who in earlier writings had expressed appreciation). Kalecki replied and, later, resigned (see Osiatynski's account of those meetings in Kalecki, 1984); official condemnation did not prevent Kalecki's critics from continuing to use his work in their texts, but deleting the source (see Nuti, 1973).

In truth, Kalecki's contentions about either the golden rule limit or the planners' increasing supply price of savings have no general validity; yet he was right in the specific conditions of Eastern Europe at the time and with reference to the policies followed there by socialist leaders, and he was proven right, with a vengeance, by the recurring Polish crises (from

1970 to 1980 through intermediate stages), the generalised decline to date and the policy reversal of the early 1980s.

The adoption of more capital intensive techniques than those which satisfy condition 3.7 cannot be regarded as necessarily mistaken: in principle - as long as the new technique is not absolutely inferior, which has been ruled out in the analysis above - that policy can always be reversed and will lead to higher consumption than with the less capital intensive technique throughout the period of transition back to that technique. This gain in consumption may be considered as insufficient to compensate the sacrifices incurred during the transition to the more capital intensive technique and before the policy is reversed; but this is a political, not a technical, judgement as Kalecki would have us believe. His neglect of potential gain from policy reversal is something of a sleight of hand; we know from optimum saving theory that golden rule growth is a crude benchmark against which to assess accumulation policy and that maximisation of maintainable consumption per head is not necessarily the best course. Yet if, in principle, it cannot be said that East European planners were inefficient simply for their disregard of golden rules, it is right to put on them the burden of proof: what conceivable reasons might there have been to shift consumption from today to tomorrow, if tomorrow's gain can only be a temporary blip? Speeding up the achievement of full communism is not a good enough answer, since nobody ever said that communist bliss had to be prepaid. No other possible reasons - as far as I know - have been given. In practical terms, therefore, Kalecki stood on firm ground.

Theoretical weakness and practical strength is a characteristic also of Kalecki's "decisional curve". The notion that planners should require faster acceleration of growth to be induced to invest higher shares of national income may seem harmless enough. This is, for instance, how the level of expenditure (and therefore its share in a given income) behaves with respect to quantity demanded for any demand function whose price elasticity falls with the quantity demanded, as happens, for instance,

for any downward sloping linear demand function for any commodity. But suppose that demand is, at some point, fairly inelastic to price increases and elastic to price decreases: total revenue beyond that point will be rising with quantity at an increasing rate; hence, progressively smaller increases in quantity will be required to induce the consumer to raise the share of that good in his total expenditure beyond that point. The economic meaning is that there is a target minimum quantity below which a commodity's demand price rises steeply. Is there any reason to exclude, in principle, that likewise growth-minded planners might price additional growth more highly, in terms of consumption foresaken, at lower than at higher growth rates, at least over a certain range? This time the burden of proof is on Kalecki, and there is nothing in his work, or in the theory of demand or of optimum saving to justify the need for a monotonically rising "decisional curve" as a general case. Yet the notion that at some point demand for growth becomes less elastic down to unity or less must be correct since some current income must be consumed even if growth becomes inordinately cheap; i.e. there will be maximum share of accumulation and in its neighbourhood the decisional curve must be rising as Kalecki supposed. If it is accepted that golden rule growth sets a maximum limit to the accumulation share, why should planners choose a minimum growth close to that limit? When the economy is close enough to the limit of sustainable consumption, Kalecki's argument applies. The question becomes one of fact: in the 1960s were Polish planners overstepping the limits of people's forbearance in their trading off of current for future consumption, or the (related) limits of the planners' own ability to deliver the consumption goods promised with the payment of wages? If they had not been, the Polish crises would have been averted. That Kalecki was right is shown by Gomulka's fall (within months of Kalecki's death), by the mounting excess demand for consumption goods at official prices and the inability of authorities to make price increases acceptable to the population, by the greater emphasis on consumption in the plans for the 1970s, the mounting external debt and deteriorating performance. The consumption sacrifices opposed by Kalecki were not worth undertaking. The lesson should not be

lost on the rest of the socialist bloc where repeatedly investment policies have neglected the constraints of full employment, natural resources and foreign balances, and have often generated not higher income, let alone higher consumption, or sufficiently higher consumption with respect to some preference system, but only excess capacity. Kalecki was fighting a dogma and could not afford to dilute his case with too many qualifications; that he glossed over some of them does not mean that he was unaware of their existence.

#### 4. Shadow interest rates and technical choice

The choice of techniques was investigated by Kalecki not only in a macroeconomic context (as seen in the previous section) but also at the microlevel, in the selection of investment projects. There is a link between his macro-analysis and his micro-findings, which were co-authored with Mieczyslaw Rakowski, an officer of the Polish Planning Commission. Their joint efforts (Kalecki-Rakowski, 1959) became almost verbatim the official handbook on project selection (KPpRM, 1962).

Since the mid-fifties in Poland the choice between alternative projects had been following informally the Soviet practice: i) the scope of selection was limited to alternative ways of producing the same kind of capacity (decided by the centre or by enterprise associations), and not extended to the choice between plants producing alternative products; ii) investment funds were made available to enterprises from the government budget at no cost; iii) investing enterprises confronted with alternative ways of producing identical capacity were instructed to choose a more investment intensive alternative only if it led to operating costs economies sufficient to recover the associated additional investment cost within a maximum number of years, a statutory "standard recoupment period" fixed by the centre. The codification of this informal practice in 1962 was profoundly influenced by the work of Kalecki on his own and with Rakowski.

The basic rule adopted by the Polish Planning Commission in their 1962 Instrukcja Ogólna (General instruction) issued to all industrial enterprises required investors to aggregate costs into investment and yearly operating costs, reject inferior alternatives (costlier in both investment and operation) and minimise the sum of operating costs and a fraction of investment costs given by the inverse of the standard recoupment period:

$$(4.1) \quad C + \frac{1}{T} I = \text{minimum}$$

where C now stands for yearly operating costs, I for the investment costs associated with C, and T is the standard recoupment period. In the Polish practice T was fixed at 6 years for new plants and 5 years for modernisation investment; these rates were uniform throughout the economy. Clearly the recommended procedure is tantamount to a shadow capital charge of  $1/T$ ; in a market economy, where an interest rate  $r$  prevails and capital is competitively rented, equipment of expected lifetime  $t$  would command a capital charge equal to a fraction  $r(1+r)^t / ((1+r)^t - 1)$  of its purchase price (here we abstract from the complications of inflation accounting, because there was price stability in that decade in Poland and because in any case inflation should not affect competitive rentals other than through its impact on the nominal interest rate  $r$ ). Hence there is an implied relation between T and an implicit interest rate, i.e.

$$(4.2) \quad T = \frac{(1+r)^t - 1}{r \cdot (1+r)^t}$$

For  $T=6$  and an investment lifetime of 20 years (regarded in the Instrukcja as the average lifetime of equipment in Poland at the time of issue) there was an implicit interest rate of about 15.7 per cent, which is considerably high in view of price stability. The same rate applied to investment in modernisation, which was shorter-lived and required a shorter standard recoupment period : five years was an approximation.

Polish practice here differed from that of the Soviet Union and Czechoslovakia, where the standard recoupment period was different in different sectors (ranging from 3 to 10 years according to the ranking of each sector in national policy; the more favoured, the longer the period over which additional investment could be recouped) and straight line amortisation was added to  $1/T$  to calculate the shadow investment charge. This departure had been advocated by Kalecki on the grounds of efficiency: seeing that these calculations affected not capacity expansion but only its form there was no reason to favour capital intensity in favoured sectors (Kalecki, 1965); while durability differences between plants could be accounted for in other ways than through amortisation (Kalecki, 1958d; see below, this section).

There are three main innovations introduced into this practice by Kalecki-Rakowski: i) a link between the uniform standard recoupment period in the economy and labour-saving investment opportunities in modernisation; ii) the compounding of output losses due to the "freezing" of investment resources in incomplete projects during their gestation period; iii) the correction of investment and operating costs to account for differences in expected lifetime of projects, based on the hypothetical comparison of steady state balanced stocks of those projects (for a more detailed discussion, see Nuti, 1971).

The rationale behind the value of T recommended by Kalecki-Rakowski for the Polish economy (in other East European countries following the same practice no rationale is given) is concern over the possibility of a labour shortage. Given full employment of labour, new plants would be operated by a number of workers equal to the natural increase of the labour force, plus workers formerly attached to equipment now come to the end of its lifetime, plus workers freed by investment in modernisation. The lower the standard recoupment period, the higher the labour requirements of new plants (labour forming the bulk of operating costs) and the lower investment in modernisation and therefore the lower the number of workers freed from scrapped

plants. Given the non-regulatory nature of wages policy with respect to labour relative scarcity, and the lack of actual investment charges, the shadow capital charge implicit in the value of  $T$  is used to prevent labour shortage. Kalecki and Rakowski had estimated that there existed ample labour-saving opportunities in the Polish economy through modernisation investment which could be recouped in five or six years. Hence, as long as labour could be drawn from this source, it would be wasteful to undertake more investment intensive projects unless their additional cost could be recovered in less than the same period (the differential  $T$  adopted in the end for new investment and modernisation is a rough way of accounting for the longer expected life of new versus modernised plant; for a more formal analysis see Nuti, 1971). The high shadow charge therefore simply reflected the low technical level of Polish industry and the high profitability of investment in its modernisation. In view of this rationale, one would have expected the standard recoupment period to have varied over time; the shadow capital charge, however, proved just as rigid as actual prices and was not altered for as long as the Instrukcja remained in force, i.e. until 1969, when a specific shadow capital charge of 0.12 - corresponding to roughly  $T=8$  - replaced  $T$ .

Kalecki's keen eye for planning malpractices had identified the dangerous propensity to open a wide "investment front" starting more projects than could be finished on schedule, and he alerted the planners to the social cost involved in locking up resources during the gestation period of projects. To favour quick-yielding projects and discourage the unnecessary prolongation of gestation periods, Kalecki introduced a "coefficient of immobilisation" by which investment costs had to be compounded during the corresponding immobilisation period (Kalecki, 1958d). Kalecki-Rakowski assume that if one unit of investment were to be "unfrozen" it would yield an amount of national product of an average pattern equal to  $1/v$ , where  $v$  is the gross capital/output ratio. Allowing for depreciation of fixed capital at a yearly rate  $d$ , the net product would be  $(1/v - d)$  per annum. At full employment, in order to release the manpower necessary to

man this unit of investment some additional investment must be undertaken elsewhere in the economy, given by  $a.T$ , where  $a$  is the labour cost of the production of one unit of gross output and  $T$  is the standard recoupment period. The yearly net product of one unfrozen unit of investment is then reckoned as:

$$(4.3) \quad q = \frac{1}{v+a.T} - d$$

It is difficult to see why the locking up of investment resources in the form of a longer gestation period should be treated any differently from the locking up of investment resources in the form of a higher investment intensity. Consistency would require  $q=1/T$ , and it is no accident that the Soviet, Czechoslovak and Hungarian investment choice methodologies of the 1960s all use  $1/T$  as the fraction of investment costs to be added to actual costs during gestation. As it happens, the value of the relevant parameters estimated by Kalecki-Rakowski for the Polish economy are  $v=2.5$ ,  $a=0.5$ ,  $d=0.03$ , which give a magnitude of  $q$ , subsequently codified in the Instrukcja, of 0.15, i.e. comfortably close to 0.157 (corresponding to  $T=6$ ). When I put this question to Michal Kalecki he insisted that  $1/T$  and  $q$  were different concepts and could differ; the only way I could accept this was by looking at them respectively as linked to notional long term and short term interest rates. Kalecki insisted that their near-identity was a mere coincidence, but seeing that they were so close he saw no point in discussing the question further.

A third implicit interest rate, moreover equal to the growth rate of investment, i.e. complying with the golden rule of the previous section, is implicit in Kalecki-Rakowski's treatment of plant lifetime. Instead of gearing the shadow capital charge to plant durability as in a competitive rental market, or adding straight line amortisation to  $1/T$  as the Soviet and Czech planners, Kalecki-Rakowski proceeded from a detailed analysis of the costs and benefits of plant durability.



A longer lived plant has the relative advantage of producing a given stream of output for a longer period, but also the disadvantage of being tied to a given technical form for a longer period, therefore remaining excluded from the benefit of technical progress of the embodied kind. The balance between the two effects in the comparison of two alternative lifetimes depends on the difference in durability, the rate at which operating costs decrease every year in the new plants, and the growth rate of investment in the production of the output considered. Suppose that investment in plants of durability of  $n$  years grows at a rate  $g$  per year, and the capital output  $v$  is constant over time. If investment at a time  $t$  is indicated by  $I$ , in the preceding year it was  $I(1+g)^{-1}$  and  $(i-1)$  years back it was  $I(1+g)^{-(i-1)}$ . The stock of fixed capital operating in a given year (expressed at historical cost at constant prices) is the sum of gross investment carried out in the last  $n$  years; since the flow of output per unit of investment is constant through time this gives a convenient index of output capacity,  $M_n$ :

$$(4.4) \quad M_n = \sum_{i=1}^n I \left( \frac{1}{1+g} \right)^{i-1} = I \left( 1 - \left( \frac{1}{1+g} \right)^n \right) (1+g)/g$$

Since capital output is  $v$ , the output of this stock of capital is  $F_n$ , or

$$(4.5) \quad F_n = \frac{M_n}{v} = I \left( 1 - \left( \frac{1}{1+g} \right)^n \right) (1+g)/g.v$$

In order to make this technical alternative comparable with that of plants of durability  $n_s$ , which is taken as "standard", the same procedure is applied to a hypothetical stream of investment with identical  $I$  and  $g$  but with lifetime  $n_s$  and with investment/output ratio  $v_s$ . Other things being equal, the output flow of an investment process with parameters  $v$ ,  $n$ , will be equal to that of an investment process of standard durability  $n_s$  and

investment output  $v_s$  if

$$(4.6) \quad v/v_s = \left( 1 - \left( \frac{1}{1+g} \right)^n \right) / \left( 1 - \left( \frac{1}{1+g} \right)^{n_s} \right) = z_n$$

Thus Kalecki-Rakowski and the Polish Instrukcja recommend that the comparison of projects should be made not minimising actual and shadow costs for the actual capacity, but the ratio between costs and  $z_n$  times actual capacity. For a standard durability  $n_s=20$  and  $g=7\%$ , for instance,  $z_n$  is 0.86 for  $n=15$  and 1.10 for  $n=25$ : in other words planners should prefer a 25 year long project to a 20 year one, given  $g=7\%$ , if the investment output is less than 10 per cent higher than for the 20 year long project; while  $n=15$  can be preferred to standard durability  $n_s$  if its investment output ratio is lower by more than 14 per cent.

The effect of durability over the introduction of technical progress is accounted for in a similar way. It is assumed that, for investment growing at a rate  $g$  per year, total operating costs of production in the new investment increase at a rate  $c < g$ , because of technical progress advancing at a rate approximately equal to  $g-c$ . Following the same method used for output, the relation between total costs  $G_n$  for a stock of plants of durability  $n$  and total costs  $G_{n_s}$  for a stock of plants of durability  $n_s$  is given by

$$(4.7) \quad y_n = G_n/G_{n_s} = \left( 1 - \left( \frac{1}{1+c} \right)^n \right) / \left( 1 - \left( \frac{1}{1+c} \right)^{n_s} \right).$$

If we call  $C$  the operating costs in a stock of plants of durability  $n$ , the operating costs in an identical stock of plants of durability  $n_s$  would be  $y_n C$ , a longer lifetime of plant involving a flow of costs larger by a factor of  $y_n$ . For instance, for  $g=7\%$  and  $c=3\%$  (with technical progress advancing at a rate of 3.9 per cent) and  $n_s=20$  years,  $y_n$  will be 0.80 for  $n=15$  and



1.17 for  $n=25$ . Instead of minimising the expression given in (4.1) above, investors are instructed to select projects so that:

$$(4.8) \quad E = \frac{I(1/T)(1+q.z) + C.y_n}{X.z_n} = \text{minimum}$$

where  $z$  is the average period of freezing of investment resources during the gestation period and  $X$  is the capacity target.

A final refinement was introduced to take into account the possible differences between the rate at which labour costs and other costs (raw materials, semifinished products, fuel, energy and capital maintenance) fall in time, but the basic approach remained unchanged: tables for alternative values of  $y_n$  and  $z_n$  were attached to the Instrukcja for the use of investors. Basically, for each project of given technical durability, first the lifetime for which the expression above reaches a minimum is found and this is taken as the optimum economic lifetime of the project; then the project is chosen for which that expression, taken for the optimum economic lifetime of each project, is lowest.

The comparison of projects with reference to the characteristics of hypothetical balanced stocks is very ingenious; it inspired my treatment of more complicated time patterns of input and outputs (Nuti, 1970); it is not, however, immune from criticism. Optimum economic lifetime of plants might vary with the reference durability  $n_s$ , which is arbitrary; the optimum lifetime of a plant should be assessed without reference to a standard durability. The treatment of durability differs from that of gestation, whereas gestation and durability are both aspects of the time profile of inputs and outputs and should be treated in the same way. If the growth rate of investment is slowing down, the advantage of a longer lifetime is higher than if the growth rate is constant, and the reverse is true for an accelerating growth rate; the opposite applies to the disadvantages of

longer lifetimes. What is most interesting, however, is that in an economy where investing firms obtained funds free of charge from the state budget no less than three shadow rates were introduced, implicit in  $T$ ,  $q$  and in the use of  $g$  to calculate  $y_n$  and  $z_n$ . Shadow rates were fairly close (15.7% for  $T$ , 15% for  $q$ , 7-15% for  $g$ ) but the approach was untidy and messy. Why did Kalecki become so involved in it? Presumably the answer is that he would have liked to introduce an actual interest rate in investment selection (see section 2 above) but was operating within a system dominated by a Soviet practice (that of recoupment period) difficult to change; he also specifically did not want to introduce interest and profitability in the selection of the areas of capacity expansion (except in the long run - see next section); at the same time he wanted to improve the existing planning system, practice prevailing over theory in his concern.

##### 5. Kalecki's "optimum structure of consumption"

Kalecki expected the structure of consumption demand to be fairly inelastic to relative prices in the short run and therefore relied on "consumption norms" or on coefficients calculated from family budgets for the purpose of current planning. In longer term planning, however, he regarded the structure of consumption demand as elastic and, therefore, subject to optimisation with respect to relative production costs on new plants. He discussed the "optimum structure of production" in a little-known article of the same title (1963; later translated into English, 1966) which, much to Kalecki's surprise, unlike his other papers on the socialist economy, was never discussed - at any rate in print - in Poland or elsewhere. In the article he introduces the notion of "equivalent" consumption patterns, makes a simple assumption about the general form of quantitative relations governing their "equivalence", and suggests the selection of the least-cost pattern among the equivalent consumption bundles. The approach is interesting because it implies the choice of relative prices based on marginal costs as measured for the purpose of investment choice in the Polish

practice by equation (4.8) above and seems to provide a missing link between investment and consumption planning.

Kalecki considers two alternative sets of consumption goods, A and B, in a simplified case in which consumption is composed of only two commodities, 1 and 2. Denote with  $q_{1A}$ ,  $q_{2A}$ ,  $p_{1A}$ ,  $p_{2A}$ , respectively the quantities composing set A and the prices at which - for a given income - these quantities are being sold. Assume that quantities  $q_{1B}$  and  $q_{2B}$  composing set B are such that the value of the two sets, expressed at prices  $p_{1A}$  and  $p_{2A}$ , is the same, that is:

$$(5.1) \quad \frac{q_{2A} - q_{2B}}{q_{1A} - q_{1B}} = - \frac{p_{1A}}{p_{2A}}$$

But as the structure of B is different from that of A, the ratio between the prices at which set B would be sold is different, i.e.:

$$(5.2) \quad \frac{q_{2A} - q_{2B}}{q_{1A} - q_{1B}} \neq \frac{p_{1B}}{p_{2B}}$$

so that the value of A and B is no longer equal when expressed at the realization prices of set B. Suppose, however, that the structure of set B is very similar to that of A, that is  $q_{1B} = q_{1A} + \Delta q_{1A}$ , and  $q_{2B} = q_{2A} + \Delta q_{2A}$ , where  $\Delta q_{1A}$  and  $\Delta q_{2A}$  are very small quantities of opposite sign; realisation prices will also change by small increments

$\Delta p_{1A}$  and  $\Delta p_{2A}$ . The condition for the equality of values of A and B at A's realisation prices is:

$$(5.3) \quad \frac{\Delta q_{2A}}{\Delta q_{1A}} = - \frac{p_{1A}}{p_{2A}} ;$$

the condition for the equality of the value of A and B at B's realisation prices would be:

$$(5.4) \quad \frac{\Delta q_{2A}}{\Delta q_{1A}} = - \frac{p_{1A} + \Delta p_{1A}}{p_{2A} + \Delta p_{2A}}$$

The ratio between the realisation prices of A differs from that of B's prices only by a very small quantity  $\epsilon$ , and "the two criteria of equivalence practically coincide here". Equations (5.3) and (5.4) can be rewritten as

$$(5.3') \quad \Delta q_{2A} = - \frac{p_{1A}}{p_{2A}} \Delta q_{1A} ,$$

and

$$(5.4') \quad \Delta q_{2A} = - \frac{p_{1A}}{p_{2A}} \Delta q_{1A} - \epsilon \Delta q_{1A} ,$$

where  $\epsilon \Delta q_{1A}$  is a small quantity of the second order which may be neglected.

In this way from the consumption structure  $(q_{1A}, q_{2A})$  with realisation prices  $(p_{1A}, p_{2A})$ , we proceed to another very close structure:  $(q_{1A} + \Delta q_{1A}, q_{2A} + \Delta q_{2A})$ , for which  $\Delta q_{2A} = - (p_{1A}/p_{2A}) \Delta q_{1A}$ . Prices in the new situation are  $p_{1A} + \Delta p_{1A}$  and  $p_{2A} + \Delta p_{2A}$ . The operation is then repeated according to the same principle, namely that the increments of the two commodities have opposite signs and that they are inversely proportional to the relative prices obtained in the previous step. In this way a chain of equivalent consumption structures is obtained, through which we pass from set A =  $(q_{1A}, q_{2A})$  to a set B =  $(q_{1B}, q_{2B})$ , the differences  $(q_{1B} - q_{1A})$  and  $(q_{2B} - q_{2A})$  no longer being very small. The two sets are considered by Kalecki as equivalent. The diagrammatical presentation of Kalecki's equivalent consumption structures is a curve in the  $(q_1, q_2)$  plane which is falling, convex towards the origin, with a slope at each point  $(q_1, q_2)$  equal to  $-p_1/p_2$ , as in Figure 2. Kalecki states that his curve is different from the indifference curves to be found in Western textbooks,

because indifference curves represent "sets of commodities considered as equivalent by the consumers", and "the fact that the slope of the tangent at point  $(q_1, q_2)$  is equal to  $-p_1/p_2$  (where  $p_1$  and  $p_2$  are the realisation prices of this set) is deduced from the assumption of an optimum consumer choice"; whereas in his curve "the equality of the slope of the tangent at the point  $q_1, q_2$  to  $-p_1/p_2$  follows directly from definitions". It should be clear by now, however, that following this procedure one ends up with the exact equivalent of Samuelson's "revealed preference" curve (Samuelson, 1947, 1948; Little, 1949; as Ian Little suggested in correspondence with Kalecki - translated into Polish in Kalecki, 1984, p. 332 - advising against the publication of this paper in an English journal for this reason). To escape from indifference curves, Kalecki has rediscovered another typical product of Western economics. The rest of Kalecki's argument is interesting because it is based on assumptions about the actual shape of the curves, and discusses the criteria for planning choice.

Kalecki takes as an indication of the unit cost of each consumption good the coefficient  $E$  used in the Polish methodology for investment choice (see equation 4.8), that is the sum of operating costs plus a shadow capital charge per unit of output, respectively  $E_1$  and  $E_2$  for the two products. The notion of aggregate (actual and shadow) costs of producing set  $(q_1, q_2)$  is equal to  $E_1 \cdot q_1 + E_2 \cdot q_2$ . This gives a family of straight lines each indicating sets of  $q_1$  and  $q_2$  producible at the same notional aggregate cost, all having a slope  $-E_1/E_2$ . Of course, as we can see from Figure 3, among a set of alternative consumption structures the variant which involves the least production cost corresponds to the point  $R$  at which the straight line  $RS$  of production costs with slope  $-E_1/E_2$  is tangent to the curve  $AB$  of equivalent consumption variants. Hence for the consumption variant characterised by the lowest level of production cost, the realisation prices are proportional to the unit costs of production, i.e.

$$p_{1R}/p_{2R} = E_1/E_2.$$

Next Kalecki tackles the question of "how one can in practice use this criterion of optimisation of the structure of consumption". In a two commodity scheme, Figure 4 represents the curve of equivalent consumption variants  $AB$ ,  $A$  being the initial set for which the prices  $p_{1A}$  and  $p_{2A}$  are known; the slope of the tangent  $AM$  at this point is equal to  $-p_{1A}/p_{2A}$ ;  $R$  is the point for which the notional aggregate costs are lowest, the slope of the tangent to the curve  $AB$  at this point is equal to  $-E_1/E_2$ . Through the point  $A$  a straight line  $AN$  parallel to this tangent is drawn;  $H$  and  $I$  denote the points of intersection of the lines  $AM$  and  $AN$  with the ordinate of the point  $R$ ; if  $AR$  was an arc of parabola with a vertical axis, then  $R$  would be situated in the middle of  $HI$ . Kalecki assumes, "which is plausible", that the curve  $AB$  can be approximated by such an arc, and that thus  $R$  lies not far from the middle of the segment  $HI$ . Thus the approximation is obtained:

$$(5.5) \quad \frac{JR}{AJ} = \frac{1}{2} \left( \frac{JI}{AJ} + \frac{JH}{AJ} \right).$$

But  $JI/AJ$  is equal to  $E_1/E_2$ , and  $JH/AJ$  is equal to  $p_{1A}/p_{2A}$ . Hence

$$(5.6) \quad \frac{JR}{AJ} = \frac{1}{2} \left( \frac{E_1}{E_2} + \frac{p_{1A}}{p_{2A}} \right).$$

As a further approximation, Kalecki takes the geometric mean of  $E_1/E_2$  and  $p_{1A}/p_{2A}$ , obtaining

$$(5.7) \quad \frac{JR}{AJ} = \sqrt{\frac{E_1 \cdot p_{1A}}{E_2 \cdot p_{2A}}}$$

The equation of the straight line  $AR$  is therefore approximated by

$$(5.8) \quad q_2 = -\sqrt{\frac{E_1 \cdot p_{1A}}{E_2 \cdot p_{2A}}} \cdot q_1 + b$$

where  $b$  is equal to the segment  $OK$ . Since the points  $A$  and  $R$  are on the same straight line, the values of the set  $A$  and  $R$  in terms of prices  $\sqrt{E_1 \cdot p_{1A}}$  and  $\sqrt{E_2 \cdot p_{2A}}$  are approximately equal. Call  $G_A$  the value of set  $A$  in terms of these prices.

The first (approximate) condition for the optimum consumption variant is given by

$$(5.9) \quad G_A = q_{1R} \cdot \sqrt{E_1 \cdot p_{1A}} + q_{2R} \cdot \sqrt{E_2 \cdot p_{2A}}$$

The second condition is the proportionality of the realisation prices of set  $R$  to unit costs  $E_1$  and  $E_2$ , i.e.

$$(5.10) \quad \frac{p_{1R}}{p_{2R}} = \frac{E_1}{E_2}$$

In a multi-commodity world, the second condition would still apply, and Kalecki suggests - without proving it - that the first condition ought to hold as well. Under these assumptions he suggests that the (approximate) determination of the consumption pattern involving the minimum aggregate costs in long-run planning could be carried out as follows:

"The initial structure of consumption  $A$  - e.g., in 1980 expressed in 1960 prices - is established on the basis of family budgets corresponding to per capita income postulated for 1980. These prices will therefore be  $p_{1A}, p_{2A}, \dots, p_{nA}$  since they are realisation prices corresponding to the actual consumption structure in 1960 as reflected in the family budgets. Furthermore, we determine the unit costs  $E_1, E_2, \dots, E_n$  according to the principles of the calculus of the efficiency of investment. The next step is to calculate the value  $G_A$  of the set  $A$  in terms of the prices  $\sqrt{E_1 p_{1A}}, \sqrt{E_2 p_{2A}}, \dots, \sqrt{E_n p_{nA}}$ . Finally, we try to find such a set  $R$  of commodities  $q_{1R}, q_{2R}, \dots, q_{nR}$  whose value, measured in terms of prices  $\sqrt{E_1 p_{1A}}, \sqrt{E_2 p_{2A}}, \dots, \sqrt{E_n p_{nA}}$ , is equal to  $G_A$  and whose realisation prices are

proportionate to  $E_1, E_2, \dots, E_n$ . Such a procedure requires, of course, a knowledge of the relationship between the consumption of a given commodity, on the one hand, and the "real" value of aggregate consumption  $G_A$ , as well as the structure of prices, on the other".

At first this appears as a promising line of analysis, because it seems to find conditions for optimality and to simplify the problem of consumption planning, reconciling central planning of the consumption structures with a respect for consumers' preferences, approximated by means of a reasonable assumption about their general form. On reflection, however, even if consumers' revealed preferences had the general form postulated by Kalecki, his approach would leave the problem of consumption pattern totally undetermined. This should be clear from reconsidering Figure 4. Condition 1 tells us that the optimum structure ought to lie on the  $AZ$  segment, condition 2 gives the slope of the equivalent consumption curve at the optimum point  $R$ , but point  $R$  itself can lie anywhere along the  $AZ$  segment, and the planner has no a priori way of determining where it lies, unless, as Kalecki puts it, he knows "the relationship between the consumption of one of them, say  $q_{1R}$  on the one hand, and the "real" value of the aggregate consumption  $G_A$ , as well as the price ratio  $p_1/p_2$  on the other". But if the planner knew the relative realisation prices of alternative bundles of commodities which at some set of prices ( $\sqrt{E_i p_{iA}}, i = 1, \dots, n$ ) have the same real value, and knew this for alternative levels of real consumption, he could draw the whole map of consumers' revealed preferences at once. The optimum structure of consumption could be determined from the outset, without having to make Kalecki's additional assumptions, nor follow the intermediate steps he suggests. In the absence of such information about the consumption of each commodity as a function of income and prices, the planner is left with the traditional methods of consumption planning.

## 6. The perspective plan

Kalecki's ideas about socialist planning reviewed in the previous sections are brought together in the procedure he devised for the construction of a perspective plan, i.e. a plan for the long-term development of a socialist economy (see Kalecki 1958e, 1963c, 1963d). What follows is a generalisation and formalisation of Kalecki's procedure.

The perspective plan covers a time span of 15 to 20 years; the planning horizon is actually longer, in that investment expenditure in the last few years of the plan is laid down on the assumption that the broad lines of development of the economy outlined in the plan will also continue after the end of the plan period. It is a "sliding" plan; the first five years become the starting point for drawing a medium run plan for the economy, especially the investment plan and, as time goes by, the terminal date of the perspective plan period is shifted forward, say, by five years every five years, so that a picture of the perspective development of the economy is kept, brought up to date as past and current experience produces more accurate projections. The plan is drawn at constant prices and is, therefore, designed basically to check the consistency of physical flows, while financial flows and the price level are adjusted later, with the drawing up of short-run financial balances and balances of the income and expenditure of the population.

The first stage in the construction of the perspective plan is the choice of a preliminary target for the average growth rate during the period, which we can call  $\bar{g}_0$ . The main constraints on average growth are: 1) the expected growth rate of the active population and the growth rate of its average productivity (partly dependent on technical progress and, partly, on the rate of investment itself); 2) the minimum growth rate of consumption of the population and the share of accumulation associated with it, constraining  $\bar{g}_0$  for the preliminary coefficients, at the prices and the sectoral composition of the base period; 3) the balance of foreign

trade. These constraints can be summed up as:

$$(6.1) \quad \bar{g}_0 \leq n_0 + h_0$$

$$(6.2) \quad \bar{g}_0 \leq s/v_0$$

$$(6.3) \quad \bar{g}_0 \leq \frac{g_x}{e_m}$$

where  $\bar{g}_0$  is the preliminary target for the average growth of income over the period,  $n_0$  and  $h_0$  are preliminary estimates of population growth and of average productivity growth;  $s$  is the maximum share of accumulation corresponding to the minimum consumption requirements of the population, and  $v_0$  is a preliminary estimate of average investment intensity;  $g_x$  is the expected growth rate of the value of exports, and  $e_m$  is the estimate of the elasticity of imports with respect to income (given the planners' expectations about world demand and relative internal and international prices). Ideally, all these constraints should be simultaneously met so as to have the equality sign in equations 6.1-6.3; if one of the constraints bites first, to some extent it might be possible to ease whatever is the bottleneck by bringing the right side of the other equations closer to  $\bar{g}_0$ : for instance, to raise  $h_0$  or lower  $e_m$  or raise  $g_x$  at the expense of raising  $v_0$ , but there might be limits to the possibility of trading off one constraint for another and the most stringent constraint will determine the highest  $\bar{g}_0$  which is tentatively considered feasible. However, even if the tentatively chosen growth rate does not quite meet all constraints one might pass to the second stage of the calculations, since the purpose of this stage is only that of ruling out blatantly unrealistic variants of the plan checking the internal consistency of expectations. The estimates are aggregates of different sectors, and it is not granted that the subsequent breakdown of these variables will give aggregation weights consistent with the provisional calculations.

The second stage is a tentative estimate of the output structure of different sectors required for final uses in each year. The changes in the pattern of final private consumption are predicted (by means of calculations of consumption elasticities, the analysis of family budgets, available time series of consumption data, the pattern of consumption of countries at similar stages of development, etc.) or planned (on the basis of consumption norms). Public consumption of the product of each sector can be added directly, but the requirements of the net output of each sector for investment and exports will depend in turn on the targets for gross output expansion in the different sectors, so that only preliminary estimates can be inserted at this stage, to be checked later for consistency with data obtained at the next stage. These operations can be summarized as the drawing of a set of provisional vectors of final demands in each period,

$$(6.4) \quad y_{t+j} = c_{t+j} + u_{t+j} + s_{t+j} + f_{t+j}, \quad j = 0, 1, \dots, 20;$$

where  $y$  is the vector of final demand,  $c$  is the vector of private and  $u$  of public consumption,  $s$  is the provisional investment vector estimate and  $f$  the export vector.

The third stage consists of the attempt to estimate the sectoral breakdown of demand for intermediate products corresponding, in each period during the plan, to the provisional estimate of final demand obtained in stage two. This is done by means of either input-output analysis, or the material balances of resources and uses usually drawn in planned economies for the main commodity groups. In either case allowance has to be made for technical progress so that ex-ante planning matrices  $A$  of technological coefficients have to be used rather than ex-post tables. An estimate of the gross output targets  $x$  consistent with the final output targets of the perspective plan is thus obtained:

$$(6.5.) \quad x_{t+j} = A_{t+j} x_{t+j} + y_{t+j} \quad j = 0, 1, \dots, 15-20.$$

The fourth stage consists of a reassessment of the provisional estimates, for investment and foreign trade, on the basis of the supply constraints on the growth of each sector. Productive activities are divided into two main categories, of "supply determined" and "demand determined" activities (Kalecki, 1963 and his Preface to Rakowski, 1963). The first category includes those activities which are subject to a ceiling for their long run growth rate, for technical or organisational reasons, which cannot be removed even at the expense of higher capital expenditure. The technological and organisational limits are given by limited natural resources, or the time necessary for the introduction of new technological processes, or for the training of workers or technicians of different skills, or by difficulties in recruiting manpower for certain trades (mining, for instance). Demand determined industries are the industries which, within the relevant range of the growth rate of national income, are not subject to such ceilings in their growth rates. The comparison between the estimates of gross output requirements and the ceilings limiting the growth of supply determined industries will give a first assessment of import requirements, to which non-competitive imports have to be added, to obtain total import requirements. In order to meet import requirements with exports, the targets for the final output of the industries which are not supply determined has to be raised, following the indications of foreign trade agencies, as long as higher amounts of output marketed for exports are not counterbalanced by more unfavourable terms of trade. Once the net trade balance and the actual targets for the increase of gross output are known a more accurate estimate of investment requirements can be obtained and checked against the provisional estimates adopted at stage two. If the divergence between the initial estimates of the net trade balance and investment requirements and the estimates obtained at stage four is not acceptable the process of plan construction will have to start again, from stage two, until the two estimates are sufficiently close and the relations hold:



$$(6.6) \quad x_{t+j} + m_{t+j} = A_{t+j}x_{t+j} + y_{t+j}, \quad j = 0, 1, \dots, 15-20;$$

$$(6.7) \quad x_{t+j} < \bar{x}_{t+j}$$

$$(6.8) \quad s_{t+j} = B_{t+j}(x_{t+j+1} - x_{t+j})$$

$$(6.9) \quad p \cdot f_{t+j} = r \cdot p_i \cdot m_{t+j}$$

where  $m$  is imports,  $\bar{x}_{t+j}$  is the capacity constraint of  $x_{t+j}$ ,  $B_{t+j}$  is the matrix of projected investment requirements on a sector-to-sector basis; and  $p$  and  $p_i$  are internal and international prices and  $r$  the exchange rate.

The choice of the technical form of investment is undertaken at this stage. Whenever alternative ways of achieving given targets for output expansion in different sectors are available the procedure for technical choice is usually that of minimizing the sum of perspective operation costs and a shadow charge for investment, according to the methods discussed in section 4 above. Alternative ways of earning foreign currency, and the alternative between import and domestic productions, are treated as any other technical choice, in the same way (Kalecki, 1971b).

After these stages are performed the disaggregated data can be aggregated to recompute the aggregate targets for the growth of national income, investment intensity and import requirements, in order to check them against the preliminary estimates. In case of inconsistency the plan is revised and a new variant is worked out through the stages described above. "The variant finally adopted should be distinguished by the highest possible rate of growth at which there is a realistic possibility of balancing foreign trade and at which the relative share of productive investment plus the increase in inventories in the national income is considered tolerable by the authorities from the point of view of the impact upon consumption and unproductive investment in the short run" (Kalecki, 1963).

This procedure proposed by Kalecki has a number of shortcomings. Computations undertaken at constant prices can at most ensure the consistency of plans in physical terms (as long as aggregation weights within sectors do not change too drastically) but there is nothing to ensure that the relative prices deriving from the plan should be consistent with the relative prices assumed in the construction of the plan. On the side of production goods, the relative scarcities of inputs caused in the very process of planning might diverge from initial relative prices and, if this divergence is neglected, opportunities for substitution among alternative inputs might be lost. For consumption goods, the relative long run production costs of consumption goods over the plan period might diverge from the pattern of relative prices of consumption goods initially assumed for the purposes of forecasting consumption patterns over the period, inducing, therefore, the neglect of opportunities for substitution among alternative consumption goods. Finally, since the calculations for investment choice are carried out for given output expansion targets, the procedure implies that the quantity of material inputs in the operation of the plants after construction and the proportion in which material inputs are required to make the investment goods considered are not affected by the technique eventually chosen; technological choice, in other words, is assumed to take the form of the substitution between labour and an aggregate notion of investment measured at constant prices, instead of more complex alternatives.

These shortcomings can be summed up as the possible inefficiency resulting from the neglect of three main feedbacks of the plan on the system of prices (and hence, whenever alternative consumption and production choices are available, on the pattern of planned quantities). These feedbacks are: i) the choice of the technical form of investment on the physical composition of the sectoral targets for output expansion; ii) the feedback of the investment plan on the prices of investment goods to be used as basis of plan construction; iii) the feedback of relative costs of consumption goods resulting from the plan, on the relative prices to be used as the basis of

the consumption plan. The extent of the divergence between the plan obtained following the stages outlined and an 'ideal' plan, which should be constructed taking into account also the feedbacks mentioned here, and the practical importance of this divergence, are questions open to discussion. According to Michal Kalecki the drawbacks of performing calculations to choose techniques measuring the value of investment (per unit of output or per labour employed) at constant prices are of the same nature as all index number problems and can be reduced, in the framework of investment planning, by using chain indexes of the volume of investment (Kalecki, 1963a, Ch. 1). He recognises that the crude recoupment period approach and the other rules put forward for investment choice are only a first approximation to a complex problem (Kalecki, 1963c) but regards more sophisticated approaches as not necessarily representing an improvement given the inaccuracy of initial data and the uncertainty about the future. The necessity of checking the consistency between the relative prices of consumption goods at which future consumption is being forecast and relative costs anticipated in the calculations of "investment effectiveness" has been stressed by Kalecki himself, although his own treatment of the problem does not seem to provide a satisfactory solution (see section 5 above).

In handling these problems in Poland in the early 1960s Kalecki rose to the challenge of 'realised' socialism and favoured approximate procedures of practical use to rigorous solutions without application. Even with hindsight, nobody could say that he was wrong.

## 7. Summary and conclusion

Kalecki's contributions to the theory and practice of socialist planning - as distinguished from the wider aspects of socialist economy and society - are discussed in this paper under five headings:

i) Kalecki's comprehensive and coherent picture of the organisation model of the socialist economy as an alternative to the Soviet-type model different from the "market socialism" of Lange and other reformers. In Kalecki's model prices are fixed, as in his picture of the capitalist economy, by mark-up pricing, with the average mark-up on actual and shadow costs related to the requirements of investment finance; markets are used but market signals are quantity signals determining quantity adjustments in the use and expansion of capacity; firms performance is assessed using net value indicators but within wage guidelines and employment targets; investment is kept in check by interest payments deducted from performance indicators; but neither investment nor employment are guided by enterprise profitability considerations; central planning is made easier by grouping enterprises in vertically integrated sectoral associations. The countervailing power vis-à-vis central planners is not the market but Workers' Councils: in Kalecki's reform scheme therefore democratisation takes the place of marketisation.

ii) Kalecki's approach to the external and political limits to the accumulation policy of central planners. Labour force growth and technical progress set a limit to the accumulation that can be usefully undertaken from the viewpoint of maintainable consumption growth (golden rule accumulation of Western texts being regarded not as an optimum but as a maximum accumulation policy). Within this maximum limit, planners' concern for short-term consumption should (following from a rationality postulate in Kalecki but really embodying a plausible but special preference system on the part of planners) stop well short of that maximum.

iii) Kalecki's innovations in revamping the Soviet-type approach to investment project selection based on the notion of "standard recoupment period" in place of interest rates. Kalecki and Rakowski linked this period



to the marginal labour saving opportunities in modernisation given the full employment constraint of the socialist economy; introduced an alternative implicit rate of interest in dealing with the immobilisation of resources during investment gestation; used investment growth rates in discriminating between projects of different lifetimes. Theoretically the use of multiple implicit shadow rates of interest can be questioned; in practice their values were close and these improvements of current practice must have seemed to Kalecki as more easily acceptable to Polish leaders than actual interest rates, and more desirable than an unqualified use of actual interest rates for the choice of investment levels and structure instead of just technical choice.

iv) Kalecki's attempt at formulating practical guidelines for the optimisation of consumption structure. His attempt, which is based on a use of chain indices practically equivalent to Western "revealed preferences", is ingenious but its practical application does not require less information on the part of planners than the application of more conventional methods.

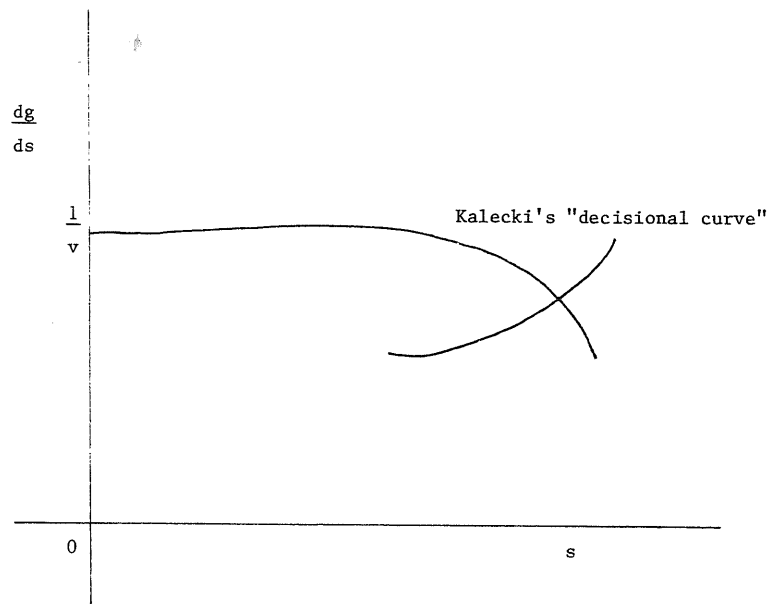
v) Kalecki's procedure for the construction of a perspective plan of the development of the socialist economy, as a foundation for medium run and investment planning. This brings together all the previous points and leads to a practical solution of plan formulation, which in theory can be regarded as possibly inefficient because it neglects a number of feedbacks in plan construction, but in practice is of considerable use especially if compared with the alternative Soviet-type methods using material balances alone.

This critical but positive assessment leads to some reconsideration of Kalecki's overall contribution to socialist economics. Accused of not being a marxist he was more leninist than his critics (with his emphasis on workers' control). Accused of neglecting social and political factors he had the most perceptive feeling for precisely these factors, with his emphasis on democratisation and on the political limits to investment policies and other work (not reviewed in this paper) on subjects ranging

from economic criminality to peasant behaviour, from systemic influence on labour productivity to income distribution between manual and non-manual workers (see Kalecki, 1984, Part III). For a man revered as a great theoretician, his propositions often lack generality, though the qualifications are not significant in practice for Eastern Europe in the nineteen sixties. In this Kalecki is in a position similar to that of Keynes, who also claimed generality for a theory deeply grounded in the time and place of his theorising, Britain in the nineteen thirties, and requiring some practically plausible qualifications which reduce generality without reducing policy relevance. Keynes was really a high tory believing in markets, as Kalecki was a high socialist believing in planning, the theoretical and political stance of both has been frequently misunderstood. The world is not in the best of possible states, not because of qualification required for the general validity of their theories, but because of the pursuit of pre-Keynesian and pre-Kaleckian policies in both West and East.

In one respect Kalecki's contribution to socialist economics has not yet been tested, i.e. the viability of his model of socialist organisation, since the combination of central planning and workers' control has not been realised anywhere. That model was more the product of Polish conditions in the 1960s than perhaps anything else produced by Kalecki; it may be no accident that he decided to include almost none of his papers on the subject in his Selected Papers on socialism (Kalecki, 1972), though pessimism on workers' powers, which was justified in 1968 Poland, might not be justified today, after the explosive effects of workers' discontent in 1980-81 Poland, and in the reform climate set by Gorbachev. Kalecki's qualms about market prices, the risks of unemployment associated with decentralisation and the risks of central planning without workers' control, however, remain as valid and relevant today as ever.

Figure 1



$v$  = marginal capital/output ratio  
 $g$  = growth rate of income  
 $s$  = share of investment in national income

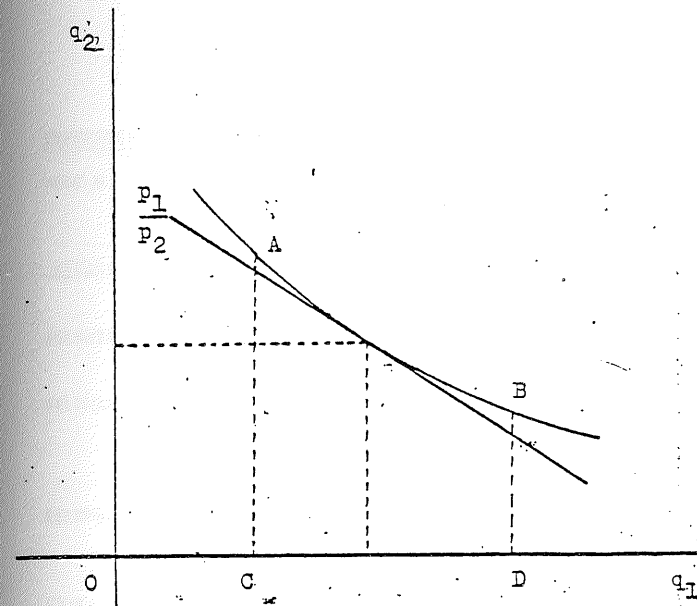


Fig. 2

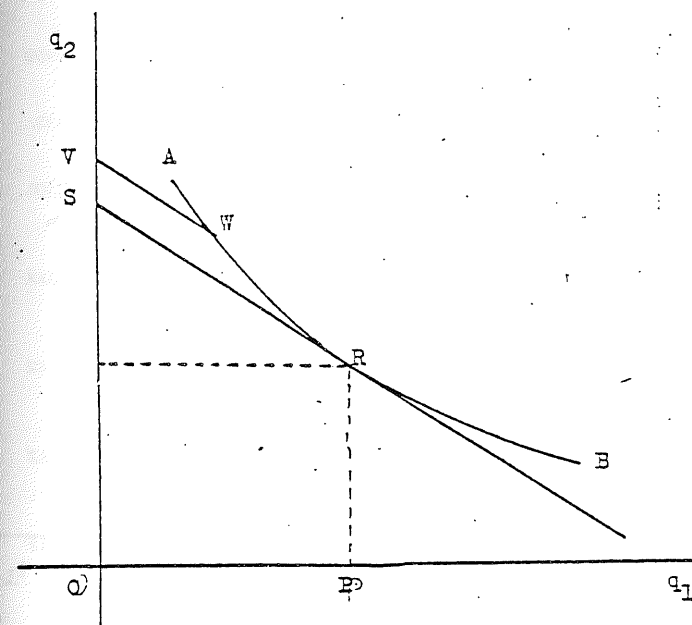


Fig. 3

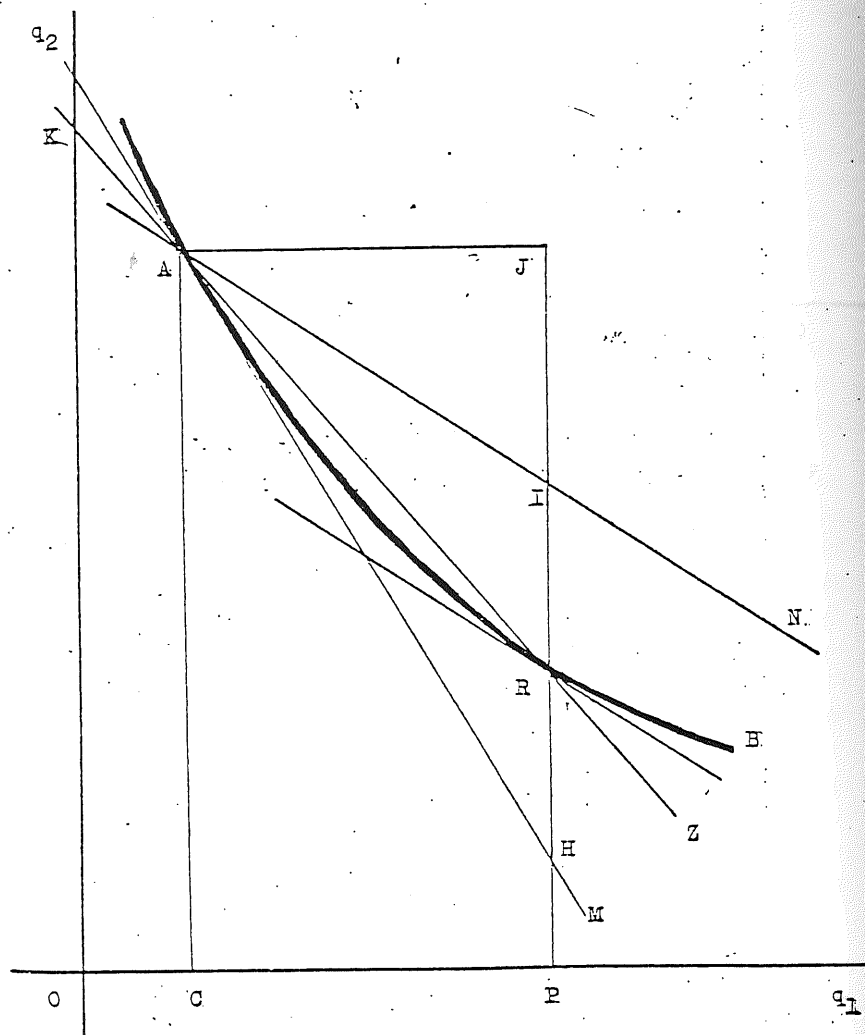


Fig. 4

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