SURVEY

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The dynamics of value, price and profit

- Neo-Classical economics has infected every social science discipline, including my own, geography. Brooding with this conceptu universe has proven remarkably difficult, and has forced most of us at one time or another to make forays into the realm of economic theory in order to clarify basic issues.1 My target here is no less than the process of economic growth itself. For the geographer it is abundantly clear that what needs to be understood is, above all, industrialization of new places as capitalism expands around the globe and the deindustrialization of older places as industry shifts gears to keep in the race of the global accumulators of capital. This process cannot be understood in the terms of (neo) Classical location theory, which conceives of the distribution of economic activities as a problem of optimal spatial allocation in an exchange framework (e.g. Saar, 1995). What needs be grasped is that the processes generate places at the same time as they produce commodities and develop their productive powers, how industrialization is driven by the forces of strong competition, technical change and accumulation, and how the spatial division of labor is repeatedly uprooted by the disequilibrating forces of economic growth (Storper & Walker, 1988).

In conventional economics, prices and profits are the crucial signals guiding business behavior, perfect competition the spur to optimal behavior and equilibrium the state to which all things tend. Satisfying individual consumer wants is the goal of economic activity, exchange the means to this end and efficient resource allocation the harmonious results of a properly functioning market. Technological change consists of smooth substitution within or between production functions, in response to market signals. This is thoroughly backwards. The goal of capitalism is accumulation, and the production, investment and expansion of surplus value the principal means to this end. Competition arises from the drive to accumulate and spur capital into further exertions to survive and gain advantage over their fellows, and these efforts, in turn, constantly disrupt existing conditions of production. Furthermore, technological change evolves in an uneven and inconsistent fashion, always keeping the production system out of joint. Equilibrium is a possibility always just out of reach, uncertainty an ever-present condition of business operation. The 'market' is a set of practical institutions for economic exchange, and prices and profits procreative guides in a rapidly shifting world of production in which there are no absolutes.

In short, what is wanted is not a theory of resource allocation via exchange, but a theory of growth based on the production of surplus value, the accumulation of capital, competition, and technological change. Growth must be understood as a fundamentally expansionary and disequilibrating process, and a theory of prices and profits erected on that foundation. This was the project of Classical economics, which reached its apex in Marx’s Capital, before the marginalist counter-revolution drove all such disturbing issues out of economics (Pasinetti, 1981: 15-14). This paper is intended to clarify the issues and contribute in small measure to the purpose before price in economic theory.

Neoclassical economics begins from the realm of exchange and works back to production (Nell, 1972; Pasinetti, 1981). Prices are established exogenously in the market by supply and demand, responding to conditions of consumer taste and resource scarcity. Prices are the key signals for business behavior, to which production responds. Capitalists seek to maximize profits, or the difference between revenues and costs, but all 'excess' or 'deficient' profits disappear under the force of perfect competition. Profit is a residual that goes to zero at equilibrium, as firms equalize revenues and costs at the margin by making adjustments freely along their production frontiers. Capital is simply equipment, one of several factors of production, which may be bought or leased. Capital does not make profit, only a 'fair
origins of profit so much as the fate of the rate of profit (Krugel, 1987). The Classical economists also shared an overriding concern with economic growth. Classical value theory, it is sometimes said, is no more than Walrasian general equilibrium by another name; but this is in error. It is more accurate to call it 'general disequilibrium theory' (Dumenil and Levy, 1987: 136). Nevertheless, much of the debate over value and price has proceeded as if the issue were primarily one of the solution to an equilibrium set of equations – demonstrating, perhaps, the grip that it has held even over radical economists in our time. The Ricardian have been the most remiss in failing to put 'history over equilibrium' (Bhadrani & Robinson, 1980; Harcourt, 1983). Fortunately, recent contributions from both sides have focused attention on the revival of Classical political economy as a whole, and to the centrality of production, competition, distribution and growth in economic theory (eg Panunciri, 1981; Semmler, 1984; Semmler, 1986).

First digression: Price stability in a classical system

With the revival of Classical price theory, a side-issue has arisen that threatens to become the focus of attention. Vigorous debate has broken out recently about the stability of properties of Classical models, if one drops an assumption of Walrasian equilibrium (Semmler, 1986). The issue as whether prices converge around long-run centres of gravity and profit rates equalize, if either is disrupted by market shifts, competition, etc. The difficulty of assuring such stability was first posed by Nikaido (1983). It revolves around the adjustment capacity of the economy. Aglietta (1983), Dumenil and Levy (1986, 1987) argue, using computer simulations, that within reasonable parameters prices do converge on long-run norms, given three kinds of adjustment: price, quantity and capital movement. That is, inventories serve to cushion variations in markets, prices are adjusted in light of inventories and investment moves towards sectors with higher profits.

Steedman's (1984) neo-Ricardian view is that deviations from equilibrium may be exacerbated by adjustments in one sector if it is producing purchased inputs from other sectors with radically different compositions of capital (capital-labor ratios); that is, above-normal prices can be consistent with an above-normal profit rate (see also Pell, 1983). While such situations do exist, they are not essential because movements of prices in the adjustment process do indeed have a straightforward effect on rates of profit (Dumenil & Levy, 1987: 153). In general the proximate cause of profit rate disequilibrium (and price deviations) is always the ill-behaved nature of the market mechanism. No one should be surprised that the allocative mechanism can, instead, work very well in certain circumstances. For example, when the mass of profit is unbalanced, low profit rate regions of the economy can continue to grow faster than high profit rate ones (Webber, 1987). But market misbehavior is a weak reed on which to build a theory of growth or crisis.

No one claims that convergence must be obtained under any and all circumstances, and the stability debate leads directly into the long-standing issue of growth cycles and capitalist crisis, which we will not take up here (see instead Harvey, 1982). While this debate is by no means settled, the orthodox resolution suggested by Dumenil and Levy does not satisfy all the critical conditions of the Classical model, as they hope. In particular, they adopt a weak form of competition, in which capitalists make adjustments but not innovations, and do not consider the systematic disequilibrium created by accumulation and strong competition. I shall put greater emphasis on investment as the instrument of both adjustment and change in a dynamic setting of growth and price formation. All these matters receive further consideration below.

For neo-Classical economics there is only one kind of circulation: the passing on and flow of commodities in the market. Economic life consists of the transfer of goods to maximize satisfaction and income. Capital and labor are themselves commodities, which differ only in that they are 'rented' by the day or the year, their rewards are profit (interest) and wages, paid at some rate over time. Economic growth in the neo-Classical model is a process of 'adjustment' to factor supplies, consumer preferences, savings decisions, and exogenous shifts in the production function. In the sense that expansion occurs for reasons lying outside the system, neo-Classical theory 'is no theory of growth at all' (Harris, 1972: 247).

The Classical economists offered another form of circulation: that of capital. They all shared the view that economic growth resulted around the accumulation of capital (Smith, 1776; Ricardo, 1817). Capital begins as money thrown into circulation in the hope of making a profit. In Marx's clearly developed presentation, the circuit of industrial capital begins with money committed to plant and equipment; labor-power and materials are then purchased, production takes place, sale of output follows and money returns to the capitalist in the end. But the money value of capital invested has now grown by the addition of surplus value.
Keynes got no further in explaining investment demand than "the animal spirits" of the capitalists. For Marx, on the other hand, accumulation of monev as the general form of value and power over commodities, provides the historic basis for capitalist behavior (Marx, 1963: 1-132, 392). "Two further elements of the Classical theory of growth, to which Keynesians pay too little attention are the competitive spur put to the rise of the slackening capitalist and the changing technology that offers a vessel into which investment may be poured. We shall turn to these at some length before returning to investment."

**Second digression: The ill-behaved profit rate**

We must take a moment to dispense with the illusion that the rate of profit—defined as the mass of profits over total capital (a flow over a stock)—guides investment activity. Although capital is invested in search of profit, the rate of profit is an unreliable indicator of investment behavior (on the empirical record, see Jorgenson, 1971). This is devoting for neo-Classical theory, for which the profit rate must be well behaved if firms are to maintain optimal levels of output and mixes of inputs. Many Marxists and neo-Ricardians also see the rate of profit on enterprise as a clear signal for capitalists to shift their investments across sectors, disinvest in old plants, or move to foreign climes (e.g. Blumenson & Harrison, 1982). Yet the rate of profit (especially the market rate) is manifestly not a well-behaved variable. There are, first of all, problems of calculation. There is no single way to calculate the rate of profit. Indeed, throughout the 19th century composites computed only profit margins, with investment charged as part of current profit. The method of determining the rate of profit on invested capital was invented in the 1920s (Chandler, 1962). Persistent difficulties will arise in handling such things as depreciation charges, inventories, unit production, variable age of capital stock, and inflation (Titli, 1979). Furthermore, businesses are forced to rely on accounting rates of return because these are the only practical data available (III, 1979).

Second, long run rates of profit are rendered obscure by the variability typical of short-run profits. Profits are not only cyclic but fluctuate wildly from year to year (Parkin & Machover, 1983: 178; Capoglu, 1987: 32). How does a company find a clear trend line? The problem rests, at one level, in the fact that profits are a residual, and any change in conditions of demand, cost, currency values and so forth can have disproportionate effects on profit rates. At a deeper level, the cause lies in the shifting currents of production; with technical change the centers of gravity for prices can change radically, making for serious adjustment problems (Semenets, 1964: 31).

A third element is the reciprocal determination of profits by investment activity itself. As Kalecki said, "workers spend what they get and capitalists get what they spend." In other words, because investment plays a crucial role in keeping the accumulation process afloat, greater investment creates more profits. Obviously this turns neo-Classical theory on its head, and for this reason, Keynes downplayed the role of prices and price-led behavior (Krugel, 1980). The reciprocal effect also challenges neo-Ricardian theory, in which profits are determined solely by the distribution of incomes between capital and labor, not their levels of expenditure. Moreover, the mutual determination of investment and prices confers further force to the idea of investment bandwagon. The converse situation is self-reinforcing underinvestment as in Keynes' "liquidity trap."

These difficulties in the performance of the rate of profit as a regulator are not an obstacle for Marxist theory. Capitalists may be said to sit atop a mountain of surplus value generated by the vast production system they command. They do by no means want to operate at bare-bones efficiency, even if they were able. They are content to ride the current in the stream of profits, and only notice the rocks when the level falls sharply (Parkin & Machover, 1983). This does not mean they are indifferent to profit rates, only that the satisfactory performance of the capitalist economy does not rest fragilely on the regulatory signals of profits and prices. In other words, we must demote the profit rate from the heights it usually occupies in economic analysis.

Competition is our third fundamental force of capitalist growth, after the production and accumulation of surplus-value. Successful accumulation causes firms to grow and come into competition with one another. As this encounter is made, competition becomes a further spur to action, lest one fall beneath the feet of the hard-galloping one beside (Weick, 1981: ch 6). Competition only becomes a central incentive as capitalism develops. Contrary to the myth of a golden age of 'competitive capitalism', competition was historically very poorly developed, especially across space. Capitalist development brings with it more intensified and widespread competition, to the point where the war among capitalists now rages freely on a worldwide basis (Clifford, 1977). Although most Marxists since the 1930s (eg Baran & Sweezy, 1966) have seen in 'monopoly capitalism' the negation of true competition, there is a strong
The economy is forever being thrown out of equilibrium by the efforts of capitalists to get ahead of each other. In such circumstances, equal profits are a sign that no one is innovating, that competition has come to a halt. An equilibrium state is a contradiction in terms for capitalism, synonymous not with calm but with crisis (Harvey, 1982: 389-90). Disequilibrium is essential to capitalism, not something introduced by exogenous shocks, as the classical claim.

Competition cannot be reduced to a gentle jostling that smooths the profit surface like so many grains of sand; the economy does not seek a level, but persistent inequality cum competitive advantage. Furthermore, competitive advantage cannot be confined within industrial sectors, while profit rate equality is assumed to obtain across sectors (e.g. Swammler, 1984: 36). Strong competition operates between as well as within sectors; it even operates between regions and countries. The mode of competitive advantage is change in the conditions of production. Competition leads capitalists to create new products, new machines, new divisions of labor, new methods of labor control and so forth. Because they are doing different things in different ways, some better, some worse, their profits vary, and do so systematically. We shall take this up below, but must first consider two common misconceptions of the origin of surplus profits and equalization of profits through capital mobility.

Two digressions: Perfect mobility and imperfect competition

Before proceeding, we must first cope with two paths of radical thought that branch off from the model of weak competition, and therefore skirt the central terrain on which the contest with neo-Classical and neo-Ricardian economics must be entered, that of production dynamics.

Perfect capital mobility: If money-capital were perfectly mobile and productive-capital perfectly adjustable, profit rate discrepancies would persist for no more than an instant. There would be no prospect of competitive advantage, no possibility of uneven development and no problem of 'capital switching' between declining and growing sectors, regions or countries (Harvey, 1983: ch 1). This is a neo-Classical never-never land, however. Profit rate inequalities exist because production takes place with real materials, real people, in real time and space. Perfect mobility is something capital strives for, but never achieves.

On the one hand, money capital can move about the world with great swiftness in the present age, a fact that has enormous significance for the ability of capitalists to invest in far-flung places in search of more advantageous combinations of inputs and markets, labor forces and technology, and to withdraw profits from the site of past investment. This raises the specter of deindustrialization (Dismorene & Harrison, 1982; Martin & Rowthorn, 1985). The rapid 'global scan' of contemporary capitalists gives them new leverage over workers and communities, by increasing the effective pool of people and places competing for the blessings of capital investment (Walker & Stimpson, 1989). On the other hand, capital must encapsulate itself in the straitjacket of fixed capital, in order to raise the productivity of labor. This leaves capital temporarily immobile, and makes it subject to a degree of leverage by workers, communities and governments. It may take a crisis to dispose of such capital both technically and economically, so that it poses less of a barrier to disinvestment and locational change than before (Harvey, 1982). Capital immobility also involves the spatial fixity of workers and communities, and the value of labour productivity and continuity in a given place (Stimpson & Walker, 1983).

Thus capital is in a bind: mobility and immobility have both advantages and disadvantages. If capital has become more mobile in certain respects, it has also become increasingly encased in a frozen landscape of immense proportions, in huge industrial complexes and cities. Remaking these to suit the ever-changing needs of accumulation is a titanic endeavour, fraught with financial and political pitfalls. Capital must therefore unleash periodic gales of what Joseph Schumpeter aptly called 'creative destruction' which free up new forces of production from the embrace of the old. This process of 'modernization' can be highly disruptive to all who live through it, including capitalists. The trick, therefore, lies in maintaining a sufficient balance of mobility/immobility of capital, not just maximizing mobility and change (Harvey, 1982).

Monopoly and imperfect competition: In the theory of imperfect competition or 'monopoly capital', the concentration of capital in larger and larger firms eclipses the classic laws of competition and value (e.g. Marx & Sweezy, 1966; Kalecki, 1971; Bain, 1956). Competition is limited by barriers to entry and measured by industry 'concentration ratios', or shares of output markets enjoyed by a few dominant firms. Monopoly power and collusion allow big firms to set artificially high prices, and thereby generate excess profits.

In fact, empirical studies of the relation of profit rates to industry concentration ratios have made a very poor showing, with weak methodologies and absurdly regression statistics (for a good review, see Semmien, 1984: ch 4). Nor do wage shares or
unequal, with no evident tendency towards convergence (Wicksa, 1981; Faquins & Machover, 1983; Semmler, 1984; Capoglu, 1987).

Rates of profit are not random, however. Empirical studies consistently show significant relationships of profit rate differentials to productivity, capital intensity, wage costs, market share and growth of output (on industries see Schwartzman, 1959; Oreinstein, 1977; on firms see Ravenstahl, 1981; Gallo, 1972; for a review see Semmler, 1984: ch. 4). Such differences rest on the fact that industries make different things, using different raw materials, machinery and labor processes (Walker, 1985, 1986a). Industries rest on different technical foundations that keep movements out of step with one another; they develop along divergent trajectories (Rosenberg, 1970; Nelson & Winter, 1982). Thus we see a succession of fast-growing 'leading sectors' such as steel in the 1880s, plastics in the 1950s, or microelectronics in the 1980s that outperform other industries (see a historical, see Schumpeter, 1939). Industries grow because their products open up new worlds of useful consumption for individuals and other industries, and because they can be produced with increasing ease, lower costs and better capabilities. Other industries limp along because their day in the sun has passed or has yet to come; their products are too competitive or too limited in capacity to have a large market or to be produced at a reasonable cost.

Technological progress has often been called 'dynamic economies of scale', although it includes much more than advantage of size in the strict sense; it means better matching, better designs, greater labor skills, a wider division of labor, and so on. The secret of industrialization is creating more from less. In the dynamic process of economic growth, technical change proceeds not on the basis of factor substitution in response to relative prices, as in neo-Classical models, but by leaping over existing factor constants to produce something that was not there before, in ways that were not imaginable before. While today's prices are not to be entirely gain sayed in the application of resources, nonetheless growth pushes past the present structure of prices to create a new fabric of production (necessary labor time, technical coefficients), on which a new set of prices will arise (Kalder, 1961, 1972).

One cannot confine industry growth and difference to technology alone, of course. Consumption patterns are not entirely reducible to technical capacities and costs of production — although 'learning by using' with new product technologies is an important part of the development of demand (Rosenberg, 1982). Changing tastes and expanding income can pull an industry forward. Then, too, wage rates are crucial to the success of industry. Pre-unit wage rates over time depend on the dynamics of learning, labor supply and employment relations, including such things as on the job training, immigration flows and union organizing drives (Stroper & Walker, 1983). Wages are therefore dynamic over time. Because consumer demand and wage rates are not reducible to technology, the fashion garment industry does very well year after year on the basis of shifting tastes alone, while standard garments rack up profits by employing cheap immigrant labor. Silicon Valley has grown even faster than it might otherwise have done owing to the spur of military demand and the lack of unionization in the region. But for all that, the age of microelectronics has been opened up by the breakthroughs in semiconductor technology. The wage-profit split is secondary in most cases to progress in the labor process, once capital moves from the production of absolute to relative surplus value, so once capital begins systematically to develop the forces of production (cf. Brenner, 1977). Over the long haul wages have been irresistibly pushed upward by the working class in some reasonable relation to productivity advances (Kalder, 1955). In general, growing industries can afford to pay their workers (or key segments) well, sharing some of the excess
there remains the second order problem of allocating capital among different sectors. Prices must include some redistribution of surplus value according to capital invested (including depreciation and new capacity). If not, it would never pay to raise the organic composition of capital by investing in fixed capital, as an extra measure of surplus value would accrue to the sector that does so: its rate of profit would fall immediately. Capitalism would thereby be rendered sterile. 11 The only way to solve the price problem is to allow for uneven profit rates generated by structural conditions of growth in different sectors.

Price with uneven technical change

Technical change further complicates the price equations because the parts of the interrelated production system are moving in different directions. This instability of input-output coefficients creates a fluctuating index problem. The indeterminate change in the producers and processes of industry renders every commodity, every machine, every measure of output transient. In a sense, this makes an even stronger case for labor as the single standard of value that is invariant over time (Fetsman, 1984; see also Walker, 1988a).

This is the approach taken by Luigi Pasinetti (1981), who constructs a model of structural change in a pure industrial system on Classical foundations. Pasinetti, while closely identified with Sraffa, pursues technological progress not input-output relations at the center of his model. He is still multisectoral, for the lesson of Quesnay, Marx, and Leontief about heterogeneous industry has been learned. But he controls for the interrelation of secondary means of a standardizing device as clever as Sraffa's standard commodity — the vertically integrated sector — which makes the entire economy appear as a set of mutually independent final commodity producing sectors (Pasinetti, 1981: ch. 6).

Every industry is then allowed a characteristic 'natural rate of growth' owing to technical change. In this Pasinetti follows the method of reduced in establishing a 'natural' or 'potential' growth path from which capitalism may devise. 12 But his approach allows for many rates of growth among industries and bases them on technical change and expansion of consumer demand rather than population growth. Solving for prices in such a dynamic system of production equations requires the use of a 'dynamic standard commodity' weighted in terms of the rates of change of labor requirements of its component parts (1981: 104-105).

Pasinetti's price and profit solution has the remarkable feature of returning to a pure labor theory of value, in which the price of any commodity is the weighted sum of its constituent direct labor, indirect labor (used up constant capital), and 'hypot-indirect' labor (new fixed capital that expands productivity over time) (1981: 132). The measure of labor time is, in this case, the time lags involved in the build-up of capital equipment (Pasinetti, 1981: 132-33). Prices as pure labor values depend, however, on the restrictive assumption that profit rates are equal to sectoral rates of increase in per capita output (and consumption) (1981: 130). Profit must, in short, be equal to investment, which perfectly matches an exogenously determined rate of growth in production and demand. Pasinetti argues, in the fashion of Marx, that prices cannot be equal to values under capitalism due to the tendency for profit equalization (1981: 151).

He, too, falls prey to the 'vicious cycle' of sectoral development from which he began. In my view, a multisectoral dynamic model such as Pasinetti's 'natural system' is the proper foundation for a valid theory of price formation. That is, the transformation from values to prices needs to take into account both different capital/labor ratios between sectors, as in the static account, and different rates of investment in new capital.

This conception of price formation corresponds to the spirit of Classical political economy. I suggest the term prices of expanded reproduction to capture the dynamic element. That is, centers of gravity are now set by long run conditions of uneven growth in different industries, which are determined by the real terms of production, but in way that includes change. Unit costs (and behind them, labor time) are still the foundation for price formation, but in a way that combines both levels in the present and change over time. Surplus value is still generated from labor and reallocated among industries, not just in terms of already invested capital and its composition, but in terms of future build up of production in faster and slower-growing industries. Because of the latter, prices of reproduction are a third approximation to market prices.

Complications in the price calculations must necessarily arise in practice from relaxing certain simplifications in the model, of course. The tendency to profit equalization caused by weak competition will certainly cause measurable deviations from warranted profit rates, as capital is torn between equalizing returns on equal investments and promoting the rapid development of advanced sectors for faster accumulation. Luxury consumption from capitalist revenues will also inevitably distort
prices by a determinant amount (Paisinetti, 1981: 151), as we saw previously. The method of constructing vertically integrated sectors is a useful simplification that bumps up against the highly imperfect constitution of industries in practice, and may be questioned in terms of its correspondence to the meaningful bases on which technology develops; for example, microelectronics forms one of the most powerful angles of attack on product and productivity change today, yet cannot be meaningfully aggregated in terms of final commodities (Walker, 1984b; 1985).}

I wish to make two further modifications of Paisinetti's line of thought in light of our first principles about the capitalist economy (cf Harris, 1982). Paisinetti is thoroughly Ricardian in his 'naturalization' of the economy in the name of abstracting from actual social relations. This device, while useful for isolating the force of production, cannot be taken too far. First, he has no concept of surplus value, so wages, not profits, appear as the residual (1981: 140). While I agree that long-run wage increases are largely a product of technical progress, capitalist rates of growth across sectors or nations are affected as well by wage rates (absolute surplus value) and the resultant level of profits and reinvested funds. All the advanced capitalist countries have developed in good measure through wringing absolute surplus value from their workers at various places and times. Favorable wage and labor conditions have to be included in the parameters of sectoral growth, not just an abstract technology.

Aggregative wages and effective demand will also be a factor in the speed and sustainability of growth (Aghaleta, 1977; Harvey, 1982). Second, Paisinetti lacks a theory of capital circulation propelling growth. Capital accumulation corrects the expansion of real capital goods in the hands of certain people—not a circuit beginning with money (Paisinetti, 1983). As a result, investment is a curiously passive instrument, and there are no capitalist actors. Industry simply adjusts to the exogenous conditions of 'structural change', as the crucial variables 'unfold in full view' (Harré, 1982: 41). A model of an economy growing along a golden age equilibrium path has a rarified quality that does not help us capture the mechanisms for coping with the disequilibrium in the system.

Is it possible to retain the classical scheme of prices of (re)production where any attempt to create fixed equations involves an artificial freeze-frame of a system in motion? Some post-Keynesian theorists, such as Joan Robinson and David Levine, think not (Harcourt, 1981). There is too much flux, too much uncertainty. But this converts the unknowable into the inconsequent. The difficulty is to wrestle with a system in motion that is structural and yet indeterminate in its actual outcomes—a common problem in social science (Sawyer, 1984). We therefore need to abandon unduly ordered models for an assessment of the more rough and ready approach that capitalists actually practice—one that conveys uncertainty and the active role of capital investment head-on.

Investment and Dynamic Price-Setting

Investment plays a pivotal role in economic growth and thus in price formation. Investment has the basic function of moving capital from lower to higher profit opportunities. But it also acts as a means of unlocking competitive advantages and the growth potential in promising situations and of coping with the inherent uncertainty of competition and change. Investment is thus a key instrument in the hands of capitalists—which brings us full circle in our search for a dynamic theory of prices and profits.

The first role of investment is to realize the growth potential of various industries. Recall that in Paisinetti's model the condition of stable growth is that investment enlarge productive capacity at a rate consistent with the underlying warranted rate of expansion in each sector. In this view, the growth trajectory sets the rate at which a sector absorbs profitable investment—empirically, a very reasonable starting point (Jorgenson, 1971). The real growth rate thus becomes the rate of accumulation of capital. We require, of course, means by which such an outcome may be arrived at, such as adjustment of investment plans in light of the utilization rate of fixed capital (Duesen & Levy, 1986; Jorgenson, 1972). But even a dynamic adjustment model is not sufficient, for it assumes that investment does all the adjustment and the rate of technical change is exogenous and known.

Investment has a more forceful role to play than adding capacity according to known specifications; however: an indus-


tial growth potential must be actively unlocked by investment. Much has been said about the process of 'learning by doing' through experimentation, problem-solving and experience in production (Rosenberg, 1976; David, 1975). This idea has been used to attack the simple notion of technical change as 'embo-
died' in fixed capital. Nonetheless, learning and technical change in dynamic industries are never particularly 'disembo-
died,' either, because they must be backed up by resources, labor and fixed capital, in a continual interaction between investment and innovation. In short, the rate of technical change (or 'warranted growth rate', in general) is not known or ever
Investment rates are not established unambiguously by cost-benefit calculations. The capital-output ratio may vary because of changes in the structure of outputs, but the output-capital ratio is an ambiguous concept. The output-capital ratio varies with the size of the economic output, and the size of the economic output is determined by the productive capacity of the economy.

The size of the productive capacity of the economy is determined by the size of the labor force, the level of technological advancement, and the rate of growth of the labor force. The size of the labor force is determined by the number of people available to work, the average number of hours worked per person, and the average number of days worked per year. The level of technological advancement is determined by the level of investment in research and development, the rate of invention of new technologies, and the rate of diffusion of existing technologies.

The rate of growth of the labor force is determined by the rate of natural increase, the rate of migration, and the rate of labor force participation. The rate of natural increase is determined by the birth rate and the death rate. The rate of migration is determined by the difference between the number of people seeking employment in a particular region and the number of job opportunities available in that region. The rate of labor force participation is determined by the availability of jobs and the attractiveness of alternative forms of employment.

The size of the productive capacity of the economy is also influenced by the level of investment in physical and human capital. The level of investment in physical capital is determined by the availability of funds, the marginal efficiency of investment, and the expected rate of return on investment. The level of investment in human capital is determined by the availability of educational and training programs, the rate of skill formation, and the expected rate of return on investment in human capital.

The size of the productive capacity of the economy is also influenced by the level of technological advancement. The level of technological advancement is determined by the rate of invention of new technologies, the rate of diffusion of existing technologies, and the rate of adoption of new technologies. The rate of invention of new technologies is determined by the level of investment in R&D, the level of collaboration among researchers, and the level of government support for R&D.

The rate of diffusion of existing technologies is determined by the level of investment in training and education, the level of government support for training and education, and the level of competition in the market for new technologies. The rate of adoption of new technologies is determined by the level of investment in marketing and sales, the level of government support for marketing and sales, and the level of competition in the market for new technologies.

The size of the productive capacity of the economy is also influenced by the level of investment in infrastructure. The level of investment in infrastructure is determined by the availability of funds, the marginal efficiency of investment, and the expected rate of return on investment. The level of investment in infrastructure is also influenced by the level of government support for infrastructure development, the level of competition in the market for infrastructure services, and the level of technological advancement in infrastructure.

The size of the productive capacity of the economy is also influenced by the level of investment in natural resources. The level of investment in natural resources is determined by the availability of funds, the marginal efficiency of investment, and the expected rate of return on investment. The level of investment in natural resources is also influenced by the level of government support for natural resource development, the level of competition in the market for natural resources, and the level of technological advancement in natural resource extraction.

The size of the productive capacity of the economy is also influenced by the level of investment in social infrastructure. The level of investment in social infrastructure is determined by the availability of funds, the marginal efficiency of investment, and the expected rate of return on investment. The level of investment in social infrastructure is also influenced by the level of government support for social infrastructure development, the level of competition in the market for social infrastructure services, and the level of technological advancement in social infrastructure.
we may return to questions of industrialization in time and place with a clear mind. This was my original purpose.

I have tried to present the case for a Classical theory of production and growth in an unobtrusive way, without seeming merely eclectic. We need to bridge some of the channels that divide left economic theorists, in the spirit of the "revival of Classical political economy" now in process, through constructive dialogue among the Marxian, Ricardian and Keynesian traditions. "The neo-Ricardian" enthusiasts have reasserted the importance of putting production and distribution before price, and of the underlying production and consumption in an input-output system. Keynes and the post-Keynesians have insisted on the significance of investment in the accumulation of capital and of uncertainty about the future of business behavior. Other threads of the Classical heritage have also been recovered, with the help of Pasinetti and Schumpeter: the priority of change over fixing, of growing over weak competition, and of disequilibrium over profit equalization, and of technological change over distribution in the evolution of industrialization.

In the end, however, I still believe that Marxian theory provides the most thoroughgoing set of categories with which to approach the capitalist economy and its expansion. I do not read Pasinetti as a vindication of Ricardo but Robinson of Keynes, brilliant though their insights have been. This paper should not be treated as "arriving" at the conclusion that either technical change or investment is the answer to the price question. On the contrary, I have sought to build out a well-rounded model from the foundations laid down by Marx (though one could surely take all of this much further). To illustrate, the theory of value grounds prices in the conditions of production, and particularly in the central fact of social labor for human industry. The theory of surplus value explains the origin of profits as a surplus gleaned from social labor, and removes any illusions about zero profit margins. Efficiency is secondary to exploitation among the functions of the capitalist class. The theory of accumulation makes it clear that this is a system always in motion, for which equilibrium is anathema. The theory of circulation shows the way capital flows through the hands of capitalists as investment and back again. The theory of competition provides a specific mechanism for the urgency with which capitalists seek out new sources of surplus value. The theory of technical change (and relative surplus value) introduces the transformative power of industrialization, as capitalism unleashes the forces of production. Marx's theory of capital still offers the soundest approach to economic growth and decline in the contemporary capitalist world.

Surveys: Dynamics of value, price and profit

1. I would like to thank Gokhan Cagaptay, Michael Snape and Donald Harris (whom I am sure to mention for him) for guiding me along the line of thought developed in this paper. Thanks also to Shawn Huguet-Heyn and Jane Whitchurch for their editorial comments.

2. Unit costs have an unambiguous effect on prices in every empirical study. For an excellent discussion of the Classical center of gravity concept, and review of the empirical literature on price determination, see Snell (1984), especially chapter 2 and pp 69-76. It is doubtful that Keynes returned to a Classical formula of price based primarily on costs, despite Robinson (1979, and also Hauriou, 1981).

3. It is a well-established argument as to why labor is the best measure of value, see Fetter and Machlup (1981: ch 4).

4. Pasinetti and Machlup's (1983: 180-81) estimates put it very close to 2½, which was always Marx's working approximation, but their very rough measure of value added over wages is suspect. See also (Amades, 1981).

5. Joan Robinson has observed that "Piero Sraffa has always stuck close to post, unaltered Marx and views my attempts with suspicion" (Robinson, 1977: 566).

6. The reader can pass over this section and subsequent digressions without losing the thread. Such digressions are not a product of my wandering mind, however, but of real issues which have sent the debate on value, price and profit down side paths.

7. Steve Marglin (1984) has lately used a one-sector model in an effort to reconcile the Marxist emphasis on surplus value (interpreted briefly as the priority of the wage rate) and the Keynesian emphasis on investment demand as determining rates of profit and growth. The union is achieved by recourse to the rate of inflation as a critical mediator between the demands of workers for wage-increases and of capitalists for investment funds (accumulation). This is a very suggestive list of reasons, which allows for the "sell of money" to play an independent role in the class struggle over distribution. But I must persist in excluding money from the discussion here.

8. Many marxists reverse things by arguing that competition creates the drive to accumulate, basing their argument on a single line from Marx (1986: 1-592) and missing the larger argument of Volume I about the role of money and drive to accumulate capital.


10. Sraffa's formulation of price equation allows a misleading degree of freedom to wage and profit variation, compared with either the Marxian or Keynesian (Robinson, 1977).

11. The capital intensity of an industry (capital to output ratio) may or may not reflect the physical composition of capital, or degree of mechanization, as Pasinetti makes clear (1981: 181-88). Marx implies that development of the former implies growth of the latter, but, as it is well known, even "counter-tendencies" as the declining cost of capital goods