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RELATIVE PRICES AND INVESTMENT: AN ESSAY ON RESOURCE ALLOCATION

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RELATIVE PRICES AND INVESTMENT: AN ESSAY ON RESOURCE ALLOCATION*

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ABSTRACT

In this essay the mainstream story about how resources are allocated in a market economy is challenged. The conventional view is that a change in relative prices leads to a change in the composition of output as a result of a reallocation of the stock of primary factors of production (land, labor and capital). No investment is required. This is possible, however, only if the primary factors of production are homogeneous and hence highly mobile. If land, labor and capital are heterogeneous and specific to particular economic activities, resources will not be mobile and the ability of an economy to respond to price incentives will be highly dependent on the rate of investment in natural, physical and human capital. The argument is illustrated by considering the response of economic agents to changes in the relative price of annual and permanent crops, a change in agriculture's terms of trade, structural adjustment and trade liberalization in sub-Saharan Africa and systemic change from plan to market in the former Soviet Union.

"The time has come, the walrus said, to speak of many things: of shoes and ships and
sealing wax, of cabbages and kings."

Lewis Carroll

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1 INTRODUCTION

Deeply embedded in mainstream economics is a story about the price mechanism and resource allocation. This story has been told so often that few people question its accuracy and most regard it as self-evidently correct. The story is a simple one. Changes in relative prices act as signals to producers, indicating which products are now more profitable to produce and which are less profitable. Producers respond to these profit opportunities by increasing the output of the now more profitable products and reducing the output of the less profitable products. This change in the composition of output, in turn, is made possible by a reallocation of the primary factors of production, usually classified as land, labor and capital. No investment is required to increase output in the newly more profitable activities; all that is needed is a redeployment of the existing stock of productive resources. This redeployment of the stock of resources, moreover, occurs without any change in the level of employment or degree of capacity utilization.

The model is perfectly general. It can be used to explain the production decisions of an individual farmer as well as the allocation of resources in the global economy as a whole. Unfortunately, however, the model is misleading. It ignores the heterogeneity of the primary factors of production and consequently the key role played by investment in facilitating a change in the composition of output and allocation of resources. The model also has misleading policy implications, predicting a smooth reallocation of resources in response to changes in relative prices when in fact adjustment often is far from smooth and output frequently declines.

2 AGRICULTURAL PRICE REFORMS: FLAWS IN THE TEXTBOOK ANALYSIS

Bucolic examples often are used to illuminate the intuition behind the mainstream model. Imagine a farmer cultivating two annual crops, say, cabbages and lettuce. If the price of cabbages falls relative to the price of lettuce, at the beginning of the next planting season the farmer will decrease the amount of land used to grow cabbage and increase the amount of land allocated to the cultivation of lettuce. Labor, similarly, will be redeployed, more hours of work devoted to lettuce and less to cabbage. The farm implements, too, will be redeployed in favor of lettuce. Thus the stocks of land, labor and physical capital will continue to be fully used, but these productive resources will be allocated to slightly different uses, more resources being used to grow lettuce and fewer resources being used to grow cabbage. If all goes well, at harvest time the output of lettuce will have increased and that of cabbage will have declined and the farmer will have earned more profit in the process.

Notice that in this example land can easily be switched back and forth between one annual crop and another. Land suitable for cabbage is also suitable for lettuce; land suitable for wheat is also suitable for oats; land suitable for maize is also suitable for pasture, and so on. The same is true for labor. The skills needed to cultivate cabbage can also be used to cultivate lettuce, or any other crop that can be grown in the locality. In other words, labor is homogeneous. The same assumption applies to physical capital. That is, farm implements (a plow, a hoe, a machete) are multi-purpose and can be used to grow a number of different crops.

It is no accident that bucolic examples of cabbages, lettuce and the like have been used to explicate the mainstream model of resource allocation, for the implicit assumptions of homogeneous primary factors of production and mobility of the stock of productive resources fit this case fairly well. Indeed there is abundant evidence that in the case of annual crops farmers do respond to changes in relative crop prices and supply elasticities are positive and reasonably high.

The situation is rather different however when one considers 'permanent' crops, i.e., crops which continue to yield output for more than one year and usually for a number of years. Most permanent crops come from trees. Examples include tropical fruits (bananas, avocado, citrus fruit of many kinds), temperate climate fruit (apples, peaches, pears), beverage crops (coffee, tea, cocoa), nuts (almonds, pistachio, cashew) and industrial crops (rubber, palm oil, olives). Some permanent crops yield multiple harvests but are not tree crops. Examples include grape vines, sugarcane, and (in some countries) cotton. Trees harvested for timber yield only one crop, but they are 'permanent' in the sense that it takes many years after planting for the tree to become economically productive. Finally, many livestock yield multiple harvests over many years and hence also should be considered 'permanent', e.g., dairy cattle, sheep raised for their wool, cashmere goats.

Now imagine a farmer growing two permanent crops, for instance, oranges and avocado. If the price of oranges falls relative to the price of avocados, it is quite possible that there will be a negligible effect on the farmer's supply of oranges. Most costs of production are 'sunk costs', namely the cost of planting the orange grove, and variable costs may be very low, particularly in countries where wages are low. Hence despite the fall in the price of oranges, farm revenue may exceed variable costs and consequently production levels may be maintained. There may be some short run adjustments on the margin – less fertilizer applied, less careful pruning of the trees, less thorough harvesting – but there will be no major change in the allocation of land, labor and physical capital to the cultivation of oranges.

This argument is strengthened by the fact that a switch out of oranges to another crop will require major expenditure on uprooting the trees and preparing the land for an alternative use. This cost of reallocation of land is a form of investment and the farmer will not undertake the investment unless expected future returns produce a normal rate of profit. In the long run, of course, the farmer will move resources out of oranges if the price remains low, but this may not occur for many years and in an extreme case not until the orange trees end their productive life and cease to yield fruit. At that point, the farmer must make an investment decision, namely, whether to replant orange trees or use his land for something else, including urban development.

The higher price of avocados raises similar issues. Resources cannot simply be switched from oranges to avocados because orange trees can only be used to grow oranges. If the farmer wishes to grow avocados, he will have to plant avocado trees, and that requires an investment decision. The problem arises because of the specificity of part of the stock of natural capital, namely, the orange trees. Perhaps the farm land, labor and physical capital used to produce oranges can readily be reallocated to grow avocados, but the orange trees cannot be transferred to any other use. In other words, the specificity of natural capital implies that a reallocation of resources can occur only if there is some investment. Price signals alone cannot in this case lead to a reallocation of resources. No investment, no resource reallocation.

The amount of investment required may be considerable. Avocado trees, for example, do not begin to yield fruit for several years and it may be a decade before the volume of production is commercially attractive. Meanwhile, the income forgone by the farmer and his family will be large. Once the trees have reached maturity, however, they may produce bountiful harvests for many decades and this high yield combined with low variable costs means that output will not be responsive in the short run to changes in relative prices.

The empirical evidence supports this conclusion. In contrast to annual crops, the price elasticity of supply of permanent crops is very low. Resources are not reallocated smoothly in response to changes in relative prices. Indeed, the pattern of resource use may remain more or less unchanged for decades, unless there is a high rate of investment. This qualification contains the core of our argument: the ability to reallocate resources is highly dependent on the level of investment. Prices matter, but investment matters even more. Indeed the neglect of investment is the great flaw in the conventional story of how resources are allocated in a market economy.

This becomes especially evident when one considers the response of the agricultural sector to an improvement in its terms of trade, i.e., to a rise in agricultural prices as a whole relative to the price of non-agricultural products. The latter can include a decline in the price of material inputs used in agriculture (fertilizer and other agricultural chemicals, farm equipment, fuel) as well as a fall in the price of manufactured goods consumed in the countryside (clothing, footwear, bicycles). The change in relative prices acts as a signal to farmers to increase agricultural output in general, leaving the composition of farm output roughly unchanged. How might farmers respond?

First, land which at present is not cultivated could be brought into cultivation. Forests could be cleared, swamps could be drained, hills could be terraced. An increase in the area cultivated, however, almost always requires some investment in removing trees, digging drainage ditches, constructing terraces, etc. Without investment, it is difficult if not impossible to expand the total area under cultivation.

Second, farmers could attempt to reduce the amount of land in fallow, raising the cropping ratio by increasing the number of harvests in a given period of time. For example, one could try to grow two crops a year instead of one. An obvious way to do this would be to increase the area under irrigation and reduce dependence on rainfall. This, too, however would require investment in dams and irrigation canals, tube wells or other irrigation technologies.

Third, one could attempt to increase crop yields, i.e., the amount obtained and marketed from any given harvest. This might be possible by applying larger doses of fertilizer, pesticides or herbicides; by employing more labor to prepare the fields, weed the plants and harvest the crop; by introducing yield increasing capital equipment (as opposed to labor saving machinery); or by reducing post-harvest losses by introducing improved transport, storage and processing facilities. More intensive cultivation of the land, however, requires more working capital and possibly more fixed capital as well. The same is true of improvements in post-harvest treatment of the crop.

In other words, the response by agriculture to an improvement in the sector's terms of trade depends heavily on the level of investment. This is true whether the response takes the form of increasing the area cultivated, raising the cropping ratio or increasing crop yields. In all

three cases, more investment will be necessary. In the absence of investment, the supply curve of the agricultural sector is likely to be highly inelastic. It simply is not possible to increase agricultural output as a whole by reallocating primary factors of production from the non-agricultural sector. Indeed the empirical evidence consistently shows that the short run response of agricultural output to a change in the terms of trade is positive but very low.

China and Vietnam are exceptions that illustrate my argument. Both countries introduced a series of agrarian reforms, beginning in 1979 in China and 1989 in Vietnam. In both countries there was a substantial improvement in the agricultural terms of trade in the early years of the reform and this change in relative prices created strong incentives to increase production. Crucially, in both countries investment was high (and rising), gross capital formation being about 35 per cent of GDP in China in the 1980s and about 30 per cent of GDP in Vietnam in the 1990s. These high rates of aggregate investment made it possible for agriculture to respond to the favorable price incentives and for a decade after the beginning of the reforms, agricultural growth rates were exceptionally rapid, namely, 5.9 per cent a year in China (1980-90) and 4.2 per cent a year in Vietnam (1990-2002). It was the flow of investment that made the difference, not a reallocation of the stock of natural, physical and human capital.

Investment also is the key to understanding the distributional implications of changes in relative prices. All price changes benefit some people and harm others, and hence alter the distribution of income, but the magnitude of the effects is sensitive to whether or not price changes occur in an environment in which high levels of investment encourage a rapid reallocation of resources and change in the composition of output.

Many countries, for example, have introduced agricultural price reforms which include an increase in prices of cereals and other food crops produced by peasant farmers. Higher food prices obviously benefit food producers with a marketable surplus, but they harm those who buy their food in the market, including landless agricultural wage workers, deficit food growers and farmers cultivating non-food crops. If supply elasticities are low, as they are likely to be in the absence of investment, large numbers of rural people (and the urban population as well) may become impoverished by the food price reforms.

On the other hand, higher food prices create an incentive to increase the production of food crops. Farmers already growing food crops will have an incentive to intensify production by investing in irrigation, applying more fertilizer, etc. Farmers growing non-food crops will have an incentive to switch part of their land to food crops, but as we have seen, this may require some investment. There will also be an incentive to increase the area under cultivation and devote the newly cleared land to cultivating food crops. This, too, however will require investment. If investment does in fact occur and food production increases, the demand for labor is likely to rise, pushing up wage rates and creating more days of employment, and thereby reducing poverty. In other words, the same price change – an increase in the relative price of food – can have completely different effects on poverty and inequality depending on whether investment is forthcoming and resources are in fact reallocated. In one case, for example, real wages fall while in the other case real wages rise.

So far we have been talking about investment in rather general terms, but in actuality some people may be able to invest and choose to do so while others may be unable to invest even if they have a strong incentive to do so. Suppose, for example, a new technology comes along which increases the yields of rice and wheat and which potentially is profitable to farmers. Some farmers may adopt the new technology immediately, some may do so only after

a lag of two or three years and some may never adopt the technology. What accounts for these differences in response to a profit opportunity?

First, there may be differences in access to knowledge about the new technology. It is not unusual, for instance, for agricultural extension agents to concentrate their efforts on large farmers (where they can have a significant impact on production) and neglect small farmers. The large farmers thus adopt the technology first and appear to be more 'progressive' while small farmers lag behind and appear to be risk averse and 'traditional'. Second, the profitability of the new technology will depend in part on the availability of infrastructure (such as irrigation) and roads (which affect transport costs and access to markets). If large farmers are better placed in terms of infrastructure and markets than small farmers, as is often the case, then large farmers will invest more heavily in the new technology than peasant cultivators.

Third, the new technology may require more working capital than the older technology. The new technology may be more intensive in the use of chemical fertilizer. This, in turn, may contribute to greater infestation by weeds, which will require more labor for hand weeding or the use of herbicides. If the new varieties of rice and wheat are grown in pure stands, this increases the likelihood that pests will increase and spread rapidly, which will then increase the need to spend more money on plant protection, such as insecticides. Those who have access to credit can obtain working capital by borrowing and thus will be able to adopt the new technology. However those who do not have access to credit or must rely on the informal credit market and pay a high rate of interest may not be able to adopt the new technology at all or may not be able to afford the entire 'package' of fertilizer-herbicides-insecticides. The latter will therefore become 'partial adopters'. Since large farmers are less likely to be constrained by a lack of credit, they will tend to be adopters, whereas small farmers constrained by a lack of credit, will tend to be non-adopters or partial adopters.

In a stratified farming system, the resulting pattern of investment across farms of different size will tend to accentuate inequalities in the distribution of income. Even worse, those who are slow to adopt the new technology or are non-adopters may experience an absolute decline in their real income. Those who are first to adopt the new technologies will reap the full benefits of their investment: yields will rise and both output and input prices will initially remain unchanged, thus ensuring a substantial increase in profit. If the early adopters are large farmers, their investments will result in a substantial, i.e., non-marginal increase in output. This is likely to lead to a fall in output prices. The laggards will therefore receive smaller gains, the rise in yields being partially offset by the fall in market price. The non-adopters will experience no rise in yields, but they will experience the fall in the market price of grains, and this will reduce their real income absolutely. If the early adopters bid up the price of material inputs such as fertilizer, this will further erode the net benefits of the laggards and further reduce the real income of the non-adopters, assuming they use some fertilizer on their crops.

The mainstream analysis of relative prices and resource allocation thus has serious flaws, even in describing behaviour of producers in the agricultural sector. The stock of primary factors of production cannot be easily reallocated from one productive activity to another because of the heterogeneity and specificity of part of the stock of natural capital. A change in the allocation of resources is heavily dependent on the rate of investment. The lower is the rate of investment, the harder it will be for farmers to change the composition of output in response to a change in relative prices. The impact of investment on output and resource

allocation is fairly straightforward. Its impact on the distribution of income is more ambiguous. In some cases investment may reduce inequality, e.g., if it increases the demand for labor and wage rates. In other cases it may increase inequality, e.g., if larger farmers are in a better position to invest than small farmers.

3 TRANSITION AND STRUCTURAL ADJUSTMENT: THE ACHILLES HEEL OF GLOBALIZATION

One of the characteristics of most physical capital, including the plant and equipment used in the industrial sector, is its specificity. Once finance capital is transformed into physical capital, there are severe limitations on the use of that capital. A shipyard cannot be converted into a shoe factory. A cement plant cannot be converted into a textile mill. A copper mine cannot be converted into an electronics assembly plant. If one wishes to increase the production of shoes, clothing and television sets, one will have to invest substantial amounts of money. True, in a few cases factories can be converted to alternative uses. For instance, an assembly line used to produce tanks can be converted to produce trucks, but even in this case, the conversion will require substantial investment. In general, swords cannot be converted into ploughshares without investment.

Adam Smith and his famous example of the pin factory taught us that economic progress occurs as a result of specialization and division of labor. Specialization, however, is likely to be accompanied by the use of plant and equipment which is designed for a specific purpose and which cannot readily be adapted to other purposes: the capital necessary to make shoes cannot readily be adapted to make ships. It makes no sense, then, to think of capital as akin to putty clay which can be represented in aggregate by a capital K . Similarly, division of labor is certain to be accompanied by the accumulation of specific skills peculiar to each occupation. That is, human capital also will become heterogeneous and one type of human capital may not easily be substituted for another type of human capital. A skilled shoemaker cannot readily be transformed into a skilled shipbuilder. If the change in relative prices signals that profits can be increased by transferring resources from shoemaking to shipbuilding, this will have to occur by channeling part of the flow of investment into shipbuilding and by training or retraining workers in the multiple skills needed in the shipbuilding industry. It cannot be done by reallocating the stock of capital K and the stock of labor L from one industry to another.

Neglect of the specificity of physical and human capital has undermined economic reforms in a large number of countries. For example, many countries in sub-Saharan Africa, under the label of structural adjustment, have been urged to reduce industrial protection and open their economies to international competition. The expectation is that a radically new set of relative prices would rapidly emerge and that this new set of relative prices would lead to a shift of resources out of the heavily protected manufacturing sector in favor of mining, plantation agriculture and food production, in which Africa is assumed to have a comparative advantage. This change in the composition of output would constitute structural adjustment and structural adjustment, in turn, would increase allocative efficiency and average incomes.

The results, however, were rather different from what was expected. In those countries which adopted the price reforms, relative prices did indeed change. Increased competition from abroad did result in lower prices of manufactured goods, larger imports and a reduction in output in the domestic manufacturing sector. All of this is consistent with the mainstream

story about resource allocation. The problem is that the resources used in the manufacturing sector were not transferred to other activities where they could be used more productively. Instead much of the stock of capital in the manufacturing sector simply became idle. Capacity utilization declined and there was little reallocation of the stock of physical capital.

Some of the labor formerly employed in the manufacturing sector also became idle, raising the urban unemployment rate and increasing poverty. Some of the labor was absorbed in the urban informal sector, increasing the number of self-employed and driving down the productivity of labor and real incomes among informal sector workers. Some of the labor dismissed from the manufacturing sector retreated into agriculture where, again, they lowered the productivity of labor and the real income of farmers and agricultural wage workers. The composition of output changed as the mainstream story predicts, but this occurred not as a result of a reallocation of primary factors of production but because of the collapse of industrial output.

Structural adjustment failed in sub-Saharan Africa not because the change in relative prices was in principle undesirable but because low rates of investment made it impossible to expand output in those sectors which became more profitable as a result of the change in relative prices. For example, one study of sub-Saharan Africa in the period 1980 to 1994 showed that in 14 of the 31 countries for which data were available, the rate of growth of investment was negative, i.e., the stock of capital fell. In 23 out of 33 countries, the average capital-labor ratio fell and in 21 out of 33 countries, the average productivity of labor declined.¹ In such circumstances, the sharp changes in relative prices necessary to bring about structural adjustment are likely to result in stagnant aggregate output, falling average incomes and increased poverty. The price mechanism, in the absence of high rates of investment, cannot induce a reallocation of resources, greater efficiency and an improved standard of living.

This lesson from Africa was repeated on a massive scale after the collapse of the Soviet Union beginning in 1989. The 15 successor states embarked on a process of systemic change, trying to effect a transition from a centrally planned economy, where resources were allocated by administrative measures, to a market-guided economy, where the price mechanism is used to provide incentives to reallocate resources. The precise situation at the time of transition varied from one successor state to another, depending on the endowment of natural resources, the size and composition of the industrial sector and the distribution of knowledge, skills and experience among the labor force.

All of the successor states of the former Soviet Union, however, to a greater or lesser degree, adopted a similar transition strategy known as 'shock therapy'. One of the central elements in the shock therapy approach was rapid price liberalization in an attempt to create as quickly as possible a well functioning price mechanism that would reallocate resources, allow the successor states to exploit their comparative advantages, increase efficiency and raise living standards above those that prevailed at the end of the period of central planning. In general, depending on the particular circumstances in each country, price signals were expected to push resources out of heavy and intermediate industrial goods towards consumer goods industries, extraction of natural resources (mining, oil, natural gas) and in a few cases, agriculture (including forest products).

In practice, the results of shock therapy were bitterly disappointing.² Prices were indeed liberalized, but output declined sharply, industrial plants became idle, unemployment increased, average living standards fell, inequality in the distribution of income rose and the

number of people living in poverty increased dramatically. Industries which became unprofitable at the set of relative prices that emerged during the transition simply shut down, their equipment often being sold for scrap value. Because of the specificity of physical and human capital, it was not possible to transfer smoothly the stock of resources from the unprofitable to the newly profitable activities. As profits and wage incomes in the unprofitable industries declined, a downward multiplier process was created which damaged even the potentially profitable industries. Industrial decay spread quickly, dismissed industrial workers sought refuge in the informal sector and in crime, drugs and alcohol. Many workers were absorbed by the agricultural sector and in fact agriculture's share of GDP and employment tended to rise while the productivity of labor in agriculture fell and aggregate production fell sharply. Even as late as 1997, GDP was still below the pre-transition level of output in all 15 of the successor states.

The key to understanding what went wrong is the level of investment. The multiplier-induced downward spiral of incomes and aggregate demand reduced the incentive to invest. Lack of investment made it difficult to maintain full employment and expand production in potentially profitable businesses. Indeed, unlike in China and Vietnam, the share of investment in GDP actually declined, and because GDP itself was falling, this implied that the absolute level of investment declined precipitously. In some countries, net investment almost certainly was negative, i.e., the stock of physical capital actually shrunk. The result is that unprofitable sectors contracted while potentially profitable sectors failed to grow or grew only slowly. The change in relative prices did not lead to a change in the allocation of resources in the way predicted by the mainstream story. The reason is that the mainstream story leaves investment out of its account, yet it is investment that in the end determines the pattern of resource use.

If structural adjustment in Africa and the transition from plan to market in the ex-socialist countries are acts in the drama of globalization, then investment is the Achilles heel of globalization. Disappointing performances in sub-Saharan Africa and in the former Soviet Union do not reflect a failure of the price mechanism to provide accurate signals, they reflect an inability of the economy to respond to price signals. The mainstream story says that economies respond to price incentives by reallocating the stock of primary factors of production from less profitable to more profitable activities. But this normally is not possible because of the heterogeneity of natural, physical and human capital. Resources are reallocated by redirecting flows of resources, channeling new investments into the more profitable activities along with workers with newly acquired skills and knowledge. What is needed, then, is a price mechanism to provide incentives and a high level of investment to enable the economy to respond to incentives. To talk about relative prices while ignoring investment is to tell only half the story.

4 CONCLUSIONS

Three different stories can be told about how economies change the composition of output and the pattern of resource use. First, there is the story told by mainstream economists. According to this story, when relative prices change, incentives are created to alter the composition of output. The economy responds to these incentives by sliding along a 'production possibilities frontier', reducing the output of the now less profitable product and increasing the output of the more profitable product. This is achieved by shifting part of the stock of homogeneous land, labor and capital from one activity to the other, all the while maintaining full employment of labor and full capacity utilization of land and capital. The analysis is static and the changes in resource allocation and the composition of output are once-for-all. The economy quickly settles down to a new equilibrium.³

A second story can be told which has a more Keynesian flavor. If there is a substantial change in relative prices – for example, after the creation of NAFTA or during a period of structural adjustment in sub-Saharan Africa or during the period of transition to a market economy in the former Soviet Union – those industries which are now unprofitable will shrink in size and perhaps shut down. Unemployment will rise and excess capacity will appear. The decline in wage incomes and profits will trigger a multiplier contraction of aggregate demand and this, in turn, may lead to a collapse of investment. The economy enters into a downward spiral. The resources of labor and capital formerly employed in the newly unprofitable industries cannot be reemployed in the newly profitable industries because they lack the required skills (in the case of labor) and the required characteristics (in the case of plant and equipment). That is, the heterogeneity of labor and capital makes it difficult and sometimes impossible to convert productive resources from one use to another. The idled resources are in effect unemployable. The economy moves inside its 'production possibilities frontier'; average income falls and inefficiency in the use of resources rises. The composition of output changes in the 'desired' direction, but this occurs because the unprofitable industries decline without an offsetting expansion of the potentially profitable industries.

The third story has a Schumpeterian flavor with perhaps a bit of Marx. In this story relative prices share star billing with investment, be it investment in human capital, natural capital or physical capital. A change in relative prices creates incentives to expand output in some industries and to reduce output in others. Because of the specificity of all forms of capital, however, the stock of productive resources cannot be moved from one activity to another. Flows of investment, in contrast, can respond to price incentives. That is, net additions to the stock of physical capital can be directed by investors towards the most profitable industries, labor can be trained or retrained so that they have the skills required for employment in the most profitable activities and farmers can invest in the land so that they can take advantage of new opportunities. Entrepreneurship, innovation and investment by the private sector and the state must be present for the economy to be able to respond to price signals.

Those economies that contrive to have high rates of investment will be able to exploit the opportunities created by changes in relative prices whereas those economies which have a low rate of investment will not, or at least will be at a severe disadvantage. The accumulation of natural, physical and human capital can be represented as causing an outward shift of the 'production possibilities frontier' rather than as a movement along it. That is, changes in the composition of output and the pattern of resource use occur as part of the process of growth.

Countries, in effect, grow out of inefficiency and grow into efficiency. They do not reallocate the stock of primary factors of production; they allocate the flows of investment.

In the mainstream/neoclassical story investment plays no role in resource allocation because the three primary factors of production are assumed to be homogeneous and hence one bit of capital (or labor or land) is a perfect substitute for another bit. This ensures that resources are highly mobile and the composition of output can change without the need for investment.

The other two stories are closer in spirit to the classical tradition in economics in which investment, or its absence, plays a prominent role in the allocation of resources. Indeed in the Keynesian story it is the lack of investment that thwarts the operation of the price mechanism. Resources are not highly mobile and consequently changes in relative prices can lead to unemployment of labor and unutilized capacity.

In the Schumpeterian/Marxian story the specificity of all forms of capital reduces the mobility of resources. It is the level of investment that determines the flexibility of an economy and its ability to respond to changes in relative prices. Economies with low levels of investment will be unresponsive to price signals whereas economies with high levels of investment will react quickly to price changes and to the opportunities created in a market economy. In the Schumpeter/Marx vision, then, accumulation in the broadest sense occupies a central position. It is the volume and composition of incremental additions to the stock of productive resources that matters. The flow of investment simultaneously determines the rate of growth of the economy, the composition of output and pattern of resource allocation. Relative prices act as signals to investors, but it is the investment decision, not the price signal, that determines how resources in fact are allocated.

NOTES

1. The data are from Keith Griffin, "Macroeconomic Reform and Employment: An Investment Led Strategy of Structural Adjustment in Sub-Saharan Africa," in Terry McKinley, ed., *Macroeconomic Policy, Growth and Poverty Reduction*, New York: Palgrave, 2001.
2. See Keith Griffin, *Studies in Development Strategy and Systemic Transformation*, Ch. 6, London: Macmillan, 2000.
3. It could be argued that the mainstream theory is more sophisticated than I allow and can accommodate specificity in the factors of production. The problem arises, according to this view, because students are taught a naïve version of mainstream theory and policy makers are strongly influenced by the naïve version. My view is that heterogeneity and specificity are introduced as minor qualifications to the mainstream theory whereas they ought to be treated as fundamental features of the analysis.



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