Policy-Induced Changes in Income Distribution and Profit-Led Growth in A Developing Economy

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1 Introduction

In the post-Keynesian/Kaleckian growth literature, the central emphasis while examining the growth process of an economy lies in the generation of demand. Demand in the economy is the sum of consumption, investment, budget deficit and trade surplus. In the absence of budget deficit and trade surplus, dynamics of consumption and investment explain the growth path of the economy. Consumption is described by the classical savings assumption wherein the entire wage income is consumed and a fixed proportion of the profits is saved, wage and profit being the only income categories. On the other hand, investment is assumed to be a function of demand in the economy.

In this set up, a worsening of income distribution is expected to cause stagnation in the economy. This is because, according to Kalecki (1971), investment in any given period depends upon decisions taken in previous periods and these decisions depend upon the level of demand in the previous periods. Since the entire wage income is consumed, investment generates savings out of profit equal to itself in the equilibrium. If profit share is fixed by the 'degree of monopoly' then the fixed level of investment determines the level of output. If income distribution worsens, due to an increase in the 'degree of monopoly', then in the equilibrium output level would be less than what it would be in case there is no change in the income distribution. Since the output is less than what it would be without worsening of distribution, investment in the next period would be less too.

Bhaduri and Marglin (1990) pointed out that the profit rate can be decomposed into the profit share and capacity utilization, where the latter indicates the level of demand. They proposed that the investment rate in the economy is a function of both profit share and capacity utilization. In the case where sensitivity of investment

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rate to profit share is greater than that of the savings rate, capacity utilization in the economy increases with increase in the profit share. They term this as the *exhilarationist* regime contrary to the *stagnationist* regime where the opposite happens. However, as pointed out by Rowthorn (1982) and Dutt (1984), if income distribution is fixed, we will expect that an exogenous increase in the profit share will decrease the growth rate due to the resulting fall in consumption out of wages. Moreover Blecker (2002) using linear and Cobb-Douglas specifications for Bahduri and Marglin's investment function has pointed out that *exhilarationism* either do not arise or arise only under extreme elasticity assumption on the investment function.

Over the last three decades most of the developing countries have adopted a more or less universal set of economic policies, often known as the neo-liberal policies. These policies aim at liberating the market from government intervention so as to achieve allocative efficiency. Therefore a particular significance is attached to restricting the size of budget deficit. Many economists have argued that this has resulted in worsening of income inequality in these countries. Assuming this to be true, the post–Keynesian/Kaleckian growth literature then seems to suggest that these economies would stagnate unless they managed to continuously increase their trade surplus. However some of these economies have put up very decent growth performance in the face of decreasing budget deficits. At same time failing to consistently maintain trade surplus and even have experienced increasing trade deficit. The post-1991 Indian growth experience, particularly the last decade, being a stand out example.

Kalecki (1971) argued that technological innovation is one major factor which can sustain the growth process. Technological innovation not only leads to obsolescence of old machinery and plants leading to their replacement by new ones but also provides a strong stimulus for investment by opening up new investment opportunities. In fact he argued that the impact of a steady stream of innovations on investment is comparable with the impact of a steady increase in profit because both give rise to "certain additional investment decisions".[1] He also emphasized that despite this demand-stimulating nature of technological innovation, there is no guarantee that the degree of utilization of resources stays at a constant level.

Patnaik (2007) have argued that in developing countries the richer section of the population aspire to match the consumption standards of the developed countries. As income distribution worsens, they are in a position to afford more and more of goods consumed in the developed countries. With increase in demand for goods consumed in developed countries, the incentive of firms to produce such goods, by imitating foreign production techniques, also increases. Thus he argues that growth and technological change in the developing countries are induced by the growing demand of the richer section of the population to consume goods available in the advanced countries as a result of increase in inequality. Patnaik terms this process as 'structural-cum-technological' change. He however concludes that though it is possi-

[1] Kalecki (1969), pp. 58

ble for such developing countries to experience high rates of but the growth process is highly unstable and any sufficiently strong negative shock to investment can take the economy to a state of stagnation.

In this paper we first show that a developing country can experience a positive equilibrium growth rate of investment and surplus as long as – investment in the economy is responsive to the aspirations of the richer section of the population to match the consumption level of the developed world and imitation of foreign production technology is not very expensive. Unlike Patnaik (2007), the growth process need not be unstable but rather can be stable under certain conditions. Moreover worsening of income distribution is not required to sustain this kind of growth process but a sufficiently unequal initial distribution of income is enough to propel it. Next, we show that the technologically dynamic sector producing for the rich is incapable in generating much employment. If the process is accompanied by no change in the distribution of income then the employment share of the the technologically stagnant sector producing for the poor increases at the cost of declining growth rate of real wage. In case the growth process is accompanied by an exogenous policy-induced worsening of the distribution of income then the high and stable equilibrium growth rate of investment is associated with an increasing growth rate of output and the growth rate of employment for the entire economy might decline.

As for the structure of the paper, in the next section we describe the major assumptions of our model. In section 3 and 4, we discuss the existence and local-stability of a positive equilibrium growth rate of investment respectively. In section 5, we consider change in income distribution caused by changes or shifts in the economic policy paradigm/regime, for example the government adopting neo-liberal reforms or becomes more mindful of equity consideration. We consider regime changes which either worsen (by increasing profit share) or improves (by decreasing profit share) over a period of time. We discuss the impact of such change in the distribution of income on the growth rate of output along the equilibrium growth path of investment. In section 6, we discuss the implications for growth rates of employment and labour productivity in the economy. And finally section 7 contains concluding remarks where we summarise and discuss the results.

2 Model

Consider a closed economy model with no government budget. This economy is neatly divided into two classes- capitalists and workers. The capitalists own all the means of production, i.e. capital. They carry out production by combining their capital with hired labour in order to earn profit. The workers have only labour which they sell to the capitalists in return for wages. The capitalists and the workers consume entirely different goods. The workers consume a subsistence good whereas the capitalists consume a variety of luxury goods but not the subsistence good. Luxury goods are defined to be goods which have been developed in the advanced countries and are initially available for consumption only in these economies. These luxury goods are substitutes to each other in the sense as new luxury goods are introduced in the market the old tend to disappear because their demand falls. We assume that luxury goods are made available in this economy only through imitation of foreign production technologies.

There are two sectors in the economy- the luxury sector and the non-luxury sector. In the luxury sector, luxury goods for the capitalists and investment goods required to produce luxury goods are produced. Similarly in the non-luxury sector, the subsistence good for the workers and the investment goods required to produce the subsistence good are produced. There is no technological progress in the non-luxury sector. On the other hand, following Patnaik (2007), we assume that the production technology associated with new luxury goods are more labour saving. Over time, goods with more sophisticated technologies and higher labour productivity are introduced in the advanced countries.[2] We will assume that there exists a ranking of the luxury goods that are introduced in the economy under consideration, such that the production techniques of newer luxury goods are associated with higher labour productivity.

2.1 Consumption and savings

The workers spend all their wages on the consumption of the subsistence good. The capitalists consume a part of their profit and save the rest. We assume that the level of consumption out of profit increases not only when the level of profit increases but also when, given a level of profit, more and more new luxury goods make their way into the market. In other words, we assume that consumption out of profit is directly related to both the level of profit and the rate at which new luxury goods are introduced in the market.

We will assume that the faster is the rate at which new luxury goods are introduced in this economy, the higher is the rate of change in the labour productivity of the luxury goods sector, $\dot{a}$. This is because if at any point of time new luxury goods are introduced at a faster rate then at that point of time the proportion of new luxury goods demanded and produced would be greater compared to a situation where there is a slower rate of introduction of luxury goods. Labour productivity of the luxury goods sector, a, will increase at a higher rate because one, a faster rate of introduction means that there are more new luxury goods with higher labour productivities are produced. And two, since the luxury goods are substitutes in the sense described above, the output share of old luxury goods is smaller when new luxury goods are introduced at a faster rate compared to a slow rate. Thus we use the rate of change in the labour productivity of the luxury goods sector to proxy the rate at which new luxury goods are introduced in the market.

[2]Labour productivity is defined as value of output per unit labour. Values are expressed in terms of the subsistence good, which is assumed to be the numeraire.

We can therefore describe consumption out of profit, C, by the following function,

$$C = C(\Pi, \dot{a}) \tag{1}$$

with $0 < C_\Pi < 1$ and $C_{\dot{a}} > 0$, where Π is the level of profit, $\dot{a}$ is that rate of change in the labour productivity of the luxury sector which proxies for the rate of introduction of new luxury goods. Since workers do not save, savings for the economy is given by

$$S = \Pi - C(\Pi, \dot{a}) = S(\Pi, \dot{a}) \tag{2}$$

with $0 < S_\Pi < 1$ and $S_{\dot{a}} < 0$.

2.2 Investment

Net investment in this economy is assumed to depend on the current level of profit and the rate at which new luxury goods are introduced in the market. A high current level of profit is the predictor of a high future level of demand in the economy and also a high level of profit eases the financing constraints on the capitalists' decision to invest.[3] Therefore, we assume investment in the economy to positively depend on the current level of profit.

The relationship between the rate at which new luxury goods are introduced and investment is ambiguous and depends on the ease with which firms can imitate the production techniques of the new goods.[4] Given our assumptions about consumption demand out of profit, a higher rate of introduction new luxury goods into the market is associated with more opportunities to invest for the firms and all firms would like to invest at a higher rate in the production of new luxury goods.

On the other hand, if cost of imitation is very high, say due to strict enforcement of intellectual property rights, then at any point of time only a few firms will invest in the production of new luxury goods. Since we have assumed that as new luxury goods are introduced in the market older ones tend to disappear, firms producing old luxury goods, unable to get access to production techniques of the relatively new luxury goods, will hold back new investment on their existing plants and let their capital stock depreciate. Moreover if some of the old luxury goods are forced out of the market as new luxury goods are introduced, firms producing these goods will have to shut down in case they can not imitate production technology of new luxury goods.

Thus investment in the economy, I, is given by the following function,

$$I = I(\Pi, \dot{a}) \tag{3}$$

with $I_\Pi > 0$ where I_Π, while there is no restriction on the sign of $I_{\dot{a}}$. $\dot{a}$ in (3) is again the proxy for the rate of introduction of new luxury goods.

[3] Kalecki, M. (1969)

[4] Henceforth by investment we mean net investment.

2.3 Technological change in the luxury goods sector

Technological change in the luxury goods sector is endogenously driven by the growth of profit in the economy. Any increase in the growth rate of profit in the economy impacts both the demand and supply of luxury goods. On one hand, increase in the growth rate of profit increases the incomes of the profit earners at a faster rate. Thus their ability to consume at the high-end of the goods available in the developed world increases at a faster rate.[5] On the other hand, the ability of the firms to meet the cost of imitation also increases at a faster rate as the growth rate of profit increases. Therefore when the growth rate of profit increases it becomes profitable to introduce more of the high-end goods available in the developed world. The high-end goods in the developed world are associated with higher labour productivities than the existing luxury goods in this economy. This combined with our assumption that the old luxury goods tend to disappear from the market with the introduction of the new luxury goods, implies that the labour productivity of the luxury goods sector tends to increase at higher rates.

The current technological capablities of firms in the economy are commensurate with the technological requirements of the existing luxury goods being produced within the economy. It is reasonable to assume that as one moves up the hierarchy of goods being produced in the advanced countries, technological requirements of production become more sophisticated compared to the current technological capabilities of firms in the economy. Thus as more and more new luxury goods are introduced in the economy at a point in time, the actual cost of imitation and introduction of additional new luxury goods increases. Therefore we assume that at any point of time, the rate of growth of labour productivity of the luxury goods sector in this economy increases with an increase in the growth rate of profit but at a decreasing rate. This relationship between the growth rate of labour productivity in the luxury goods sector, g_a and the growth rate of profit is given by the following equation.

$$g_a = \phi(g_\Pi) \tag{4}$$

with $\phi(0) = 0$ and for all $g_\Pi \in [0, \infty)$, $\phi(g_\Pi) \geq 0$, $\phi'(g_\Pi) > 0$ and $\phi''(g_\Pi) < 0$.[6]

[5] Patnaik (2007)

[6] Patnaik (2007) assumes that the growth rate of labour productivity is an increasing convex function of the growth rate of investment, which in turn is an increasing function of the growth rate of profit. It is argued that in a developing economy where technology is just imitated from abroad, there is no given set of knowledge to be progressively used up but rather with increasing investment more investments in new projects will be taken up. This we feel implicitly assumes that as the economy moves up the hierarchy of goods in the developed economies at any point of time, the cost of moving from one step to the next in the hierarchy goes down. Since at any given point in time, the technological capabilities in the economy are fixed, it is difficult to believe that at the margin the cost of introducing new luxury goods will go down. Therefore we think $\phi''(g_\Pi) < 0$ to be a more plausible assumption than $\phi''(g_\Pi) > 0$.

2.4 Demand-induced changes in the growth rate of profit

Whenever investment in the economy is greater than savings, either price adjustment happens which raises the share of profit in output leaving output level constant or the level of output increases leaving share of profit in output unchanged or both the adjustments happen simultaneously. In this model we assume that the profit share is a policy determined exogenous parameter. Therefore any excess of investment over savings will increase output in the economy. Since profit share is constant in the absence of policy changes by the government, increase in output will increase the level of profit. Similarly when investment is less than savings, the level of profit will fall and when investment is equal to savings, the level of profit will remain unchanged. This process of change in the level of profit due to mismatch between investment and savings is conveniently captured by the following equation.

$$(\dot{\ln \Pi}) = \alpha[\ln(\frac{I}{S})] = \alpha(\ln I - \ln S) \tag{5}$$

where α is a positive constant.

Differentiating equation (5) with respect to time we get,

$$\dot{g_\Pi} = \alpha(g_I - g_S) \tag{6}$$

where $\alpha > 0$ and $\dot{g_\Pi}$ is the rate of change in g_Π the growth rate of profit, g_I is the rate of growth of investment and g_S is the rate of growth of savings.[7] From (2) and (3) growth rates of savings and investment are

$$g_S = \sigma_{S,\Pi} g_\Pi + \sigma_{S,\dot{a}} \frac{1}{\dot{a}} \frac{d\dot{a}}{dt} \tag{7}$$

and

$$g_I = \sigma_{I,\Pi} g_\Pi + \sigma_{I,\dot{a}} \frac{1}{\dot{a}} \frac{d\dot{a}}{dt} \tag{8}$$

respectively. $\sigma_{i,j}$ is elasticity of i with respect to j where $i = I, S$ and $j = \Pi, \dot{a}$. $\sigma_{S,\Pi} > 0$, $\sigma_{S,\dot{a}} < 0$ for $\dot{a} > 0$ and $\sigma_{I,\Pi} > 0$. $\sigma_{i,j}$'s are assumed to be constant throughout.

Substituting for g_I and g_S from (7) and (8) in equation (6), we obtain

$$\dot{g_\Pi} = \alpha(\sigma_{I,\Pi} - \sigma_{S,\Pi}) g_\Pi + \alpha(\sigma_{I,\dot{a}} - \sigma_{S,\dot{a}}) \frac{1}{\dot{a}} \frac{d\dot{a}}{dt} \tag{9}$$

[7] Bhaduri (2006) uses a general form function, instead of the natural logarithm function used in our model, to derive an expression for the rate of change in the growth rate of ouput, $\dot{g_Y}$, similar to equation (5), i.e., $\dot{g_Y} = \alpha[g_I - g_S]$ with $\alpha > 0$ by assuming that any mismatch between investment and savings gives rise only to output adjustments. However to get the expression $\dot{g_Y} = \alpha[g_I - g_S]$ from the general form function it is assumed that any deviation of investment, I, from an initial commodity market clearing equilibrium, $I = S$, stays aribitrarily close to the value of investment at the initial equilibrium. Moreover it is assumed that whenever $I = S$, output grows at some equilibrium rate, g_Y^*, in contrast to our contention that $g_\Pi = 0$ whenever $I = S$. We simply argue that demand side adjustment in the economy, which is the focus of our model, stops whenever $I = S$.

From equation (4), using the definition of growth rate and logarithmic differentiation, we obtain

$$\frac{1}{\dot{a}}\frac{d\dot{a}}{dt} = \phi(g_\Pi) + \rho\frac{\dot{g_\Pi}}{g_\Pi} \tag{10}$$

where $\rho = \frac{g_\Pi}{\phi(g_\Pi)}\phi'(g_\Pi)$ is the elasticity of the growth rate of labour productivity in the luxury goods sector with respect to the growth rate of profit and $\rho > 0$ as $\phi' > 0$. We assume that ρ is a constant.

Substituting for $\frac{1}{\dot{a}}\frac{d\dot{a}}{dt}$ in equation (9) from equation (10) and then re-arranging the terms we obtain,

$$\dot{g_\Pi} = \frac{\alpha g_\Pi[(\sigma_{I,\Pi} - \sigma_{S,\Pi})g_\Pi + (\sigma_{I,\dot{a}} - \sigma_{S,\dot{a}})\phi(g_\Pi)]}{[g_\Pi - \alpha(\sigma_{I,\dot{a}} - \sigma_{S,\dot{a}})\rho]} \tag{11}$$

where $\dot{g_\Pi}$ is not defined for $g_\Pi = \alpha(\sigma_{I,\dot{a}} - \sigma_{S,\dot{a}})\rho$. This implies that $\dot{g_\Pi}$ is not defined when $\phi(\alpha(\sigma_{I,\dot{a}} - \sigma_{S,\dot{a}})\rho) = \alpha(\sigma_{I,\Pi} - \sigma_{S,\Pi})(\sigma_{I,\dot{a}} - \sigma_{S,\dot{a}})\rho$.[8] We will assume that $\phi(\alpha(\sigma_{I,\dot{a}} - \sigma_{S,\dot{a}})\rho) \neq \alpha(\sigma_{I,\Pi} - \sigma_{S,\Pi})(\sigma_{I,\dot{a}} - \sigma_{S,\dot{a}})\rho$.

Equation (11) expresses the rate of change of the growth rate of profit, $\dot{g_\Pi}$, as a function of the growth rate of profit, g_Π, in the economy.

3 Positive equilibrium growth rate of profit

An equilibrium for equation (11), i.e., $\dot{g_\Pi} = 0$ implies either $g_\Pi = 0$ or $[(\sigma_{I,\Pi} - \sigma_{S,\Pi})g_\Pi + (\sigma_{I,\dot{a}} - \sigma_{S,\dot{a}})\phi(g_\Pi)] = 0$. Therefore it is obvious that a positive equilibrium growth rate of profit exists if and only if the equation

$$[(\sigma_{I,\Pi} - \sigma_{S,\Pi})g_\Pi + (\sigma_{I,\dot{a}} - \sigma_{S,\dot{a}})\phi(g_\Pi)] = 0$$

has a positive solution. This implies that $\sigma_{I,\Pi} \neq \sigma_{S,\Pi}$ and $\sigma_{I,\dot{a}} \neq \sigma_{S,\dot{a}}$. Re-arranging the above eqution gives us,

$$\phi(g_\Pi) = zg_\Pi \tag{12}$$

where $z = \frac{(\sigma_{S,\Pi} - \sigma_{I,\Pi})}{(\sigma_{I,\dot{a}} - \sigma_{S,\dot{a}})}$, a constant. Notice that the assumptions on the function $\phi(g_\Pi)$, mentioned in section 2.3, ensure a positive solution of equation (12) as long as $z > 0$. In figure 1 g_Π^* denotes the positive equilibrium growth rate of profit. Given that profit grows at the positive equilibrium rate g_Π^*, investment and savings in the economy grow at constant positive rates $g_I^* = \sigma_{I,\Pi}g_\Pi^* + \sigma_{I,\dot{a}}\phi(g_\Pi^*)$ and $g_S^* = \sigma_{S,\Pi}g_\Pi^* + \sigma_{S,\dot{a}}\phi(g_\Pi^*)$. Thus the equilibrium growth rates of investment and savings depend, apart from the equilibrium growth rate of profit, on the responsiveness of investment and savings to

[8] By re-arranging equation (11) we get,

$$\dot{g_\Pi}[g_\Pi - \alpha(\sigma_{I,\dot{a}} - \sigma_{S,\dot{a}})\rho] = \alpha g_\Pi[(\sigma_{I,\Pi} - \sigma_{S,\Pi})g_\Pi + (\sigma_{I,\dot{a}} - \sigma_{S,\dot{a}})\phi(g_\Pi)]$$

Substituting $\alpha(\sigma_{I,\dot{a}} - \sigma_{S,\dot{a}})\rho$ for g_Π in the above expression gives $\phi(\alpha(\sigma_{I,\dot{a}} - \sigma_{S,\dot{a}})\rho) = \alpha(\sigma_{I,\Pi} - \sigma_{S,\Pi})(\sigma_{I,\dot{a}} - \sigma_{S,\dot{a}})\rho$.

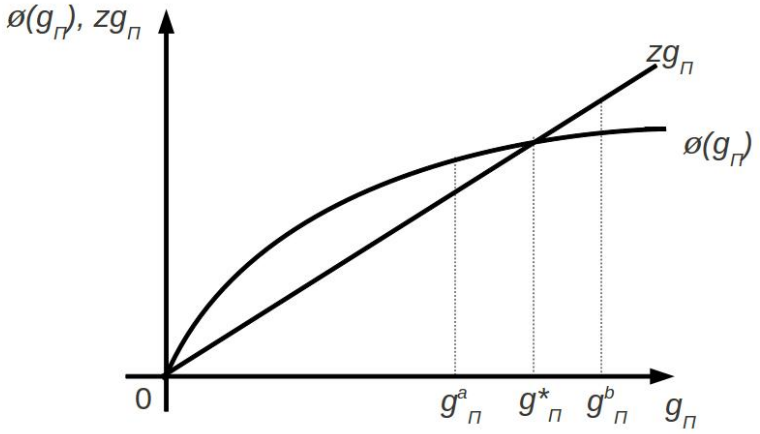

Figure 1

profits and the rate of introduction of new luxury goods in the economy and on the form of the function ϕ. Moreover from the definition of g^*_{Π} we know that in equilibrium $g^*_I = g^*_S$.

The fact that under certain conditions a positive equilibrium growth path of profit exists in the economy implies that at every instance of time on it investment is greater than savings by a fixed proportion. Notice that we can re-write equation (4) as

$$g_{\Pi} = \alpha[\ln(\frac{I}{S})] \tag{13}$$

Substituting g^*_{Π} in equation (13) and then re-arranging it, we get the following.

$$\frac{g^*_{\Pi}}{\alpha} = \ln(\frac{I}{S}) \tag{14}$$

Since $\frac{g^*_{\Pi}}{\alpha}$ is a positive constant, $\frac{I}{S}$ must be a constant greater than one. Investment-savings ratio being a constant greater than one means that the short-run macroeconomic equilibrium characterised by the equality investment and savings in the *ex-ante* sense is never realized on the equilibrium growth path of profit in the economy. This is because profit growth in our model is fueled by the excess of investment over savings in the *ex-ante* sense.

4 Stability

Local stability of the equilibrium requires that $\frac{d\dot{g_\Pi}}{dg_\Pi}$ at $g_\Pi = g_\Pi^*$ is less than zero, where g_Π^* is the positive equilibrium growth rate of profit. Differentiating (11) with respect to g_Π and then substituting g_Π^* for g_Π, we get

$$\frac{d\dot{g_\Pi}(g_\Pi^*)}{dg_\Pi} = \frac{\alpha(\sigma_{I,\dot{a}} - \sigma_{S,\dot{a}})g_\Pi^*(\phi'(g_\Pi^*) - z)}{[g_\Pi^* - \alpha(\sigma_{I,\dot{a}} - \sigma_{S,\dot{a}})\rho]} \tag{15}$$

where $\frac{d\dot{g_\Pi}(g_\Pi^*)}{dg_\Pi}$ is $\frac{d\dot{g_\Pi}}{dg_\Pi}$ evaluated at $g_\Pi = g_\Pi^*$. Now α and g_Π^* are positive constants. Existence of positive equilibrium growth rate of profit implies that $(\phi'(g_\Pi^*) - z) < 0$. To see this notice that $\phi(g_\Pi) - zg_\Pi = 0$ at both $g_\Pi = 0$ and $g_\Pi = g_\Pi^*$. The claim then necessarily follows from *Rolle's Theorem*[9] and the assumption $\phi''(g_\Pi) < 0$. Thus the necessary and sufficient conditions for local stability of g_Π^* are $g_\Pi^* > \alpha(\sigma_{I,\dot{a}} - \sigma_{S,\dot{a}})\rho$ and $\sigma_{I,\dot{a}} - \sigma_{S,\dot{a}} > 0$.

The first condition, $g_\Pi^* > \alpha(\sigma_{I,\dot{a}} - \sigma_{S,\dot{a}})\rho$, requires that the equilibrium growth rate of profit is sufficiently large. We can re-write (11) as

$$\dot{g_\Pi} = \alpha(\sigma_{I,\dot{a}} - \sigma_{S,\dot{a}})\psi(g_\Pi) + \frac{\alpha(\sigma_{I,\dot{a}} - \sigma_{S,\dot{a}})\rho}{g_\Pi}\dot{g_\Pi} \tag{16}$$

where $\psi(g_\Pi) = \phi(g_\Pi) - zg_\Pi$. The right hand side of equation (16) is the impact of excess of growth rate of investment over the growth rate of savings, which for the sake of simplicity let us call the growth rate of the I/S ratio, on the the rate of change in the growth rate of profit. Notice the first term in this expression is zero when $g_\Pi = 0$, i.e., $(\sigma_{I,\dot{a}} - \sigma_{S,\dot{a}})\psi(g_\Pi) = 0$ when $g_\Pi = 0$, while the second term is zero when $\dot{g_\Pi} = 0$, i.e., $\frac{(\sigma_{I,\dot{a}} - \sigma_{S,\dot{a}})\rho}{g_\Pi}\dot{g_\Pi} = 0$ when $\dot{g_\Pi} = 0$. Therefore we can think of $(\sigma_{I,\dot{a}} - \sigma_{S,\dot{a}})\psi(g_\Pi)$ as the component of the growth rate of the I/S ratio explained by g_Π and $\frac{(\sigma_{I,\dot{a}} - \sigma_{S,\dot{a}})\rho}{g_\Pi}\dot{g_\Pi}$ as the component of the growth rate of the I/S ratio explained by $\dot{g_\Pi}$. From equation (14), it is clear that the rate of change in the growth rate of profit ($\dot{g_\Pi}$) has the same sign as the component of the growth rate of the I/S ratio explained by the growth rate of profit, $(\sigma_{I,\dot{a}} - \sigma_{S,\dot{a}})\psi(g_\Pi)$, if and only if $\frac{\alpha(\sigma_{I,\dot{a}} - \sigma_{S,\dot{a}})\rho}{g_\Pi} < 1$. $g_\Pi^* > \alpha(\sigma_{I,\dot{a}} - \sigma_{S,\dot{a}})\rho$ implies that for values of g_Π in a sufficiently small neighbourhood of g_Π^*, $\frac{\alpha(\sigma_{I,\dot{a}} - \sigma_{S,\dot{a}})\rho}{g_\Pi} < 1$.

The second condition, $\sigma_{I,\dot{a}} - \sigma_{S,\dot{a}} > 0$, requires that either investment responds non-negatively to changes in the rate of introduction of new luxury goods or even when it responds negatively, the responsiveness of savings is more than the responsiveness of investment.[10] In either case, the indirect impact of a positive growth rate of profit on its rate of change is always positive, i.e., $\alpha(\sigma_{I,\dot{a}} - \sigma_{S,\dot{a}})\phi(g_\Pi) > 0$. Since $z > 0$, $\sigma_{I,\dot{a}} - \sigma_{S,\dot{a}} > 0$ implies that $\sigma_{S,\Pi} - \sigma_{I,\Pi} > 0$. So the direct impact of a positive growth rate of profit on its rate of change is negative, i.e., $(\sigma_{I,\Pi} - \sigma_{S,\Pi})g_\Pi < 0$.

[9] See, for example Albrecht and Smith (2003), pp no. 106

[10] Notice that since $\sigma_{S,\dot{a}} < 0$, $\sigma_{I,\dot{a}} - \sigma_{S,\dot{a}} > 0$ implies either $\sigma_{I,\dot{a}} \geq 0$ or ($\sigma_{I,\dot{a}} < 0$ and $|\sigma_{I,\dot{a}}| < |\sigma_{S,\dot{a}}|$).

Figure 1 shows two values of g_Π, g_Π^a and g_Π^b, close to g_Π^*. Let us assume that $g_\Pi^* > \alpha(\sigma_{I,\dot{a}} - \sigma_{S,\dot{a}})\rho$. This means $\dot{g_\Pi}$ has the same sign as the component of the growth rate of the I/S ratio explained by g_Π. At g_Π^a, $\phi(g_\Pi^a) > zg_\Pi^a$, thus $\psi(g_\Pi^a) > 0$. Therefore, from the definition of $\psi(g_\Pi)$, $\alpha(\sigma_{S,\Pi} - \sigma_{I,\Pi})g_\Pi^a < \alpha(\sigma_{I,\dot{a}} - \sigma_{S,\dot{a}})\phi(g_\Pi^a)$. The direct negative impact of the growth rate of profit on its rate of change is less than the indirect positive impact. Thus the component of the growth rate of I/S ratio explained by g_Π at g_Π^a is positive, which increases g_Π. Similarly at g_Π^b, since $\psi(g_\Pi^b) < 0$ we have $\alpha(\sigma_{S,\Pi} - \sigma_{I,\Pi})g_\Pi^b > \alpha(\sigma_{I,\dot{a}} - \sigma_{S,\dot{a}})\phi(g_\Pi^b)$. In this case the direct negative impact of the growth rate of profit on its rate of change dominates the indirect positive impact. Therefore, g_Π decreases at g_Π^b. Thus g_Π^* is locally stable.

5 Changes in income distribution and output growth

In this and the next section we will consider change in the distribution of income induced by exogenous shifts in the economic policy regime and examine its effect on output and employment growth in the economy. When policy regime changes many policy measures are adopted that are expected to have an impact on the distribution of income in the economy. For example, let us consider government going in for neo-liberal reforms. In that case many policy changes like easing the norms for mergers and acquisition, labour reforms, privatization of state run enterprises, reduction of corporate income tax, etc., would take place that tend to increase the 'degree of monopoly' in the economy. As a result we would expect the profit share to gradually rise over a period of time. On the other hand, suppose the goverment under popular pressure tries to orient its economic policy towards consideration of equity. In that case policies like employment guarantee and minimum wages would be adopted which tend to reduce the 'degree of monopoly' and we would expect the profit share to gradually decrease over a period of time. In the analysis that follows we consider shifts in policy regime which either improve or worsen the distribution of income and assume that whenever such shifts in policy regime happen, then the profit share changes continuously at a constant rate over a period of time. Moreover, we assume that such shifts in policy regime do not have any independent effect on investment and savings in the economy but through changes in the level of profit.

Any excess of investment over savings increases profit in the economy. In the absense of any policy induced increase in the profit share, this adjustment in the level of profit is achieved through an increase in output . In periods along the equilibrium growth path of profit, when there is a policy induced worsening of the income distribution, i.e., $\dot{h} > 0$, a part of the increase in profit required due to excess of investment over savings is automatically achieved by the exogenous rise in the profit share while the rest is achieved through endogenous output increase. On the other hand in case of an improvement in the distribution of income, i.e., $\dot{h} < 0$, decline in profit share will decrease the the level of profit and thus the excess of investment over savings will result into a greater endogenous adjustment in the level of output.

By definition $\Pi = Yh$, where Y is the total output of the economy and h is share of profit in output. Therefore the growth rate of profit is $g_\Pi = g_Y + \frac{\dot{h}}{h}$, where g_Y is the growth rate of output and $\frac{\dot{h}}{h}$ is the growth rate of profit share. On the equilibrium growth path of profit, the growth rate of output is,

$$g_Y = g_\Pi^* - \frac{\dot{h}}{h} \tag{17}$$

We will assume that the change in profit share, $\dot{h}$, is an exogenously given policy determined parameter. Thus output grows at a rate equal to the equilibrium growth rate of profit when income distribution does not change, that is $\dot{h} = 0$. When profit share increases, that is $\dot{h} > 0$, then $g_Y < g_\Pi^*$ whereas when profit share decreases, that is $\dot{h} < 0$, $g_Y > g_\Pi^*$.

Suppose $\dot{h} > 0$, then profit share, h, increases over time. This implies $\frac{\dot{h}}{h}$ decreases as $\dot{h}$ is fixed. Thus it follows from (17) that g_Y increases as $\dot{h} > 0$. Next suppose $\dot{h} < 0$, then the profit share, h, decreases over time. This implies $|\frac{\dot{h}}{h}|$ increases as $\dot{h}$ is fixed. Since $\dot{h} < 0$, it follows again from (17) that g_Y increases. Thus in periods along the equilibrium growth path of profit when there are no policy induced changes in income distribution the growth rate of output is constant and in periods when there are policy induced changes in income distribution the growth rate of output is increasing.

6 Growth of labour productivity and employment

Labour productivity of the entire economy is the weighted average of labour productivities in the luxury goods sector and the non-luxury goods sector with the weights being their respective employment shares. Thus the labour productivity of the entire economy, x is given by the following equation.

$$x = al_a + b(1 - l_a) \tag{18}$$

where b is a positive constant which is always less than a. a and b are the labour productivities of the luxury goods sector and the non-luxury goods sector respectively. l_a is the employment share of the luxury goods sector. From (18), the growth rate of labour productivity in the economy is,

$$g_x = \frac{l_a}{x}\{ag_a + (a - b)g_{l_a}\} \tag{19}$$

where g_x, g_a and g_{l_a} are respectively the growth rates of labour productivity for the entire economy, the luxury goods sector and the employment share of the luxury goods sector.

Since only capitalists consume luxury goods, we would expect the share of luxury goods output in total output to increase as the share of profit in output increases. Therefore we assume the share of luxury goods output in total output to be an increasing function of the profit share as described below.

$$\frac{Y_a}{Y} = f(h) \tag{20}$$

where $0 \leq f(h) \leq 1$ and $f'(h) > 0$. Y_a is the output of the luxury goods sector.

Using the definition of l_a and (20) we obtain,

$$l_a = \frac{f(h)x}{a} \tag{21}$$

From (21) the growth rate of the employment share of the luxury goods sector is,

$$g_{l_a} = \frac{f'(h)}{f(h)}\dot{h} + g_x - g_a \tag{22}$$

Substituting for l_a and g_{l_a} respectively from equations (21) and (22) in equation (19) the re-arranging the terms, we obtain the following expression for the growth rate of labour productivity in the economy.

$$g_x = \frac{bf(h)g_a + (a-b)f'(h)\dot{h}}{\{1 - f(h)\}a + f(h)b}$$

On the equilibrium growth path of profit $g_a = \phi(g^*_\Pi)$, therefore g_x is,

$$g_x = \frac{bf(h)\phi(g^*_\Pi) + (a-b)f'(h)\dot{h}}{\{1 - f(h)\}a + f(h)b} \tag{23}$$

Thus the growth rate of labour productivity in the economy at any instant along the equilibrium growth path of profit depends on the constant growth rate of labour productivity in the luxury goods sector, labour productivities of the two sectors, the share of luxury goods sector's output in the total output and the exogenously given rate of change in the profit share. Since a grows at a constant rate g_x is not constant along the equilibrium growth path of profit. In the absence of any exogenous change in the distribution of income, i.e., when $\dot{h} = 0$, from equation (23) we know that the growth rate of labour productivity in the economy continuously declines over time. The growth rate of employment in the economy on the equilibrium growth path of profit is $g_L = g^*_\Pi - g_x$. As g_x falls over time the growth rate of employment increases to approach g^*_Π. This is obvious because when income distribution is fixed then the employment share of the luxury goods sector declines and approaches zero as its labour productivity grows at a constant rate. Since labour productivity in the non-luxury sector is fixed, the growth rate of labour productivity in the economy must decline and approach zero and the growth rate of employment approaches g^*_Π. The entire gain in the employment in the economy comes in the non-luxury sector and moreover this decline in g_x gets translated into a decline in the growth rate the real wage which ultimately become stagnant.

However in periods the distribution of income changes (i.e. $\dot{h} \neq 0$) due to shifts in policy regime, then g_x need not always decline but can also increase. Let us consider the case of a period when there is worsening of income distribution. Along the equilibrium growth path of profit $\dot{h} > 0$. Since now both a and h are not constants but grow over time from (23) we can not say whether g_x will decline or increase over time. The increase in labour productivity of the luxury goods sector tends to decrease its employment share but this is countered by increasing share of its output due to worsening of income distribution. When the latter tendency out-weighs the former, g_x rises along the equilibrium growth path of profit leading to a possibility of declining growth rate of employment. We derive some conditions when g_x declines in periods whnn $\dot{h} > 0$ in appendix 1. Similarly in periods when $\dot{h} < 0$ too the behaviour of g_x and g_L over time are ambiguous.

7 Conclusion

In the closed economy model presented in the paper, we have shown that in a developing country consumption demand of the richer section of the population for goods available in developed countries can sustain a positive and steady growth rate of investment and profit. The consumption demand of the rich for goods available in developed countries is an incentive to the firms for investing in the production of such goods by imitating foreign production techniques. In order to capture the aspirations of the rich in the economy to match the consumption standards in the developed countries, we have postulated that the consumption out of profit is not only an increasing function of the level of profits but also of the rate of introduction new luxury goods in the economy, which are goods that are already available in developed countries. Since a faster rate of introduction of new luxury goods increases the consumption demand of the richer section of the population, it also provides an incentive to the producers to invest in production of such goods, therefore has a tendency to increase net investment . On the other hand, if imitation is very costly net investment might also decline because the luxury goods are substitute goods in nature. In fact one condition for the local stability of equilibrium is that even if investment responds negatively to the rate of introduction of new luxury goods its responsiveness should be less than that of savings.

Assuming that overtime goods introduced in the developed countries are more sophisticated and are associated with higher labour productivities, we have proxied the rate of introduction of new luxury goods in the model by the rate of change in the labour productivity of the luxury sector, $\dot{a}$. The growth process is associated with a particular kind of technological change such that the labour productivity in the luxury sector grows at a constant rate whereas by assumption there is no technological change in the non-luxury sector. The technological change in the luxury sector is induced by the growth rate of profit which indicates the richer section of the population's ability to afford sophisticated goods available in the developed countries. This is captured by a Kaldor kind of technological progress function given by equation (4). The equilibrium growth rate of profit and investment depends upon the responsiveness of investment and savings functions to changes in the level of profit and the rate of change in the labour productivity of the luxury sector along with the form of the function ϕ. It is obvious from figure 1 that the equilibrium growth rate of profit (and the growth rate of investment) increases with exogenous increase in $\sigma_{I,\Pi}$, $\sigma_{I,\dot{a}}$ and $|\sigma_{S,\dot{a}}|$ because they decrease z. On the other hand any increase in $\sigma_{S,\Pi}$ decreases the equilibrium growth rate of profit (and the growth rate of investment) because it increases z. Similarly any upward shift in the curve of the the function ϕ increases the equilibrium growth rate of profit (and the growth rate of investment).

If income distribution in the economy is fixed then growth of output along the equilibrium growth path of profit, is constant and equal to positive equilibrium growth rate of profit. From equation (20), it then follows that the growth rate of employment in the luxury sector is $g_{L_a} = (1-z)g^*_\Pi$. Thus the growth rate of employment in luxury sector is positive if and only if $z < 1$, i.e., $\sigma_{S,\Pi} + \sigma_{S,\dot{a}} < \sigma_{I,\Pi} + \sigma_{I,\dot{a}}$. However in section 6, we have seen that along the equilibrium growth path of profit, employment share of the luxury sector continuously declines and approaches zero because labour productivity in the economy declines while in the luxury sector increases at a constant rate. Since labour productivity in the economy declines, the growth rate of employment in the economy increases to approach g^*_Π. The gain in employment comes majorly in the non-luxury sector where technology is stagnant. This gain in employment growth comes at the cost of decline in the growth rate of real wage which ultimately becomes stagnant.

In section 5, we have considered shifts in economic policy regime of the government, that are either in favour of the capitalists or the workers, on the growth rate output along the equilibrium growth path of profit. Whenever such shifts in the policy regime occur, many policy changes occur that tend to raise the income share of the class toward which the regime shift is biased. We have assumed impact of such change or shift in policy regime changes the income distibution gradually, at a constant rate (i.e., $\dot{h}$), over a period of time. In time periods when $\dot{h} \neq 0$, the growth rate of output becomes increasing. This is expected because any redistributive government policy will increase the demand of one or the other section while investment grows at a constant rate and impact of the redistribution on the growth rate of profit share diminishes overtime. The analysis of impact of government policy induced changes in income distribution on the growth process presented in the paper is however limited to only those kinds of policy measures which are less likely to have any direct bearing upon investment and savings in the economy. In section 6 we have seen that in periods when $\dot{h} \neq 0$, labour productivity growth in the economy can increase or decrease both. This is because labour productivity in the economy is weighted average of the labour productivities in the two sectors with the weights being their respective employment share. Any change in the income distribution tends to change the output share of the luxury sector which might counter the impact on the employment share of the luxury sector due to continuous increase in its labour productivity.

The basic idea on which the model presented in the paper is based is that not only the level of demand but also its composition is important while studying economic growth. In a closed economy model with no government, demand is just the sum of consumption and investment. If investment in the economy responds to changes in the composition of consumption demand then the level of demand changes. Tracing this overtime not only gives insights on the growth process but also on the nature of technological change, employment growth and structural change in the economy.

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Appendix 1

The total differential of g_x is

$$dg_x = \frac{\partial g_x}{\partial a} da + \frac{\partial g_x}{\partial h} dh \tag{24}$$

where dg_x, da and dh are the changes in g_x, a and h respectively with $da > 0$ and $dh > 0$; and $\frac{\partial g_x}{\partial a}$ and $\frac{\partial g_x}{\partial h}$ are the respective partial derivatives of g_x with respect to a and h.

From equation (23) the partial derivative of g_x with respect to a is,

$$\frac{\partial g_x}{\partial a} = \frac{f'(h)\dot{h}}{[(1-f(h))a + f(h)b]} - \frac{(1-f(h))\{bf(h)\phi(g^*_\Pi) + (a-b)f'(h)\dot{h}\}}{[(1-f(h))a + f(h)b]^2}$$

and the partial derivative of g_x with respect to h is,

$$\frac{\partial g_x}{\partial h} = \frac{\{bf'(h)\phi(g^*_\Pi) + (a-b)f''(h)\dot{h}\}}{[(1-f(h))a + f(h)b]} + \frac{(a-b)f'(h)\{bf(h)\phi(g^*_\Pi) + (a-b)f'(h)\dot{h}\}}{[(1-f(h))a + f(h)b]^2}$$

Substituting for $\frac{\partial g_x}{\partial a}$ and $\frac{\partial g_x}{\partial h}$ in equation (24) and then re-arranging the terms we get,

$$dg_x = \frac{f'(h)\dot{h}da}{[(1-f(h))a + f(h)b]} + \frac{[bf'(h)\phi(g^*_\Pi) + (a-b)f''(h)\dot{h}]dh}{[(1-f(h))a + f(h)b]} + \frac{[(a-b)f'(h)dh - (1-f(h))da][bf(h)\phi(g^*_\Pi) + (a-b)f'(h)\dot{h}]}{[(1-f(h))a + f(h)b]^2}$$

Since $\phi(g^*_\Pi)$, $\dot{h}$, a, and b are all positive with $a > b$ and $0 < f(h) < 1$, it follows from the above equation that if $f''(h) \geq 0$ and $(a-b)f'(h)dh - (1-f(h))da \geq 0$ then dg_x is positive. Otherwise dg_x can be negative. Since $adh > 0$ and $\frac{da}{dt} = \dot{a} = a\phi(g^*_\Pi)$ and $\frac{dh}{dt} = \dot{h}$, $(a-b)f'(h)dh - (1-f(h))da \geq 0$ implies,

$$(a-b)f'(h)\dot{h} \geq a(1-f(h))\phi(g^*_\Pi) \tag{25}$$

If we assume that the share of luxury goods output increases at a constant or an increasing rate as the profit share increases, i.e., $f''(h) \geq 0$, then in periods when government policy changes result in worsening of income distribution, the growth rate of labour productivity increases as long as the inequality (25) is satisfied.