Formal Informal Interactions: A Simple Chayanov Model

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Abstract

Needless to say, the topic of formal-informal interaction is well traversed. Several dual economy models have been in operation to understand the dynamics of formalization-or in its popular acronym-development. Development discourse is essentially a way in which the economy becomes increasingly formalised or its operations become visible to the panoptic vision of law and legal institutions. The story is essentially the same. Formalisation raises efficiency and productivity thereby yielding benefit to all concerned. Also it adds to the society's overall capacity to reproduce and produce itself giving way to future growth and prosperity. The story told and retold many a times fails to capture the reason for continuous existence or even (re)creation of informality even in a world where formality is the sure way to succeed. In an interesting paper Porta and Shleifer (2014) deals with this issue and comes out with an interesting conclusion. The informal sector does not merely exist for taking advantage of legal loopholes. Even if these loopholes are somehow stitched, the informal sector will not become formal. The clue perhaps lies in an old view expressed by Chayanov (though not included in the standard Chayanovian models) that in certain circumstances an

informal sector can outperform a modern capitalist sector. This paper is a modest attempt to include this clue in a formal model of the simplest possible type that tries to unravel the relation between formal and informal sector as also the consequences of policies that leads to forced formalisation.

JEL CODES: O10, O12, O17, O14

Keywords: Informal production, formal production, dual economy model, forced formalisation

1. Introduction

One of the major dilemmas of the development economics is the continuous existence or even (re)creation of the informal sector. Development economists have repeatedly preached that informal sectors are inefficient and outmoded forms of operation[1]. Hence they cannot survive in an atmosphere of competition with the formal sector. The Lewis model (Lewis1954)[2] gives the point beautifully by positing formal sector absorbing surplus labour that is emanating from the informal sector. The model posited informal sector embedding in itself cheap labour that has to be released for more profitable (and gainful) activities elsewhere. Models after that simply elaborated the pull and push factors that transform the labour from its informal (unproductive use) to more formal (and hence productive) utilization.

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[1]There has recently been some dissenting view coming from empirical observations. For example, Banerjee and Duflo (2011) have pointed out to supreme efficiency of some very rudimentary form of informal transactions. However they stress that these firms are scale inefficient and they can survive only in a small scale. It is somehow not possible for them to replicate their performances if they are made to operate at a higher scale.

[2]Unfortunately as Basu (1984) has commented that the so-called "Lewis model" is only a tiny part of the entire Lewis endeavour. The Lewis paper is indeed an engrossing detailed analysis of the formal-informal interaction that remains outside the purview of the so-called "Lewis model". In spite of its richness, Lewis (1954) does not capture the issues that are dealt here.

The issue got jumbled up when it was observed that the informal sector did not die off even after the expansion of formal sector[3]. The experiences clearly show that there is no way of ruling out the informal sector. It has remained almost an inseparable part of our economy. Bose (1998) finds that most of small cultivators in the less developed countries are not treated as credit-worthy by the formal sector financial institutions. In fact, easy credit policy through the formal channel can lead to adverse `composition effects' which deteriorates the terms of credit and the availability of loans in the informal sector. They are forced to borrow from the moneylenders in the informal credit market. Rye et al. (2018) evaluates the interplay between formal governance structures and informal processes by using case studies of four countries: Britain (more specifically England, outside London); the Netherlands; Germany; and Sweden, covering the local and regional public transport system. They find that that the two modes of governance are, in fact, highly complementary.

However, the proponents of formalisation posited that formal sector is still the best option available to the people who select formality only because they are constrained to do so. In other words, informality is always the second best option that will melt away once the barriers to formality are lifted.

In this whole arena of formalisation debate, a sole voice is raised that seek to challenge this dominating paradigm. The views are of A.V. Chayanov, a person cruelly executed in the old

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[3]The story of Indian finance market is an important illustration in this regard. Data showed that in 1950-51, non-institutional credit formed 92.8% of the total credit market. The Indian government went forward to curb its influence by expanding formal credit. As a result, the share of formal sector rose from 7.2% in 1950-51 to 64% in 1990-91 (All India Rural Credit and Debt Survey 2013). The share of informal credit fell to 36%. This level of formal credit proved unsustainable in the 1990s leading to the reform program. There was a turnabout. The share of formal credit fell to 56% and that of informal sector bounced back to 44%. If we leave out cooperatives from the formal sector, the picture is bleaker. Even at peak point of 1991, the share was 45.4% while the informal sector contributed 36%. The share of (co-operative less) formal sector again fell to 31.2% while the informal sector rose to 44%. The recent rise of informal funds leading to financial scams (chit funds) is well documented fall out of this. In fact, in one case, the Reserve Bank of India was forced to give legal recognition to one such financial group on the pretext that it has observed all the regulations posted by it. One can see, in this case, a documentation of formal sector yielding to informality.

Soviet in 1939 and resurrected later by Western scholars[4]. Chayanov was comparing the peasant farms (farms trying to maximise family utility) with the so-called "capitalist" farms (farms that run by profit). He argued that in certain conditions, a peasant farm can outperform a capitalist farm in the sense that market conditions might force out the capitalist farms though the peasant farms might continue to exist. His reason was simple. If market does not provide remunerative conditions, capitalist farms earning negative profit cannot exist, a peasant farm can still exist earning a meagre amount for its members. In short, there might be situations, where it is not profitable to run capitalist farms but peasant farms are still viable. This paper takes this cue from this great thinker and tries to integrate into a simple model of formal-informal interaction.

The paper is organised as follows. Section 2 gives a brief discussion of the formalisation story and its dissenters. Section 3 gives our basic model with implications for forced formalisation. Section 4 deals with the impact of technological improvement in the formal sector. We conclude in section 5.

2. The Formalisation Story and Its Dissenters

There are many dual economy models. One basic assumption of these models is that at any level of labour resources, formal sector earns more than the informal sector. (Lewis, 1954; Ranis and Fei, 1961). Formal sector is more profitable than the informal sector. When economic development takes place, formal sector rules out the informal sector. However, empirical results suggest that informal sector still remains. The informal sector is always with us. According to the Harris Todaro migration model, amount of labour supplied to the formal sector is higher than the demand generated by the sector. This implies presence of surplus labour or informality.

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[4]Unfortunately the popular Chayanovian models miss this point.

This however cannot explain the long run existence of informal sector. Since there is a learning process, there is a decline in the surplus labour, implying dwindling of the informal sector with time. There may be some frictional unemployment, but there cannot be long term sustenance of the informal sector because there is learning process and people are rational.

Answer to this lies in one forgotten prescription of Chayanov. According to Chayanov, there may be situations where informal sector is more viable than the formal sector. This idea of him was much misunderstood by the development economists and policy makers[5].

There are models of two technologies by Murphy, Shleifer and Vishny (1989) which took the idea sketched by Rosenstein-Rodan, Nurkse and others. These models refine Lewis suggestion. Unlike Lewis, they did not argue that modern sector will always dominate the traditional sector. There are resource levels beyond which the modern technology begins to dominate. Below that, traditional sector dominates. Hence a big push is needed to push up the economy beyond this level.

The Chayanovian model is on the other hand shows the existence of both the technologies simultaneously. It is a simultaneity model, not a historical model. In Nurkse, the modern technology dominates after the big push – the old technology becomes obsolete. So, there is no way to choose the old technology even at low level of resources. In the Chayanovian model, technology of various types co-exists. So, there is possibility of selecting technology appropriate to resource base.

3. **The Model: Simple Specification**

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[5]This might also be a cause of his arrest and execution in 1939. He was identified as an apostle of "small is beautiful" maxim. It was clearly against the collectivisation drive that was in full force in Stalinist Russia. He was declared as the "enemy of the people" promulgating small peasant farms against large scale collective farms that were considered to be a symbol of socialistic planning mechanism. Hence he was charged of sabotaging the planning process.

The model that we construct is adopted from the standard specifications of dual technology models of Murphy, Shleifer and Vishny (1989) with a slight adjustment. In the standard models the specification is based on the production function. In our model, we emphasise on the Earning (or profit) functions.

Following the standard tradition, we formalize the formal sector and informal sector profits as:

$$\pi_f = \alpha R - F \qquad (1)$$

$$\pi_{inf} = R \qquad (2)$$

Where R is the available resources and F the fixed cost associated with the setting up of a productive unit in the formal sector. Also in the standard notation, $\alpha > 1$.

It is easily seen in the figure 1 that below R*, the formal sector earning is less than the informal sector[6]. OR^* is the **Chayanovian range.**

Lemma 1: OR^* is the **Chayanovian range where $\pi_{inf} >$**

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[6]This situation does not appear in the historical Nerlovian models. For them, below R*, the only available option is π_{inf}, and above R*, the only available option is π_f. In the Chayanovian model, however all the options are available.

Figure 1: Graphical Presentation of Simple Chayanov Model
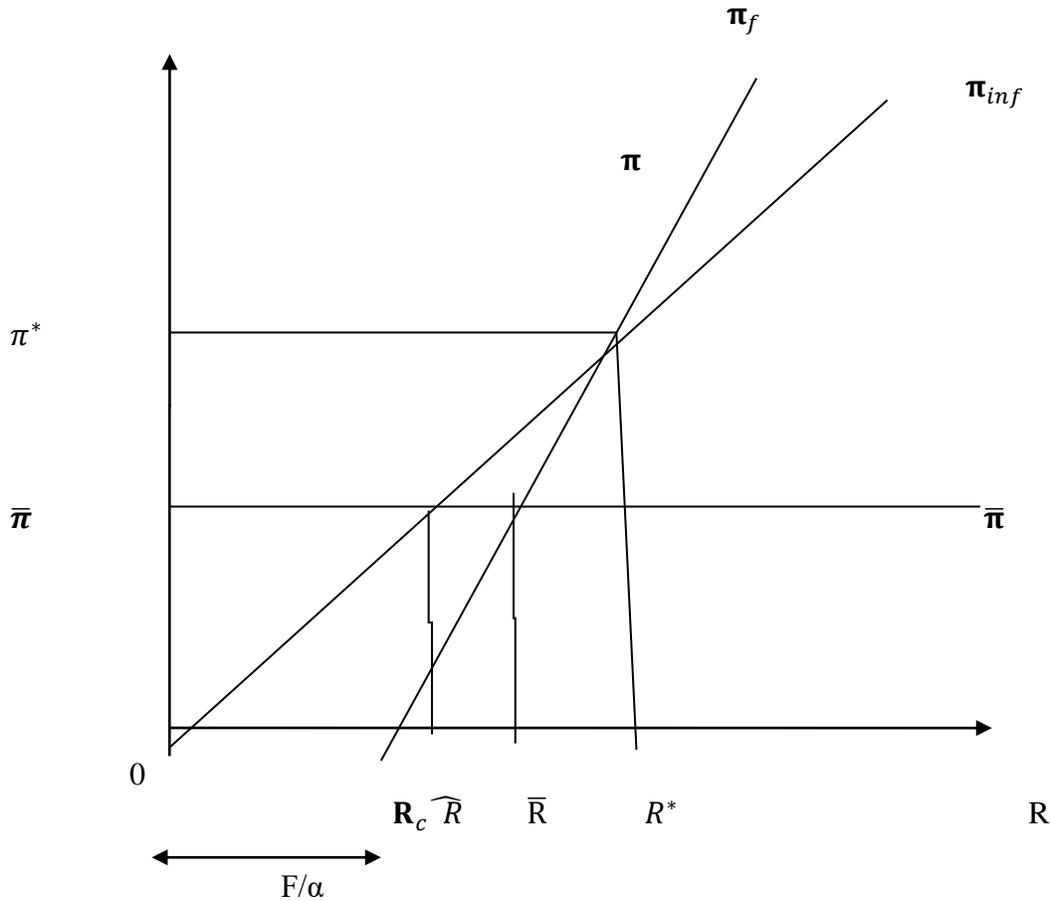
However there is an important consideration that is beyond the consideration of Chayanov. It is not only sufficient to inquire whether the income of informal sector is above the formal sector. It is also necessary to see that this income is above the subsistence level.

We have thus introduced the subsistence level income $\overline{\overline{\pi}}\,\overline{\pi}$. We now define;

Lemma 2: $\hat{R}R^*$ is the effective **Chayanovian range (ECR)** where $\pi_{inf} > \pi_f$ and $\pi_{inf} > \overline{\pi}$

Theorem 1: The condition of $R^* > \overline{R} > \hat{R}$ is:

$$F > \overline{\pi}\,(\alpha-1)$$

Proof: The values of $\hat{R}$, $\overline{R}$ and R^* can be determined by solving the following equations.

The value of $\hat{R}$ can be determined by solving equation 3.1.

$$\hat{R} = \bar{\pi} \tag{3.1}$$

For the value of $\bar{R}$, equation 3.2 needs to be solved.

$$\alpha \, \bar{R} - F = \bar{\pi} \tag{3.2}$$

or, $\alpha \, \bar{R} = \bar{\pi} + F$

or, $\bar{R} = \dfrac{\bar{\pi} + F}{\alpha}$ \hfill (3.3)

From the figure, it is evident that, $\bar{R} > \hat{R}$

So, now from equations (3.3) and (3.1), we get,

$$\dfrac{\bar{\pi} + F}{\alpha} > \bar{\pi}$$

or, $F > \bar{\pi} \, (\alpha\text{-}1)$ \hfill (3.4)

This is the condition required for $\bar{R} > \hat{R}$

Now since $\alpha > 1$, $F > 0$

Assume that $\bar{\pi} \, (\alpha\text{-}1) = \mathbf{F_0} > 0$, implying $F > \mathbf{F_0}$

Again, from equation (3.3), we get,

or, $\bar{R} = \dfrac{\bar{\pi} + F}{\alpha}$

or, $\bar{R} = F/\alpha + \bar{\pi}/\alpha$

or, $\bar{R} = \mathbf{R}_c + \bar{\pi}/\alpha$ \hfill (3.5)

In other words, $\bar{R} > \mathbf{R}_c$

For determining the value of R^*, the following equation mends to be solved

$$\alpha R^* - F = R^* \tag{3.6}$$

Or, $R^* \, (\alpha\text{-}1) = F$

Or, $R^* = F/(\alpha\text{-}1)$ \hfill (3.7)

Now since $R^* > \bar{R}$, comparing equation (3.3) and (3.6) we get,

$$F/(\alpha-1) > \frac{\bar{\pi} + F}{\alpha}$$

Or, F α >/(α-1)($\bar{\pi}$+F)

Or, F α > F α-F+$\alpha\bar{\pi}$ -$\bar{\pi}$

or, 0 > $\bar{\pi}$ (α-1) – F

or, F > $\bar{\pi}$ (α-1)

Or, F > F_0 where F_0 = $\bar{\pi}$ (α-1) > 0 since α > 1

So, we can say that $R^* > \bar{R}$ if F > F_0 where F_0 = $\bar{\pi}$ (α-1)

This is the same condition as that of (3.4). In other words, this ensures that $R^* > \bar{R} > \hat{R}$

This condition ensures the existence of the effective **Chayanovian range** $(\hat{R}R^*)$ **where** $\pi_{inf} > \pi_f$

and $\pi_{inf} > \bar{\pi}$. When, F = F_0, the $\hat{R}$, $\bar{R}$ and R^* coincide, implying that π_f, π_{inf} and $\bar{\pi}\bar{\pi}$ line

intersect with each other. In other words, the $\bar{\pi}\bar{\pi}$ line passes through the (OR^*, $O\pi^*$) point. If

F < F_0, then the informal sector yields a profit below $\bar{\pi}$. On the other hand, though the formal

sector becomes profitable, that is at R^*, it is still not able to raise the individual profit above the

subsistence level.

3.1 Implication of Forced Formalisation

Formalisation entails considerable transition pains, if not managed well. Any attempt to

forcefully squeeze the informal sector or forced formalisation is laden with undesirable

consequences because majority of the low skilled workers in the developing nations are engaged

in the informal sector (Porta and Shleifer. 2014).[7]

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[7]For years, one of the main objectives of the economic policy in India has been to create conditions for workers to move from low to high income employment. This meant a shift from the informal sector where productivity is low, to the formal sector where productivity is high. This process of "formalisation" has been excruciatingly slow. (Business Standard, 2018)

The informal sector is generally the repository of unskilled labourers. They are unskilled in the sense that their skill is not saleable and do not fetch high income. They are mainly poor people who do not have time and resources to acquire sufficient skills. It may also include those whose skills have suddenly become obsolete due to the arrival of new techniques or services (Sengupta and De, 2018). These people with obsolete skills often lacked sufficient flexibility in order to gain access to the income earning avenues. They have only informal sector to eke out a meaningful living. This is what Ray (2012) calls as 'solidarity economics'. This section can never survive in a formal market structure. If forced to compete, they will simply wither away. Hence, in formalising them, it would incite various new innovative ways –both legal and extra-legal – to subvert and bypass the pangs of 'danger' that arise from forced formalisation.

A case of forced formalisation may be the current demonetization process of the Government of India, a set up cost for the informal sector rises. Formally speaking, it is easy to introduce the implications within our model. We argue that forced formalisation, say in the form of demonetisation imposes certain restrictions on the availability of cash for the informal sector. Such costs are not imposed for the formal sector.

Optimum profit functions for the formal and the informal sector now can be written as

$$\boldsymbol{\pi}_f = \alpha\, R - F \qquad\qquad (3.8)$$

$$\pi^1_{inf} = R - \beta.\, R = (1 - \beta)\, R \qquad\qquad (3.9)[8]$$

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[8]It is later shown in that if the set up cost of the informal sector is increased beyond F (the set up cost of the formal sector, the informal sector extinguishes.

Where $0<\beta<1$ (in case of demonetisation β is the cost of acquiring cash)[9]

The impact of forced formalisation has been depicted in the figure below. Prior to any measure of forced formalisation, middle class was denoted by $\hat{R}R^*$ (see figure 2). Forced formalisation rotates the profit line of the informal sector to the right along the origin to π_{inf}^1. After any forced formalisation move, middle class is squeezed to $\hat{R}_1 R_1^*$. This implies polarization of the society after forced formalisation. However, this condition holds true if Theorem 1 holds or if $F>\bar{\pi}$ (α-1). In other words, the new profit line of the informal sector should cut the $\bar{\pi}\bar{\pi}$ line at any point which is left to point E.

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[9] It is clear from the new equation that profit of the informal sector will be zero at certain positive level of resources. However, this is not our concern because such a value of π_{inf}^1 will obviously be below $\bar{\pi}$.

Figure 2: Impact of Forced Formalisation
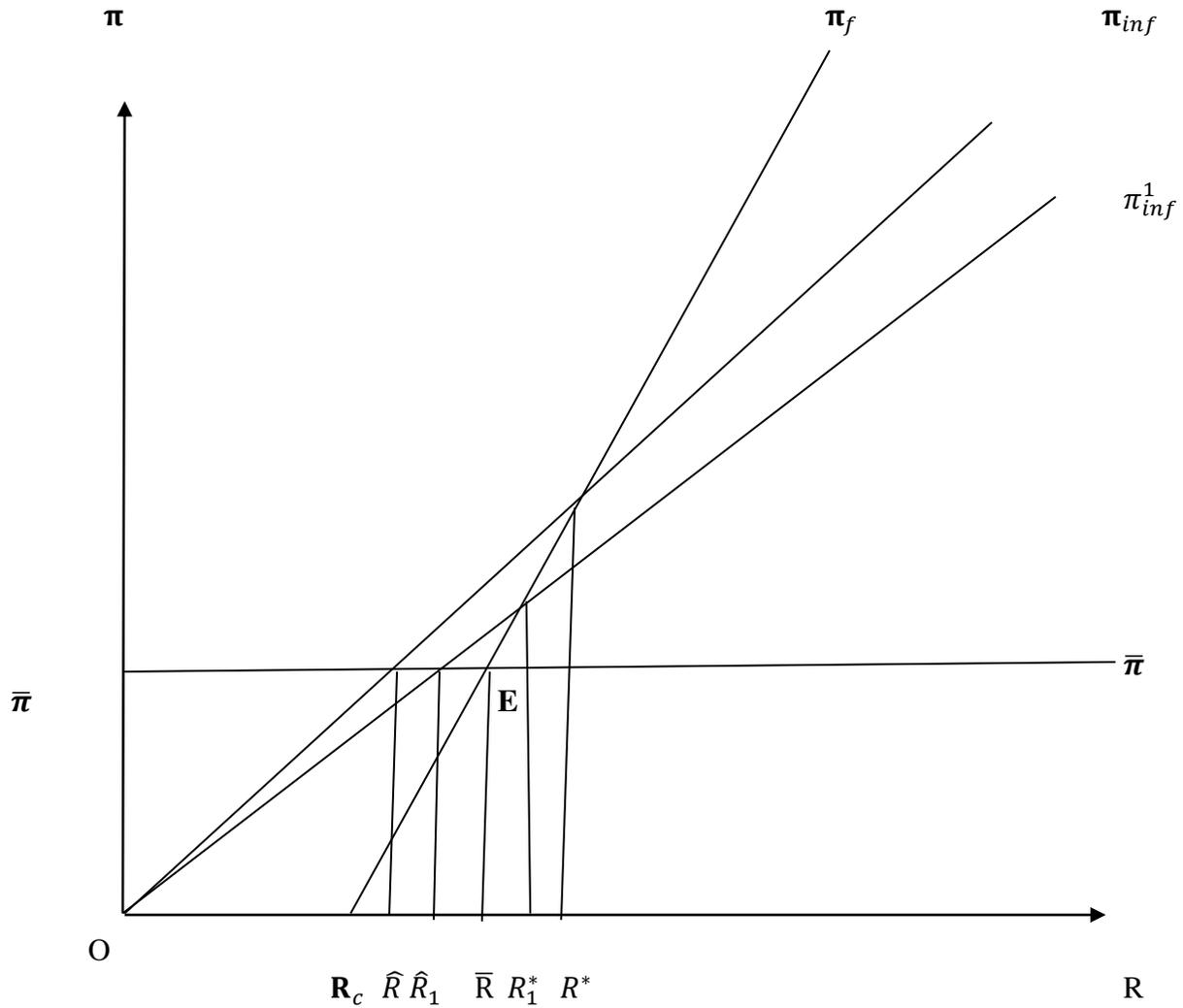
Condition 1(for $\widehat{R}_1$)

$(1- \beta)\widehat{R}_1 = \overline{\pi}$

or, $\widehat{R}_1 = \dfrac{\overline{\pi}}{(1- \beta)}$ (3.10)

Comparing this with equation (3.1), we get, $\widehat{R}_1 > \widehat{R}$

Condition 1(for R_1^*)

$\alpha R_1^* - F = (1-\beta)R_1^*$

or, $R_1^* = \dfrac{F}{(\alpha+\beta-1)}$ $\hspace{4cm}$ (3.11)

We now define;

Lemma 3: $\hat{R}_1 R_1^*$ is the new effective **Chayanovian range (ECR) where** $\boldsymbol{\pi}_{inf} > \boldsymbol{\pi}_f$ **and** $\boldsymbol{\pi}_{inf} > \overline{\boldsymbol{\pi}}$

Theorem 2: The condition of $R_1^* > \overline{R} > \hat{R}_1$ is:

$$F > \frac{\overline{\pi}(\alpha+\beta-1)}{(1-\beta)}$$

Proof: The values of $\hat{R}_1, R_1^*$ and $\overline{R}$ can be determined by solving the following equations.

The value of $\hat{R}_1$ can be determined by solving the following equation:

$(1-\beta)\hat{R}_1 = \overline{\pi}$

or, $\hat{R}_1 = \dfrac{\overline{\pi}}{(1-\beta)}$ $\hspace{4cm}$ (3.12)

For the value of $\overline{R}$, equation 3.13 needs to be solved.

$\alpha \overline{R} - F = \overline{\pi}$ $\hspace{5cm}$ (3.13)

or, $\alpha \overline{R} = \overline{\pi} + F$

or, $\overline{R} = \dfrac{\overline{\pi}+F}{\alpha}$ $\hspace{5cm}$ (3.14)

From the figure, it is evident that, $\overline{R} > \hat{R}_1$

So, now from equations (3.12) and (3.14), we get,

$\dfrac{\overline{\pi}+F}{\alpha} > \dfrac{\overline{\pi}}{(1-\beta)}$

or, $F > \overline{\pi}\dfrac{(\alpha+\beta-1)}{1-\beta}$ $\hspace{4cm}$ (3.15)

This is the condition required for $\bar{R} > \hat{R}_1$

Now since $\alpha > 1$, $0 < \beta < 1$

Assume that $\bar{\pi} \frac{(\alpha+\beta-1)}{1-\beta} = \mathbf{F_1} > 0$, implying $F > \mathbf{F_1}$

For determining the value of , R_1^*, the following equation mends to be solved

Or, $\alpha R_1^* - F = (1-\beta)R_1^*$ (3.16)

or, $R_1^* = \frac{F}{\alpha+\beta-1}$ (3.17)

Now, from figure 2, since $R_1^* > \bar{R}$, comparing equation (3.17) and (3.14) we get,

$\frac{F}{\alpha+\beta-1} > \frac{\bar{\pi} + F}{\alpha}$

or, $F - \beta F > \bar{\pi}(\alpha+\beta-1)$

or, or, $F > \bar{\pi} \frac{(\alpha+\beta-1)}{1-\beta}$ (3.18)

This is the same condition as that of (3.15). In other words, this ensures that $R_1^* > \bar{R} > \hat{R}_1$

This condition ensures the existence of the new effective **Chayanovian range ($\hat{R}R^*$) where**

$\pi_{inf} > \pi_f$ and $\pi_{inf} > \bar{\pi}$.

Now, we find the value of $R_1^* - \hat{R}_1 = \frac{F}{(\alpha+\beta-1)} - \frac{\bar{\pi}}{(1-\beta)}$ (3.19)

Again, $R^* - \hat{R} = \frac{F}{(\alpha-1)} - \bar{\pi}$ (3.20)

Now, both the conditions that need to be fulfilled for the presence of new effective Chayanovian range, that we have derived in theorem 1 and theorem 2 are:

         $F > \bar{\pi}(\alpha-1)$

and $F > \overline{\pi} \frac{(\alpha+\beta-1)}{1-\beta}$

From these two conditions, we get :

$\frac{F}{(\alpha-1)} - \overline{\pi} > 0$

and $\frac{F}{(\alpha+\beta-1)} - \frac{\overline{\pi}}{(1-\beta)} > 0$

From these two conditions, it is evident that $(R_1^* - \hat{R}_1) < (R^* - \hat{R})$

We can recant the above discussion in the following way.

Theorem 3: Under certain conditions, forced formalisation implies increasing polarization and reduction of the effective **Chayanovian range (ECR).**

There may be another consequence of forced formalisation that may be more disastrous. This is depicted in figure 3. The effect of forced formalisation is here to drag down the income from the informal sector to a very low level. In such situation, informal sector becomes less profitable vis-a-vis the formal sector. There are small range of low resource level at which informal sector is profitable, otherwise the formal sector is profitable. With this, we thus move towards the classical Lewis framework where the formal sector is always above the informal sector.

We can summarise the results in the next theorem.

Theorem 4: Given certain conditions, forced formalisation makes the informal sector gradually declining.

Now the question arises what happens to those involved in the informal sector. Conjecturally, they should gradually move to the formal sector.

The crucial question is then what happens to those who have resources below $0\mathbf{R}_c$. They cannot move to the formal sector because they cannot bear the minimum fixed cost. Informal sector is available for them but it offers income below the subsistence level. Their only way out is to eke out living out of the legal vestiges of the society. They will adapt to the semi-legal and illegal activities (vagabonds, beggars, prostitutes and others). This is not a very ideal consequence of any public policy.

Figure 3: Impact of Forced Formalisation (Declining Informal Sector)
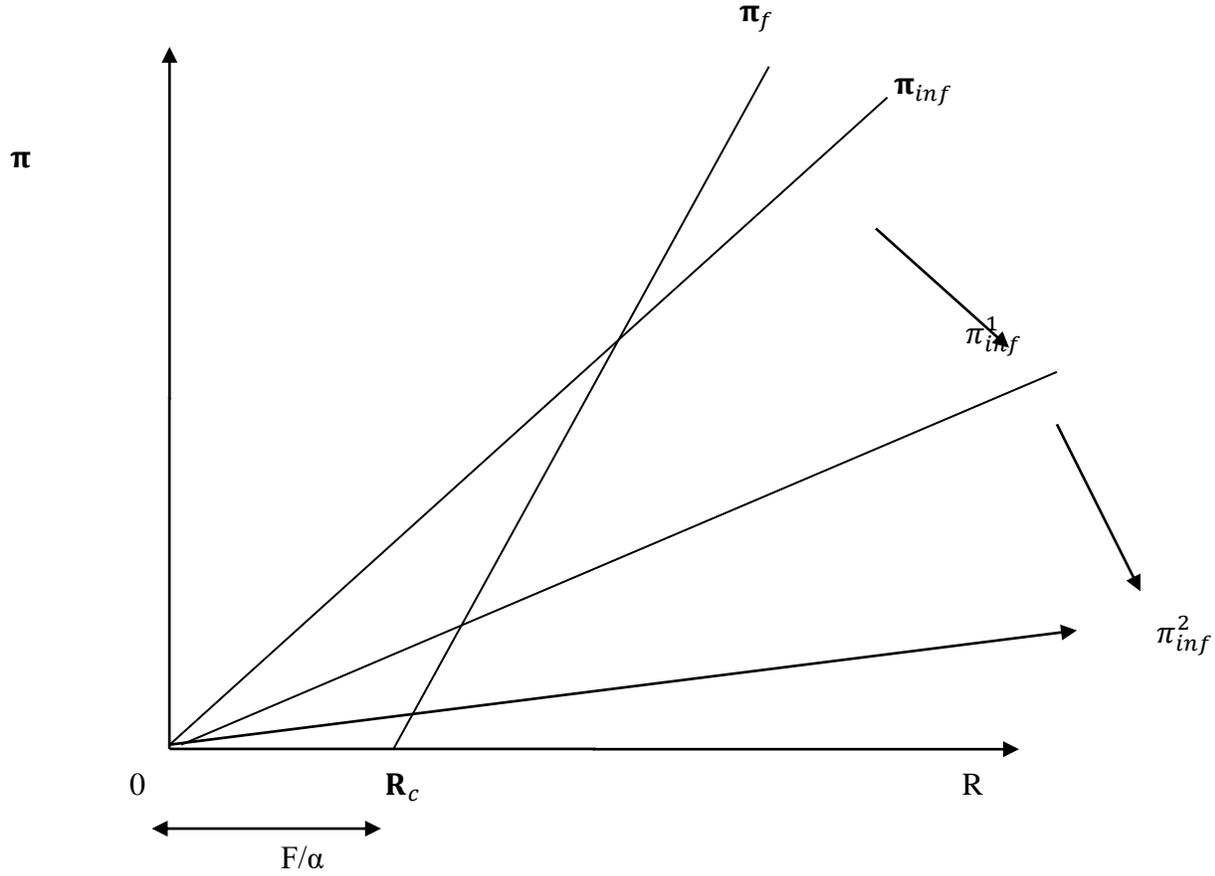
4 . Technological Improvement in the Formal Sector

So far, our model was static. It assumed more or less an unchanged technology both for the formal and the informal sectors. This may attribute well for the informal sector that is largely stagnant. However, it is difficult to sustain such an argument for the formal sector. By its nature, there should be continuous improvement in the formal sector. It is possible to capture this change in our model with a comparative static framework.

We consider two different types of technological change. First type of technological change is scale independent. Under this specification, we assume that technological change raises the profitability of the formal sector at all levels of resources. The scale independence nature of this model enables us to visualize a parallel shift of the profit line of the formal sector in the upward direction which is shown in figure 4.

In such case, the profit functions for the informal and the formal sector can be written as:

$$\pi_{inf}(t) = R(t) \tag{4. 1}$$

$$\pi_f(t) = \alpha R (t) - F \tag{4.2}$$

The effect of scale-neutral technological progress can be captured with the help of the following profit function for the formal sector.

$$\pi_f^1 (t) = \alpha R (t) - F + A \tag{4.3}$$

Where $A \geq 0$

Prior to scale neutral technological progress, OR^* can be determined by solving equations (4. 1) and (4.2), $R^* (t) = F/(\alpha\text{-}1)$ $\tag{4.4}$

However, after scale neutral technological progress, OR_1^* can be determined by solving equations (4. 1) and (4.3).

$$R_1^* (t) = (F\text{-}A)/(\alpha\text{-}1) \tag{4.5}$$

Comparing equations (4.4) and (4.5), it is evident that $R_1^* (t) < R^* (t)$

However, (F-A)>0 In other words, fixed cost associated with the setting up of a productive unit in the formal sector should be greater than the positive effect of technological progress.

Figure 4: Impact of Technological Improvement (Scale Neutral Technology)
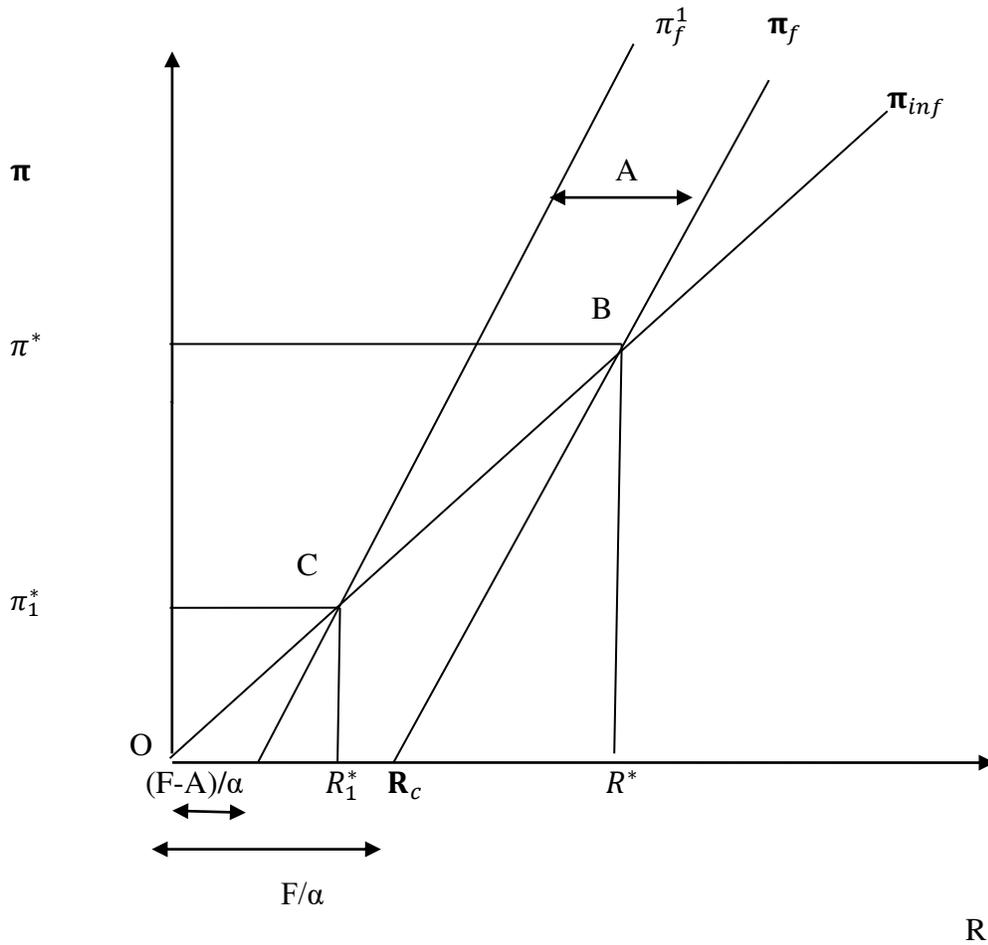
From the figure 4, it is clear that scale independent technology change lowers the fixed cost of the formal sector. In such case, higher formal sector profit can be attained lower level of resources. Here, $OR_1^* < OR^*$. As a consequence, some of the people who could not have entered the formal sector, can now join it.

We can also think of a special case where A>F, (technological improvement outweighing the costs of entering the formal sector. This eliminates the presence of **Chayanovian range which keeps provision for $\boldsymbol{\pi}_{inf} > \boldsymbol{\pi}_f$**. This is depicted in figure 5 below. The π_f^2 is the new profit line for the formal sector.

Figure 5: Impact of Technological Improvement (Scale Neutral Technology where A>F)
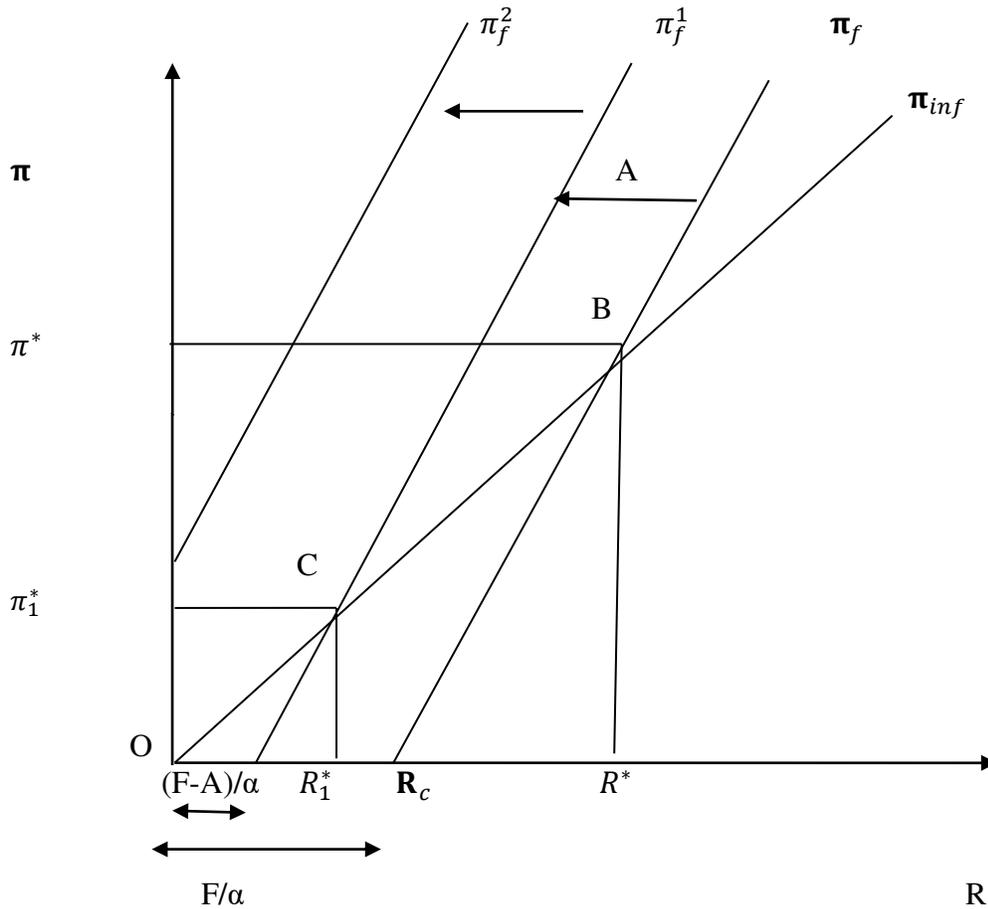
Theorem 5:   Scale-neutral technological change raises the degree of formalisation in the economy.

This result is in corroboration with the findings of Porta and Shleifer (2014). They found that formalisation can be improved only through growth of the economy. A scale-neutral technology only achieves this. There may be examples of such scale-neutral changes. Internet revolution and the improving telecommunication might be a good example of scale-neutral technological change. This change has good prospects of lowering poverty and reducing inequality.

Unfortunately, all technological changes are not scale-neutral. There might be some technologies that benefit only those who are at the higher rung of technology usage. For example, technology improvement in aerodynamics and lowering of air travel time cannot benefit all the sections of the society. The benefits are only accrued by those who remain at the higher echelon of the society.

We can consider this in figure 6. The figure clearly shows that the benefits of technological changes are accrued to those who have resources above OR***. The new profit line is π_f^1.

The new profit line for the formal sector is sharper than π_f. There are now two consequences. Firstly, the fixed-cost for setting up formal sector has increased. The entry cost to formal sector is higher with a lowering of opportunities. Secondly, at resource level beyond OR***, the gap between π_{inf} and π_f becomes larger. In short, this type of technological change raises both poverty and inequality. Poverty is increased in the sense that the span of informality increases from OR^* to OR**.Inequality is increased in the sense that at each resource level beyond OR***, the gap of π_{inf} and π_f rises.

In such case, incorporating the effect of scale-dependent technological progress, the profit functions for the informal and the formal sector can be written as:

π_{inf} (t) = R (t)   (4. 6)

π_f(t) = α R (t) – F, if R <R***

     = α R (t) – F - A_0, if R >R***   (4.7)

Where $A_0 \geq 0$

Prior to scale dependent technological progress, OR** can be written as R** (t) =F/(α-1)

(4.9)

However, after scale dependent technological progress progress, OR***   can be determined by

solving equations (4. 6) and (4.7).

R*** (t)= (F+A_0)/(α-1)   (4.10)

Comparing equations (4.9) and (4.10), it is evident that OR** < OR***

Theorem 6: Scale-dependent technological change decreases the degree of formalisation in the economy, with more people forced to informalisation.

Figure 6: Impact of Technological Improvement (Scale Dependent Technology)
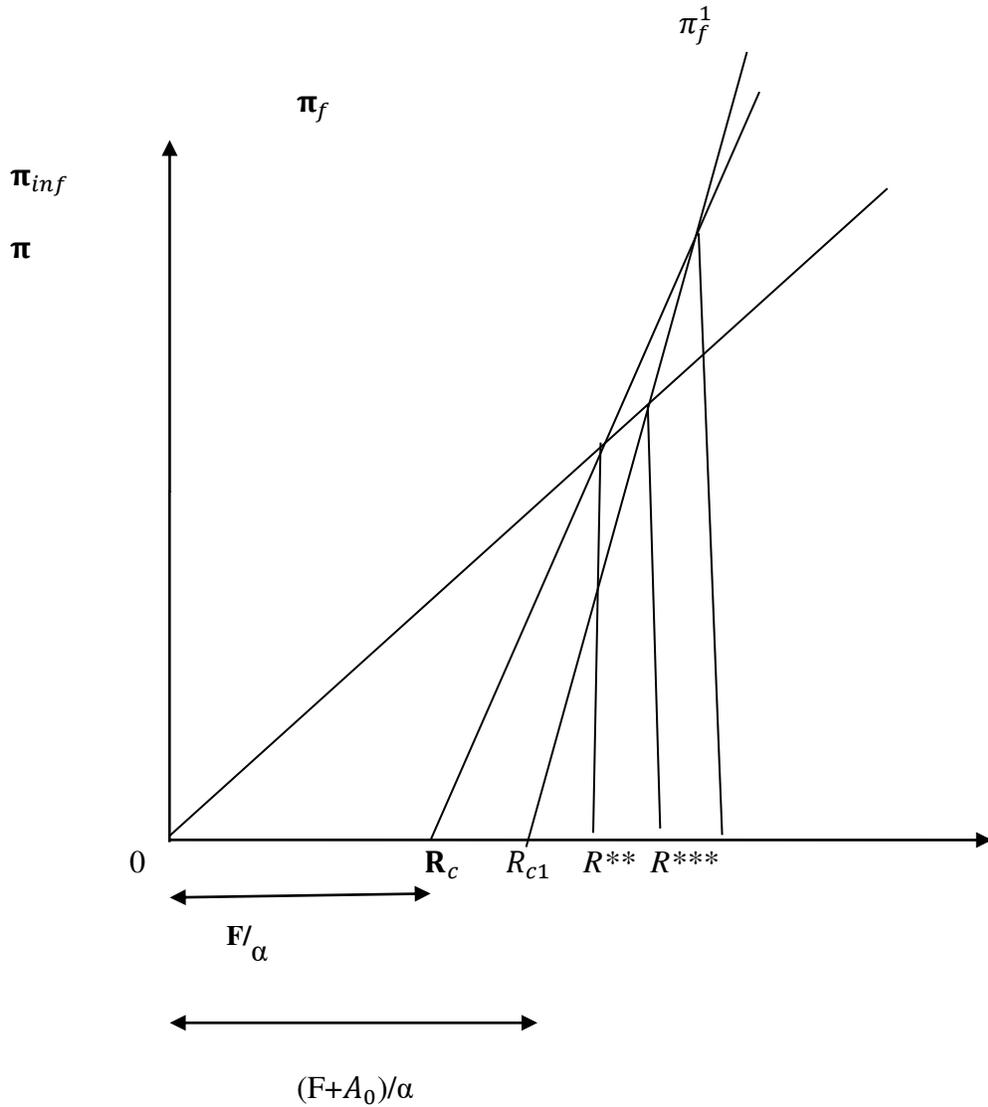
5. Conclusion

It is clear from the above deliberations that the relation between formal and informal sector is neither simplistic nor straight forward. We have built here a very simple model using the specification of Murphy, Shleifer and Vishny (1989). We turned their model descriptive by invoking the Chayanov's principles.

We argue that both formal and informal technologies are available. At lower resource level, people choose the informal technology because of the high set up cost of the formal technology. Beyond this level, however, formal technology dominates. Calibrating our model for different policy prescriptions and comparative static changes, we find that the results are not unambiguous. Different types of results crop up due to difference in policy regimes and/or comparative static changes. Our analysis reveals that people should be more cautious about suggesting any policy and/or technological changes because of the differences in results.

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Appendix

Chianov vs. Nurkse
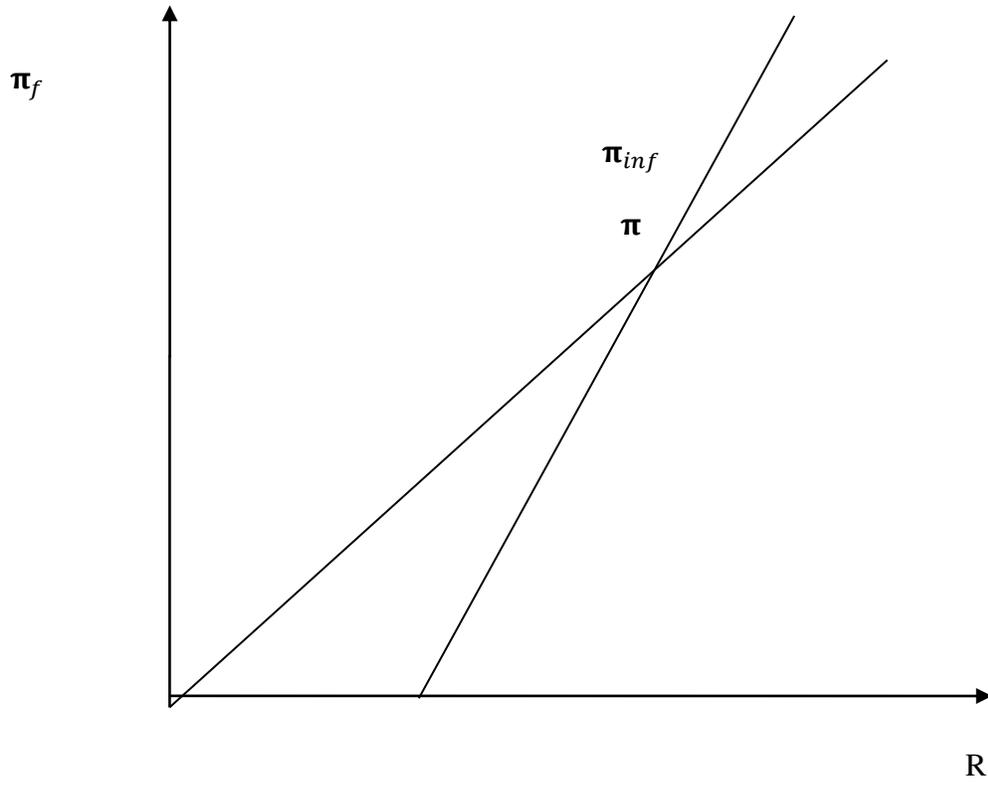
Chayanov (Non-historical)

Chayanov vs. Nurkse

π_f

π_{inf}

π

R

Nurkse (Historical)