Class-bias in Technology Adoption: Stagnation and Transformation of Subsistence Agriculture in the Ethiopian Northern Highlands
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Class-bias in Technology Adoption: Stagnation and Transformation of Subsistence Agriculture in the Ethiopian Northern Highlands

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This study enquires into the persistence of subsistence agriculture in the Ethiopian Northern Highlands. It argues that the system of land tenure that emerged after the agrarian reform of 1975 entails the same conflict of interests over land that used to characterize peasant mode of production before the reform. The only difference lies in the fact that in the past that conflict used to be solved directly through explicit land litigations, while today it is less apparent and mediated by sharecropping. The study shows how under the present system of land tenure agrarian stagnation may result to be the only solution to peasant conflict of interests. The argument rests on a model of corn economy with two productive classes - deficit and surplus producers - exchanging land and labour in an interlocked manner and responding to technological change with two different systems of rationality. While deficit producers cannot adopt the improved technology because of their necessity of survival, surplus producers avoid to do it in the attempt to maintain, if not improve, their access to additional land. Although set in a specific historical context, the argument highlights a more general problem of interaction between technology and class structure.

Keywords: Ethiopia, technological change, stagnation, class structure, conflict of interests.

I. BRIEF HISTORICAL BACKGROUND

This study inquires into the persistence of subsistence agriculture in the Ethiopian Northern Highlands. More precisely, it inquires into the unsuccessful attempts of transforming it through modern agricultural packages. Today chemical fertilizers and improved seeds are registering good rates of adoption around certain cities and highways. However, while those positive experiences should be not disregarded, they should be also considered against the negative ones. It is a matter of fact that, although

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in the 1960s smallholders readily adopted agricultural packages (Hoben 2001, p. 21), today subsistence farming remains by far the dominating form of agriculture, where most peasants are reluctant to change technology (Belay 2003; Dejene 2003), where the majority lacks resources to till land (Befekadu et al. 2002, 53-7), and where the food security of entire communities is under threat (Devereux 2000; Devereux and Sharp 2006).

Figure 1. Negative correlation between household size and land per person

The form of agriculture that today persists in the region emerged after the agrarian reform of 1975 (Dessalegn 1984; Mesfin 1984). In reaction to the last developments of the empire (Calchi Novati 1994, ch. 4-5; Crummey 2000, 8-12), land was redistributed among the peasantry with egalitarian ideals, somehow presenting in a new vest the traditional system of land tenure (Hoben 1973; Hoben 2001). Ideally, by taking into account the prevailing technical conditions of production and the differentiation of soil and household size, the reform allotted to each peasant household the inheritable but unmarketable usufruct right to specific plots of land according to two basic principles. On the one hand, that land had to be large enough to allow for the economic reproduction of the household. On the other, it had to be small enough to permit direct cultivation (Mesfin 1991, 12-3; Aspen 1993, 31). Given that today the land tenure system rests on the same right to land, it might be expected that the observed variation in holding size can be explained substantially by the variation in household size. Nevertheless, this is not the case. There is a significant residue, and a consistent negative correlation is observed between household size and land per person. Thus, the situation appears somewhat paradoxical, in so far as the households that result
poorer in terms of land, labour and other typical indicators of wealth, tend to be better off in terms of land per person (Ege 2002a, 1443-4). Why?

Figure 1 synthesizes the question. Let the traditional technique of production persisting in the region be characterized by the fixed produce-land and land-labour ratios $Y/A$ and $A/L$. Consider then two households, respectively of size $L_1$ and $L_2$ with $L_1 < L_2$. Assume a null dependency ratio for both, so that the size of each household identifies also its labour force. Ideally, being the two households in the condition to provide directly the labour forces $L_1$ and $L_2$, they were assigned of the amounts of land $A_1$ and $A_2$ respectively, such that $A_1 < A_2$ and $A_1/L_1 = A_2/L_2 = A/L$, and such that the two productive capacities $Y_1$ and $Y_2$ were enough to ensure their economic reproduction. Hence, the situation entailed by the reform should be the one captured by the points $P_1$ and $P_2$. However, the observed situation seems to be closer to the points $P_3$ and $P_4$, where the land-labour ratio of the household of smaller size is significantly greater than the one of the household of greater size. Why?

Indeed, focusing only on land was of a somewhat narrow perspective. Land, household composition, draught power and annual advances of agricultural produce are all equally necessary to the economic reproduction of a peasant household. Thus, although the reform was successful in correcting inequality in the social distribution of land, a significant residual inequality was left in all the other sectors of the peasant economy (Dessalegn 1984, 49-53). Correspondingly, sharecropping emerged as a widespread practice with the relative status of the lessor and lessee of land typically reversed. While sharecropped land tends to belong to smaller households supplying labour force, lessees are typically larger households hiring labour force. In some cases, lessors seem to lack draught power, and therefore to be compelled to hire the latter in exchange for labour or agricultural produce (Aspen 1993; Yared 2003). In some other cases, they seem to lack male labour for ploughing, or to be unable to feed their draught animals, and therefore to be compelled to hire out the latter in exchange for agricultural produce (Ege 2002a and 2006). Yet, in many other cases, the different sectors of the economy seem to be interlocked in a far more complex manner increasingly mediated by market-based exchange relations, so that no definite pattern seems to emerge (Ege 2002b). Nevertheless, below this apparently protean situation,

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1 For instance, Ege 2002a refers to a case study where the Gini index of the land distribution per person is 0.30. The same index is virtually equal for the land distribution per household, namely 0.31. Correspondingly, the correlation between household size and holding size is +0.49, while the one between land per person and household size is –0.41.

2 This assumption can be justified as follows. The Amharic noun timmad customarily designates a local unit of measure for land fertility (Mesfin 1991, 12-13). Interestingly, it derives from the verb temede – to yoke – and identifies a yoke of two oxen, or the land the latter can plough in one day (Aspen 1993, 31). A Leontief-type of production function solves this apparent ambiguity in interpretation by providing the conversion rule $Y/A = Y/K \times K/A$, where $Y/A$ stands for land productivity, $Y/K$ for the productivity of the draught power of two oxen, and $K/A$ for the draught power of two oxen required by a unit of land. A similar logic, often extended to include human labour, is found all over the country, the world and history (Kula 1986, ch. VI; Bhaduri 1973, 124). It is this logic that allowed to put into practice the two principle followed in land redistributions.

3 Draught power can be exchanged under different peasant institutions, their names varying from place to place. In the case studied by Aspen 1993 for instance, mekenajo allows two households with one ox each to share their oxen. Igui allows to hire two oxen for one day in exchange for two days of labour, while arso in exchange for ploughing the land of the lender and rearing the animals. Ribi typically concerns female animals and their offspring, but it also allows to hire oxen in exchange for agricultural produce. For these and the other production relations mentioned in the following notes refer to Aspen 1993.
the underlying recurrent fact is that land tends to be supplied along with labour force by households unable to survive only of the produce of their land. Even with the support they receive from their communities, those households are typically not in the condition of advancing all the agricultural produce required by their economic reproduction – which includes their food needs, but also seed, fodder, and any other annual requirement of the production process accordingly with its specific organization. Consequently, they are typically compelled to hire out labour in exchange for agricultural produce while sharecropping leased-out land they are unable to cultivate on their own.

Turning back to Figure 1, let the difference $L_1 - L_5$ stand for the amount of labour force supplied by the household of smaller size $L_1$. Thus, $L_5$ stands for the residual amount of labour force self-employed in the direct cultivation of the amount of land $A_5$, while the difference $A_1 - A_5$ stands for the amount of land the household supplies. Correspondingly, the differences $L_6 - L_2$ and $A_6 - A_2$ stand for the amounts of land and labour demanded by the household of greater size $L_2$. Note that land and labour are supplied so as to maintain the land-labour ratio of the smaller household at the technical level $A/L$. Thus, if that supply of labour and land is fully met by the demand from the larger household, it holds $L_1 - L_5 = L_6 - L_2$ and $A_1 - A_5 = A_6 - A_2$. The first household cultivates directly only the amount of land $A_5$, while the second one cultivates the operational holding of overall size $A_6$ by means of both self-employed and hired labour. Nevertheless, note also that although the effective situation entailed by peasant exchanges corresponds to the points $P_5$ and $P_6$, yet the one observed should correspond to the points $P_1$ and $P_2$. Hence, the question still is: why is the observed situation captured by points similar to $P_3$ and $P_4$?

In the first period of its life cycle, a new peasant household typically tills a small amount of land, limited to an anticipation of inheritance. With the passage of time, while the household grows in size, its land holding tends to increase through full inheritance, leaving the land per person ratio substantially unaltered. But then, how can an expanding household in search for additional land gain access to it? Before the reform, the land tenure system was based on a fundamental contradiction – the distinction between right to land and land effectively held. Thus, the customary practice was that of claiming land on the basis of own rights in a court, in front of a judge and witnesses (Hoben 1973, ch. 8). The reform put an end to that contradiction,

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4 Maheber and senbete are Coptic feasts that along with other similar occasions may involve up to one third of the calendar, and that are sponsored by the richest participants, who supply food in turns.

5 Wenfel allows to hire labour in exchange for food. Debo is a working group hosted in exchange for food. Households hosting debo tend to gather a number of people slightly exceeding the number of debo they take part to, signalling the existence of a weak but net supply of labour also in working groups.

6 Gulma is an advance of land inheritance given to sons when they become capable of ploughing and managing land on their own. The produce of gulma, along with the gifts received for the marriage, and the support received during the two-year starting period spent in the groom’s parental homestead, allows the new couple to build the agricultural capital necessary to establish a new independent household.

7 In deterministic terms, this would be true only if demographic growth was nil homogeneously, there was no overlap between the nth and the (n + 2)th generation; and the gender distribution within the household was homogeneous (in spite of gender-neutral rules, in practice inheritance tends to show a gender-bias).

8 In some case grazing or free land was put under cultivation. In some other, land litigations involved entire descent corporations. Nevertheless, in most cases, litigations involved two households (Hoben 1973).
so that the main, if not only, way left has become leasing land\(^9\) (Hoben 2001, 6-7). However, today as in the past, peasant conflict over the control of land tends to result in a reallocation from households that cannot cultivate it to households that can\(^10\). Before the reform that conflict used to find explicit expression inside courts, while today it is somehow less apparent because mediated by sharecropping. Hence, if the lessees of today – like the successful claimants of the past – may be larger households disposing of a surplus of labour with respect to their inherited land holding because in the full of their demographic cycles, lessors are typically households in deficit of labour force because some of their able male members were adopted by richer households as ploughboys (Hoben 1973, 62-3; Hoben 2001, 5), or emigrated to seek food, or died prematurely, or divorced, leaving behind them distressed households of smaller size\(^11\) (Aspen 1993; Yared 2003; Ege 2002a and 2006).

It is also this deficit of labour force – and not only that surplus labour – that might explain the negative correlation observed between household size and land per person. In Figure 1 the points \(P_3\) and \(P_4\) might capture the extreme situation where the surplus labour of the lessee in the full of its demographic cycle cultivates all sharecropped land, while all the labour force supplied by the lessor remains unemployed. \(L_6\) stands for the household size of the lessee. The difference \(L_6 - L_2\) stands for its surplus of labour with respect to the inherited holding of size \(A_2\). The difference \(A_1 - A_5 = A_6 - A_2\) stands for sharecropped land. The difference \(L_1 - L_5\) stands for the labour force of the lessor left unemployed, and therefore compelled to emigrate and leave behind an household of residual labour force \(L_5\), which in turn cultivates directly the residual amount of land \(A_5\). Alternatively, the points \(P_3\) and \(P_4\) might capture the other extreme situation where the surplus labour of the lessee is attributable to a ploughboy adopted from the lessor, while all the residual labour force of the latter remains unemployed. In this second case, \(L_6\) stands for the household size of the lessee, which includes the ploughboy. The difference \(L_6 - L_2 = L_1 - L_5\) stands for the labour force of that ploughboy, in surplus with respect to the holding of size \(A_2\) inherited by the lessee. The difference \(A_1 - A_5 = A_6 - A_2\) stands for sharecropped land. \(L_5\) stands for the residual labour force of the lessor left unemployed, and therefore in part compelled to emigrate and in part surviving of the rent from sharecropping. Finally, \(A_5\) stands for land left uncultivated. Both these situations are somewhat extreme, nevertheless one fact is clear: if the lessee is typically a larger household disposing for one reason or the other of surplus labour, the lessor is typically a smaller

\(^9\) The subsequent waves of land redivisions that redistributed land until 1996 up to once every four years represent another important element of continuity between the two systems of tenure (Hoben 2001, in particular page 13 and 18).

\(^10\) When considering demographic cycles in land-bounded communities, it is important to take into account that where there is an expanding household, there is also a contracting one, the game being a zero-sum one (Hoben 1973). Moreover, it is worth emphasizing that although land and labour reallocations are typically judged in terms of economic efficiency, the problem analyzed by this paper is the different and more substantial one of efficacy (Hoben 2001, 23; Ege 2002b, 1452).

\(^11\) Also divorce may be the result of economic distress – for instance, think of the consequences of permanent emigration – especially in a context where infra-household relationships appear of such a strong economic nature (Hoben 1973 and 2001; Ege 2002b, 1452).
household in deficit of labour force because of adoptions, emigration, premature deaths, or divorce. This peculiar mode of production is commonly termed subsistence agriculture. The terminology is appropriate in so far as it emphasizes that the primary economic objective of a peasant household is the direct production of its means of subsistence. However, it is also at risk of misinterpretation. Peasant households are not an undifferentiated mass of autarchic units of production and consumption reproducing on a scale of bare subsistence. Their economy does produce a surplus, which allows for the existence of non-farming classes. Furthermore, their produce does circulate within the peasantry as well, through specific exchange relations. These are characterized by at least two aspects.

(a) Freedom and necessity. While human needs might not have an upper limit, in any culture there is quite a clear definition of the lower one. By referring to those basic needs, peasant households can be meaningfully grouped into two economic classes, ultimately distinguished by the motivations underlying their behaviour. On the one hand there are deficit producers, who are compelled by the necessity of attaining their subsistence to supply labour and land in exchange for agricultural produce. On the other hand there are surplus producers, who are able to supply the latter to command labour and land and maintain, if not improve, their status. The asymmetry observed in peasant exchange relations reflects this different capability of advancing produce, and therefore these two systems of rationality (Cipolla 1962, ch. II; Keynes 1963, part II; Robinson 1970, ch. II-III; Kula 1980, ch. III; Bhaduri 1983, ch. I-III).

(b) Conflict and integration. Land and labour are not simply the economic basis of peasant life. They are the natural environment and the human substance of society. If traditionally they never entered the domain of commerce at par with commodities, today they are still mainly exchanged within the peasant community under the principles of reciprocity and redistribution. These, along with house-holding, are the dominant organizational principles of social production. Correspondingly, peasant terms of exchange are not determined by impersonal market forces, but are typically fixed at certain customary levels that somehow sustain all the members of society. In the light of peasant longstanding conflict for the control of land, those customary terms of exchange ultimately represent the way society absorbs conflict to remain integrated (Weber 1922; Polanyi 1944, ch. IV-VI; Godelier 1984, ch. V; Harris-White 2003).

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12 In other terms, it is not that ox-deficient households are poor – as wanted by the so-called ox argument – but the other way round: poor peasants are those who do not dispose of enough agricultural produce to feed their draught animals, or to hire draught power. The same causality applies also to labour force: it is not that labour-deficient households are poor, but poor households lack labour force as a result of poverty. Of course poverty is a self-reinforcing process resulting from interactions, but the fundamental deficit seems to be in the capacity of advancing agricultural produce. It is the latter that seems to unify the protean situation observed in the countryside (Ege 2002b, 1453).

13 Surplus extraction is another important element of the situation. Nevertheless, the notion of tributarism seems to be more relevant for the past rather than for the present (Berhanu 2005). Furthermore, at least today commercial capital plays a role. Finally, although the assumption of a homogeneous peasantry is useful, if not necessary, when analyzing state-peasant relationship, yet it is empirically untenable. It is necessary to analyze it properly when discussing the impact of a new land policy, otherwise important misinterpretations may follow (with this respect, see also note 32).
Starting from these preliminary observations, the next section of the paper abandons the static point of view of this first section to analyze the dynamics of reproduction of a corn economy with two representative producers – a deficit and a surplus one – exchanging land and labour in an interlocked manner\textsuperscript{14}. The third section analyses the consequences of a positive shock on production in the form of chemical fertilizer, to show how in this economy unintended outcomes like technological stagnation rather than agricultural growth might emerge. The last section concludes with some consideration about the more general significance of the analysis.

II. THE MODEL

Consider a closed economy where two peasants produce a homogeneous commodity – corn – by means of the same technique of production, under which land and labour are to be mixed in fixed proportion. The production process lasts one period, and the next starts with the new harvest. Each peasant has access to an amount of land that produces a positive surplus with respect to his subsistence needs, and that requires exactly his self-labour to be tilled. Even though, one of the two peasants cultivates directly only part of his land, self-employing only part of his labour. In order to cover his subsistence needs, this producer is compelled to supply the rest of his labour to the other producer in exchange for a wage, to be advanced during the cropping year in terms of corn. Consequently, he also supplies the rest of his land to the other producer, in exchange for a rent amounting to a share of the harvest of the year after. At the ruling unit rent and wage rate, the land and labour supplied by the deficit producer are fully demanded by the surplus producer. Note that such exchanges are interlocked: had not the one to supply labour, he would neither supply land; and did not he supply land, the other would not demand labour\textsuperscript{15}.

Under these assumptions, the deficit producer’s balance of corn $B_t$ for the year $t > 0$ amounts to the algebraic sum of four flows

\begin{equation}
B_t = Y_t + R_t + W_t - X_t.
\end{equation}

\textsuperscript{14} The precise link existing between the static analysis of this section and the dynamic one of the following two sections is found in the last paragraph of the next section.

\textsuperscript{15} In comment to the assumptions of the model, it is worth adding few observations. First, recall that the reason underlying the deficit producer’s labour disposal is discussed in the previous section. Second, recall also that the assumption of fixed coefficients of production is justified in note 2. Third, smaller peasants might adopt more labour-intensive techniques. Similarly, land fertility, labour effort and skills might be differentiated. However, these details are unnecessary to the argument. Fourth, note that peasant interlocked exchanges can be reduced substantially to a pure reciprocal exchange of labour, the one of the deficit producer being repaid by wage advance, the one of the surplus producer by a share of the harvest of the year after. However, from the disaggregate point of view, the individual deficit producer may supply labour and land to a number of different surplus producers. Last, note that the model is oversimplified for many reasons. In particular, it avoids to analyze the role of commercial capital in the external market for produce, which in practice may involve a relatively limited share of production (for instance, around 15% in the case studied by Mesfin 1991).
$Y_t$ stands for the direct product. $R_t$ stands for the rent. $W_t$ stands for the wage. $X_t$ stands for the circulating capital advanced on an annual basis to reproduce the production process. Let $\lambda_t \in [0, 1]$ be the fraction of the deficit producer’s labour $L > 0$ hired out in the year $t$, so that the complementary fraction $1–\lambda_t$ is deployed in direct production. The direct product $Y_t$ amounts to a fraction $1–\lambda_{t-1}$ of the overall product $Y > 0$ of the deficit producer’s land:

(2) \[ Y_t = Y(1–\lambda_{t-1}). \]

Instead, the complementary share of that product $Y\lambda_{t-1}$ is produced under sharecropping, and the rent $R_t$ amounts to a fraction $\sigma_S \in [0, 1]$ of it, $\sigma_S$ being the ruling unit rent:

(3) \[ R_t = \sigma_S Y\lambda_{t-1}. \]

The wage $W_t$ amounts to the corn repaying the hired-out labour $L\lambda_t$ at the ruling wage rate $w_S > 0$:

(4) \[ W_t = w_S L\lambda_t. \]

Finally, it is convenient to reduce the annual advance $X_t$ to household’s subsistence needs, assumed to be equal to the constant value $X > 0$:

(5) \[ X_t = X. \]

From (1)-(5), the corn balance of the deficit producer can be expressed as

(6) \[ B_t = (Y–X) – (1–\sigma_S)Y\lambda_{t-1} + w_SL\lambda_t \]

with $\lambda_t, \lambda_{t-1} \in [0, 1]$. Note that the constant term in (6) satisfies the accounting condition

(7) \[ Y–X > 0. \]

Let the production function be $Y_t = \min((Y/A)A_{t-1}, (Y/L)L_{t-1})$. $Y_t$ is the corn harvested at the beginning of the year $t$ after having cultivated during the year $t–1$ the amount of land $A_{t-1}$ by means of the labour force $L_{t-1}$. $Y/A$ and $Y/L$ are land and labour productivities. According to the assumptions of the model, $Y$ can be read as the productive capacity of the producer, $A$ as his holding size, and $L$ as his labour force. Thus, $L_{t-1} \leq L, A_{t-1} \leq A$, and $Y_t = Y \times \min(A_{t-1}/A, L_{t-1}/L)$. Expression (2) follows after setting $A_{t-1}/L_{t-1} = A/L$ and $L_{t-1}/L_t = 1 – \lambda_{t-1}$.

The first definition of surplus of the earliest classical thought includes also seed, fodder, fixed capital amortization, etc. That definition fits a context where house-holding is the prevailing mode of production, while later definitions of surplus may accommodate different modes of production (Bhaduri 1983, ch. I). Given the peculiarity of the Ethiopian system of land tenure, it would be also convenient to include in the outflow $X_t$ tax payment, which ensures peasant access to land. There are also other obligations, like the progressive agricultural income tax, but most households may be registered below the threshold above which income is to be taxed on a progressive basis (Aspen 1993, 85-90).
This condition says that if the deficit producer did not hire out labour, so that in (6) \( \lambda_{t-1} = \lambda_t = 0 \) holds, then his corn balance \( B_t \) would amount to the entire surplus product of his land \( Y-X \), which is positive according to the assumptions of the model.

Given that in the economy land and labour are fully employed, the aggregate balance of corn is constant, amounting to the surplus product of the overall land. Consequently, the corn balance of the surplus producer – amounting to the surplus of his land plus the profit realized by tilling rented land by means of hired labour – is of an expression similar to (6), but with the signs of the terms proportional to \( \lambda_{t-1} \) and \( \lambda_t \) reversed, and with the constant term redefined as the surplus product of his land. Hence, while the aggregate surplus is constant, the social distribution of the latter varies according to the labour disposal of the deficit producer. The latter supplies labour only if forced by necessity. If his availability of corn \( Y_t + R_t \) for the year \( t \) was enough to cover his subsistence needs \( X_t \), that is \( Y_t + R_t - X_t \geq 0 \), then his supply of labour of that year would be nil. Nevertheless, this is not the case. He faces a deficit \( X_t - Y_t - R_t > 0 \), and consequently he is compelled to hire out labour in order to cover such a deficit. Therefore, until the following boundary condition holds

\[(8) \quad (Y-X)/(1-\sigma_s)Y < \lambda_{t-1} \leq 1,\]

the labour disposal of the deficit producer is bound to satisfy the null-balance condition

\[(9) \quad W_t = X_t - Y_t - R_t.\]

This, along with (2)-(5), gives the first-order difference equation

\[(10) \quad wS\lambda_t = (1-\sigma_s)Y\lambda_{t-1} - (Y-X).\]

Note that the deficit producer’s labour supply is of a forced nature. According to (10), the labour supplied \( L \lambda_t \) is negatively correlated to the wage rate \( wS \): given the deficit on the right hand side of (10), which depends on the labour disposal of the year \( t-1 \), and which according to (8) is positive, the higher the wage rate, the lower the labour that in the year \( t \) the producer is compelled to hire out to cover that deficit and match subsistence. The general solution of (10) is

\[(11) \quad \lambda_t = (1+\pi_s)(\lambda_0 - \lambda_s) + \lambda_s,\]

where \( \lambda_0 \) is an arbitrary initial value, and \( \pi_s \) and \( \lambda_s \) are defined by

\[(12) \quad (1+\pi_s) = (1-\sigma_s)Y/wSL\]

\[(13) \quad \lambda_s = (Y-X)/[(1-\sigma_s)Y-wSL].\]
\( \pi \) is the prevailing rate of profit, while \( \lambda \) is the value of the only constant sequence satisfying (10). (11)-(13) exhibit how the time-path of reproduction followed by the deficit producer – and therefore by the overall economy – may be of three types, depending on the values of the parameters \( \lambda_0, 1+\pi S \) and \( \lambda S \).

(a) Enlarged reproduction and autarchy. If the initial condition is \( \lambda_0 < \lambda S \), which in view of (13) can be written as

\[
(14) \quad w_0 L + \sigma S Y > Y - (Y - X)/\lambda_0,
\]

then the time-path followed by (11) negatively diverges and overcomes in a finite time the lower extreme of (8). Correspondingly, the economy reaches a stationary state where the deficit producer has the full control of his labour and land, and their produce. In other terms, if the prevailing terms of exchange \((\sigma S, w)\) are sufficiently high that in the initial year the amount of corn extracted by the surplus producer as profit, that is \(\lambda_0[(1 - \sigma S)Y - w_0 L] \), does not exhaust the entire surplus product of land, that is \(Y - X\), then, starting from the subsequent year, the deficit producer is able to satisfy his subsistence needs by reducing his supply of labour and land in favour of direct production. In this way, year after year, he gradually emancipates himself from any form of economic dependency, being finally able to maintain full control of his resources. From the point of view of the overall economy, the enlarged reproduction of the deficit producer leads to a new class configuration – say autarchy – where the two producers share the same status.

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18 The general solution of (10) is (11) only if \((1+\pi S)=1\), which implies \(\sum_{t=0}^{\infty} (1+\pi S)^t = [1 - (1+\pi S)]/[1-(1+\pi S)]\). Conversely, if \((1+\pi S)=1\), then \(\sum_{t=0}^{\infty} (1+\pi S)^t = 1\), and the general solution is

\[
(11\text{-bis}) \quad \lambda - \lambda_0 = (Y - X)/w_0 L.
\]

19 From an analytical viewpoint, enlarged reproduction accounts for four different sub-cases. Refer to (11)-(13). First, if

\[
(14a) \quad Y < w_0 L + \sigma S Y,
\]

then \(1+\pi S < 1, \lambda S < 0\), and independently from the initial value \(\lambda_0 \in [0, 1]\), the time-path tends to converge to the negative stationary value \(\lambda S\). Second, if

\[
(14b) \quad Y = w_0 L + \sigma S Y,
\]

then \(1+\pi S = 1\), and the time-path negatively diverges (recall note 18). Third, if

\[
(14c) \quad X < w_0 L + \sigma S Y < Y,
\]

then \(1+\pi S > 1, \lambda S > 1\), and again the time-path negatively diverges. Last, if

\[
(14d) \quad Y - (Y - X)/\lambda_0 < w_0 L + \sigma S Y \leq X,
\]

then \(1+\pi S > 1, \lambda_0 < \lambda < \lambda S \leq 1\), where \(\lambda_0 = (Y - X)/(1 - \sigma S)Y\) is the lower extreme of (8), and once more the time-path negatively diverges. Note that according to (7), the term on the left-hand side of (14a) exceeds the one of (14c), which in turn exceeds the one of (14d). Note also that the time-path of enlarged reproduction overcomes in a finite time the lower extreme \(\lambda_0\): if \(1+\pi S \neq 1\), then \(\lambda_0 < \lambda S\) iff \(t > \log_{1+\pi S}((\lambda - \lambda_0)/(\lambda_0 - \lambda_0))\); if \(1+\pi S = 1\), then \(\lambda_0 < \lambda S\) iff \(t > w_0 L(\lambda_0 - \lambda_0)/(Y - X)\).

Last, note that if \(t\) is the critical year, then \(\lambda_0 = 0 \forall t \geq t\).

20 Note that condition (14) can be easily written as \(\lambda_0[(1 - \sigma S)Y - w_0 L] < Y - X\).
(b) Simple reproduction and stagnation. If the initial condition is \( \lambda_0 = \lambda_S \), then the inequality (14) turns into an equality, and the time-path followed by (11) is constantly equal to \( \lambda_S \) given by (13). Correspondingly, the economy stagnates in a stationary state where a fraction \( (1 - \lambda_S) \) of the deficit producer’s labour and land are under his direct control, while the complementary fraction \( \lambda_S \) is commanded by the surplus producer. In other terms, when the surplus producer extracts as profit the entire surplus product of land, the deficit producer is left in a state of simple reproduction, where he is just able to reach subsistence and maintain a partial control of his labour and land. From the point of view of the overall economy, the simple reproduction of the deficit producer corresponds to a stagnating class configuration where the status of the two producers is relatively differentiated.

(c) Contracted reproduction and polarization. If the initial condition is \( \lambda_0 > \lambda_S \), then in (14) the sign of inequality is reversed, and the time path followed by (11) positively diverges and reaches in a finite time the upper extreme of (8). Correspondingly, the economy reaches a state where the surplus producer has no more direct control of labour and land. In other terms, when in the initial year the surplus producer extracts as profit more than the surplus product of land, the deficit producer is compelled since the year after to augment his supply of labour and land at the expense of direct production. In this way, year after year, he is gradually evicted, being finally forced to depend completely on the surplus producer’s support. From the point of view of the overall economy, the contracted reproduction of the deficit producer leads to a new class configuration – say polarization – where the difference between the status of the two producers is maximum.

Before turning to the problem of technological change, it is worth referring once more to Figure 1. The condition allowing for the deficit producer’s simple reproduction identifies one point on the line characterized by the fixed land-labour ratio of technology \( A/L \). For instance, let such a point be \( P_5 \). Thus, its coordinates satisfy the condition \( 1 - \lambda_0 = L_5/L_1 = A_5/A_1 \), where \( A_1 = (A/L)L_1 \) and \( L_1 \) stands for \( L \) above. The point \( P_5 \) identifies the first (unstable) equilibrium of the model – stagnation. The second (stable) equilibrium – autarchy – is captured by the point \( P_1 \). It is the final result of the process of enlarged reproduction, and corresponds to a situation where the deficit producer’s land and labour are both fully employed in direct production. Finally, the deficit producer’s eviction, which is the situation resulting from the process of contracted reproduction, is captured by the origin of the axis, where the deficit producer’s labour and land are both entirely supplied to the surplus producer. Note that such a situation is not an equilibrium: under the conditions of contracted reproduction the deficit producer cannot survive of only wage and rent. Nevertheless, if emigration, ploughboys adoption, or any other factor that may finally reduce the deficit producer’s labour force are allowed, then the last (stable) equilibrium of the model – polarization – is captured by the point \( P_3 \). The interpretation of the latter is given in the first section: while the difference \( L_1 - L_5 \) stands for hired labour force, \( L_5 \)

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21 Refer to (11)-(13), and recall note 19. If the sign of inequality of (14) is reversed, then \( 1 + \pi_S > 1, \lambda_S < \lambda_S < \lambda_0 < 1 \), and the time-path positively diverges, overcoming in a finite time the upper extreme of (8): \( \lambda_t < 1 \) iff \( t > \log_{\lambda_S}((1-\lambda_0)/(\lambda_0-\lambda_S)) \), where \( \lambda_S < \lambda_0 < 1 \). Note also that if \( \tau \) stands for the critical year, then \( \lambda_t = 1 \) \( \forall t \geq \tau \).
now stands for labour force compelled to emigrate. Correspondingly, while the difference \( A_1 - A_5 \) stands for rented land, \( A_5 \) now stands for land supplied but left uncultivated. In fact, the land of the evicted deficit producer might remain fully cultivated if the wage rate and unit rent adjusted to allow for his subsistence. More realistically, it would be enough to assume that the surplus producer disposed also of surplus labour. Nevertheless, although this last assumption is at least of some descriptive relevance, it is analytically unnecessary when turning to the problem of technological change\(^{22}\). As the next section shows, it is the underlying conflict for the control of land that plays the key role.

*Figure 2. Conditions of production and class structure*

III. THE TRANSFORMATION

Figure 2 synthesizes the model. The two axes report the values of the ruling wage rate \( w \) and unit rent \( \sigma \) respectively. To economize in notation, set \( S = Y - X \) and normalize \( L \) and \( Y \) to the unit. Given the initial state \( \lambda_0 \), the segment AB is the graph of (14) with the sign of equality. It is the locus of all the terms of exchange \((\sigma, w)\) that are compatible with the deficit producer’s simple reproduction. The terms of exchange left at northeast of AB are conversely compatible with his enlarged reproduction, while the rest with his contracted reproduction. Starting from the initial state \( \lambda_0 \), and depending on the ruling conditions of production \((\sigma, w)\), the dynamics of reproduction of the economy may lead to three stationary states: (a) autarchy; (b) stagnation; (c) polarization. What discriminates among these three situations is the class structure

\(^{22}\) However, it is important to observe that, under that assumption, the loss of productive labour due to the partial emigration of the deficit producer’s labour force tends to be compensated by the absorption of the surplus labour of the surplus producer. Thus, emigration tends to correspond both to a reallocation of resources and, from the point of view of the overall economy, to an extraction of surplus labour, so that aggregate production tends to stagnate.
of society, reflection of the underlying social distribution of labor, land, and their produce.

Consider a situation like the one corresponding to the point \( P_0 \) of Figure 2. Given the initial state \( \lambda_0 \), let the prevailing conditions of production \((\sigma_S, w_S)\) satisfy (14) with the sign of equality, so that \( \lambda_0 = \lambda_S \). In other terms, let the deficit producer persist in a stationary state of simple reproduction, with a partial control of his labour and land. Starting from this initial situation, what follows analyzes the consequences of a positive shock on production in the form of chemical fertilizer. Assume that the latter has to be mixed with land in fixed proportion, that it leaves the previous land-labour proportion unaffected, that it requires an advance of corn, and that improves land productivity. In particular, suppose that if in the year \( t-1 \) the deficit producer advances the corn necessary to cover the subsistence needs \( X \) and to adopt the fertilizer to be mixed with the self-labor \( L (1-\lambda_{t-1}) \), that is

\[
(15) \quad X_{t-1} = X + xL (1-\lambda_{t-1}),
\]

then, the year after, he harvests the corn

\[
(16) \quad Y_t = (1+\delta)Y (1-\lambda_{t-1}).
\]

In (16) \( x \) stands for the corn advanced for fertilizer per unit of labour, while \( \delta \) for the corresponding relative improvement of labour productivity. Both \( x \) and \( \delta \) are positive and satisfy the accounting condition

\[
(17) \quad \delta Y - xL > 0.
\]

Note that according to (7) and (17), the surplus product of land improves. Whether this enhancement is enough to benefit the deficit producer depends on how the change of technology interacts with the pre-existing conditions of production \((\sigma_S, w_S)\), and transforms the parameters \( \lambda_0, 1+\pi_S \) and \( \lambda_S \) governing the dynamics of reproduction (11).

In the adoption year \( t = 0 \), the deficit producer’s availability of corn is \( Y_0 + R_0 \), where \( Y_0 \) and \( R_0 \) are the direct product and rent given by (2) and (3) for \( \lambda_{t-1} = \lambda_S \).

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23 In comment to this second set of assumptions, it is worth adding few other observations. First, not analyzing the market for produce, this study does not analyze the market for fertilizer as well. Second, a change in the land-labour ratio would not affect the essence of the analysis. Third, the argument substantially applies to any other technology. In fact, the morphology of terrain and the fragmentation and small size of peasant plots might contribute to explain the lack of private investments on land and mechanized technology. Conversely, the insecurity of land tenure entailed by the recurrent redivisions experienced until the most recent past (Hoben 2001; Berhanu et al. 2003; Berhanu 2005) fails to explain permanent crops, tree-planting (Crummey 2003), and reluctance towards agricultural packages (recall note 10, the fact that in the 1960s peasants readily adopted agricultural packages, and the fact that the benefits of the latter are limited to only one agricultural season). Last, it might be wondered why credit is not included in the picture. For a comment on this refer to note 29.

24 It might be argued that in order to represent an improvement, the new technology should entail a lower unit cost of production, so that condition (17) should be replaced by the more binding one \( \delta Y > (Y/X)(xL) \), where \( Y/X > 1 \) according to (7). Nevertheless, there is no possibility for agricultural extension, so that the surplus cannot be reinvested on new land with the traditional technique.
Hence, according to (9) and (15), if he advances corn for fertilizer, he is compelled to hire out a fraction of labour $\lambda_{0T}$ satisfying the initial condition

$$\lambda_{0T} = \frac{(x+ws\lambda_0)}{(x+w_0)}.$$  

In (18), $\lambda_0 = \lambda_S$ is the fraction of labour that he would hire out if he did not adopt fertilizer, while $w_0$ is the wage rate ruling in the year of adoption. Since the labour supply is of a forced nature, according to (18) the hired-out labour $L\lambda_{0T}$ is correlated positively to the unit advance $x$, but negatively to the wage rate $w_0$: given the availability of corn $Y_0+R_0$, the higher the wage rate, the lower the labour the producer is forced to supply in order to match subsistence and adopt fertilizer. Since the labour supply is of a forced nature, according to (18) the hired-out labour $L\lambda_{0T}$ is correlated positively to the unit advance $x$, but negatively to the wage rate $w_0$: given the availability of corn $Y_0+R_0$, the higher the wage rate, the lower the labour the producer is forced to supply in order to match subsistence and adopt fertilizer. Therefore, the comparative cost determined by his relative class position may exclude the deficit producer from the change of technology.

To prove this, let $(\sigma_T, w_T)$ be the terms of exchange ruling after the transformation. From (3), (4), (9), (15) and (16), the two parameters (12) and (13) are transformed into

$$\lambda_T = \frac{(1+\delta)}{(1+\delta)}Y - X - xL - \lambda_{0T},$$  

and (18) becomes

$$\lambda_{0T} = \frac{(x+ws\lambda_0)}{(x+w_0)},$$

Thus, from (11), the transformation pushes the deficit producer onto a time-path of enlarged reproduction only if the initial condition is $\lambda_{0T} < \lambda_T$. In view of (18)-(20), this becomes

$$wTL + \sigma_Y > Y + (\delta Y - xL) - [(Y - X) + (\delta Y - xL)]/\lambda_{0T}.$$  

In such a case, the stationary state that prevails after the transformation is the one of autarchy. Compare (21) and (14). If the change of technology satisfies the accounting condition

$$Y - X(\lambda_{0T} - \lambda_0)/\lambda\lambda_{0T} - (\delta Y - xL)(1 - \lambda_{0T})/\lambda_{0T} > 0,$$
then the enlarged reproduction of the deficit producer requires that the post-
transformation terms of exchange \((\sigma_T, w_T)\) dominate those that before the
transformation were compatible with his simple reproduction, that is \((\sigma_S, w_S)\). Note
that (22) captures a net cost: the second addendum captures the absolute improvement
of the surplus product of land (17), while the first one captures the initial cost of
adoption specific to the deficit producer, which is due to the initial contraction
corresponding to (18), and which is positive according also to (7)
28. Consider then a
change of technology satisfying (22). Coherently with (21), the deficit producer would
benefit from the improved technology only if he could prevail on the other producer,
and make the post-transformation terms of exchange \((\sigma_T, w_T)\) dominate the pre-
transformation ones \((\sigma_S, w_S)\) so much to absorb the net initial cost captured by (22).
However, he is in a relatively weak position with respect to the surplus producer,
because the rent and wage paid by the latter are necessary to his survival. Thus, he
cannot turn those customary conditions of production to his own advantage, and his
class-determined comparative disadvantage may finally exclude him from the
benefit.

It might be argued that although the deficit producer might not adopt fertilizer, it
is the surplus producer that should do it on the land he commands. After all, if he
disposes of enough surplus to advance fertilizer on his own land, he may do the same
on sharecropped land, and in such a case he does not encounter the cost specific to the
other producer
30. Hence, let the deficit producer persist in the stationary state \(\lambda_0 = \lambda_S\),
and suppose that indeed the surplus producer is able to advance the corn required by
the fertilizer to be mixed with the hired labour \(\lambda_S L\). Note that if in the generic year \(t–1\)
the surplus producer adopts fertilizer, then the deficit producer’s rent of the year \(t\)
turns into

\[
R_t = (1+\delta)\sigma_T Y \lambda_{t-1},
\]

where \(\sigma_T\) is the unit rent prevailing after the transformation. From (2), (4), (5) (9) and
(23), the two parameters (12) and (13) governing the time-path (11) are transformed
into

\[
(22)-\text{bis} \quad \pi_{S\omega L}(\lambda_0–\lambda_0) – (\delta Y-xL)(1–\lambda_0) > 0.
\]

The deterministic nature of the argument might lead to deduce that credit would solve the impasse. Nevertheless, if
stochastic harvest fluctuations are included in the analysis, then crop-failure – and therefore contracted reproduction
and eviction – is an event of small but positive probability. The (compounded) loss entailed by the latter is so high that
the sign of the final expected outcome may result to be negative. The fact that crop failure is an issue for credit-based
agricultural extension programmes is a matter of experience (Belay 2003, 39; Dejene 2003, 197).

If surplus labour is allowed, then, because of self-consumption, the surplus product left to the surplus producer
would be little, if not nil. Hence, it might be even argued that the latter might not have the capacity of adopting
fertilizer on its own land. Nevertheless, the important point here is that while the surplus producer may have some
interest in increasing the productivity of his own land, this is not the case with respect to sharecropped land.
(24) \((1+\pi T) = [1-(1+\delta)\sigma T]Y/wL\)

(25) \(\lambda T = (Y-X)/[[1-(1+\delta)\sigma T]Y-wL].\)

Thus, according to (11), (18), (24) and (25), the transformation pushes the deficit producer onto enlarged reproduction if it holds the initial condition \(\lambda S < \lambda T\), that is

(26) \(wT + \sigma T (1+\delta)Y > Y + Y - (Y - X)/\lambda_0\)

with \(\lambda_0 = \lambda S\). Compare (26) and (14). If the post-transformation terms of exchange \((\sigma T, wT)\) are dominated by those that before the transformation were compatible with the simple reproduction of the deficit producer, that is \((\sigma S, wS)\), then they foster autarchy – and therefore, the surplus producer’s loss of command of the other’s labour and land. In economic terms, if the surplus producer adopts the fertilizer under fixed terms of exchange, he exerts on the income path of the other producer the positive externality

(27) \(\sigma S \delta Y \lambda_0 > 0.\)

This additional inflow, which originates from the rent, activates the deficit producer’s enlarged reproduction, and compromises the surplus producer’s relative status. Consider then a change of technology. Coherently with (26), the surplus producer benefits from it only if he could prevail on the other producer, and make the post-transformation terms of exchange \((\sigma T, wT)\) dominated by the pre-transformation ones \((\sigma S, wS)\) so much to internalize the externality (27) and seize the entire improvement of the product of land. However, also his position is relatively weak, because the system of land tenure protects the deficit producer’s right to land. Thus, he cannot turn those customary conditions of production to his own advantage, and the positive externality exerted through the rent on the income path of the deficit producer gives the surplus producer a disincentive to change technology on sharecropped land.

Figure 3 summarizes the overall argument. Again, the two axes report the values of the wage rate \(w\) and unit rent \(\sigma\) respectively, \(S = Y-X, S_T = (1+\delta)Y-X - xL,\) and \(L = Y = 1.\) Recall the situation prevailing before the transformation. The segment AB is the graph of (14) with the sign of equality, and is the locus of the terms of exchange that are compatible with the simple reproduction of the deficit producer. The region left at northeast identifies the terms of exchange that are compatible with his enlarged reproduction, while the region OAB those compatible with his contracted reproduction. Turn now to the situation arising after the transformation. The segment CD refers to a change of technology satisfying (22), and is the graph of (21) with the sign of equality. It is the transformation of the locus AB due to the adoption by the deficit producer. Note that CD is parallel to AB, and that their constant vertical distance – measured by the length of the segment AC – is equal to the deficit producer’s net cost of adoption (22). Similarly, the segment AE is the graph of (26) with the sign of equality, and represents the transformation of the locus AB due to the
adoption by the surplus producer. Note that AE and AB are of equal intercept but different slope, so that their variable vertical distance is indeed equal to the positive externality (27) per unit of sharecropped produce. CD and AE divide the plan into three regions: the one at northeast of CD, OAE, and the critical one ACDE.

*Figure 3. Technological change and conflict of interests*

Given the initial state \( \lambda_0 \), suppose that before the transformation the ruling conditions of production are those corresponding to the point \( P_0 = (\sigma_5, w_5) \), which lies on AB in the critical region ACDE. Starting from this initial situation, where the deficit producer has partial control of his labour and land, consider the transformation. If the deficit producer could absorb his class-determined cost – measured by the length of the segment \( P_0F \) – by means of post-transformation conditions of production lying in the region at northeast of CD, like the point \( P_1 = (\sigma_7, w_7) \), he would change technology. In such a case, the stationary state prevailing after the transformation would be autarchy. Conversely, if it was the surplus producer to internalize the inter-class externality – measured by the length of the segment \( P_0G \) – by means of post-transformation conditions of production lying in the region OAE, like the point \( P_2 = (\sigma_8, w_8) \), he would be the one to change technology. In this second case, the prevailing stationary state would be polarization. Nevertheless, each producer is in a relatively weak position with respect to the other. The wage and rent paid by the one are necessary to the other's survival, while the latter’s right to land is ensured by the system of land tenure. Therefore, neither one can prevail in turning the customary conditions of production to his own advantage outside the critical region ACDE. In this case, the change of technology benefits no one, and the conflict of interest results.
in stagnation. The latter is the only equilibrium where the best response when the other does not adopt is not adopting as well.

IV. SIGNIFICANCE OF THE RESULT

In the specific historical situation considered by this paper, class-differentiation is neither a question of holding size nor of ox-ownership, but is forced by the necessity of survival of deficit producers\textsuperscript{31}. This attributes a differentiated response to price and market mechanisms that may be termed rationality dictated by \textit{class-determined comparative costs}. The latter reflects the longstanding conflict for the control of land that before the agrarian reform of 1975 used to find explicit expression in the customary practice of peasants of claiming land in courts, and that after the reform has became somehow less apparent because mediated mainly by sharecropping. Today as in the past, that conflict tends to reallocate land from contracting households that cannot cultivate it to enlarging households that can\textsuperscript{32}. This is an important element of continuity between the pre-reform system of land tenure and the post-reform one. Nevertheless, there is also an important difference. While in the past successful claimants gained full control over additional land, today that control is only partial. The post-reform system of land tenure guarantees the right to land to any peasant, and enlarging households must pay a rent on additional land. It is this new fact that might explain why today peasants are so reluctant towards agricultural packages while in the 1960s they were not. Notwithstanding its historical specificity, this situation assumes a more general significance in so far as it exemplifies the consequences of a reform that addressed only one sector of the economy, while neglecting the other interlocked ones. Inequality is a multidimensional phenomenon, and to correct it only in one dimension may result counterproductive. In analogy with the second-best argument, when equality pertains only to one sector, the free adjustment of the other sectors may lead to counterintuitive outcomes, like technological stagnation rather than agrarian growth\textsuperscript{33}.

\textsuperscript{31} It is worth emphasizing that the economic notion of class is not incompatible with the typical weak sense of community, or with the fact that peasant households are not enduring entities with strong kinship ties. Indeed, there is little if no space for the social notion of class consciousness (Hoben 1973; Ege 2002a). However, as long as there is evidence for different modes of organizing household production, it is the economic notion of class that allows to discriminate between them. In fact, deficit and surplus producers are to some degree both direct producers, so that the logic distinction between the two classes is of a fuzzy nature. Nevertheless, when considering their economic motivations, any ambiguity is ruled out. Neither the notion of class is incompatible with the one of class mobility (Berhanu 2005, 308). The latter remains beyond the scope of this analysis, but it is worth observing that it is an important open question whether the factors that before the reform used to grant a high degree of mobility (Hoben 1973), are still operating today, and in what direction. For instance, in the past, the adoption of poor ploughboys by richer households, and the gifts they received for marriage in the form of fixed and circulating capital, used to contribute to a great extent to their sustenance. Are today this and other similar practices still common?

\textsuperscript{32} This enduring aspect of peasant agriculture is of overwhelming relevance when analyzing the impact of a new land policy (recall note 13). Virtually any peasant – land lessors included – will asserts that he would never sell his land if he had the right to do it (Berhanu et al. 2003). However, this does not mean that he would never do it if compelled by his necessity of survival. What peasant would like to do in theory, and what they finally do in practice, may not coincide.

\textsuperscript{33} This situation might be of a more general interest also because, with due care (Ege 2002b, 17), it shows strong similarities with other historical realities. At least one of them received special attention (Cox 1979 and 1984).
The argument is developed in two steps. The first shows why, under the ruling social conditions of production, both deficit and surplus producers may be reluctant to change technology. Deficit producers tend to be excluded from the change by the cost of adoption specific to their relative class position. They cannot substitute corn satisfying their subsistence needs for advancing fertilizer, for their consumption cannot be contracted any further. Instead, they would be forced to hire out labour they self-employ, therefore contracting direct production and incurring a loss. On the other hand, surplus producers may have the interest in changing technology on their own land, but they tend to avoid the change on sharecropped land because of the positive externality they would exert on the other producers. The economic function of rent is reversed in so far as it is an integral component of deficit producers’ income. This entails a positive externality in the sense that, if surplus producers improved technology, the benefit would be felt also by the income-path of deficit producers, with the result of compromising the former’s command over the latter’s resources. In both cases a change in technology would require a major change also in the ruling social conditions of production, to favour one class at the expense of the other. And should it take place, it would transform the class structure of society in two opposite directions.

Hence, the second part of the argument abandons the notion of allocative efficiency of price response, and evaluates instead how peasant exchange relations resolve that conflict of interest to sustain all the members of society. The final result argues that the interaction between technology and mode of production may oppose innovation – a result that has its precedents in the analytical traditions of semi-feudalism (Bhaduri 1973) and of the early classical thought (Vaggi 1985). As long as it requires a change in the ruling social conditions of production, technological change tends to depend on its interaction with the class structure of society. If deficit producers were in the position to turn those conditions to their own advantage, technological change would promote the mitigation of differentiation within society. Conversely, were surplus producers in such a position, technological change would exacerbate differentiation. However, if no class can impose itself on the other because of necessary economic dependencies and common cultural values embodied into law, technological stagnation tends to emerge as the only resolution of the conflict of interest, and the existing class configuration of society is preserved. Therefore, judged from this point of view, peasant exchange relations are relatively efficient in maintaining society integrated, if not in favouring technological dynamism. In the light of the present lack of knowledge of peasant mode of production, what set and what timing of interlocked interventions would be more efficient in promoting social integration and agrarian growth does remain an open question.

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There is both clear evidence and widespread agreement on the fact that, in comparison to other historical realities, in Ethiopia emigration from rural areas is still contained and mainly directed towards other rural areas (Getnet 2010).
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