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*Inequality and Trade: A Behavioral-Economics Perspective*

by

*Sugata Marjit and Punarjit Roychowdhury*



## **The Authors**

**Sugata Marjit** is Reserve Bank of India Chair Professor of Industrial Economics at the Centre for Studies in Social Sciences, Calcutta, India and External Research Fellow at The Leverhulme Centre for Research on Globalisation and Economic Policy (GEP), Nottingham, United Kingdom.

**Punarjit Roychowdhury** is a PhD student and Adjunct Lecturer at the Department of Economics, Southern Methodist University, United States.

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# Inequality and Trade: A Behavioral-Economics Perspective

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## Abstract

In this paper we present a version of the Mitra and Trindade (*CJE*, 38: 1253-1271, 2005) model to examine how differences in preexisting levels of inequality between countries may determine the pattern of international trade when individual preferences are non-homothetic. In particular, using a standard 2x2x2 Heckscher-Ohlin framework, we propose a *behavioral* linkage between asset inequality and trade pattern by endogenizing non-homotheticity in terms of *status dependent preferences*. We show that for sufficiently high ratios of capital to labor earnings, there exists a critical level of inequality such that specificities of the pattern of trade that emerge between the two countries are contingent upon whether the inequality levels prevailing in the countries are above or below this level. For sufficiently low ratios of capital to labor earnings, however, the trade pattern is independent of the existing levels of inequality relative to the critical level. Based on our model, we examine the impact of the resultant trade pattern on the levels of income inequality. Finally, we discuss some interesting international spillover effects of redistributive policies.

**Keywords:** Heckscher-Ohlin Model, Income Inequality, Non-homothetic preferences, Social Status, Status good, Trade pattern.

**JEL Classification:** D11, F11, Z13

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# 1 Introduction

Classical and neoclassical trade theory posits differences in relative factor endowments between countries as the basis of international trade. Empirical studies, however, reveal that the bulk of world trade takes place between “similar” countries, i. e., countries that virtually have no supply side differences (Krugman, 1981).<sup>1</sup>

In this paper, we attempt to explain this seemingly paradox by constructing a simple model of international trade focusing on the role of income distribution in determining trade pattern and flows under the assumption of non-homothetic preferences (that is, income expansion paths are non-linear).<sup>2</sup> Specifically, we try to answer the following questions: can difference in the levels of income inequality determine the pattern of trade between countries, all else equal? If so, what are the specificities of the pattern of trade potentially emerging out of differences in levels of inequality? What are the implications of such trade on commodity and factor prices in the trading economies? What are its implications for the economies as a whole from a welfare perspective?

Our paper is inspired primarily by the seminal work of Mitra and Trindade (2005) which proposes that when preferences are non-homothetic, differences in inequality levels between two countries may potentially act as a driving factor of trade between countries with similar factor endowments. Our approach, as well as theirs, is related to the burgeoning literature in international economics that systematically incorporates demand side considerations mainly by exploiting the idea of non-homotheticity in individual preferences (see for example Markusen, 1986, 2013; Hunter, 1991; Bond et al., 2011 and Santra, 2014) so as to explain trade pattern and flows.<sup>3</sup> However, our paper departs from Mitra and Trindade (2005) precisely by the way the non-homotheticity in preferences is modeled to establish a link between inequality and trade. As it turns out, altering the foundation of non-homothetic preferences changes the key predictions of the theory of inequality driven trade considerably.

In order to provide a basis of the non-homotheticity in preferences, Mitra and Trindade (2005) make use of the Engel’s law according to which as income rises, the proportion of expenditure on food is likely to decline whereas that on non-food items is likely to increase. Based on this idea, they argue that if there are two countries with one country being more unequal than the other in terms of income distribution, all else equal, then the demand for food would be lower in the relatively more unequal country because the rich are richer in this country and hence by the

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<sup>1</sup> Empirical evidence of trade between countries that are similar in terms of the supply side is plenty. There is a large literature that shows that North-North trade is far more common than North-South trade. This has also been recently confirmed by Grossman and Rossi-Hansberg (2014) who note that “most trade flow between and among the advanced industrialized economies”. That South-South trade has also seen a marked increase in recent times is also noted by the World Trade Organization.

<sup>2</sup> The intuition behind why income inequality might potentially serve as a determinant of trade flows and pattern when preferences are non-homothetic is simple. Non-homothetic preference implies aggregate demand for each good depends not only on aggregate income but also on its distribution. Now if that is the case, then the income distribution must also be a determinant of trade since a country’s imports is nothing but the difference between its aggregate demand and supply.

<sup>3</sup> As pointed out by Davis and Weinstein (2003) and later re-iterated by others, although research on demand side trade theory is still in a preliminary stage, there are already some indications of the importance of demand on trade.

virtue of Engel's law, consumes less food. As such, when these two countries open to trade, the world price lies between the two autarky prices which in turn causes the relatively more unequal country to export food and import non-food items (manufactures).

We, however, refrain from incorporating non-homotheticity in preferences via Engel's law.<sup>4</sup> Instead, we provide an alternative 'behavioral' explanation of why preferences might not be homothetic based on recent experimental insights from social psychology (Sivanathan and Petit, 2010). In particular, using a standard Heckscher Ohlin framework involving two countries, two factors of production and two goods - a *status good* and a *non-status good* - our paper endogenizes non-homotheticity in terms of 'status dependent preferences' (Marjit, 2012).<sup>5</sup> That is, utility of individuals in our model depend not only on absolute levels of consumption of status and non-status good as usual, but also on individuals' *social status* - which we define as her position in the society in terms of income relative to the average societal income - in a very specific way. Based on prior evidence, we assume that individuals having lower than average income are psychologically hurt and suffers a loss in utility from falling behind. In order to compensate for their loss in utility they seek to consume more of the status good to protect their 'self'. Those with equal to or more than average income, quite naturally, do not have such additional motives to consume the good. Therefore status consumption in our model is purely due to affirmational purposes.

We start off by assuming that both countries in our model are identical in terms of factor endowments and technology. We do so to rule out any supply side differences. The only difference between the countries that we would like to have is in terms of income distribution with one country being more unequal than the other. We do this in a very specific way. We explicitly assume an ownership structure for the factors of production in our model. For given factor prices, this determines an income distribution in each country. We specify the distribution of endowments in each country in a particular way, such that it causes the income inequality levels between the countries to differ.

Notice that this difference in the levels of inequality is likely to cause equilibrium individual as well as aggregate consumption in the two countries to differ by the virtue of preferences being status dependent. This effect, as we shall show, becomes instrumental in determining how preexisting levels of income inequality within countries determine the pattern and flow of trade. In a sense, therefore, this paper provides a foundation to what one may call a *behavioral trade theory* that merges insights from conventional trade theory with that from

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<sup>4</sup> The validity of Engel's law is debatable. For example Banerjee and Duflo (2007), based on evidence from less developed countries, remarks that it is often those earning the *least* that spend the *greatest* fraction of their income on conspicuous consumption. This pattern of expenditure, however, is not restricted to only less developed nations. Wagner (2008) illustrates the presence of such consumption patterns in the US. These examples clearly go against the main prediction of Engel's law. Other empirical studies that explicitly find that Engel's law does not always hold include Kedir and Girma (2007) and Maki and Ohira (2014). Therefore, one justification for incorporating non-homotheticity via a route different from that of Engel's law is to examine whether and how inequality could drive trade in situations where Engel's law does not hold.

<sup>5</sup> Status goods usually refer to those goods whose consumption is, at least, partly driven by the prestige or status value associated with the goods. Examples of such goods are branded clothing, footwears, personal transport equipment etc. Such goods are also sometimes referred to as *conspicuous* or *positional* goods.

behavioral economics and social psychology.

Our model predicts, when the ratio of the labor to capital earnings in the two countries is *sufficiently high*, there exists a critical level of inequality such that the exact pattern of trade that arises between the countries is contingent upon whether the inequality levels prevailing in the countries is above or below this critical level. Specifically we show that if the levels of inequality prevailing in the trading countries is above the critical level, the autarky relative price of the status good would be lower in the more unequal country than the less unequal country. Consequently, when the countries open to trade, the relatively more unequal country will export the status good and import the non-status good, whereas the relatively less unequal country will do the opposite. On the other hand, if the countries are characterized by low levels of inequality (below the critical level), the autarky relative price of the status good would be higher in the more unequal country and as such under free trade the reverse pattern of trade is observed. It is interesting to note that, assuming status goods to be capital intensive, this pattern of trade may cause levels of income inequality in the countries either to *diverge* or *converge* depending upon whether the preexisting levels of income inequality within countries are above or below the critical threshold.

As mentioned, a precondition for the above results to hold is that the ratio of capital to labor earnings prevailing in the trading countries must be high enough. For lower ratios of capital to labor earnings, however, our model predicts that the relatively more unequal country will export the non-status good and import the status good, whereas the relatively less unequal country will do the opposite. In other words, critical level of inequality has no role in determining trade pattern when the ratio of capital to labor earnings is low enough. In this case, unlike the situation described above, free trade will unambiguously cause levels of income inequality between the trading countries to converge.

Thus, assuming status goods to be primarily manufactured in nature and food to be a typical non-status good, our analysis admits Mitra and Trindade (2005)'s results as a special case. While Mitra and Trindade (2005) predict that free trade driven by the differences in inequality levels *always* causes the more unequal country to export the non-status good and import the status good and in turn leads to (partial) income inequality equalization between the trading countries, our model specifies conditions under which this result might hold and under which the polar opposite result might be observed. This distinction that arises specifically from the way how preferences are modelled, certainly, is important from the perspective of designing trade policies.

We also discuss some interesting international spillover effects of redistributive policies based on our model. For instance, we show how fiscal policy undertaken by the government of a particular country impacts the pattern and the terms of trade. While, this does mean that such policies could potentially be used by the government of a country to protect a particular industry, our results suggest that same policies in our framework have the potential to yield entirely paradoxical results under certain conditions.

The paper unfolds as follows. In section 2, we present a behavioral microeconomic model of social status. Based on this model, we completely characterize the autarky and open economy equilibria and discuss some important policy issues in section 3. The last section concludes.

## 2 The Model

There are two goods, status good ( $S$ ) and non-status good ( $N$ ). There are also two factors of production, capital ( $K$ ) and labor ( $L$ ). We assume that production functions for status and non-status goods exhibit constant returns to scale. Further, we assume that the status good is capital intensive good and there are no factor intensity reversals. Also we assume perfect competition in all markets.

Individuals (indexed by subscript  $i$ ) in our framework care not only about absolute consumption of the two goods but are also concerned about their social status ( $\Lambda$ ) which we define as individual income ( $y_i$ ) relative to the average income of the society ( $\bar{y}$ ). That is,

$$\Lambda_i = \frac{y_i}{\bar{y}} \quad (1)$$

Clearly, higher is the individual's income relative to the average income, greater is her social status. On the other hand, lower is individuals income relative to the average income, lower is her social status. Note that this definition in spirit is similar to the definition of status used previously in economic literature (for instance, see Clark et al., 2008).

The reasons that might make social status a valued commodity are many. For instance, as argued by Lachman and Weaver (1998) and Lea and Webley (2006), individuals strive to attain high social status because it offers them control and the luxury of manipulating the negative elements of their social system. Moreover, status confers other psychological rewards like self esteem (Berger et al., 1972) and sense of power (Rucker and Galinsky, 2008). Conversely, those who have low status or fall behind others suffer lower self-esteem (Rosenberg and Pearlin, 1978) and therefore lack psychological resources needed to assuage self-threats (Steele, 1988). Under chronic self-threat, these individuals are likely to seek indirect opportunities to compensate for the loss in happiness and restore their global self worth.

One indirect route, as hypothesized by Sivanathan and Petit (2010), through which the individuals who fall behind attempt to restore self-worth could be by consuming status infused goods. Given the intimate connection between *self* and *possessions* (Beggan, 1992), consumption of such goods can potentially serve as an indirect source of self-affirmation. Put simply, by consuming status goods, wounded egos could tend to compensate for their loss of happiness they suffer from not being able to keep up with the rest.

To test whether status consumption indeed serves as a compensatory behavior aimed at restoring self-integrity, Sivanathan and Petit (2010) carry out a series of experiments in the laboratory and field. They find strong evidence in favor of their hypothesis. Specifically, they find that threatened individuals seek out status goods to soothe their psychological pain and they do so more when alternate affirmational resources are unavailable. Further, they find clear evidence showing that the need to acquire status goods, is at least partially motivated by their bruised self esteem. Finally, they also find that possessing a status good provides a strong psychological shield

to protect the self against arrows of negativity. In short, consumption of the status good, unlike that of the non-status good, is not driven (purely) by its inherent objective or subjective value. Rather, the internal psychology of the *self* plays a key role in determining status consumption (Baumeister, 1998; James, 1890).<sup>6</sup>

Using these insights, we invoke the following axioms to characterize the behavior of individuals in our analysis.

**Axiom 1.** *Falling behind hurts*

This implies that having income below the average level in a society reduces individual utility but having income above the average does not matter. This axiom directly stems from the fact that those who fall behind are psychologically hurt.

**Axiom 2.** *Falling behind increases the marginal rate of substitution for the status to non-status goods*

This means that people with lower than average income are willing to give up more of the non-status good to consume an extra unit of the status good. This is also directly drawn from the experimental social psychology literature where intensity of desire to consume the status good seems to be greater among those who are psychologically affected by social inequality.

Note that, our assumption of asymmetry in the comparison effect (that is, the poor by falling behind are psychologically hurt, but the rich by getting ahead of others are not psychologically better off) used to highlight the implications of belonging to the downside of the social ladder in an unequal society is confirmed by a number of empirical studies including Ferrer-i-Carbonell (2005). Using a German micropanel, Ferrer-i-Carbonell (2005) finds that, "poorer individuals' well-being is negatively influenced by the fact that their income is lower than that of their reference group, while richer individuals do not get happier from having an income above the average."

Based on the axioms we devise the following utility function to represent the preference of a representative individual  $i$ :

$$U(N_i, S_i, \Lambda_i) = f(\Lambda_i)[\log N_i + \phi(\Lambda_i)\log S_i] \quad (2)$$

where

$$f(\Lambda_i) = \begin{cases} 1 & \text{if } \Lambda_i \geq 1 \\ \Lambda_i & \text{if } \Lambda_i < 1 \end{cases}$$

(follows from Axiom 1)

$$\phi(\Lambda_i) = \begin{cases} 1 & \text{if } \Lambda_i \geq 1 \\ \frac{1}{\Lambda_i} & \text{if } \Lambda_i < 1 \end{cases}$$

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<sup>6</sup> Note that our explanation of status consumption is an alternative to commonly invoked wealth signaling explanation of this phenomenon (Bagwell and Bernheim, 1996; Charles et al., 2009).



(follows from Axiom 2).<sup>7</sup>

It is interesting to note that the utility function that we have developed may be homothetic or non-homothetic based on the level of inequality in the society. If there is no inequality, the utility function is homothetic and income expansion paths are linear. However, if there is some positive level of income inequality, the utility function becomes non-homothetic and income expansion paths are non-linear. Thus, income inequality has a direct bearing on the nature of the utility function.

We assume that the economy consists of two homogenous groups of people, each of mass one: the rich and the poor (from here onwards, the superscripts  $R$  and  $P$  will denote the two income groups respectively). Both groups are endowed with equal amounts of labor,  $L/2$  each, but the shares of  $R$  and  $P$  in the economy's capital stock are  $\sigma$  and  $1 - \sigma$  respectively with  $\sigma \in [1/2, 1]$ . Thus, incomes of the groups  $R$  and  $P$  are respectively given by

$$y^R = \frac{wL}{2} + r\sigma K, y^P = \frac{wL}{2} + r(1 - \sigma)K \quad (3)$$

where  $w$  denotes wage or the returns to labor and  $r$  denotes the rental price or returns to capital. Note that income inequality increases with  $\sigma$ . In other words, an increase  $\sigma$  causes a mean preserving spread of the income distribution (since, mean income is independent of  $\sigma$ ). If  $\sigma = 1/2$ , there is perfect income equality (that is, both groups have equal incomes). If  $\sigma = 1$ , there is perfect income inequality (that is, the poor only have labor income and no capital income as the entire capital stock belongs to the rich).<sup>8</sup>

**[INSERT FIGURE 1 ABOUT HERE]**

Assuming that the non-status good is the numeraire good and letting  $p$  denote the price of the status good, utility maximization subject to individual income constraint yields the demand functions for the two income groups for the status good as

$$S^R(\sigma, w, L, r, K, p) = \frac{\frac{wL}{2} + r\sigma K}{2p} \quad (4)$$

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<sup>7</sup> People belonging to the downside of the social ladder, in our framework, engage in status consumption in order to compensate for the loss of satisfaction due to falling behind. In the Appendix A we rigorously show that the utility function constructed – more specifically the behavior of the  $f$  and  $\phi$  functions – ensures that falling behind hurts.

<sup>8</sup> Following Mitra and Trindade (2005), we assume asset inequality as the sole source of income inequality

$$S^P(\sigma, w, L, r, K, p) = \frac{\frac{wL}{2} + r(1 - \sigma)K}{p \left[ 1 + \frac{1}{\left( \frac{\frac{wL+rK}{2}}{\frac{wL}{2} + r(1-\sigma)K} \right)} \right]} \quad (5)$$

and the same for the non-status good as

$$N^R(\sigma, w, L, r, K, p) = \frac{\frac{wL}{2} + r\sigma K}{2} \quad (6)$$

$$N^P(\sigma, w, L, r, K, p) = \frac{\frac{wL}{2} + r(1 - \sigma)K}{1 + \left( \frac{\frac{wL+rK}{2}}{\frac{wL}{2} + r(1-\sigma)K} \right)} \quad (7)$$

where  $S^j$  and  $N^j$  denote equilibrium consumptions of the status good and non-status good respectively by a typical individual belonging to group  $j = R, P$ .<sup>9</sup>

Consequently, aggregate equilibrium consumption of the status good is given by

$$\tilde{S}(\sigma, w, L, r, K, p) = \sum_{j=\{R,P\}} S^j(\sigma, w, L, r, K, p) \quad (8)$$

and aggregate consumption for the non-status good is given by

$$\tilde{N}(\sigma, w, L, r, K, p) = \sum_{j=\{R,P\}} N^j(\sigma, w, L, r, K, p) \quad (9)$$

Having laid out the framework of our model, in what follows we characterize the closed economy equilibrium.

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<sup>9</sup> Note that, for arguments of the utility function to be defined we must have  $S^j > 0$  and  $N^j > 0$ . For these conditions to hold, we assume that  $y^P > \max \left\{ \left( 1 + \frac{\bar{y}}{y^P} \right), \left( 1 + \frac{\bar{y}}{y^P} \right) p \right\}$ . A specific example of the above utility function yields a conflict between income and nutrition based measures of poverty (Marjit et al., 2015).

### 3 Analysis

#### 3.1 Autarky Equilibrium

We start off our equilibrium analysis of a closed economy by discussing two important properties of aggregate status consumption. These properties, as we shall show, will be instrumental in determining the pattern of trade in an open economy setting.

First, we shall consider the impact of a ceteris paribus increase in income inequality on aggregate demand for status goods. More precisely, we will show how aggregate status consumption responds to a mean preserving spread of income distribution.

The aggregate status consumption in a closed economy is given by equation (8). Consider the impact of a one unit change in income inequality on the aggregate status consumption. This is given by

$$\frac{\partial \tilde{S}(\sigma, w, L, r, K, p)}{\partial \sigma} = \frac{\partial S^R(\sigma, w, L, r, K, p)}{\partial \sigma} + \frac{\partial S^P(\sigma, w, L, r, K, p)}{\partial \sigma} \quad (10)$$

Note that, the impact of a change in income inequality on status consumption for the rich is given by

$$\frac{\partial S^R(\sigma, w, L, r, K, p)}{\partial \sigma} = \frac{rK}{2p} > 0 \quad (11)$$

which arises entirely due to the income effect

On the other hand, the impact of a change in income inequality on status consumption for the poor is given by

$$\begin{aligned} & \frac{\partial S^P(\sigma, w, L, r, K, p)}{\partial \sigma} \\ = & -\frac{rK}{p \left[1 + \frac{1}{\phi(\Lambda^P)}\right]} + \frac{\frac{wL}{2} + r(1 - \sigma)K}{p} \frac{1}{[\phi(\Lambda^P)]^2 \left[1 + \frac{1}{\phi(\Lambda^P)}\right]^2} \frac{\partial \phi(\Lambda^P)}{\partial \Lambda^P} \left( -\frac{rK}{2} \right) \end{aligned} \quad (12)$$

where the first term represents the direct impact of a change in income on status consumption of the poor and the second term captures the impact of a change in income on status consumption of the poor through the function  $\phi(\Lambda^P)(= y^P/\bar{y})$ .<sup>10</sup>

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<sup>10</sup> Note that we are cautious in interpreting the first term of the right hand side of the above equation as the standard

This can be manipulated to get

$$\frac{\partial S^P(\sigma, w, L, r, K, p)}{\partial \sigma} = \frac{-\left[1 + \frac{1}{\phi(\Lambda^P)}\right] rK - \frac{\left[\frac{wL}{2} + r(1-\sigma)K\right] \frac{\partial \phi(\Lambda^P)}{\partial \Lambda^P} \left(\frac{rK}{\frac{rK+wL}{2}}\right)}{\left[1 + \frac{1}{\phi(\Lambda^P)}\right]^2} \frac{1}{p}$$

which can be rewritten in a more compact form as

$$\frac{\partial S^P(\sigma, w, L, r, K, p)}{\partial \sigma} = \frac{-rK - \frac{rK}{\phi(\Lambda^P)} - \frac{\Lambda^P}{\phi(\Lambda^P)} \frac{\partial \phi(\Lambda^P)}{\partial \Lambda^P} \left[\frac{rK}{\phi(\Lambda^P)}\right] \frac{1}{p}}{\left[1 + \frac{1}{\phi(\Lambda^P)}\right]^2} \quad (13)$$

since  $\frac{\frac{wL}{2} + r(1-\sigma)K}{\frac{rK+wL}{2}} = \frac{y^P}{\bar{y}} = \Lambda^P$ .

Substituting

$$\frac{\Lambda^P}{\phi(\Lambda^P)} \frac{\partial \phi(\Lambda^P)}{\partial \Lambda^P} = -1 \quad (14)$$

in equation (13), we get

$$\begin{aligned} \frac{\partial S^P(\sigma, w, L, r, K, p)}{\partial \sigma} &= \frac{-rK - \frac{rK}{\phi(\Lambda^P)} + \frac{rK}{\phi(\Lambda^P)} \frac{1}{p}}{\left[1 + \frac{1}{\phi(\Lambda^P)}\right]^2} \\ &= \frac{-\frac{rK}{p}}{\left[1 + \frac{1}{\phi(\Lambda^P)}\right]^2} \end{aligned} \quad (15)$$

This implies that

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income effect even though it represents the impact of a change in income of status consumption holding  $\phi(\cdot)$  constant. This is because, the magnitude of this term is dependent on the relative income of the poor unlike in the standard income effect.

$$\frac{\partial S^P(\sigma, w, L, r, K, p)}{\partial \sigma} < 0$$

Using equations (11) and (15), we thus get

$$\frac{\partial \tilde{S}(\sigma, w, L, r, K, p)}{\partial \sigma} = \frac{rK}{p} \left\{ \frac{1}{2} - \frac{1}{\left[1 + \frac{1}{\phi(\Lambda^P)}\right]^2} \right\} \quad (16)$$

Equation (16) clearly shows that the impact of income inequality on aggregate status consumption in a closed economy is not unambiguous. More precisely,

$$\begin{aligned} \frac{\partial \tilde{S}(\sigma, w, L, r, K, p)}{\partial \sigma} &\geq 0 \\ \Leftrightarrow \frac{1}{2} \left[ 1 + \frac{1}{\phi(\Lambda^P)} \right]^2 - 1 &\geq 0 \end{aligned} \quad (17)$$

Lemma 1 establishes this property of the aggregate status consumption.

**Lemma 1** *At any given price, for sufficiently high ratios of capital to labour earnings  $\eta$ , total consumption of status goods initially increases, reaches a maximum and thereafter decreases with an increase in inequality. However, for sufficiently low levels  $\eta$ , the relation between total consumption of status goods and inequality is monotonically increasing. More precisely, for  $\eta > \sqrt{2}$ , while there exists a  $\sigma^* \in (1/2, 1)$  such that for  $\sigma < \sigma^*$ ,  $\partial \tilde{S}/\partial \sigma > 0$ , for  $\sigma > \sigma^*$ ,  $\partial \tilde{S}/\partial \sigma < 0$ , and for  $\sigma = \sigma^*$ ,  $\partial \tilde{S}/\partial \sigma = 0$ , for  $0 < \eta < \sqrt{2}$ ,  $\partial \tilde{S}/\partial \sigma > 0$  for all  $\sigma \in (1/2, 1)$ .*

**Proof.** Notice that we can re-write equation (17) as

$$\frac{1}{2} \left[ 1 + \frac{\frac{wL}{2} + r(1-\sigma)K}{\frac{wL}{2} + \frac{rK}{2}} \right]^2 - 1 \geq 0 \quad (18)$$

Let curve  $XX'$  be the locus of the left hand side of equation (18). It is easy to show that  $XX'$  is a downward sloping convex function since  $\partial XX' / \partial \sigma < 0$  and  $\partial^2 XX' / \partial \sigma^2 > 0$ .  $XX'$  reaches maximum at  $\sigma = 1/2$  and the maximum value of  $XX'$  (call it  $XX'_{\max}$ ) is equal to one. On the other hand,  $XX'$  reaches minimum at  $\sigma = 1$  and the minimum value of  $XX'$  (call it  $XX'_{\min}$ ) is  $[\{1 + 1/(1 + \eta)\}^2/2] - 1$  where  $rK/wL = \eta$ . Consequently,  $XX'_{\min}$  may be either positive or negative depending on the given  $\eta$ . If  $\eta > (<)\sqrt{2}$ , then  $XX'_{\min} < (>)0$ . Figure 2

depicts the  $XX'$  curve when  $\eta > \sqrt{2}$ . As evident,  $XX'$  crosses the horizontal axis only once. Call that point  $\sigma^*$ . As such, for all  $\sigma < \sigma^*$ ,  $1/2[1 + 1/\phi(\cdot)]^2 - 1 > 0$  implying that aggregate status consumption increases with income inequality and for all  $\sigma > \sigma^*$ ,  $1/2[1 + 1/\phi(\cdot)]^2 - 1 < 0$  implying that aggregate status consumption decreases with income inequality. On the other hand, for  $\eta < \sqrt{2}$ ,  $XX'$  is always positive and as such irrespective of  $\sigma$ , we get  $1/2[1 + 1/\phi(\cdot)]^2 - 1 > 0$  which implies a monotonic positive relation between inequality and demand for status goods. ■

The intuition behind the previous lemma can be explained simply as follows. Recall that the demand function of status good for the two income groups can be written as

$$S^R = \frac{y_R}{2p} \text{ and } S^P = \frac{y_P}{p \left(1 + \frac{y_P}{\bar{y}}\right)}$$

Differentiating the demand functions with respect to income of the two income groups (holding  $\bar{y}$  constant), we obtain

$$\frac{\partial S^R}{\partial y^R} = \frac{1}{2p} > 0 \text{ and } \frac{\partial S^P}{\partial y^P} = \frac{1}{p \left(1 + \frac{y_P}{\bar{y}}\right)^2} > 0.$$

**[INSERT FIGURE 2 ABOUT HERE]**

As such, a redistribution of income from the rich to the poor will cause status consumption of the rich to fall and that of the poor to rise in turn implying. This implies that the net effect of income redistribution on aggregate status consumption will depend on the relative strengths of the income group specific effects. Note that, the effect of a change in income of the poor income group on their status consumption can be rewritten as

$$\frac{\partial S^P}{\partial y^P} = \frac{1}{p \left(1 + \frac{\frac{1}{2} + (1-\sigma)\eta}{\frac{1}{2} + \frac{\eta}{2}}\right)^2}$$

Evidently, the impact of a rise in income on poor's status consumption depends on the preexisting level of inequality and the ratio of factor earnings. Given  $\eta$ , lower (higher) the  $\sigma$ , lower (higher) is the impact of an increase in income of the poor on their status consumption. In other words, if the poor is not so poor, transferring some income from the rich to the poor, will cause them to increase their spending on status goods alright, but this increase would be small. On

the other hand, if the poor's income is far below the mean level, the additional income that they receive will cause them to increase their status consumption substantially. This is in line with what intuition would suggest in our framework: the further away the poor are from the average, the unhappier they are. Consequently, they would spend any additional resource that they might get in 'soothing' their psychological pain of relative deprivation.

As such, when preexisting level of inequality is low (high), it is likely the decrease in status consumption of the rich outweighs (is outweighed by) the increase in status consumption of the poor. In other words, when level of inequality is low, a fall in income inequality will cause aggregate status consumption to fall whereas a when the level of inequality is high, the opposite will be true. This in turn will produce the non-monotonic inverted U shaped relation between aggregate status consumption and inequality.

However, as it turns out, because we have introduced inequality in our model *only* in terms of asset distribution,  $\eta$  plays a crucial role in influencing how income redistribution impacts the aggregate status consumption. While, for sufficiently high levels of  $\eta$ , status concerns and psychological effects of relative deprivation of the poor as described above are instrumental in determining the exact magnitude and direction of the overall impact of income redistribution on aggregate status consumption in the economy, these behavioral effects lose bite in doing so when  $\eta$  is low. For example, as  $\eta \rightarrow 0$ ,  $\frac{\partial S^P}{\partial y^P} \rightarrow \frac{1}{4p}$  which is clearly lesser than  $\frac{\partial S^R}{\partial y^R} = \frac{1}{2p}$ . This means that for sufficiently small values of  $\eta$ , the impact on status consumption of a unit fall in income of the rich will outweigh the impact of a unit rise in income of the poor, thereby causing the aggregate status consumption in the economy to fall *irrespective* of the initial asset distribution. It is easy to check that the impact of an unit change in income on status consumption by the rich always outweighs that of the poor as long as  $\eta \in (0, \sqrt{2})$ .<sup>11</sup>

**[INSERT FIGURE 3 ABOUT HERE]**

Next, we discuss is the relation between aggregate demand for status goods and it's price. Suppose there is an increase in price of status goods. In our framework, apart from price affecting demand for status goods via the standard substitution and income effects, it influences consumption through two additional channels. First, price changes the factor prices and this in turn affects income of the two groups of consumers. This is the additional income effect that arises due to our assumption of an ownership structure for the factors of production. Second, price impacts the relative income which in turn has implications for status effects via the function  $\phi(\cdot)$ . This effect however is limited for poor income group. Given these additional ways through which price

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<sup>11</sup> Since inequality is captured in our model only in terms of capital as an asset and not in terms of labor income, people with very low income will always have a non-zero lower bound provided by their labor power. In case, we allow income for some to hit zero (by defining inequality both in terms of labor and capital income), it is easy to check that  $\eta$  will no longer be a significant determinant of the relation between inequality and status consumption. Hence, the emphasis should be on the non-monotonicity of autarky price with respect to the degree of inequality.

influences aggregate status consumption, the relation between price and demand for status goods is not unambiguous in our model. However, the following lemma establishes the sufficient condition which has to hold for price to have a negative impact on status consumption in our framework.

**Lemma 2** *For any price  $p$  and income  $y^j$ , suppose that the following condition holds:  $[(p/y^j)(dy^j/dp)] - \left\{ \left[ p / \left( 1 + \frac{1}{\phi(\Lambda^j)} \right) \right] \left[ d \left( 1 + \frac{1}{\phi(\Lambda^j)} \right) / dp \right] \right\} < 1, (j = R, P)$ . Then, aggregate consumption of status goods decreases with the price of the status goods; that is,  $d\tilde{S}/dp < 0$ .*

**Proof.** The total derivative of status consumption with respect to price for the rich is given by

$$\frac{dS^R}{dp} = \frac{1}{2} \left[ \left( \frac{1}{p} \frac{dy^R}{dp} \right) - \frac{y^R}{p^2} \right] \quad (19)$$

Hence, for  $\frac{dS^R}{dp} < 0$ , we need to have

$$\frac{p}{y^R} \frac{dy^R}{dp} < 1 \quad (20)$$

Analogously, the total derivative of status consumption with respect to price for the poor is given by

$$\frac{dS^P}{dp} = \frac{p \left( 1 + \frac{1}{\phi(\Lambda^P)} \right) \frac{dy^P}{dp} - y^P \left( 1 + \frac{1}{\phi(\Lambda^P)} \right) - y^P p \frac{d}{dp} \left( 1 + \frac{1}{\phi(\Lambda^P)} \right)}{\left[ p \left( 1 + \frac{1}{\phi(\Lambda^P)} \right) \right]^2} \quad (21)$$

For  $\frac{dS^P}{dp} < 0$ , we thus need to have

$$p \left( 1 + \frac{1}{\phi(\Lambda^P)} \right) \frac{dy^P}{dp} - y^P \left( 1 + \frac{1}{\phi(\Lambda^P)} \right) - y^P p \frac{d}{dp} \left( 1 + \frac{1}{\phi(\Lambda^P)} \right) < 0$$

which on simple manipulation yields

$$\frac{p}{y^P} \frac{dy^P}{dp} - \frac{p}{\left( 1 + \frac{1}{\phi(\Lambda^P)} \right)} \frac{d}{dp} \left( 1 + \frac{1}{\phi(\Lambda^P)} \right) < 1. \quad (22)$$

■

Now suppose that there are two countries: Country 1 and Country 2. Let  $\eta^1$  and  $\eta^2$



denote the ratio of capital to labor earnings in countries 1 and 2 respectively. To start with assume,  $\eta^1 = \eta^2 > \sqrt{2}$ . Let Country 1 have a more equal income distribution than Country 2 (i.e.,  $\sigma^1 < \sigma^2$  where the superscript indexes the two countries respectively). Note that, the two countries do not differ in terms of factor endowments or technology. As such the supply curve for the status (and non-status good) that each country faces is the same. Assuming that the sufficient condition given by lemma 2 holds, each country faces a downward sloping aggregate demand curve. Since we have  $\partial \tilde{S} / \partial \sigma > (<) 0$  for  $\sigma < (>) \sigma^*$ , Country 2 faces a higher demand curve relative to Country 1 if  $\sigma^1 < \sigma^2 < \sigma^*$  and Country 1 faces a higher demand curve relative to Country 2 if  $\sigma^* < \sigma^1 < \sigma^2$ . Thus, in autarky the equilibrium relative price of the status good would be higher in Country 2 than in Country 1 (i.e.,  $p^2 > p^1$ ) if preexisting income inequality in both countries is sufficiently low and that it would be higher in Country 1 than Country 2 (i.e.,  $p^1 > p^2$ ) if preexisting levels of income inequality in both countries is sufficiently high. Further, since by the Stolper Samuelson theorem,  $r$  increases and  $w$  decreases with  $p$ , we have  $r^2 > r^1$  and  $w^2 < w^1$  if  $\sigma^1 < \sigma^2 < \sigma^*$  and  $r^1 > r^2$  and  $w^1 < w^2$  if  $\sigma^* < \sigma^1 < \sigma^2$ . However, if  $\eta^1 = \eta^2 \leq \sqrt{2}$ ,  $d\tilde{S}/d\sigma > 0$  for all  $\sigma \in 1/2, 1]$ . In this case, Country 2 always faces a higher demand curve relative to Country 1. Hence in autarky  $p^2 > p^1, r^2 > r^1$  and  $w^2 < w^1$ .

### 3.2 Open Economy Equilibrium

Suppose now the two countries open up to free trade. Figures 4(a) and 4(b) show the open economy equilibria when  $\eta^1 = \eta^2 > \sqrt{2}$  and the countries have sufficiently low and sufficiently high levels of income inequality respectively. The world average supply curve is same as the individual supply curves, i.e.,  $Y_S^1 = Y_S^2 = Y_S$  since there are no supply side differences between the countries. The aggregate demand curves for the two countries are given by  $Y_D^1$  and  $Y_D^2$  respectively and the world average demand curve is given by  $Y_D = (Y_D^1 + Y_D^2)/2$ . The intersection of the average supply and demand curves determine the free trade equilibrium (relative) price and quantity of status good which we denote as  $p^W$  and  $\tilde{S}^W$  respectively. After free trade is opened up, price of status good falls in Country 2 and rises in Country 1 when the preexisting levels of asset inequality in the two countries are sufficiently low and the opposite happens when the countries are characterized by sufficiently high levels of inequality to start with. Thus, when preexisting inequality is low, Country 2 exports the non-status good and imports the status good and Country 1 does the opposite. However, when the preexisting levels of inequality are high in the two countries, Country 1 exports the non-status good and imports the status good and Country 2 does the opposite.

**[INSERT FIGURES 4(a) AND 4(b) ABOUT HERE]**

What if the two countries have large difference in the preexisting levels of inequality? Suppose that Country 2 is ‘extremely unequal’ and Country 1 is ‘extremely’ equal to start with

( $\sigma^1 < \sigma^* < \sigma^2$ ). It is evident that in this case, trade will not necessarily emerge between the two countries. This is because, the aggregate demand for status goods in the two countries may be equal. Even if the aggregate demands differ in the two countries, our model cannot make any specific prediction regarding the pattern of trade emerging out of differences in inequality: it is equally likely for either of the two countries to become a net exporter (net importer) of the status good (non-status good).

Finally, if  $\eta^1 = \eta^2 \leq \sqrt{2}$ , as evident from the above discussion, Country 2 *always* exports the non-status good and imports the status good and Country 1 does the opposite (this is identical to the situation depicted in Figure 4(a)).

Thus we have the following proposition:

**Proposition 1** *With non-homothetic preferences, where non-homotheticity emerges endogenously as a result of inequality and consequent status effects, free trade between two countries that differ in only their asset inequality causes the more unequal country to export the non-status (status) good and import the status good (non-status) good if the preexisting levels of inequality in both the countries is sufficiently low (high) as long as  $\eta^1 = \eta^2 > \sqrt{2}$ . If, however,  $\eta^1 = \eta^2 \leq \sqrt{2}$ , then the more unequal country always ends up exporting the non-status good and importing the status good.*

Note that the emerging trade pattern would imply that relative price of status good falls in Country 1 and rises in Country 2 if either  $\eta^1 = \eta^2 \leq \sqrt{2}$  or if  $\eta^1 = \eta^2 > \sqrt{2}$  and  $\sigma^1 < \sigma^2 < \sigma^*$  and rises in Country 1 and falls in Country 2 if  $\eta^1 = \eta^2 > \sqrt{2}$  and  $\sigma^* < \sigma^1 < \sigma^2$ . This in turn would have crucial ramifications on relative factor rewards on the two countries as follows.

**Corollary 1** *Assuming status good to be capital intensive, the pattern of trade between two countries that arises due to differences income inequality results in an increase (decrease) in the relative factor price of labor in the more (less) unequal country if either  $\eta^1 = \eta^2 \leq \sqrt{2}$  or  $\eta^1 = \eta^2 > \sqrt{2}$  and  $\sigma^1 < \sigma^2 < \sigma^*$ . However, inequality driven trade results in a decrease (increase) in the wage rate, and an increase (reduction) in the rental rate in the more (less) unequal country if  $\eta^1 = \eta^2 > \sqrt{2}$  and  $\sigma^* < \sigma^1 < \sigma^2$ .*

It is interesting to note that trade driven by differences in asset inequality impacts the levels of income inequality in the trading countries. To see this, let us define income inequality in country  $m$  ( $m = 1, 2$ ) in terms of the Gini Index which, in our case, is given by

$$\hat{g}^m = \frac{\frac{wL}{2} + r\sigma^m K}{wL + rK} - \frac{1}{2} \quad (23)$$

where first term denotes the share of income of the rich in total income. Simple manipulation of (23) yields

$$\hat{g}^m = \frac{1}{2} \frac{1}{\left(1 + \frac{rK}{wL}\right)} + \sigma^m \frac{1}{\left(\frac{wL}{rK} + 1\right)} - \frac{1}{2} \quad (24)$$

Differentiating (24) with respect to  $w/r$  we observe that

$$\frac{\partial \hat{g}^m}{\partial (w/r)} < 0$$

This, therefore, directly implies that, when either  $\eta^1 = \eta^2 \leq \sqrt{2}$  or  $\eta^1 = \eta^2 > \sqrt{2}$  and  $\sigma^1 < \sigma^2 < \sigma^*$ , since  $(w/r)$  rises in Country 2 and falls in Country 1,  $\hat{g}^2$  decreases and  $\hat{g}^1$  increases. That is, free trade causes income inequality to increase in the country which initially was more equal and causes income inequality to decrease in the country which initially was more unequal. However, when  $\eta^1 = \eta^2 > \sqrt{2}$  and  $\sigma^* < \sigma^1 < \sigma^2$ , free trade causes  $\hat{g}^2$  to increase and  $\hat{g}^1$  to decrease. This leads to the following proposition:

**Proposition 2** *With status dependent non-homothetic preferences, if the status good is capital intensive, free trade between two countries that differ only in their levels of asset inequality results in a reduction (increase) in income inequality in the more (less) unequal country if the ratios of capital to labor earnings are sufficiently low. Otherwise, free trade may lead to levels of income inequality of the trading countries either to converge or diverge depending on whether the pre-trade levels of asset inequalities within countries are below or above the critical level.*

Thus when the countries have sufficiently high levels of inequality to start with, then free trade may potentially accentuate the degree of income inequality in the more unequal country. This we believe has serious welfare consequences, especially, for those who fall further behind in the social ladder.

### 3.3 Policy Issues

To start with, assume that  $\eta^1 = \eta^2 > \sqrt{2}$  and  $\sigma^1 < \sigma^2 < \sigma^*$ . Consider a redistributive fiscal policy in Country 1 that effectively transfers income from the poor to the rich. For instance, suppose that the government takes away some amount of capital from the poor and gives it to the rich.

Evidently, such redistributive policy increases the level of inequality in Country 1.<sup>12</sup> The policy will cause aggregate demand for the status good to increase in Country 1 as long as it does not cause the inequality level of Country 1 to increase to a level greater than the threshold level  $\sigma^*$ . If the new level of inequality is lower than critical level of inequality, aggregate demand schedule of the status good faced by Country 1 shifts to the right and new demand curve of Country 1 may lie either above or below Country 2's demand curve depending on the severity of the fiscal policy. If Country 1's new demand curve lies below Country 2's demand curve, then the trade pattern between the countries remain unchanged. On the other hand, if Country 1's new demand curve lies above Country 2's demand curve, then the pattern of trade gets reversed. However, independent of the new level of Country 1's demand for status good relative to Country 2, the fiscal policy in Country 1 causes the average world demand and free trade price goes up and ratio of world wage to rental rate goes down. This, in turn, implies the income inequality increases in the whole world.

What if the redistributive fiscal policy enacted in Country 1 causes the Country 1's inequality level to increase beyond  $\sigma^*$ ? In this case, aggregate demand for status good in Country 1 may increase, decrease or remain the same. If Country 1's aggregate demand for status good increases, the new demand curve may lie below or above Country 2's demand curve and consequently trade pattern may change or remain same, but world free trade price and world income inequality unambiguously increases as before. If Country 1's aggregate demand for status good decreases or remains the same, the new demand curve lies below country 2's demand curve and trade pattern remains unchanged. Moreover, while in the former case, world demand, free trade price and income inequality in the whole world falls, in the latter case, these remain unchanged.

Next, suppose that  $\sigma^* < \sigma^1 < \sigma^2$ . Now, a redistributive fiscal policy that transfers income from the poor to the rich in Country 1 decreases the total demand for status good. Consequently, the demand curve for Country 1 shifts to the left but it may remain above Country 2's demand curve or may go below Country 2's demand curve. However, immaterial of where the new demand curve of Country 1 lies, the average world demand for status good falls. This in turn means, while it trade pattern may remain the same or may get reversed, world free trade price and world income inequality unambiguously decreases.

Naturally, the dependence of the policy effect on whether initial level of asset inequality is below or above the critical threshold vanishes if  $\eta^1 = \eta^2 \leq \sqrt{2}$ . In this case a redistributive policy implemented in Country 1 that increases the level of inequality will cause aggregate demand for the status good to increase in Country 1. The new aggregate demand schedule of the status good faced by Country 1 shifts to the right this may lie either above or below Country 2's demand curve depending on which trade pattern may remain the same or get reversed. Further, the policy causes the average world demand and free trade price to goes increase and ratio of world wage to rental rate goes down. This causes income inequality to increase in the whole world.

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<sup>12</sup> Since, given the total stock of capital, transferring capital from the poor to the rich decreases (increases) poor (rich) people's share of total capital, i.e.,  $\sigma$  rises.

This clearly shows that in our framework, fiscal policy by impacting the pattern and the terms of trade can have international spillover effects. While, this does mean that fiscal policy could potentially be used by the government of a country to protect one of the two industries (Mitra and Trindade, 2005), our results suggest that the policy should be designed cautiously, particularly, when the ratio of capital to labor is sufficiently high. This is because the same fiscal policy can, in principle, generate opposite results in our framework depending upon whether the trading countries are in the high or low inequality regime and also the magnitude of the impact (or the severity) of the policy in question.

## 4 Conclusion

In this paper we examine how inequality affects the pattern of international trade when preferences are non-homothetic. Using a standard Heckscher-Ohlin framework involving two countries, two goods (a status and a non-status good) and two factors of production (capital and labor), we propose a *behavioral* linkage between asset inequality and trade pattern by endogenizing non-homotheticity in terms of *status dependent preferences*. Our model predicts that for sufficiently high ratios of capital to labor earnings, there exists a critical level of inequality such that specificities of the pattern of trade that emerge between the two countries are contingent upon whether the inequality levels prevailing in the countries are above or below this level. For sufficiently low ratios of capital to labor earnings, however, the critical level of inequality does not have a significant role in determining the trade pattern between the two countries. Our model also predicts that trade which solely arises due to differences in asset inequality can either lead to convergence or divergence of the levels of income inequality characterizing the two countries depending on the ratio of capital to labor earnings and preexisting levels of inequality prevailing in the two countries. Based on our model, we also discuss some interesting international spillover effects of redistributive policies.

An useful extension of our model would be to consider a monopolistically competitive setup where there is continuum of goods that can be ordered by status ranking. This is likely to yield very detailed predictions concerning trade patterns, the empirical validation of which might be of some interest. We, however, postpone this task until later.

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## Appendix A

In what follows, we show that the chosen  $f(\cdot)$  and  $\phi(\cdot)$  functions ensure that falling behind hurts.

Note that, for  $y < \bar{y}$ , we can write the utility function given by equation (2) as

$$U = \frac{y}{\bar{y}} \log N + \log S$$

Let  $U^*$  denote the optimal value function

$$U^* = \frac{y}{\bar{y}} \log N^* + \log S^*$$

where  $N^*$  and  $S^*$  denotes the optimum values of  $N$  and  $L$ .

For the benchmark case  $y = \bar{y}$ , we have

$$U^0 = \log N^0 + \log S^0$$

Now, if falling behind has to hurt, it must be that  $(U^* - U^0) < 0$ .

Differentiating  $U^*$  w.r.t.  $y/\bar{y}$ :

$$\frac{dU^*}{d\left(\frac{y}{\bar{y}}\right)} = \log N^* + \frac{y}{\bar{y}} \frac{d(\log N^*)}{dN^*} \frac{dN^*}{d\left(\frac{y}{\bar{y}}\right)} + \frac{d(\log L^*)}{dL^*} \frac{dL^*}{d\left(\frac{y}{\bar{y}}\right)}$$

Due to Envelope theorem

$$\frac{dU^*}{d\left(\frac{y}{\bar{y}}\right)} = \log N^* > 0$$

This implies that if  $(y/\bar{y})$  falls, then  $U^*$  will fall.

Again, we know that for  $y = \bar{y}$ ,  $U^* = U^0$ . In other words, for  $(y/\bar{y}) = 1$ ,  $U^* = U^0$ .

Since,  $(y/\bar{y})$  falling below 1 implies that  $(y/\bar{y}) < 1$  (or  $y < \bar{y}$ ) and a fall in  $(y/\bar{y})$  implies a fall in  $U^*$ , then it must be that for  $y < \bar{y}$ ,  $U^* < U^0$ . That is, falling behind hurts.

Also since, it will be apparent in our analysis that  $f$  does not have an explicit role (that is, it does not appear in the demand functions), one might be tempted to ask if one could get rid of this particular function, i.e., assume  $f = 1$  for all  $y$ . It is easy to see from an exercise similar to the one above that now

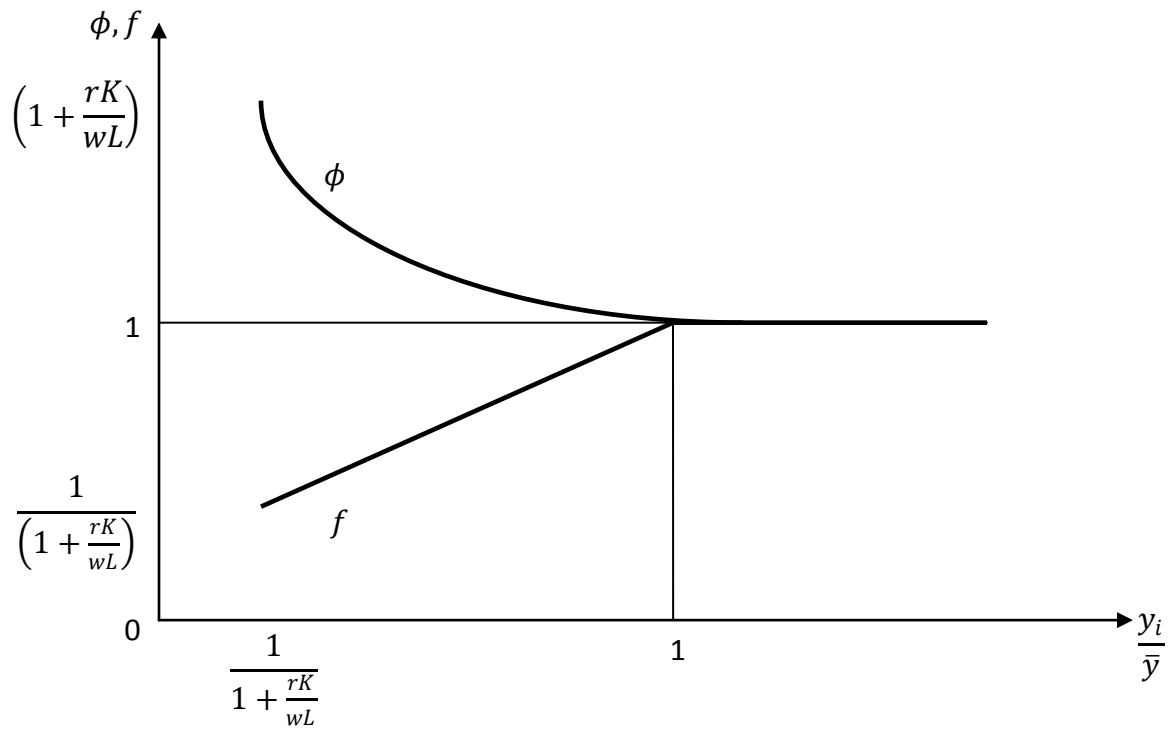
$$\frac{dU^*}{d\left(\frac{y}{\bar{y}}\right)} < 0$$

and hence falling behind will not hurt.

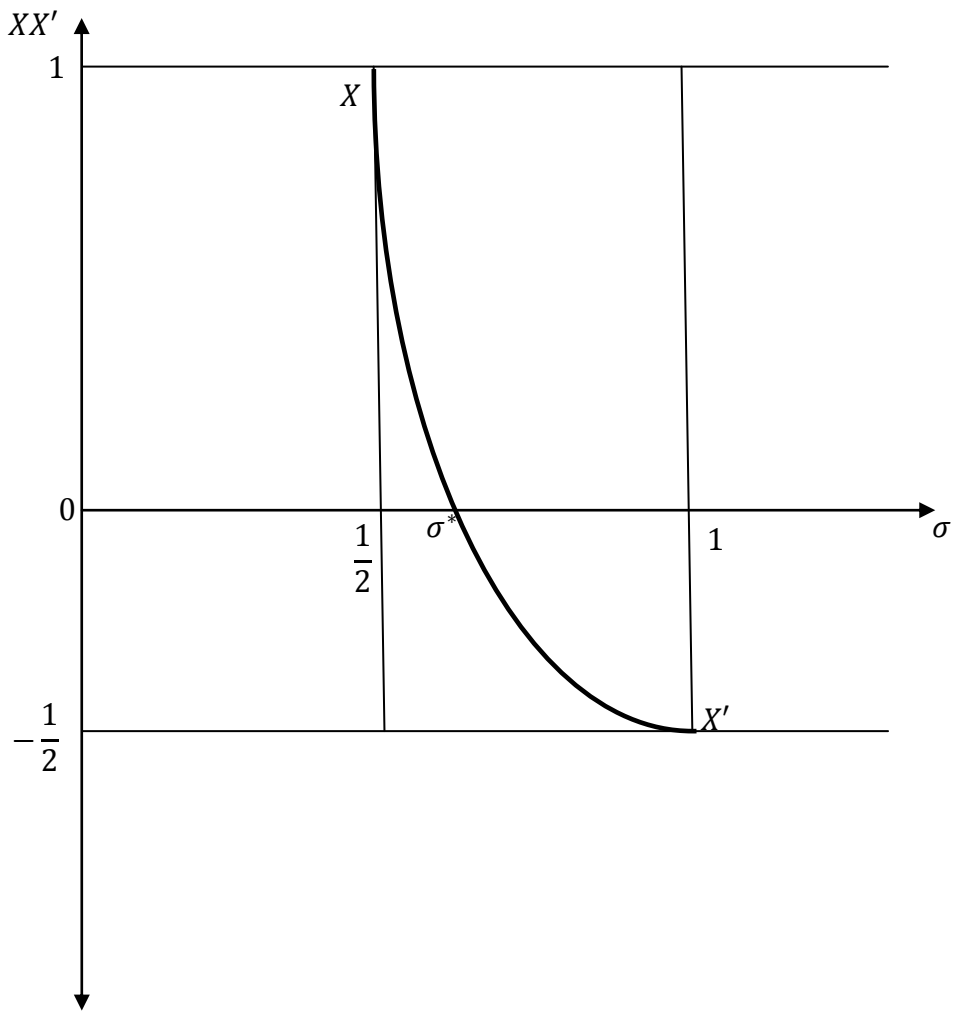


Note, however, the functions  $f$  and  $\phi$  can be defined in a way which is more general than what we have used in our paper. See Marjit (2012) for a detailed discussion on the general form of the utility function used in this paper.

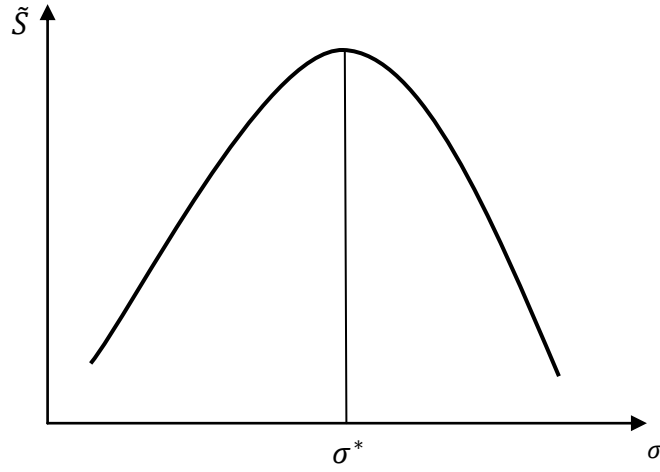
## Figures



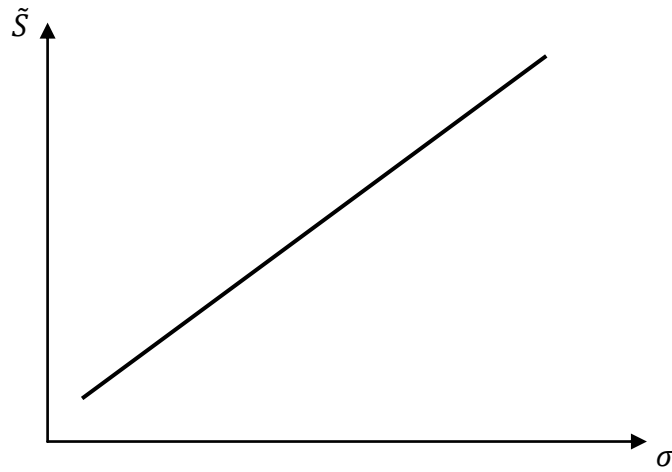
**Figure 1.** Behavior of  $\phi$  and  $f$



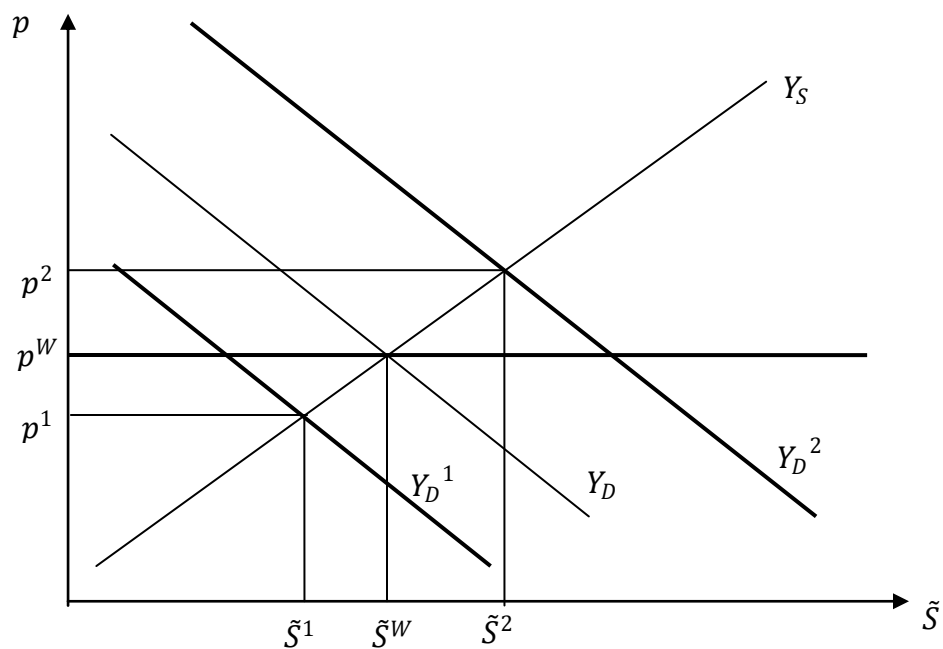
**Figure 2.** Determination of  $\sigma^*$  when  $\eta > \sqrt{2}$



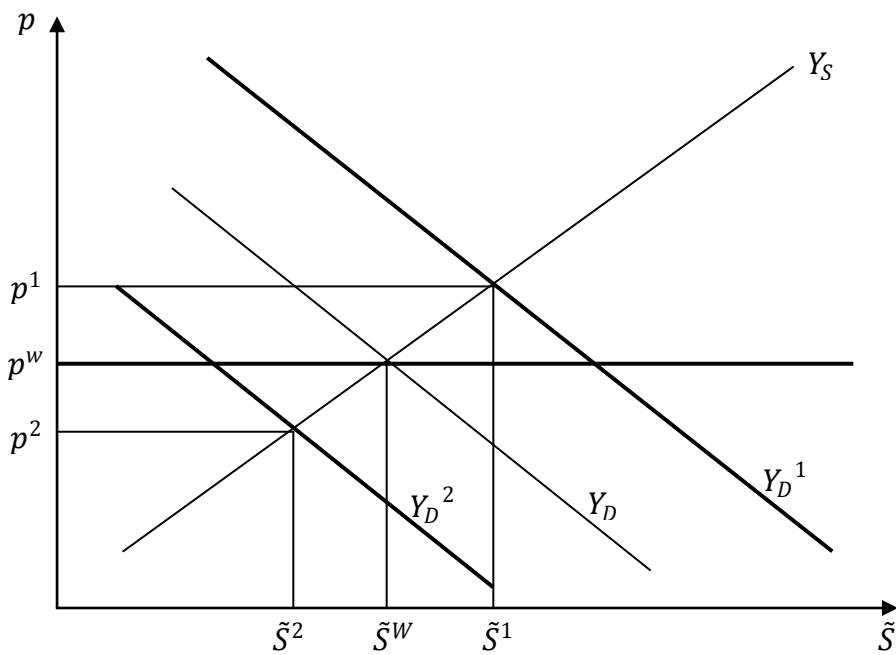
**Figure 3(a).** Relation between  $\tilde{S}$  and  $\sigma$  when  $\eta > \sqrt{2}$



**Figure 3(b).** Relation between  $\tilde{S}$  and  $\sigma$  when  $\eta \leq \sqrt{2}$



**Figure 4(a).** Closed and open economy equilibria when  $\eta_1 = \eta_2 > \sqrt{2}$  and  $\sigma^1 < \sigma^2 < \sigma^*$



**Figure 4(b).** Closed and open economy equilibria when  $\eta_1 = \eta_2 > \sqrt{2}$  and  $\sigma^* < \sigma^1 < \sigma^2$