THE IMPACT OF LAND OWNERSHIP INEQUALITY ON RURAL FACTOR MARKETS

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Utilizing a heretofore untapped household-level World Bank Survey from rural Turkey for 2002, this paper explores the link between land ownership concentration and rural factor markets. We construct a unique index which measures market malfunctioning based on the neoclassical model linking land and labor endowments through factor markets to household income, and test if land ownership concentration affects market malfunctioning empirically. Based on our empirical investigation in which we separately test the relationship at province, town and village levels, we find a positive and significant relationship between market malfunctioning and land ownership concentration. This suggests that factor markets are structurally limited in reducing existing inequalities as a result of land ownership concentration. Our findings show that in the presence of land ownership inequality, malfunctioning rural factor markets result in increased land concentration, increased income inequality, and inefficient resource allocation.

1. Introduction:

One of the common characteristics of developing countries is the large share of agriculture in their economies. In an economy where agriculture is among the major sources of livelihood, the most obvious reason for the importance of land ownership arises from its productive capacities [Benjamin and Brandt (1997)]. Perhaps what is not so obvious is how ownership of land plays a central role in the allocation of non-land factors of production, such as labor and capital through rural factor markets, particularly in economies where land is the scarce factor compared to labor [Sen, (1981), Griffin et al. (2002), Rao (2005)]. Furthermore, distribution of land ownership contributes to systematic differences in institutions which allow access to investment in public goods, infrastructure, and to economic opportunities [Deininger and Feder (1997); Engerman and Sokoloff (2002); Baland and Robinson (2003)].

The distribution of land as a productive asset has important implications for allocative efficiency in the economy. As widely covered in the literature, except for plantations, there are no economies of scale in agriculture in the developing world; on the contrary there exist an inverse relationship between farm size and yield per acre [Heltberg (1998) for Pakistan; Berry and Cline (1979) for Brazil, Colombia, Philippines, Pakistan, India and Malaysia; Cornia (1985) for 15 different countries; Khusro (1973), Rudra et.al (1974), Bhalla (1979) and Bharadwaj (1974), and Sen (1981) for India; Carter (1984) for Haryana in North India; Kutcher and Scandizzo (1981) for North East Brazil; Benjamin for Java (1995); Masterson (2005) for Paraguay; Unal for Turkey (2007)]. Hence unequal distribution of land as a major productive asset would result in over utilization of land and under utilization of labor in a labor rich economy.

Binswanger and Rosenzweig (1986) argue that when efficiency and/or productivity are the criteria, operated land, not owned land, becomes the interesting factor of analysis since

markets should help in optimizing factor proportions when there are skill or endowment differences. Factor proportions, however, are rarely optimized based on skill or endowment differences through factor markets. In the face of imperfect markets, efficiency of resource use depends crucially on the distribution of assets, particularly land assets [Griffin et al. (2002); Sen (1981); Rao, (2005)]. In either efficient resource allocation or reduction of poverty and inequality, markets are deemed to be effective to the extent that they offer economic opportunities to the people. And the extent to which they offer such opportunities depends on how markets function.

The major inquiry of this paper is to study the link between land ownership inequality and the functioning of rural factor markets in Turkey. Our main argument is that rural factor markets have a tendency to perpetuate initial land and land-related inequalities rather than ameliorate them.

The structure of this paper is as follows: in the next section we provide the agrarian context of Turkey given the most recent reforms in agricultural sector. In the third section we review the literature on the rural factor markets-inequality nexus and claim that heterodox approaches provide a more powerful understanding of the functioning of factor markets in the context of developing countries where markets are less developed and land concentration is high. In the fourth section we detail the methodology; in the fifth section we test our hypotheses by utilizing a heretofore untapped World Bank Survey on rural Turkey for 2002; finally, in the last section we take account of our empirical inquiry and conclude.

2. The Agrarian Context of Rural Turkey:

To begin with, looking at the nexus between inequality and rural factor markets is interesting for Turkey because not only is Turkey considered a typical developing country with a

large proportion (30%)[1] of the population employed in agriculture with a skewed landownership distribution with a Gini coefficient of 0.65,[2] but it is also a country at the brink of a major socio-economic change via possible European accession.

Turkey is a major agricultural producer by international standards. Its surface area is 77.9 million hectares with 97% in Asia. Asia Minor, also known as Anatolia, is surrounded by mountains on all sides. Because of her mountainous landscape many valleys and narrow coastal plains provide good agricultural lands. Out of 77.9 million hectares, 26.4 million is agricultural land excluding pastures [FAO (2004)].

With 27 % of the Middle East's and North Africa's (MENA) arable land and abundant water resources, Turkey ranks among the world's top five producers of chickpeas, chilies and peppers, cotton, cucumber, eggplant, green beans, lentil, nuts (pistachios, chestnuts, and walnuts), onion, sugarbeet, tomatoes, watermelons and melons, stone fruit, olives, and sheep's milk. Turkey is the world's largest producer of apricots, hazelnuts and figs [Kaldjian (2001); Longworth (2005)].

Turkey is a middle income developing country, with approximately PPP $7,687 per capita GDP in 2004. The share of agriculture in GDP has been on the decline and was 11.5 % in 2005; compared to 12.5% in 2000, 15.7% in 1995, and 26.7% in 1980. However, 30 % of the labor force was still in agriculture in 2006.[3]

Like so many other countries in the world, development policies in Turkey have been strongly influenced by the World Bank since the late 1970s. The latest major reforms have been in agriculture: the Agricultural Reform Implementation Program (ARIP) was implemented in 2001 to make the agricultural policies more "market friendly" [Aysu (2002); Cakmak (2004)].

[1] State Statistics Institute, 2006.
[2] Author's own calculations based on a 2002 World Bank Survey on rural Turkey.
[3] State Statistics Institute, 2006.

On the brink of accession to the European Union, agriculture is one of the most "hotly" debated issues due to the sector's low productivity (11.5% of the contribution to the Gross Domestic Product (GDP) despite 30% of the employment).[4] 40 % of 70 million Turks live in rural areas, and of that population segment 41% of those in the agriculture sector are living under poverty.[5] This clearly could be a challenging issue not only for Turkey but for MENA and for Europe.

The recent application of ARIP since 2001 resulted in the elimination of most government subsidies in agriculture and put emphasis on the role of the markets as the sole decision-making mechanism in production and distribution in the agricultural sector. The impact of this transformation will hardly stay confined to the sector due to the high proportion of the population living in rural areas and working in agriculture.

Given the major role of rural factor markets in transforming Turkish agriculture it becomes important to have a better understanding of the functioning of rural factor markets and to evaluate their capacity for efficiency in production and distribution of resources, and to identify the role of land ownership inequality in this functioning.

3. Literature Review:

In the literature, studies of inequality and rural markets can be divided into three different strands with respect to where they locate inequality in relation to factor markets. The first one is the pure neoclassical view in which inequality is an outcome of the efficient functioning of competitive factor markets. The second strand, transactions cost / asset dependency theory, locates inequality outside of markets as a factor that prevents market participation, i.e., inequality in the ownership of certain assets prevents full participation of agents, thereby impeding perfect competition and resulting in inefficient resource allocation in the economy. The third strand, the heterodox view, locates inequality at the center of the exchange process as a whole which is

[4] State Statistics Institute, 2006.
[5] State Statistics Institute, 2005.

inclusive of but not limited to markets. In other words, in the heterodox view, inequality is both an outcome and a force that affects the process that produces the outcome.

3.1. Pure Neoclassical Theory:

In the pure neoclassical view, income inequality maps to endowment inequality perfectly. Through perfectly competitive markets all factors of production are fully utilized and receive their marginal contribution, consequently resources are allocated efficiently across alternative uses [Schultz (1964); Conning (2000)]. In short, mainstream economics disregards the distribution of assets or resources and exclusively focuses on efficiency through perfect competition. Inequality is a result of competition in which the most efficient producer wins and hence the outcome is reflected in resource allocation.

Schultz' (1964) study evaluating developing country agriculture as "poor but efficient" is perhaps the most well-known study of "traditional agriculture" from a pure neoclassical standpoint where "efficiency," not inequality, is the focus. Schultz (1964) argues that in farming communities bound by the behavior of traditional agriculture all factors of production are allocated efficiently because all resources are fully utilized; hence, poverty in traditional agrarian societies is not due to under-utilization of resources but due to lack of productivity-increasing technology. According to Schultz (1964) these "efficient but poor" farmers respond to prices, which bring about allocative efficiency. Since prices transfer the information about marginal productivities of land and labor, intervention with the market mechanism creates not only impediments to integration of larger markets with local ones, but also problems in disseminating information about factors and products which help in reducing imperfections in capital markets, such as pricing of irrigation and other facilities at marginal costs.

Schultz (1964) doesn't look directly to the relation between inequality and rural factor markets but Conning (2000) does. Based on a two factor (land and labor), two household (land

rich and land poor) trade model, he argues that factor market participation reduces inequality through market exchange since increases in marginal productivity of land (labor) would be very significant for land-rich (land-poor) farmers.

3.1.1. Asset Dependency and Transactions Cost Theory:

A second strand of thinking on inequality within the framework of mainstream theory on agriculture emerges from including transactions costs into analysis of rural markets and inequality. Transactions costs could be defined as various costs such as registration fees, titling costs, and information costs which make market participation costly for the poor, thereby making them settle for the second best option and leading to market failure in allocating resources efficiently. Some of the studies within this paradigm are more holistic in their study of the imperfect markets-inequality nexus since such studies look at differentiation in agrarian organization as outcomes based on imperfections in rural factor markets [Eswaran and Kotwal (1986); Bardhan (1984), (1998); Carter and Wiebe (1990); Barham et al (2000)] rather than outcomes pertinent to one asset only [Dercon (1998); Carter and Zegarra (2000);Carter and Zimmermann (2000), (2003); Renkov, Hallstrom, and Karanja (2004)].

Within the first group, in their well known study Eswaran and Kotwal (1986) look at how credit access and supervision impact the organization of class structure and agricultural production. Using a static optimization model they show how different choices of working on or off the farm determine the class position of farmers and agrarian organization, given credit and supervision constraints. Their study is important because it shows that land distribution and hence agrarian organization is partly an outcome of imperfect rural factor markets.

Carter and Zimmermann (2000) extend Eswaran and Kotwal's (1986) analysis to a dynamic one and they look at how markets correct for land inequality and claim that markets

bring about equality through the equalizing mechanism of differences in shadow prices for land and labor among different classes of peasants in the long run- within 50 years.

The "asset dependency theorem," as it is called by Barham et al. (2000), looks at the problem of inequality over time and over different sets of endowments and activities, and posits inequality as a result of production and investment decisions made by people based on the assets they hold.[6] Their study looks at two different types of assets (fishing nets and land) related to two different activities (fishing and agriculture) from seven villages in the Peruvian Amazon. The reproducibility of fishing nets as opposed to the fixed nature of land assets provides the basis for endowment dependency. Despite showing how the structure of endowments (i.e., assets before entering the market exchange) affects asset accumulation (i.e., assets after the market exchange) their study doesn't shed light on *how* rural markets correct, retain, or create inequalities.

Other studies on transaction costs focus on the link between the distribution of one main asset and rural factor markets [Dercon (1998); Carter and Zimmermann (2003) Renkow Hallstrom, and Karanja (2004)]. A well-known study within this category is by Dercon (1998) which looks at the patterns between rich and poor farmers in Western Tanzania using a model of "activity choice and asset accumulation". The central point of his work is that most profitable investments are constrained by entry, which is eased by credit. However credit is not accessible to poor households due to the collateral problem; hence credit market imperfections form a barrier to enter the cattle market. His conclusions suggest that when investment is a necessity to participate in high yield returning economic activity, market imperfections widen the gap between rich and poor farmers.

[6] Barham et al. (2000), Carter and Zimmerman (2000).

Despite its contribution to modify the neoclassical theory to include market imperfections as reflected in transactions costs, the asset dependency approach is mainstream not only in the sense that it uses mainstream methodological individualism and fails to recognize power structures within markets, but also in the message it gives, which is: markets are crucial for efficient resource allocation, and inequality as such would be independent of efficiency or inefficiency.

3.2. Heterodox Approach:

Heterodox literature integrates power into its analysis of inequality and rural factor markets, and departs from mainstream theory in two major ways. First, inequality is not only an outcome of a malfunctioning market as conceived in mainstream theory, but is a major determining factor that creates malfunctioning. Second, markets are part and product of a larger entity -in which not everything can be explained by the fundamentals of economics.

The seminal paper that started a great deal of discussion not only within the mainstream paradigm but also among heterodox thinkers is the contribution of Griffin, Khan and Ickowitz (2002) on monopoly land power and how it affects rural land and labor markets and thus inequality and poverty.[7] Griffin et al. (2002) includes power as a factor that creates market imperfections. Rural factor markets are fragmented, "law of one price", i.e., small and large farmers facing the same price for goods and services, doesn't apply due to the latter's ability to exercise monopoly power, thereby resulting in increased inequality and poverty.

Monopoly land power also affects rural labor markets. Maybe more than any other markets, there are systems of labor control in rural markets, because local markets are more prone to abuse of local powers than a centralized one. Labor control systems affect who can participate to what extent and the relative bargaining power of certain groups that are engaged in

[7] See Journal of Agrarian Change, (2004). Vol. 4, Issue 1 and 2.

labor market transactions. Griffin et al. (2002) claim that land concentration particularly is a form of institutional (as opposed to environmental and cultural) labor control in the context of fragmented local markets because monopoly in land market gives the landlord monopsony power in labor markets in which they operate; i.e., when there is only one landlord to work for, he sets the rules. They further argue that it is the economic outcomes of monopsony power within labor markets that are responsible for production inefficiencies, surplus labor and rural inequality and poverty through low wages, low levels of employment and low levels of production.

From our point of view the major difference between mainstream theories and Griffin et al.'s (2002) approach to the rural markets-inequality issue is that in Griffin et al.'s study, markets are recognized as entities where power plays a role. In mainstream conceptualization, markets are perceived as entities where the major role belongs to individuals who are independent of demographic, ethnic or cultural features who act rationally to maximize economic self interest and through competition which results in efficient resource allocation. If inefficiencies occur, it is because asset poor agents cannot compete due to transactions costs – which are exogenous imperfections in markets. Griffin et al.'s (2002) approach suggests that it is not the imperfections in the market that results in persisting inequalities and inefficiency; it is inequality that results in imperfections in the markets which generates inequality and inefficiency. In short, two major differences between Griffin et al. (2002) and mainstream studies looking at the nexus of inequality and rural factor markets are: first, causality and, second, a broader understanding of the functioning of rural markets as being impacted by inequalities.

A methodological critique of the Griffin et al. (2002) study is on the limited scope of power in their analysis; power is only confined within the structure of the markets, not outside of what constructs that structure, and therefore lacks a multi-dimensional inquiry into history, culture, and the relations of production that are reflective of classes in agriculture [Byres (2004);

Rao (2005)]. Rao (2005) takes Griffin et al.'s (2002) analysis on monopoly land markets a step further and puts it in a broader framework. His contribution to the literature is to delineate a framework within which rural factor markets function and agrarian organization is shaped based on three major determinants: economic (degree of land inequality), political (effectiveness of supervision given the social structure of both parties engaged in labor contracts), and technical (labor productivity given the technology). Constrained by these three structural variables, large landowners maximize their surplus—which Rao (2005) defines as economic rent—and decide among different tenure types, such as sharecropping[8], fixed rent tenancy[9], wage labor, and labor rent[10]. In his work, Rao (2005) emphasizes the relations of production rather than the relations of exchange, and, in doing so, directs the reader into thinking about non-economic fundamentals similar to Griffin et al (2002) but making it more central to the question of agrarian organization and land concentration.

In short, the contribution by Rao (2005) is the dialectical analysis of the nexus of inequality and market imperfection. In the neoclassical paradigm causality is from market imperfections to inequality; in Griffin et al.'s (2002) analysis it is from inequality to market imperfections. Rao's (2005) theoretical analysis combines the two conclusions rather than exclude either of them: pronounced land inequality is a cause of (monopolistic) imperfections just as for Griffin et al. (2002) but it is not the sole cause of income inequality; market imperfections, for any given level of land inequality, work through the relations of production and exchange as the other key determinant of income inequality.

[8] Sharecropping is a system in which tenant provides labor, landlord provides land, and output is mostly shared equally.
[9] In fixed rent tenancy, tenant pays a fixed amount of rent, which could be in cash or kind to the landlord, and the output produced belongs to the tenant.
[10] Is the direct exchange of land for labor time, includes key characteristics of both fixed rent (control over the allocation of farmer's labor time and the output) and wage-labor (supervision is required to control the rent).

In this paper, we locate inequality both within and outside of factor markets. We look at the causes of rural inequality both as an outcome of malfunctioning markets and as a factor that induces malfunctioning in factor markets. As such, the central concept in our study is the *connectedness* between land ownership inequality and factor market malfunctioning.[11]

4. The Methodology:

To define malfunctioning one needs to define "well functioning" which will serve as the norm of proper functioning. The norm we use in this study is perfect markets. There are two main assumptions for perfect markets. The first is about the macro context: all factors are fully utilized, i.e., there exists no unemployment. The second is about the micro-context: all markets function within a perfectly competitive framework, i.e., there are no transaction costs, no information costs, and no fragmented markets. In other words, all agents have equal opportunity in the exchange process in which all factors get exactly their marginal contribution as a reward. The wage rate is equal to the marginal productivity of labor, and rent is equal to the marginal productivity of land. If there is income inequality in the society where such markets function, it must be due to endowment inequality. In other words, perfect markets map endowment inequality to income inequality perfectly.

After setting up the norm, we can move on to the discussion of the analytical framework this research employs, which is a combination of Rao (2005), Benjamin and Brandt (1997), and Sen (1981). In their 1997 paper on rural China, Benjamin and Brandt develop a simple analytical model which serves two main functions. First, to assess if the factor markets are functioning as suggested by the neoclassical model, i.e., whether or not rural markets are perfect, and, second, to evaluate the functioning of the factor markets as either increasing or decreasing inequality.

[11] The term "connectedness" is from Sen's (1981) pioneering work on agrarian market failure.

Both of these points require more detailed elaboration which will be provided in the following pages while simultaneously building our analytical framework.

The basic idea of the model by Benjamin and Brandt (1997) is to construct a neoclassical account of the functioning of rural markets and of incomes derived from such markets, and then compare the theoretically predicted outcomes with the actual outcomes. Following this, they estimate an inequality index for both incomes (predicted and actual) and then utilize the gap among the incomes and the indices in evaluating the functioning of the factor markets as inequality increasing or decreasing while being able to point out the ways in which they fail.

Benjamin and Brandt's (1997) evaluation of the functioning of factor markets is based on using trade variables as proxies to measure the markets' ability to function. The two variables are the ratio of leased (in or out) land to total holdings and the ratio of adults participating in the labor markets in agriculture and in non agriculture. Hence their norm, i.e., evaluation of the markets' functioning, is based on the market's depth. We think use of market depth variables is quite inadequate and circular in logic since they try to explain the wellness of the functioning of actual factor markets with itself, i.e. the market depth. Benjamin and Brandt (1997) argue that the smaller the volume of trade, the poorer the functioning of markets. We think they mismatch the definition of well functioning and developed markets; it is possible that very developed and deep markets, such as stock markets in the U.S. can fail in functioning perfectly.

The model we utilize here differs from their model in various ways. First and foremost, our analysis in evaluating the impact of factor markets is an inquiry into the connectedness aiming to look at the relation between the inequality of land ownership distribution and the factor market failure, which is measured by comparing the norm to the actual by utilizing income inequality indices. Perfect markets should map endowment inequality to income inequality perfectly; to the extent that they do not, markets malfunction. We further argue that the higher

the land inequality, the poorer rural markets function, and also that the relationship between inequality and market malfunctioning is dialectical.

The mathematical modeling of the framework which we employ follows the similar set up of Benjamin and Brandt's (1997) neoclassical agrarian economy; however, our utilization of this model is quite different from theirs and is motivated by the concept of "connectedness" between land ownership inequality and rural market malfunctioning which are used by Sen (1981) and Rao (2005).

Basic assumptions of the normative model (markets functioning under the neoclassical ideal):

- Homogeneity of agricultural output across households where output can be sold in the market for price **p** or consumed at home:

$$Q=F(T, L) \quad (1)$$

Where T is land and L is labor used in production.

- Households can hire in labor or hire themselves out in the labor market at the wage rate **w**, and also land can be rented in or rented out at the same rental rate **r**. Markets are perfect, thus p, r, and w are given and there is perfect substitution between the family and hired factors, which suggests household income won't change, for example, due to preference of leasing out one's own land or cultivating it.

- Households decide the optimal level of land and labor to be used in the production from a mixture of hired in and family inputs, i.e., on- farm production is a result of hired in and family inputs.

$$L^* = L^F + L^H \text{ and } T^* = T^F + T^H \quad (2)$$

$$Q^* = F(T^*, L^*) \quad (3)$$

Where the superscript F stands for family, and H stands for hired factors.

- Household income then can be written as the sum of returns on land, labor and farm profits, and since working on or off the farm doesn't make a difference, a simplified version of income is:

$$\tilde{Y} = wLn + rTo + \Pi(w,r,p) \quad (4)$$

Where Π is the farm profits, Ln is the labor time endowment, and To is the amount of owned land. Π could be written more elaborately as:

$$\Pi(w, r, p) = pF(T^*, L^*) - wL^* - rT^* \quad (5)$$

- Farm profits are assumed to be zero for simplicity, which redefines the net farm income as:

$$\tilde{Y} = wLn + rTo - wL^H - rT^H = wL^F + rT^F \quad (6)$$

Equation (5) suggests that net farm income is the returns to family inputs used in farm production; if we add hired out factors into this equation we come up with the net household income, which is an elaborated form of equation (3):

$$\tilde{Y} = wL^F + rT^F + wL^M + rT^M = wLn + rTo \quad (7)$$

As mentioned by Benjamin and Brandt (1997), this suggests an accounting identity which would hold only under a strictly neoclassical model, i.e., under perfect factor markets where income equals the market value of the endowments of land and labor. In the real world one of the reasons this identity might not hold is due to imperfect markets. For example, the household's actual labor earnings might be less than the market value of their labor endowment if the labor markets are not clearing due to high unemployment. The correct valuation of the endowments would then be at shadow prices rather than market prices[12]:

$$Y = w^*L^F + r^*T^F + wL^M + rT^M = w' Ln + r' To \quad (8)$$

[12] This is still assuming identical returns for each factor for all the households, ignoring land and labor heterogeneity among households, The reason we are not introducing land and labor heterogeneity is for simplification purposes to be able to focus more on the functioning of rural markets rather than intrinsic differences.

Where w' and r' are weighted averages of the shadow and market wage and rental rates, w* and r* are the shadow wage and rental rate, and Y is the actual income. This suggests that $\tilde{Y}$ will diverge from Y in the direction that shadow prices for wage and rent diverged from the market rate for evaluating family inputs. However, w* and r*, the shadow wage rate and the shadow rental rate are not observed variables. What we are doing in this paper is to predict an approximation of neoclassical income per household by using the average market land rental and average market wage rates and multiplying with the land and labor endowments from the data set. On the basis of these approximations of the neoclassical income, a neoclassical inequality index, i.e., the neoclassical Gini coefficient ($G_{\tilde{Y}}$) can be computed. We can calculate the actual income inequality index, i.e., G_Y from the actual income obtained from the data set. We then take the distance between the two Gini coefficients, predicted and actual, and normalize this distance with the predicted Gini coefficient, to arrive at an index which we call the market malfunctioning measure (MMM).

$$MMM= (G_Y-G_{\tilde{Y}})/ G_{\tilde{Y}} \quad (9)$$

Our general hypothesis is that, in Turkey, as in any labor surplus economy, labor is not fully utilized and what lies behind this is the malfunctioning of markets, which is connected to land ownership inequality. Thus, when there is an improvement in the functioning of factor markets, labor utilization improves; the presumption is that labor utilization improves relatively more. Therefore, whenever markets function better, effective demand for labor will be higher. This will cause the earnings of labor to be greater. Any improvement in land earnings will be comparatively smaller than the improvement in labor earnings. In all, this hypothesis indicates that any improvement in market functioning reduces inequality of income.

It is obvious that the poor are those with relatively little land endowment and those who supply a lot of labor. Conversely the rich are those who have a lot of land and supply relatively

little labor. Finally, by definition, markets function best at the neoclassical ideal from which it follows that income inequality will be lowest under neoclassical market conditions.

On the basis of the preceding arguments it can be expected that when markets function perfectly in the neoclassical sense, then MMM=0, otherwise MMM will be positive for a labor abundant economy. However, there may be some exceptions to this.

In an ideal world of neoclassical economics it is reasonable to expect inequality of income to be necessarily less where there are perfect markets, i.e., no asymmetric information, no transactions costs, no interdependence of preferences. There are some cases which may or may not support this hypothesis. First, there may be non-economic arguments regarding familial or quasi familial relationships, in which poor families may get priority in labor, land, or credit market transactions in the actual world, but not in a neoclassical world. This then causes inequality to rise in a neoclassical world as opposed to the actual one.

In addition to the non-economic arguments, an economic one could be made based on land underutilization in large farms. In large farms there will be more land underutilization compared to the small farms. Thus, when household income is calculated with the average land rental rates, there could be cases where neoclassical income for the land-rich households could be much greater than its actual level. When this is the case, rich would be richer and poor would be better off, but the income gap might be larger than before. The distribution of income could worsen depending on the land underutilization of land-rich farms compared to labor underutilization of labor-rich but land-poor farms. In such a case, MMM could be negative. Keeping these points in mind, we will now move forward.

We first examine whether or not factor markets are neoclassical in rural Turkey. In other words whether MMM=0 or $Y-\tilde{Y}=0$. The test is a statistical paired t-test on the means of Y and $\tilde{Y}$.

Second, we look at the relationship to test the connectedness between land inequality and market malfunctioning utilizing the following equation:

$$MMM = \beta 0 + \beta 1 * G_{TO} + \beta 2 * \text{population density} + \beta 3 * \text{infrastructure availability} + \text{error} \quad (10)$$

Where $\beta 0$ is the constant term, G_{TO} is the Gini coefficient for owned land.

This is the hypothesis of connectedness put forth by Sen (1981), and Rao (2005).[13] Our argument is that even though factor markets serve to reduce inequality the reduction in equality will be small when markets malfunction widely. Conversely, well functioning markets will produce large reductions in inequality. Our main argument is not that factor markets may not diminish inequality; rather our argument is that while factor markets do in fact diminish inequality, the extent of reduction in inequality depends on how well the markets function. However, because market malfunctioning is itself connected to endowment inequality the inequality reducing role of markets is structurally limited. Hence we expect a positive relationship between land ownership inequality and MMM.

We expect the population density to have a negative impact on MMM. Boserup (1965) argues that population density creates a pressure to introduce intensive cultivation techniques to meet food requirements. This suggests that a higher population density brings about higher land yields and even higher average incomes. In addition to this, it is plausible to argue that in densely populated areas, work and land leases may be accessed with lower transaction costs from within proximate neighborhoods, which may be an impediment to monopoly power in local land markets.

We expect the sign of infrastructure to be negative since more and better quality infrastructure availability would de-link the connection between investment and private wealth. Poor peasants and small landholders would have access to services such as irrigation canals, a

[13] From conversations on the topic with Prof. Mohan Rao.

better commute, and technical assistance. Availability of infrastructure enables peasants to be more aware of opportunities and to access such opportunities with less cost and with increased participation in various markets, which in turn would result in reduced margins through arbitrage. Also, depending on the type of infrastructure it would relax seasonal and storage constraints, overall resulting in reduced monopoly power in local or fragmented markets.[14]

Third, in addition to MMM which is a measure based on outcomes in terms of household incomes, we assess the malfunctioning of markets via process measures. For assessing land markets, we look at the relation between land holding inequality and land ownership inequality and test the connectedness between the two by the following regression:

$$G_T = \beta 0 + \beta 1\, G_{TO} + \beta 2 * \text{population density} + \beta 3 * \text{infrastructure availability} + \text{error term} \qquad (11)$$

Where G_T stands for Gini coefficient for land holding, and G_{TO} stands for Gini Coefficient for land ownership.

4.1. Data and Assumptions of Income Calculations:

4.1.1. Data

The data we are using is the Quantitative Household Survey (QHS) for the year 2002 for Turkey.[15] The dataset includes 5,302 rural households from 7 regions, 73 provinces, 389 towns, and 517 villages in rural Turkey. The survey allows us to look at the degree of land and income inequality at the household level on a per capita basis. We have utilized 5,280 of the 5,302 households to calculate the Gini coefficients, and when expanded by the household members our dataset includes 30,242 observations. We have conducted our analysis on three different levels of observation: province level, town level, and village level.

[14] Please see Appendix A for the details on calculations of infrastructure variable.
[15] The survey was conducted by the World Bank (WB) to study the impact of ARIP which started in 2001 and will phase out in 2007.

4.1.2. Calculations of actual income:

Actual net farm household income is calculated by taking the gross income of the household from crop production, secondary production and animal sales and adding the household's market based labor income. In addition, we also included net rental income from land (both fixed rent and sharecropping), and net labor income (wages earned minus wages paid). Finally, from this, we deducted other farm related expenditures, such as fertilizers and pesticides, irrigation, veterinary, and utility bills for the barns, and homestead, to arrive at net household income.

4.1.3. Calculations and assumptions of neoclassical income:

To consider different preferences regarding off-farm labor market participation (labor supply response) we have calculated five different per capita neoclassical incomes, hence five different MMMs. In all the calculations, labor markets are assumed to be perfectly neoclassical in the sense that there exist no fragmented markets, no transactions costs, and no unemployment.

A general point regarding the neoclassical income calculations is that in some of these calculations when we used total on-farm family labor[16] as the labor endowment strictly, we multiplied the family labor endowment with the average market rate for labor, and then added the total labor income from the already hired out labor. In doing so, the members of the household who are already in the market got evaluated at their relevant market incomes. As we will elaborate in the following pages, in some of the other neoclassical income calculations we valued all labor endowment at the going average market wage rate.

In the first calculation of the neoclassical income, it is assumed that all adult members of the household prefer to perform labor either on or off-farm. Labor endowment is then multiplied by a market wage rate that is calculated by taking the average of agricultural and non-agricultural

[16] Please see Appendix A for details on the adjustments made to calculate on-farm labor input.

wage rates for permanent employment. Wage rates are averaged for each unit of analysis, i.e., village, town and province. In this model, even though total working adults are assumed to be fully providing their labor like in the Benjamin and Brandt (1997) model, there are no assumptions made on the length of the work week. Different than Benjamin and Brandt's (1997) 40 hours of work for week per each adult assumption, we use annual average wage income. This freed us from assuming total hours worked for annual or seasonal wage employment. Hence total neoclassical wage income of the household is calculated by multiplying the annual wage rate by the number of working age adults assuming their labor is valued at the going market wage for permanent agrarian and non-agrarian workers. [17]

The second calculation introduces preferences towards off-farm female employment. These preferences could be due to non-economic factors regarding gender roles which may be limiting labor force participation of females (on the supplier side) via discouraging women to look for off- farm jobs. To account for preferences due to male bias in households we have deflated the total female labor endowment by 0.25.

It is argued that lack of off-farm labor market participation (labor supply response) in rural agrarian economies is due to one's love for one's own farm [Visaria (1970)]. The third calculation differs from the ones above in the sense that total family labor days are assumed to be the households' work preference. Given market employment opportunity, it is assumed that household workers would not work one day more off the farm compared to what they have been already working on their own farm. The total number of days spent on-farm by the family then is multiplied by a daily agricultural wage rate. Since wage income is reported annually, we have estimated a daily wage rate via dividing this number by 90 days assuming the season to be three

[17] We have also calculated the first model via using seasonal agricultural wage, and our regression results are almost identical.

months. In addition, the amount of leased-out labor income is included to account for household members who are already earning wages from off-farm employment.

The fourth and fifth calculations differ from the third one in terms of the wage variable only. Rather than using agricultural seasonal income we used non-agricultural seasonal income as the daily wage rate, again divided by 90 days. For the fifth one, we took the market value of permanent value of full time employment (both agricultural and non-agricultural) and divided this annual figure into 330 work days to arrive a daily wage rate.

Now that we have detailed assumptions regarding the calculations and have set up the model, it is time to move forward with the actual empirical investigation.

4.2. Data, and sample characteristics:

Table (1) provides sample means of the key components of the variables we used in the analysis for the whole sample. An average household has 5.7 members, the least crowded households have one member, and the most crowded have 37. On the average, a typical household owns 69 decares[18] of land and operates 92, i.e., approximately one fifth of an average farm is accessed through land markets. Earnings from crop production make 78% of total household income. Income from agricultural sidelines such as animal sales, husbandry, secondary production sales of dairy and flour products constitutes 12% of the total household income, followed by labor income from hired out labor (10%). An average household pays 383 YTL per year for labor hired on farm, and spends more than half of its gross crop income on expenses such as fertilizer, pesticide, irrigation related expenses, veterinary costs, and electricity and gas bills.

[18] 1 decare= 1600 sq meter.

Table 1: Selected Household Characteristics

	Mean	Min	Max
Crop Production [a]	6260.0	0	751,000
Agricultural sidelines [b]	994.0	0	90,300
Income from land rent (Agr)	25.3	0	15,000
Land rent paid (agr)	219.3	0	30,000
Given crop share	183.0	0	133,000
Taken crop share	1.8	0	3,600
Labor income from market [c]	765.0	0	30,000
Wages paid	382.8	0	45,000
Other Expenses	3422.3	0	154,000
Net Income	3,839	-0.02	753,000
Household size	5.7	1	37
Land owned (in decares)	68.5	0	3,800
Land operated (in decares)	91.6	0	3,884
Sample size 5,280			

[a] Net of sharecropping
[b] Secondary production and animal sales
[c] Includes both agricultural and non-agr. labor income, all income is in (1000s)

5. Regression Analysis:

Before looking to see if land ownership inequality is instrumental in market malfunctioning, we first examine whether or not factor markets are neoclassical in rural Turkey. In other words whether MMM=0 or Y=$\tilde{Y}$. The test is a statistical t-test on the means of actual income (Y) and neoclassical income ($\tilde{Y}$).

$Y= \alpha +\beta \tilde{Y} + \varepsilon$

Where ε is the error term.

The null hypothesis states that $\alpha= 0$, and $\beta=1$. As can be seen from Table 2, we reject the null hypothesis of rural factor markets are neoclassical in Turkey, i.e., Y=$\tilde{Y}$. The F statistics is 428.2.

Table 2: Y=Ỹ

α	β	R^2	F test[b]
655,000	0.124	0.003	428.20
(367,000,000)	(0.04)		

N=5280
Robust standard errors in parenthesis
[b] Null Hypothesis: (α,β)= (0,1)

After establishing that rural factor markets are non-neoclassical, next we regress MMM onto land ownership inequality by using equation (10)

MMM= β1* G_{TO} + β2* population density + β3 * infrastructure availability + error

5.1. Province level analysis:

Province level results suggest a positive relationship between land ownership inequality and market malfunctioning (Table 3). In all the models, coefficient of land ownership inequality is positive; and in the first three models it is also statistically significant. One percent change in provincial land ownership inequality results in almost 1% increase in the market malfunctioning index for models I and II, and slightly more than a 1% increase in models IV and V at the 10% significance level, and a 2% increase for model III at the 5% significance level.

In model I, population density is significant and negative as expected, at the 10% level (p value 0.087). One percent increase in population density results in a 0.11% decrease in market malfunctioning index. In all other models, the coefficient is still negative but not significant. On the other hand, contrary to our expectations, the infrastructure variable is positively related to the market malfunctioning index. One reason for this could be the unequal access/utilization of the infrastructure based on wealth; if access to the infrastructure is a function of existing assets, it would have a dis-equalizing impact rather than an equalizing one.

Table 3: Province level results for Market Malfunctioning Measure

	I (ln)MMM1	II (ln)MMM2	III (ln)MMM3	IV (ln)MMM4	V (ln)MMM5
(ln) city land Gini	0.99	0.95	2.04	1.13	1.19
	(0.511)*	(0.516)*	(0.971)**	-0.87	-0.96
(ln) population density	-0.11	-0.10	0.01	-0.15	-0.19
	(0.061)*	-0.06	-0.11	-0.11	-0.13
(ln) infrastructure	0.16	0.16	0.44	1.49	1.50
	-0.43	-0.38	-1.73	-1.31	-1.26
Constant	0.40	0.32	-3.09	-6.22	-6.12
	-1.85	-1.67	-7.23	-5.58	-5.44
Observations	73	73	70	71	71
Adjusted R-squared	0.14	0.12	0.08	0.16	0.17

Robust standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%
All regressions are controlled for regional variation

We further our analysis by dropping the most developed and populated province in Turkey, i.e., Istanbul. A good reason to drop Istanbul is its large share in total economic activity (50 %) and population (23%). A village that is under the jurisdiction of Istanbul is basically very different than the ones elsewhere since this monster city's effective urban boundaries are inclusive of its villages. Therefore looking at the relationship without Istanbul provides a better picture of the inequality-factor market nexus in Turkey.

Our results change dramatically without Istanbul. As can be seen from Table 4, not only the significance of land ownership increases compared to the full sample, but land ownership distribution becomes significant also in the models in which it was not significant before. Population density, however, loses its significance in all the models; however, the sign is still negative (with the exception of model III).

Table 4: Province level results for Market Malfunctioning Measure without Istanbul

	I (ln)MMM1	II (ln)MMM2	III (ln)MMM3	IV (ln)MMM4	V (ln)MMM5
(ln) city land Gini	1.05	1.02	2.04	1.44	1.56
	(0.524)**	(0.525)*	(0.971)**	(0.816)*	(0.880)*

(ln) population density	-0.08	-0.07	0.01	-0.05	-0.06
	-0.07	-0.06	-0.11	-0.09	-0.09
(ln) infrastructure	0.16	0.16	0.44	1.50	1.52
	-0.41	-0.37	-1.73	-1.23	-1.17
Constant	0.24	0.14	-3.09	-6.94	-6.98
	-1.79	-1.62	-7.23	-5.24	-5.00
Observations	72	72	70	70	70
Adjusted R-squared	0.15	0.13	0.08	0.15	0.16

Robust standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%
All regressions are controlled for regional variation

5.2. Town and Village level Analysis:

We also ran the same regressions for town and village levels; however, for some of the towns and villages, the index of MMM takes a negative value, suggesting that actual income distribution is better compared to the neoclassical income distribution, particularly for the models in which we made the assumption that the quantity of labor supplied to the market by the households is equal to the quantity of labor supplied on the farms. Along with the reasons discussed earlier on the possibility on negative MMMs, another reason could be derived from the calculation of neoclassical wages which are estimated from the dataset, i.e., from an environment where markets are already imperfect and wages are low; hence, it is reasonable to see some of the index values turn negative. Out of 363 towns, seven turn negative in Models I and II, and the number of negative MMMs are 48, 35, and 30 for models III, IV, and V respectively. Overall, a maximum 98% and a minimum 87% of all towns predict a positive MMM. When MMM turns negative the interpretation of the coefficients becomes challenging; hence we narrowed the analysis to the ones with positive MMMs.

For villages, for models I though V. similar to town level calculations, a small number of MMMs turn negative, only 5 out of 500 villages. For Models III through V, however, the number of negative MMMs is 75, 50, and 42 respectively. Overall, a maximum 99% and a minimum 85% of all villages depict a positive MMM.

5.2.1. Town Level results:

For town level analysis we have excluded the population density variable since it cannot be disaggregated to the town level [19] and have added the distance-to-cities variable. It is hypothesized that the closer a household is to a larger market in cities, the less impact land ownership inequality will have on market malfunctioning since larger markets provide opportunities of alternative employment.[20]

As illustrated in town level regressions in all the models, land ownership inequality depicts a positive relationship with the MMM; however, only in one model (VI) this relationship is statistically significant (Table 5). In model V (in which total labor endowment is assumed to equal to the quantity of labor supplied on the farms), town land ownership distribution is significant at the 10% level (p value= 0.058). One percent change in land ownership distribution is correlated with 0.74% increase in the MMM.

Surprisingly, the only significant variable in town level analysis is the infrastructure index in models I and II. Contrary to our expectations it seems like better infrastructure is positively correlated to the market malfunctioning index. As we have discussed before, our insight about such a finding is the possible impact of unequal access to infrastructure that in turn may enhance inequality rather than impede it. Infrastructure index is significant at the 10% level; a 1% increase in the infrastructure index results in 0.9% increase in the market malfunctioning measurement.

[19] For town level regressions including population density, please see Table 10 in Appendix A.
[20] The distance-to-cities variable measures the distance in kilometers to the city center that the town is under the jurisdiction of. Ideally it is true that not political but geographical proximities to the city centers would be a better indicator of how close the town is to the nearest city center; however, due to data unavailability, we have used the jurisdiction level distances from towns to the cities they are under the municipality of.

Table 5: Town level results for Market Malfunctioning Measure

	I (ln)MMM1	II (ln)MMM2	III (ln)MMM3	IV (ln)MMM4	V (ln)MMM5
(ln) town land Gini	0.45	0.42	0.44	0.51	0.74
	-0.30	-0.29	-0.46	-0.42	(0.395)*
(ln) distance	0.00	0.00	0.01	-0.01	0.02
	-0.02	-0.02	-0.04	-0.03	-0.03
(ln) infrastructure	0.88	0.84	0.60	0.81	0.41
	(0.471)*	(0.469)*	-0.82	-0.75	-0.81
Constant	-3.02	-2.91	-3.31	-3.99	-2.62
	-2.02	-2.02	-3.50	-3.25	-3.48
Observations	356	356	315	328	333
Adjusted R-squared	0.10	0.09	0.00	0.06	0.03

Robust standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%
All regressions are controlled for regional variation

When we ran the town level regressions for the reduced sample (exclusive of Istanbul) we see that in addition to model V, land ownership inequality becomes significantly related to the market malfunctioning index in models IV and V as well (Table 6).

Table 6: Town level results for Market Malfunctioning Measure without Istanbul

	I (ln)MMM1	II (ln)MMM2	III (ln)MMM3	IV (ln)MMM4	V (ln)MMM5
(ln) town land Gini	0.44	0.48	0.45	0.69	0.75
	-0.31	-0.29	-0.46	(0.400)*	(0.396)*
(ln) distance	-0.01	0.00	0.01	0.00	0.02
	-0.02	-0.02	-0.04	-0.03	-0.03
(ln) infrastructure	0.86	0.86	0.69	0.98	0.48
	(0.483)*	(0.471)*	-0.81	-0.71	-0.80
Constant	-3.01	-3.02	-3.71	-4.80	-2.93
	-2.08	-2.03	-3.45	-3.08	-3.45
Observations	354	354	314	326	332
Adjusted R-squared	0.10	0.10	0.00	0.05	0.03

Robust standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%
All regressions are controlled for regional variation

In models IV and V land ownership inequality is significantly related to market malfunctioning. One percent increase in town landownership inequality is positively correlated

with 0.7% increase in the market malfunctioning index for model IV, and with a 0.8% increase for model V. Infrastructure is again positively and significantly correlated in models I and II.

5.2.2. Village Level Results:

In village level regressions along with population density variable, we also excluded the distance-to-cities variable since we cannot disaggregate this variable at the village level, and since there exist no linear relationship between the distance from villages and towns, adding distance-to-cities would not add much explanatory power. [21]

As illustrated in Table 7 there is a positive and significant correlation between land ownership inequality and the market malfunctioning index in all the models. For models I and II, a 1 % increase in land ownership inequality in a village is positively correlated with a 0.6% increase in MMM at the 5% significance level. For models III, IV, and V this impact is larger; and it is more significant for models IV and V at the 1% level (p value 0.004 and 0.002). A 1% increase in village landownership inequality is correlated with more than a 1% increase in the market malfunctioning index: 1.07, 1.12 and 1.24 for models III, IV, and V respectively.

Table 7: Village level results for Market Malfunctioning Measure

	I (ln)MMM1	II (ln)MMM2	III (ln)MMM3	IV (ln)MMM4	V (ln)MMM5
(ln) village land Gini	0.60	0.59	1.07	1.12	1.24
	(0.273)**	(0.272)**	(0.433)**	(0.396)***	(0.402)***
(ln) infrastructure	0.46	0.46	0.47	0.65	0.09
	-0.39	-0.40	-0.63	-0.62	-0.65
Constant	-1.28	-1.35	-2.96	-3.64	-1.53
	-1.67	-1.69	-2.66	-2.65	-2.78
Observations	495	495	425	450	458
Adjusted R-squared	0.11	0.10	0.02	0.04	0.02

Robust standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%
All regressions are controlled for regional variation

[21] Regressions including distance and population density are also conducted, and the significance results for land ownership inequality do not change; moreover, including these variables does not add much to the goodness of fit as can be seen from same adjusted R squares. Please see Table 11 in Appendix A for the village level results.

When we ran village level regressions after omitting Istanbul, we found out that our results were similar to the regular sample, except with slightly larger coefficients for the land ownership distribution variables (Table 8).

Table 8: Village level results for Market Malfunctioning Measure without Istanbul

	I (ln)MMM1	III (ln)MMM2	VI (ln)MMM3	VII (ln)MMM4	VIII (ln)MMM5
(ln) village land Gini	0.64	0.64	1.07	1.14	1.24
	(0.274)**	(0.273)**	(0.433)**	(0.395)***	(0.402)***
(ln) infrastructure	0.47	0.47	0.52	0.76	0.12
	-0.39	-0.40	-0.62	-0.61	-0.65
Constant	-1.33	-1.39	-3.17	-4.12	-1.69
	-1.67	-1.70	-2.65	-2.59	-2.78
Observations	493	493	424	449	457
Adjusted R-squared	0.12	0.11	0.02	0.03	0.02

Robust standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%
All regressions are controlled for regional variation

Similar to province level regressions, the infrastructure variable is also positively related with the MMM with no statistical significance.

To further our analysis, next we look to see if there is also "connectedness" between land ownership inequality and land holding inequality, as land markets seem to be the culprit in market malfunctioning.

For assessing if land ownership inequality is instrumental in land access, we test the "connectedness" between the two via utilizing QHS 2002 on province, town, and village level, by the following regression:

G_T= constant + β1 G_{TO} + β2* population density + β3 * infrastructure availability +error term

Our results suggest a very strong "connectedness" between land holding distribution and land ownership distribution in rural Turkey (Table 9). For city level analysis one unit change in land ownership Gini results in 0.5 unit change in land holding Gini. The relationship is significant at the1% level, and the same relationship holds for town and village level

observations. One unit of change in the Gini coefficient for land ownership results in 0.52 units of change for town level observations, and a 0.47 unit change in village level observations. Contrary to our expectations, population density and infrastructure are neither significantly nor negatively related to the distribution of land holdings in any of the samples. It seems like land ownership distribution is the driving factor behind land holding distribution.

Table 9: Connectedness in Land Market

	city land holding Gini	**town land holding Gini**	**village land holding Gini**
	I	**II**	**III**
land ownership Gini	0.507	0.519	0.468
	(4.65)**	(9.92)**	(10.54)**
lnpopdens	0.018	0.005	0.006
	-1.520	-0.850	-0.990
lninfcity	0.013	0.076	0.063
	-0.160	-1.340	-1.380
Constant	0.081	-0.170	-0.105
	-0.240	-0.710	-0.540
Observations	73	363	500
R-squared	0.50	0.48	0.40

Robust t statistics in parentheses
* significant at 5%; ** significant at 1%

6. Conclusion:

One of the major contributions of this paper to the existing inequality-factor markets literature is to suggest an analytical method to look at the connectedness between market malfunctioning and asset distribution. In places where the scope of markets is mostly local, such as in rural factor markets in developing countries, looking at the inequality-market functioning nexus becomes even more crucial. Markets with a local scope not only are more prone to abuses of local powers, but more often than not these markets are the only alternative people have. In developing countries where a large majority of the population relies on agriculture, the role of

factor markets in distributing economic alternatives becomes very crucial not only for the people engaged in agriculture but also for the country's resource allocation.

This paper showed that rural factor markets are structurally limited in functioning perfectly due to unequal distribution of land ownership. Our extensive empirical investigation on the relationship between land ownership inequality and rural factor market functioning illustrates that there is strong evidence in support of how and why rural factor markets fail not only in functioning perfectly but also in distributing economic opportunities. It is the" connectedness" between land ownership inequality and market malfunctioning in agriculture that results in such failures.

Further, our findings suggest that when markets are already non-neoclassical, it would be unrealistic to expect efficient outcomes. No developing country markets, particularly rural ones, follow the dictates of neoclassical economics textbooks.

Given these findings, we argue that in the presence of structural problems, such as land concentration, rural factor markets left to their own will be very ineffective in achieving allocative efficiency and will further add to the existing problems of rural unemployment, and income and asset inequality in Turkey.

REFERENCES

Aysu, A., (2002). 1980-2002 Turkiye Tariminda Yapilanma(ma)Tarladan Sofraya Tarim. Istanbul: Su Yayinlari.

Bardhan, P., K., (1984). Land, Labor, and Rural Poverty: Essays in Development Economics. New York: Columbia University Press.

Barham, B., L., Takasaki, Y., and Coomes, O.,T., (2000). "Are Endowments Fate? An Econometric Analysis of Multiple Asset Accumulation in a Biodiverse Environment". http://www.gdnet.org/pdf/890_Yoshito.pdf.

Berry, A., W., Cline (1979). Agrarian Structure and Productivity in Developing Countries. Baltimore, Johns Hopkins University Press.

Benjamin, D., (1995). *Can Unobserved Land Quality Explain the Inverse Productivity Relationship?* Journal of Development Economics, Vol. 46. pp. 51-84.

Benjamin D., and Brandt, L., (1997). "Land, Factor Markets, and Inequality in Rural China: Historical Evidence." *Explorations in Economic History*, Vol. 34, pp. 460–94.

Boserup, E. (1965). The Conditions of Agricultural Growth: The Economics of Agrarian Change under Population Pressure. London: George Allen & Unwin Ltd.

Byres, T., (2004). "Neo-Classical Neo-Populism 25 Years On: *Déjà Vu* and *Déjà Passé*. Towards a Critique". *Journal of Agrarian Change*, Vol. 4, No. 1-2, pp. 17-44.

Cakmak, E., (2004). "Structural Change and Market Opening in Agriculture: Turkey towards EU Accession". *ERC Working Papers in Economics*.

Carter, M., (1984). *Identification of the Inverse Relationship between Farm Size and Productivity: An Empirical Analysis of Peasant Agricultural Production*. Oxford Economic Papers, New Series, Vol. 36, No.1, pp. 131-145.

Carter, M., R., and Wiebe, K., D., (1990). "Access to Capital and Its Impact on Agrarian Structure and Productivity in Kenya". *American Journal of Agricultural Economics*, Vol. 72, pp. 1146-50.

Carter, M., and Zegarra, E., (2000). "Land Markets and the Persistence of Rural Poverty in Latin America: Conceptual Issues, Evidence and Policies in the Post-Liberalization Era." in A. Valdes and R. Lopez eds., Rural Poverty in Latin America, MacMillan Press.

Carter, M., and Zimmermann, F., J., (2000). "The dynamic Cost and Persistence of Asset Inequality in an Agrarian Economy." *Journal of Development Economics* ,Vol. 63, pp. 265–302.

Carter, M., and Zimmermann, F., J., (2003). "Asset Smoothing, Consumption Smoothing and the Reproduction of Inequality under Risk and Subsistence Constraints". *Journal of Development Economics,* Vol. 71, No, 2, pp. 233-60.

Conning, J., (2000). "Do Better Functioning Factor Markets Reduce Inequality: a simplified exposition". Prepared for the Panel on Asset Ownership, Redistribution, and Rural Growth at the Annual Bank Conference on Development Economics, Washington DC, April 18, 2000. http://www.worldbank.org/research/abcde/washington_12/agenda_12.html

Cornia, G., A., (1985). Farm Size, Land Yields and the Agricultural Production function: an analysis for fifteen Developing Countries. World Development. Vol. 13, pp. 513-34.

Dercon, S., (1998). "Wealth Risk and Activity Choice: Cattle in Western Tanzania". *Journal of Development Economics*, Vol. 55, pp. 1-42.

Dyer, G., (2004). "Redistributive Land Reform: No April Rose. The Poverty of Berry and Cline and GKI on the Inverse Relationship". *Journal of Agrarian Change*, Vol. 4, No.1 and 2, pp. 45-72.

Eswaran, M., and Kotwal, A., (1986). "Access to Capital and Agrarian Production Organization". *Economic Journal,* Vol. 96, pp.482-98.

Food and Agriculture Organization of the United Nations (FAO), (2004). *FAOSTAT on-line statistical* service. Rome: FAO. http://www.fao.org/es/ess/yearbook/vol_1_2/pdf/Turkey.pdf

Griffin, K., Khan, A., and Ickowitz, A., (2002). "Poverty and Distribution of Land". *Journal of Agrarian Change,* Vol. 2, No. 3, pp. 279-330.

Kaldjian, P., (2001). "The Smallholder in Turkish Agriculture: Obstacle or Opportunity?" In Engelmann, K., and Pavlakovic, V., eds., Rural Development in Eurasia and the Middle East: Land Reform, Demographic Change, and Environmental Constraints, University of Washington Press.

Khan, M., H., (2004). "Power, Property Rights and the Issue of Land Reform: A General Case Illustrated with Reference to Bangladesh." *Journal of Agrarian Change*, Vol. 4, No. 1 and 2, pp. 73-106.

Khusro (1974). Economics of Land Reform and Farm Size in India. McMillan Press. India.

Longworth, N., (2005). Agricultural Production, Prices and Trade. In A.M. Burrell, and A.J. Oskam eds., Turkey in the European Union: Implications for Agriculture, Food and Structural Policy. Cambridge: Cabi Publishing.

Masterson, T., (2003). Productivity, Gender and Land Rental Markets in Paraguayan Rural Development. Unpublished Dissertation, University of Massachussetts, Amherst.

Rao, J., M., (2005). "The Forms of Monopoly Land Rent and Agrarian Organization". *Journal of Agrarian Change*, Vol.4, No. 1 and 2, pp. 161-90.

Renkow, M., Hallstrom, D., Karanja, D., (2004). "Rural Infrastructure, Transactions Costs and Market Participation in Kenya". *Journal of Development Economics,* Vol. 73, pp. 349–67.

Roemer, J., E., (1982). A General Theory of Exploitation and Class. Cambridge, MA: Harvard U. Press.

Rudra, A., and B., Bandapadhyaya. (1973). Marginalist Explanation for More Intense Labor Input in Smaller Firms. Economic and Political Weekly. Pp. 989-04.

Sabates-Wheeler, R., (2005). "Asset Inequality and Agricultural Growth: How are patterns of asset inequality established and reproduced?" *WDR Background Paper on Asset Inequality and Agricultural Productivity.*

Unal, F. G., (2007). Small is Beautiful: Evidence of Inverse-Size Yield Relationship in rural Turkey. Unpublished Dissertation, University of Massachusetts, Amherst.

APPENDIX A

Calculation of family labor input

There are two major assumptions we made in calculating total on-farm labor input. First, reported labor input in QHS is only for crop production but work on a farm is rarely confined to crop production only. Agricultural sidelines such as cattle grazing, household food-processing and providing services to reproduce labor power in the household are all significant parts of on-farm labor input. Therefore, we have taken all these additional activities into consideration since labor input if not used in such activities can be sold in the market. Second, reported family labor input required a further assumption to prevent the problem of underestimation of family labor

input. There are two categories that family labor is reported as being utilized in the crop production: one category reports family-labor-only, and the other is a mixture of family labor and wage labor. We have assumed half of the mixed category is family labor and hence multiplied the amount reported in man-days by half and added to this to the family-labor-only category in crop production. This may be a conservative assumption given that small rural households generally hire when the family members are not adequate; so it is reasonable to expect that this ratio in reality would be more than the half.

Calculation of family labor input for agricultural sidelines:

For households that own cattle, we have added labor days based on the following assumptions: for households who own more than 0 but less than 10 cattle, we have added two additional man-days days per week, for households who own more than ten but less than 20 cattle we added three man-days per week, for households who own more than 20 but less than 30, we have added four man-days per week, for households who own more than thirty but less than 50 cattle, we have added five man-days per week, for households who own more than fifty but less than 81, we have added six man-days per week. Maximum number of cattle owned by any household in the dataset is 80.

We further added man-days for household labor to each household based on the household size: for households with more than one and less than five members we have added 3 man-days per week; for households who have more than six and less than nine members we have added 4 man-days per week; for households with more than nine and less than 14 members we have added 5 man-days per week; for households who have more than 14 and less than 19 members we have added 6 man-days per week; for households who have more than 19 and less than 24 members we have added 7 man-days per week; for households who have more than 24 and less than 29 members we have added 14 days per week; for households who have more than 29 and less than 38 members we have added 21 man-days per week. The maximum household in the dataset is 37.

Calculation of Infrastructure variable:

Infrastructure variable is an index, in which 100 is the highest value. This index is calculated based on the part of the survey (QHS 2002) where households were asked to evaluate public services in the village compared to what was available five years ago. The components of the infrastructure index includes: education services (high school and equivalent), drinking water, irrigation, agricultural marketing support, provision of irrigation canals and roads, agricultural education extension services, and veterinary services. Each household is asked to evaluate the services compared to five years ago in the village. Based on the household's evaluation, each category is given a number (by the household) from 1 to 5, one referring to positive improvements in the service, and 5 referring to its absence, and 4 referring to no opinion.[22] Since the higher the number the worse the overall infrastructure we aggregated these reported numbers and deducted them from 100; after this transformation the index reflects a better level of infrastructure with a higher number. It is useful to add that such an index is actually an indicator of comparison among households, i.e., within villages and not a very good one for among villages. However, rather than omitting this variable totally, we assumed that improvement of a service could proxy for overall evaluation of infrastructure in a village; hence we decided to include it rather than having to face the problem of omitted variable bias.

[22] We did not exclude if and when households responded in 4, i.e., no opinion, because them having no opinion could be reflective of the fact that they are not using these services.

Table 10: Town level results for Market Malfunctioning Measure including population variable:

	I (ln)MMM1	III (ln)MMM3	VI (ln)MMM6	VII (ln)MMM7	VIII (ln)MMM8
(ln)town land Gini	0.47	0.43	0.39	0.53	0.70
	-0.30	-0.30	-0.47	-0.41	(0.400)*
(ln)population density	-0.02	-0.01	0.08	-0.02	0.06
	-0.04	-0.04	-0.07	-0.08	-0.06
(ln)distance	0.00	0.00	0.01	-0.01	0.02
	-0.02	-0.02	-0.04	-0.04	-0.03
(ln) infrastructure	0.90	0.85	0.48	0.84	0.35
	(0.474)*	(0.47037)*	-0.83	-0.74	-0.81
Constant	-3.02	-2.91	-3.17	-3.99	-2.63
	-2.03	-2.02	-3.53	-3.25	-3.49
Observations	356	356	315	328	333
Adjusted R-squared	0.10	0.09	0.00	0.05	0.03

Robust standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%
All regressions are controlled for regional variation

Table 11: Village level results for Market Malfunctioning Measure without Istanbul including population and distance variable:

	I (ln)MMM1	III (ln)MMM3	VI (ln)MMM6	VII (ln)MMM7	VIII (ln)MMM8
(ln) village land Gini	0.62	0.61	1.07	1.12	1.22
	(0.271)**	(0.271)**	(0.435)**	(0.398)***	(0.403)***
(ln) population density	-0.03	-0.02	-0.01	0.01	0.02
	-0.04	-0.04	-0.06	-0.07	-0.06
(ln) infrastructure	0.47	0.46	0.48	0.65	0.08
	-0.40	-0.40	-0.63	-0.62	-0.65
Constant	-1.17	-1.28	-2.94	-3.70	-1.62
	-1.67	-1.69	-2.68	-2.70	-2.82
Observations	495	495	425	450	458
Adjusted R-squared	0.11	0.10	0.02	0.03	0.02

Robust standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%
All regressions are controlled for regional variation