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Market Failure and Land Concentration

by

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ABSTRACT

Utilizing a 2002 household-level World Bank Survey for rural Turkey, this paper explores the link between concentration of land ownership and rural factor markets. We construct a unique index that measures market malfunctioning based on the neoclassical model linking land and labor endowments through factor markets to household income. We further test whether land ownership concentration affects market malfunctioning. Our empirical investigation supports the claim 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. This work fills an important empirical gap within the development literature and establishes a positive association between asset inequality and factor market failure.

Keywords: Market Failure; Land Ownership; Turkey

JEL Classifications: Q12, Q13, Q15

INTRODUCTION

According to conventional theory in economics, it is presumed that perfectly competitive markets allow the full utilization of land, labor, and capital, and their efficient allocation across alternative uses. This assertion provides a theoretical as well as a normative benchmark for economic outcomes in terms of aggregate income, poverty, and inequality (Rao 2005).

Despite nonconformity to the conditions of perfect competition, developing countries have received more than their fair share in implementation of free market policies and the accompanying failures, particularly in agriculture (Aysu 2002). Following those experiences, and during a time when we are witnessing the failure of neoliberal free market policies all over the globe, this paper contributes to the dialogue on why free market policies fail.

For most developing countries, the agriculture sector still continues to provide employment for a majority of the population regardless of high rates of migration (Hall and Midgely 2004), and the poorest of the poor still live in rural areas (WDR 2008). Thus, economic policies focusing on the agricultural sector are crucial for a large number of people who are among the most vulnerable.

From a historical perspective, compared to earlier economic policies on agriculture, there has been a clear shift towards increased emphasis on the importance of markets. The 1940s emphasized support of agriculture via prices set by states. The 1950s were marked by industrialization where the agricultural sector had a passive "role" to provide the industry with the surplus needed for investment (Lewis 1954; Fei and Ranis 1964). The 1960s witnessed a paradigm shift to agriculture as an active player in development rather than merely a "passive" contributor to industry. Mechanized agriculture provided markets and other linkages to industrial growth (Johnston and Mellor 1961). The linkages agriculture provided fostered the view of balanced growth rather than acceptance of the exploitation of the agricultural sector by industry. Concurrent with this development, debates on inverse size yield relationship (Mazumdar 1965; Sen 1966; Rudra and Bandapadhyaya 1973; Khusro 1973) also constituted the economic justification for small farms being considered as a path to growth out of poverty and provided the rationale for land reforms. The late 1960s and early 1970s ushered in modernization in agriculture, marked by machines replacing labor, and combined with the Green revolution, created mass unemployment in capital-poor, labor-rich countries like Turkey (Koymen 2000).

The 1980s were the beginning of neoliberal policies; developing country economies needed to be "structually adjusted" to development. Somehow "stabilization" not "development"

was the top priority on the development agenda. In the 1990s, development policies were targeted at improving rural lives to correct urban bias by "getting the prices right" for agriculture vis-a-vis exchange rate devaluation, abolishing export taxes, reducing trade barriers, and opening national borders to imports from heavily subsidized developed countries. The early policies in the 2000s focused on property rights (De Soto 2000), and on advocating for an increased role for NGOs managed by some "white guy in shorts"[1] who was trained to accomplish what "corrupt" governments could not in the Third World; eliminate poverty and other developmental problems by empowering and emancipating peasants, with no accountability to any authority other than their donors.

Policies, however, cannot exist or function on their own; they have to be mediated and implemented. Markets have always been among the many existing policy mediators along side states, courts, schools, and religious institutions. However, this view is in striking contrast to the policies observed after the 1980s in which markets became the decision makers rather than mediators of economic policy.

Markets mediate between the people and the economy. In reducing poverty and inequality, markets are deemed to be effective to the extent that they offer economic opportunities to people. The extent to which they offer such opportunities depends on how markets function, and on the distribution and structure of the assets and income people have Sarris (2001)[2].

The major inquiry of this paper is to study the link between land ownership inequality and the functioning of rural factor markets in Turkey. We suggest an analytical method to meaure market malfunctioning, and in so doing, this research fills an important empirical gap in the development literature that looks at market failure mostly via theoretical models.

In an economy where agriculture is among the major sources of livelihood, it is clear that land ownership is important because of its productive capacities (Benjamin and Brandt 1997). Perhaps what is not so clear 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

[1] Term quoted from chief economist, Oxfam England, CAPORDE 2005 discussions.
[2] Reference in Sabates-Wheeler (2005).

to economic opportunities (Deininger and Feder 2001; 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 discussed in the literature, except for plantations, there are no economies of scale in agriculture in the developing world; on the contrary there is an inverse relationship between farm size and yield per acre (Unal 2008). 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 this paper, we argue that rural factor markets have a tendency to perpetuate initial land and land-related inequalities rather than ameliorate them. The main question we will answer is the following: is land ownership inequality positively associated with factor market malfunctioning?

In doing so, the structure of this paper is as follows: in the next 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 third section we detail the methodology; in the fourth section we provide the agrarian context of Turkey given the most recent reforms in the agricultural sector and test our hypotheses by utilizing a World Bank Survey on rural Turkey for 2002; finally, in the last section we take account of our empirical inquiry and present our conclusions.

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 within the exchange process. In the heterodox view, inequality is both an outcome and a force that affects the process that produces the outcome.

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 free markets. Inequality is a result of perfect competition in which the most efficient producer wins and the outcome is reflected in efficient 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's (1964) ultra neoclassic work sheds no light on the relation between inequality and rural factor markets neither it aims to do so, however, another work within the same paradigm does. Based on a two factor (land and labor), two household (land rich and land poor) trade model, Conning (2000) 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.

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 approach to the imperfect markets-inequality nexus since they look at more dimensions, such as differentiation in agrarian organization as outcomes resulting from imperfections in rural factor markets (Eswaran and Kotwal 1986; Bardhan 1984; Carter and Wiebe 1990; Barham et al. 2000) rather than one dimension, such as outcomes pertinent to one asset only (Dercon 1998; Carter and Zegarra 2000; Carter and Zimmermann 2000, 2003; Renkov et al. 2004).

Within the first group, in their influential study Eswaran and Kotwal (1986) model the impact of credit access and supervision cost on the organization of class structure and agricultural production. Subject to credit and supervision constraints, farmers optimize between different choices of working on or off the farm, which then determine their class position and thereby the agrarian organization. Their study is important because it shows the importance of land distribution and thus agrarian organization as partly an outcome of imperfect rural factor markets.

Carter and Zimmermann (2000) extend Eswaran and Kotwal's (1986) analysis to a dynamic one and look at how markets correct for land inequality. Based on their findings, in the long run, within 50 years, markets bring about equality through the equalizing mechanism of differences in shadow prices for land and labor.

The "asset or endowment 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 nature of endowments they hold. Their study on the Peruvian Amazon, considers two different types of endowments, reproducible and fixed, such as fishing nets and land, related to two different activities, fishing and agriculture. The fixed nature of land, as opposed to the

reproducibility of fishing nets creates 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 et al. 2004). A well-known study within this category is by Dercon (1998) on the patterns of activity choice and asset accumulation between rich and poor farmers in Western Tanzania. The central point of his work is that most profitable investments are constrained by entry, which is eased by credit, and credit access is eased by land ownership. 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.

A common point in the transactions costs/ asset dependency view, which constitutes a major difference from the pure neoclassical one, is that the efficiency of the outcome is rejected under market imperfections. Despite its contribution to modify the neoclassical theory to include market imperfections as reflected in transactions costs, in our view, 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. Either by time as countries develop, or by the efforts of market friendly multinational institutions, such as the World Bank, the problem of rural economies by smoothing the functioning of markets would be solved. In short, the policy suggestion to increase efficiency is to correct for market failures which are exogenous to the system, and not produced by the existing structures such as markets and asset inequality.

Heterodox Approach

Heterodox literature 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.[3] 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 relatively isolated local rural 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 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 a 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 output.

From our point of view, the major difference between mainstream theories and Griffin et al.'s (2002) approach to the rural markets-inequality nexus 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 utility given exogenous constraints, i.e., endowments. If inefficiencies occur, it is because asset poor agents cannot compete due to transactions costs, which are again 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

[3] See Journal of Agrarian Change, (2004). Vol. 4, Issue 1 and 2 for the debate.

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[4], fixed rent tenancy[5], wage labor, and labor rent[6]. In his work, Rao (2005) emphasizes the relations of production rather than the relations of exchange, and 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) 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.

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.[7]

[4] Sharecropping is a system in which the tenant provides labor, the landlord provides land, and output is mostly shared equally.
[5] In fixed rent tenancy, the tenant is the full claimant to the residual after paying a fixed amount of rent to access land. Rent may be in cash or kind.
[6] Labor rent 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).
[7] The term "connectedness" is from Sen's (1981) pioneering work on agrarian market failure.

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 as defined by conventional theory. 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. 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 markets 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 land 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 circular in logic since they try to explain the well functioning of actual factor markets with itself.

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 same set up of Benjamin and Brandt's (1997) neoclassical agrarian economy; however, the utilization of the model differs in aforementioned ways.

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:

$$pF(T^*, L^*) - wL^H - rT^H = wL^F + rT^F \quad (6)$$

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. Then a more precise valuation of the household endowments would be at shadow prices rather than market prices[8]:

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

Where w* and r* are the shadow wage and rental rate, w and r are market wage and rental rates, w' and r' are weighted averages of the shadow market wage and rental rates, and Y is the actual income. This suggests that neoclassical income ($\tilde{Y}$) will diverge from the actual income (Y) when there is inequality between shadow and market wage and rental rates. 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).

[8] Following Benjamin and Brand (1997), this is still assuming identical returns for each factor for all the households, ignoring land and labor heterogeneity among households.

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

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.[9] 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 transaction 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. Hence, the distribution of income

[9] However, one should be careful to evaluate equality of MMM to zero as market perfection without further analysis, as in rare cases, imperfections in land markets could cancel out imperfections in labor markets. One way to overcome this shortcoming is to conduct a closer analysis of MMMs when they turn to zero to make sure that the source of the zero value of MMM is not due to two imperfections canceling each other out.

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 $\tilde{Y}$. It is important to note that, the major contribution of this paper is not to show markets are imperfect in Turkey, as this is no secret to anyone with common sense. Particularly rural markets in developing countries are far from functioning perfectly as they are prone to imperfect information, transaction costs, inadequate infrastructure, and high unemployment. The novelty in this paper is to show that land ownership inequality distorts market functioning in the direction predicted by the theory. One other major contribution of this paper is to fill the empirical gap of most of the theoretical work looking at the nexus of market imperfection and asset distribution.

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

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

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).[10] 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

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

proximate neighborhoods, which may be an impediment to monopoly power in local land markets.

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:

$G_T = \beta 0 + \beta 1\ G_{TO} + \beta 2 *$ population density + error term (11)

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

Calculations and Assumptions of Actual and Neoclassical Income

Calculations of Actual Income

Actual net farm household income is the summation of two major components. The first component is the summation of gross income from crop production, secondary production and animal sales net of farm expenditures such as fertilizers, pesticides, irrigation, veterinary, and utility bills for the barns, and homestead. The second component is net rental income from land (both fixed rent and sharecropping), and net labor income (wages earned minus wages paid).

Calculations and Assumptions of Neoclassical Income

Given factor endowments, income inequality may not be necessarily the result of malfunctioning factor markets. It may be the result of preferences to participate in the markets, or due to factor price differences in different markets. To address different preferences regarding off-farm labor market participation, and differing wage rates for seasonal and permanent employment within and outside of agriculture we have estimated five different per capita neoclassical incomes, hence five different MMMs. In all the estimations, labor markets are assumed to be perfectly neoclassical in the sense that there exist no fragmented markets, no transaction costs, and no unemployment.

First, we have assumed that all adult members of the household prefer to work full time and are indifferent between working on or off the farm.[11] Labor endowment is then multiplied by

[11] For a more realistic estimation of labor input, we have added man-days to total number of man-days reported in the dataset as the reporting only addressed crop production. Please see Appendix B for details.

a market wage rate which is the average of agricultural and non-agricultural wage rates for full time permanent employment.[12]

The second calculation addresses gender preferences about market work within the household. These preferences could be due to non-economic factors regarding gender roles which may be limiting off-farm labor force participation of females. To account for such preferences we have deflated the total female labor endowment by 0.25. Wage rate is the same as in model one.

The third calculation of neoclassical income addresses the issue of love for one's own farm. 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[13]). Hence, the third calculation differs from the ones above in the sense that total family labor days on the farm are assumed to be the households' work preference. The wage rate that is used to calculate the value of labor endowment is a daily agricultural wage rate.[14]

The fourth and fifth calculations differ from the third one in terms of the wage variable only. Rather than using agricultural seasonal income we have used non-agricultural seasonal income as the daily wage rate. For the fifth one, we took the market value of the 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 estimations and have set up the model, it is time to move forward with the actual empirical investigation.

[12] Wage rates are averaged for each unit of analysis, i.e., village, town, and province. In the first model, unlike the calculations offered by Benjamin and Brandt (1997), we did not assume the length of the work week, such as 40 hours of week per week-. Rather, we used annual average wage income as reported in the dataset. 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. We have also conducted same calculations with seasonal agricultural wage rates, and obtained very similar results. Results could be furnished upon request.

[13] Citation from Bardhan 1973.

[14] 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 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. Hence, we did not have to include them in the category of estimated income.

AGRARIAN CONTEXT OF TURKEY, DATA, AND SAMPLE CHARACTERISTICS

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%)[15] of the population employed in agriculture with a skewed landownership distribution with a Gini coefficient of 0.65,[16] 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, with 35% of all lands in use for agricultural production, excluding pastures. With nearly 25% of the Middle East and North Africa's arable land and abundant water resources, Turkey ranks in the top five producers for chickpeas, chillies and peppers, cotton, cucumber, eggplants, green beans, lentils, nuts (pistachios, chestnuts, and walnuts), onions, sugarbeets, 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).

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.[17]

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).

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 working in agriculture and 30% of 70 million Turks live in rural areas (State Statistics Institute 2006b). The success of the ARIP program is crucial as, of that population segment, 37% of those in the agriculture sector are living under poverty (State Statistics Institute 2006a). This clearly could be a challenging issue not only for Turkey but for MENA and for Europe.

[15] State Statistics Institute, 2006b.
[16] Author's own calculations based on QHS 2002.
[17] State Statistics Institute, 2006b.

Hence, 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 function.

Data and Sample Charecteristics

The data we use in this research is QHS 2002, the details of which are outlined in Appendix A. The QHS 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 observations to calculate the Gini coefficients, and when expanded by the household members there are 30,242 observations.

Table 1 provides sample means of the key components of the variables we used in the analysis for the whole sample. 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 the 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.

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
Note: all income and expenses are in YTL.

The descriptive statistics for five different MMMs at three different levels of analysis (province, town, and village) can be seen in tables 10 through 12, and also figures 1 through 15 in Appendix A. First of all, there is not even a single case where MMM index has the value zero, including all models and all three levels of analysis.

The means of provincial MMMs are higher for the first two models, 2.76 and 2.61, but lower for the others, 0.67 for the third and 0.74 for the fourth and fifth (table 9). It is reasonable to see a smaller MMM for the third, fourth and fifth models, as the labor endowment estimation for these are only the total number of days worked on one's farm. When labor endowment is taken only as the total number of days worked on the farm, it is normal to see the neoclassical income distribution gets closer to the actual one, as neoclassical income will be much closer to

the actual one since the labor income gap between the actual and the neoclassical household income would be simply due to wage differences and not differences of labor endowments. Hence the market malfunctioning index gets smaller. The same pattern is also visible for town and village level MMMs.

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. The test is a statistical t-test on the differences of means of actual income (Y) and estimated neoclassical income ($\tilde{Y}$) by using the assumptions of the first model. A statistical test on the equivalence of means rejected the null hypothesis at the 1% significance level (table 10 in Apendix A).

After establishing that rural factor markets are non-neoclassical, we regress MMM onto land ownership inequality using equation (2)

$$MMM = \beta 1 * G_{TO} + \beta 2 * \text{population density} + \text{error}$$

Province Level Analysis

Province level results suggest a positive relationship between land ownership inequality and market malfunctioning (table 2). In all the models, the coefficient of land ownership inequality is positive; and in the first three models it is also statistically significant. A one percent change in provincial land ownership inequality results in approximately a 1% increase in the market malfunctioning measurement for models I and II, and slightly more than a 1% increase in models IV and V with no significance, and a 2% increase for model III at the 5% significance level.

Table 2: 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	1.02	0.97	2.09	1.13	1.13
	(0.51)*	(0.52)*	(0.94)**	-0.93	-1.06
(ln) population density	-0.10	-0. 09	0.02	-0.19	-0.25
	(0.06)*	-0.06	-0.11	-0.15	-0.18
Constant	1.02	0.96	-1.28	0.25	0.54
	(0.40)**	(0.38)**	(0.75)*	-0.95	-1.13
Observations	73	73	70	71	71
Adjusted R-squared	0.15	0.13	0.09	0.13	0.15

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

In model I, population density is significant and negative as expected, at the 10% level. A one percent increase in population density results in a 0.10% decrease in market malfunctioning measurement. In all other models, the coefficient is negative, however insignificant.

We further our analysis by dropping the most developed and populated province in Turkey, Istanbul. A good reason to drop Istanbul is the fact that it accounts for 50% of all economic activity and is home to 23% of Turkish population. A village that is under the jurisdiction of Istanbul is basically very different than villages elsewhere since this monster city's effective urban boundaries include its villages. Therefore, looking at the relationship without Istanbul provides a better picture of the inequality-factor market nexus in rural Turkey. The results of this reduced sample are illustrated in table 3.

Table 3: 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	1.08	1.04	2.09	1.59	1.70
	(0.52)**	(0.53)*	(0.97)**	(0.82)*	(0.90)*
(ln) population density	-0.08	-0.06	0.02	-0.02	-0.04
	-0.07	-0.06	-0.11	-0.09	-0.09
Constant	-1.79	0.79	-1.28	-0.74	-0.70
	(0.43)**	(0.40)*	(0.75)*	-0.59	-0.59
Observations	72	72	70	70	70
Adjusted R-squared	0.16	0.14	0.09	0.12	0.13

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

Our results change dramatically without Istanbul (table 3). Not only the significance of land ownership increases compared to the full sample, but land ownership distribution also becomes significant in the models in which it was not significant before. Population density, however, loses its significance in all the models; however, with the exception of the third model, the sign is still negative.

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 assumed the quantity of labor supplied to the market and the farm were equal. As we have discussed earlier, values of MMM can be negative under certain circumstances: first, in the actual world when land is not utilized fully by large landlords, the gap between rich and poor households would be smaller compared to the neoclassical world where all factors of production are fully utilized. Second, where familial preferences are given to the very poor in an actual world for land or labor employment access, the income distribution would be lower compared to a neoclassical world where everybody has equal market access. Hence, it is reasonable to see some of the index values turn negative. Out of 363 towns, eight turn negative in Models I and II, and the number of negative MMMs are 50, 35, and 32 for models III, IV, and V respectively. Overall, a maximum 98% and a minimum 86% of all towns predict a positive MMM. It is reasonable to see more negative values for MMMs for models III through V as labor endowment is assumed to be identical to the actual days worked on a farm. In an economy where land is concentrated but labor is not, returns to labor should have an equalizing effect on the income distribution. In our estimation of MMMs in models III through V, we have reduced the impact of labor endowment and hence reduced the equalizing impact of labor endowment; hence there are more negative MMMs. One drawback of the regression analysis of the MMM index is that when MMM turns negative the interpretation of the coefficients becomes challenging; hence we narrowed the analysis to the ones with positive MMMs. Basically, where the MMMs are positive, the possibility of their meaningful interpretation and explanation exists within the framework adopted in this paper. Otherwise, for villages with negative MMMs, one must conclude that the relevant universe is distinct.

For villages, in 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.

Town level results

For town level analysis we have excluded the population density variable since it cannot be disaggregated to the town level[18] and have added the distance-to-cities variable. It is hypothesized that the closer a household 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.[19]

Table 4: 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	0.57	0.51	0.43	0.64	0.73
	(0.28)**	(0.28)*	-0.46	-0.40	(0.39)*
(ln) distance	-0.01	-0.01	0.007	-0.01	0.02
	-0.02	-0.02	-0.04	-0.03	-0.03
Constant	0.70	0.66	-0.74	-0.58	-0.88
	(0.17)***	(0.17)***	(0.30)**	(0.24)**	(0.25)***
Observations	355	355	313	325	331
Adjusted R-squared	0.11	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

As illustrated in town level regressions in all the models, land ownership inequality depicts a positive relationship with the MMM; in models (I), (II) and (V) this relationship is statistically significant (table 4). In model I, one percent change in land ownership gini is correlated with 0.57% change in MMM at the 5% significance level. In Model V, town land

[18] For town level regressions including population density, please see table 14 in Appendix A.
[19] The distance-to-cities variable measures the distance (in kilometers) to the city center of which the town is under jurisdiction. 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 of which they are a municipality.

ownership distribution is significant at the 10% level (p value= 0.08). One percent change in land ownership distribution is correlated with 0.73% increase in the MMM.

The regression results for the reduced sample (exclusive of Istanbul) are not significantly different for town level analysis. Only magnitude effects change slighlty (table 5).

Table 5: 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	0.61	0.56	0.44	0.66	0.74
	(0.28)**	(0.28)**	-0.46	-0.40	(0.39)*
(ln) distance	0.004	0.01	0.01	-0.01	0.02
	-0.02	-0.02	-0.04	-0.03	-0.03
Constant	0.67	0.63	-0.75	-0.60	-0.89
	(0.17)***	(0.17)***	(0.30)**	(0.24)**	(0.25)***
Observations	353	353	312	324	330
Adjusted R-squared	0.12	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

Village Level Results

In village level regressions along with a population density variable, we excluded the distance-to-cities variable since disaggregation of this variable at the village level is not possible given the data. Also, there exists no linear relationship between the distance from villages and towns, adding distance-to-cities would not add much explanatory power.[20]

[20] Regressions including distance and population density are also conducted, and the significance results for land ownership inequality do not change, moreover including these variables do not add much to the goodness of fit. Please see table 15 in Appendix A for the regressions including population variable. Results including distance variable can be furnished upon request.

Table 6: 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	0.59	0.58	1.13	1.07	1.36
	(0.27)**	(0.27)**	(0.43)***	(0.41)***	(0.39)***
Constant	0.69	0.61	-0.97	-0.86	-1.21
	(0.13)***	(0.13)***	(0.24)***	(0.21)***	(0.23)***
Observations	495	495	423	450	457
Adjusted R-squared	0.11	0.1	0.03	0.03	0.03

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

As illustrated in table 6 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 0.008 and 0.001). A one percent increase in village landownership inequality is correlated with more than a 1% increase in the market malfunctioning index: 1.13, 1.07 and 1.36 for models III, IV, and V respectively.

For the reduced sample, the results are similar to the regular sample, except with slightly larger coefficients for the land ownership distribution variables (table 7).

Table 7: 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	0.62	0.62	1.137	1.09	1.36
	(0.28)**	(0.28)**	(0.43)***	(0.41)***	(0.39)***
Constant	0.671	0.60	-0.971	-0.87	-1.22
	(0.132)***	(0.13)***	(0.24)***	(0.21)***	(0.23)***
Observations	493	493	422	449	456
Adjusted R-squared	0.12	0.11	0.02	0.03	0.03

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

After establishing the positive correlation between land ownership inequality and market malfunctioning measurement, it makes sense to look at "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 tested the "connectedness" between the two via utilizing QHS 2002 on province, town, and village level, by the following regression:

$G_T = constant + \beta 1\ G_{TO} + \beta 2 * population\ density + error\ term$

The results suggest a very strong "connectedness" between land holding distribution and land ownership distribution in rural Turkey (table 8).

Table 8: Connectedness in Land Market

	city land holding Gini	**town land holding Gini**	**village land holding Gini**
	I	**II**	**III**
Land ownership Gini	0.48	0.51	0.46
	(0.11)**	(0.05)**	(0.05)**
lnpopdens	0.02	0.01	0.004
	-0.01	-0.01	-0.01
Constant	0.20	0.19	0.20
	(0.08)*	(0.04)**	(0.08)*
Observations	73	363	500
Adj-R-squared	0.47	0.48	0.41

Robust t statistics in parentheses
* significant at 5%; ** significant at 1%
All regressions are controlled for regional variation

For all levels of analysis, one unit change in land ownership Gini results in approximately 0.5 unit change in land holding Gini. The relationship is significant at the 1% level in all levels. Contrary to our expectations, population density is 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.

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. We further fill an important empirical gap in the literature that studies asset inequality and markets. 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, they 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.

In this paper, we showed that rural factor markets are structurally limited in their functioning which is positively correlated with unequal distribution of owned land in agriculture. Our empirical investigation on the relationship between land ownership inequality and rural factor market functioning illustrates that there is strong evidence in support of the "connectedness" between land ownership inequality and market malfunctioning in agriculture that results in failure to distribute economic opportunities.

Further, our findings suggest that when markets are already non-neoclassical, it would be unrealistic to expect efficient outcomes. No country markets, particularly rural ones in developing countries, 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.

APPENDIX A

Table 10

Ym	Ỹm	Difference (Ym- Ỹm)	SE (Ym- Ỹm)	95% confidence interval for difference	
1.43e+09	1.44e+10	-1.30e+10	2.82e+08	-1.34e+10	-1.25e+10

*The difference is significantly different from zero at the 1% significance level.

Table 11: DESCRIPTIVE STATISTICS for PROVINCE LEVEL MMMs

Variable	N	Mean	Std. Dev.	Min	Max
MMMI	73	2.76	1.26	0.74	8.51
MMM II	73	2.61	1.07	0.71	6.86
MMM III	73	0.67	0.51	-0.25	2.47
MMM IV	73	0.74	0.52	-0.26	2.53
MMM V	73	0.74	0.53	-0.25	2.52

Source: Quantitative Household Survey, 2002

Table 12: DESCRIPTIVE STATISTICS for TOWN LEVEL MMMs

Variable	N	Mean	Std. Dev.	Min	Max
MMMI	363	2.77	2.12	-0.1	31.05
MMM II	363	2.58	1.62	-0.13	17.19
MMM III	363	0.66	0.8	-0.48	6.79
MMM IV	363	0.76	0.86	-0.5	7.42
MMM V	363	0.74	0.76	-0.49	5.81

Source: Quantitative Household Survey, 2002

Table 13: DESCRIPTIVE STATISTICS for VILLAGE LEVEL MMMs

Variable	N	Mean	Std. Dev.	Min	Max
MMMI	500	2.71	2.03	-0.4	31.05
MMM II	500	2.52	1.60	-0.39	17.19
MMM III	500	0.66	0.82	-0.61	6.79
MMM IV	500	0.78	0.83	-0.5	6.30
MMM V	500	0.74	0.78	-0.49	5.81

Source: Quantitative Household Survey, 2002

Table 14: 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
	(0.47)*	(0.47)*	-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 15: 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
	(0.27)**	(0.27)**	(0.44)**	(0.40)***	(0.40)***
(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

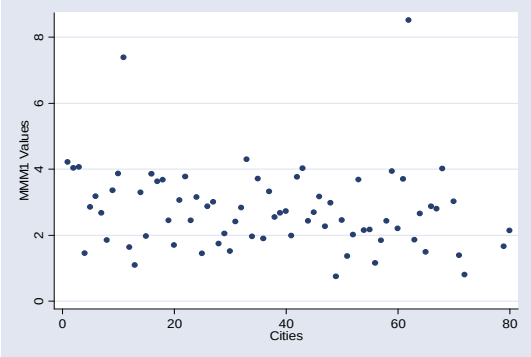

Figure 1: Province Level Values of MMMs for Model I

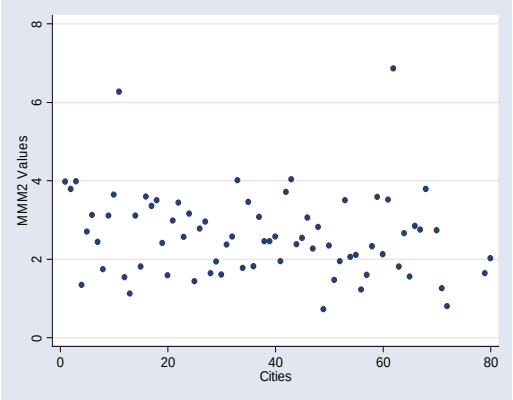

Figure 2: Province Level Values of MMMs for Model II

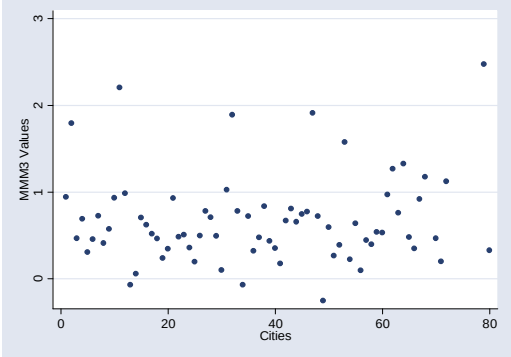

Figure 3: Province Level Values of MMMs for Model III

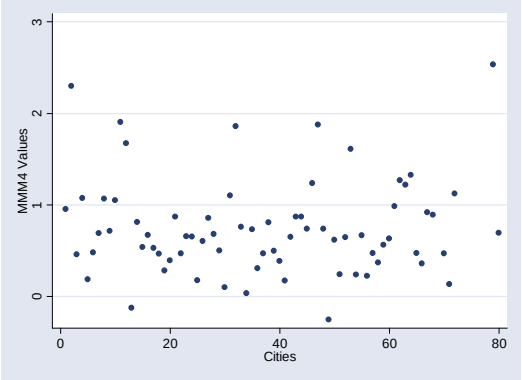

Figure 4: Province Level Values of MMMs for Model IV

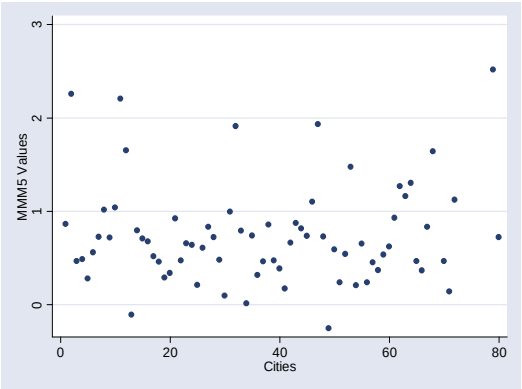

Figure 5: Province Level Values of MMMs for Model V

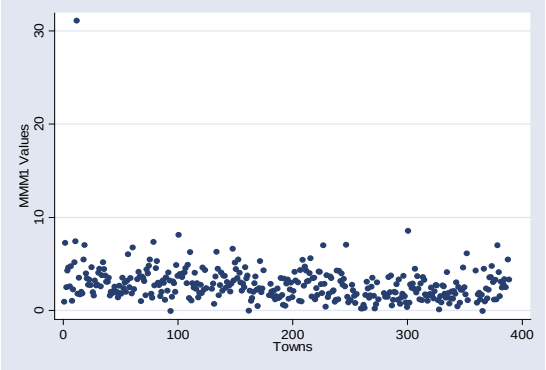

Figure 6: Town Level Values of MMMs for Model I

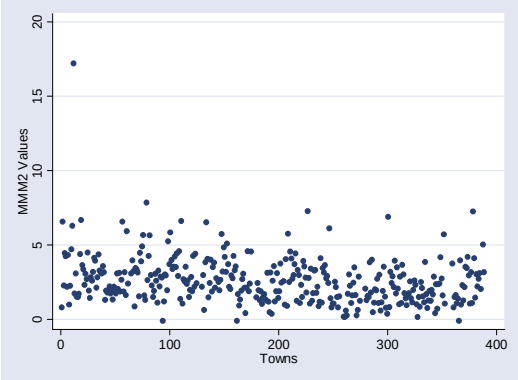

Figure 7: Town Level Values of MMMs for Model II

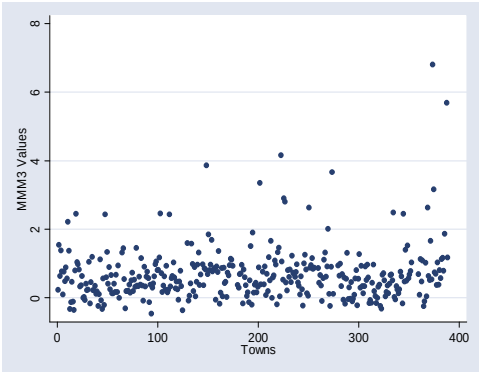

Figure 8: Town Level Values of MMMs for Model III

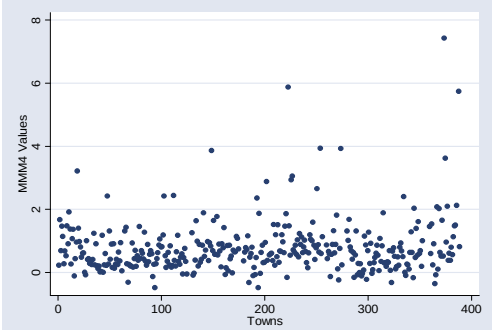

Figure 9: Town Level Values of MMMs for Model IV

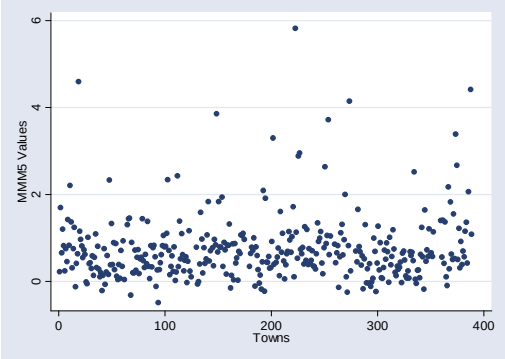

Figure 10: Town Level Values of MMMs for Model V

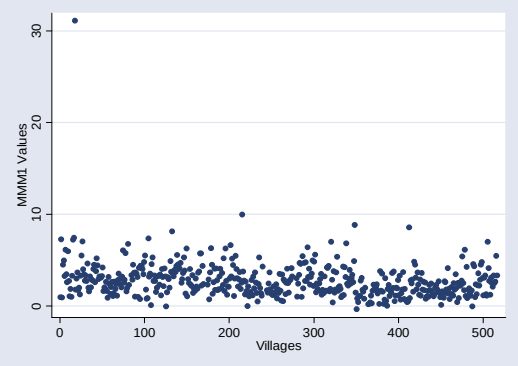

Figure 11: Village Level Values of MMMs for Model I

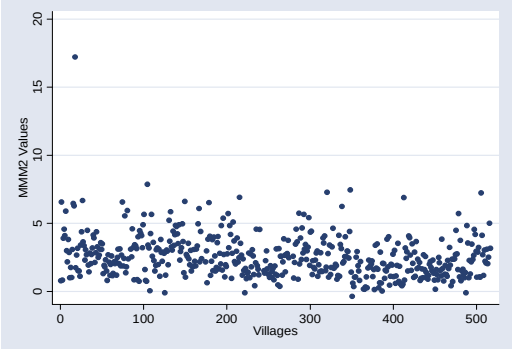

Figure 12: Village Level Values of MMMs for Model II

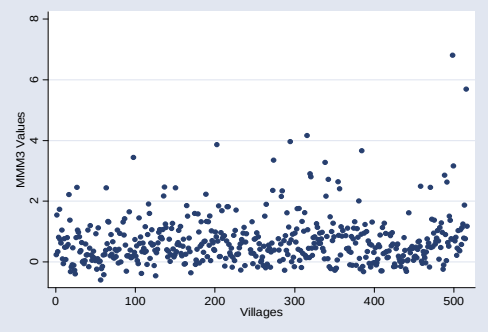

Figure 13: Village Level Values of MMMs for Model III

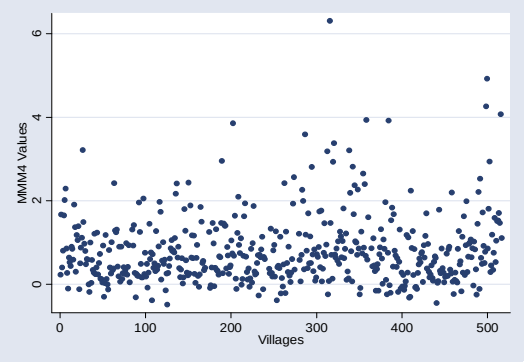

Figure 14: Village Level Values of MMMs for Model IV

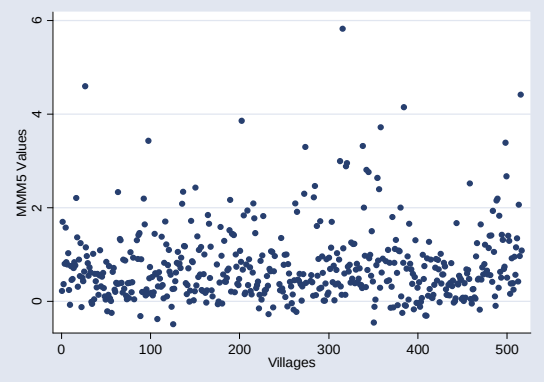

Figure 15: Village Level Values of MMMs for Model V

APPENDIX B

QHS 2002: According to the world Bank Turkey Report (2004): Quantitative Household Survey employs cluster sampling, prepared according to eight project crops: wheat, tobacco, hazelnut, sugarbeet, maize, cotton, olives, and tea. Four hundred and ninety-nine villages were selected by random sampling from the lists of State Institute of Statistics (SIS) that are divided according to regions where crops are grown. The sample has 71 provinces: 11 in the Marmara region, 13 in Central Anatolia, 6 in the Aegean, 12 in the Mediterranean, 6 in Southeast Anatolia, 10 in East Anatolia, and 13 in the Black Sea region. Random selection of the farm holders was based on a "village list" generated after an interview with the *muhtar* (village headman). After completion of the village *muhtar* questionnaire, eleven households were selected for interviewing. Agricultural-business households were randomly selected from the village household list with a systematic sampling method while implementing the survey (World Bank Turkey Report 2004).

Calculation of family labor input in crop production:
Within the labor input category, total number of man-days that family members put into production is reported under two sections; the first is family labor only, and the other is a mixture of family labor and wage labor with no specification of the exact share of either. Hence, we have assumed half of the mixed category is family labor and multiplied the amount reported in this section by half and added this with the family labor only category to arrive at the total number of man-days used in crop production. This may be a conservative assumption given that small rural households usually hire only 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:
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. For households that own cattle, we have added man days to total labor input based on the following assumptions: for households who own more than 0 but less than 10 cattle, we have added 2 additional man-days days per week, for households who own more than 10 but less than 20 cattle we added 3 man-days per week, for households who own more than 20 but less than 30, we have added 4 man-days per week, for households who own more than 30 but less than 50 cattle, we have added 5 man-days per week, for households who own more than 50 but less than 81, we have added 6 man-days per week. Maximum number of cattle owned by any household in the dataset is 80. We have added the numbers based on our interviews with farmers in Central Anatolia.

We further added man-days to account for household production based on the household size: for households with more than one and less than 5 members we have added 3 man-days per week; for households who have more than 6 and less than 9 members we have added 4 man-days per week; for households with more than 9 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.

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