Extended Abstract
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Paper/Poster Title	Paper/Poster Title: Land Inequality and Landlessness: Measuring the True Nature of Land Disparities

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Abstract	200 words max

Measuring the precise nature and fundamental cause of land inequality is critical for addressing and implementing policy initiatives related to agricultural productivity, rural development, and within-country income distribution. In this study, we argue that measuring land inequality solely among landowners does not provide a complete picture of land allocation among agricultural actors. Using data on 152,582 farm households from two rounds of the district-representative PSLM Survey, we analyse land inequality at intensive-margins, i.e. without including landless peasants, and extensive-margins, i.e. including landless peasants. We found that inequalities measured at intensive- and extensive-margins portray different pictures of land disparities: 1) Land inequality is much higher at the extensive-margin (Gini=0.84) than at intensive-margin (Gini=0.67). 2) In 22% of districts, land inequality decreased between 2007-15 on the intensive-margin but increased on the extensive-margins. 3) Intensive-margin land inequality is higher in irrigated and humid regions while extensive-margin inequality is higher in more arid and semi-arid districts. Districts with rough topography face less landlessness, whereas more fertile soil is associated with higher landlessness. 4) Districts based on Pashtun tribal land distribution rights have the lowest rates of landlessness (20%) while districts with pre-colonial Zamindari-based land distribution have the highest incidence of landlessness (66%).

	Keywords: Land inequality; landlessness; Pakistan.
	JEL codes: Q15, Q24

Introduction	100 – 250 words

Concentration of farmland in the hands of a few has important political, economic and social ramifications for the society in the short and long term. Agriculture growth cannot be inclusive unless it addresses the issues of land inequality and landlessness.

Existing literature generally uses land distribution only among landholders to study land inequality (see for example Deininger and Squire, 1998). However, excluding landless peasants from the distribution may not provide a complete picture of land allocation (Erickson and Vollrath 2004). Suppose only 10 out of 1,000 agricultural agents own land, while the remaining 990 do not. The ten landowners share equal portions of land. Although the land distribution in this scenario is ostensibly egalitarian, it obscures the true story of land inequality. Areas with low apparent land inequality could have high incidence of landlessness. In Pakistan, for example, districts with low land inequality have high rates of landlessness and those with high land inequality have lower landlessness (Figure-1). The two types of areas differ in geographical and climatic distribution: Districts with high land inequality and low rates of landlessness are concentrated in the north of the country with relatively-humid climate, while those with low land inequality and high landlessness are mostly located in the south with a mostly-arid climate. Therefore, it is necessary to consider land distribution and landlessness together to paint a complete picture of land distribution. In this study, we estimate an alternative measure of land distribution, termed extensive-margin land inequality, that includes both landowners and landless peasants, and compare it with estimates obtained using the intensive-margin.
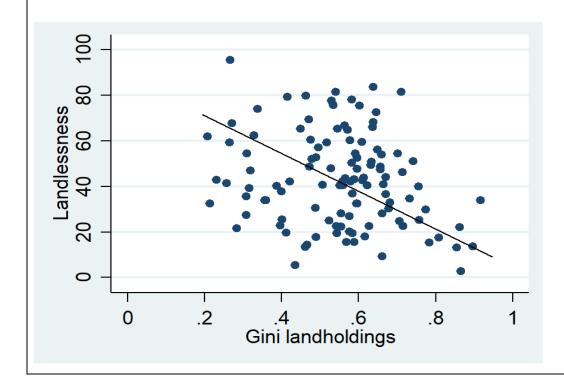
Figure 1 Land inequality and landlessness across districts of Pakistan.

| **Methodology** | *100 – 250 words* |

We developed a mathematical model and illustrated how land inequality at intensive-margins, i.e. without including landless peasants, and extensive-margins, i.e. including landless peasants can be measured. We use Gini and MLD (Mean Logarithmic Deviation, Theil (0)) Theil (1967) indices to quantify various types of land inequality. MLD is more sensitive to the lower end of the distribution, whereas the Gini index is more sensitive to changes in the middle. Unlike MLD, the Gini index has values between zero and one, which are self-explanatory. However, MLD can be decomposed exactly into its components. We use the two measures of inequality to compare various land distributions and decompose inequality into within and between district components.

The Gini coefficient $\mathcal{G}$ is measured using the following formula:

$$\mathcal{G} = \frac{\sum_{i=1}^{N} \sum_{j=1}^{N} |\ell_i - \ell_j|}{2N^2 \bar{\ell}}$$

Where ℓ_i represents the ith landholdings, $\bar{\ell}$ is the mean landholding, and N is the sample size. Mean logarithmic deviation $\mathcal{H}$ is estimated using the following formula:

$$\mathcal{H} = \frac{1}{N} \sum_{i-1}^{N} \ln\left(\frac{\bar{\ell}}{\ell_i}\right)$$

Using MLD, we decompose overall land inequality into within- and between-district inequality as follows:

$$T(\mathcal{H}) = \underbrace{\sum_{d=1}^{D} \left(\frac{N_d}{N}\right) \mathcal{H}_d}_{between\ groups} + \underbrace{\sum_{d=1}^{D} \left(\frac{N_d}{N}\right) \ln\left(\frac{N_d/N}{\bar{\ell}_d/\bar{\ell}}\right)}_{within\ group}$$

Where the subscript $'d'$ in the above formula represents subgroups (districts).

We use margin plots to analyse the factors x_j and the historical land ownership system z_i prevalent in a given area, which help analyse and explain the patterns of various land inequality measures across districts. This can be given by the following equation:

$$\mathcal{G}_i = \beta + \sum_{j-1}^{m} \gamma_j x_{ji} + \delta z_i + \varepsilon_i$$

We used GIS-based maps to present the results of various inequality measures.

| **Results** | *100 – 250 words* |

Intensive-Margin inequality

The results show that intensive-margin inequality is higher in districts with fertile soil, rough terrain, higher precipitation and irrigation. In contrast, it is lower in districts that are mostly arid and sparsely-populated with poor soil quality. Furthermore, inequality is lower in Riayatwari,

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Sardari and Pashtun tribal land distribution systems, but higher in Mahalwari, tribal Taluqas, or Ilaqa or Daftar system.

The inequality patterns presented above do not match those of landlessness, as land ownership inequality and rates of landlessness appear to be negatively associated.

Extensive-margin inequality

The level of inequality, and its growth over time, appears to be much stronger when measured at the extensive-margin. Extensive-margin inequality is 0.84, as against 0.67 for intensive-margin. Due to rising rates of landlessness, extensive-margin inequality has grown by 6% between 2007-15 as compared to only 1% increase in intensive-margin inequality.

Like intensive-margin inequality, most of the extensive-margin inequality is within- and not between-district. However, in contrast to intensive-margin inequality, extensive-margin inequality is concentrated in arid and semi-arid districts. The relatively high extensive-margin inequality observed in the southern districts of the Sindh province is associated with the landlord-based *Zamindari* land distribution system that existed prior to the British era, which was replaced by the *Riayatwari* system later on. This set up required extensive use of landless farm labor. In contrast to the southern districts, the districts in the north and the west inhabited by Pashtun tribes have low incidence of extensive-margin inequality as the rates of landlessness are low.

Discussion and Conclusion	*100 – 250 words*

We find that the patterns of land inequality are significantly different depending on whether or not we include the landless peasants in the measurement. Most of the districts that are placed in to fourth quartile on intensive-margin inequality are in the first quartile on the extensive-margin inequality. The differences in terms of historic land distribution systems are also clear: Intensive-margin inequality is lower in districts where the Riayatwari- (Gini=0.49) and Sardari (Gini=0.42) systems of land distribution were historically prevalent. However, due to the presence of a large number of landless peasants, extensive-margin inequality is substantially high in these districts (Gini=0.82 and 0.76). The districts with comparatively egalitarian land distribution based on Pashtun tribal ancestral land distribution rights have the lowest rates of landlessness (20%) and much lower extensive-margin inequality (Gini=0.64), despite showing a mid-range level of intensive margin inequality (Gini=0.49).

These findings have implications for farm productivity and welfare of the rural population. In the arid areas, land inequality is high and worsening over time. Decreasing water availability coupled with low soil fertility is making the economic survival of small landholders and

landless peasants difficult. This is leading to increasing outflows of unskilled labour from the rural to the urban areas, causing haphazard and uncontrolled growth of major cities. Besides, wealth in the rural areas is increasingly getting concentrated in fewer hands. This trend could be slowed or reversed by focusing on improving the opportunities for landless peasants and smallholders.