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Land Reform and Economic Growth: A Century of Evidence from OECD Countries♣

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Abstract

We investigate the potential impact of land reform on long run economic growth for 21 OECD countries. Using a novel land reform database at the cross-country level which distinguishes between land reform enactments and implementations, and controlling for other plausible long run growth determinants, we show that cumulative land reform enactments and implementations have positive and statistically significant bearing on the long run growth path for the OECD countries in the twentieth century. Further, in terms of magnitudes, the cumulative land reform implementations tend to influence long run growth more than those of the cumulative land reform enactments. These findings remain robust to alternative measures of long run economic growth.

Key Words:

Land reforms, enactments, endogenous growth, technological progress

1. Introduction

In spite of the overwhelming evidence of the importance of land reform on agricultural production (see, *inter alia*, Banerjee & Iyer, 2005), there is little cross-country research on the perceived impact of land reform on the economic growth of nations, especially the developed ones in the long run. Using a novel long run panel dataset spanning the period 1900-2010, this paper provides a very first cited look on the possible effects of land reforms on economic growth for a group of 21 advanced, OECD countries in the very long run.

Agricultural development is one of the key pillars of long run economic growth (Gollin *et al.*, 2002). With the advent of modern technological prowess, productivity in agricultural sector increases steadily and once it reaches at a sustainable level, valuable resources like labour, land and capital are then released towards other sectors, such as industrial and services. As a result, the economy then starts growing at higher rates. In this process of development, equitable distribution and efficient use of land increases rural productivity. There is some evidence that higher income inequality is quite common in less-egalitarian societies and tends to be associated with lesser redistribution of land (Ramcharan, 2010). Consequently, land reform plays an important role in reducing income inequality, eliminating poverty and affecting economic development by augmenting the process of achieving a well-developed agricultural sector (De Janvry, 1981; Besley & Burgess, 2000). However, does this necessarily imply that land reform will always promote higher income per capita growth with the help of a well-established agricultural sector? The current evidence is either very scant or not very clear on this aspect.

There are various channels through which land reform may have direct and indirect bearings on the long run economic growth. In addition, there are possible heterogeneities in the land reform processes in the sense that not all land reforms that are enacted legislatively would have been implemented over time due to various social and political reasons (see, among others, Besley & Burgess, 2000; Lipton, 2009). For instance, land reforms may not always influence economic growth positively via the channel of economic development because the marginal effects of land reforms are expected to be higher only at the initial stages of the development, during the successful "take-offs of nations". Once a particular reform is enacted and subsequently implemented, the marginal effects on growth may gradually die out in the long run when the economy is already transformed into an industrial state. Moreover, since all reforms that are enacted may not be implemented or an extensive time lag may exist between enactment and implementation of land reforms, the positive effects from any land reform may not be realised ever.

On the other hand, the impact of well enacted and implemented land reforms may have permanent growth effects via the channel of institutional changes in a country. The pattern of land holdings can influence the institutional developments, and more broadly growth in the long run (Engerman & Sokoloff, 2002). A divided society, less egalitarian in nature, has higher probability of having distorted land holding policies in place because of self-interested elite groups who would like to hold money and power in their favour. This in turn can significantly delay the process of successful take-offs of nations and thus puts permanent drag on growth in the long run (Acemoglu *et al.*, 2005). Moreover, inequality of distribution of landownership may have adverse effects on growth through the channel of less stock of human capital (Galor *et al.*, 2009). The Galor *et al.* (2009) theory predicts that if land holdings are distributed disproportionately in the hands of few elite-groups, it will adversely affect the expenditure on primary education on schools. This in turn, will translate into severe shortage of human capital promoting institutions in the long run and thus will distort the successful transition process from agriculture to an industrial nation. In other words, the *Great Divergence* in income per capita across nations will emerge as a result of this institutional failure.

While financial development is also crucial to long run economic growth, in a more recent study, Rajan and Ramcharan (2011) finds that in the early twentieth century US, elite groups restricted successful financial and banking development by disproportionately holding land under their control, limiting access to credit. Their evidence clearly points out that land reforms can have permanent growth effects in the long run. Nevertheless, we do not find much empirical evidence in the existing literature to comment on the possible relationship between land reforms and growth in the long run.

This paper fills this gap by examining the direct effects of land reforms on the very long run growth for 21 OECD countries over the 20^{th} century (a period of more than hundred years). Two heterogeneous aspects of land reforms are considered: reforms that were enacted (laws passed) and enacted reforms which were later implemented. In order to decipher the total impact of enactment and implementation of laws, we treat the land reform variable in the empirical specification in two different ways. First, we focus on the effect of land reform enactment and implementation over individual years across countries. Second, we concentrate on the cumulative effects of these land reforms over every five years.

Following the standard literature and to address the impact of key supply factors which may have potentially direct effect on income per capita growth in the long run, a number of additional controls are included in the empirical specifications: population growth, technological progress, trade openness and infant mortality rates. While higher population growth can have positive or negative influence on income per capita growth depending on which stage of development the economy is, higher technological progress is expected to have permanent positive effects on growth. If an economy is

growing (higher GDP growth), and at a stage of transition, where resources are being transferred from less productive to more productive sectors, population growth can have positive bearings on per capita growth. Here higher income growth rates are reinforced by higher population growth through positive employment growth, where a large proportion of the population are employed and bring their skills to use of modern technology. This in turn influences growth positively (Jones, 2001).

However, if the economy is not growing (lower GDP growth), or converges to its balanced growth path (growth declines), higher population growth will have negative impact on income per capita growth. Trade openness is important to sustain growth in the long run, where the literature suggests that higher openness provides more integration among nations and promotes growth in the long run (Vamvakidis, 2002; Lucas, 2007; Madsen, 2009). Finally, the importance of health on long run growth is captured by infant mortality rates, which is expected to have negative effects on growth if infant mortality rate increases. Higher infant mortality implies that the economy is less healthy and productive. Then they will contribute less to overall production and growth rates will fall in the long run.

The empirical analysis reveals a number of important results. First, the cumulative effect of land reform enactment and implementation remains statistically significant and positive in explaining the long run growth for OECD countries after controlling for population growth rate, trade openness growth rate and rate of innovations. Second, the cumulative impact of land reform implementation is higher than the cumulative effect of land reform enactments on long run economic growth. Third, the above findings remain robust across different measures of long run economic growth. Overall, we find that land reforms markers do influence the long run economic growth in OECD countries.

The rest of the paper is organized in the following way. Section 2 describes the data and construction of variables used in the empirical estimation. Section 3 outlines the empirical methodology. The results are discussions are presented in Section 4. Section 5 concludes the paper.

2. Data Construction

2.1. Land reform data

We codify the major land reform laws/acts/legislations (initiatives), their explicitly stated objectives, and the extent to which these reforms have been implemented over the time period 1900-2010. The codification is done annually starting from the year 1900 and ending in 2010 for each of the 21 countries in the sample. We seek the answers to the following three questions for coding land reforms:

(1) Is there any information on major land reform laws being passed or enacted? If yes, then the year and the law number(s) are noted.

(2) Are there any explicitly stated principles or objectives of the land reform laws/legislations? Based on the extant literature, we separate these principles into ten categories: (i) capping of landholding size, (ii) redistribution, (iii) distribution, (iv) restitution, (v) privatization, (vi) enhancing the security of land tenure, (vii) formal recognition of land practice based on customs, traditions and religion, (viii) expropriation, (ix) consolidation and (x) other. In general, we can term the above land reforms as traditional land reforms in that the state or the government is actively involved in dictating the land transfers.[1] The details on these principles/objectives and their coding are provided in Bhattacharya, Mitra and Ulubasoglu (2015). There we also explain that the above concepts do not overlap with each other. Note, however, that any land reform act or law may have multiple objectives, and our codification takes into account all the objectives. In this paper, we do not exploit these variations in the empirical specifications.

(3) Is there any information on whether the land reform laws being implemented? If yes, the year or years of implementation are coded.

The response to each of the three main questions is entered as: 0 (no evidence), 0.5 (partial evidence) and 1 (complete evidence). Note that a 0.5 entry relates only to the implementation case, while 0 and 1 relate both to enactment and implementation.

The above entries are based on evidence cited in the extant literature.[2] These include country and region specific books like the *Agrarian Land Law in the Western World* by Grossman and Brussard (1992) as well as country specific reports and articles from OECD and other UN organizations. Further, for each country, country specific academic articles in the field of Economics, Agricultural Economics, Political Science and Sociology are used in the coding process.

In coding the implementation of the enacted land reforms, we utilize the relevant information provided in the source documents. Our approach is to ensure consistent and compatible coding by adopting systematic criteria as applied to all country cases. If the source document explicitly mentions

[1] The dataset also coded three alternative categories of land reforms, based on Deininger (2002), which can be termed as non-traditional ways or neo-liberal concepts of land reform. They are, i) recognition of private property rights, ii) mechanism for privatization of land and its allocation to producers, and iii) transferability of land rights. These are, however, not used in the present paper.

[2] See Data Appendix in Bhattacharya, Mitra and Ulubasoglu (2015) for a detailed description of the coding process. The full codebook is available from Bhattacharya et al. (2015).

(with supportive evidence) that a particular land reform has been implemented, then we code the implementation to be full and assign it a value of 1. On the other hand, if the reference document mentions that the reform has not been implemented, or makes no mention of implementation or associated attempts, then we assign 0 to these implementations. If the reference document explicitly mentions about partial implementation of the enacted reform, or makes implicit mention of partial implementation, then we assign 0.5 to those implementation. In a few instances, we make use of judgment based on the information in the reference documents regarding the extent of implementation, but we keep this type of judgment at a minimum.[3]

In our OECD countries dataset, there are 51 major land reform enactments across these 21 OECD countries out of which 33 are implemented fully and 18 are implemented partially. There are quite a few variations in land reform enactments and implementations across countries over the twentieth century period. For example, UK and France has the highest numbers of land reforms acts enacted (5), out of which 3 are implemented fully for UK and 4 are implemented fully for France. On the other hand, Austria has enacted only 1 major land reform in this long span of time.

2.2. Data for long run growth and controls

We use Maddison (1998) to obtain data for real GDP per capita as well as the level of population (in thousands). The dependent variable, real GDP per capita growth rate has been calculated using both five yearly non-overlapping data and overlapping data. The non-overlapping measures, used in the baseline specifications, are calculated in two different ways. The first measure captures the five yearly growth rate by taking the difference between fifth year's and first year's real GDP per capita in natural logarithm in a non-overlapping manner (denoted by 'rgdp5yrgr' in the results tables). This measure is in line with the extant literature (see, inter alia, Madsen *et al.*, 2010). The second measure follows Acemoglu *et al.* (2003) and is calculated as the five year average of annual growth rates in a non-overlapping manner. The second measure is denoted by 'rgdpyrace' in the results tables. The overlapping measures, used in the baseline specifications, are generated using rolling data at five years interval. This means, fifth year's growth rate will be the difference between fifth year's and first year's logarithm of real GDP per capita, sixth year's growth rate will be the difference between sixth year's and second year's logarithm of real GDP per capita etc. Population growth rates are also generated in a similar way.

Mitchell (2005) provides the necessary data for trade openness and infant mortality rate till the year 2000. The last 10 years of trade openness and infant mortality data are downloaded using Datastream platform which incorporates, among other sources, the World Bank Development Indicators database.

[3] Additional information about the coding procedure can be found in Bhattacharya, Mitra and Ulubasoglu (2015).

The measure of innovation, patent application by residents is obtained from the World Intellectual Property Organisation database. Patent application weighted by population is calculated using population data from Maddison (1998). All growth rates for trade openness, patent applications and infant mortality rate are calculated in the similar ways we generated the real growth rate measures.

3. Empirical Methodology

We estimate the following empirical model:

$$\text{RGDPGR}_{i,t} = \phi_i + \alpha * \text{LandReform}_{i,t} + \mathbf{X}'_{i,t}\boldsymbol{\delta} + \varepsilon_{i,t} \quad (1)$$

where, the dependent variable RGDPGR, denotes the real GDP per capita growth rate at five years interval. We use two different measures of real GDP per capita growth rate in our baseline specifications. The first measure captures the five yearly growth rate by taking the difference between fifth year's and first year's real GDP per capita in natural logarithm in a non-overlapping manner (denoted by 'rgdp5yrgr' in the results tables). This measure is in line with the extant literature (see, inter alia, Madsen *et al.*, 2010). The second measure follows Acemoglu *et al.* (2003) and is calculated as the five year average of annual growth rates in a non-overlapping manner. The second measure is denoted by 'rgdpyrace' in the results tables.

The main independent variable, land reform, is denoted by LandReform in the above equation (Equation 1). We employ four different variants of land reform in the estimation. The first two measures capture whether there were any major land reform legislations being enacted in the parliament or by the executive (denoted by 'Enacted' in the tables) and whether the enacted land reforms legislations have been implemented subsequently (denoted by 'Implemented' in the tables). The last two measures are the most important ones from this papers perspective as they capture the long run, cumulative effects of land reforms enacted as well as implemented. The cumulative measure of land reform enactments is denoted by 'Integrated Enacted' and the cumulative measure of land reform implementations is denoted by 'Integrated Implemented' in the tables. We use the cumulative effects in the five years non-overlapping interval to maintain parity with the dependent variable. These measures capture the heterogeneous impact of land reforms on long run economic growth.

In line with the extant literature, we use a number of control variables (denoted by the vector **X**) in Equation (1). These are, population growth rates (denoted by 'Population' when the dependent variable is the five yearly growth rate and denoted by 'Population five yr avg' when the dependent variable is the five yearly average of annual growth rates); trade openness growth rates where trade openness is measured by the total amount of exports and imports as a proportion of GDP (denoted by 'Trade openness' and 'Trade openness five yr avg' , respectively, based on the dependent variable used in the regressions); two different proxies for rates of innovations, viz., patent applications (denoted by 'Patent appl.' and 'Patent appl. five yr avg' in the tables based on the dependent variable

used in the regression specifications) and patent applications weighted by population (depicted by 'Patent appl. weighted' and 'Patent appl. weighted five yr avg' in the tables based on the dependent variable used in the regressions), as well as infant mortality rates (denoted by 'Infant mortality' and 'Infant mortality five yr avg' in the tables based on the dependent variable used in the regression specification). The controls are used in a sequential manner in the tables as we wanted to decipher the differential impact of land reforms on long run economic growth after controlling for other plausible sources of long run growth in a chronological way.

The above equation is estimated with country-specific fixed effects (ϕ_i) to control for any unobserved heterogeneity pertaining to cross-country idiosyncrasies. The estimated standard errors are clustered at the country level to address possible consequences of heteroskedasticity and autocorrelation in the error term ($\varepsilon_{i,t}$).

We also cross-check the robustness of the baseline results with five yearly overlapping long run growth rates, land reforms and other control variables.

In the empirical estimation, we control for a large amount of time-variant and time-invariant factors having a direct bearing on long run economic growth. Therefore, the chance of endogeneity problem due to omitted variables would not arise. The other source of potential endogeneity attributed to reverse causality may occur if the impact of long run economic growth facilitates more land reforms being enacted or implemented as the countries reap the benefits of successful land reforms and would like to continue on the reform path. However, the above reverse causality channel would most likely be absent in our setup due to the following reason. Note that the novel dataset on land reform documents the major land reform events in OECD countries which do not occur frequently. Keeping this in mind, one could treat the land reforms as exogenous shocks which would have a bearing on the long run economic growth but not vice versa.[4] Since endogeneity is not being addressed explicitly in this version of the paper, the estimated results could be interpreted as correlations than causations.

4. Results and Discussion

4.1. Baseline results

Tables 1 to 6 provide the baseline results following Equation (1) showing the relationship between the land reform variables and GDP per capita growth in the period 1900-2010. In each table, there are eight specifications to capture this relationship. While specification 1 estimates the coefficient of land reform enactment (info_enacted2) on long run growth, specification 2 estimates the coefficient of land reform implementation (info_implemented2) on long run growth. The first two specifications enter

[4] Nevertheless, we will resort to instrumental variable strategy to explicitly address the potential endogeneity problem in future.

the land reform variable in the regression equation as a dummy variable (0 for no land reform and 1 for successful land reform). In contrast, specifications 3 and 4 use continuous cumulative values of land reform enactments and implementations, respectively, instead of dummy variables in the earlier two specifications. While specifications 1 to 4 uses five-years' non-overlapping series following the construction method of Madsen *et al.* (2010), models in columns 5 to 8 repeat specifications 1 to 4 with the five-years' non-overlapping series following the construction method of Acemoglu *et al.* (2003).

Table 1 shows the unconditional effect of land reform enactment and implementation on long run economic growth without incorporating any controls discussed earlier. The results reveal that real GDP per capita growth at five years interval could not be explained by the land reform markers as all the estimated coefficients are statistically insignificant. Therefore, land reform enactments and implementations and their cumulative impact, though remain important events by themselves, have no direct bearing on the long run economic growth without controlling other possible factors influencing growth.

Table 2 presents the conditional results, which capture the effects of successful land reforms on per capita income growth after controlling for population growth and trade openness in the regression models. We find that the cumulative effects of land reform enactments and implementations are both positive and significant at the five per cent level (see specifications 3, 4, 7 and 8 in Table 2). The result is robust across both construction methods of five-year's non-overlapping series.[5] Moreover, coefficients of population growth and trade openness turns out to be positive and significant. This clearly indicates that without the inclusion of the control variables, the empirical model is potentially misspecified, and estimated coefficients become biased due to the problem of omitted variables. The positive effect of population growth on per capita income growth follows Kremer (1993) principle, where if population grows at constant finite speed and income is above its steady state, rather than adjusting instantaneously, per capita income will rise over time. This finding is not surprising in the sense that the period covered is from 1900, when most OECD countries are at their stage of transition to the phase of modern economic growth culminated by sustained population increase. As Kremer's model predicts, the OECD countries in the twentieth century had higher initial population and thus had faster growth rates in technology and per capita income. However, once the per capita income gradually increased with the growth rate of technology toward the end of the century, population growth slowed down. The positive effect of trade openness on growth captures the economy-wide gains expected to be generated through greater trade (see Ben-David, 1993; Vamvakidis, 2002).

[5] The magnitudes of the coefficients of cumulative land reforms in specifications 7 and 8 are smaller than the magnitudes in specifications 3 and 4.

A number of candidate explanations could be put forward to elucidate the positive cumulative effects of land reform enactments and implementation on long run growth. First, the positive effect of successful land reforms may work through the channel of an efficient agricultural sector (De Janvry, 1981; Besley & Burgess, 2000). Successful land reforms play important roles in reducing income inequality by redistributing and releasing land from the hands of landlords and government to general public. Land reform, in the classic agrarian term, when successfully implemented, may generate higher agricultural trade, technical innovations in farming and also reduces social differentiation of peasantries and class struggle. In other words, effective land reforms hasten the transformation of a feudal society towards a more capitalist economy (see, Bernstein, 2002 for a detailed discussion on this). Consequently, a more productive agrarian economy would be in a better position to modify itself into an industrialised economy by achieving higher income per capita growth in the long run.

The effects of successful land reform on growth could also be revealed via the channel of political economy model of growth. Alesina and Rodrik (1994) argue that greater the inequality of wealth and income, the higher the rate of taxation, and lower the income growth rate in the long run. Their empirical results show evidence of inequality of land and income ownership is negatively correlated with subsequent economic growth.[6] Moreover, there is a strong link between skewed income distribution and socio-political instability, which in turn generates slower economic progress and lower per capita income in the long run (Hibbs, 1973, Gupta, 1990, Alesina and Perotti, 1996; Perotti, 1996). In a highly unequal polarised society, there is an increased interest to perform non-market activities by individuals, such as rent-seeking activities or other forms of unproductive activities, which may generate political protests, government turnover and political assassinations (Perotti, 1996). There is no doubt that unsuccessful land reform policies would create highly unequal society, which may result in social unrests and hinders the growth process in the long run by generating lower per capita income. For a detailed survey of literature and associated theories, please see Binswanger *et al.* (1993).

The final virtue of land reform markers on economic growth could disseminate via removing society's borrowing constraints and achieving higher investment in human capital (Galor and Zeira, 1993, Galor *et al.*, 2009). If land holdings are distributed disproportionately in the hands of few elite-groups in absence of land reforms, it would adversely impact the expenditure on primary education on schools. This in turn, would translate into severe shortage of human capital promoting institutions in the long run and would distort the successful transition process from agriculture to an industrial nation. In contrast, if wealth is more equally distributed through successful implementation of land reform policies, more individuals could borrow freely against future income and would be able to invest in education, one of the most important attribute of human capital. Investment of human capital

[6] Their findings are also closely related to political models of taxation and endogenous growth developed by Bertola (1993) and Persson and Tabellini (1991).

increases as equality increases, which promotes higher growth in the long run. Our results could be interpreted as supporting this view as well.

Following the R&D-based endogenous growth literature mentioned above, Tables 3 and 4 include innovation as an additional control variables in the regression models. Table 3 presents the results with innovation measured by the change in patent applications, following the theory of semi-endogenous growth models of Jones (1995), Kortum (1997) and Segerstrom (1998). Table 4 shows the results with an alternative measure of innovation, which is being proxied by five-years' average of patent applications weighted by population, following the Schumpeterian theory of Aghion and Howitt (1998) and Howitt (1999). Finally in Table 5, we repeat the regressions in Table 3, adding infant mortality rate as an additional control variable. Similarly, Table 6 repeats the regressions in Table 4, adding infant mortality rate as an additional control variable.

Comparing the regression coefficients in Tables 3 to 6, we find that the cumulative land reform enactments and implementation remain consistently positive and significant with the statistical significance being more pronounced for the long run growth rate at the five yearly average (see columns 7 and 8). This implies that the cumulative effect of successful land reforms have permanent growth effects in the long run after controlling for population growth, trade openness growth, growth rate of innovations and infant mortality rate. It is interesting to note that cumulative impact of land reform enactments and implementations have a direct bearing on long run economic growth for the OECD countries, which implies land reform markers remain effective in explaining long run growth in developed countries as well. Further, the positive effect of land reform implementations in terms of magnitudes are always higher than that of the land reform enactments. Therefore, not only land reform enactments matter, but their implementations matter even more in influencing the growth process in the long run for OECD countries.

When we examine the effects of control variables on long run growth, population growth and trade openness are positive and significant in all specifications, similar to our findings in Table 2 earlier. However, while examining the innovation channel on long run growth, although we find the coefficients of innovation measures to be consistently positive for the first four specifications in each table, they are not significant at the 10 percent level. Thus, empirical testing of the two second generation endogenous growth theories yield very similar results in our models. Overall, our results exhibit positive relationship between innovation and per capita income growth in the long run. Similarly, coefficients of infant mortality rate in Tables 5 and 6, although insignificant, again produce the right negative sign. This shows, as infant mortality rates increases, it has a negative bearing on GDP per capita growth in the long run. In societies where infants and pregnant women face poor living conditions, productivity of labour would fall in the long run due to low investment in human

capital and wide range of health problems they face later in their life (see, *inter alia*, Fogel, 1994). As a result the total life time income earned by those individuals would fall, reducing their per capita wealth in the long run (van den Berg *et al.*, 2006). Next, we perform robustness checks of our results.

4.2. Robustness check

Robustness check results are presented in Tables 7 to 12. The findings are in line with the baseline results except when we control for all factors including the infant mortality rate (see Tables 11 and 12). This means that the cumulative impact of land reform enactment and implementation does play a significant role in explaining long run economic growth after controlling for initial income per capita, population growth, trade openness growth and growth in innovations. In line with the baseline results, the magnitudes for land reform implementations are higher than the magnitudes for land reform enactments showing the supremacy of land reform implementations on long run economic growth for this sample of OECD countries.

In terms of controls, we find that there is statistical significance for innovation measures and infant mortality rates with correct signs, which was not the case in the baseline specifications as in the baselines, the signs were correct, but these were not statistically significant. Overall, robustness results provide good support to the baseline specifications and there is robust evidence that cumulative effects of land reform enactments and implementations have positive bearings on the permanent growth for the OECD countries. These findings lend credence to some theoretical postulates discussed in the introduction.

5. Conclusion

In this paper, we investigate if there is any effect of land reform on long run economic growth for OECD countries. To the best of our knowledge, we are the first one in providing cross-country evidence from the perspective of developed, OECD countries long run economic growth after disentangling the feedback from heterogeneous land reform markers, viz., land reform enactment and implementation.

Land reforms play important roles in enhancing agricultural productivity and household income from the developing countries perspective. Whether the same story holds good for OECD countries remains an enigma as one would have thought that OECD countries long run economic growth may not be explicitly fuelled by agricultural factors *per se*. Using a novel cross-country data on major land reform enactments and implementations for the twentieth century and using a large number of potential controls influencing long run economic growth, in this analysis, we shadow some light on how land

reform enactments and implementations could be used as potential factors for long run economic growth.

The empirical analysis reveals that major land reform enactments and implementations, when used cumulatively, i.e., when we use their accumulative impact over the years, do have a positive and statistically significant bearing on the long run economic growth for OECD countries in the twentieth century. The positive effect is paramount in presence of population, trade openness, and innovations as controls. In addition, the cumulative impact of land reform implementations are higher than the cumulative impacts of land reform enactments.

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Tables

Table1. Baseline results, Growth and land reform without any controls

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	rgdp5yrgr	rgdp5yrgr	rgdp5yrgr	rgdp5yrgr	rgdpgyrace	rgdpgyrace	rgdpgyrace	rgdpgyrace
Enacted	-0.0728				-0.0154			
	(0.0606)				(0.0159)			
	0.229				0.333			
Implemented		-0.0575				-0.00955		
		(0.0617)				(0.0155)		
		0.351				0.539		
Integrated Enacted			-0.00877				-0.000408	
			(0.0220)				(0.00424)	
			0.690				0.923	
Integrated Implemented				-0.0156				-0.00145
				(0.0313)				(0.00606)
				0.618				0.810
Constant	0.0827***	0.0807***	0.0940**	0.0924***	0.0191***	0.0186***	0.0191***	0.0196***
	(0.00275)	(0.00140)	(0.0368)	(0.0262)	(0.000723)	(0.000353)	(0.00710)	(0.00506)
	0.000	0.000	0.0106	0.000419	0.000	0.000	0.00716	0.000107
Observations	462	462	462	462	462	462	462	462
Number of cd	21	21	21	21	21	21	21	21

Note: All results are generated with country-specific fixed effects. Robust standard errors clustered at the country-level are reported in parentheses. Enacted depicts land reform enacted and Implemented denotes land reform implemented as dummy variables. Integrated Enacted and Integrated Implemented are calculated on a five year non-rolling basis in line with the dependent variables. *** p<0.01, ** p<0.05, * p<0.1.

Table2. Baseline results, Growth and land reform after controlling for population and trade openness

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	rgdp5yrgr	rgdp5yrgr	rgdp5yrgr	rgdp5yrgr	rgdpgyrace	rgdpgyrace	rgdpgyrace	rgdpgyrace
Enacted	0.0161				0.00802			
	(0.0877)				(0.0201)			
	0.854				0.689			
Implemented		0.0811				0.0264		
		(0.107)				(0.0230)		
		0.449				0.251		
Integrated Enacted			0.0118**				0.00322***	
			(0.00483)				(0.00123)	
			0.0142				0.00899	
Integrated Implemented				0.0130**				0.00366***
				(0.00546)				(0.00137)
				0.0174				0.00771
Population	1.199**	1.208**	1.279**	1.264**				
	(0.577)	(0.579)	(0.545)	(0.543)				
	0.0377	0.0371	0.0190	0.0200				
Trade openness	0.0763***	0.0801***	0.0733***	0.0732***				
	(0.0192)	(0.0180)	(0.0198)	(0.0198)				
	6.97e-05	8.31e-06	0.000212	0.000210				
Population five yr avg					1.245**	1.263**	1.327**	1.310**
					(0.570)	(0.579)	(0.526)	(0.521)
					0.0291	0.0291	0.0117	0.0119
Trade openness five yr avg					0.0941***	0.0998***	0.0878**	0.0877**
					(0.0311)	(0.0274)	(0.0343)	(0.0344)
					0.00252	0.000270	0.0105	0.0108
Constant	0.0154	0.0138	-0.00762	0.00209	0.00168	0.00118	-0.00437	-0.00184
	(0.0298)	(0.0297)	(0.0296)	(0.0279)	(0.00739)	(0.00747)	(0.00755)	(0.00688)
	0.605	0.643	0.797	0.940	0.820	0.874	0.563	0.789
Observations	436	436	436	436	436	436	436	436
Number of cd	21	21	21	21	21	21	21	21

Note: All results are generated with country-specific fixed effects. Robust standard errors clustered at the country-level are reported in parentheses. Enacted depicts land reform enacted and Implemented denotes land reform implemented as dummy variables. Integrated Enacted and Integrated Implemented are calculated on a five year non-rolling basis in line with the dependent variables. Population depicts population growth and Trade openness denotes trade openness growth on a five year non-rolling basis. Population five yr avg and Trade openness five yr avg denote five year non-rolling average of annual population growth rate and trade openness growth rates, respectively. *** p<0.01, ** p<0.05, * p<0.1.

Table3. Baseline results, Growth and land reform after controlling for population, trade openness and patent applications

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	rgdp5yrgr	rgdp5yrgr	rgdp5yrgr	rgdp5yrgr	rgdpgyrace	rgdpgyrace	rgdpgyrace	rgdpgyrace
Enacted	0.0138				0.00803			
	(0.0872)				(0.0199)			
	0.874				0.687			
Implemented		0.0782				0.0266		
		(0.106)				(0.0227)		
		0.462				0.241		
Integrated Enacted			0.0121**				0.00322**	
			(0.00531)				(0.00126)	
			0.0221				0.0106	
Integrated Implemented				0.0133**				0.00366***
				(0.00595)				(0.00139)
				0.0256				0.00829
Population	1.204**	1.213**	1.288**	1.272**				
	(0.578)	(0.581)	(0.549)	(0.546)				
	0.0373	0.0369	0.0189	0.0199				
Trade openness	0.0760***	0.0798***	0.0730***	0.0729***				
	(0.0190)	(0.0178)	(0.0195)	(0.0195)				
	6.52e-05	7.85e-06	0.000179	0.000179				
Patent appl.	0.0124	0.0113	0.0148	0.0143				
	(0.0265)	(0.0264)	(0.0272)	(0.0269)				
	0.639	0.667	0.586	0.595				
Population five yr avg					1.245**	1.267**	1.325**	1.309**
					(0.562)	(0.572)	(0.517)	(0.512)
					0.0267	0.0267	0.0104	0.0106
Trade openness five yr avg					0.0941***	0.1000***	0.0877**	0.0877**
					(0.0316)	(0.0278)	(0.0347)	(0.0348)
					0.00292	0.000319	0.0115	0.0118
Patent appl. five yr avg					-0.000278	-0.00238	0.00158	0.00102
					(0.0304)	(0.0297)	(0.0323)	(0.0320)
					0.993	0.936	0.961	0.975
Constant	0.0147	0.0131	-0.00930	0.000751	0.00168	0.00118	-0.00437	-0.00184
	(0.0298)	(0.0298)	(0.0306)	(0.0286)	(0.00738)	(0.00747)	(0.00761)	(0.00691)
	0.621	0.660	0.761	0.979	0.820	0.875	0.565	0.790
Observations	436	436	436	436	436	436	436	436
Number of cd	21	21	21	21	21	21	21	21

Note: All results are generated with country-specific fixed effects. Robust standard errors clustered at the country-level are reported in parentheses. Enacted depicts land reform enacted and Implemented denotes land reform implemented as dummy variables. Integrated Enacted and Integrated Implemented are calculated on a five year non-rolling basis in line with the dependent variables. Population depicts population growth, Trade openness denotes trade openness growth and Patent appl. denotes patent applications by residents on a five year non-rolling basis. Population five yr avg, Trade openness five yr avg, and Patent appl. five yr avg denote five year non-rolling average of annual population growth rate, trade openness growth rate and patent applications by residents growth rates, respectively. *** p<0.01, ** p<0.05, * p<0.1.

Table4. Baseline results, Growth and land reform after controlling for population, trade openness and patent applications weighted by population

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	rgdp5yrgr	rgdp5yrgr	rgdp5yrgr	rgdp5yrgr	rgdpgyrace	rgdpgyrace	rgdpgyrace	rgdpgyrace
Enacted	0.0138				0.00795			
	(0.0872)				(0.0199)			
	0.874				0.689			
Implemented		0.0782				0.0265		
		(0.106)				(0.0226)		
		0.462				0.242		
Integrated Enacted			0.0121**				0.00322**	
			(0.00531)				(0.00126)	
			0.0221				0.0104	
Integrated Implemented				0.0133**				0.00366***
				(0.00595)				(0.00138)
				0.0256				0.00811
Population	1.216**	1.224**	1.303**	1.287**				
	(0.579)	(0.581)	(0.552)	(0.549)				
	0.0356	0.0351	0.0182	0.0191				
Trade openness	0.0760***	0.0798***	0.0730***	0.0729***				
	(0.0190)	(0.0178)	(0.0195)	(0.0195)				
	6.52e-05	7.85e-06	0.000179	0.000179				
Patent appl. weighted	0.0124	0.0113	0.0148	0.0143				
	(0.0265)	(0.0264)	(0.0272)	(0.0269)				
	0.639	0.667	0.586	0.595				
Population five yr avg					1.244**	1.264**	1.325**	1.309**
					(0.568)	(0.577)	(0.524)	(0.519)
					0.0284	0.0285	0.0114	0.0116
Trade openness five yr avg					0.0940***	0.0998***	0.0876**	0.0876**
					(0.0316)	(0.0278)	(0.0346)	(0.0348)
					0.00293	0.000322	0.0115	0.0118
Patent appl. weighted five yr avg					0.00158	-0.000551	0.00315	0.00258
					(0.0299)	(0.0292)	(0.0317)	(0.0314)
					0.958	0.985	0.921	0.935
Constant	0.0147	0.0131	-0.00930	0.000751	0.00168	0.00118	-0.00437	-0.00184
	(0.0298)	(0.0298)	(0.0306)	(0.0286)	(0.00736)	(0.00746)	(0.00759)	(0.00689)
	0.621	0.660	0.761	0.979	0.819	0.874	0.564	0.790
Observations	436	436	436	436	436	436	436	436
Number of cd	21	21	21	21	21	21	21	21

Note: All results are generated with country-specific fixed effects. Robust standard errors clustered at the country-level are reported in parentheses. Enacted depicts land reform enacted and Implemented denotes land reform implemented as dummy variables. Integrated Enacted and Integrated Implemented are calculated on a five year non-rolling basis in line with the dependent variables. Population depicts population growth, Trade openness denotes trade openness growth and Patent appl. weighted denotes patent applications by residents weighted by population on a five year non-rolling basis. Population five yr avg, Trade openness five yr avg, and Patent appl. weighted five yr avg denote five year non-rolling average of annual population growth rate, trade openness growth rate and patent applications by residents weighted by population growth rates, respectively. *** p<0.01, ** p<0.05, * p<0.1.

Table5. Baseline results, Growth and land reform after controlling for population, trade openness, patent applications and infant mortality rate

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	rgdp5yrgr	rgdp5yrgr	rgdp5yrgr	rgdp5yrgr	rgdpgyrace	rgdpgyrace	rgdpgyrace	rgdpgyrace
Enacted	0.00457				0.00793			
	(0.0866)				(0.0201)			
	0.958				0.693			
Implemented		0.0622				0.0268		
		(0.110)				(0.0227)		
		0.572				0.238		
Integrated Enacted			0.00874				0.00284**	
			(0.00546)				(0.00126)	
			0.109				0.0242	
Integrated Implemented				0.00905				0.00324**
				(0.00608)				(0.00137)
				0.137				0.0184
Population	1.302**	1.309**	1.354**	1.341**				
	(0.607)	(0.610)	(0.579)	(0.580)				
	0.0318	0.0319	0.0194	0.0208				
Trade openness	0.0722***	0.0757***	0.0708***	0.0708***				
	(0.0185)	(0.0174)	(0.0191)	(0.0191)				
	9.51e-05	1.42e-05	0.000214	0.000215				
Patent appl.	0.0125	0.0114	0.0140	0.0136				
	(0.0263)	(0.0263)	(0.0268)	(0.0266)				
	0.636	0.664	0.601	0.610				
Infant mortality	-0.0469	-0.0449	-0.0403	-0.0412				
	(0.0499)	(0.0499)	(0.0491)	(0.0495)				
	0.347	0.368	0.412	0.405				
Population five yr avg					1.288**	1.310**	1.352***	1.340***
					(0.558)	(0.568)	(0.518)	(0.514)
					0.0209	0.0212	0.00907	0.00911
Trade openness five yr avg					0.0936***	0.0996***	0.0879**	0.0878**
					(0.0318)	(0.0279)	(0.0353)	(0.0355)
					0.00324	0.000359	0.0129	0.0133
Patent appl. five yr avg					-0.00162	-0.00381	3.03e-05	-0.000460
					(0.0313)	(0.0306)	(0.0330)	(0.0328)
					0.959	0.901	0.999	0.989
Infant mortality five yr avg					-0.0294	-0.0295	-0.0244	-0.0249
					(0.0244)	(0.0245)	(0.0240)	(0.0237)
					0.228	0.228	0.309	0.293
Constant	0.00506	0.00371	-0.0113	-0.00365	0.00391	0.00337	-0.00164	0.000712
	(0.0334)	(0.0334)	(0.0320)	(0.0313)	(0.00661)	(0.00672)	(0.00701)	(0.00627)
	0.880	0.912	0.725	0.907	0.554	0.616	0.816	0.910
Observations	432	432	432	432	429	429	429	429
Number of cd	21	21	21	21	21	21	21	21

Note: All results are generated with country-specific fixed effects. Robust standard errors clustered at the country-level are reported in parentheses. Enacted depicts land reform enacted and Implemented denotes land reform implemented as dummy variables. Integrated Enacted and Integrated Implemented are calculated on a five year non-rolling basis in line with the dependent variables. Population depicts population growth, Trade openness denotes trade openness growth, Patent appl. denotes patent applications by residents and Infant mortality denotes infant mortality growth rate on a five year non-rolling basis. Population five yr avg, Trade openness five yr avg, Patent appl. five yr avg, and Infant mortality five yr avg denote five year non-rolling average of annual population growth rate, trade openness growth rate, patent applications by residents growth rates and infant mortality growth rates, respectively. *** p<0.01, ** p<0.05, * p<0.1.

Table6. Baseline results, Growth and land reform after controlling for population, trade openness, patent applications weighted by population and infant mortality rate

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	rgdp5yrgr	rgdp5yrgr	rgdp5yrgr	rgdp5yrgr	rgdpgyrace	rgdpgyrace	rgdpgyrace	rgdpgyrace
Enacted	0.00457				0.00786			
	(0.0866)				(0.0201)			
	0.958				0.695			
Implemented		0.0622				0.0267		
		(0.110)				(0.0227)		
		0.572				0.239		
Integrated Enacted			0.00874				0.00284**	
			(0.00546)				(0.00126)	
			0.109				0.0238	
Integrated Implemented				0.00905				0.00324**
				(0.00608)				(0.00137)
				0.137				0.0181
Population	1.315**	1.320**	1.368**	1.354**				
	(0.608)	(0.611)	(0.582)	(0.583)				
	0.0307	0.0307	0.0188	0.0202				
Trade openness	0.0722***	0.0757***	0.0708***	0.0708***				
	(0.0185)	(0.0174)	(0.0191)	(0.0191)				
	9.51e-05	1.42e-05	0.000214	0.000215				
Patent appl. weighted	0.0125	0.0114	0.0140	0.0136				
	(0.0263)	(0.0263)	(0.0268)	(0.0266)				
	0.636	0.664	0.601	0.610				
Infant mortality	-0.0469	-0.0449	-0.0403	-0.0412				
	(0.0499)	(0.0499)	(0.0491)	(0.0495)				
	0.347	0.368	0.412	0.405				
Population five yr avg					1.286**	1.306**	1.352***	1.339**
					(0.563)	(0.573)	(0.525)	(0.520)
					0.0225	0.0227	0.00999	0.0100
Trade openness five yr avg					0.0935***	0.0995***	0.0878**	0.0877**
					(0.0318)	(0.0279)	(0.0353)	(0.0354)
					0.00326	0.000363	0.0129	0.0133
Patent appl. weighted five yr avg					8.68e-05	-0.00213	0.00152	0.00102
					(0.0308)	(0.0300)	(0.0325)	(0.0322)
					0.998	0.944	0.963	0.975
Infant mortality five yr avg					-0.0294	-0.0295	-0.0244	-0.0249
					(0.0244)	(0.0245)	(0.0240)	(0.0237)
					0.228	0.228	0.309	0.294
Constant	0.00506	0.00371	-0.0113	-0.00365	0.00392	0.00337	-0.00164	0.000714
	(0.0334)	(0.0334)	(0.0320)	(0.0313)	(0.00660)	(0.00671)	(0.00699)	(0.00626)
	0.880	0.912	0.725	0.907	0.553	0.615	0.815	0.909
Observations	432	432	432	432	429	429	429	429
Number of cd	21	21	21	21	21	21	21	21

Note: All results are generated with country-specific fixed effects. Robust standard errors clustered at the country-level are reported in parentheses. Enacted depicts land reform enacted and Implemented denotes land reform implemented as dummy variables. Integrated Enacted and Integrated Implemented are calculated on a five year non-rolling basis in line with the dependent variables. Population depicts population growth, Trade openness denotes trade openness growth, Patent appl. weighted denotes patent applications by residents weighted by population, and Infant mortality denotes infant mortality on a five year non-rolling basis. Population five yr avg, Trade openness five yr avg, Patent appl. weighted five yr avg, and Infant mortality five yr avg denote five year non-rolling average of annual population growth rate, trade openness growth rate, patent applications by residents weighted by population growth rates, and infant mortality rates respectively. *** p<0.01, ** p<0.05, * p<0.1.

Table7. Robustness check, Growth and land reform without any controls

VARIABLES	(1) rgdp5yrgrrolling	(2) rgdp5yrgrrolling	(3) rgdp5yrgrrolling	(4) rgdp5yrgrrolling
Enacted	-0.0293			
	(0.0303)			
	0.333			
Implemented		-0.0363		
		(0.0396)		
		0.360		
Integrated Enacted			-0.0103	
			(0.0270)	
			0.704	
Integrated Implemented				-0.0214
				(0.0372)
				0.564
Constant	0.0737***	0.0736***	0.0909**	0.0916***
	(0.000283)	(0.000185)	(0.0458)	(0.0315)
	0.000	0.000	0.0472	0.00364
Observations	2,238	2,238	2,238	2,238
Number of cd	21	21	21	21

Note: All results are generated with country-specific fixed effects. Robust standard errors clustered at the country-level are reported in parentheses. Enacted depicts land reform enacted and Implemented denotes land reform implemented as dummy variables. Integrated Enacted and Integrated Implemented are calculated on a five year rolling basis in line with the dependent variable. *** p<0.01, ** p<0.05, * p<0.1.

Table8. Robustness check, Growth and land reform after controlling for population and trade openness

VARIABLES	(1) rgdp5yrgrrolling	(2) rgdp5yrgrrolling	(3) rgdp5yrgrrolling	(4) rgdp5yrgrrolling
Enacted	-0.0111			
	(0.0224)			
	0.620			
Implemented		-0.00993		
		(0.0290)		
		0.732		
Integrated Enacted			0.0163**	
			(0.00646)	
			0.0117	
Integrated Implemented				0.0177**
				(0.00708)
				0.0126
Population	1.220**	1.221**	1.341**	1.321**
	(0.511)	(0.511)	(0.532)	(0.530)
	0.0169	0.0169	0.0118	0.0128
Trade openness	0.0937***	0.0937***	0.0890**	0.0894**
	(0.0349)	(0.0348)	(0.0359)	(0.0362)
	0.00725	0.00716	0.0131	0.0134
Constant	0.00912	0.00904	-0.0246	-0.0109
	(0.0259)	(0.0259)	(0.0335)	(0.0302)
	0.725	0.727	0.463	0.717
Observations	2,128	2,128	2,128	2,128
Number of cd	21	21	21	21

Note: All results are generated with country-specific fixed effects. Robust standard errors clustered at the country-level are reported in parentheses. Enacted depicts land reform enacted and Implemented denotes land reform implemented as dummy variables. Integrated Enacted and Integrated Implemented are calculated on a five year rolling basis in line with the dependent variable. Population depicts population growth and Trade openness denotes trade openness growth. All growth rates are calculated on a five year rolling basis. *** p<0.01, ** p<0.05, * p<0.1.

Table9. Robustness check, Growth and land reform after controlling for population, trade openness and patent applications

VARIABLES	(1) rgdp5yrgrrolling	(2) rgdp5yrgrrolling	(3) rgdp5yrgrrolling	(4) rgdp5yrgrrolling
Enacted	-0.0114			
	(0.0224)			
	0.612			
Implemented		-0.0104		
		(0.0290)		
		0.721		
Integrated Enacted			0.0173**	
			(0.00700)	
			0.0135	
Integrated Implemented				0.0187**
				(0.00774)
				0.0155
Population	1.199**	1.199**	1.322**	1.301**
	(0.512)	(0.511)	(0.533)	(0.531)
	0.0191	0.0191	0.0132	0.0143
Trade openness	0.0924***	0.0924***	0.0872**	0.0877**
	(0.0342)	(0.0341)	(0.0351)	(0.0355)
	0.00683	0.00675	0.0130	0.0135
Patent appl.	0.0226	0.0226	0.0274	0.0266
	(0.0171)	(0.0171)	(0.0186)	(0.0185)
	0.186	0.186	0.141	0.151
Constant	0.00875	0.00867	-0.0271	-0.0126
	(0.0261)	(0.0260)	(0.0348)	(0.0310)
	0.737	0.739	0.435	0.685
Observations	2,128	2,128	2,128	2,128
Number of cd	21	21	21	21

Note: All results are generated with country-specific fixed effects. Robust standard errors clustered at the country-level are reported in parentheses. Enacted depicts land reform enacted and Implemented denotes land reform implemented as dummy variables. Integrated Enacted and Integrated Implemented are calculated on a five year rolling basis in line with the dependent variable. Population depicts population growth, Trade openness denotes trade openness growth and Patent appl. denotes growth rate of patent applications by residents. All growth rates are calculated on a five year rolling basis. *** p<0.01, ** p<0.05, * p<0.1.

Table10. Robustness check, Growth and land reform after controlling for population, trade openness and patent applications weighted by population

VARIABLES	(1) rgdp5yrgrrolling	(2) rgdp5yrgrrolling	(3) rgdp5yrgrrolling	(4) rgdp5yrgrrolling
Enacted	-0.0117			
	(0.0224)			
	0.602			
Implemented		-0.00982		
		(0.0293)		
		0.737		
Integrated Enacted			0.0152**	
			(0.00682)	
			0.0260	
Integrated Implemented				0.0161**
				(0.00776)
				0.0379
Population	1.168**	1.169**	1.291**	1.271**
	(0.514)	(0.514)	(0.540)	(0.539)
	0.0232	0.0231	0.0168	0.0183
Trade openness	0.0920***	0.0920***	0.0880**	0.0885**
	(0.0350)	(0.0350)	(0.0360)	(0.0363)
	0.00860	0.00849	0.0146	0.0149
Patent appl. weighted	0.0171**	0.0170**	0.0136**	0.0134*
	(0.00734)	(0.00737)	(0.00686)	(0.00698)
	0.0202	0.0210	0.0481	0.0552
Constant	-0.0918	-0.0917	-0.103*	-0.0883*
	(0.0575)	(0.0576)	(0.0544)	(0.0534)
	0.111	0.112	0.0594	0.0980
Observations	2,128	2,128	2,128	2,128
Number of cd	21	21	21	21

Note: All results are generated with country-specific fixed effects. Robust standard errors clustered at the country-level are reported in parentheses. Enacted depicts land reform enacted and Implemented denotes land reform implemented as dummy variables. Integrated Enacted and Integrated Implemented are calculated on a five year rolling basis in line with the dependent variable. Population depicts population growth, Trade openness denotes trade openness growth and Patent appl. weighted denotes growth rate of patent applications by residents weighted by population. All growth rates are calculated on a five year rolling basis. *** p<0.01, ** p<0.05, * p<0.1.

Table11. Robustness check, Growth and land reform after controlling for population, trade openness patent applications and infant mortality rate

VARIABLES	(1) rgdp5yrgrrolling	(2) rgdp5yrgrrolling	(3) rgdp5yrgrrolling	(4) rgdp5yrgrrolling
Enacted	-0.00826			
	(0.0211)			
	0.695			
Implemented		-0.00723		
		(0.0276)		
		0.793		
Integrated Enacted			0.0104	
			(0.0102)	
			0.306	
Integrated Implemented				0.00798
				(0.0108)
				0.460
Population	1.405***	1.406***	1.391***	1.394***
	(0.529)	(0.529)	(0.536)	(0.532)
	0.00788	0.00783	0.00946	0.00875
Trade openness	0.0884***	0.0884***	0.0872**	0.0876**
	(0.0335)	(0.0335)	(0.0347)	(0.0348)
	0.00834	0.00824	0.0120	0.0119
Patent appl.	0.0250	0.0250	0.0267	0.0260
	(0.0178)	(0.0178)	(0.0186)	(0.0184)
	0.160	0.160	0.151	0.158
Infant mortality	-0.0130***	-0.0131***	-0.00675	-0.00906*
	(0.00432)	(0.00431)	(0.00611)	(0.00533)
	0.00252	0.00247	0.269	0.0890
Constant	0.0457**	0.0457**	0.00785	0.0265
	(0.0212)	(0.0212)	(0.0425)	(0.0330)
	0.0314	0.0314	0.854	0.423
Observations	2,101	2,101	2,101	2,101
Number of cd	21	21	21	21

Note: All results are generated with country-specific fixed effects. Robust standard errors clustered at the country-level are reported in parentheses. Enacted depicts land reform enacted and Implemented denotes land reform implemented as dummy variables. Integrated Enacted and Integrated Implemented are calculated on a five year rolling basis in line with the dependent variable. Population depicts population growth, Trade openness denotes trade openness growth and Patent appl. denotes growth rate of patent applications by residents. Infant mortality denotes infant mortality rate. All growth rates are calculated on a five year rolling basis. *** p<0.01, ** p<0.05, * p<0.1.

Table12. Robustness check, Growth and land reform after controlling for population, trade openness, patent applications weighted by population and infant mortality rate

VARIABLES	(1) rgdp5yrgrrolling	(2) rgdp5yrgrrolling	(3) rgdp5yrgrrolling	(4) rgdp5yrgrrolling
Enacted	-0.00859			
	(0.0211)			
	0.685			
Implemented		-0.00674		
		(0.0279)		
		0.809		
Integrated Enacted			0.00883	
			(0.00934)	
			0.344	
Integrated Implemented				0.00595
				(0.00999)
				0.552
Population	1.369**	1.370**	1.359**	1.363**
	(0.539)	(0.539)	(0.544)	(0.541)
	0.0111	0.0110	0.0125	0.0117
Trade openness	0.0888**	0.0888**	0.0879**	0.0882**
	(0.0346)	(0.0345)	(0.0356)	(0.0356)
	0.0102	0.0101	0.0137	0.0133
Patent appl. weighted	0.0132**	0.0132**	0.0130*	0.0129*
	(0.00648)	(0.00650)	(0.00675)	(0.00666)
	0.0410	0.0423	0.0536	0.0521
Infant mortality	-0.0119***	-0.0119***	-0.00657	-0.00895*
	(0.00434)	(0.00434)	(0.00562)	(0.00473)
	0.00605	0.00597	0.243	0.0587
Constant	-0.0348	-0.0346	-0.0656	-0.0474
	(0.0515)	(0.0516)	(0.0624)	(0.0536)
	0.499	0.503	0.293	0.377
Observations	2,101	2,101	2,101	2,101
Number of cd	21	21	21	21

Note: All results are generated with country-specific fixed effects. Robust standard errors clustered at the country-level are reported in parentheses. Enacted depicts land reform enacted and Implemented denotes land reform implemented as dummy variables. Integrated Enacted and Integrated Implemented are calculated on a five year rolling basis in line with the dependent variable. Population depicts population growth, Trade openness denotes trade openness growth and Patent appl. weighted denotes growth rate of patent applications by residents weighted by population. Infant mortality denotes infant mortality rate. All growth rates are calculated on a five year rolling basis. *** p<0.01, ** p<0.05, * p<0.1.