

10

Trade, Infrastructure and Inequality: A Cross Country Analysis

Introduction

In spite of the success of Millennium Development Goals (MDGs), many principals including equality, outlined in Millennium Declaration have not been integrated. As MDGs mainly focussed on national and global averages, they failed to check the growing disparities at the regional level and also among specific groups of population. The Post-2015 Development Agenda takes into consideration the Rio+20 promises to “strive for a world that is just, equitable and inclusive”. The Sustainable Development Goals (SDGs) ensure the inclusion of marginalised, disempowered and excluded groups, and reducing within and between inequalities along with poverty eradication. The SDGs have specific targets for reduction of inequality and this paper is an endeavour to suggest how those targets can be met through various policy initiatives. There are two good reasons to study issues related to income and wealth distribution. Firstly, there are philosophical and ethical grounds for reduction of inequality. Second and most importantly, even if the problem of inequality at an intrinsic level is ignored, care must be taken at the functional level; that is its impact on other economic features. Widening inequality is believed to have significant implications for economic growth and macroeconomic stability as it can lead to concentration of political and decision making power in the hands of a few, leading to a suboptimal use of resources that may raise the chances of political and economic instability.

In the recent past the relationship between globalisation and inequality has attracted considerable attention. Trade liberalisation is an integral part of globalisation and thus there is good reason to study the effects of trade liberalisation on inequality. Globalisation and hence trade liberalisation has both short run and long run effects on inequality and poverty

reduction. In the short run, trade liberalisation changes returns to labour and other factors and thus reduce inequality; in long run, through growth of output trade liberalisation indirectly impact on wages and inequality (Acharyya, 2008).

Infrastructure

In the modern era, when trade liberalisation compels countries to face more global competition, infrastructure development helps them to become more competitive. At the same time, there is empirical evidence showing a negative impact of quantity and quality of infrastructure on inequality. A number of studies show that some specific categories of public spending such as public investments in infrastructure, on health and education, and social insurance provision, may be pro-growth and pro-equality (see Benabou, 2000, 2002; and Bleaney *et al.*, 2001). Infrastructure development can have a positive impact on the income and welfare of the poor over its impact on average income¹ (Lopez, 2003). Infrastructure development allows poor to access additional productive opportunities and thus helps poorer individuals and underdeveloped areas to get connected to core economic activities (Estache, 2003). Reduction of production and transaction costs is possible if infrastructure development takes place in poorer regions (Gannon and Liu, 1997). Thus development of infrastructure is necessary to reduce income inequality, when it results in improved access and/or enhanced quality especially for low-income households (Estache *et al.*, 2000). Along with quantity, quality of infrastructure also plays an important role in reducing inequality. Chong and Calderon (2001) find that development of infrastructure, quantitatively and qualitatively, is associated with reduction of inequality. Working on ASEAN countries, Seneviratne and Sun

(2013) show that better infrastructure both in quantity and quality improve income distribution. In the Indian context there are few studies related to inequality and infrastructure. Bajar and Rajeev (2015), working with 17 major Indian states and different infrastructural indicators, find a positive relationship between infrastructure and inequality and thus contradict the existing literature. Another important factor for reduction of inequality is financial infrastructure. Some studies find a positive impact of development of financial markets on income distribution as more developed and free markets widen the availability of credit especially to the poorer section of the society and thus allow them to invest in building their human and physical capital (Banerjee and Newman, 1993). The relationship between the two is complex in the sense that while Galor and Zeira (1993) and Banerjee and Newman (1993) find a linear relationship between financial development and income inequality, Greenwood and Jovanovic (1990) find an inverted U-shaped relationship.

Trade Openness

Trade openness is an important factor influencing income inequality. According to the Heckscher-Ohlin theory, if a country opens up to trade, redistribution takes place in favour of abundant factors and as the poorer section of the society mostly owns these factors they certainly gain from it. Anderson (2005) identifying some channels through which increased trade openness could affect income inequality, suggests that countries engaged in trade may be more eager to use re-distributional policies since some groups are likely to suffer an income loss when the economy is subject to trade. Some studies find that trade openness significantly reduces income inequality (White and Anderson, 2001; Dollar and Kray, 2002; Edwards, 1997b; and Higgins and Williamson, 1999). This result is not universal in the sense that using a trade-GDP ratio Barro (2000) and using an S&W index, Lundberg and Squire (2003) find that increase in trade openness increases inequality. Spilimbergo *et al.* (1999) suggest the opposite, that countries engaged in trade are likely to have liberal governments who are also likely not to redistribute income in their country. Thus, if the benefits of trade are not naturally distributed evenly, these countries would experience increased inequality

as a result of trade. In the same vein one may discuss the importance of trade liberalisation. In a more liberalised trade regime, income inequality is expected to be reduced.

Foreign Direct Investment (FDI)

The relationship between FDI, growth and inequality has also been investigated thoroughly in literature. While a number of studies find a significant role of FDI to reduce inequality and poverty in the host country by improving technology and productivity, critics put forth counter arguments. Some studies find evidence from emerging market economies that FDI increases inequality in host countries by benefitting skilled workers more than unskilled workers (see Aitken *et al.* 1996; Feenstra and Hanson, 1997; Lipsey and Sjöholm, 2004; Mah, 2002, and Hanson, 2003). Inward FDI deteriorates income distribution by raising wages in the corresponding sectors in comparison with traditional sectors (Girling, 1973; Rubinson, 1976; Bornschier and Chase-Dunn, 1985; Tsai, 1995). However, the opposite conclusion is also drawn by a number of studies (see Markusen and Venables, 1997; Blonigen and Slaughter, 2001; Aghion and Howitt, 1998, etc.). FDI is argued to help reduce income inequality by utilising abundant low-income unskilled labour (Deardorff and Stern, 1994) or when capital, domestic or foreign, stimulates economic growth and its benefits eventually spread throughout the whole economy (Tsai, 1995).

This paper is divided in six major sections. This short introduction is followed by a discussion on relevance of inequality in SDGs. Section 3 presents a snapshot view of inequality across countries. Data and methodology are discussed in section 4. Section 5 presents the results and lastly we conclude by discussing possible policy interventions.

Inequality and Sustainable Development Goals

Fifteen years back, global leaders took a historic decision to eradicate poverty, hunger, killer diseases, unmet schooling, gender inequality, and reduce environmental degradation. By packaging these priorities into an easily understandable set of eight goals, and by establishing measurable and time-bound objectives, MDGs were also expected to help

to promote global awareness, political accountability, improved metrics, social feedback, and public pressure. Although the degree of progress varies extensively across goals, countries and regions, developing countries have made significant progress towards achievement of the MDGs. Substantial progress was seen with regards to poverty, hunger and diseases. However, the objective of social inclusion or reduction of inequality was lost somewhere. In 2010, at the time of the UN MDG summit, the Institute of Development Studies (IDS) and the MDG Achievement Fund released a report claiming that the MDG targets largely overlooked inequality. It has been shown that in countries where development has taken place in terms of MDG targets, inequality has increased substantially. On the other hand, some emerging concerns such as climate change and other environmental ills alongside the inequality reduction objectives have compelled global leaders to proceed to a more punctilious agenda of “sustainable development” to help the world to move to a sustainable trajectory. A high level global sustainability panel, appointed in the run up to the Rio+20 Summit in 20-22 June 2012, had submitted its report recommending a set of SDGs.

The 10th goal among the 17 goals that make up the 2030 Agenda for Sustainable Development is to “reduce inequality within and among countries”. Compared to MDGs, targets to reduce inequality in SDGs seems more comprehensive as the reference to both “within” and “among” countries stresses the importance of inequality reduction in all countries. Under SDG10, the structural factors, such as lack of fiscal, wage and social policies, discrimination, lack of representation, etc., that cause inequality are identified and are focussed on. Therefore, targets set under SDG10 have a broad scope.

Let us now very briefly discuss importance of each target. The first target, Target 10.1 is precisely a measurable target that stipulates that by 2030, an above-average growth of income of the bottom 40 per cent of population needs to be achieved. This target is to reduce the within country inequality at the absolute level or to reduce inequality among different income groups. The second target, Target 10.2 aims social, political and economic inclusion of population without any discrimination on the basis of age, sex, disability, race, religion, etc. With firm contrast to MDGs, this

target ensures a fair distribution of progress towards all targets of 2030 Agenda and goes hand in hand with the suggestion of the UN Secretary General’s synthesis report (2014), to consider a target to be achieved if and only if it is met for all relevant income and social groups. Target 10.3 requires reducing inequality of outcome caused by discriminating laws, policies and practices and calls for sound policy action in this regard. This problem is very likely to occur and is sensitive. Thus choosing proper indicator to measure this type of discrimination is important and in this regard a relevant module is to be developed and should be integrated with national sample surveys, etc. Target 10.4 calls for adoption of appropriate fiscal, wage and social protection policies for a progress towards greater equality. This target lacks clarity as it does not indicate any direction for change. There are several indicators related to this target, such as labour share of GDP, comprising wages and social protection transfers and progressivity of tax and social expenditures. However, collection of data to estimate these indicators is not very easy. Target 10.5 can be said to be linked with Goal 17 as it requires improvement of financial regulation and strengthening of the same by monitoring global financial markets and institutions. Target 10.6 is to reduce inequality among countries and is probably the most important target. An indicator to measure the representation of developing countries in global fora, used by Inter-agency and Expert Group on Sustainable Development Goals Indicators (IAEG-SDGs), is the percentage of members or voting rights of developing countries in international organisations. The last target is about “orderly, safe, regular and responsible migration”. Inter- and intra-country migration is responsible for both within country and among country inequality. Thus targeting migration is urgently required.

Now given the targets the most important question is what are the means of implementation? The SDGs merely consist of some targets without any proper direction or policy prescription to achieve those targets. Firstly, the targets require differential and special treatments for developing and especially least developing countries in accordance with World Trade Organisation (WTO) agreements. Secondly, encouragement of Official Development Assistance (ODA) especially FDI to developing and least

developed countries in accordance with their national plans is also required. Third and most importantly, reduction of transaction cost is important. Otherwise implementation of other macroeconomic and social policies will be difficult and far from the targeted level with these targets in the backdrop, this study underlying income inequality between and within inequalities.

A Snapshot View of Inequality across Countries

Cross country comparisons of inequality are generally plagued by problems of poor reliability, lack of coverage, and inconsistent data and methodology. The World Bank database has been used for this study. Three indicators, namely the difference between income shares of top 20 per cent and bottom 20 per cent of the population, the difference between income shares of top 10 per cent and bottom 10 per cent of the population, and the Gini index are considered. With over 0.99 correlations between every pair of the above three indicators, they can be used interchangeably. From the yearly data of different indicators related to inequality, average inequality indicators are calculated for the last decade of the 20th century (1991-2000) and the first decade of the 21st century (2001-2010), given in Table 1 in Appendix 1. Comparing average inequality in all continents, highest level of inequality is found in African countries, followed by South American and North American Countries. Inequality is lowest in European countries. The discussion on inequality across countries requires some more detail, which is as follows.

Africa: Comparison of inequality in the African continent between 1990s and 2000s is shown in the first part of Table 1 in Appendix 1. Very high inequality is seen in countries like Botswana, Central African Republic, Namibia and South Africa. In Botswana, Kenya, Ethiopia, Nigeria and Cameroon, all three indicators show a downward trend from the 1990s to the 2000s, whereas in countries like Egypt, Morocco, and South Africa they tend to increase. As an Emerging Market Economy, South Africa show high economic growth in 2000s, it also experienced a large increase in inequality, as the Gini coefficient is found to increase from 57.96 to 63.33.

Asia and Australia: Inequality in Asian countries is not as severe as in African countries. From 1990s

to 2000s when the Chinese economy showed an increase in inequality, India and Indonesia experienced a moderate increase. Small countries like Jordan, Kazakhstan, Malaysia, Pakistan, Philippines and large countries like Russia, Thailand showed a decline in inequality, whereas Bangladesh and Sri Lanka experienced an increase in inequality. Inequality measured in terms of Gini coefficient for Bangladesh increased from 30.5 to 32.9. China showed almost 15 per cent increase in inequality in last two decades. In case of India, the Gini coefficient increased from 30.8 to 33.6. Among ASEAN countries, in Indonesia, Lao PDR and Vietnam Gini coefficient increased from 29.37 to 34.3, from 32.7 to 34.7 and from 35.6 to 36.8 respectively. Some other ASEAN countries like Philippines and Thailand showed downward trend in inequality. In Australia inequality increased slightly.² In 1990s average inequality measured in terms of Gini coefficient was 33.7 which increased to 34.1 in 2000s.

Europe: The third part of Table 1 shows inequality estimates for Europe. In general, inequality across countries in Europe is lower than those in Asian and African countries. In the 21st century, European countries show a mixed trend in terms of decline in inequality. Inequality, measured in terms of Gini coefficient declined in Austria, France, Greece, Ireland, Moldova, Netherlands, Spain and Ukraine and increased in all other countries. At the same time Switzerland successfully reduced its level of inequality from a level of 37.10 to 32.70 (and in counties like Belgium it went up from a level of 26.75 to 33.14).

North America: Inequality in North American countries is higher than those in Asian and European countries but lower than in African countries. Inequality increased in the 21st century in almost all major countries in this continent, though the magnitude varies across countries. In the United States, inequality measured in terms of all three indicators increased marginally. Some countries such as Guatemala, Mexico, Nicaragua and Panama, however, showed a marginal decline in inequality.

South America: In all countries in this continent, inequality is very severe. High level of income and consumption inequality persists in countries like Bolivia, Brazil, Chile, Colombia, Paraguay, etc. From the last decade of 20th century to the beginning of 21st century, inequality increased in all countries except

Brazil, Chile and Ecuador. In Paraguay and Peru it increased marginally.

Inequality in India

Even as the Indian economy has been registering steady growth in the recent years, poverty and inequality remain a major concern to policy makers. Sustained growth is a necessary condition for poverty reduction but not sufficient (Ali and Son, 2007), as inequality plays an important role here. While Indian policy makers have been giving considerable attention to reduction of poverty, inequality persists despite the fact that increase in inequality not only slows down the growth process but also hinders the process of poverty reduction. If we ignore the financial crisis period, the Indian economy has been growing at a rate between 6 to 9 per cent per annum in real terms for the last two decades. This was possible mainly because the Indian economy integrated more closely with the global economy after reforms of 1990s and due to the exposure to external competition as well as the incentives generated by global relative prices. It was expected to bring about labour-intensive industrialisation and a Lewis-style transformation of economy along with reduction in inequality. However, since independence inequality in India did not show any nosedive (Chandrasekhar and Ghosh, 2015). Based on several estimates of inequality considering income or consumption distribution, many studies have explained the upward trend of inequality in India. Most of the studies have used National Sample Survey (NSS) consumption expenditure survey statistics to calculate Gini coefficients. A few studies have mentioned several problems associated with the 55th round, 1999-2000 data of NSS statistics (see Sen, 2001; Deaton and Dreze, 2002; Sen and Himanshu, 2005, etc.) and some others have revised their estimates accordingly (see Deaton and Dreze, 2002; Sundaram and Tendulkar, 2003a and 2003b; Sen and Himanshu, 2005). In general these studies show that between 1993-94 (50th round) and 1999-2000 (55th round) rural inequality had increased significantly. Using real mean per capita expenditure data Sen and Himanshu (2005) provide the striking evidence of increased inequality in the post-liberalisation period. Using *India Human Development Survey (IHDS)* data, Vanneman and Dubey (2011) show the upsurge of both vertical and horizontal inequality of consumption in India. Based

on the consumption data, Chandrasekhar and Ghosh (2015) show that from 1993-94 to 2009-10, national Gini coefficient of consumption has increased from 0.31 to 0.36.

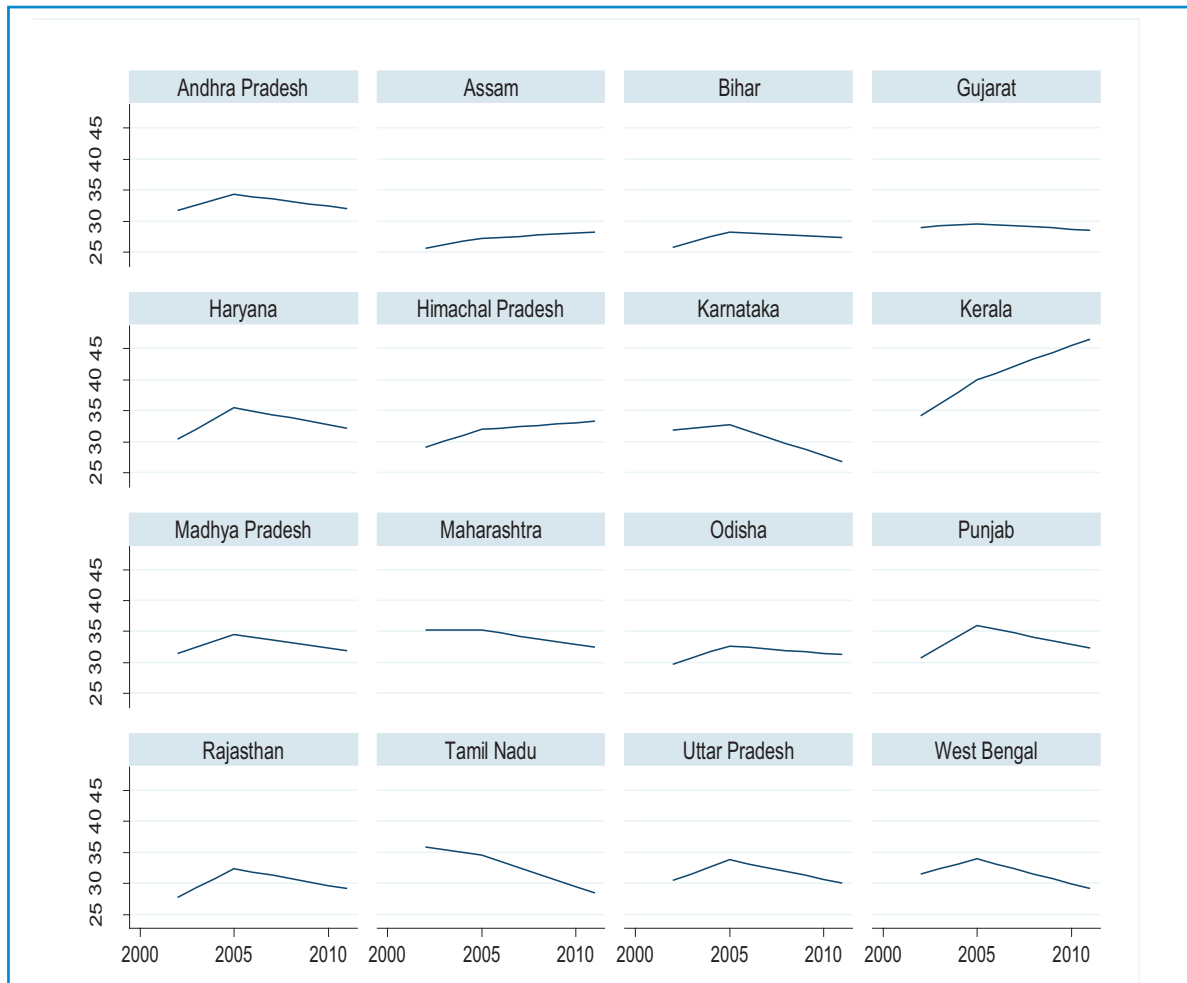
India is a widely diverse country of over a billion people, and hence, it is necessary to discuss the overall trend of inequality at a disaggregated level. If Gini index calculated on the basis of monthly per capita consumption expenditure at the state level, is considered no overall trend of inequality is found (see Table 1a in Appendix 1). During, 1974 to 1978 inequality increased in all states except for West Bengal. However, from 1978 to 1984 inequality increased in states such as Andhra Pradesh (AP), Haryana, Himachal Pradesh (HP), Karnataka, Tamil Nadu, and West Bengal when in all other states the Gini coefficient declined. In the pre- and post-liberalisation period, inequality showed an interesting pattern. While inequality increased in Assam, Kerala, Madhya Pradesh (MP), Orissa, and Uttar Pradesh (UP) between 1984 to 1988, inequality declined in AP, Assam, Gujarat, Karnataka, Kerala, Orissa, Punjab and Rajasthan between 1988 to 1994. It is interesting to find that in the beginning of 21st century, inequality decreased in almost all states except Gujarat, Karnataka and Tamil Nadu. In between 2000 and 2005 when the Indian economy experienced massive growth, inequality increased in all states except for Maharashtra where inequality declined marginally. In the aftermath of the Global Financial Crisis, inequality declined noticeably in all states except for Assam, HP and Kerala. It is striking that in Kerala between 2005 and 2010, Gini index increased by over 13 per cent. Therefore in summary, in 1970s and 1980s the Indian economy experienced moderate growth, while inequality increased in mainly large states which contributed significantly in country's economic growth. When liberalisation failed to reduce inequality universally in the subsequent period, high growth phase of the early 21st century led to the increase in inequality in these states.

Empirical Analysis

Empirical Model and Data

This empirical analysis uses three models for estimation. In the first model, i.e. the baseline model, the non-linear relationship between inequality and

Figure 1: Trends in Inequality across States in India



Source: Planning Commission of India database.

GDP growth (commonly known as the Kuznets (1955, 1963) inverted U hypothesis) is checked by regressing inequality on per-capita GDP and its square. The estimated model is as follows:

$$(\ln \text{INQ})_{it} = \beta_0 + \beta_1 (\ln \text{PCGDP})_{it} + \beta_2 (\ln \text{PCGDP})_{it}^2 + \epsilon_{it} \quad (1)$$

where, $\ln \text{INQ}$ = log of inequality index

$\ln \text{PCGDP}$ = log of per capita GDP

While estimating the second model, different macroeconomic factors related to globalisation or more specifically trade liberalisation are considered. This model helps to understand the importance of free trade and sound macroeconomic policies in reducing income inequality.

$$(\ln \text{INQ})_{it} = \beta_0 + \beta_1 (\ln \text{PCGDP})_{it} + \beta_2 (\ln \text{PCGDP})_{it}^2 + \beta_3 (\ln \text{inf})_{it} + \beta_4 (\ln \text{TO})_{it} + \beta_5 (\ln \text{Tariff})_{it} + \beta_6 (\ln \text{FDI})_{it} + \epsilon_{it} \quad (2)$$

where $\ln \text{inf}$ = log of inflation
 $\ln \text{TO}$ = log of trade openness
 $\ln \text{Tariff}$ = log of average tariff rate
 $\ln \text{FDI}$ = log of FDI

The third model considers different types of infrastructures: physical and financial and human capital, and related variables including urbanisation and distribution of arable land that might affect income inequality. The model is as follows:

$$(\ln \text{INQ})_{it} = \beta_0 + \beta_1 (\ln \text{PCGDP})_{it} + \beta_2 (\ln \text{ISI})_{it} + \beta_3 (\ln \text{HCI})_{it} + \beta_4 (\ln \text{Fi})_{it} + \beta_5 (\text{UI})_{it} + \beta_6 (\ln \text{PC Land})_{it} + \beta_7 (\ln \text{InfraQ})_{it} + \epsilon_{it} \quad (3)$$

where $\ln \text{ISI}$ = log of infrastructure stock index
 $\ln \text{HCI}$ = log of human capital index

ln FI = log of financial infrastructure

UI = urbanisation index

ln PC Land = log of per capita arable land holding

ln InfraQ = log of infrastructure quality

Data sources used in this analysis are collected from World Development Indicators³. An unbalanced panel, depending on income inequality data, of all developing, emerging and advanced countries is considered for the period 1991-2014.

Econometric Methodology

Each model described above are estimated using pooled data Ordinary Least Square (OLS), fixed and random effects panel data model. The Bruesh-Pagan Lagrange Multiplier test is done to choose between simple OLS and random effect panel data model. On the other hand, Hausman test is undertaken to choose between fixed and random effect panel data models. Wooldridge test for serial correlation is used to check presence of possible dynamic effect in the panel data.

To address the problem of serial correlation, dynamic panel data models are estimated. Secondly, the relationships described above cannot be interpreted as causal until the possibility of endogeneity has been ruled out in equations (2) and (3). To address this problem, a dynamic GMM estimator (system-GMM) – also known as Arellano-Bover/Blundell-Bond linear dynamic panel-data estimation, – is used to analyse changes across countries and over time.⁴ The system-GMM estimator uses lagged levels and differences between two periods as instruments for current values of the endogenous variable, together with external instruments. This approach ensures that all information will be used efficiently, and that focus is placed on the impact of regressors (such as trade openness) on inequality, and not vice versa. In this paper, with many panels with few time periods, a system estimator as suggested by Blundell and Bond (1998) is used. Some post-estimation tests are required to check the consistency of estimators. For each model Sargan test is done to check the validity of over-identifying restrictions.

Empirical Results and Discussion

Table 2a in Appendix 3 shows descriptive statistics of Gini index and other variables. It can be seen

that Gini index varies between 16.64 and 65.77. Per capita GDP, on the other hand, varies from 146.398 and 61662.47 US dollar. The sample thus includes countries with very low income to very high income. The dependent variable, Gini index, is very closely normally distributed as skewness and kurtosis coefficients are close to zero and three respectively. High and significant correlation is found between per capita GDP and financial infrastructure, and between physical infrastructure and human capital index (see Table 3).

Graphs in Appendix 3 (Figure 2) show relation of inequality with other explanatory variables. It can be seen that when inequality has a negative relation with per capita GDP, trade openness, FDI, physical and financial infrastructures, and human capital, it has the opposite relation with tariff and inflation. Table 4 in Appendix 4 shows estimation results of equations (1), (2) and (3). In case of all five models, the Bruesh-Pagan Lagrange multiplier test rejects the estimation using simple OLS technique and strongly recommends the use of panel data estimation methods. Similarly, presence of serial correlation is found in all five cases and hence, dynamic panel data analysis ultimately carried out. On the other hand, Durbin-Wu-Hausman test shows presence of endogeneity and in all four models (model 2 to 5) considered with per capita GDP as an endogenous variable.

Results of all 5 models show lagged Gini to be positively significant indicating path dependence of inequality. Past inequality is found to increase inequality in the present. Model 1 is the baseline model that considers only two explanatory variables, namely log per capita GDP and its square. Both are found to be significant when square of log per capita GDP has a negative sign. This clearly proves the inverted U-shaped relationship between GDP growth and inequality as proposed by Kuznets (1963). Using both cross country and time series data, Kuznets (1963) found an inverted U-shaped relation between income inequality and GNP per capita. It is noteworthy that the first model however does not satisfy the Sargan test possibly due to consideration of too few explanatory variables.

In model 2, some more macroeconomic variables are included along with per capita GDP. This model shows the impact of globalisation on income inequality.

From estimation of model 2 given in Table 4, it is seen that trade openness has a negative impact on income inequality. An increase in trade openness by one unit reduces inequality by 0.05 units. Trade liberalisation is also found to have a positive impact on reduction of inequality. A one unit increase in tariff increases inequality by 0.02 units. It is found that FDI can significantly reduce income inequality, though in a very small magnitude compared to other factors. However, there is no significant impact of inflation on inequality. The p value of the Sargan test gives evidence in favour of over-identifying moment conditions and hence consistent estimates. In model 3, lag of few explanatory variables are considered. Though the second lag of Gini was insignificant in model 2, in model 3 it turns out to be significant. Tariff and its first lag are found to be significant; thus showing trade liberalisation to have both short run and long run impact on inequality. Interestingly, when tariff has a positive sign, its first lag has a negative sign. Thus in short run, reduction of tariff barriers can reduce inequality; in long run it can increase the former. Though ambiguous results are found when cross country evidences are studied or time series data are estimated, panel data estimation helps us to find the correct result when all possible endogeneity related problems are taken into account. The p value of the Sargan test shows that the null hypothesis of over-identifying moment conditions is accepted.

The estimation of last two models (models 4 and 5) consider infrastructure variables along with “traditional” causes of inequality. In model 5, again lags of all explanatory variables are considered, and both models 4 and 5 show consistent estimates as the p value of the Sargan test gives evidence in favor of over-identifying moment conditions. Results of model 4 show that infrastructure has a significant negative impact on income inequality. It implies that infrastructural development within a country helps to reduce thus income inequality. One unit increase in infrastructure index can reduce inequality by 0.07 units. Lag of infrastructure has a significant negative impact on income inequality. However, there is no significant impact of human capital on income inequality. It is an interesting result in the sense that while human capital development is necessary for capability building, it is not an important factor in inequality reduction. Lag of human capital index found

to be insignificant (see model 5). Public investment in social infrastructure development should target the deprived section of the society. On the other hand, quality of infrastructure is found to reduce inequality. Financial infrastructure is found to reduce income inequality as well. More financial development or improvement of financial infrastructure thus helps to reduce income inequality. Consideration of lag for financial infrastructure increases the magnitude of its coefficient, though its lag is not found to be significant. Results further show that urbanisation index has a positive significant effect on inequality (see model 4). Even though contemporaneous urbanisation tends to increase inequality, it has a lagged negative effect. Distribution of land also plays an important role to reduce income inequality. Urbanisation and its lag (in model 5), are found to be significant but of opposite sign. When urbanisation has a positive sign, its lag has a negative sign; which implies that while urbanisation increases inequality in short run, it reduces inequality in the long run. As measurement of urbanisation in this study can also be described as an indicator of migration, the results thus show that migration causes an increase in income inequality in the short run. Similarly, urbanisation can also be seen as an indicator of infrastructural development in urban areas; that can only possibly reduce inequality in the long run.

Conclusions and Policy Implications

The main objective of the study is to arrive at specific policies in order to achieve targets under SDG 10 on reduction of inequality across and within countries. Though targets under SDG 10 aim at adoption of sound macroeconomic policies, they fail to show any specific direction and suggest any indicator through which those targets can be met. Trade liberalisation and infrastructural development are chosen as two policy instruments to reduce inequality by achieving targets. Considering all possible factors that can help to reduce income inequality of a country, this empirical study contributes to the literature in many significant ways. The empirical results are comprehensive in the sense that a panel of a large number of countries over a long time period is considered for this purpose. On the one hand, the results support the orthodox Kuznets hypothesis, on the other they show important dimensions of inequality reduction through possible

elimination of trade barriers and/or infrastructural bottlenecks thereby reduce transaction costs.

The results show that globalisation certainly plays an important role in reducing income inequality as trade leads to redistribution of income in favour of the poorer section of the society or people owning the abundant factors. It is also shown that this is only necessary in the sense that additional efforts from the governments through sound macroeconomic policies such as tariff reduction, removal of non-tariff barriers and investment in physical and social infrastructure are required. Financial development also plays an important role as it empowers the deprived sections of the society through access to credit. Urbanisation can be seen as an indicator of infrastructural development that might reduce inequality in the long run; even though it increases inequality in the short run. This result is similar to Kuznets's theory that in the early phase of industrialisation, rapid urbanisation may increase income inequality and then reduce the same in the long run. This result thus ensures that SDG target 10.7 can be achieved through urbanisation policies as well.

Endnotes

- ¹ For a detail survey of infrastructure-distribution link see Estache, Foster and Wodon (2002), Estache (2003) and Calderon and Serven (2003).
- ² Data for New Zealand is not available.
- ³ A detailed discussion of data sources is given in Appendix 2.
- ⁴ First introduced by Arellano and Bond (1991).

References

- Acharyya, R. . 2008. "International Trade, Poverty, and Income Inequality: The Indian Experience during the Reform Period 1985-2000" in *Asian Development Bank Trade Policy, Industrial Performance, and Private Sector Development in India*. New Delhi: Oxford University Press. 97-140.
- Aghion, P. and P. Howitt. 1998. *Endogenous Growth Theory*. Cambridge, MA: MIT Press.
- Aitken, B., A. Harrison and R.E. Lipsey. 1996. "Wages and Foreign Ownership: A Comparative Study of Mexico, Venezuela, and the United States." *Journal of International Economics*, 40(3-4), 345-371.
- Ali, I., and H. Son. 2007. "Defining and Measuring Inclusive Growth: Application to the Philippines." *ERD Working Paper Series No. 98*. ADB, Manila.
- Anderson, E. 2005. "Openness and Inequality in Developing Countries: A Review of Theory and Recent Evidence." *World Development*, 33(7), 1045-1063.
- Arellano, M., and S. Bond. 1991. "Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations." *Review of Economics Studies*, 58(2), 277-297.
- Bajar, S. and M. Rajeev. 2015. "The Impact of Infrastructure Provisioning on Inequality: Evidence from India." *Global Labour University Working Paper No. 35*.
- Banerjee, A. V. and A.F. Newman. 1993. "Occupational Choice and the Process of Development." *Journal of Political Economy*, 101(2), 274-298.
- Barro, R. J. 2000. "Inequality and Growth in a Panel of Countries." *Journal of Economic Growth*, 5(1), 5-32.
- Benabou, R. 2000. "Unequal Societies: Income Distribution and Social Contract." *The American Economic Review*, 90 (1), 96-129.
- Benabou, R. 2002. "Tax and Education Policy in a Heterogeneous-Agent Economy: What Levels of Redistribution Maximize Growth and Efficiency?" *Econometrica*, 70(2), 481-517.
- Bleaney, M., N. Gemmell and R. Kneller. 2001. "Testing the Endogenous Growth Model: Public Expenditure, Taxation, and Growth over the Long Run." *Canadian Journal of Economics*, 34 (1), 36-57.
- Blonigen, B.A. and M.J. Slaughter. 2001. "Foreign-Affiliate Activity and U.S. Skill Upgrading." *Review of Economics and Statistics*, 83(2), 362-376.
- Blundell, R. and S. Bond. 1998. "Initial Conditions and Moment Restrictions in Dynamic Panel Data Models." *Journal of Econometrics*, 87(1), 115-143.
- Bornschier, V. and C. Chase-Dunn. 1985. *Transnational Corporations and Underdevelopment*. New Delhi: Praeger Press.
- Calderon, C. and L. Serven. 2004. "The Effects of Infrastructure Development on Growth and Income Distribution." *World Bank Policy Research Working Papers No. S3400*.
- Chandrasekhar, C.P. and J. Ghosh. 2015. "Growth, Industrialisation and Inequality in India." *Journal of the Asia Pacific Economy*, 20 (1), 42-56.
- Chong, A. and C. Calderon. 2001. "Volume and Quality of Infrastructure and the Distribution of Income: An Empirical Investigation." *Inter-American Development Bank Working Paper No: 450*.
- Deardorff, A. and R. Stern (eds). 1994. *The Stolper-Samuelson Theorem: A Golden Jubilee*. Ann Arbor, MI: University of Michigan Press.
- Deaton, A. and J. Dreze. 2002. "Poverty and Inequality in India: A Re-examination." *Economic and Political Weekly*, 37(36): 3729-3748.
- Dollar D. and A. Kraay. 2002. "Growth is Good for the Poor." *Journal of Economic Growth*, 7(3), 195-225.
- Edwards, S. 1997. "Trade Policy, Growth and Income Distribution." *The American Economic Review*, 87(2), 205-210.
- Estache, A. 2003. "On Latin America's Infrastructure Privatization and its Distributional Effects." Mimeo, The World Bank.

- Estache, A., V. Foster and Q. Wodon. 2002. *Accounting for Poverty in Infrastructure Reform: Learning from Latin America's Experience*. WBI Development Studies. The World Bank, Washington, DC.
- Estache, A., A. Gomez-Lobo and D. Leipziger. 2000. "Utility Privatization and the Needs of the Poor in Latin America." Mimeo, The World Bank.
- Freenstra R.C., and G. Hanson. 1997. "Foreign Direct Investment and Relative Wages: Evidence from Mexico's Maquiladoras." *Journal of International Economics*, 42(3-4): 371-393.
- Galor, O. and J. Zeira. 1993. "Income Distribution and Macroeconomics." *Review of Economic Studies*, 60(1): 35-52.
- Gannon, C. and Z. Liu. 1997. "Poverty and Transport." Mimeo, The World Bank.
- Girling, R. 1973. "Dependency and Persistent Income Inequality" in F. Bonilla and R. Girling (eds) *Structures of Dependency*, Institute of Political Studies, Stanford, CA, p. 83-101.
- Greenwood, J. and B. Jovanovic. 1990. "Financial Development, Growth, and the Distribution of Income." *Journal of Political Economy*, 98(5), 1076-1107.
- Hanson, G.H. 2003. "What Has Happened to Wages in Mexico since NAFTA? Implications for Hemispheric Free Trade." *NBER Working Paper No. 9563*.
- Higgins, M. and J.G. Williamson. 1999. "Explaining Inequality the World Round: Cohort Size, Kuznets Curves, and Openness." *NBER Working Paper No. 7224*.
- Kuznets, S. 1955. "Economic Growth and Income Inequality." *American Economic Review*, 45(1), 1-28.
- Kuznets, S. 1963. "Quantitative Aspects of the Economic Growth of Nations: VIII. Distribution of Income by Size." *Economic Development and Cultural Change*, 11 (2), 1-80.
- Lipsey, R.E. and F. Sjöholm. 2004. "Foreign Direct Investment, Education and Wages in Indonesian Manufacturing." *Journal of Development Economics*, 73(1), 415-422.
- López, H. 2003. "Macroeconomics and Inequality." The World Bank Research Workshop, Macroeconomic Challenges in Low Income Countries, Washington DC.
- Lundberg, M. and L. Squire. 2003. "The Simultaneous Evolution of Growth and Inequality." *The Economic Journal*, 113(487), 326-344.
- Mah, J.S. 2002. "The Impact of Globalization on Income Distribution: The Korean Experience." *Applied Economics Letters*, 9(15), 1007-1009.
- Markusen, J.R. and A.J. Venables. 1997. "The Role of Multinational Firms in the Wage-Gap Debate." *Review of International Economics*, 5(4), 435-451.
- Rubinson, R. 1976. "The World Economy and the Distribution of Income within States: A Cross-National Study." *American Economic Review*, 41(4), 638-59.
- Sen, A. 2001. "Estimates of consumer expenditure and implications for comparable poverty estimates after the NSS 55th Round." Paper presented at NSSO International Seminar on 'Understanding Socio-economic Changes through National Surveys', 12-13 May, New Delhi. Reprinted in Angus Deaton and Valerie Kozel (eds). *Data and Dogma: The Great Indian Poverty Debate*. New Delhi: Macmillan, 2005: 203-238.
- Sen, A. and Himanshu. 2005. "Poverty and Inequality in India: Getting closer to the truth." Available at www.networkideas.org. Reprinted in Angus Deaton and Valerie Kozel (eds). *Data and Dogma: The Great Indian Poverty Debate*. New Delhi: Macmillan, 2005: 306-370.
- Seneviratne, D. and Y. Sun. 2013. "Infrastructure and Income Distribution in ASEAN-5: What are the Links?" *IMF Working Paper No. 13/41*.
- Spilimbergo, A., J.L. Londono and M. Szekely. 1999. "Income Distribution, Factor Endowments and Trade Openness." *Journal of Development Economics*, 59(1), 77-101.
- Sundaram, K., and S.D. Tendulkar. 2003a. "Poverty has Declined in the 1990s: A Resolution of Comparability Problems in NSS Consumer Expenditure Data." *Economic and Political Weekly*, 38(4), 327-337.
- Sundaram, K., and S.D. Tendulkar. 2003b. "Poverty in India in the 1990s: An Analysis of Changes in 15 Major States." *Economic and Political Weekly*, 38(14), 1385-1393.
- Tsai, P.L. 1995. "Foreign Direct Investment and Income Inequality: Further Evidence." *World Development*, 23(3), 469-483.
- UN Secretary General Synthesis Report. 2014. *The Road to Dignity by 2030: Ending Poverty, Transforming All Lives and Protecting the Planet*. United Nation, New York.
- Vanneman, R. and A. Dubey. 2011. "Horizontal and Vertical Inequalities in India." *India Human Development Survey Working paper No. 16*.
- White, H. and E. Anderson. 2002. "Growth Versus Distribution: Does the Pattern of Growth Matter?" *Development Policy Review*, 19(3), 267-289.

Appendix 1

Table 1: Inequality Across Countries

Continent	Country	1990s							2000s						
		Income Share		Difference between Quintiles	Income Share		Difference between Deciles	Gini	Income Share		Difference between Quintiles	Income Share		Difference between Deciles	Gini
		Highest 20%	Lowest 20%		Highest 10%	Lowest 10%			Highest 20%	Lowest 20%		Highest 10%	Lowest 10%		
Africa	Botswana	65	3.13	61.87	51.2	1.3	49.91	61	67.3	2.56	64.7	51.4	0.9	50.41	62.6
Africa	Burkina Faso	55.1	5.51	49.62	41	2.3	38.64	48.8	48.4	6.27	42.1	33.1	2.7	30.4	41.5
Africa	Burundi	44.8	6.54	38.27	29.7	2.6	27.11	37.9	42.8	8.96	33.79	28	4.1	23.9	33.3
Africa	Cameroon	51.6	6.2	45.36	36.5	2.8	33.78	44.6	48.3	6.26	42.04	32.8	2.7	30.09	41.4
Africa	Central African Republic	65	1.99	62.99	47.7	0.7	47.04	61.3	55	4.29	50.71	39.6	1.7	37.92	49.9
Africa	Egypt, Arab Rep.	40.5	9.11	31.39	26.4	4	22.37	31.1	41.3	9.05	32.24	27.5	3.9	23.61	31.9
Africa	Ethiopia	43.6	8.17	35.4	29.6	3.4	26.22	35	40.6	8.61	32.02	26.6	3.6	22.95	31.7
Africa	Gambia, The	55.3	4.02	51.23	38.2	1.6	36.56	50.2	52.8	4.79	48.05	36.9	2	34.99	47.3
Africa	Ghana	46	6.13	39.9	30	2.5	27.52	39.4	48.6	5.24	43.31	32.8	2	30.72	42.8
Africa	Guinea	50.5	4.15	46.33	33.3	1.6	31.68	45.9	45	6.77	38.2	29.7	2.8	26.91	37.8
Africa	Guinea-Bissau	53.5	5.15	48.35	39.2	2.1	37.13	47.8	43.2	7.28	35.93	28.1	3.1	25.08	35.5
Africa	Kenya	54.1	4.8	49.33	39.4	1.9	37.48	48.6	53.2	4.84	48.36	38	2	36.03	47.7
Africa	Lesotho	64.4	2.05	62.34	46.2	0.7	45.51	60.6	56.7	2.94	53.78	39.7	1	38.66	52.9
Africa	Madagascar	48.6	5.69	42.92	33.1	2.3	30.81	42.4	49.3	6.14	43.18	33.9	2.5	31.45	42.3
Africa	Malawi	56	4.84	51.12	42	1.9	40.08	50.3	49.8	6.16	43.6	35.1	2.5	32.57	43.1
Africa	Mali	56.1	4.64	51.46	40.6	2	38.58	50.5	44.7	6.87	37.78	28.9	2.9	26	37.3
Africa	Mauritania	50.1	5.78	44.29	35.4	2.3	33.15	43.7	46.9	6.17	40.72	31.5	2.5	28.95	40.3
Africa	Morocco	46.4	6.55	39.87	30.8	2.8	27.99	39.3	47.8	6.5	41.3	32.8	2.7	30.04	40.8
Africa	Mozambique	50.7	5.63	45.06	35.9	2.2	33.73	44.5	52.4	5.33	47.05	38	2	35.94	46.4
Africa	Namibia	78.3	1.48	76.77	65	0.6	64.39	74.3	67.4	3.26	64.13	53.3	1.4	51.83	62.6
Africa	Niger	46	6.74	39.28	31.1	2.8	28.34	38.8	45.2	7.38	37.77	30.6	3.1	27.47	37.3
Africa	Nigeria	50.7	4.5	46.24	34.3	1.7	32.66	45.7	47.5	5.51	41.99	31.4	2.2	29.2	41.5
Africa	Senegal	53.5	4.98	48.55	38.4	2	36.37	47.8	47.1	6.28	40.77	31.6	2.6	28.97	40.3
Africa	Seychelles	48.9	5.68	43.23	34	2.1	31.86	42.7	69.6	3.71	65.92	60.2	1.6	58.52	65.8
Africa	South Africa	63.1	3.26	59.82	45.9	1.4	44.49	58	68.3	2.67	65.58	52	1.1	50.84	63.3
Africa	Swaziland	64.3	2.74	61.59	49.9	1	48.81	60.7	57.9	4.35	53.54	42.2	1.9	40.37	52.4
Africa	Tanzania	41.6	7.43	34.18	26.6	3	23.57	33.8	44.3	7.17	37.11	29.2	3	26.2	36.7
Africa	Tunisia	47.1	5.76	41.34	31.2	2.3	28.93	41	44.9	6.39	38.54	29.3	2.6	26.7	38.1
Africa	Uganda	47.9	6.43	41.42	33.1	2.7	30.46	40.9	50.8	5.85	44.96	35.9	2.4	33.44	44.3
Africa	Zambia	56.3	3.54	52.77	40.2	1.3	38.88	52	56.4	4.24	52.15	40.8	1.7	39.11	51.2
Asia	Bangladesh	39.9	9.14	30.8	25.7	4	21.64	30.5	42.2	8.78	33.37	27.8	4	23.79	32.9

INDIA AND SUSTAINABLE DEVELOPMENT GOALS: THE WAY FORWARD

Asia	Cambodia	46.8	8.04	38.79	33	3.7	29.32	38.3	43.9	8.05	35.81	29.1	3.6	25.54	35.3
Asia	China	43.4	7.26	36.09	27.5	3.1	24.37	35.7	47.9	4.98	42.91	31.2	1.9	29.29	41.4
Asia	India	40.1	9.09	31.05	26	4	22.03	30.8	42.6	8.59	34	28.5	3.7	24.81	33.6
Asia	Indonesia	39.4	9.36	30.04	25.3	4.2	21.18	29.7	42.2	8.4	33.77	27.5	3.7	23.81	34.3
Asia	Iran, Islamic Rep.	49.5	5.29	44.18	33.5	2.1	31.41	43.6	45.2	6.43	38.73	29.6	2.6	27.01	38.3
Asia	Israel	43.4	6.53	36.86	27.6	2.6	24.95	36.8	46.3	4.99	41.29	29.9	1.8	28.09	41.3
Asia	Jordan	47.2	6.78	40.42	32.4	2.9	29.51	39.9	43.1	7.87	35.2	28.2	3.4	24.79	34.8
Asia	Kazakhstan	41.4	7.17	34.24	25.7	2.9	22.73	34	39.1	8.65	30.41	24.2	3.6	20.54	30.3
Asia	Kyrgyz Republic	50.3	4.84	45.45	34.1	1.9	32.2	44.8	41.9	7.75	34.14	26.4	3.2	23.22	33.8
Asia	Lao PDR	41.7	8.65	33.03	27.4	3.8	23.61	32.7	43.2	8.06	35.15	28.7	3.5	25.16	34.7
Asia	Malaysia	53.8	4.51	49.25	37.8	1.8	35.96	48.4	49.2	5.23	43.98	32.7	2.1	30.62	43.4
Asia	Maldives	65.7	1.41	64.33	48.1	0.4	47.75	62.7	44.2	6.51	37.73	28	2.7	25.32	37.4
Asia	Mongolia	39.5	7.55	31.91	23.9	3.1	20.89	31.7	42.3	7.28	34.99	26.6	3.1	23.53	34.7
Asia	Nepal	43.5	7.87	35.65	29.1	3.4	25.69	35.2	46.2	7.4	38.82	31.6	3.3	28.34	38.3
Asia	Pakistan	40.9	8.93	31.99	26.9	3.9	22.95	31.6	40.5	9.35	31.12	26.6	4.2	22.42	30.8
Asia	Philippines	50.8	5.73	45.05	35	2.5	32.5	44.3	50.6	5.66	44.89	34.3	2.4	31.91	44.1
Asia	Russian Federation	49.4	5.01	44.39	33.8	1.8	32	44	45.5	6.51	38.97	29.5	2.6	26.93	38.4
Asia	Slovak Republic	33.1	10.3	22.81	19.5	4.1	15.41	22.7	37.1	9.25	27.84	23	3.8	19.24	27.6
Asia	Sri Lanka	42.7	8.37	34.34	28.3	3.7	24.62	34	46.9	7.14	39.8	32.2	3.1	29.07	39.2
Asia	Tajikistan	38.1	8.34	29.77	23.3	3.3	20.05	29.5	40.4	7.87	32.57	25.4	3.1	22.25	32.3
Asia	Thailand	50.9	6.01	44.91	35.1	2.5	32.59	44	48.5	6.4	42.08	32.7	2.7	29.99	41.4
Asia	Turkey	47.7	5.8	41.88	32.3	2.3	29.99	41.5	46.3	5.66	40.59	30.2	2.1	28.09	40.1
Asia	Uzbekistan	49.6	3.91	45.65	33.4	1.1	32.27	45.3	42.7	7.79	34.86	27.8	3.1	24.74	34.2
Asia	Vietnam	44	7.92	36.08	29.2	3.5	25.64	35.6	44.3	7.13	37.21	29	3	25.98	36.8
Asia	Yemen, Rep.	41.2	7.41	33.75	25.9	3	22.88	33.4	44.2	7.84	36.31	29.9	3.3	26.61	35.9
Europe	Armenia	47.3	6.57	40.73	32.4	2.7	29.69	40.2	41.6	8.49	33.07	27.3	3.6	23.69	32.7
Europe	Austria	38.6	7.64	31	23.5	2.8	20.76	31	38.1	8.51	29.61	23.4	3.3	20.03	29.5
Europe	Azerbaijan	42.3	6.94	35.31	27	2.8	24.29	35	34.5	11.2	23.29	21.1	5	16.08	23.1
Europe	Belarus	36	9.4	26.62	21.7	3.9	17.79	26.5	36.9	8.94	27.99	22.3	3.7	18.66	27.9
Europe	Belgium	36	9.03	26.92	21.5	3.5	18.04	26.8	41.7	8.35	33.34	28.3	3.3	25.03	33.1
Europe	Bulgaria	37.9	9.09	28.81	23.6	3.8	19.85	28.5	40	7.23	32.74	25	2.6	22.36	32.4
Europe	Croatia	37.1	9	28.13	22.5	3.7	18.87	28.1	39.9	8.36	31.54	25.1	3.5	21.59	31.2
Europe	Czech Republic	36.7	10.3	26.41	23.2	4.5	18.68	26.2	36.4	9.45	26.99	22.6	3.8	18.81	26.5
Europe	Denmark	34.2	9.93	24.29	20.2	3.8	16.42	24.3	35.1	9.68	25.45	21	3.7	17.3	25.4
Europe	Estonia	43.2	7.16	36.05	27.9	3	24.99	35.7	41.3	7.27	34.01	25.9	2.7	23.26	33.6
Europe	Finland	34.1	10.7	23.32	20.1	4.6	15.54	23.2	37.3	9.32	27.99	23	3.8	19.18	27.9
Europe	France	40.5	7.92	32.62	25.7	3.2	22.47	32.4	39.6	7.94	31.69	24.6	3.2	21.4	31.5
Europe	Georgia	45.8	5.44	40.4	30.1	1.9	28.14	40.1	46.5	5.46	41.02	30.5	1.9	28.51	40.6
Europe	Germany	38.4	8.31	30.13	23.7	3.3	20.37	30	39.4	8.38	31.05	24.7	3.4	21.34	30.9
Europe	Greece	43.3	5.78	37.5	27.4	1.9	25.49	37.2	41.1	6.7	34.38	25.8	2.3	23.51	34.2
Europe	Hungary	37.1	9.58	27.55	23.2	4	19.13	27.4	37.4	8.78	28.66	23	3.6	19.4	28.5

INDIA AND SUSTAINABLE DEVELOPMENT GOALS: THE WAY FORWARD

Europe	Ireland	44.1	6.96	37.09	28.4	2.8	25.62	36.5	40.7	7.76	32.93	25.7	3.1	22.65	32.7
Europe	Italy	41.6	6.36	35.23	26.3	2.2	24.18	35.1	42.4	6.2	36.2	27.2	2.1	25.03	36.1
Europe	Latvia	39.2	8.04	31.2	24.7	3	21.68	31	42.5	6.66	35.85	27	2.4	24.61	35.5
Europe	Lithuania	40.8	7.87	32.94	26.2	3.1	23.05	32.7	41.5	7.14	34.32	26.2	2.7	23.5	34
Europe	Macedonia, FYR	36.7	8.48	28.2	22.1	3.3	18.88	28.1	45.9	5.88	40	30	2.3	27.7	39.6
Europe	Moldova	45	6.38	38.61	29.4	2.5	26.93	38.1	42.2	7.43	34.78	27	3	23.97	34.5
Europe	Netherlands	38.8	7.8	30.96	23.2	2.5	20.68	30.7	38.5	8.2	30.3	23.9	3	20.91	30.1
Europe	Norway	35.8	9.44	26.32	21.4	3.8	17.63	26.4	37.1	9.2	27.87	23.1	3.5	19.58	27.8
Europe	Poland	39.6	8.4	31.22	24.8	3.5	21.26	31.1	41.6	7.7	33.89	26.4	3.2	23.27	33.7
Europe	Romania	37.1	8.82	28.24	22.5	3.6	18.86	28.1	37.9	8.48	29.37	23	3.5	19.56	29.3
Europe	Slovenia	38.2	9.19	28.99	23.8	4	19.81	28.8	36.1	9.3	26.82	21.8	3.8	17.97	26.7
Europe	Spain	41.8	6.78	35.05	26.4	2.4	24.02	34.7	40.8	6.48	34.29	25.2	2.1	23.08	34.1
Europe	Sweden	34.6	9.23	25.36	20.1	3.4	16.72	25.5	36.2	9.32	26.84	21.8	3.7	18.07	26.8
Europe	Switzerland	42.5	5.32	37.2	27.2	0.8	26.4	37.1	40.3	7.67	32.65	24.8	2.9	21.89	32.7
Europe	Ukraine	40.4	7.91	32.46	25.5	3.3	22.27	32.3	37.4	9.16	28.27	22.8	3.9	18.97	28.1
Europe	United Kingdom	43.5	6.32	37.17	27.9	2.2	25.66	36.9	44.2	5.98	38.17	28.7	2	26.7	37.9
North America	Canada	39.5	7.32	32.21	24.2	2.7	21.5	32	41	7.02	33.99	25.8	2.6	23.17	33.8
North America	Costa Rica	50.9	3.94	46.91	34.2	1.1	33.07	46.2	54.3	3.92	50.35	37.7	1.3	36.44	49.3
North America	Cote d'Ivoire	45.3	6.51	38.81	29.6	2.7	26.92	38.4	48.6	5.69	42.89	33	2.3	30.73	42.3
North America	Dominican Republic	54.3	4.19	50.1	38.8	1.5	37.31	49.2	54.9	4.24	50.68	39.1	1.6	37.54	49.6
North America	El Salvador	56.2	2.84	53.39	39.8	0.7	39.11	52.4	52.4	4.11	48.32	36.1	1.4	34.73	47.5
North America	Guatemala	59.7	3.14	56.53	44.8	1	43.81	55.8	58.3	3.13	55.17	42.3	1	41.25	54
North America	Honduras	58.9	3.09	55.77	42.9	1	41.93	54.6	60.1	2.52	57.61	43.7	0.8	42.94	56.5
North America	Jamaica	47.3	6.16	41.14	32	2.5	29.48	40.6	58.5	3.39	55.12	41.9	1.4	40.43	54.3
North America	Mexico	55.1	4.19	50.93	39.4	1.7	37.72	50.1	54.1	4.49	49.58	38.8	1.7	37.03	48.8
North America	Nicaragua	55.9	3.74	52.12	40.1	1.3	38.81	51.3	49.2	5.5	43.69	33.5	2.2	31.35	43.1
North America	Panama	60.5	1.55	58.99	43.1	0.2	42.94	57.6	58	2.83	55.22	41.3	0.9	40.44	54
North America	United States	44.6	5.28	39.28	28.3	1.8	26.52	39.1	46.2	4.95	41.2	30	1.5	28.53	40.9
Oceania	Australia	40.8	6.8	33.98	24.9	2.1	22.78	33.7	41.1	6.99	34.15	25.2	2.4	22.89	34.1
South America	Argentina	52.8	4	48.76	36	1.3	34.68	47.9	53.1	3.51	49.57	35.9	1.1	34.85	48.9
South America	Bolivia	57.2	3.15	54.06	40.7	1.1	39.64	53	58.3	2.41	55.87	41.9	0.6	41.29	54.7
South America	Brazil	63.1	2.42	60.65	46.6	0.7	45.9	59	60.3	2.93	57.32	44.3	0.9	43.4	55.9
South America	Chile	61	3.56	57.4	45.5	1.3	44.2	55.8	58.6	4.12	54.44	43.4	1.5	41.86	52.9
South America	Colombia	58.9	2.94	55.97	43.1	0.8	42.32	54.6	60.7	2.93	57.74	45.1	0.9	44.26	56.3
South America	Ecuador	58	3.27	54.69	42.2	0.9	41.25	53.4	56.4	3.61	52.83	40.6	1.1	39.49	51.7
South America	Paraguay	56.5	3.38	53.09	40.1	1.1	38.98	52.1	57	3.53	53.47	41.6	1.2	40.37	52.6
South America	Peru	53.6	4.49	49.08	37.8	1.7	36.1	48.1	53.6	3.93	49.68	37.5	1.4	36.12	49
South America	Uruguay	47.9	5.1	42.84	31.6	1.8	29.75	42.3	51	4.68	46.34	34.4	1.8	32.61	45.7
South America	Venezuela, RB	51.1	4.14	47	34.7	1.3	33.48	46.3	51.9	3.48	48.4	35.2	0.9	34.29	47.7

Table 1a: State-wise Comparison of Inequality

State	1974	1978	1984	1988	1994	2000	2005	2010
Andhra Pradesh	28.05	30.97	31.3	32.98	30.98	29.8	34.32	32.33
Assam	24.69	24.76	21.2	26.2	24.56	24.5	27.22	28
Bihar	25.53	27.93	27.8	25.76	25.8	24.1	28.26	27.45
Gujarat	23.94	29.97	28.4	26.78	27.06	28.6	29.52	28.69
Haryana	29.94	29.97	30.6	29	29.6	26.9	35.5	32.72
Himachal Pradesh	25.41	27.93	29	27.94	39.08	27.1	32	33.04
Karnataka	28.47	32.97	33.2	31.42	29.94	31.3	32.68	27.76
Kerala	33.82	36.73	33.6	34.02	32.62	30.4	39.92	45.48
Madhya Pradesh	28.06	35.41	30.7	31.68	32.16	29.3	34.54	32.28
Maharashtra	29.29	41.17	34.1	32.64	33.7	35.3	35.16	32.93
Orissa	29.75	30.96	28.4	28.54	28.26	27.8	32.64	31.5
Punjab	27.94	33.86	30.3	29.34	28.1	27.1	35.98	32.87
Rajasthan	28.47	38.28	35	32.74	28.18	24.6	32.36	29.64
Tamil Nadu	28.88	32.48	37.1	34.12	33.36	36.6	34.54	29.47
Uttar Pradesh	26.35	31.45	30.2	30.5	30.88	28.2	33.74	30.65
West Bengal	30.94	30.45	32.8	29.32	30.5	29.8	33.94	29.94

Source: Different Rounds of NSS data (database of Planning Commission, India, now renamed as NITI Aayog).

Appendix 2

Table 2: Description and Sources of Data

Label	Content	Sources
Inequality (INQ)	Gini coefficient	World Development Indicators
Per capita income (PCGDP)	GDP per capita (constant 2005 US\$)	World Development Indicators
Trade openness (TO)	Trade (export and import) as percentage of GDP (per cent)	World Development Indicators
Trade liberalisation (Tariff)	Tariff rate applied, weighted mean, all products (per cent)	World Development Indicators
Foreign Direct Investment (FDI)	Foreign direct investment, net inflows (BoP, current US\$)	World Development Indicators
Infrastructure Stock Index (ISI)	Infrastructure quantity, which is estimated using the method of principal component analysis (PCA) on normalised indicators such as (a) total road network (km); (b) air transport, passengers carried (per 1000 population); (c) per capita energy consumption; (d) internet users (per 1000 population); (e) fixed telephone subscribers (per 1000 population); (f) domestic credit provided by the public sector.	World Development Indicators
Infrastructure quality (IQ)	Electric power transmission and distribution losses (percentage of output)	World Development Indicators
Financial Infrastructure (FI)	Commercial bank branches (per 100,000 adults)	World Development Indicators
Human Capital Index (HCI)	Stock of human capital, which is estimated using the method of principal component analysis (PCA) on normalised indicators such as (a) gross primary school enrollment; (b) life expectancy at birth; (c) mortality rate, under age 5 (per 1000 live births); (d) population with access of improved drinking water; (e) population with access of improved sanitation facilities; (f) labour force participation rate; (g) total health expenditure (percentage of GDP).	World Development Indicators
Urbanisation	Ratio of urban and rural population	World Development Indicators
Land	Arable land (hectares per person)	World Development Indicators

Table 2a: Descriptive Statistics

	GINI Index	Per Capita GDP	Per Capita GDP_SQ	Tariff Rate	TO	Inflation	FDI	Infrastructure	Infrastructure Quality	Human Capital Index	Financial Infrastructure	Land	Urbanisation
Mean	38.737	11263.540	3.220E+08	4.687	0.839	7.616	1.380E+10	114.446	17.091	569.596	20.549	0.304	3.201
Median	37.630	5325.490	2.836E+07	2.790	0.741	5.725	2.250E+09	84.765	12.776	440.299	16.495	0.231	2.134
Maximum	65.770	61662.470	3.800E+09	30.660	1.794	45.191	3.400E+11	471.536	62.594	2688.487	90.610	1.507	16.902
Minimum	16.640	146.398	21432.390	0.390	0.000	-2.008	-2.090E+10	31.239	2.653	203.803	0.684	0.012	0.106
Std. Dev.	9.738	13994.740	6.800E+08	4.247	0.418	7.268	3.940E+10	85.343	12.916	390.635	16.251	0.284	3.475
Skewness	0.414	1.733	2.603	2.424	0.306	1.775	5.479	2.189	1.938	2.802	1.830	1.960	2.195
Kurtosis	2.285	4.921	9.581	11.909	2.269	7.429	38.195	7.737	6.223	12.544	7.535	7.496	7.439
Observations	189	189	189	189	189	189	189	189	189	189	189	189	189

Table 3: Correlation Matrix

	GINI Index	Per Capita GDP	Per Capita GDP_SQ	Tariff Rate	TO	Inflation	FDI	Infrastructure	Infrastructure Quality	Human Capital Index	Financial Infrastructure	Land	Urbanisation
GINI Index	1												
Per Capita GDP	-0.358*	1											
Per Capita GDP_SQ	-0.309*	0.961*	1										
Tariff Rate	0.436*	-0.385*	-0.306*	1									
TO	-0.426*	0.006	-0.023	-0.339*	1								
Inflation	0.152*	-0.394*	-0.327*	0.227*	0.003	1							
FDI	-0.021	0.432*	0.414*	-0.149*	-0.188*	-0.124*	1						
Infrastructure	0.085	0.022	0.030	0.000	-0.013	-0.063	-0.009	1					
Infrastructure Quality	0.229*	-0.210*	-0.169*	0.143*	-0.042	0.023	-0.015	0.167*	1				
Human Capital Index	-0.014	0.084	0.087	-0.064	0.045	-0.092	0.007	0.931*	-0.014	1			
Financial Infrastructure	-0.142*	0.485*	0.435*	-0.280*	0.004	-0.302*	0.150*	0.234*	0.043	0.181*	1		
Land	-0.251*	0.089	0.074	-0.200*	-0.015	0.217*	0.176*	-0.027	0.128*	-0.059	-0.025	1	
Urbanisation	0.173*	0.252*	0.248*	-0.097	-0.271*	0.073	0.042	0.142*	-0.098	0.117*	0.121*	0.253*	1

Note: * implies significance at 5 per cent level.

Appendix 4

Figure 2: Relation between Inequality and other Macro Variables

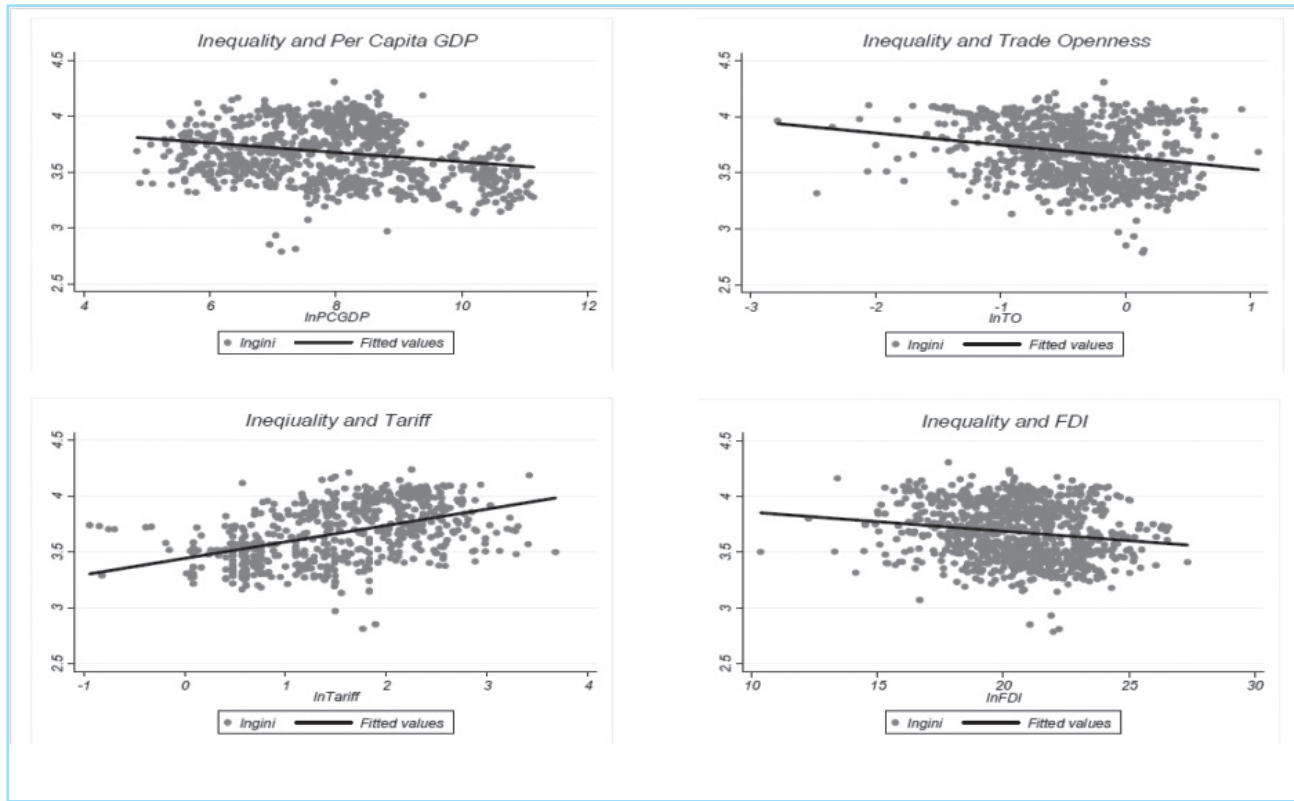
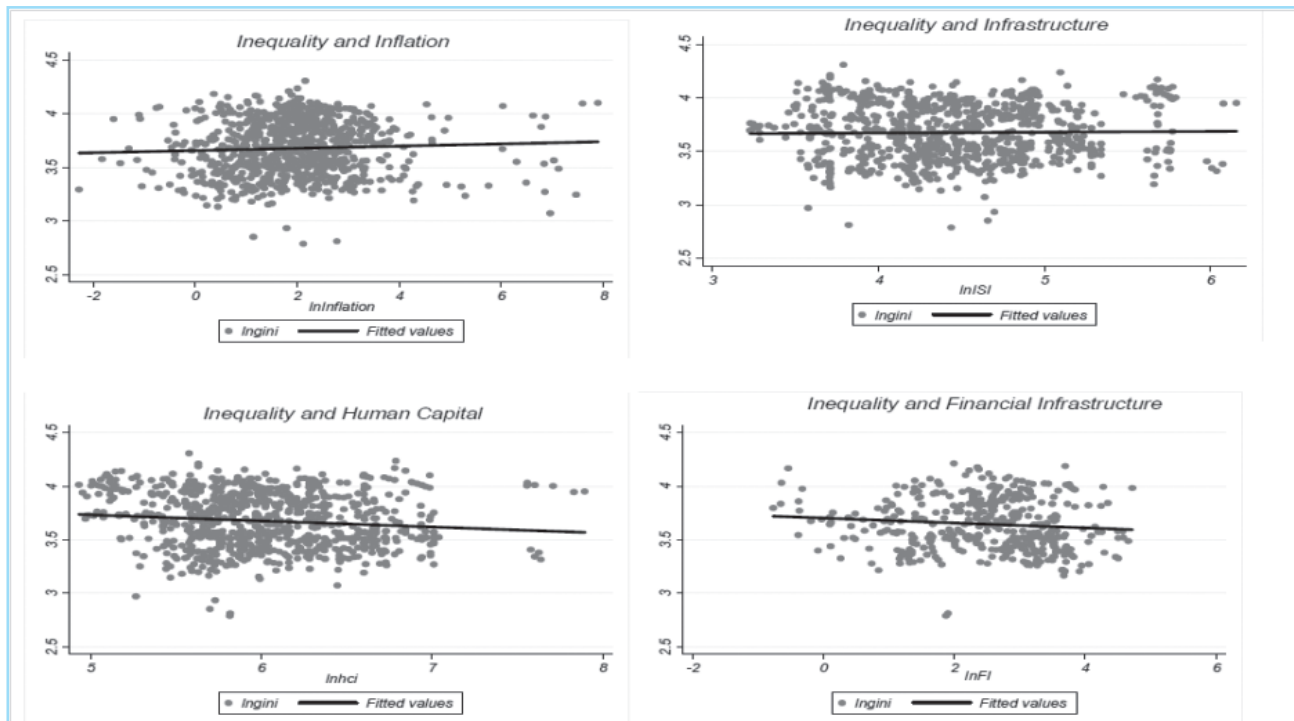


Figure 3: Relation between Inequality and other Macro Variables (continued)



Appendix 4

Table 4: Determinants of Income Inequality

Dependent Variable: lnGini			
	Model 1	Model 2	Model 3
ln Gini L1	0.6885364*** (0.030554)	0.72827*** (0.0491846)	0.0752345*** (0.0539454)
ln Gini L2		0.0377768 (0.0517835)	0.1186454** (0.0502608)
lnPCGDP	0.5656235*** (0.1795454)	-0.022904* (0.0132404)	0.2314531* (0.1315622)
lnPCGDP_sq	-0.0386083*** (0.0114081)		-0.0145234* (0.007857)
lnTO		-0.046435* (0.0259047)	-0.0082476 (0.0245453)
lnTariff		0.0176992* (0.0098832)	0.0450609*** (0.0119304)
lnTariff L1			-0.0225347** (0.0105994)
lnInflation		-0.0015636 (0.0048268)	-0.0069166 (0.0045763)
lnFDI		-0.000499 (0.0044332)	0.0061923 (0.0051241)
lnFDI L1			-0.0086181* (0.0051241)
Constant	-0.8683673 (0.6834259)	1.026879*** (0.2448164)	-0.4085665 (0.5977322)
No. of Instruments	227	157	158
Sargan test p value	0.0012	0.7099	0.7823
Note: (a) standard errors are mentioned in parentheses; (b) *** denotes significance at 1 per cent level, ** denotes significance at 5 per cent level, and * denotes significance at 10 per cent level; (c) L1 and L2 denote first and second lags respectively.			

Table 4: Determinants of Income Inequality (contd.)

Dependent Variable: lnGini		
	Model 4	Model 5
ln Gini L1	0.3893619*** (0.0772508)	0.4117642*** (0.0760743)
ln Gini L2	0.1266494 (0.0788206)	
lnPCGDP	-0.139795*** (0.0249953)	-0.0944781*** (0.0203502)
lnISI	-0.0746297** (0.0350597)	0.0275785 (0.051195)
lnISI L1		-0.0862694** (0.0434007)
lnInfraQ	-0.0507057** (0.0246196)	0.0206315 (0.0245602)
lnInfraQ L1		-0.0509874* (0.0284099)
lnHCI	0.0766996 (0.0487024)	-0.0236148 (0.0659693)
lnHCI L1		0.0764929 (0.0502853)
lnFI	-0.0398411** (0.0171768)	-0.0691487* (0.0359944)
lnFI L1		0.0501564 (0.0398771)
Urbanization	0.0273234*** (0.0043052)	0.8298549** (0.3548481)
Urbanization L1		-0.8506233** (0.3691776)
lnLand	-0.0710673 (0.0372081)	-0.0632297 (0.0440273)
Constant	2.817942*** (0.509128)	2.898507*** (0.4619027)
No. of Instruments	117	100
Sargan test p value	0.1615	0.3858
<p>Note: (a) standard errors are mentioned in parentheses; (b) *** denotes significance at 1 per cent level, ** denotes significance at 5 per cent level, and * denotes significance at 10 per cent level; (c) L1 and L2 denote first and second lags respectively.</p>		

Goal 10: Reduce inequality within and among countries: Targets and Indicators	
10.1 By 2030, progressively achieve and sustain income growth of the bottom 40 per cent of the population at a rate higher than the national average	10.1.1 Growth rates of household expenditure or income per capita among the bottom 40 per cent of the population and the total population
10.2 By 2030, empower and promote the social, economic and political inclusion of all, irrespective of age, sex, disability, race, ethnicity, origin, religion or economic or other status	10.2.1 Proportion of people living below 50 per cent of median income, by age, sex and persons with disabilities
10.3 Ensure equal opportunity and reduce inequalities of outcome, including by eliminating discriminatory laws, policies and practices and promoting appropriate legislation, policies and action in this regard	10.3.1 Proportion of the population reporting having personally felt discriminated against or harassed within the previous 12 months on the basis of a ground of discrimination prohibited under international human rights law
10.4 Adopt policies, especially fiscal, wage and social protection policies, and progressively achieve greater equality	10.4.1 Labour share of GDP, comprising wages and social protection transfers
10.5 Improve the regulation and monitoring of global financial markets and institutions and strengthen the implementation of such regulations	10.5.1 Financial Soundness Indicators
10.6 Ensure enhanced representation and voice for developing countries in decision-making in global international economic and financial institutions in order to deliver more effective, credible, accountable and legitimate institutions	10.6.1 Proportion of members and voting rights of developing countries in international organizations
10.7 Facilitate orderly, safe, regular and responsible migration and mobility of people, including through the implementation of planned and well-managed migration policies	10.7.1 Recruitment cost borne by employee as a proportion of yearly income earned in country of destination 10.7.2 Number of countries that have implemented well-managed migration policies
10.a Implement the principle of special and differential treatment for developing countries, in particular least developed countries, in accordance with World Trade Organization agreements	10.a.1 Proportion of tariff lines applied to imports from least developed countries and developing countries with zero-tariff
10.b Encourage official development assistance and financial flows, including foreign direct investment, to States where the need is greatest, in particular least developed countries, African countries, small island developing States and landlocked developing countries, in accordance with their national plans and programmes	10.b.1 Total resource flows for development, by recipient and donor countries and type of flow (e.g. official development assistance, foreign direct investment and other flows)
10.c By 2030, reduce to less than 3 per cent the transaction costs of migrant remittances and eliminate remittance corridors with costs higher than 5 per cent	10.c.1 Remittance costs as a proportion of the amount remitted