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Faculty of Economics

Study program: Economics



The impact of fiscal policy on income  
inequality in selected countries of Latin  
America

*Bachelor thesis*

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Year: 2017

I hereby declare on my honour that I wrote this bachelor's thesis personally and independently and confirm that all sources used are acknowledged and declared in the reference section.

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Prague, 12.5.2017

## Acknowledgement

Foremost, I would like to thank my supervisor Ing. Robin Maialeh for his vulnerable guidance and sincere interest. I would also like to thank my family and Bc. Marek Pyszko for their constant support throughout my studies.

# Abstract

The region of Latin America remains the most unequal in the world, despite the downward trend of last years. The negative socioeconomic impact of high income inequality has been examined and proved by many studies. The difference between inequality rates in Latin America and more equalitarian countries is much bigger when regarding income after taxes and transfers, which follows that the source of persisting high rates of unequal income distribution might be found in ineffective fiscal policy. This thesis examines the assumed impact of implemented fiscal policy on level of income inequality for four Latin American countries – Mexico, Brazil, Chile and Colombia. In the theoretical part, theoretical background for income inequality and fiscal policy is covered. The practical part includes analysis of development of income inequality, public expenditures and tax revenues in these countries over the period of 1992-2012. Subsequently, regression model proves a significant negative impact of public health expenditures on income inequality in case of Mexico, Brazil and Chile. Public spending on education is found effective in reduction of income inequality in Brazil, however in case of Chile an increase in public spending on education seems to increase unequal distribution of income among households. Main finding of this thesis is that when efficiently targeted, fiscal policies aimed at increasing expenditure on health and education systems are likely to serve as effective measures of reduction of unequal income distribution.

**Keywords:** income inequality, Gini index, fiscal policy, Latin America, public expenditures

**JEL classification:** E62, I14, N16

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# 1. Introduction

For decades, income inequality has been an object of research to both economists and sociologists. The problematic of this phenomena has been recently emphasized by several institutions. Organization for Economic Development and Cooperation (OECD) warns about rising income inequality as it during last years recorded the highest levels of income inequality since 1980s. In January 2017, World Economic Forum in Davos considered income inequality to be a number one world threat. Traditionally, Latin America is recognized as the world most unequal region and thus was chosen as the main object of research in this thesis. Particularly, I focus on Mexico, Brazil, Chile and Colombia. These four countries are (along with Peru and Argentina) considered as a part of “LA6” group, referring to six economies which together account for 90 % of total output of Latin America.

An important conclusion comes from the work of Goñi, López and Servén (2008). According to their study, the difference between inequality rates in Latin America and more equalitarian countries is much bigger when regarding income after taxes and transfers. It follows that in case of Latin America, origins of high inequality may be found in ineffective fiscal policy rather than market forces. For that reason, I decided to focus on examining how implemented fiscal policies influence country’s level of income inequality.

The theoretical part provides theoretical background for income inequality and fiscal policy. Practical part can be divided into two parts. First part includes analysis of development of income inequality, government expenditures and tax revenue in Mexico, Brazil, Chile and Colombia. Second part consists of econometric model which aims at evaluation of the effectivity of particular fiscal instruments in income inequality reduction.

The aim of this thesis is to analyse the impact of fiscal policy on income inequality in four chosen countries of Latin America to recognize effective instruments and subsequently recommend possible measures to be taken in order to reduce the high level of unequal income distribution across households in the region.

## 2. Income inequality

Income inequality refers to the extent to which the income is unevenly distributed among subjects. It is a part of a more general concept of economic inequality which further recognizes pay inequality (referring to difference in pay from employment) and wealth inequality (considering distribution of assets).

The definition of income depends on whether we consider disposable income or market income. Former includes earnings, self-employment and capital income and public cash transfers; income taxes and social security contributions paid by households are deducted. Market income refers to the total of employment income, excluding subsequent tax payments or transfers received from government.

### 2.1. Measure of income inequality

The standard methods for measuring income inequality are as follows: Lorenz curve, Gini coefficient, Coefficient of income inequality S80S20, Atkinson index, Theil index, Robin Hood index and variation coefficient (Lapáček, 2007). In this work, Gini index will be used.

According to OECD definition, Gini index measures the deviation of distribution of income among subjects and household from perfectly equal distribution, usually expressed by values from interval  $(0,100]$  where 0 stands for perfect equality. It is defined as the ratio of the area between Lorenz curve (a graphical representation of cumulative percentage of income received by a cumulative percentage of households) and hypothetical line of equity to the total area under the line of equity (Lapáček, 2007). There are two different Gini indices – market and net, depending on which income it considers.

### 2.2. Socioeconomic impact of income inequality

Socioeconomic impact of unequal income distribution has been a topic of interest to many economists and sociologists. This thesis inquiries into effects on most commonly examined phenomena – criminality, economic growth and health.

Morgan Kelly (2000) in his study outlines three theories which form the theoretical background for the relation between criminality and income inequality. First, important



findings come from the founder of the economics of crime, Gary Becker. He describes a potential criminal as an economic agent who chooses between the market activity and committing crime by comparing expected yields of both to maximize his utility. When deciding, the probability and cost of punishment must be taken into account. Therefore, it is likely that agent from low-income household finds his possible pay-off of market participation to be very low. Simultaneously, if we consider a society with high income inequality, there are subjects with relatively great wealth. Committing crime on such subject can bring relatively high revenues. As a result, we conclude a positive impact of income inequality on criminality.

Another mentioned theory is the theory of social disorganization (Shaw, McKay, 1942). It demonstrates that what matters when considering the source of crime is the place or neighbourhood rather than the ethnicity or social origin of the subject. The study of American Chicago shows that even after the former residents move out, the rate of criminality of the place does not fall. In contrary, Shaw and McKay found that those residents tend to reduce their criminal activity when relocated. It is likely that cities have particularly bad neighbourhoods where crime is concentrated. An important finding for the income inequality study is that those are distinctively low-income parts of the city. The economic factor of poverty has impact on other features typical for those places, such as high mobility of residents and ethnic heterogeneity. These factors simultaneously cause bad social organization and low social control and therefore support criminality. Again, a positive impact of income inequality – through the channel of poverty – can be deducted.

The last theory mentioned in Kelly's paper is the strain theory developed by R.K. Merton, according to which society emphasizes the importance of career and financial success and thus puts pressure mainly to subjects who have no means to reach their objectives. Deprivation of these subjects tends to increase when being confronted with the members of high-income households. Arisen strain increases criminality of agents experiencing such frustration. Kelly, using all three mentioned theories together, comes with an econometric model proving significant effect of income inequality on criminality. The result holds even after adding the control variables for ethnicity, poverty and family background. Therefore, a hypothesis about the impact of unequal distribution of income across households on criminal activity cannot be denied.

Another commonly studied phenomenon in the context of income inequality is economic growth. The best-known work examining this relation is the ‘Economic growth and income inequality’ published in 1955 in *The American Economic Review*. The author, American economist and statistician Simon Kuznets, was awarded the Nobel prize in 1971 for his contribution to the field of inequality.

Kuznets describes the relation by a U-shaped curve from which follows that economics and income inequality grow simultaneously during the period of industrialization of country as the physical capital held by rich supports economic development. Eventually, when a certain level of income per capita is achieved, the inequality starts to decrease while economics continues to grow. Kuznets himself mentioned flaws of his study, claiming 95% of his conclusions to be speculations. Both him and his critics find the main problem in insufficient dataset. Other criticisms cover using income as the only factor describing inequality (Kyn, Papanek, 1986) or including GDP as the only independent variable (Anand, Kanbur, 1993).

The theory deducing a positive effect of income inequality on economic growth was introduced by Kaldor (Mendes, 2013) who based his theory on Keynesian concepts. High inequality among residents increase the accumulation of physical capital as rich have higher marginal propensity to save and thus tend to save more, while physical capital being the source of economic growth. This so-called classical theory is extended by Galor and Moav (2004) who claim the Kaldor’s theory to be true while speaking of primary economic development. In mature stages of development, when human capital appears to be the engine of growth, a problem with its little accumulation occurs as low-income subjects face credit constraints due to market imperfections. Therefore, societal equality, while diminishing the effect of credit constraints, supports needed human capital accumulation and simultaneously economic growth.

On the contrary, studies from last decades tend to proclaim a negative relation between these two factors. Alesina and Perotti (1996) claim that high inequality cause tension and political instability and thus increase insecurity, which decreases the probability of investments and subsequently slows down economic growth. Perotti (1996) adds a theory according to which equalitarian societies tend to have lower fertility rate and higher rate of education investments, both of which promotes growth. Another study by Alesina and Rodrik (1994) shows that members of society where majority has no access to productive

economic sources are likely to call for higher rate of redistribution leading to higher taxes, which results in slower growth.

Most inconsistent results, when considering studies dealing with impacts of income inequality, are the ones solving potential effects on health. However, a few studies confirm the relationship. The authors of paper 'Income distribution, socioeconomic status, and self-rated health in the United States: multilevel analysis' (Kennedy et al., 1998) researched 50 of the United States in relation to income inequality and subjective rated health conditions. The findings proved statistically significant dependence mainly for low-income groups. Results hold true also for middle-income groups – residents of American states with higher levels of income equality report better self-rated health status than residents from states with high values of Gini index.

Several studies consider an impact of income inequality on mortality. Worth mentioning is the research 'Social capital, income inequality, and mortality' (Kawachi et al., 1997) which proves statistically significant indirect effect of income inequality on mortality through the channel of social capital which is defined by social participation and rate of social trust.

### 3. Fiscal policy – theoretical background

Fiscal policy is an intentional activity of state, represented by government, focused on regulation of monetary relations between the state and other economic subjects by public expenditure and revenues, with the aim of stabilization of macroeconomic development. It uses state budget as a main instrument, serving as an allocative, redistributive and stabilizing factor. Generally, key objectives of fiscal policy are reaching low unemployment rate and high economic growth while maintaining low inflation rate and stable balance of payments.

#### 3.1. Types and measures

Generally, we distinguish two types of fiscal policy. First, it is the expansive politics, stimulating aggregate demand directly by increasing public expenditures and indirectly by decreasing the taxes and thus raising disposable financial sources of private sector, usually used during recessions to promote economic growth and push economy towards full-employment. Second type is the restrictive politics, commonly applied while economic booms, the aim of which is to suppress over-heated economy by implementing restrictive measures, such as reducing public expenditures and raising taxes. Apart from these two, Peková (2008) adds so-called neutral fiscal policy. In this case, instruments offset each other – public spending is fully funded by taxes, leaving neutral impact on economic activity.

Measures of fiscal policy can be likewise divided into two groups. First, there are discretionary measures, which are one-off measures used by government to eliminate the fluctuation of economy around its potential and thus keep the natural rate of unemployment. These interventions can be done even several times a year. Measures belonging into this group are either indirect, such as changes, implementation and dissolution of certain tax rates, or direct ones, including changes in state budget. (Peková, 2008)

The second type of measures includes automatic stabilizers which are policies and programs inbuilt into economic mechanisms, affecting stability with no need of government action, such as unemployment insurance, progressive income tax or welfare. For instance, In the period of expansion, progressive tax rate decreases the disposable

income of subjects in order to protect economy from overheating and to stabilize the aggregate demand. (Peková, 2008).

Both types of measures come with certain disadvantages. In case of discretionary policies, it is the time lag due to the necessity of legislative approval. On the other hand, automatic stabilizers work immediately, however even in cases when their effect is not desired. Stabilizers also lack power when fluctuations are not directly caused by aggregate demand.

### 3.2. Efficiency

As for the efficiency of fiscal policy, it is usually demonstrated in IS-LM models. Effectivity results in the size of a shift of IS curve (impacted by the strength of former fiscal measure), size of fiscal multiplier and slope of LM curve – the steeper the LM curve, the lower interest elasticity of demand for money it represents.

Fiscal policy is maximally efficient when LM curve remains horizontal – measures result in a product increase. On the other hand, vertical LM curve prevents economy from desired effect of implemented measures, which results only in increased interest rates while preserving former level of product. This is due to the crowding-out effect of investment, the size of which can be deducted from the slope of LM curve. Increase in public expenditures and decrease of taxes lead to budget deficit and expansionary measures must be funded by great borrowing, which can result in increase of interest rates. This makes borrowing more expensive for private sector and therefore leads to reduction of private investment, which suppress the intended effect of expansive measures. Alternatively, an increase in public expenditures boost the growth of product and thus increase money demand. To restore the money market equilibrium, interest rates must increase as well, again, decreasing private investment.

Crowding-out effect can be also represented in AD-AS model which, in contrary to IS-LM model, considers changes in aggregate price level. The efficiency of fiscal policy depends on the slope of the curve of aggregate supply. When economy is at its full capacity, represented by vertical AS curve, boosting of aggregate demand only increase price levels, demand for money and consequently interest rates. On the other hand, when economy is not at its potential, expansive fiscal measures can increase the real product.

As mentioned above, another determinant of fiscal policy efficiency is fiscal multiplier, defined as the final change of endogenous variable caused by a unit change in exogenous variable. Peková (2008) recognizes three types of fiscal multipliers derived from various exogenous variables: government spending multiplier, income tax multiplier and balanced-budget government spending multiplier. The final effect on aggregate demand depends on marginal rate of consumption.

### 3.3. Fiscal policy and income inequality

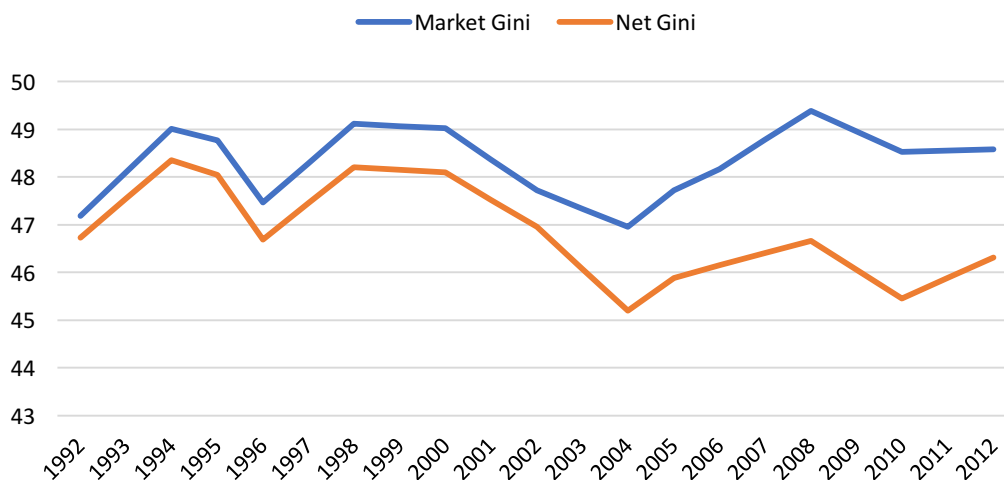
Although the redistribution effect is one of main features of fiscal policy, the amount of studies examining impact of implemented fiscal policies on country's level of income inequality is rather insufficient. Several remarks come from Martinez-Vazquez (2001) who emphasizes the role of government expenditures. As stated above, according to Galor and Moav (2004) (and many others), there is an impact of income inequality on low accumulation of human capital. The effect is thought to be reciprocal. Thus, public spending on education or healthcare which promotes human capital accumulation can be used to reduce income inequality. Several studies proved this hypothesis. Eckstein and Zilcha (1994) find a positive effect of compulsory education (when funded by a proportional income tax) on income inequality reduction. Gregorio and Lee (2012) claim both equal distribution of income and level of attainment to decrease income inequality as well. Furthermore, they prove a significant role of government social expenditures in equalizing income distribution. Martinez-Vazquez (2001) stresses the progressivity of public expenditure to be dependent on the amount of spending given on services used frequently by the poor, such as basic education and primary health care. As for public revenues, there is no doubt of impact of tax system to income distribution. Martinez-Vazquez expectedly finds direct taxes better in reducing income inequality. Generally speaking, the more progressive tax system is, the more it reduces inequality. However, the question is what level of progressivity is the best for a society as whole. According to Burman (2012), the "right" level depends on whether we find inequality to be a result of various effort of subjects or of difference in rent-seeking and luck. Then, the former approach would emphasize higher progressivity.

## 4. Analysis of income inequality trends in selected countries

Latin America is known as a region with highest rates of income inequality in the world. However, as previously stated, the difference between the region and more equalitarian countries is much bigger when regarding income after taxes and transfers. For instance, when concerning country with the highest rates of income inequality in Europe, Latvia, its net Gini index is about 30 % smaller than market Gini while in Latin America the difference between net and market Gini remains slight. In the following chapter, the development of their inequality levels for the period of 1992-2012 will be described. To take account of distributions of income both after and before including taxes and transfers, net and market Gini indices are recognized.

### 4.1. Mexico

Figure 1| Income inequality measured by Gini index, Mexico, 1992-2012



Data source: SWIID, 2016.

As seen on graph, from 1992 to 1994, income inequality as measured in Gini raised sharply. During these two years, share of income of richest 20 % of population increased by 1 %. By 1996, income inequality decreased back close to the level of 1992 and share of the richest quantile fell by 3,13 %. However, income share of the poorest increased only by 0,33 %. Inequality increased rapidly over 1997-1998 but since 1999, it followed decreasing trend, hitting an all-time bottom in 2004. As seen in table x.x., there were only

little changes in income share of the poorest – redistribution of income of the richest 20 % affects mainly middle quantiles. For instance, from 2000 to 2004, Gini decreased by approximately 3 points, income share of the highest 20 % decreased by 5,52 % but income share of the lowest income group increased by only about 0,63 %. From 2005 to 2008, market Gini rose sharply and reached its peak. However, net Gini increased more slowly a subsequently fall more sharply from 2008 to 2010, when both indices started growing again.

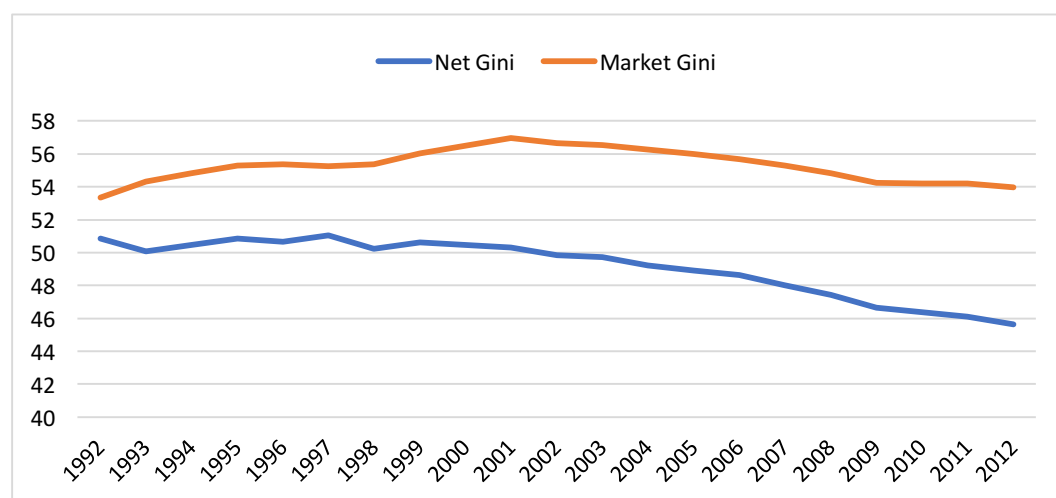
Table 1| Shares of income by quantiles in %, Mexico, 1992-2012

Year	Highest 20%	Second 20%	Third 20%	Fourth 20%	Lowest 20%
1992	56,13	7,84	12,29	19,69	4,04
1994	57,1	7,75	12,02	19,08	4,05
1996	53,88	8,49	13,02	20,24	4,38
1998	53,88	8,33	13,04	20,7	4,06
2000	56,83	7,92	12,2	19,16	3,89
2002	55	8,31	12,66	19,72	4,31
2004	51,31	9,29	13,96	20,92	4,52
2005	55,81	8,09	12,61	19,79	3,69
2006	53,88	8,7	12,9	19,8	4,72
2008	54,06	8,79	12,91	19,48	4,76
2010	53,89	8,67	12,92	19,79	4,72
2012	54,1	8,84	12,75	19,45	4,86

Data source: World bank, 2017.

## 4.2. Brazil

Figure 2| Income inequality measured by Gini index, Brazil, 1992-2012



Data source: SWIID, 2016.



Opposite trends can be seen in market and net Gini from 1992 to 1993. During that year, income share of the top quintile increased by 7,26 %. The share of lowest quintile declined only by approximately 0,5 %. Since then, both indices followed a slow upward trend. While net Gini has been falling since 1997, market Gini continued increasing until it reached its peak in 2001 and have been falling since then. Despite net Gini having fallen by about 5 points from 1993 to 2012, income share of the poorest did not grew even by 1 %.

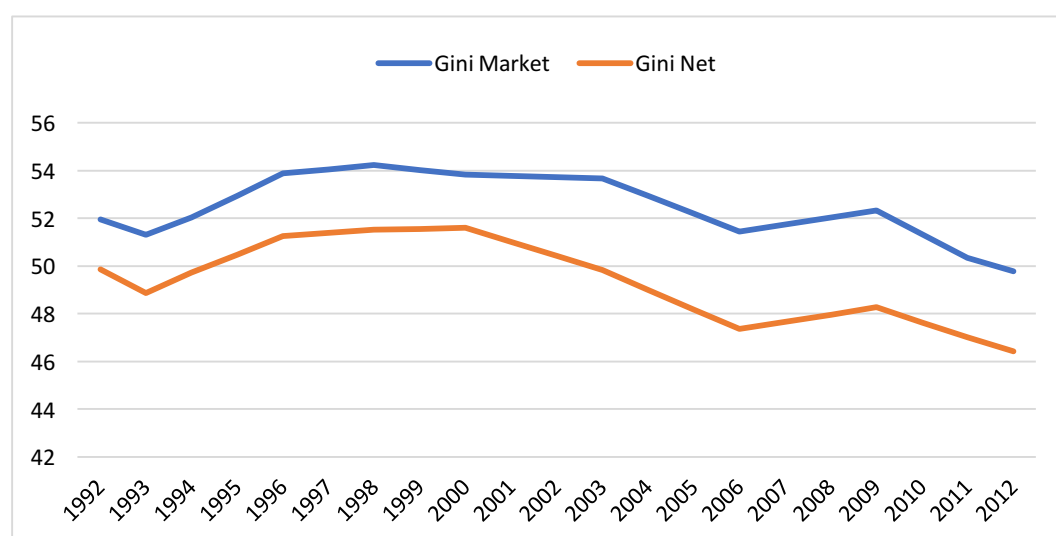
Table 2| Shares of income by quantiles in %, Brazil, 1992-2012

Year	Highest 20%	Second 20%	Third 20%	Fourth 20%	Lowest 20%
1992	57,1	7,08	12,25	20,76	2,82
1993	64,27	5,81	10,07	17,51	2,35
1995	63,84	5,82	10,06	17,86	2,44
1996	63,86	5,69	10,03	18,17	2,25
1997	63,81	5,69	10,05	18,15	2,3
1998	63,82	5,82	10,05	17,9	2,42
1999	63,3	5,95	10,25	17,99	2,5
2001	63,45	5,9	10,3	17,97	2,4
2002	62,93	6,04	10,4	18,03	2,59
2003	62,21	6,19	10,65	18,36	2,59
2004	61,24	6,46	10,93	18,55	2,82
2005	61,04	6,54	11,04	18,48	2,9
2006	60,43	6,75	11,23	18,59	3
2007	60,43	6,89	11,6	18,97	2,97
2008	59,57	7,13	11,8	19,09	3,14
2009	58,85	7,28	11,98	19,22	3,17
2011	58,34	7,53	12,3	19,36	3,25
2012	57,56	7,65	12,44	19,34	3,38

Data source: World bank, 2017.

### 4.3. Chile

Figure 3| Income inequality measured by Gini index, Chile, 1992-2012



Data source: SWIID, 2016.

After a year of fall, an increasing trend in both market and net Gini can be observed. Market Gini reached its peak in 1998 and had been falling since then. Net Gini grew for another year and then decreased by about 4 points from 2000 to 2006 when both indices started a 2-year growth. In 2012, market and net Gini hit their bottom. From 1992 to 2012, income share of the richest quintile fell by 3.45 % while share of poorest 20 % of population grew by 0.78 %.

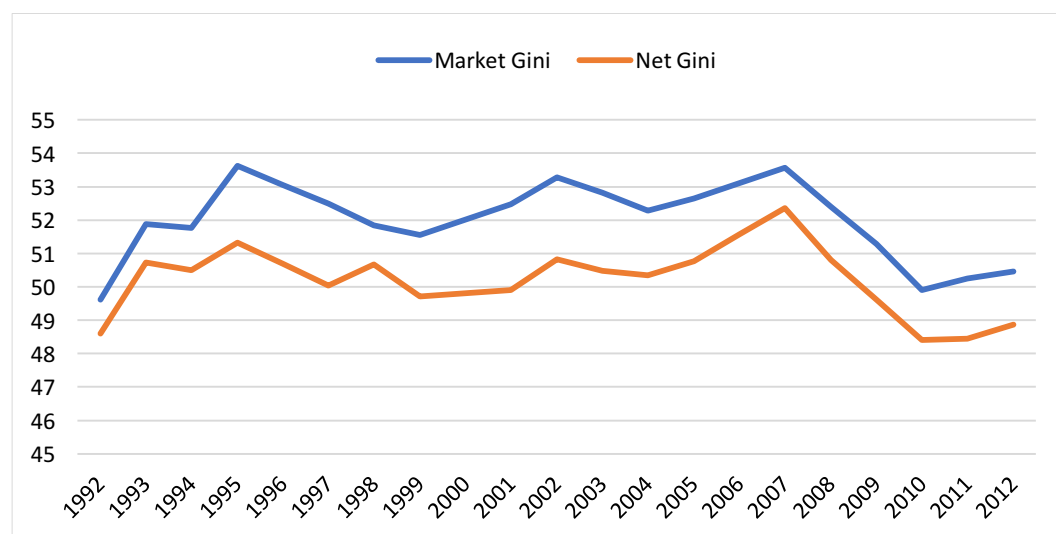
Table 3| Shares of income by quantiles in %, Chile, 1992-2012

Year	Highest 20%	Second 20%	Third 20%	Fourth 20%	Lowest 20%
1992	60,14	7,17	10,98	17,86	3,85
1994	61,5	6,73	10,59	17,73	3,46
1996	60,1	7,06	10,97	18,22	3,65
1998	60,68	6,94	10,85	18,02	3,51
2000	60,55	7,06	10,93	17,79	3,68
2003	60,12	7,24	11,07	17,74	3,82
2006	57,43	7,86	11,81	18,65	4,24
2009	57,68	7,95	11,74	18,33	4,3
2011	56,99	8,2	11,86	18,42	4,52
2013	56,69	8,29	12,05	18,33	4,63

Data source: World bank, 2017.

## 4.4. Colombia

Figure 4| Income inequality measured by Gini index, Colombia, 1992-2012



Data source: SWIID, 2016.

Colombia performs the worst results in comparison to Mexico, Brazil and Chile. From 1992 to 2012, income inequality in terms of Gini did not fall. From 1992 to 2000, income share of lowest quintile decreased by almost a half, from 3,68 % to 1,9 %, while share of the richest 20 % grew by 5,57 %. Both market and net Gini were strongly fluctuating during the two decades, and in 2012 performed higher inequality levels than those from the beginning of 1990s.

Table 4| Shares of income by quantiles in %, Colombia, 1992-2012

Year	Highest 20%	Second 20%	Third 20%	Fourth 20%	Lowest 20%
1992	56,68	8	12,24	19,41	3,68
1996	60,78	6,99	11,34	18,46	2,43
1999	62,39	6,5	10,91	18,17	2,04
2000	62,25	6,74	10,98	18,13	1,9
2002	62,85	6,28	10,35	18,04	2,75
2004	60,98	6,83	10,85	18,05	3,31
2006	63,7	5,87	10,28	17,97	2,19
2008	60,28	6,73	10,41	18,88	2,42
2010	60,03	6,9	11,16	18,72	3,06
2012	57,88	7,29	11,9	19,66	3,35

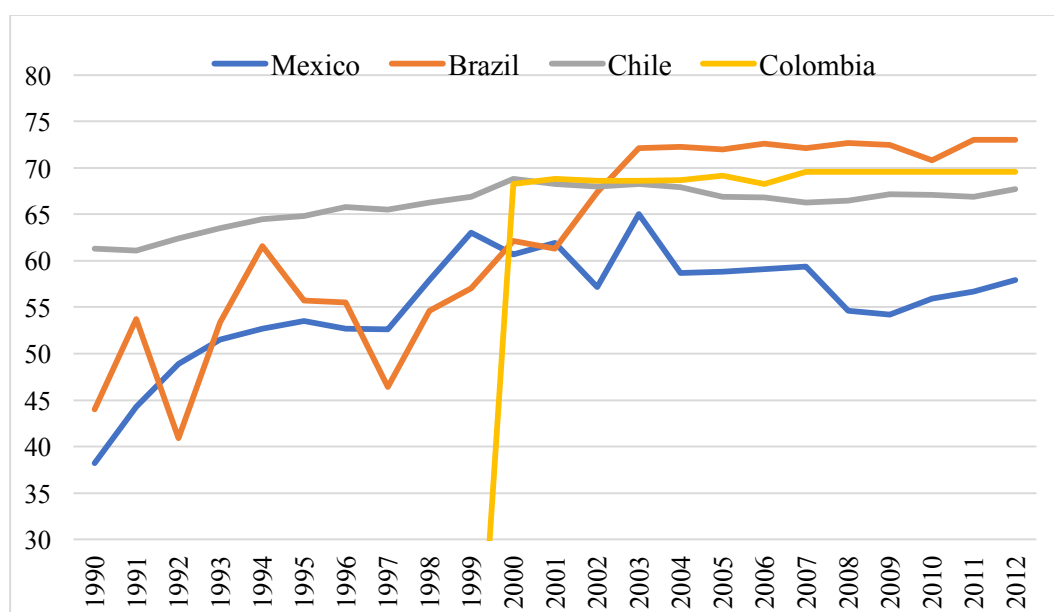
Data source: World bank, 2017.

## 5. Analysis of fiscal policy in selected countries of LA

This chapter concerns with fiscal policy of Mexico, Brazil, Chile and Colombia in terms of government social expenditures and tax revenues. In case of social spending, I will particularly focus on education and healthcare systems as they have an especial indirect impact on inequality reduction by facilitating human capital accumulation for poor.

### 5.1. Government social expenditures

Figure 5| Government social expenditure as % of total government expenditure

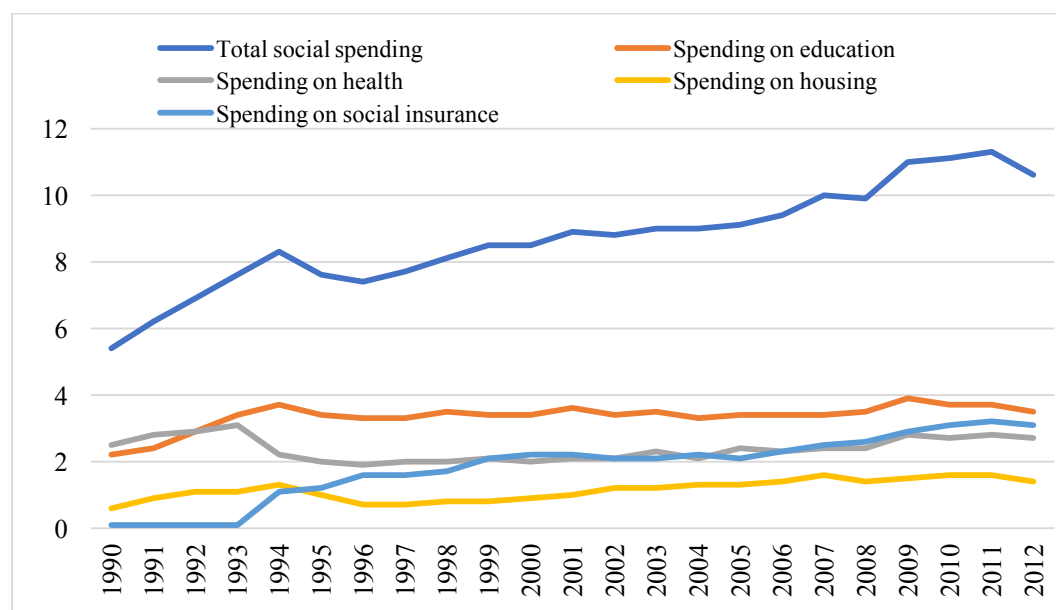


Data source: CEPAL, 2016.

As seen on graph, for a decade, Chile had the highest rate of social spending as proportion of total public expenditure. Nonetheless, in 2003, Brazil has overstepped as it increased their social spending as percentage of total government expenditure from 62,1 % to 72,1 % in only three years. In total comparison, Brazil experienced an overall increase of 27 % from 1990 to 2012, which is almost four times as much as the increase of Chile. Mexico recorded an upward trend as well, however, in both 1990 and 2012, its social expenditure remained very low compared to others. The smallest change was experienced by Colombia, of about 1,5 % in ten years. The overview is not perfectly predicative as Colombian data are available only from 2000.

### 5.1.1. Mexico

Figure 6| Government social expenditures in % of GDP, Mexico, 1990-2012



Data source: CEPAL, 2016.

Since 1990, government social expenditures have been mostly following an upward trend. A strong increase can be observed from 1990 to 1994, with expenditures growing by 2,9 %. The stable growth was disrupted by so-called „peso crisis” which started in the end of 1994, resulting in a hyperinflation with peso devaluating by 50 % and a GDP shrinking by 6,2 % in 1995, according to OECD. Although Mexico ‘s economy could buck up quite fast, supported by a massive bailout organized by international monetary institutions, crisis had a strong impact on poverty rate which increased by 23,7 % and did not fall back on pre-crisis level until 2002 (Pereznieta, 2010). Public social spending followed a trend of slow growth until 2008, when, due to the global financial crisis, unemployment rate hiked from 3,9 % to 5,4 % (Worldbank) in only one year, reaching the highest level since peso crisis. Government reacted by a strong increase in social expenditures by 1,1 % of GDP in 2009. In 2012, social spending was slightly reduced, following fiscal consolidation which took place in most of OECD countries.

#### 5.1.1.1. Education

From 1990 to 1994, public spending on education grow by 68 %. Since 1992, it cut the largest share of social expenditures. This could be influenced by *Modernización de la Educación Básica y Normal*, a general education reform established in 1992. The reform

was made to decentralize educational system, including funding, to each of 32 Mexico's states, which was thought to give states more control over their budgets and increase incentives of raising money on state and local level. However, in Money having come from federal government (specifically directed by *Secretaría de Educación*) was divided among states based on direct negotiation between each state and federal government, which led to opportunism (Santibañez, Vernez, Razquin, 2005).

In 1997, reform of financing was introduced, changing the conditions of receiving federal funding – money was allocated into each state according to the number of federal schools and teachers existing at its territory in 1992. This step may have prevented sources allocation from opportunism and made it more transparent, however, the system, based only on situation of fiscal year 1992, gives states no incentives to improve their own resources, as there is no possibility of rewarding those who success in increasing of their local fundraising. Furthermore, it does not improve the situation of states which are at disadvantages due to low economic status and subsequently inability of collecting own local resources by higher taxation as it offers no possibility of favouring them (Santibañez, Vernez, Razquin, 2005). Thus, current system of allocation of public resources on education is not efficient in decreasing inequality in education quality among states. Furthermore, funding is directed mainly towards urban centres, broadening disparities between urban and rural areas. Another problem increasing inequality appears with the distribution of finance among education stages, leaving secondary education with low efficiency and coverage (World Bank, 2016).

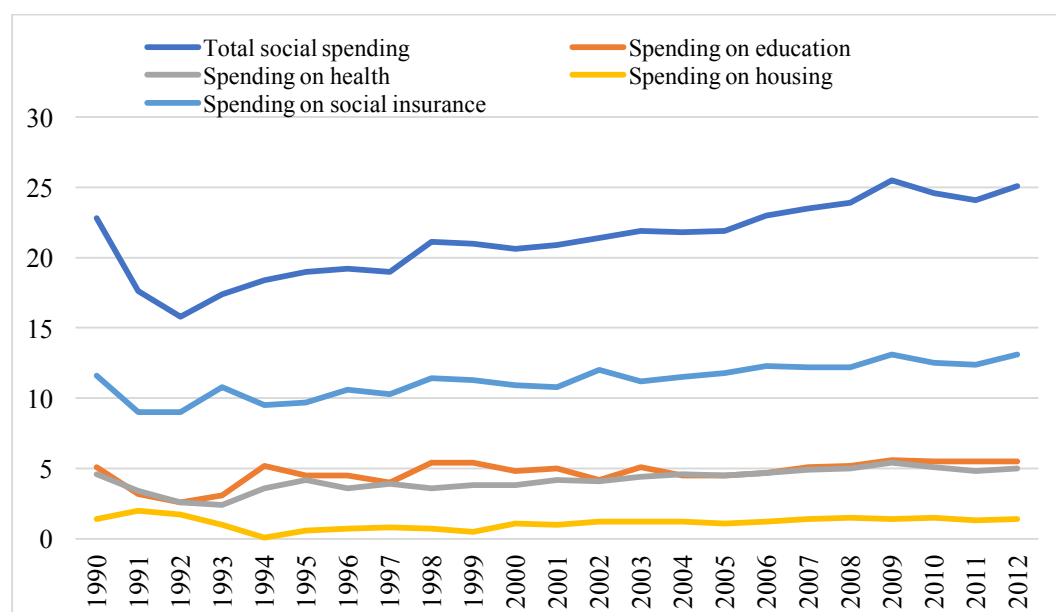
#### 5.1.1.2. Health

As for the health system, until 2003, there was no universal system of health insurance. Approximately half of Mexican population had no coverage of health or social security. The health system consisted of many funds and private providers, access to which was based on employment status. The biggest provider was *Instituto Mexicano del Seguro Social*, serving formal workers. Those institutions could be described as a kind of health services rather than real insurance providers. For instance, they offered no guaranteed package of services. People which were not included in those funds, such as unemployed or self-employed subjects, could use clinics and ambulances belonging to the Ministry of Health (MOH). MOH largely required out-of-pocket payments which were destructive for many households – 2 to 4 million people per year fell into poverty due to such fees.

In 2004, *Seguro Popular*, the first universal health insurance system for poor, came into force. It aimed at providing free or subsidized healthcare insurance to households which had no access to existing security for formal workers, which counts for 50 % of Mexican population. (Lakin, 2010) Since then, public spending on health has been slowly increasing. The biggest hike can be observed from 2008 to 2009 when federal government had to boost expenditures due to financial crisis leaving many subjects unemployed.

### 5.1.2. Brazil

Figure 7| Government social expenditures in % of GDP, Brazil, 1990-2012



Data source: CEPAL, 2016.

For Brazil, the last decade of 20. century was the decade of structural and administrative reforms, established in attempt to recover the economy after years of devastation by military government. However, in early 90's, country experienced recession in social spending, falling by almost 31 % in only 2 years. Despite political effort, economy (damaged mainly by high inflation rates reaching 30 % per month) did not stabilize until 1994 when the minister of finance and succeeding president, Fernando Henrique Cardoso, introduced a new stabilization program - *El Plano Real*. The plan was successful and Brazilian economy could continue growing (Baumann, 2002). Since then, social expenditure has been slowly increasing as well. A strong hike can be observed in 1998. This could be since next presidential elections were held in autumn 1998. President Cardoso, as the head of government and thus executive power, possibly used the increase in social spending as a part of his re-election campaign. Indeed, after him winning the

elections, social expenditure slightly dropped and later continued in a slow growth. Another significant increase can be noticed in 2009 when Brazil government had to react counter-cyclically to the global economic crisis.

#### 5.1.2.1. Education

In 1995, president Cardoso came with an education reform which set three main goals: equalization of education financing across states and municipalities, making education accessible to children from poor families and creation of a national measurement system of learning.

In 1998, *Fundo de Manutenção e Desenvolvimento do Ensino Fundamental e de Valorização do Magistério* (FUNDEF) fund was established to equalize funding among pupils of grades 1-8. Its main contribution was setting a national spending floor per student. States had to share its resources among all municipalities so that all could meet the required minimal spending level. At the same time, federal government pledged to top up its fiscal spending to places where national floor could not be reached. A 60 % of per student allocation had to be spend on teachers' salaries, increasing them by 70 % in first years of implementation. In 2006, the fund was transformed and extended into FUNDEB - *Fundo de Manutenção e Desenvolvimento da Educação Básica e de Valorização de Profissionais de Educação*, setting a spending floor for pre-school and secondary education. It also ensured financing of education for indigenous minorities. Setting of such limits of minimal spending increased total public expenditure on education (Bruns et al., 2011).

To ensure education for children from low-income households, Cardoso established *Bolsa Escola* in 2001, a conditional cash transfer program which had already existed in several municipalities. The program was based on providing direct cash transfers to the poorest families, conditioned by enrolling their children in schools where they were obligated to meet a certain percentage of attendance. During 2002, *Bolsa Escola* supported 4.9 million families by providing cash transfers for a total of 3.9 billion BRL. In 2003, newly elected president Silva joined the program together with several other CCT programs into one universal *Bolsa Família* (Bruns et al., 2011).

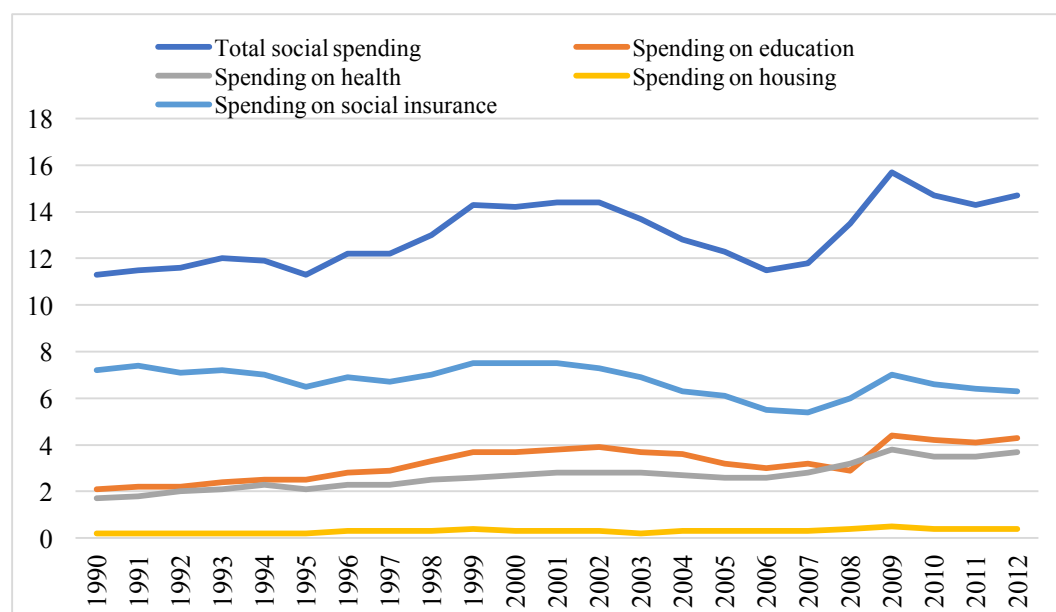


### 5.1.2.2. Health

In Brazil, health became a universal right for all in 1988. Until then, its financing was provided through social security paid by employers and workers, which meant no access to health insurance for a big part of poor Brazil population. Even after establishing health as a responsibility of state constitutionally, social security contribution had to cover most of the expenditures. Since 1993, healthcare had to be financed strictly by national budget due to structural changes promoted by International Money Fund, which increased public spending on health, as seen on graph – until 2012, spending more than doubled. To bear the cost, a new tax on financial transactions was implemented in 1996 which temporarily served as healthcare resource. In 2001, a constitutional amendment came into force, having make federal government, states and municipalities obligated to spend a certain amount of their budgets on healthcare (Elias and Cohn, 2003).

### 5.1.3. Chile

Figure 8| Government social expenditures in % of GDP, Chile, 1990-2012



Data source: CEPAL, 2016.

Until 1990, Chile had been under neoliberal free-market economic policy promoted by the military regime of dictator Pinochet. Social and health sector was privatized, which raised inequality among low-income households and the rest of population, as they could not afford participation in contracts provided by private institutions. Simultaneously, these institutions were partly funded from state budget, increasing underfinancing of

public social system. Pinochet's policy resulted in 44 % of Chilean population living in poverty by 1989. In 1990, a newly elected democratic president Patricio Aylwin made attempts to solve the situation of public social expenditure benefiting the poorest the least. His administration aimed at increasing equity by promoting special social programs. However, he did not change the free-market system of social provision (Vergara, 1996). As seen on graph, public social expenditure has been following a counter-cyclical trend – big hikes are observed in 1998-1999 when country was influenced by the Asian financial crisis of 1997 and in 2008-2009 as a reaction to global financial crisis.

#### 5.1.3.1. *Education*

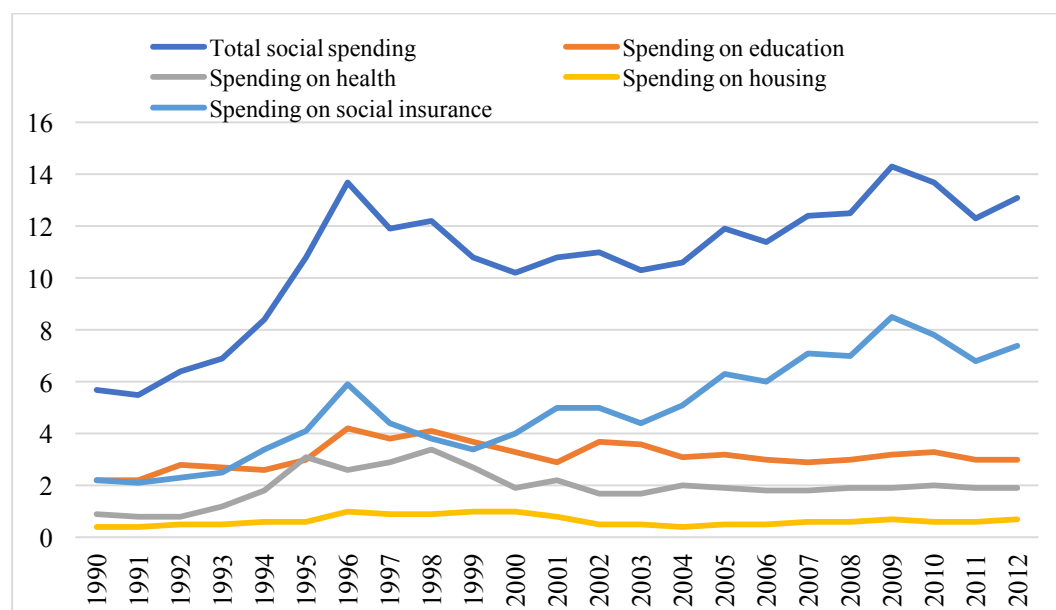
Democratic politics who came to power in 1990 aimed at making education more efficient and equate, however, they kept the administrative and financial structure based on market competition and coexistence of both private (state-funded) and public schools. There was a system of education vouchers enabling parents and students voluntarily choose which school they want to attend. Government provided finances to schools according to vouchers enrolled. This system was thought to increase the competition among institutions and thus make them work efficiently. During the first decade of democratic government, many reforms were implemented, with the main objection of rising education culture in country (OECD, 2004). Education was a priority to all succeeding governments as well, which can be visible also from graphs – from 1990 to 2010, public expenditures on education raised by 100 % from 2,1 % to 4,2 % of GDP.

#### 5.1.3.2. *Health*

As mentioned before, under Pinochet's regime, health public system of Chile (*Fondo Nacional de Salud*) suffered from underfinancing as state had to fund also newly established private providers (*Instituciones de Salud Provisional*) which were growing fast. During 1990s, health costs rose faster than salaries which resulted in majority of population returning to public system (Bossert and Leisewitz, 2016). From 1990 to 2012, a steady increase in public spending on health can be observed, growing from 1,7 to 3,7 % of GDP.

### 5.1.4. Colombia

Figure 9| Government social expenditures in % of GDP, Colombia, 1990-2012



Data source: CEPAL, 2016.

Social spending in Colombia hiked significantly in 1994 after Ernesto Samper Pizano won presidential elections. The member of centre-left Liberal party promoted welfare programs and increased social spending, in attempt to support low-income households. However, poverty statistics were increasing as well – according to Worldbank, 19,3 % of population lived on less than \$1.90 a day in 1999, compared to 11,3 % of 1991. Pizano's policy increased fiscal deficit, which was one of the causes of following economic crisis of the end of the decade. Since 2002, with more than 49 % of population under the national poverty line, social spending started to grow. The biggest hike occurred in 2009 when government raised expenditure (mostly on social security) by almost 2 % of GDP in one year as a reaction to global crisis of 2008.

#### 5.1.4.1. Education

During the 1990s, Colombia experienced many reforms. The country suffered big political and societal instability due to corruption and years of violence caused by drug cartels, guerrillas and paramilitaries. Thus, the society as a whole needed a reorganization and politicians understood the importance of education quality in the process of stabilization and development. Educational reforms of 1990s mainly emphasized decentralization and universal coverage of basic education (Borjas and Acosta, 2000).

During 1990-1998, public spending on education rose rapidly by almost 2 % of GDP. In 1999, the growing trend slowed down and did not change much until 2012. Compared to the trend followed by total social expenditure, the overall increase over the period of 1990-2012 was relatively small (of about 0,8 % of GDP).

#### 5.1.4.2. *Health*

Since implementing the “Law 100” in 1993, Colombian government provides health insurance for all population, based on two systems – Contributory a Subsidize. Subsidize regime is for those citizens whose monthly income does not reach a specific amount and thus they are free of charge. Their insurance is financed by national and local taxes as well as by a solidarity payroll tax (1,5 %) paid by the rest of citizens. Contributory regime is funded by a 11% payroll tax (Giedion and Uribe, 2009).

#### 5.1.5. Conditional cash transfer programs

When discussing income inequality in the region of Latin America, it is convenient to at least briefly mention the existence of conditional cash transfer programs (CCT).

CCT program is a governmental instrument of poverty reduction. It has a significant success in decreasing income inequality, as it supports poor in their long-run human capital investment. Programs are usually based on direct cash payments which are provided to low-income subjects after meeting certain conditions such as getting children vaccinated or accomplishing required school attendance.

Mexican *Oportunidades*, founded in 2006 as a successor of previous CCT program *Progreso* (founded in 1996), is highly awarded in the whole world. Program aims at increasing school enrolment of children mainly from poor rural families as well as at improving nutrition and health conditions of low-income households. It includes compulsory health education sessions held for main beneficiaries. In order to prevent corruption and misuse, monetary transfers are provided by government directly to mothers of selected families (Nigenda and González- Robledo, 2005). According to Soares et al. (2006), *Oportunidades* is responsible for 21 % of the total fall in inequality (as measured in Gini index) in Mexico during 1996-2004. The same result performs Brazilian *Bolsa Familia* during 1995-2004. The program was established in 2003 by joining together four existing CCT programs – *Bolsa Escuela* (focused on primary

education), *Vale Gás* (subsiding cooking gas to low-income subjects), *Fome Zero* and *Bolsa Alimentacao* (both concerned with nutrition and food subsidiaries). Unlike most of similar CCT programs in the region, it also provides transfers to extremely poor households with no children or pregnant members (Soares et al., 2010). Chilean *Solidario* security program was founded in 2002 in order to reduce the multidimensional problem of poverty which lies not only in insufficient income but also in lack of human capital. Selected families are contacted and offered to commit themselves to meet 53 conditions from selected areas such as health, education or housing conditions. In return, families gain guaranteed psychological support, cash transfers and priority access to several social services, such as free healthcare services or training programs (Hoces de la Guardia et al., 2011). Colombian *Familias en Acción* was established in 1999 as a part of temporal Social security net. Its main objective is to support and protect creation of human capital of children from low-income households. Subsidiaries include direct cash transfers to cover the expenses of school attendance. It also provides transfers for nutrition and healthcare to families with kids at the age from 0 to 6. Such transfers are provided directly to beneficiary mothers in order to increase female autonomy (Villatoro, 2005).

## 5.2. Government tax revenue

The biggest share of tax revenues in the region of Latin America comes from indirect taxes imposed on goods and service (such as value added tax). During 1990-2009, its proportional share on total tax revenues rose by 47 % in average. There is also a significant increase (about 24 %) in role of direct income and capital gain taxes in general tax structure. This could be a result of reforms implemented during 1990s and 2000s which aimed at broadening tax base, increasing indirect tax rates and improving monitoring of payers. Third rank in tax composition belongs to social security contribution, although there can be seen a small decline of about 6 % in its share during 1990-2009. (Gómez Sabaini and Jiménez, 2012). The relatively big share of indirect taxes on total tax revenues can consequently hinder inequality reduction.

The four countries used in our comparison vary in rates of tax burden (counted as ratio of total tax revenue to GDP). Mexico, despite very high income per capita, has a very low tax burden (1990-2012 average of 12,93 %). On the other hand, the highest burden (average of 30,19 %) is seen in Brazil where income per capita is smaller than in Mexico. Chile with very high income per capita impose medium tax burden (average of 18,17 %)

as well Colombia (average of 15,14 %) which has much smaller per capita income rates. In total comparison, the region of Latin America shows very low average tax burden relatively to other world regions. For instance, average burden of OECD countries is almost two times higher.

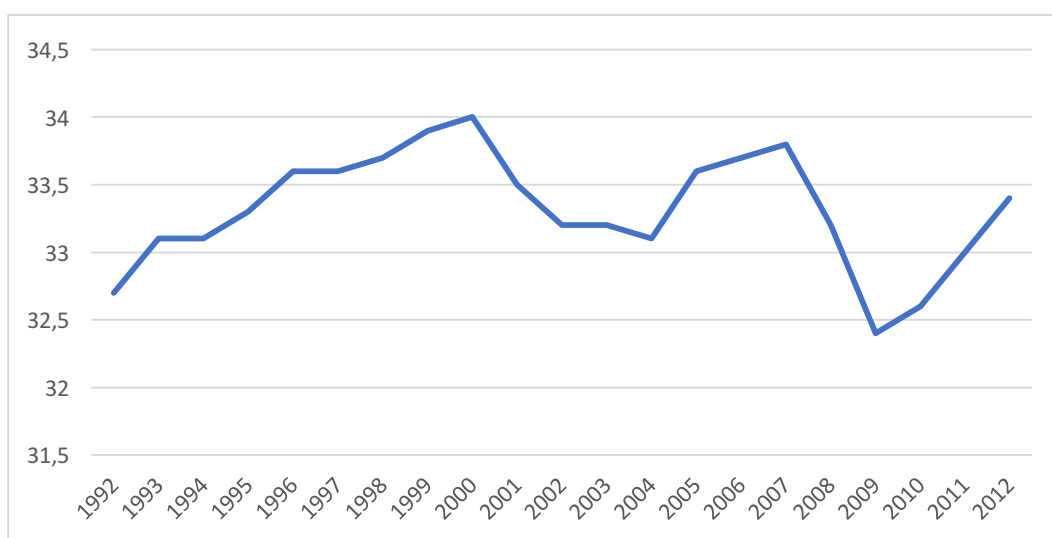
Table 5| Average tax burden (total government tax revenues as % of GDP)

Year	Mexico	Brazil	Chile	Colombia
1990-2001	12,48	27,21	17,50	12,93
2002-2012	11,43	33,44	18,89	17,55
1990-2012	11,98	30,19	18,17	15,14

Own calculation based on data from CEPAL, 2015.

As seen on graph below, average tax burden in OECD countries did not fall under 32 % during the last two decades. Compared to averages of the four Latin America countries, only Brazil can keep up with such rate.

Figure 10| Total government tax revenues as % of GDP, OECD average, 1992-2012

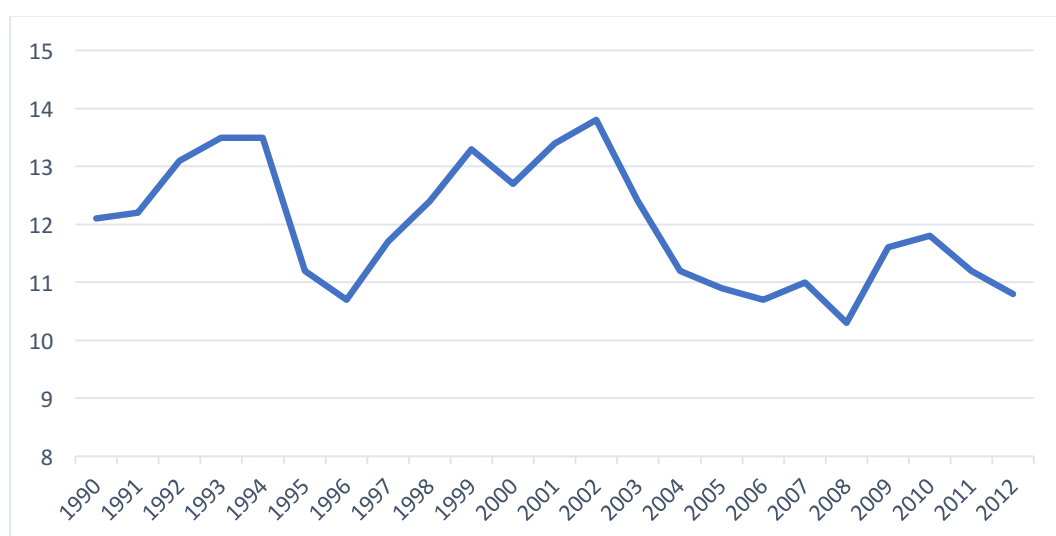


Data source: OECD, 2017.

### 5.2.1. Mexico

As stated previously, tax burden in Mexico is very low. Over the period of 1990-2012, tax revenue in % of GDP followed slight fluctuations. The biggest drop of almost 2,8 % of GDP can be seen from 1994 to 1996 during the economic recovery from Peso Crisis. In 2002, tax burden reached its peak. Four years later, in the period of global economic crisis, tax revenues in % of GDP hit its low. In 2012, tax burden was lower than in the beginning of 1990s.

Figure 11| Total government tax revenues as % of GDP, Mexico, 1990-2012

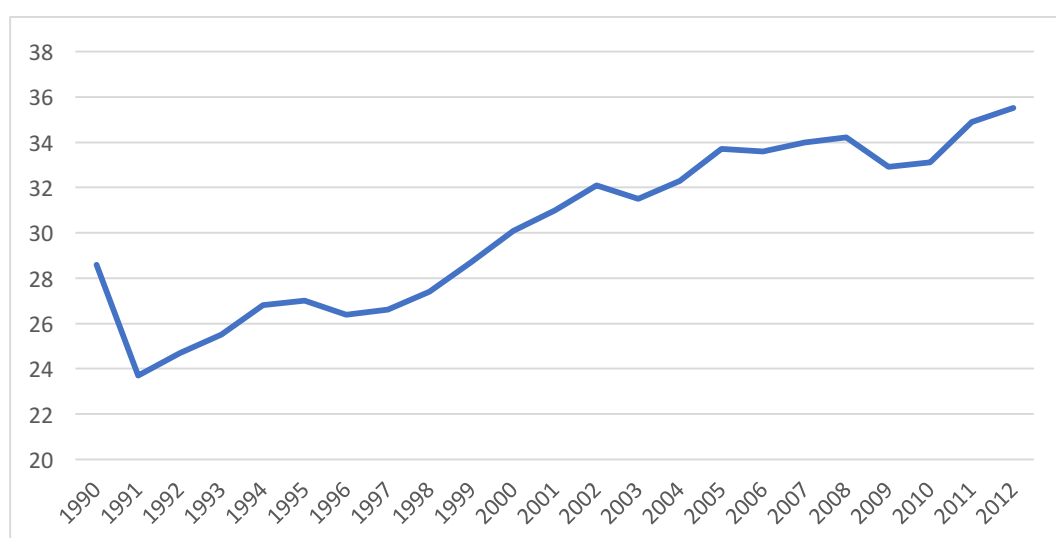


Data source: CEPAL, 2015.

### 5.2.2. Brazil

Compared to its neighbours, Brazil has relatively high tax burden. Except for a significant drop in the beginning of 1990s, it followed a slow upward trend. Brazil, similarly to other countries in the region, experienced another smaller decrease in 2008 as a result of global economic crisis.

Figure 12| Total government tax revenues as % of GDP, Brazil, 1990-2012

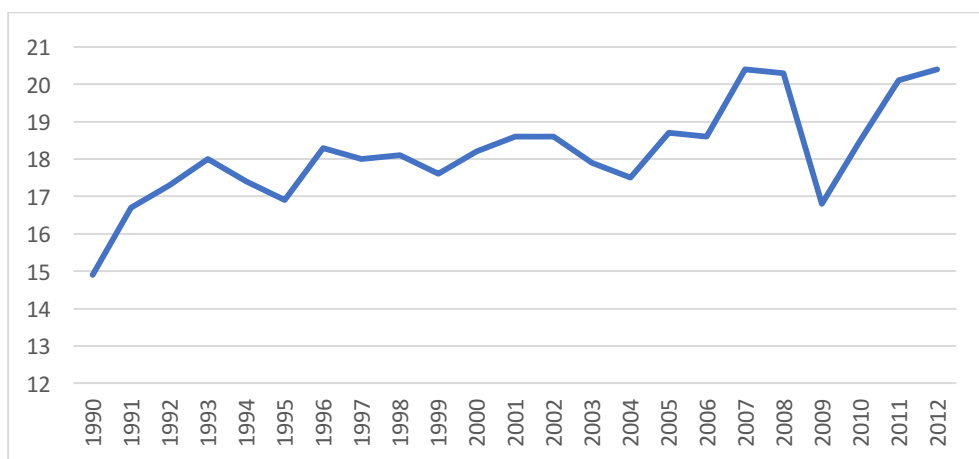


Data source: CEPAL, 2015.

### 5.2.3. Chile

A significant growth in tax revenues can be seen from 2004 to 2007 when collected taxes in terms of % of GDP increased from 14,9 % to 17,9 %. In next two years, tax revenue fell sharply and reached a historical low of only 13,8 % of GDP. However, in 2010, revenues recovered and during next years rose steadily.

Figure 13| Total government tax revenues as % of GDP, Chile, 1990-2012

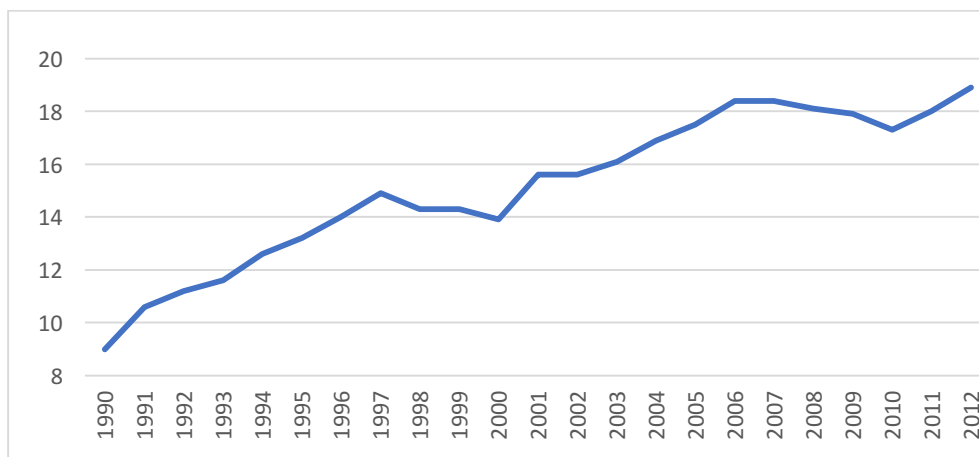


Data source: CEPAL, 2015

### 4.2.4. Colombia

From 1990 to 2012, Colombian tax revenues in % of GDP noticed a significant increase as they more than doubled. Slight decline in tax burden can be seen only during 1998-2000 and 2008-2010. However, they recovered fast and continued in a stable growth, reaching an all-time peak in 2012.

Figure 14| Total government tax revenues as % of GDP, Colombia, 1990-2012



Data source: CEPAL, 2015.



## 6. Empirical evidence

In the following chapter, I will create an econometric model for each country in order to examine the impact of implemented fiscal policies on inequality levels as measured by net Gini coefficient. The main objection is to find variables which have a significant impact on income inequality reduction and thus can be used as efficient fiscal policy instruments. The method of least squares (OLS) will be used to carry out the regression analysis.

### 6.1. Data and variables

Obtaining relevant data for chosen countries of the LA region turned to be rather problematic. The biggest challenge was posed by income inequality data as most institutions, including OECD or ECLAC (CEPAL), do not report annual data on Gini indices and thus offer too small dataset size. A great contribution to this issue was made by American professor Frederick Solt who created the Standardized World Income Inequality Database (SWIID) which provides highly comparable data as well as a great coverage for both number of countries and time. Furthermore, it represents Gini index in both market and net terms. As for the social expenditures and tax revenues, data provided by ECLAC are used. All data used for following basic models and their development over the observed period of 1992-2012 are also presented in previous chapters 3 and 4. As for the extended model, data for exogenous variable corruption are obtained from Amnesty International database. For exogenous variable of economic growth, data from Worldbank are used.

Following independent variables are derived from existing studies described in subchapter 2.3.: *government tax revenues* (Tax), *public expenditures on education* (Edu), *public expenditures on health* (Health). In extended model, additional exogenous variables are implemented: *corruption* (Corrupt) derived from previous study of Li et al. (2000) and *economic growth* (Eco\_growth) which takes place in many inequality studies (e.g. Odedokun and Round, 2004).

Table 6| Exogenous variables summary

Exogenous variable	Measure	Expected effect on income inequality
Government tax revenues	As % of GDP	-
Public expenditures on education	As % of GDP	-
Public expenditures on health	As % of GDP	-
Corruption	Corruption Perception Index	+
Economic growth	Annual growth of GDP per capita	-

As CPI for corruption is available from the year 1995, estimated models examine the period of 1995-2012 instead of previously assumed 1992-2012.

Income inequality (*Gini*) is the dependent variable of this model. It is measured by net Gini index which covers income after taxes and transfers to reduce market forces which certainly influence observed income inequality level but are not subject of this research.

## 6.2. Estimation procedure and regression results

For each country, the basic model takes the following form:

$$Gini_{ti} = \beta_0 + \beta_1 * Tax_{ti} + \beta_2 * Edu_{ti} + \beta_3 * Health_{ti} + u_{it}$$

where  $t$  stands for year,  $i$  stands for country and  $u_{it}$  is an error term.

Before testing, correlation among exogenous variables are examined. Basic model is later extended by adding exogenous variables for corruption and economic growth:

$$Gini_{ti} = \beta_0 + \beta_1 * Tax_{ti} + \beta_2 * Edu_{ti} + \beta_3 * Health_{ti} + \beta_4 * Corrupt + \beta_5 * Eco\_growth + u_{it}$$

As the OLS method is used, additional tests to examine heteroscedasticity, multicollinearity and autocorrelation are carried out to find whether OSL estimators are BLUE (best linear unbiased estimators).

### 6.2.1. Mexico

Table 7| Mexico: Regression results

Dependent variable: Gini			
	MOLS1	MOLS2	MOLS3
<i>(Intercept)</i>	43.1851*** (4.4809)	49.60316*** (6.21491)	51.56824*** (3.52052)
<i>Tax</i>	0.1473 (0.2105)	0.24198 (0.21669)	0.28903 (0.17407)
<i>Edu</i>	2.4141 (1.9768)	0.90552 (2.32086)	
<i>Health</i>	-2.8800* (1.1180)	-2.30014 (1.19878)	-1.89963** (0.59862)
<i>Corrupt</i>		-0.10571 (0.07310)	-0.11373 (0.06782)
<i>Eco_growth</i>		-0.06299 (0.06279)	-0.07602 (0.05140)
<i>R-squared</i>	0.5491	0.6234	0.6186
<i>Adj. R-squared</i>	0.4525	0.4664	0.5012
<i>p-value</i>	0.00926	0.02336	0.009546

Standard errors are in parentheses. Significance codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.'.

Figure 20 shows results of three following regressions. MOLS1 states for regression following the basic model. Excluding constant, only variable Health is found statistically significant. Estimated coefficients for variables Tax and Edu are opposite to anticipated. It seems that both variables increase observed Gini. Estimated coefficient for variable Health is negative as assumed, stating that a 1-point increase in government expenditure on health decreases Gini by 2,88 points. According to estimated R-squared, model explains almost 55 % of variability of dependent variable. P-value shows a statistical significance of model at 1 % level.

OLS2 stands for the extended model. As in previous case, excluding constant, Health is the only statistically significant variable but its significance decreased. Variables Tax, Edu and Corrupt shows opposite estimated coefficients than presumed, which follows that tax burden and government expenditures on education increase income inequality while corruption reduces it. Economic growth shows anticipated negative effect on income inequality but does not prove statistically significant. Extended model has higher both R-squared and adjusted R-squared but overall model significance as measured by p-value decreased. As variable Edu showed the highest p-value, additional regression OLS3 is carried out with Edu excluded. The statistical significance of Health increased, which follows that a 1-point increase in government expenditures on health decreases income inequality by 1.89963 points on 1 % significance level. Significance and coefficients of other variables remain similar to OLS2 but overall significance of model increased.

### 6.2.2. Brazil

Table 8| Brazil: Regression results

Dependent variable: Gini			
	BOLS1	BOLS2	BOLS3
<i>(Intercept)</i>	64.9301*** (1.9488)	64.7486*** (2.5786)	66.19852*** (2.30753)
<i>Tax</i>		-0.5039 (0.0818)***	
<i>Edu</i>	-1.0621* (0.4164)		-1.06948* (0.48616)
<i>Health</i>	-2.4304*** (0.3755)		-2.21401*** (0.45633)
<i>Corrupt</i>			-0.05354 (0.05177)
<i>Eco_growth</i>			-0.11137 (0.10389)
<i>R-squared</i>	0.846	0.7035	0.8649
<i>Adj. R-squared</i>	0.8254	0.6849	0.8234
<i>p-value</i>	8.072e-07	1.369e-05	1.478e05

Standard errors are in parentheses. Significance codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.'.

As correlation analysis shows high correlation (above 0.8) for variables Tax and Edu as well as for Tax and Health, variable Tax is excluded from basic model of regression. OLS1 shows presumed estimated coefficients for both variables which follows that government expenditures on both health and education decrease income inequality. All included exogenous variables are statistically significant as well as whole model. OLS1 explains approximately 85 % of variability of dependent variable.

OSL2 stands for simple linear regression with the only explanatory variable Tax, which is proved as statistically significant. A 1-point increase in tax burden decreases income inequality by 0,5039 points. OLS 2 is found statistically significant as well.

Extended model proved statistical significance of both health and education expenditure which estimated coefficients show a negative effect on income inequality. Additional exogenous variables for corruption and economic growth are not found significant and they both are assumed to decrease Gini. Model OLS3 is proved statistical significant and according to R-squared seems to explain 86 % of variability of dependent variable.

### 6.2.3. Chile

Table 9| Chile: Regression results

Dependent variable: Gini			
	CHOLS1	CHOLS2	CHOLS3
<i>(Intercept)</i>	60.7672*** (5.3879)	66.55300*** (6.82583)	62.43106*** (4.92971)
<i>Tax</i>	-0.3566 (0.2963)	-0.28592 (0.28591)	
<i>Edu</i>	1.7423 . (0.9129)	1.69553 (0.96044)	2.47749** (0.81079)
<i>Health</i>	-3.8297** (1.1265)	-4.12313** (1.09393)	-4.87570*** (0.92333)
<i>Corrupt</i>		-0.07994 (0.07078)	-0.11026 (0.06441)
<i>Eco_growth</i>		-0.11842 (0.12718)	

<i>R-squared</i>	0.6753	0.7489	0.702
<i>Adj. R-squared</i>	0.6057	0.6443	0.6381
<i>p-value</i>	0.00101	0.002557	0.0005637

Standard errors are in parentheses. Significance codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’.

Estimated coefficients of first regression shows presumed reducing effect for tax burden and health expenditures. However, government spending on education seems to have opposite impact and thus increase income inequality as measured by Gini. Excluding variable Tax, all other variables are statistically significant, as well as whole model which explains approximately 68 % of variability of endogenous variable. Including additional explanatory variables for corruption and economic growth in extended model seems to decrease significance and estimated coefficient of variable Edu. Variable Health remains significant and its estimated coefficient is higher in comparison to previous regression – a 1-point change increase in government expenditures on health decrease Gini by 4.12313 points. Variables Corrupt and Eco\_growth both show negative impact on income inequality, however they do not prove as significant. OSL2 has higher R-squared than OSL1 but is statistically less significant (but still significant).

Next, explanatory variables with highest p-values Tax and Eco\_growth were excluded to carry out third regression. The significance for variables Edu and Health increase as well as their estimated coefficients. Increasing expenditures on health by 1 point reduces income inequality by 4.87570 while the same increase in expenditures on education increase income inequality by 2.47749 points. Model explains about 70 % of variability of dependent variable and is statistically more significant compared to OLS1 and OLS 2.

#### 6.2.4. Colombia

Table 10| Colombia: Regression results

Dependent variable: Gini		
	COLS1	COLS2
<i>(Intercept)</i>	52.3663*** (6.2018)	38.3594*** (8.8326)
<i>Tax</i>	-0.0849 (0.2277)	-0.1173 (0.2088)
<i>Edu</i>	-0.2532	1.2130

	(0.8471)	(1.0094)
<i>Health</i>	0.0554	1.3524
	(0.0554)	(0.9289)
<i>Corrupt</i>		0.1961 .
		(0.1020)
<i>Eco_growth</i>		0.1371
		(0.1207)
<i>R-squared</i>	0.01842	0.308
<i>Adj. R-squared</i>	-0.1919	0.01962
<i>p-value</i>	0.9657	0.4246

Standard errors are in parentheses. Significance codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.'.

Results of both basic and extended models estimated for Colombia are very insufficient. Only variable (excluding the constant), corruption, proves significant and its estimated coefficient is as assumed – a 1-point increase in corruption increase income inequality by 0.1961 point. Explanatory variables Health and Eco\_growth accompanied by Edu in second regression show opposite estimated coefficients compared to assumption. Both COLS1 and COLS2 have very low values of R-squared and very high p-values, thus their explanatory ability and statistical significance is negligible.

### 6.2.5. Econometric verification

Table 11| Variance inflation factor

	MOL S 1	MOL S 2	MOL S 3	BOL S 1	BOL S 2	BOL S 3	CHO LS 1	CHO LS 2	CHO LS 3	COL S 1	COL S 2
Tax	1.599	1.740	1.201				1.432	1.478		2.379	2.432
Edu	3.289	4.653		1.287		1.734	3.431	4.209	2.949	1.638	2.827
Health	3.721	4.391	1.171	1.287		1.879	4.022	4.197	2.944	2.050	3.759
Corrupt		1.204	1.109			1.275		1.242	1.046		4.859
Eco_growth		1.562	1.119			1.558		1.654			1.688

Data source: own calculation from Rstudio

To examine multicollinearity in all models, variance inflation factor (VIF) was used. If the VIF of variable lies between 5 and 10, there may be high multicollinearity which can be problematic. VIF above 10 indicates extremely high collinearity.

As seen in Table 11, no value of VIF goes above 5, thus multicollinearity in all models is acceptable and should not cause overinflation of standard errors of estimated coefficients.

As for the heteroscedasticity, Breusch-Pagan test is carried out. For all regressions, the p-value of Breusch-Pagan test is higher than 0.05, therefore null hypothesis about homoscedasticity cannot be rejected on the 5% level of significance.

Autocorrelation was tested by Breusch-Godfrey test. For Brazil and Mexico, null hypothesis about no autocorrelation cannot be rejected on 1 % level of significance. However, for Chile and Colombia, existed autocorrelation is proved. Thus, additional regressions is carried out, using logarithmic form of exogenous variables. For Colombia, autocorrelation is present even when using logarithms. In case of Chile, autocorrelation is eliminated for regression CHOLS2 when including logarithmic form of independent variables. New estimated coefficients for Chile are showed in Figure 25. When using logarithms, p-value for CHOLS2 and CHOLS3 decreases but all models remain statistically significant on 1% level. Significance of variable Edu decreased in CHOLS3 as well as significance of variable Health in CHOLS2. All estimated coefficients increased.

Table 12| Chile: Regression results when including logarithmic forms of exogenous variables

Dependent variable: Gini			
	CHOLS1	CHOLS2	CHOLS3
<i>(Intercept)</i>	69.670*** (16.166)	112.4566* (39.5400)	56.8851*** (2.6513)
<i>Log(Tax)</i>	-5.579 (5.589)	-9.4467 (9.6036)	
<i>Log(Edu)</i>	6.470 . (3.083)	4.5864 (3.7150)	5.8090 . (2.9981)
<i>Log(Health)</i>	-11.679** (3.282)	-9.8549 . (4.9979)	-13.3841*** (0.5653)



<i>Log(Corrupt)</i>		-6.9872 (5.1389)	
<i>Log(Eco_growth)</i>		-0.9833 (0.5864)	-0.8437 (0.5653)
<i>R-squared</i>	0.6754	0.76	0.7077
<i>Adj. R-squared</i>	0.6058	0.64	0.6347
<i>p-value</i>	0.00101	0.006687	0.001582

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Standard errors are in parentheses. Significance codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.'.

## 7. Conclusion

The aim of this thesis was to examine the impact of fiscal policy on income inequality. On the grounds of existing literature, I decided to focus on public spending on health and education and government tax revenues and use them as exogenous variables for income inequality. Additional variables corruption and economic growth were used as well as they figure in many studies which consider determinants of income inequality.

Except for Colombia, government expenditures on health were proved statistically significant in income inequality reduction for each country, which follows assumptions derived from previous theoretical and empirical studies. Health status of subjects impacts income inequality level mainly through human capital accumulation. When public health system remains underfinanced, the quality remains low as well and therefore people who seek a proper treatment are forced to pay to private providers. These high out-of-pocket expenditures can be economically devastating for subjects who are only slightly above the poverty level and consequently move them below the level. Many subject from low-income households decide not to receive any treatment and so their health status gets worse and consequently their market performance lowers which only widens disparities among low-income households and higher socio-economic groups. Institutional and financial reforms implemented in Brazil, Mexico and Chile over last decades created universal health security and increased both quality and coverage of provided health care. Such reforms are found efficient in income inequality reduction only when well-targeted to services used primarily by low-income household, such as the basic care provision. Government policies directed to health expenditures in these countries therefore seem to be efficiently chosen.

Public expenditure on education was found statistically significant in case of Brazil and Chile. However, the effect has an opposite direction for each country. As for Brazil, public spending on education follows findings from existing studies and seems to reduce income inequality. As in the case of health expenditures, the efficiency of spending on education depends on its direction. When well-aimed, it undoubtedly reduces income disparities by allowing subjects to raise their human capital. As “well-aimed” might be considered improving quality and coverage of primary and secondary education. On the other hand, when using public funds mainly on tertiary education, it may have a reverse

effect as households across different economic groups contribute to financing through taxes but only subject of middle and high income groups take advantage of such development. This might be the reason why in case of Chile the coefficient for government expenditures on education was estimated as positive, which follows that increase in education funding increases income inequality. However, when comparing spending on tertiary student in % of GDP per capita, Brazil spends in both relative and absolute terms more than Chile, compared to spending on secondary and primary student. As I did not manage to eliminate the autocorrelation in case of CHOLS2, estimated coefficient for education might be overestimated.

Despite assumptions, government tax revenue (measured as % of GDP) was proved significant in income inequality reduction only when included in a simple regression for Brazil. Estimated effect comply with assumptions – an increase in tax burden causes decrease in income inequality, which follows that Brazilian tax system fulfils its redistributive role.

As for Colombia, no regression model proved statistically significant, which may imply that chosen components of fiscal policy are not determinants of the level of income distribution. I found this as a support for the claim that as for impact of fiscal policy on income inequality, it is not quantity but rather quality what matters. Colombia implemented several tax reforms since 1990, most of them aimed at short-term increase in revenues rather than at institutional changes in the tax system which could improve its redistributive function. Similarly, public spending on education increased over the two decades but the expenditures grow faster than the rate of coverage. Furthermore, the country has been trapped in a circle of violence for last decades. Difficult and unstable societal and political situation can be marked as another reason why Colombian fiscal policy lacks efficiency.

To conclude, fiscal policies aimed at increasing expenditure on health and education systems are likely to serve as effective measures of reduction of unequal income distribution among households. However, there must be ensured that money is spend effectively – as for Latin America, I regard as most important even distribution of funds among all municipalities.

The major limits to this research are connected to problems with data sources. In many cases, relevant data for the region are insufficient, cover only short period or are missing. In further research, I would recommend contacting directly government institutions to provide more exact data.

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