The Empirical Relationship between Intersectoral Inequality and Growth: Evidence of Talent Misallocation in the U.S. States*

Liliya Khabibulina and Andreas Hefti

University of Zurich

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Abstract

This paper investigates the empirical relationship between intersectoral firm inequality and growth in case of the U.S. states during the time period from 1970 to 2011, and presents a number of new and intriguing results. We document a significant negative effect of intersectoral inequality, as measured by the distribution of wages or labor force across sectors, on the subsequent economic growth within a state. Our main hypothesis is that the relative increase of wages in the financial sector reallocated a significant fraction of talented employees in an inefficient manner between financial and manufactoring sectors, which then implies that shifts in relative wages should be negatively correlated with subsequent growth. The data support this conjecture as we can trace out a robust negative correlation between the relative wage in the financial sector and subsequent growth. In fact, we show that this negative correlation is the central driving force behind the aforementioned negative relation between intersectoral inquality and growth.

***Keywords*:** intersectoral inequality, economic growth, financial sector

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1. Introduction

One of the most important issues of economic policy is the distribution of income and wealth anticipating its effects on the aggregate outcomes of an economy. How a country's level of income inequality affects the subsequent economic growth rate is an open question up to now, both theoretically and empirically. While most of the studies focusing on the link between *personal* income inequality and economic growth do not provide general agreement in the results, it becomes of interest what could be other determinants of inequality that could relate to economic growth in more direct way. In particular and much more intuitively the performance of firms or economic sectors has a direct impact on the national economy. According to Kaldor (1956) the savings rate from profits is higher than the savings rate from wages. "I have always regarded the high savings propensity out of profits as something which attaches to the nature of business income, and not to wealth … of the individuals … . It is the enterprise … ." (Kaldor, 1966, p. 310). Why then not to look at the income distribution at the firm or *sectoral* level?

The sectoral structure and the distribution of income across the sectors vary between countries. In more developed countries manufacturing or financial sector are the leading sectors, whereas in less developed countries agriculture is the leading sector. Thus, sectoral structure may depend on the country's level of development, geographical aspects and other factors, which may be induced by political measures. The distribution of income across the sectors may be the result of such measures, structural changes, markets conditions, technological progress or may be also influenced by exogenous shocks. However, there has been little study about how income distribution over the economic sectors affects the growth performance in an economy.

Over the past three decades United States and other developed industrialized countries have experienced a significant increase in wage inequality both between sectors and within sectors (Dunne, Foster, Haltiwanger, & Troske, 2004; Faggio, Salvanes, & Van Reenen, 2010). During the same decades slow productivity growths and undergone structural changes in developed industrialized economies were also observable (Petit, 1999). Hefti (2006) analyzing panel data on cantons of Switzerland has found a negative effect of unequal firms' profit distribution on the subsequent economic growth rate and has shown that this negative effect depends on the sectoral structure of the econ-

omy. The purpose of the present thesis is to study which empirical relationship may hold between intersectoral inequality and economic growth.

The thesis is organized in the following way. In Section 2 we review the relevant theoretical and empirical literature that helps to motivate the subsequent empirical analysis. In Section 3 we first introduce briefly the data, variables and inequality measure to be used. We then describe different estimation methods applied to our regression model. Next, we examine the empirical relationship between intersectoral inequality and economic growth. Finally, we state a hypothesis that is central in our study, and perform an empirical evidence in favor of it. In Section 4 we discuss the major findings of this thesis. Section 5 concludes.

2. Review of Related Literature

Even though, there is a wide research work on the assessment of the relationship between personal income inequality and economic growth, the existing theoretical and empirical studies do not provide a definitive answer to whether income inequality has a negative or positive impact on economic growth. Most of the theoretical works suggest that more unequal distribution of personal income causes slower economic growth arguing this negative effect by different approaches such as credit-market imperfections, political economy, social unrest, and saving rates. The same or other studies reconsidering the theoretical models find the opposite so that under certain conditions a positive effect of income inequality on growth becomes also possible (see Aghion & Bolton, 1997; Alesina & Rodrik, 1994; Grüner, 1995; Rossi, 2000). The empirical studies report contradictory findings on the relationship between personal income inequality and economic growth as well. Recent literature has emerged that the sign of the correlation between inequality and growth can depend on country's level of development, political regime, or the relationship between two variables may be non-linear (see Banerjee & Duflo, 2003; Barro, 2000; Forbes, 2000; Persson & Tabellini, 1994).

While the research up to now has tendency to focus on the link between personal income inequality and growth, and still, there is no general agreement about this relationship, some questions are raised such as, through which channels the inequality in personal incomes is induced and whether these channels have more direct relation with the performance of economy than personal income inequality. Unfortunately, in

the recent research too little attention was devoted to the importance of sectoral structure for the national economic performance. Hereinafter, we point out some central works that could be extracted from the different databases of economic publications.

Barro (2000) finds the empirical evidence on the Kuznets curve across countries and over time. He argues that the relation between the level of per capita product and the extent of income inequality depends on the level of economic development, which involves a reallocation of persons and resources from agricultural and rural sector to industrial and urban sector. So, that at early stages of development this relation tends to be positive, whereas at later stages of development, as industrial sector has expanded, the relation tends to be negative. As a counterpart of the movement from rural agriculture to urban industry, Greenwood and Jovanovic (1990), also supporting the Kuznets hypothesis, show in their model that the level of income inequality depends on the stage of the development of financial sector, so that as an economy has a fully developed financial structure, it reaches a stable distribution of income and has a higher growth rate than at the early stages of financial development.

Dunne et al. (2004) utilize the establishment level data of manufacturing sector in the United States from 1975 to 1992 to show that most of the increase in individual wage inequality can be explained by an increase in wage inequality between establishments within sector. They also find a positive cross-plant relationship in the level of wages and labor productivity, and a positive cross-plant relationship in the changes in wages and productivity, arguing that changes in wage and productivity dispersion in the manufacturing sector are highly linked. Unfortunately due to data constraints this study did not considered other sectors of the economy. Faggio et al. (2010) using establishment level data on manufacturing and service sectors in the United Kingdom from 1984 to 1999 find that increasing wage dispersion and increasing productivity dispersion are moving in a similar manner over long run in both sectors, where increases in wage and productivity inequality for the whole economy are largely driven by the service sector. The drawback of this study is that the financial sector was dropped from the analysis because of the problem of measuring productivity in banking and insurance. However, it would be interesting to look at the evolution of the wage dispersion in the financial sector too.

Petit (1999) comparing the sectoral data for nine OECD countries for the periods 1960-72 and 1973-92 stressed the fact that there were shifts in the distribution of income and they occurred mainly at the sectoral level and also, that the slowdowns in the rate of productivity growth and in the rate of economic growth, were sector specific. Namely, considering average wages, productivity of labor and value added in each of five service sectors and in manufacturing sector, he finds that the changes in relative wages in service sectors with respect to manufacturing sector were matched with a changes in relative productivity of labor in these sectors with the exception of financial and personal services. Where relative average wages in financial or personal services exhibited positive time trends, relative productivities did not. He shows also that there is a linear relationship between value added and productivity growths in manufacturing sector, which does not hold in service activities. Supposing that these results may be indicated by the problem of measurement of productivity in business, finance and personal services, he reports the time trends of productivity gains in all sectors, where the significant decrease in productivity growth from 1960-72 to 1973-92 were observable in almost all sectors in all countries, accompanied by especially low gains in financial and personal services. He concludes that a relationship between productivity growth and growth in output in manufacturing held positive in almost all countries in the post 1973 period, whereas in service sectors productivity changes were not tied to changes in output.

Murphy, Shleifer, and Vishny (1989) presenting their model of industrialization emphasize the importance of domestic demand for manufacturing production, and hence for economic growth. They argue that for industrial markets to expand the income generated by the leading sector of an economy must be broadly distributed to create large markets for domestic manufactures; while if wealth is narrowly concentrated, more of luxury goods and imports rather than domestic manufactures will be demanded, what will lead to failure of industrialization, and hence the stagnation of economic development. Zweimüller (1999) has also noted the important role of demand composition, which depends on the income distribution, for economic growth.

In another approach Murphy, Shleifer, and Vishny (1991) occupy with the allocation of talents in a two-sector model, in which one sector is productive and another is rent-seeking sector. They argue: “Which activities the most talented people choose can have

significant effects on the allocation of resources" (Murphy et al., 1991, p. 505). So that when talented people become entrepreneurs in the productive sector, they improve the technology and so contribute to productivity and foster growth. In contrast, in rent-seeking sectors such as low, financial services, government bureaucracy etc. most of the income flows from redistribution of wealth and not from wealth creation, and if such sectors attract the talented people by offering the highest prizes, technological progress in the productive sector falls and the economy stagnates. This study provides a certain support for the hypothesis, which was proposed within the present work and is discussed later in the thesis.

Other studies assessing the importance of financial system for economic growth suggest, that "the level of financial development is a good predictor of future economic development" (Levine, 1997, p. 703). A growing literature shows that developed financial system by reducing information and transaction costs and facilitating efficient allocation of resources improves investment decisions, and hence promotes technological innovation and long-run growth (Levine, 1997). Beck, Demirguc-Kunt, and Levine (2007) using the data on income inequality, and in the later study Beck, Demirguc-Kunt, Laeven, and Levine (2008) using industry-level data for a broad sample of countries argue that financial development exerts "disproportionately positive effect" both on the poorest population and the small-firm industries, and hence reduces both personal income inequality and inequality between firms in accessing financial services. Claessens and Perotti (2007) survey the recent literature on finance and inequality and conclude that in order to succeed financial development and involved financial sector reforms must be accompanied by established institutional environment, otherwise they will increase inequality and lead to political backlash.

So far, however, no research has been found that investigates how inequality across a broad spectrum of economic sectors affects economic development and growth performance. As a contribution to the existing literature this study using sectoral- and subsectoral-level data on individual states of the United States has found negative effect of intersectoral firm inequality measured in different parameters such as employment size, payrolls, and average wages, on the prospective growth rate of real GDP per capita. Moreover, the further analysis of the data has shown, that this negative effect is caused by the highest percentiles of average wage distribution, at which mostly the

subsectors of Finance, Insurance and Real Estate Division were located. We suggest that the recent studies on finance-growth nexus leave out of consideration the role of "upgraded wages" observed in the resent time in the financial and business sectors.

3. Empirical Evidence

3.1. Data and Variables

Our main data are from the Country Business Patterns (CBP) provided by the U.S. Census Bureau. The CBP provides substantial economic statistics on U.S. business establishments at the state and industry levels. The data is arranged by the Standard Industrial Classification (SIC) System from 1977 to 1997 and North American Industry Classification System (NAICS) [1] from 1998 to 2011, and aggregated both at the Division level (4-digit codes) and at the Major Group level (6-digit codes), which hereinafter we call sectors and subsectors respectively. Information is available on the number of establishments, employment, and annual payroll. Hence, the following variables are used: *Number of Employees*, *Annual Payroll* and *Number of Establishments* both at the sectoral and the subsectoral levels. The next variables are generated:

$$Average\ Wage_{s,t,i} = \frac{Annual\ Payroll_{s,t,i}}{Number\ of\ Employees_{s,t,i}}$$

$$Total\ Number\ of\ Employees_{st} = \sum_{i=1}^{n} Number\ of\ Employees_{sti}\ ,$$

$$Total\ Number\ of\ Establishments_{st} = \sum_{i=1}^{n} Number\ of\ Establishments_{sti},$$

where s stands for state, t for year, and i for subsector.

We then select a sample of sectors and subsectors for which we have consistent data for both *Annual Payroll* and *Number of Employees* for the same time period. For this reason, we impose a set of the following sample restrictions. We first exclude observations for which there is clear evidence of measurement error. In particular, we exclude observations with negative *Annual Payroll*, and negative or zero *Number of Employees.* Further, we exclude observations with average wage less than 10th percentile and

[1] The SIC is a United States government system for classifying industries. It was replaced by NAICS starting in 1998. For more information about SIC and NAICS see: http://www.census.gov/epcd/www/sic.html

greater than 90th percentile of the *Average Wage* distribution across subsectors in each state in each year.

The data on Gross Domestic Product (*GDP*) by state, Population Size (*N*) by state, Government Consumption (*G*) by state and Price Indexes (*PI*) at the national level are from the Bureau of Economic Analysis (BEA). The following variables are constructed:

$$real\ GDP\ per\ capita_{st} = \frac{GDP_{st}}{N_{st} \cdot PI_t} \equiv y_{st}\ , \qquad with\ PI_{2005} = 1$$

$$real\ GDP\ per\ capita\ growth\ rate_{st} = \frac{y_{st} - y_{st-1}}{y_{st-1}} \equiv g_{st}\ ,$$

$$Government\ Share_{st} = \frac{G_{st}}{GDP_{st}} \equiv f_{st}\ ,$$

where s stands for state, and t for year.

As the Price Indexes we use the GDP Deflator to deflate *GDP per capita*, and the Consumer Price Index (CPI) from the BEA to deflate *Average Wage* with a base year 2005.

We use Gini Coefficient as our measure of intersectoral inequality. We have calculated the Gini Coefficients using the variable *Average Wage* distribution at the subsectoral level for each state in each year. Figure 1 shows the evolution of the Gini Coefficients for eight U.S. states over the time period from 1977 to 2011. There are significant differences between the states: for example Florida has always lower Gini coefficient than Alabama. The figure also shows, that there is an evidence that the level of intersectoral inequality measured by the Gini Coefficients has risen on average over time in all states, and there is increasing dispersion of intersectoral inequality between the states after the end of the 90's. Figure 2 shows time series of the growth rates of real GDP per capita for the same states. The growth rates are in clear harmony with each other, which suggest that the business cycles of these states are quite synchronous. The national recessions in 1980-1982, 1990-1991 and 2007-2009 are also remarkable on the graph.

In the next section we will try to find out whether there is a significant correlation between intersectoral wage inequality and economic growth within a given state over time.

3.2. Model Specification and Estimation Methods

In this paragraph, constructing the panel data set for fifty U.S. states for the time period 1977-2011, we investigate the following research question: which impact has a change in intersectoral inequality within a given state on subsequent economic growth within that state? The growth model to be tested takes the following specification:

$$g_{s,t} = \beta_0 g_{s,t-1} + \beta_1 t + \beta_2 Gini(Average\ Wage)_{s,t-1} + CV'_{s,t-1}\gamma + u_s + \varepsilon_{s,t}\ , \qquad (1)$$

where $CV_{s,t}$ is a vector of control variables and u_s is unobserved, time invariant state specific effect.

The empirical results and their interpretation strongly depend on the econometric methods used for estimating the relationship between interesting variables. Therefore the choice of an appropriate estimation technique is essential to each research question. In this study investigating the empirical relationship between intersectoral firm inequality and economic growth we use dynamic estimation techniques to analyze the panel data. There are two methods commonly used for analyzing panel data: Fixed Effects estimation (FE) and Random Effects estimation (RE). The key distinction between the fixed effects and the random effects estimations is that a random effects estimator assumes that an unobserved, time constant, state specific effect is uncorrelated with all the explanatory variables in all time periods. This is a quite strong assumption and to verify this, there is a formal test called Hausman test, which specifies whether there are statistically significant differences between the FE and the RE estimates. (Wooldridge, 2009, pp. 481-505)

The Hausman test was implemented for each of the following regressions analyzing the panel data and in all cases it has rejected the RE estimation in favor of the FE estimation suggesting the presence of state specific effects, which supports the regression model stated above. Therefore, only the results of the fixed effects estimation will be performed. Moreover the estimation was carried out using robust standard errors to control for the presence of heteroskedasticity in error terms.

The first problem, which can arise from estimating the equation (1) by the FE, is endogeneity, since it contains a lagged value of independent variable and therefore can lead to inconsistent and biased fixed effects estimator (Forbes, 2000, p. 876;

Wooldridge, 2009, p. 503). To correct for this bias the Generalized Method of Moments (GMM) of Arellano-Bond dynamic panel technique, which uses lagged values of each variable as instruments, and hence allows for some endogeneity in the regressions, is applied to each regression. The same principle was used by Hefti (2006) and Forbes (2000).

The second problem is that both estimation methods, the FE and the GMM, have a strong assumption, which implies that the idiosyncratic errors are serially uncorrelated (Forbes, 2000, p. 876; Wooldridge, 2009, p. 504). As we have seen in Figure 2 there are short-run fluctuations in yearly growth rate of real GDP per capita. In order to eliminate large variation in the data we average all variables over four-year and five-year periods. This provides several advantages: first it reduces serial correlation from the business cycles (Forbes, 2000, p. 873)[2]; second more relevant economic policy issue of medium-run response of economic growth to a change in intersectoral wage inequality will be examined. Further, *Time* variable, which indicates each period, is included into the regressions to control for a linear time trend.

The third problem in (1) is an implied linear trend in the growth process. Therefore, the Time Fixed Effects (TFE) method, which is the FE that includes time dummies for each time period, and hence allows for state and time specific effects, is implemented to each of the regressions. Summarizing, in the next section estimation results of the GMM, the FE and the TFE, each with four- and five-year periods will be performed.

3.3. Estimation Results

3.3.1. Intersectoral Inequality and Growth

The estimation results of the model (1) are presented in Table 1. The estimated coefficients on the control variables in most cases have expected signs and are statistically significant. The estimated coefficient on the lagged value of *Growth rate* suggests that the stochastic process is oscillating, but mean-reverting, i.e. the stability condition $|\beta_0| < 1$ is satisfied. There is an upward time trend in the growth process. *Growth rate* depends negatively on the initial level of *real GDP per capita*, which supports the conditional convergence in the U.S. states. For a given value of GDP, growth is positively re-

[2] There is a formal test for the second-order serial correlation applied in GMM estimation. This test was carried out for each of the regressions, and the null hypothesis of no autocorrelation could not be rejected at least at the 10% level.

lated to *Government Share*, which includes government consumption expenditures for civilian, military, and state and local sector, but the estimates are never significant. Growth is positively related to the number of employees and negatively related to the number of establishments in the previous period. Quite possibly, the latter result suggests the inefficiency of fix costs replication. The same result was obtained by Hefti (2006) for Switzerland. The within R-square in FE estimation can be interpreted as the amount of time variation in the growth rate that is explained by the time variation in the explanatory variables (Wooldridge, 2009, p. 484). The lost in the number of observations is due to lagged variables in the FE estimation, and lagged and instrumental variables in the GMM estimation.

The estimated coefficients on the Gini coefficients are negative and statistically significant at the 1% level by the GMM (columns 1 and 4) and the FE (columns 2 and 5) estimation in both four-year and five-year period datasets, whereas the TFE (columns 3 and 6) estimates of the Gini coefficients are not significant. The regression results suggest that, if intersectoral inequality in *Average Wage* as measured by the Gini Coefficient would have increased by 10 percentage points given all other variables remain the same, the real GDP per capita had grown on average by 2.9 percentage point slower in the next period.

To summarize this paragraph, intersectoral inequality, as measured by the distribution of wages across economic sectors, correlates negatively with the subsequent growth rate of real GDP per capita within a state across time. When the TFE is applied to the regression, which controls for the time fixed effects of a state, the negative effect of the Gini coefficients becomes insignificant. This finding suggests that not the intersectoral inequality *per se* can explain the negative effect on the growth rate, but some other factors that inefficiently redistribute economic resources between the sectors, increasing the level of inequality and shrinking the growth rate in a state.

3.3.2. Talent Misallocation Hypothesis

Within the study it is further hypothesized that the central driving factor behind the observed negative correlations was the fact that, by paying relatively high wages, the financial sector reallocates talented employees from the manufacturing sector to the financial sector in a macro-economically inefficient manner. In this paragraph we try to

find empirical evidence for the stated hypothesis. For this purpose, we use the data set at the sectoral level and filter out the observations on Manufacturing Division and Finance, Insurance, and Real Estate Division, which hereinafter we call manufacturing and financial sector respectively.

We generate the following new variables:

$$Average\ Wage_i = \frac{Annual\ Payroll_i}{Number\ of\ Employees_i},$$

$$Relative\ Wage_{s,t} = \frac{Average\ Wage_{s,t,f}}{Average\ Wage_{s,t,m}},$$

where $i \in \{f, m, r\}$, f stands for financial sector, m for manufacturing and r for the rest.

Figure 3 shows dispersion of average wages in the manufacturing, the financial sector, the rest of the sectors, and average wage in all sectors for four U.S. states over 1977-2011. It is evident from the graph that the growth rate of real average wage in the financial sector was on average higher than in other sectors in these states. Even in Michigan, one of the leading states in manufacturing, while real average wages in the manufacturing and in the rest of sectors were at the same levels, average wage in the financial sector had risen.

We average the new variables over four- and five-year periods as well, and estimate which effect relative average wage in the financial sector has with respect to average wage in the manufacturing on growth rate in the next period within a state. The model to be tested takes the following specification:

$$Growth_{s,t} = \beta_1 Growth_{s,t-1} + \beta_2' t + \beta_3 Relative\ Wage_{s,t-1} + \beta_4' CV_{s,t-1} + u_s + \varepsilon_{s,t} \quad (2)$$

where $CV_{s,t-1}$ is a vector of control variables and u_s is unobserved, time invariant state specific effect.

Table 2 reports the estimation results of the model (2). The estimated coefficients on the control variables do not differ substantially from the results of the previous paragraph. The estimated coefficient on the interesting variable *Relative Wage* in the financial sector is negative and highly statistically significant in every specification. The result of the TFE estimation suggests that a ceteris paribus increase in the *Relative Wage*

by 10 percentage points would have resulted in a 0.3 percentage point lower growth rate in the next period (see columns 3 and 6 of Table 2).

Table 3 shows the estimation results of the same model specification, but with the variable *Relative Wage* calculated using *Average Wage* in the Real Estate subsector only. The estimated coefficients on the control variables do not substantially change from Table 2. The negative effect of the *Relative Wage* on the growth rate doubles compared to the previous results, that is, a 10 percentage point increase in the *Relative Wage* results on average in a 0.6 percentage point lower growth rate in the next period by the TFE estimation (see columns 3 and 6 of Table 2).

The estimated negative coefficient on the relative wage of financial sector is a central finding of this study and it is very robust to each estimation method.

To summarize, analyzing the data at the sectoral level on the U.S. states in 1977-2011, there is empirical evidence for the hypothesis, that relative high wages in the financial sector, attracting talented employees from other sectors or even if newcomers, might have negative impact on economic growth.

4. Discussion

This thesis set out with the aim of assessing the empirical relationship between intersectoral firm inequality and economic growth in the U.S. states. The results of this study have shown that there is a negative relationship between intersectoral inequality, as measured by the Gini coefficients for number of employees, annual payroll, and average wage in the subsectors, and the growth rate of real GDP per capita in the cross-sectional analysis. In panel data analysis, unconditional intersectoral inequality was found to cause negative impact on the subsequent growth rate within a given state. When controlling for economic features of the states, the results indicated that only intersectoral inequality in average wages had significant negative impact on the subsequent growth rate within a state. These results are in line with the studies that found negative relationship between personal income inequality and economic growth (see e.g. Persson and Tabellini, 1994). Additionally they may be considered as a new channel through which the effect of inequality on growth performance might be examined.

Within the study, it was also hypothesized that relative higher wages in financial sector attracting "talented" employees from other sectors might negatively affect economic growth. The hypothesis has found sufficient empirical evidence analyzing the data on the U.S states over the 1977-1997 time period. This finding is consistent with some studies mentioned in the literature review. Murphy et al. (1989) emphasized the importance of the leading sector of an economy and composition of demand that it generates. We suggest the following interpretation. If manufacturing sector is one of the leading sector in an economy, and income inequality caused by financial sector, where relative high wages are relative narrowly distributed, leads to increasing demand for luxury goods and imports, and decreasing demand for domestic manufactured goods, the development of industrialization in this economy will suffer. Moreover, if labor force is hired away from manufacturing into financial sector which offers higher wages, marginal product of labor in manufacturing will raise leading to higher wages in this sector, hence the prices of manufacturing goods will raise as well, leading to decrease in demand for these goods. Thus, this economy will stagnate. On the contrary, if incomes generated by the sectors are broadly enough distributed, the wide spectrum of goods produced by manufacturing and many other sectors of an economy will be demanded leading to more investments in new technology, R&D, and hence to an improved economic performance.

The finding is also consistent with another study of Murphy et al. (1991), where the authors argue that "the allocation of talent has significant effects on the growth rate of an economy". They also state: "The flow of some of the most talented people in the United States today into law and financial services might then be one of the sources of our low productivity growth. When rent-seeking sectors offer the ablest people higher returns than productive sectors offer, income and growth can be much lower than possible" (Murphy et al., 1991, p. 506).

This combination of the findings may provide potentially important implications for economic policy. However, one should be aware that econometrics helps the economists just to test economic models by estimating the relationships between the interesting variables, but by no means can econometrics conclude that the estimated models are true. To understand the relationship between intersectoral inequality and econom-

ic growth, we need theoretical model. Before any conclusion for the economic policy can be drawn, the further research on this topic is required.

As in any research we should point out the shortcomings of this study. First, the variable *Average Wage* was constructed by using other variables from the original data set. Therefore there could be a lack of precision in the measurement of actual average wages in the sectors or subsectors. Second, avoiding the disclosure in the raw data utilized the number of employees and payroll data for very small subsectors were replaced by zeros. Mostly it was subsectors of Agricultural Services Division, such as Fishing, hunting, and trapping, and subsectors of Manufacturing Division, such as Tobacco products and Leather products. Therefore such subsectors were not considered in the study. These shortcomings must be obviated in the future research by utilizing more comprehensive statistics.

5. Conclusion

This thesis has investigated the empirical relationship between intersectoral firm inequality and growth in the U.S. states during the time period from 1977 to 1997. The following conclusions can be drawn from the present study. The econometrical results have shown that generally there is a significant negative correlation between economic growth and intersectoral firm inequality in diverse parameters, such as employment size, annual payrolls and average wages, both between states and within a state over time, where the most robust finding is a negative effect of intersectoral firm inequality in average wages on the subsequent growth rate of an economy within a state. Further analysis of the data has shown that this negative effect was caused by the highest percentiles of average wage distribution across the subsectors, at which mostly the subsectors of Finance, Insurance, and Real Estate Division, namely Security and commodity brokers, and Holding and other investment offices were located.

The present study provides additional evidence with respect to the hypothesis, that financial sector with relative higher wages attracting employees from other sectors can cause negative impact on the growth rate of an economy. Although this hypothesis could not be proven within this thesis, it has found sufficient empirical evidence analyzing the data on the financial and manufacturing sectors in individual states of the United States over the considered time period.

This research has thrown up much potentiality for further investigation. First, it is recommended that further work should be undertaken on constructing of theoretical model that can explain the link between intersectoral firm inequality and economic growth. Second, further empirical investigations are needed to estimate this relation in other countries or at the cross-national level. Considerably more research work need to be done on the hypothesis proposed within this thesis. A future study exploring how allocation of employment across the economic sectors affects growth performance would be also very interesting.

We do believe that the findings of this study and recommended future research will have a number of important implications for future economic policy.

Appendix

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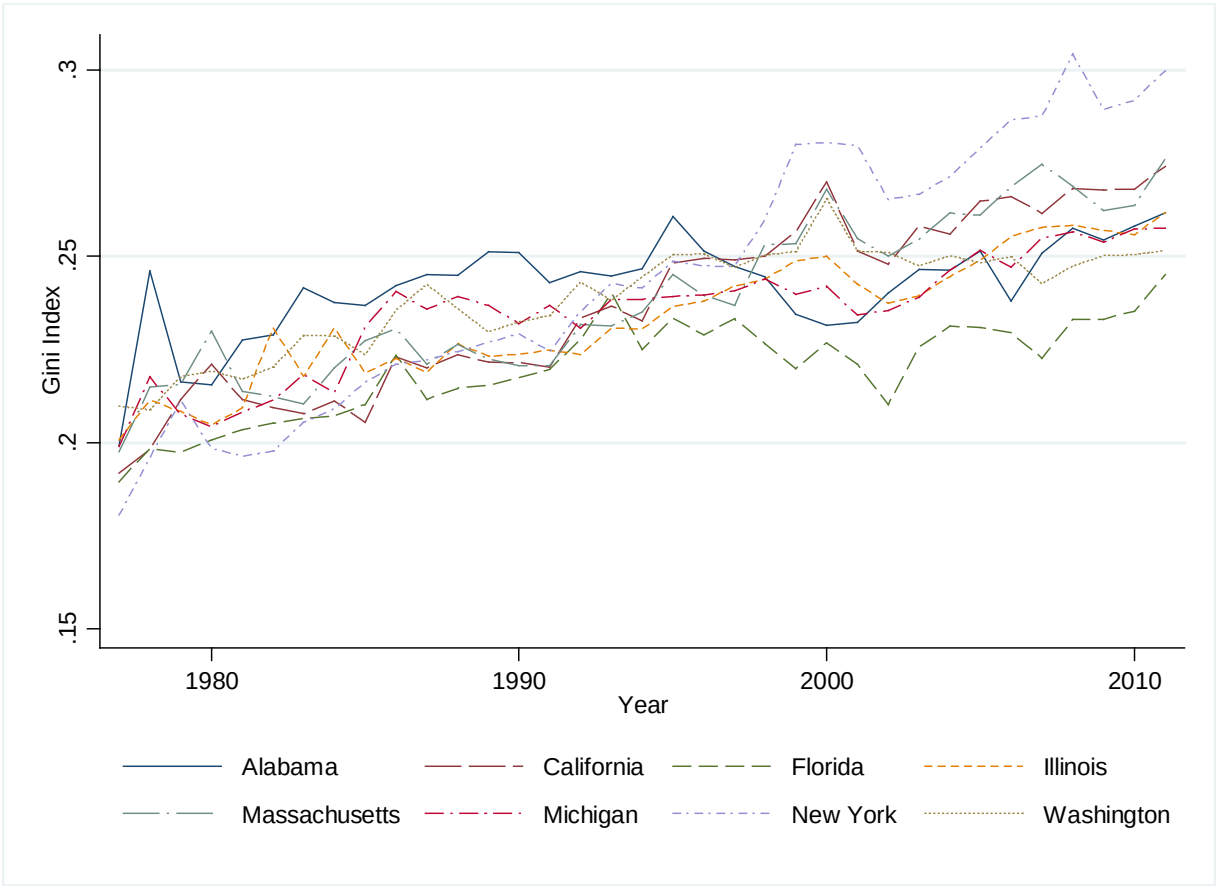
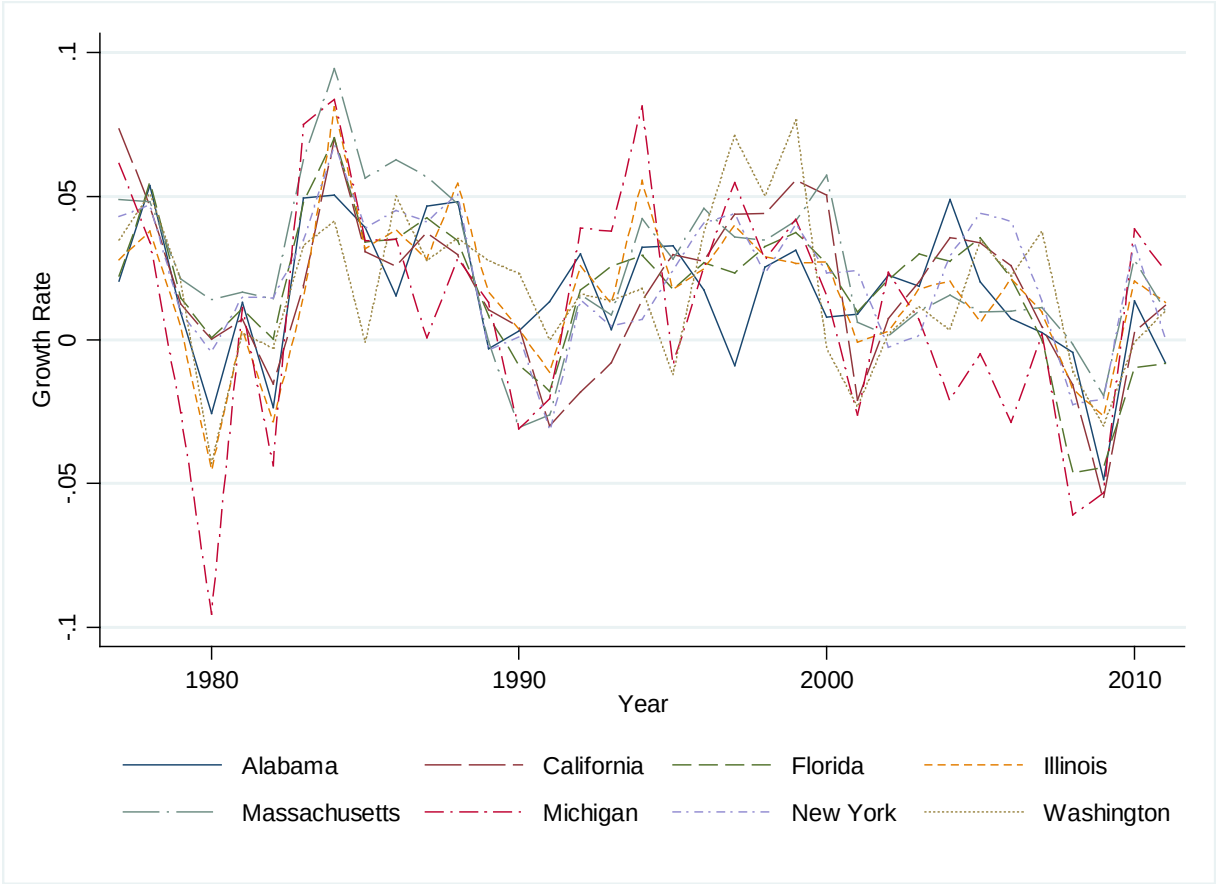
Figures and Tables

Figure 1. The Evolution of Intersectoral Wage Inequality in the U.S. States



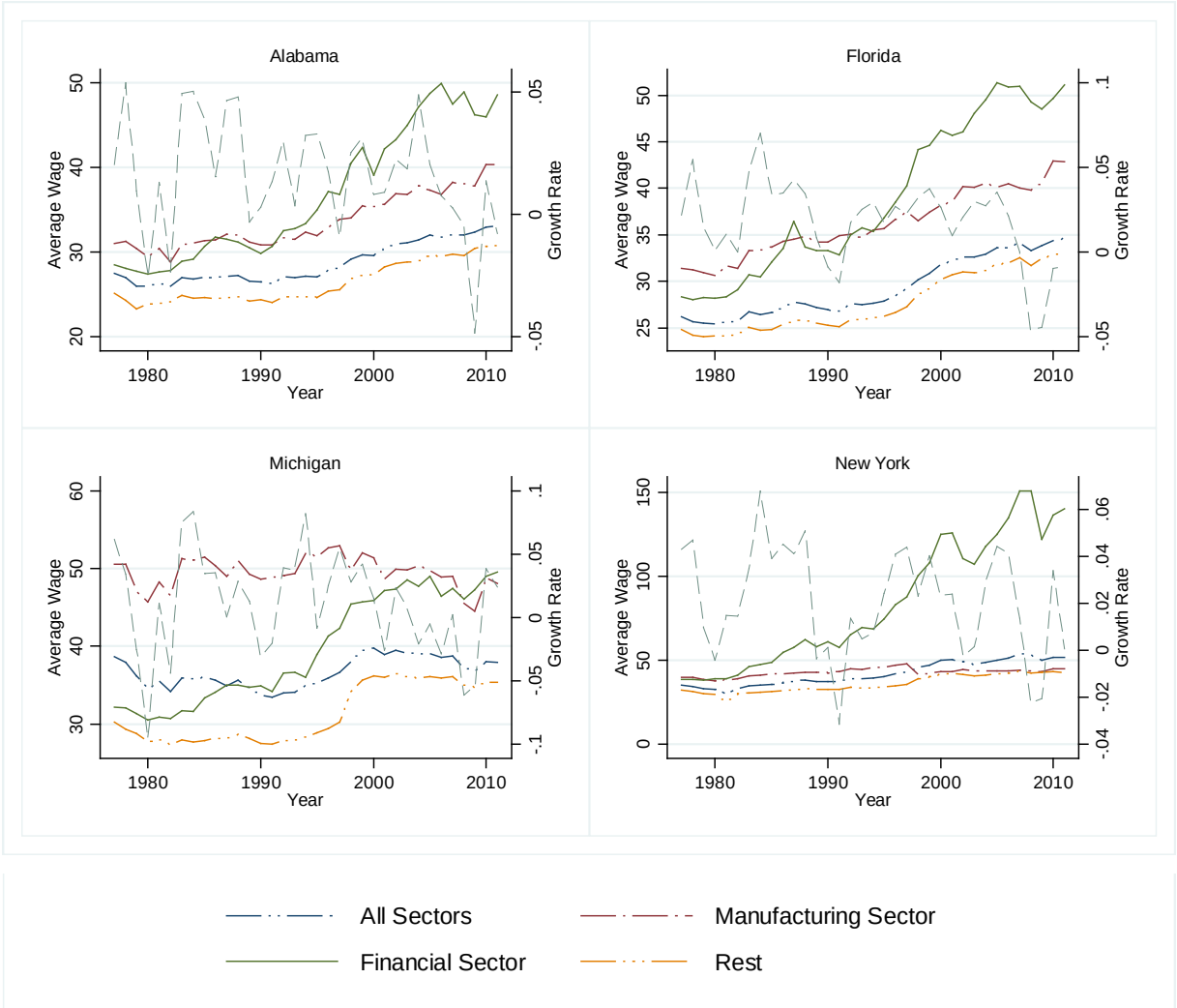
Note: The figure depicts time series of Gini Coefficient of Average Wage distribution at the subsectoral level for eight U.S. states.

Figure 2. The Evolution of Growth Rate in the U.S. States



Note: the figure depicts time series of growth rate of real GDP per capita for eight U.S. states.

Figure 3. Intersectoral Wage Dispersion in the U.S. states



Note: the figure depicts the time series of Average Wage in the financial sector, in the manufacturing, in all sectors and in the rest of the sectors for four U.S. states. Average Wage is in constant 2005 U.S. Dollars. Dash line on the second y-axis denotes growth rate of real GDP per capita.

Table 1: The Effects of Gini Coefficient of Average Wage on Growth Rate

Dependent variable:	$Growth_{s,t}$					
Period length:	4-year			5-year		
Estimation method:	GMM	FE	TFE	GMM	FE	TFE
Independent variables	(1)	(2)	(3)	(4)	(5)	(6)
$Growth_{s,t-1}$	-0.0462*	0.0365*	-0.001	-0.3762***	-0.3316***	-0.3798***
	(0.024)	(0.0205)	(0.0287)	(0.0266)	(0.0374)	(0.0308)
$Period_t$	0.0179***	0.0097***		0.0133***	0.0096***	
	(0.0028)	(0.0019)		(0.0029)	(0.0022)	
$\log(real\ GDP\ per\ capita)_{s,t-1}$	-0.2109***	-0.1336***	-0.1207***	-0.1576***	-0.1227***	-0.1213***
	(0.0421)	(0.0221)	(0.0189)	(0.0239)	(0.0165)	(0.0172)
$Government\ Share_{s,t-1}$	0.1545	0.0884	0.1262	0.2329	0.2793	0.2303
	(0.159)	(0.0985)	(0.1168)	(0.1794)	(0.1187)	(0.1585)
$Gini(Average\ Wage)_{s,t-1}$	-0.7068***	-0.2966***	-0.0153	-0.4793***	-0.293***	-0.0342
	(0.119)	(0.0801)	(0.0773)	(0.1205)	(0.108)	(0.0994)
$\log(Total\ Number\ of\ Employees)_{s,t-1}$	0.0178	0.0165	0.0268	0.0382	0.0359*	0.0525*
	(0.0251)	(0.0191)	(0.0243)	(0.0272)	(0.0211)	(0.0283)
$\log(Total\ Number\ of\ Establishments)_{s,t-1}$	-0.0466**	-0.0243	-0.0504	-0.0184	-0.018	-0.0674*
	(0.0193)	(0.0195)	(0.0321)	(0.0167)	(0.0204)	(0.0365)
within R-sq		0.46	0.62		0.56	0.73
Observations	350	400	400	250	300	300

Note: Robust standard errors are in parentheses. *, **, *** represent significance at 10%, 5%, 1% respectively.

Table 2: The Effects of Relative Wage in Financial Sector on Growth Rate

Dependent variable:	$Growth_{s,t}$					
Period length:	4-year			5-year		
Estimation method:	GMM	FE	TFE	GMM	FE	TFE
Independent variables	(1)	(2)	(3)	(4)	(5)	(6)
$Growth_{s,t-1}$	-0.0747***	0.0242	-0.0038	-0.4032***	-0.3595***	-0.3923***
	(0.0239)	(0.0242)	(0.0276)	(0.0278)	(0.0391)	(0.0308)
$Period_t$	0.0176***	0.0124***		0.0158***	0.0136***	
	(0.0032)	(0.0022)		(0.0035)	(0.003)	
$\log(real\ GDP\ per\ capita)_{s,t-1}$	-0.1932***	-0.1404***	-0.1304***	-0.1539***	-0.13***	-0.1286***
	(0.0318)	(0.0175)	(0.0156)	(0.0178)	(0.014)	(0.0154)
$Government\ Share_{s,t-1}$	0.0336	0.0189	0.0493	0.2516	0.2049	0.1672
	(0.1514)	(0.1108)	(0.1169)	(0.1754)	(0.1356)	(0.1661)
$Relative\ Wage_{s,t-1}$	-0.0671***	-0.0517***	-0.0344**	-0.0645***	-0.0519***	-0.0335**
	(0.0255)	(0.015)	(0.0141)	(0.0193)	(0.0159)	(0.0162)
$\log(Total\ Number\ of\ Employees)_{s,t-1}$	0.0357	0.0166	0.0233	0.0547**	0.0395**	0.0468*
	(0.0243)	(0.0187)	(0.0229)	(0.0243)	(0.0196)	(0.0274)
$\log(Total\ Number\ of\ Establishments)_{s,t-1}$	-0.0579***	-0.031*	-0.0545*	-0.0378**	-0.0318	-0.0692**
	(0.0188)	(0.0178)	(0.0292)	(0.018)	(0.0199)	(0.0342)
within R-sq		0.46	0.62		0.58	0.73
Observations	350	400	400	250	300	300

Note: Robust standard errors are in parentheses. *, **, *** represent significance at 10%, 5%, 1% respectively.

Table 3: The Effects of Relative Wage in Real Estate Sector on Growth Rate

Dependent variable:	$Growth_{s,t}$					
Period length:	4-year			5-year		
Estimation method:	GMM	FE	TFE	GMM	FE	TFE
Independent variables	(1)	(2)	(3)	(4)	(5)	(6)
$Growth_{s,t-1}$	-0.0592**	0.0312	0.0102	-0.3938***	-0.3477***	-0.3774***
	(0.0264)	(0.0201)	(0.0274)	(0.0268)	(0.0378)	(0.0317)
$Period_t$	0.0144***	0.0117***		0.0133***	0.0128***	
	(0.0019)	(0.0016)		(0.0027)	(0.0023)	
$\log(real\ GDP\ per\ capita)_{s,t-1}$	-0.1658***	-0.1348***	-0.1287***	-0.1373***	-0.1268***	-0.1296***
	(0.0248)	(0.0146)	(0.0148)	(0.015)	(0.0116)	(0.014)
$Government\ Share_{s,t-1}$	0.0642	0.0456	0.0022	0.2491	0.131	0.116
	(0.1311)	(0.1)	(0.106)	(0.1689)	(0.1209)	(0.1519)
$Relative\ Wage_{s,t-1}$	-0.143***	-0.1067***	-0.0608***	-0.1437***	-0.1127***	-0.0652***
	(0.0148)	(0.0129)	(0.0164)	(0.0157)	(0.0175)	(0.0221)
$\log(Total\ Number\ of\ Employees)_{s,t-1}$	0.0581***	0.0214	0.0224	0.07***	0.0453**	0.053**
	(0.0192)	(0.0166)	(0.021)	(0.0214)	(0.0182)	(0.0241)
$\log(Total\ Number\ of\ Establishments)_{s,t-1}$	-0.072***	-0.0384**	-0.0521*	-0.05***	-0.0388**	-0.0729**
	(0.0169)	(0.0163)	(0.0275)	(0.0178)	(0.0185)	(0.0309)
within R-sq		0.54	0.64		0.64	0.75
Observations	343	395	395	246	297	297

Note: Robust standard errors are in parentheses. *, **, *** represent significance at 10%, 5%, 1% respectively.