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Income Inequality and House Prices across US States

Edmond Berisha, Montclair State University
John Meszaros, U.S. Postal Service
Rangan Gupta, University of Pretoria

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Edmond Berisha* John Meszaros † Rangan Gupta‡

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Abstract

This paper studies the secular increase in US income inequality and its relation to growing house prices over the past three decades. We explore income inequality's effect on house prices based on a high-frequency (quarterly) data-set for all US states, including the District of Columbia. The analysis show that higher income inequality decreases the growth rate of house prices. However, the relationship differs for the Northeast region. We find higher income inequality corresponds with higher house prices across the states within the Northeast region.

Keywords: Inequality, House Prices, Regional Studies

Journal of Economic Literature Classification Numbers: D60, O40, O50.

*Feliciano School of Business, Montclair State University, Montclair, NJ 07043; E-mail: berishae@montclair.edu

†U.S. Postal Service, USA; E-mail:john.meszaros@yahoo.com; This research was prepared by the author (Meszaros) in his personal capacity. The opinions expressed in this article are the author's own and do not necessarily reflect the views of the United States Postal Service or the United States government.

‡University of Pretoria, Pretoria, South Africa; E-mail: rangan.gupta@up.ac.za

1 Introduction

Since Thomas Piketty published *Capital in the Twenty-First Century*, there has been an enormous amount of literature published pertaining to all aspects of income inequality. House prices and returns on housing are also key factors in household earnings and the overall US economy. Further, monetary policy plays a part in both income inequality and house prices. Much research in the past was directed toward understanding how monetary policy affected house prices. Recently, research has also focused on monetary policy's affect on income inequality. However, until very recently, little work has been done investigating income inequality's effect on house prices. In addition to being a relatively new area of research, the impact of income inequality on housing prices is uncertain. Intuitively, higher income inequality means there are high earning households which may then bid up house prices across the United States. On the other hand, higher income inequality means there are, correspondingly, more lower earning households who may be priced out of the housing market, driving down prices of the existing housing stock.

In any case, this paper will investigate how income inequality affects housing prices. Our contribution is that we use inequality data that are available at a high frequency, i.e., on a quarterly basis for over 30 years (1991:Q1 to 2017:Q2). Accurate prediction of the consequences of inequality at a higher frequency should be more relevant to policymakers in designing appropriate policies to circumvent the wide-ranging negative impacts of inequality compared to when predictions are only available at the lower annual frequency. The higher frequency provides more degrees of freedom, which allows us to be more precise in understanding the relationship between inequality and house prices in different macroeconomic environments and investigate how regional differences in the US may impact income inequality and housing prices.

The rest of the paper is structured as follows. Section II reviews the literature on housing prices and income inequality. Section III discusses the data and model. Section IV explains the results and section V concludes.

2 Literature Review

As discussed in the introduction, there is a relatively new subset of income inequality literature that focuses on how income inequality affects housing prices. Özmen et al. (2019) show that income inequality, measured by the Gini coefficient, is negatively correlated with housing prices in Turkey. They argue this is because reductions in income in the lower quintiles suppresses housing demand, driving prices down. Thus, increased income inequality leads to lower prices for housing. Zhao et al. (2021) also show that increases in income inequality lowers housing prices. However, they show that, although many households have seen stagnant incomes, borrowing has allowed U.S. households to continue to purchase houses. Määttänen and Terviö (2014), using a theoretical model, also demonstrate that higher income inequality tends to lower housing prices. They state that the theoretical effect could go either direction, but their analysis shows increased inequality leads to lower housing prices. However, Hassani et al. (2019) show, in a forecasting exercise, that inequality does not add much predictive power to future house price estimates.

Hailemariam et al. (2020) document the theoretical channels that might drive the relationship between income inequality and housing prices. They explain that income inequality can either increase or drive down housing prices depending on the channels considered. Hailemariam et al. (2020) document 3 main channels that push house prices higher resulting from increased income inequality. The first is that an increasing amount of income generated among a small group of households may force lower earners out of the housing market and inflate prices of the outstanding stock of homes. A second channel through which increased income inequality could increase house prices is through conspicuous consumption: households want to buy larger, more expensive homes to "keep up with the Joneses". Lastly, sorting may occur where higher earning households move to similar areas (San Francisco, New York City) and bid up the prices of the existing housing stock. However, Hailemariam et al. (2020) also claim that higher income inequality can increase crime, which can pull down home values. Ultimately, Hailemariam et al. (2020) find that higher levels of income inequality lead to lower housing prices.

On the other hand, Goda et al. (2020) find that increasing levels of income inequality have

contributed to higher housing prices. Goda et al. (2020) reiterate that increased income inequality increases competition for housing and, therefore, bids up house prices. Further, there are a variety of views on how interest rates and inequality have influenced house prices in the US. Del Negro and Otrok (2007) argue that monetary policy had little to do with increased housing prices in the United States. However, more recently, La Cava (2016) shows that low interest rates have pushed up housing prices. Thus, there is some debate over the connection between monetary policy, income inequality, and housing prices.

In sum, there is not a clear consensus on income inequality and housing prices in the United States. Various authors have found that income inequality lowers housing prices by pushing low-income buyers out of the housing market or through an increased crime channel that lowers property values overall. On the other hand, income inequality may cause an increase in home prices by causing a bidding war amongst high income buyers in sought after areas. This paper will add to the existing literature by looking at income inequality's effect on housing prices based on a high-frequency(quarterly) data set in the US at the national level, but, importantly, also at the regional level.

3 Data and Model Specification

3.1 Data

We build a quarterly panel dataset (1991:Q1 to 2017:Q2) that includes information on income inequality, real per capita total personal income, and unemployment rates for all US states, including the District of Columbia. The data set is complemented by a set of fiscal and monetary policy measures, such as total state and local current government expenditures and 3-month Treasury bills. Summary statistics of the income inequality series along with the other variables are shown in Table 1. Disaggregating the analysis at the state-level allows us to take into account the heterogeneity in dynamics of income inequality and house prices across US states. In addition, performing state-level quarterly analysis provides enough observations to uncover any robust re-

lationship that might exist between income inequality and house prices. Figures 1, 2, 3, and 4 show the time series of house prices, income inequality and two key macroeconomic variables for US states (real GDP per capita and unemployment). The graphs show close correlation in the dynamics of the variables over time. We see that economies across US states experienced significant growth in GDP per capita. Particularly, GDP per capita on average across US states increased by almost 150% over the sample period. Interestingly, increases in house prices very closely follow the growth rate of GDP per capita. Looking at Figure 2, we see that home prices increased exactly 150%. Figure 3 shows the time series of the Gini coefficient. On average, the Gini coefficient increased by 16% across the US states. Figure 4 shows the time series of unemployment. Overall, there is a downward trend in the unemployment rate, with an exception from 2008 to 2009 (the Great Recession period), where unemployment rates increased from 4.5% to almost 9%. Afterwards, we observe a steady decline in the unemployment rate.

The inequality measure for all states is obtained from Fischer et al. (2019)[1]. The measure is constructed using household income data from the Annual Social and Economic Supplement of the Current Population Survey (CPS). Fischer et al. (2019) provide extensive documentation of the construction of the inequality series. The authors use splines to interpolate annual measures of household income inequality to quarterly frequency. House Price Index data are from the Federal Housing Finance Agency. The index measures changes in single-family home values based on data from all US states, including the District of Columbia. The remaining variables are obtained from the Federal Reserve Bank of St. Louis database.

3.2 Model Specification

To examine the impact of income inequality on house prices across US states, the following model is estimated:

$$HP_{i,t} = \lambda_i + \delta_t + \beta_1 Gini_{i,t-m} + \beta_2 X_{i,t-m} + \epsilon_{i,t} \tag{1}$$

[1]We would like to thank Professor Florian Huber for kindly providing us the data.

where HP is House Price Index data, which measures changes in single-family home values based on data from all US states (including the District of Columbia), and $\mathtt{Gini}_{i,t-m}$ is the Gini coefficient from Fischer et al. (2019), which captures household income inequality across all US states. We also account for state level economic conditions, government expenditures, and monetary policy actions of the Federal Reserve, which can contaminate the relationship between income inequality and house prices. Thus, to isolate the impact of income inequality on house prices, as additional controls $(X_{i,t})$ we use real per capita total personal income, state and local government current expenditures, and Treasury bill rates (a proxy for monetary policy). λ_i captures state effects that measure unobserved heterogeneity across states that might be correlated with the regressors in (1). In addition, δ_t controls for the time trend in case such a trend might drive the association among the variables analyzed in (1).

To identify the impact of income inequality on house prices across four US regions (Northeast, Midwest, West, and South), in Model 1 we introduce three interaction terms between three dummy variables (d1, d2, and d3) and the income inequality measure. Particularly, we estimate the following model:

$$HP_{i,t} = \lambda_i + \beta_1 \mathtt{Gini}_{i,t} + \beta_2 X_{i,t} + \beta_3(d_1 * \mathtt{Gini}_{i,t}) + \beta_4(d_2 * \mathtt{Gini}_{i,t}) + \beta_5(d_3 * \mathtt{Gini}_{i,t}) + \epsilon_{i,t} \tag{2}$$

Note, β_1 captures the average impact of income inequality on house prices within the West region. Correspondingly, $\beta_1 + \beta_3, \beta_1 + \beta_4$ and $\beta_1 + \beta_5$ quantify the impact of inequality on house prices within the Northeast, South, and Midwest regions.

4 Results

Table 1 presents the results from estimating Model 1 across various specifications. Column 1 shows the magnitude of the association between income inequality and house prices when controlling for state and year effects. A one percent increase in the inequality measure is associated

with a 0.26 percent decrease in house prices. The negative association remains intact even after controlling for state economic conditions. As presented in column 2, per 1 percent increase in the income inequality measure, house prices decrease by 0.22 percent. As expected, improvement in state economic conditions corresponds with higher house prices. Particularly, per one percent increase in GDP per capita, house prices increase by 1.2 percent.

Variations in state and local government spending and monetary policy actions by the Federal Reserve can also contaminate the relationship between income inequality and house prices. To address this issue, we estimate Model 1 including government spending at the state and local level and with 3-month Treasury bill rates. Real GDP per capita is also included to control for economic conditions within each state. Results reported in column 3 show that the negative association between the inequality measure and house prices remains statistically significant and becomes slightly stronger.

We are aware that, contemporaneously, there might be a feedback effect from house prices to inequality. We estimate Model 1 using one period lags for the income inequality measure and the other controls. Results shown in column 4 indicate the earlier findings are intact and, further, increases in inequality decrease house prices. To further address feedback effects from house prices to inequality, we re-estimate Model 1 by treating the inequality measure as a dependent variable and house prices as an independent variable. After controlling for state economic conditions, state and local government spending, and monetary policy actions, the impact of house prices on the income inequality measure is null. Therefore, we conclude that income inequality negatively affects house prices.

To ensure that our findings are robust across various sub-sample periods and the relationship is not driven by the Great Recession of 2008-09, we perform the analysis separately for the periods before and after 2008. Results reported in Table 3 again show that higher income inequality negatively impacts house prices across the two sub-sample periods. Findings are especially strong for the specifications when we control only for state effects (Columns 1 & 4) and for the period post-2008 (Columns 3 & 4). In addition, we continue the analysis by exploring if the observed

negative relationship between inequality and house prices varies across four US regions (Northeast, Midwest, West, and South). Results from the model with regional dummies, reported in Table 4, indicate that the relationship varies across the four regions. We find that, within the Northeast region, the relationship between income inequality and house prices is positive. Particularly, per 1% increase in the income inequality measure, house prices in the Northeast region increase by 0.34%[2]. The positive relationship remains intact even when we control for state economic conditions (Column 2 & 3) and fiscal and monetary policy actions (Columns 5 & 6). However, the sign of the relationship changes to negative for the period post-2007. The results indicate that higher income inequality negatively impacts home prices even for the Northeast region for the period after 2007.

5 Conclusion

We use panel data methods to disentangle the relative importance of income inequality on influencing house prices across all US states, including the District of Columbia. Our sample consists of quarterly data from 1991:Q1 to 2017:Q2. We find that increases in income inequality lowers the growth rate of house prices. The identified negative relationship is stronger for the period post-2008. In addition, we examine the impact of income inequality on house prices across four US regions (Northeast, Midwest, West, and South). Interestingly, we find higher income inequality corresponds with higher house prices across the states within Northeast region. For the remaining three regions, the relationship remains negative.

Note, majority of the wealth for middle class households is concentrated in housing. From our findings, we can assert that the negative contribution of income inequality on house prices would disproportionately hurt middle income households. Thus, designing appropriate policies that circumvent the upsurges in income inequality would ensure that the most valuable asset for middle class households is not losing ground.

[2] 0.56-0.12

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Table 1: Summary statistics

Variable	**Mean**	**Std. Dev.**	**Min.**	**Max.**	**N**
ineq	-0.874	0.078	-1.119	-0.631	5406
lhpsa	5.100	0.323	4.409	6.219	5406
inc	10.365	0.322	9.508	11.24	5406
lsexp	7.388	0.372	6.697	7.933	5406
tb	2.608	2.135	0.01	6.03	5406

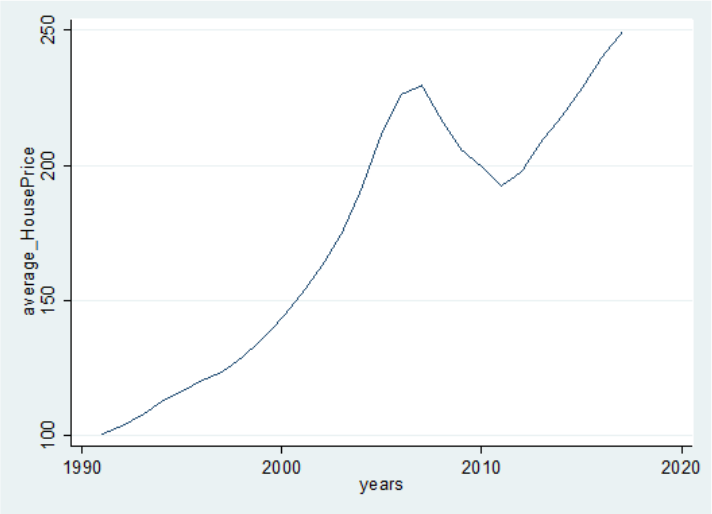

Figure 1: Time Series of Average House Prices across US states

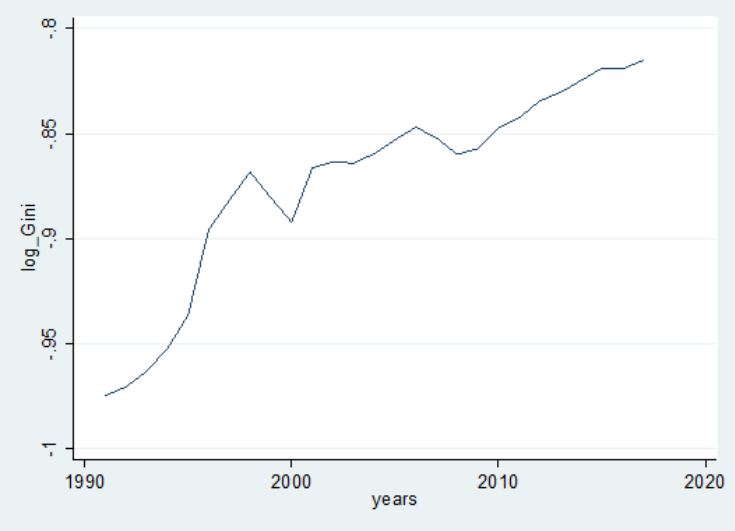

Figure 2: Time Series of Average Income Inequality across US states

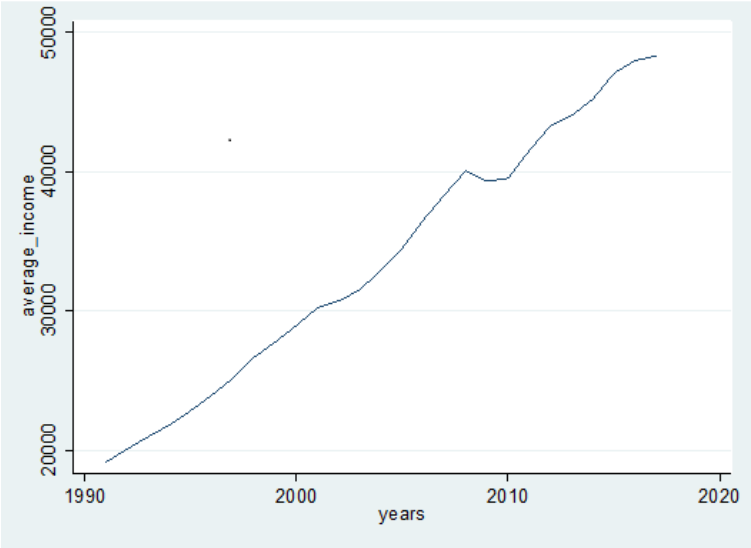

Figure 3: Time Series of Average Income per Capita across US states

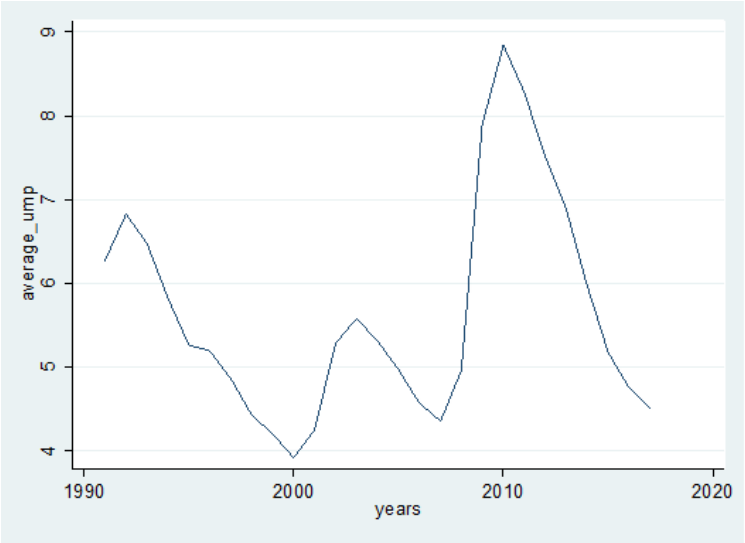

Figure 4: Time Series of Average Unemployment Rate across US states

Table 2: Model 1 Results

	(1) $HP_{i,t}$	(2) $HP_{i,t}$	(3) $HP_{i,t}$	(4) $HP_{i,t}$	(5) $HP_{i,t}$	(6) $HP_{i,t}$
$Gini_{i,t}$	-.215***	-.22***	-.21***			
	(.04)	(.04)	(.04)			
$PerCapitaInc_{i,t}$	1.00***	1.20***	1.20***			
	(.00)	(.03)	(.03)			
$TBrate_t$			.00**			
			(.00)			
$StateGovExp_t$			.00			
			(.02)			
$Gini_{i,t-1}$				-.12*	-.17***	-.17***
				(.04)	(.04)	(.04)
$PerCapitaInc_{i,t-1}$				.98***	1.20***	1.20***
				(.00)	(.03)	(.03)
$TBrate_{t-1}$						.00**
						(.00)
$StateGovExp_{t-1}$						.00
						(.02)
_cons	-5.48***	-7.57***	-7.66***	-5.20***	-7.56***	-7.60***
	(.13)	(.32)	(.35)	(.13)	(.31)	(.36)
Fixed Effects	✓	✓	✓	✓	✓	✓
Year Effects		✓	✓		✓	✓
N	5406	5406	5406	5355	5355	5355
R^2	0.8555	0.9173	0.9174	0.8521	0.9164	0.9165

Robust Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 3: Model 1 Results: Sub-sample analysis

	(1) $HP_{i,t}$ $Y < 2008$	(2) $HP_{i,t}$ $Y < 2008$	(3) $HP_{i,t}$ $Y > 2007$	(4) $HP_{i,t}$ $Y > 2007$	(5) $HP_{i,t}$ $Y < 2008$	(6) $HP_{i,t}$ $Y > 2007$
$Gini_{it}$	-.57***	-.09*	-.33***	-.15***		
	(.047)	(.04)	(.05)	(.04)		
$PerCapitaInc_{i,t}$	.92***	1.48***	.51***	1.13***		
	(.07)	(.06)	(.04)	(.05)		
$TBrates_{t}$	-.00*	.00	.08***	.04***		
	(.00)	(.00)	(.00)	(.00)		
$StateGovExp_{t}$	.32***	-.01	.49***	.07		
	(.05)	(.02)	(.05)	(.11)		
$Gini_{it-1}$					-.05	-.10*
					(.04)	(.04)
$PerCapitaInc_{i,t-1}$					1.52***	1.09***
					(.06)	(.04)
$TBrates_{t-1}$					.00	.04***
					(.00)	(.00)
$StateGovExp_{t-1}$					-.02	.15
					(.02)	(.10)
_cons	-7.34***	-10.16***	-4.27***	-7.48***	-10.44***	-7.59***
	(.39)	(.63)	(.26)	(.94)	(.63)	(.94)
Fixed Effects	✓	✓	✓	✓	✓	✓
Year Effects		✓	✓		✓	✓
N	3465	3465	1941	1941	3414	1941
R^2	0.8841	0.9156	0.9127	0.9397	0.9157	0.9392

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4: Model 1 Results: Regional Analysis

	(1) HP_t	(2) HP_t	(3) HP_t $Y < 2008$	(4) HP_t $Y > 2007$	(5) HP_t	(6) HP_t
$Gini_{it}$	-.12*	-.11*	.02	-.27*	-.28***	-.10*
	(.05)	(.05)	(.06)	(.12)	(.05)	(.05)
$PerCapitaInc_{i,t}$	1.00***	1.18***	1.42***	.84***	.71***	1.18***
	(.00)	(.02)	(.06)	(.02)	(.05)	(.02)
northeast*$Gini_{i,t}$	.56***	.41***	.15	-.83***	.56***	.41***
	(.08)	(.07)	(.08)	(.19)	(.08)	(.07)
south*$Gini_{i,t}$	-.17**	-.10*	-.28***	-.04	-.19***	-.10*
	(.06)	(.04)	(.06)	(.13)	(.05)	(.04)
midwest*$Gini_{i,t}$	-.62***	-.70***	-.38***	-.10	-.62***	-.70***
	(.06)	(.04)	(.06)	(.13)	(.05)	(.04)
$TBrates_t$					.02***	.00**
					(.00)	(.00)
$StateGovExp_t$					.35***	.00
					(.04)	(.02)
_cons	-5.50***	-7.42***	-9.67***	-4.10***	-5.30***	-7.48***
	(.13)	(.30)	(.62)	(.30)	(.23)	(.35)
N	5406	5406	3465	1941	5406	5406
R^2	0.8600	0.9212	0.9170	0.8791	0.8704	0.9214
Fixed Effects	✓	✓	✓	✓	✓	✓
Year Effects		✓	✓			✓

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$