

# *Land, Booms, Wealth and Inequality: Evidence from Canada's Western frontier*

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# INTRO

- 1870 to 1930 a period of rapid economic growth for the Canadian economy.
- Economic growth accompanied by rising wealth *and rising inequality*.
- Evolution of wealth and inequality in Canada over the period 1870 to 1930 examined using probated estates from: Eastern Judicial District, Manitoba, Thunder Bay District, Ontario and Wentworth, County, Ontario.

# The Story...

- Western settlement played the role of a booming resource sector in Canada's economy during the 1870 to 1930 period.
- This boom increased the size of the Canadian economy and expanded aggregate wealth but only raised real per capita wealth in the short run – there was a post-boom decline in wealth.
- Inequality rose in Canada between 1870 and 1930 but more slowly after the 1896-1914 boom.
- The western boom raised both the level of wealth and inequality only in the short term and caused the Canadian economy to deviate from its longer-term growth performance at least in terms of per capita wealth accumulation.

# Dimensions to Story

- The effect of the booming sector on per capita wealth in the short & long term.
- The effect of the booming sector on wealth and inequality.

# Land and Resources

- Natural resources have traditionally been seen as an important source of Canadian growth
- One important component of wealth determinants in 19<sup>th</sup> century Canada that has not been fully explored is the effect of sudden windfalls in wealth as a result of natural resource rents and particularly land endowments acquired during settlement phases

# Land Policy in Canada

- In Upper Canada, there were land settlement grants during the early nineteenth century that were accompanied by a massive expansion of population and economic activity.
- For the west, Norrie (1975: 410) documents how the registration of homestead entries in the Canadian west jumps dramatically upwards during the wheat boom period after 1896 from 1,897 in 1896 to 7,426 in 1900 to 44,749 by 1911.

# Dominion Land Grants Policy

- Title to 160 acres of land to any settler over 18 years of age after three years of residence subject to minimum use of the land and a ten-dollar fee.
- Manitoba was first on the Canadian western frontier to be subject to large-scale agricultural settlement particularly after the Canadian Pacific Railway reached Winnipeg after 1883.

# Farms in Manitoba and Canada

## Farm Statistics

<i>Year</i>	<b>Farm Holdings</b>		<b>Area of Farm Holding*</b>		<b>Acres of Improved Land*</b>	
	<b>Manitoba</b>	<b>Canada</b>	<b>Manitoba</b>	<b>Canada</b>	<b>Manitoba</b>	<b>Canada</b>
<i>1881</i>	9077	464025	2384	45358	250	21866
<i>1891</i>	22008	542181	5228	60288	1232	28603
<i>1901</i>	32252	511073	8843	63422	3995	30166
<i>1911</i>	43631	682329	12184	108969	6746	48734
<i>1921</i>	53252	711090	14616	140888	8058	70770

\* Thousands of acres

Source: Historical Statistics of Canada Series (1983) M12, M19, M23, M30, M34, M41.

# Effect of Booming Sectors

- Canadian economy can be divided into two regions – a natural resource region (west) and a manufacturing region (east).
- Capital and labour mobile across the two regions in short run; mobile internationally between Canada and world in the long run.
- Prairie wheat boom increases demand for labour in the west which raises wages and attracts labour and capital from east.
- Short run: wages rise in the west and in the manufacturing region.
- Long run: capital and labour migrate to Canada from the rest of the world equalizing factor returns and therefore the ultimate impact of the boom is to increase the overall size of Canadian income – and wealth – but not per capita amounts.

# Factors Affecting Inequality

- Growth in income and wealth (Kuznets Curve)
- Population characteristics – age, cohort size
- Technology
- Globalization
- Education supply and demand for skills

# Economic Growth & Inequality

- Is inequality necessary for growth?
  - First, according to the Kaldor hypothesis, the marginal propensity to save of the rich is higher than that of the poor.
  - Second, there are indivisibilities in investment that require large sunk costs that require wealth concentration.
  - Third, there is a trade-off between equity and efficiency that has growth effects.

# Empirical Evidence

- Alesina and Rodrik (1994) show that growth in the Gini coefficient seems to slow economic growth.
- Persson and Tabellini (1994) and Perotti (1994) also find greater equality in income distribution positively related to economic growth.
- Aghion, Caroli and Garcia-Penalosa (1999) argue that the view that inequality is necessary for accumulation and redistribution harms growth is at odds with the empirical evidence.

# However...

- Aghion, Corli and Garcia-Penalosa (1999) acknowledge that macroeconomic volatility another factor.
- High inequality generates macroeconomic fluctuations via unequal access to investment opportunities and imperfect capital markets that can generate credit cycles.
- During a boom, the higher net worth of investors allows for the accumulation of more debt. As savings increase a larger fraction is invested in lower yield opportunities, which then results in an economic slump. Can result in a boom with rising inequality.

# Clark & Taylor (1999)

- Data for the United Kingdom documented a huge growth in inequality during Britain's economic boom of the post 1979 era but after 1990 as the boom gave way to a slump, the rise in inequality was halted.

## Two additional ingredients in inequality

- Link between inequality and the manner in which assets are held which influences returns and subsequent distribution of wealth.
- Effect of individual windfalls in wealth as a result of natural resource rents and particularly land endowments acquired during settlement phases.

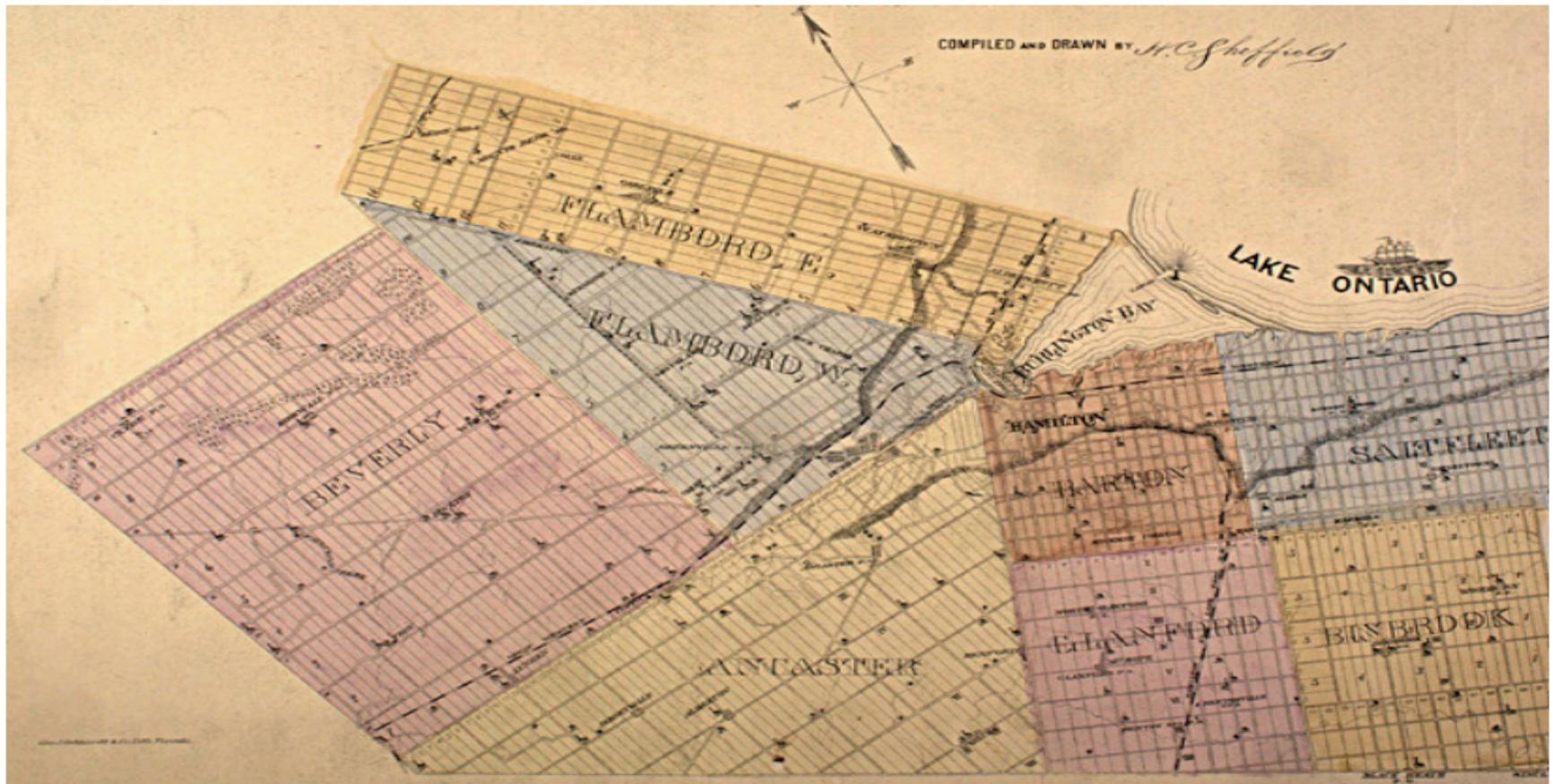
# The Data: Probate Wealth Data

- Wentworth County, Ontario
  - 2,516 probated decedents from 1872-1927
- Thunder Bay District, Ontario
  - 2,338 estates from 1885 to 1930
- Eastern Judicial District of Manitoba
  - 500 probated decedents from 1875 to 1927

# Data Caveat

- Are populations of probate records in more settled and developed areas comparable to frontier regions?
- Mobility and turnover of population on frontier.
- Transiency also a feature of urban populations.
- No reason to believe a priori that there are asymmetric differences in rates of migration and persistence between the urban and rural regions.
- Gagan(1976) - migration levels were as high in rural communities as they were in urban areas

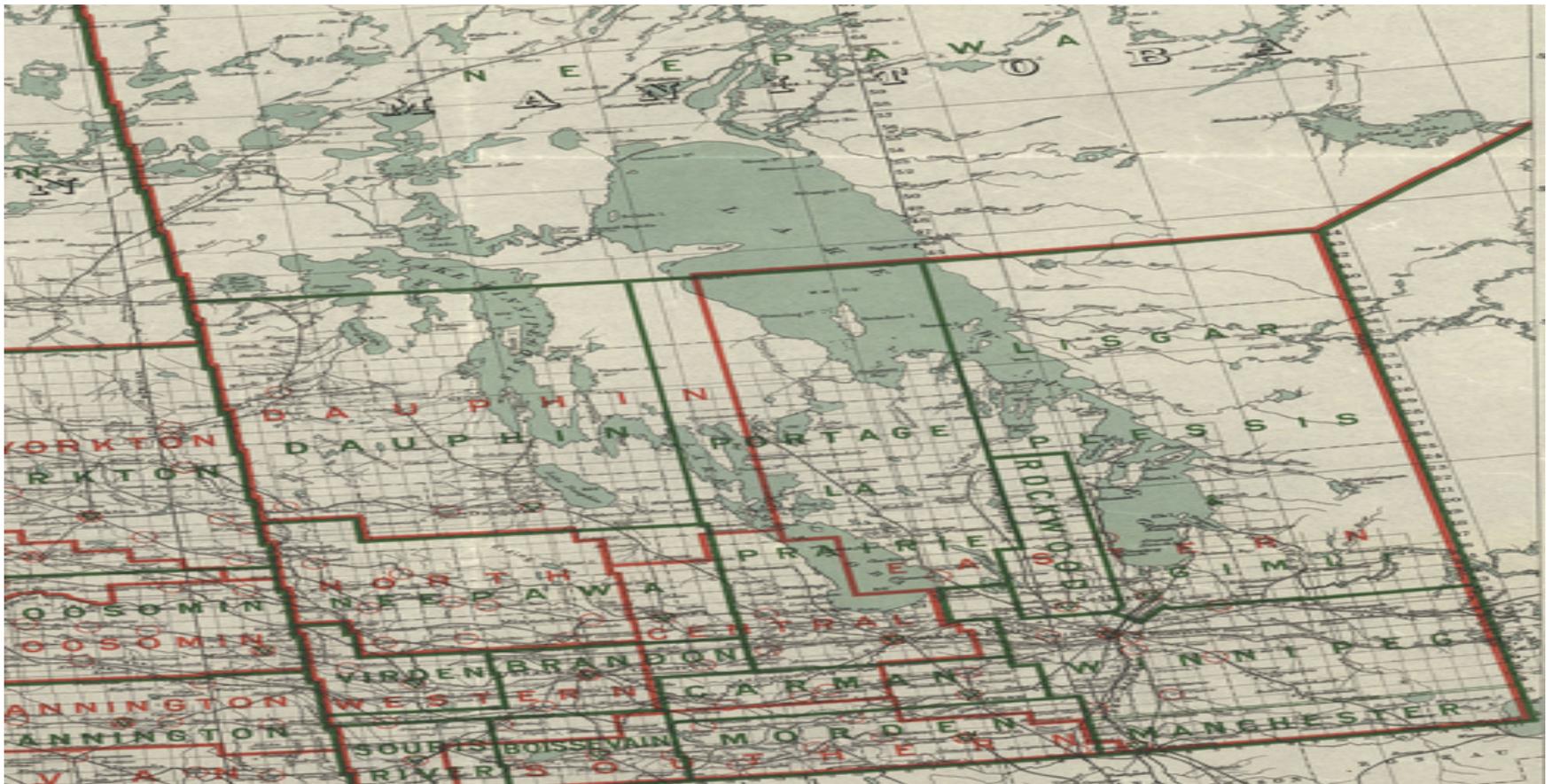
# Wentworth County (Source: Canadian County Atlas Digital Project- circa 1880s)



# Thunder Bay District (Source Rand McNally Commercial Atlas of America, 1924).



# Manitoba (Source: Department of the Interior, Canada, 1919)

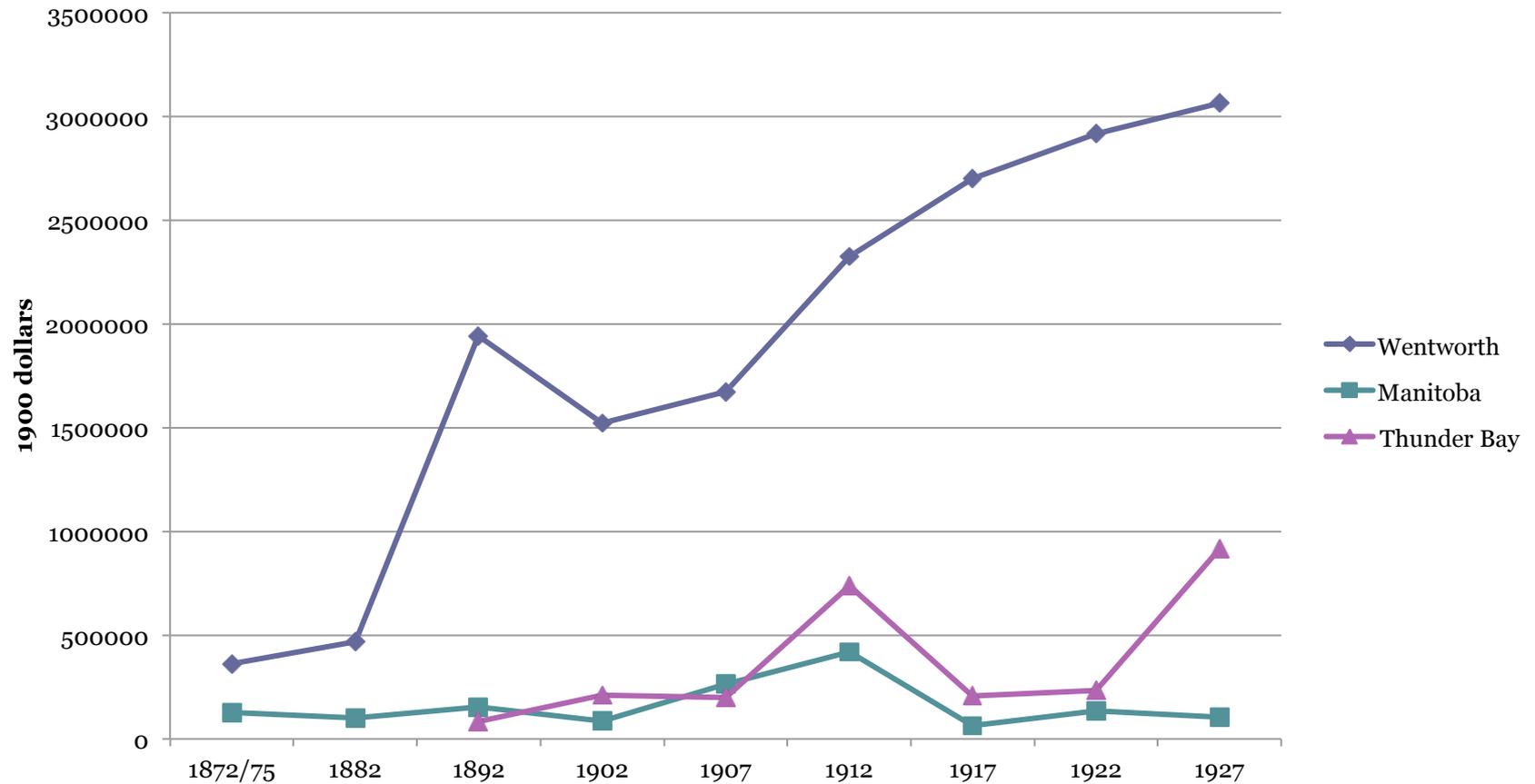


**Table 1: Summary Characteristics: 1872-1930\***

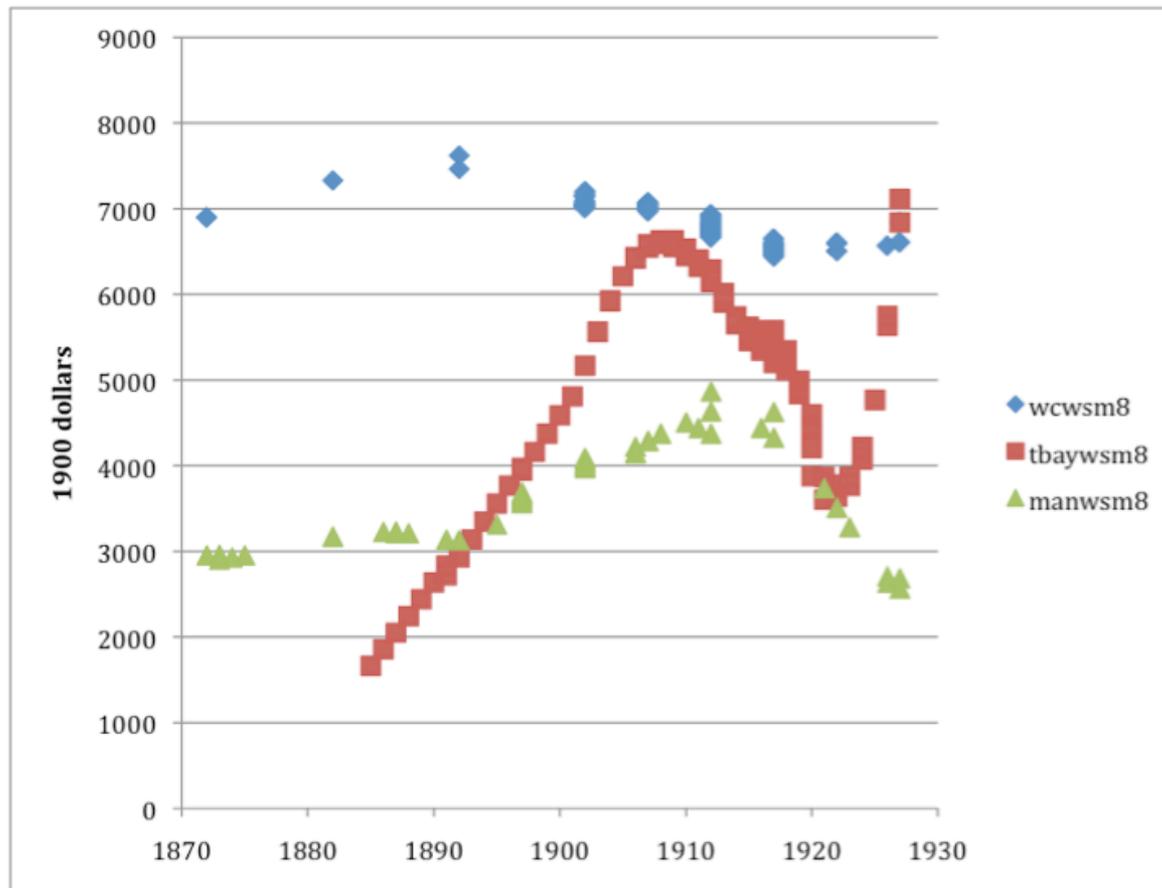
	<i>Wentworth Co.</i>	<i>Manitoba</i>	<i>Thunder Bay District</i>
<b><i>BASIC CHARACTERISTICS</i></b>			
N	2516.00	500.00	2338.00
Proportion Testate	0.68	0.44	0.49
Proportion Farmer	0.14	0.21	0.09
Number of Children	2.14	2.20	1.64
Proportion With Children	0.62	0.57	0.51
Proportion Male	0.63	0.76	0.77
Proportion in Hamilton	0.71	0.00	0.00
Proportion in Winnipeg	0.00	0.47	0.00
Proportion in Lakehead	0.00	0.00	0.70
<b><i>WEALTH</i></b>			
real estate (1900\$)	2383.00	2106.00	2425.92
financial assets (1900\$)	3866.00	849.00	3936.52
total wealth (1900\$)	6796.00	3709.00	6966.92
Proportion with Real Estate	0.64	0.59	0.69
Proportion with Financial Assets	0.77	0.43	0.71
<b><i>MARITAL STATUS</i></b>			
married	0.50	0.58	0.55
widow	0.20	0.07	0.09
widower	0.13	0.09	0.07
single	0.17	0.26	0.28

\*Wentworth & Manitoba span 1872-1927, Thunder Bay spans 1885 to 1930.

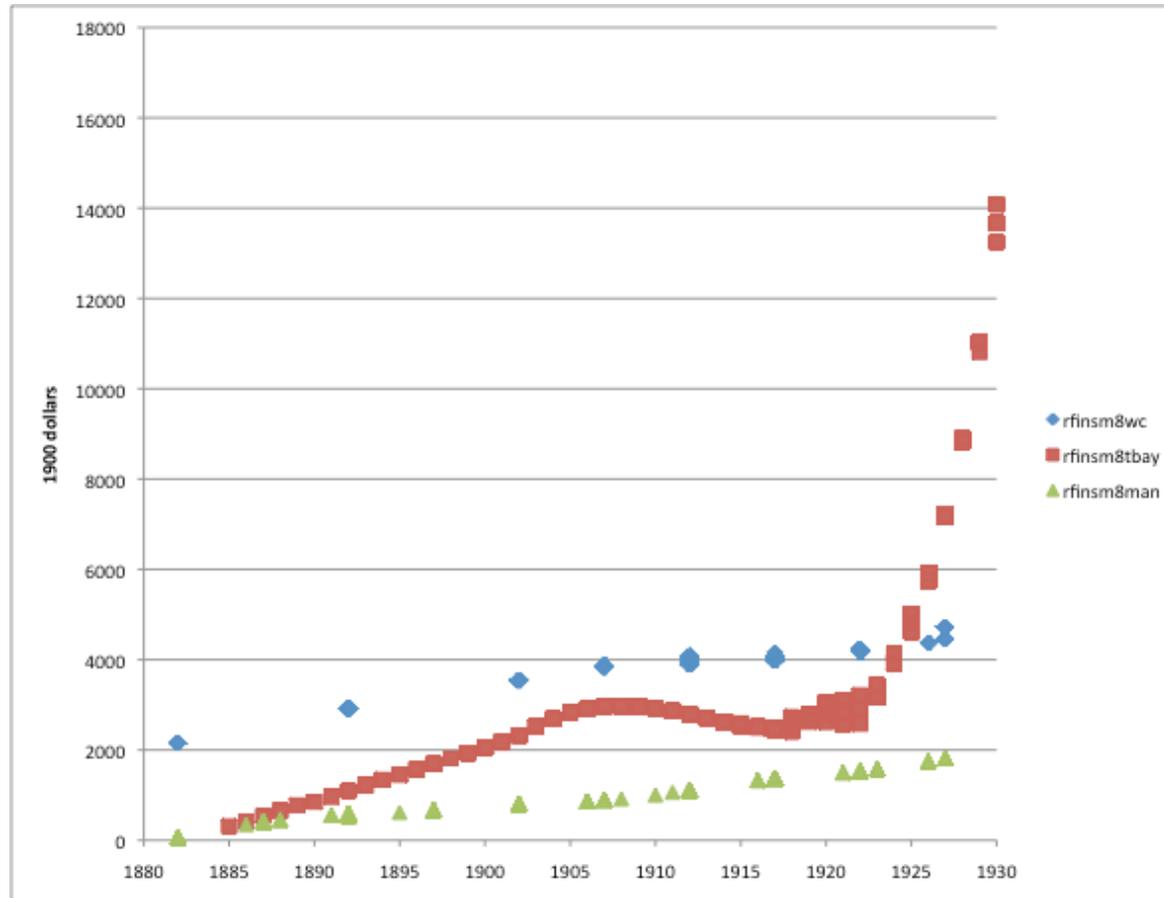
# Real Aggregate Wealth: 1872/75-1927



# Real Per Capita Wealth Trends: LOWESS Profiles

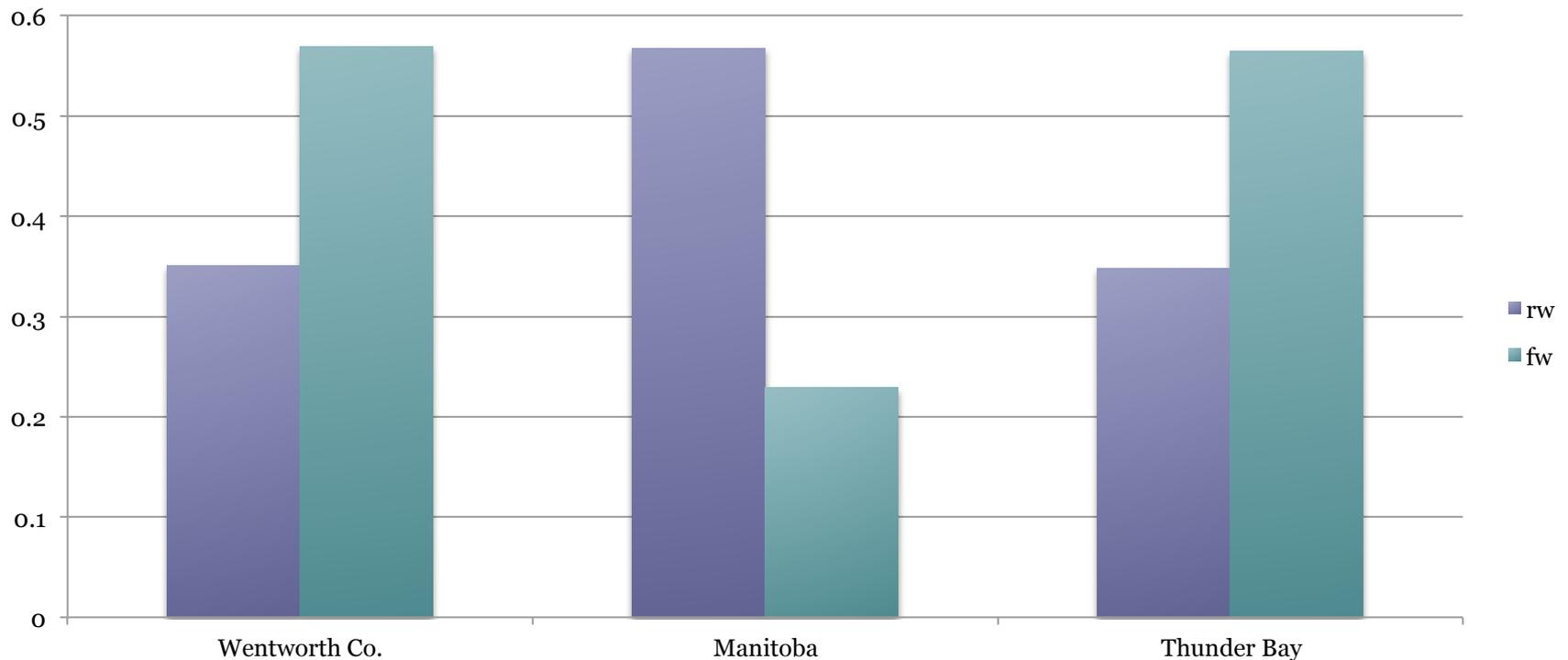


# Real Per Capita Financial Assets: LOWESS SMOOTH



# Portfolios

## Wealth Share Held as Real Estate (rw) and Financial Assets (fw\*): 1872-1927 (fw is 1882-1927)



# Regression Analysis

Determinants of Log of Real Wealth to determine boom and bust trend while controlling for confounding factors

**Table 2: Variables in Determinants of Wealth Regression**

lrwelt	Log of real wealth (1900 dollars)
majorurbancenter	1 if resident of Hamilton, Lakehead or Winnipeg, 0 otherwise.
period187099	1 if estate probated during 1870-99, 0 otherwise
period190014	1 if estate probated during 1900-14, 0 otherwise
period191530	1 if estate probated during 1915-30, 0 otherwise
male	1 if male, 0 otherwise
children	number of children
wentworth	1 if estate probated in Wentworth, 0 otherwsie
thunderbay	1 if estate probated in Thunder Bay District, 0 otherwise
manitoba	1 if estate probated in Manitoba, 0 otherwise
married	1 if decedent married, 0 otheriwse
marspd	1 if decedent widow or widower, 0 otherwise
single	1 if decedent single, 0 otherwise
rw	Proportion of wealth held as real estate
agriculture	1 if employed in agriculture, 0 otherwise
buildingtrades	1 if employed in building trades, 0 otherwise
service	1 if employed in service industries, 0 otherwise
government	1 if employed in civil government, 0 otherwise
fishhunt	1 if employed in fishing or hunting, 0 otherwise
forestry	1 if employed in forestry, 0 otherwise
manufact	1 if employed in manufacturing, 0 otherwise
mining	1 if employed in mining, 0 otherwise
profession	1 if employed in professions, 0 otherwise
trade	1 if employed in trade & commerce, 0 otherwise
transcomm	1 if employed in transport & communications, 0 otherwise
laborer	1 if employed as laborer, 0 otherwise
retired	1 if retired, 0 otherwise
otherocc	1 if no occupation or unclassified, 0 otherwise

# Results

**Table 3: Determinants of Wealth Regression I**

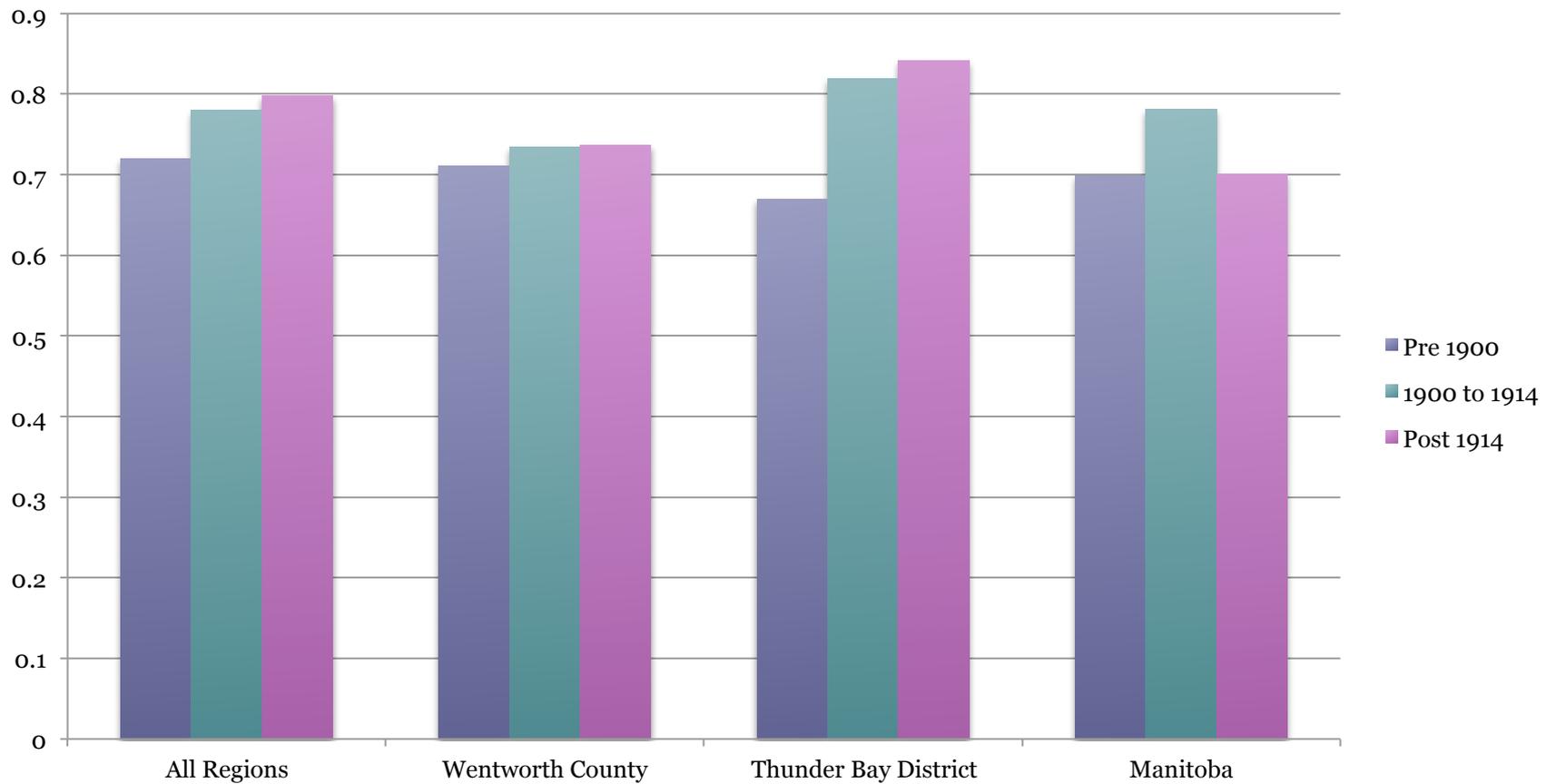
Irwelt	All Decedents		Major Urban Centers Only	
	Coef.*	t	Coef.*	t
majorurbancer	-0.01	-0.17		
period187099	-0.06	-0.94	-0.13	-1.58
period191530	<b>-0.16</b>	-3.65	<b>-0.21</b>	-4.16
male	<b>0.22</b>	2.75	0.16	1.81
children	<b>0.03</b>	3.38	<b>0.03</b>	3.04
wentworth	<b>0.62</b>	8.35	<b>0.34</b>	3.31
thunderbay	<b>0.35</b>	4.37	0.15	1.49
married	<b>0.51</b>	9.51	<b>0.49</b>	8.19
marspd	<b>0.56</b>	8.53	<b>0.59</b>	7.92
rw	<b>0.20</b>	4.03	<b>0.21</b>	3.64
buildingtrades	-0.21	-1.94	0.17	1.32
service	0.01	0.07	<b>0.41</b>	2.53
government	0.01	0.06	<b>0.34</b>	2.46
fishhunt	0.18	0.53	0.67	1.69
forestry	0.40	1.18	0.71	1.98
manufact	0.01	0.13	<b>0.36</b>	2.92
mining	<b>-0.64</b>	-2.34	-0.32	-1.13
profession	<b>0.48</b>	4.46	<b>0.86</b>	6.52
trade	<b>0.77</b>	8.13	<b>1.20</b>	10.17
transcomm	-0.17	-1.74	0.18	1.54
laborer	<b>-1.29</b>	-12.94	<b>-0.94</b>	-7.91
retired	<b>0.44</b>	4.93	<b>0.83</b>	7.16
otherocc	-0.17	-1.78	0.17	1.45
_cons	<b>6.40</b>	49.06	<b>6.35</b>	37.02
Adj R-squared	0.1475		0.1521	
F( 23, 5293)	40.99		35.03	
n	5317		4317	

\* **bold** denotes significant at 5% level

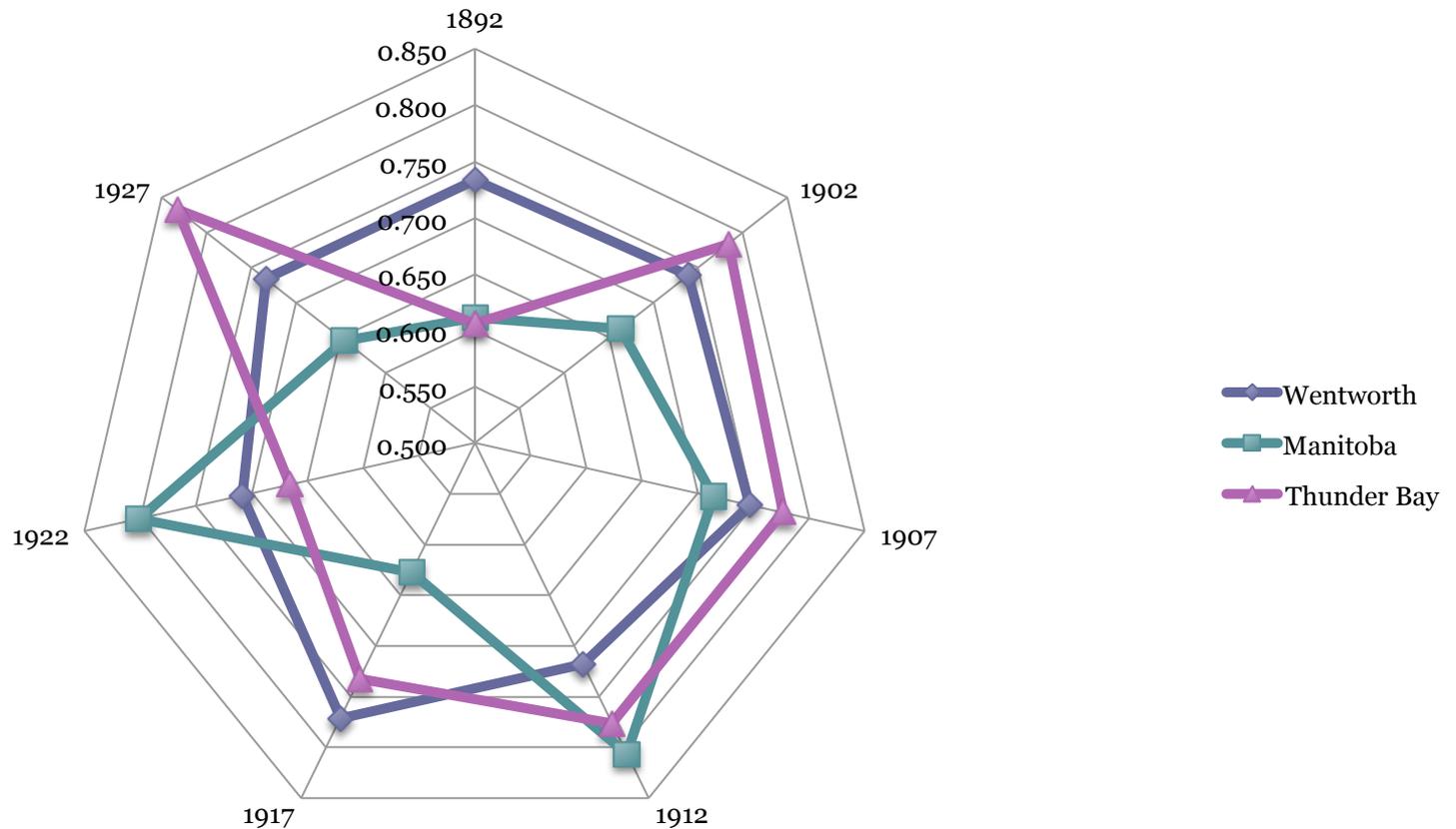
# Analysis of Inequality

- Inequality measures constructed
  - Gini Coefficient
  - Theil Coefficient
  - Coefficient of Variation

# Gini



# Gini Inequality Over time: 1892-1927



# Empirical Analysis

- Construct annualized data for inequality and inequality determinants for the period 1872-1927 for Wentworth Co., Thunder Bay District & Manitoba
- Estimate a regression to see what variables affect inequality

# Regression Variables

**Table 5: Variables for Inequality Regressions**

<b>Variable</b>	<b>Description</b>
year	Year estates probated
wentworth	1 if Wentworth County, 0 otherwise.
manitoba	1 if Manitoba, 0 otherwise.
thunder Bay	1 if Thunder Bay district, 0 otherwise
number	Number of decedents probated in observation year.
gini	Value of GINI inequality coefficient
theil	Value of THEIL inequality coefficient.
male	Proportion male.
children	Average number of children.
wealth	Average nominal wealth (\$).
rwealth	Average real wealth (\$1900 dollars)
realest	Average nominal real estate.
rrealest	Average real real estate (\$1900 dollars).
hamilton	Proportion of Wentworth decedents residing in Hamilton.
winnipeg	Proportion of Manitoba decedents residing in Winnipeg.
lakehead	Proportion of Tbay District residents in Lakehead.
married	Proportion married.
marspd	Proportion with deceased spouse.
single	Proportion single.
farmer	Proportion of decedents employed as farmers.
realestp	Proportion of decedents reporting real estate ownership.
rw	Average ratio of real estate to total wealth.

# Summary Statistics for Regression Variables

**Table 6: Summary Statistics for Inequality Data Set**

Variable	Obs	Mean	Std. Dev.
year	29	1904	16.07794
wentworth	29	0.3103448	0.4708236
manitoba	29	0.3793103	0.493804
thunderbay	29	0.3103448	0.4708236
number	29	118.8966	134.4104
gini	29	0.7148053	0.0692704
theil	29	1.140518	0.3300092
male	29	0.7570331	0.1067803
children	29	2.00233	0.5740097
wealth	29	6925.758	3910.433
rwealth	29	5101.771	2425.296
realest	29	2958.462	1843.657
rrealest	29	2311.065	1498.96
hamilton	29	0.202957	0.3145713
winnipeg	29	0.1904269	0.2824923
lakehead	29	0.2091057	0.3194225
married	29	0.546753	0.1058429
marspd	29	0.2353318	0.1001832
single	29	0.2567799	0.1321156
farmer	29	0.1592782	0.1023516
realestp	29	0.6065873	0.2027952
rw	29	0.4319793	0.164051

# Inequality Regression Results-I (Bold denotes significant at 5% level)

**Table 7: Inequality Regression Results**  
(OLS Regression)

	Gini coefficient*	t-statistic	Theil coefficient	t-statistic
year	0.000119	0.13	0.003742	0.84
propmajorurb	0.037678	0.31	-0.024286	-0.04
wentworth	-0.066563	-1.69	-0.175511	-0.90
thunderbay	-0.028939	-1.21	0.052766	0.45
male	-0.086298	-0.65	-0.874184	-1.33
children	0.019431	0.78	0.134512	1.10
rwealth	<b>0.000029</b>	<b>7.77</b>	<b>0.000124</b>	<b>6.75</b>
married	<b>-0.425877</b>	<b>-2.78</b>	<b>-1.337498</b>	<b>-1.77</b>
marspd	<b>-0.473738</b>	<b>-4.28</b>	<b>-2.284895</b>	<b>-4.19</b>
farmer	-0.158592	-0.75	-0.793766	-0.77
rw	-0.232638	-1.22	-0.927572	-0.99
realestp	0.088881	0.55	0.187831	0.23
_cons	0.790933	0.45	-4.486546	-0.52
Adjusted R-sq	0.7755		0.7604	
F(12,16)	9.060000		8.410000	

\* **Bold** denotes significant at 5% level.

# Inequality Regression Results-II (Bold denotes significant at 5% level)

<b>Table 8: Inequality Regression Results</b>				
(OLS Weighted Regression by Number of Observations)				
	Gini		Theil	
	coefficient*	t-statistic	coefficient	t-statistic
year	-0.000907	-1.15	-0.001910	-0.43
propmajorurb	0.022974	0.21	-0.017044	-0.03
wentworth	<b>-0.068873</b>	<b>-2.13</b>	-0.302665	-1.68
thunderbay	-0.017908	-0.74	0.015405	0.11
male	<b>-0.229581</b>	<b>-1.98</b>	<b>-1.707265</b>	<b>-2.64</b>
children	-0.008265	-0.45	-0.018896	-0.18
rwealth	<b>0.000027</b>	<b>7.85</b>	<b>0.000125</b>	<b>6.45</b>
married	<b>-0.298623</b>	<b>-2.52</b>	-0.991710	-1.50
marspd	<b>-0.452573</b>	<b>-4.19</b>	<b>-2.173283</b>	<b>-3.61</b>
farmer	-0.207390	-1.17	-1.083591	-1.09
rw	-0.286656	-1.52	-1.678743	-1.60
realestp	0.135745	0.82	0.863320	0.93
_cons	2.853421	1.86	7.005610	0.82
Adjusted R-sq	0.7751		0.7517	
F(12,16)	9.04		8.06	
* <b>Bold</b> denotes significant at 5% level.				

# Inequality Regression Results-III (Bold denotes significant at 5% level)

**Table 9: Inequality Regression Results Using Most Significant Variables**

(OLS Weighted Regression by Number of Observations)

	Gini		Theil		
	coefficient*	t-statistic	coefficient	t-statistic	
wentworth	<b>-0.043083</b>	<b>-2.31</b>	-0.177734	-1.74	
thunderbay	-0.008892	-0.45	0.074211	0.68	
male	-0.149375	-1.79	<b>-1.555650</b>	<b>-3.40</b>	
rwealth	<b>0.000027</b>	<b>8.54</b>	<b>0.000122</b>	<b>7.02</b>	
married	<b>-0.302483</b>	<b>-4.05</b>	<b>-0.861776</b>	<b>-2.11</b>	
marspd	<b>-0.489388</b>	<b>-5.88</b>	<b>-2.309317</b>	<b>-5.06</b>	
farmer	-0.167542	-1.85	-0.925450	-1.87	
rw	<b>-0.157596</b>	<b>-3.14</b>	<b>-0.772867</b>	<b>-2.81</b>	
_cons	1.082609	13.52	3.229006	7.36	
Adjusted R-sq	0.8018		0.7892		
F(8,20)	15.16		14.10		
* <b>Bold</b> denotes significant at 5% level.					

# Conclusions

- The effect of the western land settlement boom was to raise both the level of wealth and inequality in the short term with the end of the boom period reducing wealth and inequality.
- Share of wealth held as real estate positively and significantly related to level of wealth and negatively correlated with inequality.