

**UTC2720**

**Income Inequality: A Teleological Perspective**

Special Term Part 2 AY 2018/2019

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#### **Introduction**

Over the past few decades, there has been increasing wealth inequality all over the world. A major factor for this has been the growing inequality in wage income, which has been observed in many free-market democracies. This report will look at five countries in particular, namely: Norway, the United States (U.S.), Singapore, Malaysia and Sweden. We will be examining pre-tax wage income data, as well as how the level of income inequality in these countries deviate from an ideal society, BhuVai (Venkatasubramanian, 2017), and what accounts for such differences. We will also take a look at some of the post-tax policies in the different countries and evaluate their effectiveness based on the post-tax wage income data. Lastly, a one-class agent-based model simulation will be done based on 2 countries - Singapore and Sweden, to mimic the income distribution of these 2 countries over the same period and observe the accuracy of the theoretical inequality function.

#### **Pre-Tax Wage Income Data**

We collected wage income data using the World Income Database to get some context for the levels of income we intended to model.

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| Figure 1a Pre-Tax Income, Norway |
| Figure 2a Pre-Tax Income, United States |
| Figure 3a Pre-Tax Income, Singapore |
| Figure 4a Pre-Tax Income, Malaysia |
| Figure 5a Pre-Tax Income, Sweden |

While the income shares do display an overall trend of the bottom 90% having reduced income shares and the top 1% increasing their incomes shares, a more meaningful measure of this inequality would be one that shows the deviation of these income shares from the ideal. Therefore, the non-ideal inequality coefficient, ψ, is used. To calculate this ψ for every country, we found values of σ and μ, in which:

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#### **Extending Wage Income Data Using ψ**

For all five countries, we took data of the mean income from the World Income Database. For minimum income, In Singapore, while no minimum wage exists, the lowest wage that was fixed by the state was $1000 in 2014 for government cleaners (Tan, 2014). We adjusted this for inflation for every preceding year. The highest salary was taken from the highest paid government official in Singapore, which was comparable to many Singaporean listed companies’ CEOs (Singapore Government Website, 2018). Since this CEO pay was based on performance of the company, we took the ratio of this maximum income to average income for 2018 and scaled it for every preceding year.  
  
For the minimum salaries of other countries, we obtained the latest (2019) minimum salary from [www.salaryexplorer.com](http://www.salaryexplorer.com) and took the proportion of min salary/mean salary for that year. Then, we took that ratio, and multiply against the mean salary for the different years to get an estimate of the minimum salary for each year.   
  
For the maximum salaries of other countries, we obtained them from table 6.1 in How Much Inequality Is Fair by Professor Venkat, with the exception of Malaysia which we obtained from salaryexplorer.com then adjusted it for inflation each year. Using these values, we calculated the ideal share for each of the three classes and then compared them to empirical data to get non-ideal inequality coefficient, ψ.

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| Figure 1b Pre-Tax Income using ψ, Norway |
| Figure 2b Pre-Tax Income using ψ, United States |
| Figure 3b Pre-Tax Income using ψ, Singapore |
| Figure 4b Pre-Tax Income using ψ, Malaysia |
| Figure 5b Pre-Tax Income using ψ, Sweden |

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#### **Post-Tax Wage Income Data**

In attempting to obtain a more complete idea of the state of income distribution in the world, it was important to collect data pertaining to income distribution after taxation.

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| Figure 6 Post-Tax Income, Norway |
| Figure 7 Post-Tax Income, United States |
| Figure 8 Post-Tax Income, Sweden |

**Comparison and Analysis of Actual Data with Ideal Society**

In an ideal hybrid society such as BhuVai, “all are treated as equals and everyone enjoys the same rights associated with life and liberty, similar to the individuals in Rawlsian and Nozickian societies” (Venkatasubramanian, 2017, p. 38).

As seen from the graphs (Fig. 1b-5b), all the countries deviate from BhuVai, with Norway deviating the least and the US deviating the most from ideal. Also, all countries have seen an overall increase in national income share for the top 1% since 1980, showing the growing inequality. This deviation of actual data from the ideal is due to the failure of the free-market system in creating a level playing field for all its agents (Venkatasubramanian, 2017).

#### **Comparison and Analysis of Data across Countries**

Sweden and Norway both being scandinavian countries, have roughly the same pre-tax income share distribution (Fig. 1a and 5a) among the different income levels, with the bottom 90%, middle 9% and top 1% having about 70%, 20% and 10% share of the national income respectively. However, as we take a closer look at Fig 1b , Norway has a larger deviation from the non-ideal inequality coefficient distribution. Also, as seen in the post-tax income distribution between these 2 countries (Fig. 6 and 7), their distribution among the bottom 50% and top 10% differs significantly with Norway’s top 10% having a larger share. This could be due to the different tax policies implemented between the 2 countries and their varied effectiveness.

Next, let us compare the 2 southeast asian countries Singapore and Malaysia. Singapore’s distribution of the inequality coefficient (Fig. 3b) over the years seems comparable to that of the Scandinavian countries in recent years. Looking at the pre-tax national income distribution (Fig. 3a) for Singapore in recent years, the top 1% occupies only about 13% of the income pie and the middle 9% occupies about 30% of the income pie, leaving an estimated 57% for the bottom 90%. We see a trend in Singapore’s bottom 90% share decreasing further and further while the middle 9% has their share increasing but the top 1% remains relatively stagnant, which may lead to a problem of greater divide between the middle and bottom levels. In comparison, Malaysia seems to be doing better in managing income inequality as its bottom 90% has close to 80% of the income share, with the top 1% occupying close to 10% like Singapore and scandinivian countries (Fig.4a). This is also evident as Malaysia’s bottom 90% share deviates less from the ideal society of BhuVai, as compared to Singapore (Fig.4b). It's interesting to see how Singapore despite being the most economically developed country in southeast asia to deviate further from ideal income inequality distribution than Malaysia. Which brings us to the question whether Singapore’s economic growth is at the expense of the bottom 90%.

The income distribution of the US and Singapore’s are the most similar to each other with the bottom 90% only occupying 55-60% of the income pie. However, the US shows a more worrying trend of the top 10% getting larger shares of the pie at the expense of the bottom 90% while Singapore’s only has the middle 9% steadily increasing. Yet, the US middle 9% share lie closer to that of the ideal society of BhuVai as the non-ideal inequality coefficient is very close to 0%, but Singapore’s is deviating towards 20%. This shows that though both countries have a problem of growing inequality, the 2 countries differ in the classes which the inequality is prominent in. Knowing this, the government would be able to devise policies targeting certain classes only to reduce this inequality and model the income distribution closer to that of the ideal.

**Possible Factors that Lead to Income Inequality in Singapore**

The shift from manufacturing industry, which engaged a large proportion of the workforce in the 1960s and 1970s, to knowledge-based economy in the 1980s, which demanded more highly skilled workers, had resulted in structural unemployment, leading to a widening income gap between the highly skilled and the unskilled (Dhamani,2008).

Additionally, the strong emphasis of meritocracy where individuals were rewarded based on merits and achievements over the years had resulted in the job markets paying well to those with educational accomplishments over those with vocational technical training, resulting in a widening income gap (Dhamani, 2008).

In addition, regarding taxation policy, personal income tax rates remain progressive but have declined over the past years. Currently the marginal tax rate is 3.5% on annual income of S$30,000, rising to the maximum marginal tax rate of 20% on annual income above S$320,000. This is a decline from the tax rates in 2003-05 which was 4% and 22% respectively. This reduction benefits the higher income groups more than the lower income segment. Corporate income tax has been progressively reduced over the years from over 40% in the 1960s to 18% currently. With the reduction in corporate and personal income tax, the government made up for the loss in tax revenue by progressively increasing the Goods and Services Tax (GST) from 3% in 2003 to 7% in 2008. GST equally affects all consumers, both rich and poor alike, thus undermining the equalising role of the taxation policy. Although GST vouchers do help to relieve the burden on the low-income households, the cumulative effect of decreasing personal and corporate taxes and increasing GST has led to a greater income divide (Dhamani, 2008).

**Post-Tax Policies and Transfers**

Owing to the different post-tax policies of Norway, the United States, Singapore, Malaysia, and Sweden, they have resulted in varying degrees of effectiveness. Such policies are seen as follows:

**Norway**

In Norway, the public social security system, also known as the Norwegian National Insurance Scheme, permits every resident to gain access to services offered by The Norwegian Labour and Welfare Administration (NAV).

Firstly, unemployment benefit – there is a minimum income from paid work of at least NOK 149,787 in the last 12 completed calendar months (1.5 x the National Insurance basic amount – “G”), or at least NOK 299,574 (3G) over the last 36 completed calendar months (NAV, 2011).

Secondly, health services are financed by the government, through the National Health Insurance Scheme and with patient charges. Residents must pay for all treatment, including a standard consultation with a General Practitioner (GP). However, once a person reaches an annual limit of expenditure, currently just over 2,000kr, they will receive an exemption card which entitles them to free treatment for the remainder of the year (Euraxess Norway, 2019).

Thirdly, retirement pensions are given to those who have had pensionable income and/or have at least three years of National Insurance cover, that is, they must have lived and/ or worked in Norway (NAV, 2015).

**United States**

Medicaid is a social welfare programme and also the nation’s public health insurance program for those with low income. It finances nearly a fifth of all personal health care spending in the U.S., providing significant financing for hospitals, community health centres, physicians, nursing homes, and jobs in the healthcare sector (Rudowitz, Garfield & Hinton, 2019).

Social security payment has a similar idea as pension. The average social security benefit was $1,461 per month in January 2019. The maximum possible social security benefit for someone who retires at full retirement age is $2,861 in 2019 (Brandon, 2019). Unemployment compensation provides partial income replacement only for a defined length of time or until the worker finds employment, whichever comes first. In the U.S., policies vary by state, but unemployment benefits will usually pay eligible workers up to $450 per week (Kagan, 2018).

**Singapore**

Government transfers include the two new funds in the Singapore Budget 2019 - the Merdeka Generation Fund of S$6.1 billion and the Long-Term Care Support Fund of S$5.08 billion. The key benefits of Merdeka Generation Package include annual MediSave top-ups over five years, additional outpatient care and MediShield Life premium subsidies for life, and additional participation incentives for Merdeka Generation seniors who join CareShield Life.

Besides, special transfers like the S$1.1 billion Bicentennial Bonus, where the government will dole out S$150 to S$300 to about 1.4 million lower-income Singaporeans aged 21 and above this year, will be implemented. The Bonus also includes top-ups to Edusave and Post-Secondary Education Accounts, and Central Provident Fund (CPF) top-ups of up to S$1000 for Singaporeans aged 50 to 64 this year who have less than S$60,000 of retirement savings in their CPF accounts (Lai, 2019).

**Malaysia**

Under the new Cost of Living Aid scheme, a revised version of the 1Malaysia People’s Aid (BR1M) scheme for low income families, households earning RM2,000 and below a month will receive RM1,000 in 2019. Households earning between RM2, 001 and RM3, 000 will receive RM750, while families earning RM3, 001 to RM4, 000 will receive RM500 (CNA, 2018).

Besides, the B40 (bottom 40%) National Protection Scheme, a free national health insurance scheme for the low income, will provide coverage against 36 critical illnesses. (Wai, 2018). Under the scheme, there will be income replacement payments of RM50 per day for up to 14 days, or RM700 a year for hospitalisation. This scheme aims to establish a comprehensive social safety net from the aspect of inclusive health insurance and takaful coverage for low income groups for free (Wai, 2018).

Additionally, the Employee Provident Fund (EPF), a social security institution under the Ministry of Finance Malaysia, manages a compulsory savings and retirement planning scheme for legally employed workers in Malaysia (ExpatGo, 2013).

**Sweden**

Government welfare policies include health subsidised doctor care mainly in the country clinics, free public hospital treatment and subsidised dental care, just to name a few. Besides, cash benefits are given to compensate for the loss of most wages due to sickness and a separate benefit is available for workers injured on the job. Furthermore, there is a tax-free monthly payment to parents for each child and single parents receive an additional payment. Pensions are also given to retired persons paid for by taxes and employers contributions (Costly, 2019).

#### **Agent-Based Modelling**

The analysis thus far has been very theoretical in nature. Therefore, to better appreciate how this theory might appear in real economic systems, we have employed Agent-Based Modeling (ABM) to observe the evolution of income distribution in society by defining a finite number of economic agents.

We ran simulations for Singapore and Sweden, with 100,000 agents attempting to maximise their utility based on 100 distinct salary bins. These simulations were done by using the σ and μ values that were calculated in the first part of this report. We decided to run the simulation from 1980 to 2014, which was the last year that reliable data for income share was found for Singapore.

**Singapore**

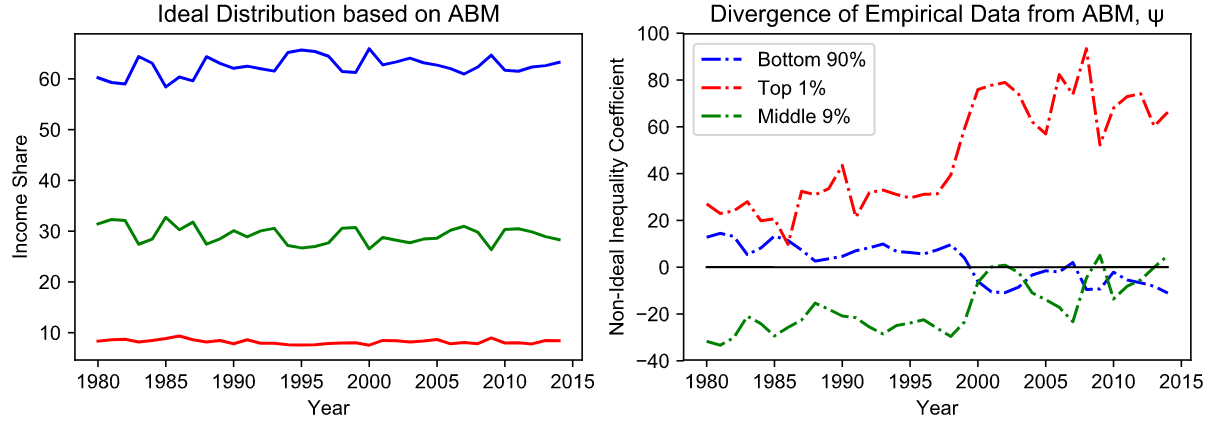


Figure 9 Results of ABM

From Fig. 9, we observed that from the period 1980 to 2014, the bottom 90% go from getting slightly more than their fair share in 1980 (of about 12% more) to getting 11% less than what they are due in 2014.

The middle 9%, which is also the top 10-1%, start in 1980 getting less than their fair share,with a disparity of 30%, but start moving towards more equitable income share levels, ending on a positive 5% in 2014. Both these two classes seem to tend towards the x-axis as time went on, getting fairer levels of income share.

However, the top 1% enjoyed tremendous growth to their already disproportionate levels of income share, starting at a positive 27% in 1980, and more than doubling in 2014 with a positive 66%.

**Sweden**

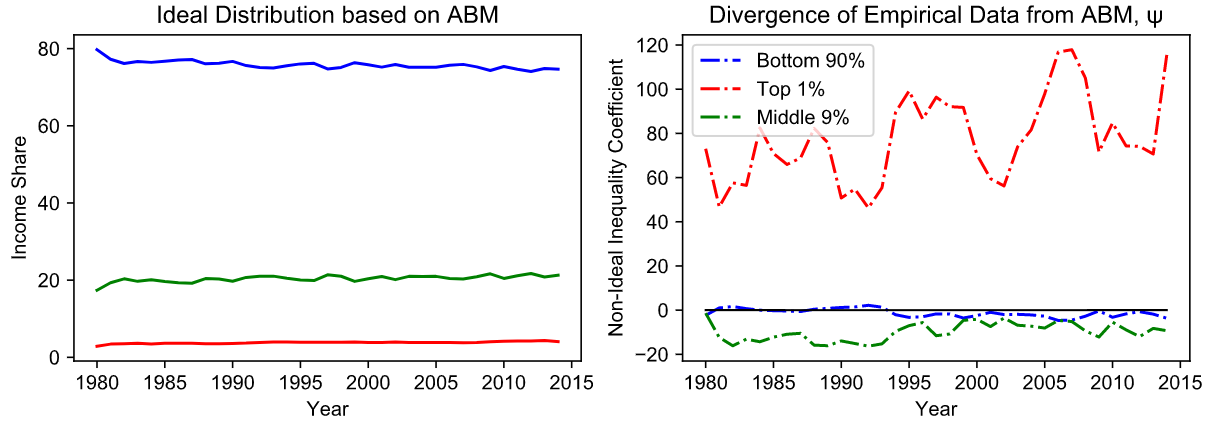


Figure 10 Results of ABM

Based on our simulations, the ideal income share that the bottom 90% should enjoy stayed mostly constant at about 75% of the economic pie. The top 1% was due around 3% of the total income in society and the middle 9% was to receive 20%.

When we used empirical data to calculate the non-ideal inequality coefficient, we observed that the bottom 90% and the middle 9% were receiving more or less their fair share of the entire income of society.

The bottom 90% had the most fair distribution, with ψ never falling below negative 5% throughout the 35 years. The middle 9% also received a comparably fair share, but they got slightly less than what they were due, an average of around negative 9%.

The top 1% for Sweden, again, did very well when comparing between reality and our simulation. They enjoyed gradually more income than was ideal. At its peak in 2014, the top percentile got 115% more income than what they were supposed to. From 1980 to 2014, however, they averaged a ψ coefficient of positive 77%.

**In Context**

Our modeling results showed that Sweden, in general, showed higher levels of equitable distribution in terms of income than Singapore. This could be accounted for in reality perhaps by the presence of stronger unions in Sweden, leading to higher wages for working-class jobs.

Additionally, when were compared the evolution of ψ using the ideal lognormal and the ABM, we found that while the general trends of data seemed to reconcile, there was sometimes marked differences in the ψ values for each year. This could be accounted for by the fact that we modeled our distribution using fixed, and finite number of distinct salary bins. In contrast, the lognormal distribution is a continuous one.

#### **Conclusion**

In conclusion, it is essential for us to compare the income share data of Singapore with that of other countries to realise where does our problem of income inequality lie in and how serious it is. Through this report, we have learnt that the income distribution of the scandinivian countries lie closest to the ideal income distribution of BhuVai, thus having the fairest income inequality. Also, despite Singapore being the most economically advanced southeast asian country, we have failed to address the growing inequality adequately unlike our neighbour, Malaysia. In fact, our income inequality is almost as bad as that of the US. This calls for a review of our current tax policies and compare them with those of the scandinivian countries so that we stop this divide from growing larger, especially in Singapore. Through agent-based simulation of Singapore and Sweden (using parameters we calculated for each country), we are able to mimic the income distribution of these 2 countries over the same period and observe the accuracy of the theoretical inequality function. Once its accuracy has been verified, we would be able to use this framework to predict how the income distribution would change if certain policies are enacted affecting the different parameters. This would allow governments to formulate accurate and effective policies to achieve the fairest income distribution. With policies being created that are supported by actual data from simulation and not through trial and error in the real world, less resources would be wasted in policy testing and there would be greater confidence and support in implementing the policies.

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