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**Income Inequality in South Korea, 1982-2020: Evidence from
the Distributional National Accounts**

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Abstract

This study presents “Distributional National Accounts (DINA)” for South Korea. I combine household survey micro data, tax data, and national accounts to build annual income inequality series, that is coherent with macro aggregates. I show the distribution of pre-tax national income by percentiles over the 1982–2020 period, with detailed breakdown by age, gender, and income composition. This series allow a much richer analysis of the long-run income inequality trend than the previous tax-based series, which only suggested top income shares and missed a rising part of (tax-exempted) capital income in recent years. My new series suggest that after the East Asia financial crisis, income inequality worsened and its ripple effect is still ongoing. Gender inequality is still very high in Korea, despite the improvement for the last 25 years. Also, senior citizens’ income is much lower than other age groups, which is contrast to US or France.

South Korea has a lower income inequality than its counterparts in East Asia because the national income growth was equally distributed in the early stage of economic development. In fact, the biggest difference of income distribution today among East Asian countries is based on how much bottom 50% could have increased their national income during the economic growth process. Korean growth incidence curve is similar to the “French type” during their “thirty glorious years”. On the other hand, Chinese growth incidence curves are similar to “US type” and Taiwanese one is similar to French one in recent years.

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Chapter 1

Introduction

The story of Korean economic development caught a lot of economists' attentions over decades. In the 1960s, Korea was indeed one of the poorest countries in the world. However, the post-1960s Korea's economy was very different to the one in the 60s. From 1960 to 1988, GDP per capita in Korea grew about 6.2 percent annually ([Lucas, 1993](#)). It is not news anymore that Korea had experienced one of the most successful economic development for decades.

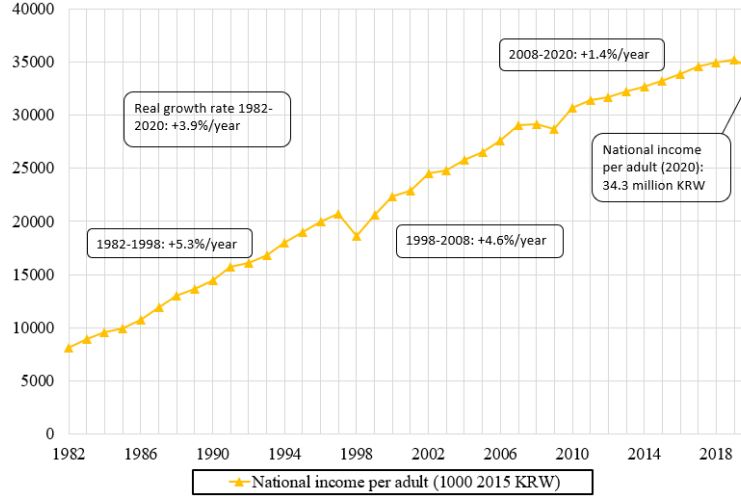
This successful economic growth was not gone even after this period. Korean economy continued to grow in the 1980s and 90s until the East Asia financial crisis in 1997. [Figure 1.1](#) suggests the average national income among adults in Korea from 1982 to 2020. The big blip in 1997 is caused by the East Asia financial crisis. The general belief about Korean economic growth is it ended right after this financial crisis, however, at least in terms of per adult national income growth, it kept growing even in the 2000s, almost as fast as increased in the 1980s and 90s until the global financial crisis in 2007.

After these glorious years of economic growth, so-called “the miracle on the Han river”, people started to question if this economic growth was a successful one. In fact, according to [OECD \(2020\)](#), 40.4% of senior citizens in Korea are still in poverty, which is the highest rate among OECD countries. Then did this “successful economic development” really get Korea out of poverty?

Regardless of disciplines, many scholars tried to answer this question. However, it is impossible to find an answer to this question without any quantitative inequality data and unfortunately there had not been much research done to put Korean economic inequality on the map, until very recently. [Kim and Kim \(2015\)](#) did a very first attempt to build the long-run trend of Korean income inequality using the homogeneous fiscal data, in the spirit of [Piketty and Saez \(2003\)](#). This series is available at World Inequality Database as fiscal income inequality series in Korea (hereinafter “WID series”). The caveat of their research is it only covers the fiscal income and top income concentration. The bottom and middle income percentiles are missing and so are individual characteristic in their series. Also, in the 1980s and 90s, tax data are not fully available, hence it is hard to estimate the total income inequality.¹

¹In fact, the total income inequality series is only available from 1976 to 1985 and 1995 to 2016. I discuss this data issue in the appendix. Please see the appendix A for details.

Figure 1.1: Per adult national income trend in Korea, 1982-2020



Notes: National income divided by adult population..

In this context, this study aims to construct a better income inequality dataset in Korea and show the long-run Korean income inequality trend with various perspectives. For that purpose, I use Distributional National Account (DINA) approach (Piketty, Saez, & Zucman, 2018; Alvaredo, Atkinson, et al., 2020) to show not only the distribution of fiscal income but also that of national income. This DINA series combines survey data, tax data, and national accounts, so that we can handle the inequality matters consistent with macroeconomic data. I discuss the DINA project in details in Chapter 2.

The remaining part of this thesis is as follows. In Chapter 2, I present the data sources that I used and explain the concept and methodology of DINA. In Chapter 3, I present Korea DINA series from 1982 to 2020 and suggest the result by inequality breakdowns: gender, age, and income decomposition. This paper is the first attempt to try showing the detailed pictures of income inequality in Korea for the last 40 years. After that, I compare this Korea DINA income series with other Asian countries whose DINA series are also available. The main purpose of DINA series is to construct the homogeneous inequality series to do a cross-country comparison. Unlike the other continent, comparative inequality analysis in East Asia is rarely done. In fact, Blanchet, Chancel, and Gethin (2022) did the comparative inequality research in Europe and Alvaredo, Assouad, and Piketty (2019) did for Middle-east. This paper contributes to providing similar analysis results in East Asia. In Conclusion, I discuss a possible research avenue in the future.

Chapter 2

Data and Methodology

In this chapter, I first review the related literature in this inequality research and suggest the context and aim of this DINA global project. Then, in the second section, I explain the detailed data source I used for DINA estimates. In the last section, I discuss the crucial concepts and methodology used in DINA. The longer version of detailed guidelines for constructing DINA series are available in [Alvaredo, Atkinson, et al. \(2020\)](#).

2.1 Related literature

Even though [Piketty \(2014\)](#) attracted many people's interest in inequality and put inequality on the mainstream economic and political discussion, the attempt to estimate the income distribution is not new. [S. Kuznets \(1953\)](#) tried to combine the income tax tabulation data with national income data to estimate the top income shares in the US from 1913 to 1948. Then, [Piketty \(2003\)](#) tried to expand this top income distribution analysis in the French context. [Piketty and Saez \(2003\)](#) refined and constructed the top fiscal income inequality series for the US. Ever since then many researchers tried to construct the top fiscal income series. In the context of East Asia, [Moriguchi and Saez \(2008\)](#) did construct the long-run top fiscal income distribution series for Japan. Then, using the tax data available in Korea, [Kim and Kim \(2015\)](#) and [Kim et al. \(2018\)](#) did construct the top fiscal income inequality series for Korea, from 1933 to 2016.¹

However, using the fiscal income data has some disadvantages. The biggest downside is tax-exempted incomes are missing in tax data. Because of this tax-exempted income, there are gaps between national income and fiscal income. This gap arises because of tax exempted income, tax avoidance, and tax evasion ([Piketty et al., 2018](#); [Alvaredo, Chancel, Piketty, Saez, & Zucman, 2020](#)). Due to this discrepancy between macroeconomic total and fiscal income inequality series, economists find it challenging to answer the distributional macroeconomic questions as previously mentioned in Chapter 1, i.e., how equally the economic growth has been distributed over the population. Also, fiscal data miss out the distribution of middle and bottom income shares. Estimating bottom and middle income distribution is as important as estimating top income shares, because that completes the whole picture of one country's income distribution. Furthermore, in the Korean

¹[Kim et al. \(2018\)](#) is the updated version of [Kim and Kim \(2015\)](#). The current WID fiscal income series in Korea is based on [Kim et al. \(2018\)](#).

context, we only can get an access to tax tabulation data that do not provide any individual characteristics.² Lastly, since each country has their own tax system and household survey, it hinders the accurate cross-country comparison of inequality. The homogeneous inequality data and methodology are necessary to proceed a cross-country comparative analysis in a consistent way. Because of these shortcomings, some researchers measure income distribution solely based on the survey data, however, household survey data usually have a more serious under-representative issue that is mostly concentrated in the top income distribution (Alvaredo, Atkinson, et al., 2020; Alvaredo, Chancel, et al., 2020; Carletto, Tiberti, & Zezza, 2022).

This is where “A System of Distributional National Accounts (DINA)” steps in. Alvaredo, Atkinson, et al. (2020) share this critical point of view on using fiscal income data and try to reconcile it by adding other datasets. The basic idea is to estimate top income distribution using tax data and bottom income distribution using survey data. They combine these two datasets and national accounts, so that this income inequality can be consistent with the macroeconomic data. Piketty et al. (2018) is the first application of this DINA project on the US. This DINA series captures 100% of national income distribution in the US and also shows the detailed income growth by income groups that is consistent with growth in macroeconomic total. Using the individual characteristic (such as gender and age etc.), they also suggest very detailed inequality long-run trend of each sub-groups’ income distribution, such as female income shares evolution over the years. Moreover, since every country follows the System of National Accounts, when producing its national accounts, these series are homogeneous among all countries and enable us to do a cross-country comparison in a comprehensive manner. World Inequality Lab pursues this project as a global inequality project and this Korea DINA is a part of this big global project.

2.2 Data sources

For the countries where the tax microdata are not available, the household survey data become a main data source (Alvaredo, Atkinson, et al., 2020). Korea is this cases. Currently, tax microdata are not available, therefore I am using household survey data as the main data source instead.

2.2.1 Survey data

The main household survey data I used is Household Income and Expenditure Survey (HIES). Statistics Korea started HIES from 1963³ and has been doing this survey ever since. As of 2020, the sample size is 7,200 households from all over the country. Basically, Statistics Korea provides a household ledger to each sample household and checks the contents every month. HIES contains much information including housing type, residing type, deposit, rent, imputed rent, wage, business income, financial income, expenditure, tax and social contributions, as well as individual characteristics, e.g. age, education, gender, occupation etc.

However, HIES microdata is not available before 1990. Instead, I use the survey tabulation data for 1982, which is the first year when distributional information is available as a tabulation form. Hence, my Korea DINA series starts from 1982. Another point to be noteworthy is HIES did not

²Recently, Korean National Tax Service started to provide tax microdata but only for very recent years (2015-2020).

³There was a household survey before 1963, but it was not a nationwide survey.

include certain types of households. For example, before 2019, HIES did not include any farm or fishery household in its sample. It is because HIES started as the urban household survey and Statistics Korea has separate household surveys to cover farm and fishery households. Thus, I use these two supplementary household surveys to cover the full population with survey data.⁴ Two supplementary household surveys are Farm Household Economic Survey (FaHES) and Fishery Household Economic Survey (FiHES) respectively. FaHES and FiHES are the farm and fishery household version of HIES. So, it is compatible with combining HIES for every year. The limitation of using this data is they do not have any distributional tabulation data for old years, i.e., 1982, and their microdata are available from 2003.

Lastly, there is another survey data that I used, which is called Household Expenditure Survey (HES). HES was conducted only three times (1991, 1996, and 2000) and was shut down after 2000 HES. Nonetheless, the reason I used this survey data is even though I can combine 3 homogeneous household surveys that are all conducted by Statistics Korea every year, it is still better to use one household survey from Statistics Korea that covers all types of households than combining several similar surveys. Also, HIES does not include single-member households before 2006 and we can only find any distributional information as tabulated form. Conversely, HES covers not only farm, fisher households, but also single-member households for all three years, i.e., 1991, 1996, and 2000.⁵

2.2.2 Tax data

In Korea, we have two different types of personal income tax system: global income taxation and withhold taxation. [Moriguchi and Saez \(2008\)](#), [Kim and Kim \(2015\)](#), and [Kim et al. \(2018\)](#) explain this complicated tax system very nicely.⁶ In Korean personal income tax, there is the term ‘global income’, which means the total sum of wage, business income, interest income, dividend income, pension income, and other incomes. This global income is usually taxed through self-assessed process, so every taxpayers who are obliged to do a global taxation, need to report their income by themselves. However, only a part of total taxpayers are pertinent to this global income taxation. Those taxpayers are usually top income earners by the nature of its structure. It is because normally most incomes are taxed withheld when income occurs. For example, you pay 14% of your interest income through withholding taxation, whenever you have interest income. But, if your yearly financial income is over 20 million KRW, then you are obliged to be part of global income taxation and your interest income now should be taxed at your global income marginal tax rate, which is the same as (total) personal income tax rate. The criteria of being included in global taxation makes most global income taxpayers in the upper income distribution. Thus, normally, taxpayers who earn more than 20 million KRW through financial activity, they face a higher marginal tax rate in their total personal income tax and they end up paying this difference from the tax amount paid through withholding taxation.

In Korea, Japanese colonial government ran a global income taxation back in the days, but it was gone with its independence in 1945. Korean government reinstated this global income taxation later in 1975. Unlike now, in the early years, the global income used to include real estate income,

⁴HIES also misses out other types of households over the years. Please see Appendix A for details of all issues with data. I described every issue that I faced while using household survey data.

⁵This data is also compatible with HIES. In this sense, you can treat this HES survey as the full-population expanded edition of HIES by Statistics Korea.

⁶In fact, Japan has a very similar personal income tax system to Korean one.

dividend income, wage, business income, and other incomes. The interest income became included in 1996.⁷ People with business income are required to report the global income, but if you have only wage, your tax affairs end with the year-end settlement of wage and salary, without reporting global income. Also, if your financial income combined with interest and dividend income is less than 20 million KRW, you do not have to report your financial incomes through global income taxation. Hence, there are some taxpayers only exist in withholding taxation data. To construct the DINA income series, it is necessary to combine the withholding taxation data and global taxation data. Japan has a similar situation, so I am using the methodology used in [Moriguchi and Saez \(2008\)](#) and its modified one in [Kim and Kim \(2015\)](#) to combine these two tax data. After I combined two tax data and erase the overlapped ones⁸, using the non-parametric generalized pareto interpolation method, I estimate income distribution from tax data.

2.3 Income concept

The income concept of Korea DINA series are based on the income category from System of National Accounts. As [Garbinti, Goupille-Lebret, and Piketty \(2018\)](#) points out, the income concept of DINA series is based on the system of national accounts, only because there is no other series that tries to provide the internationally consistent definition of income and wealth. According to System of National Accounts 2008,

$$\text{NationalIncome} = \text{GDP} - \text{CapitalDeappreciation} + \text{NetForeignIncome} \quad (2.3.1)$$

I try to construct the consistent pre-tax national income distribution in this paper. Pre-tax national income is the sum of all pre-tax income that goes to every adult in the economy that owns production factors, i.e., labor and capital, before any operation of tax and transfer system except for pension and other social insurance programs ([Alvaredo, Atkinson, et al., 2020](#))⁹. Hence, I subtract pension and other social insurance contribution from individual income and add pension and other social insurance benefits, e.g., unemployment insurance benefits, to their income.

There is another income concept called “pre-tax factor income”. The difference between pre-tax factor income and pre-tax national income is whether you consider operation of pension and social insurance. Given that age structure in Korea has changed rapidly for the last 20 to 30 years, it is much better to use pre-tax national income, instead of pre-tax factor income. This is because generally retirees have lower factor income since their main income sources are from pension and it biases the long-run series in one country and an international comparison for this mechanical reason¹⁰. Therefore, I chose the pre-tax national income as a main income concept in Korea DINA series.

Now, what about a unit of observation in DINA series? The standard unit of DINA series is equal-split adults. It means you have income information for couples and you split that couple’s income to each partner equally (‘narrow equal split unit’). Please note that Korea DINA series is constructed

⁷Before 1996, the tax on interest income was only withheld.

⁸For the details of tax data issue, please refer to Appendix A.

⁹DINA series takes into account of operation of pension because in this way we can construct the long-run income inequality series that is less sensitive to a change of population pyramid in one country. Please see [Alvaredo, Atkinson, et al. \(2020\)](#) for details.

¹⁰Some countries with elderly citizens will be more likely to have higher income inequality.

based on survey microdata, which means it is easy to construct DINA series with household unit. However, in order to compare the other countries, I choose our main DINA series based on equal-split unit. Nonetheless, equal-split unit in Korea DINA series is to equally split household income into every adult member in household (‘broad equal-split unit’). It is not uncommon when constructing the DINA where tax microdata is not available, e.g., China, but one should keep in mind this disparity when comparing Korean series with US or France DINA (Alvaredo, Atkinson, et al., 2020). In the US and France, their equal-split unit is to equally split couples’ income to each partner.¹¹ Of course, when I compare our fiscal income estimates, constructed through combining tax and survey data, with WID series, I use DINA individual unit, which is possible in Korea because in our household survey microdata, we have all detailed information for every household members.¹²

2.4 Methodology

In this section¹³, I describe step-by-step how I constructed Korea DINA income series from 1982 to 2020. Generally, I start with the HIES microdata. I combine FaHES and FiHES data with HIES data (hereinafter ‘the combined raw survey’). Then, I interpolate pareto distribution of fiscal income from tax tabulation data, using generalized pareto interpolation technique (Blanchet, Fournier, & Piketty, 2022). Then, I correct the combined raw survey, using tax data (hereinafter ‘the corrected survey’) with the non-parametric reweight and replacement approach to correct top distribution of survey (Blanchet, Flores, & Morgan, 2022). Lastly, I use national accounts data to fill the gap between our fiscal income and national income, which means distributing tax-exempted capital income, such as imputed rent or retained earnings. This process is to reconcile our fiscal income with pre-tax national income.

Step 1 I estimate income shares using the combined raw survey. I estimate the individual level income shares¹⁴ and then get equal-split income shares separately. I proceed the same process with the corrected survey, because survey weights are based on household. The equal-split here means the ‘broad’ one from Alvaredo, Atkinson, et al. (2020) that is within the household, every adult household member earns equally, so we “equally split” total household income to each adult household member, even though they do not report any actual income. It is somewhat reasonable that even adults without any income still consume goods and services with financial help from other household members.¹⁵ I use the equal-split unit as the unit of observation to be consistent with the DINA series in the WIL. Also, there has been a demographic change recently, e.g. the number of single-member households over the last few decades. If you use this equal-split approach, your DINA estimates are more neutral to these changes than individual unit approach. It is one of the reasons why an equal-split adult is DINA benchmark unit of observation.

¹¹In fact, it makes sense to equally split the household (or couple) income to each adult in household (or to couples). Even when you do not have any income and if your partner works, you get to spend his or her money after all. For the detailed discussion, please see Piketty et al. (2018).

¹²In 1982 and 1991, I only have tabulation data based on household unit. I could construct the DINA equal-split adult unit only for these two years. Please see Appendix A for detailed discussion of data issues.

¹³For 1982 and 1991, I use a different approach to construct the Korea DINA series due to the data limitation. Please see Appendix A for detailed discussions.

¹⁴Korean household survey data is household based but it contains every individual data in each household.

¹⁵Actually, the empirical evidence suggests the financial sharing among married couples is somewhere between full sharing and none. For more details, see Chiappori and Meghir (2015).

Step 2 As aforementioned, survey data are underrepresenting top income distribution. So I am correcting this top income distribution from survey data, using fiscal data in this step. Following the [Blanchet, Fournier, and Piketty \(2022\)](#) (hereinafter “bfm correction”), I correct top income shares in survey data, using tax data. Also, given that Korean tax tabulation data provide detailed income composition by brackets, we can calibrate income compositions as well.¹⁶ Basically, this correction is a non-parametric approach to adjust the weight of survey, assuming the continuity of the density of income. They use endogenously determined “merging point” between tax and survey data, above which they combine tax data with survey data. Then, they re-weight and replacing the observations, while preserving the original survey microdata, assuming there is no re-ranking among observations. So, with tax data, top income distribution in the survey data above the merging point is corrected (get close to) by tax data top income distribution, which is known to represent the reality better than survey data. Additionally, in survey data, if some income percentiles are under-represented (i.e. top income distribution above the merging point), then other income percentiles should be over-represented (i.e. income distribution lower the merging point), because the sum of weights in survey should be equal to the sum of population. In a nutshell, we correct top income shares above the merging point by fiscal data, then we automatically correct income shares below the merging point as well.

Step 3¹⁷ Finally, after taking into account of pension income observed from survey, I reconcile the pretax fiscal income series while distributing tax-exempted capital income, e.g., imputed rent¹⁸ and retained earnings with pretax national income. Within fiscal income data, the private shares of corporate undistributed profits are not included.¹⁹ South Korea is not alone in this case ([Khalid & Yang, 2021](#)). Therefore, to construct the DINA series, it is very important to take these profits into account. It is because without considering this aspect, it can underestimate the inequality estimates, given that this is really deferred dividend income in a way. To correct this part, I do simply take net private corporate savings per adult from national account data and redistribute it proportional to their financial income, because of the absence of the detailed auxiliary data that helps to distribute the retained earnings ([Alvaredo, Atkinson, et al., 2020](#)). At the last stage of this step. I re-scale this income to match with the pretax national income at national account level.

¹⁶I apply this income composition calibration, when this calibration is necessary. Please see Appendix B for details.

¹⁷While doing this step, I assume that tax evasion and tax avoidance do not vary by income shares ([Khalid & Yang, 2021](#)). But, tax evasion is usually positively correlated with income and wealth ([Alstadsaeter, Johannesen, Herry, & Zucman, 2022](#)). Hence, my results should be the lower bound of true income inequality.

¹⁸All household survey data in Korea have imputed rent information. So I used this distribution.

¹⁹Since 2015, Korean government started to tax undistributed corporate profits among the conglomerates. But still it is absent in personal income tax data.

Chapter 3

Results

3.1 Long-run trends in income inequality in Korea

I now present Korea DINA income series from 1982 to 2020. As figure 1.1 shows, per adult national income has increased greatly from 1982 to 2020. Especially, before 1997 East Asia financial crisis, national income per adult increased 5.3% annually. Though, even after the financial crisis, the average national income grew almost as much as the previous time (4.6% annually), which is contrast to the general belief that Korean economic development did not continue after the financial crisis. Overall, per adult national income has been increasing by 3.9% annually which is similar to France during their "thirty glorious years" (Garbinti et al., 2018).

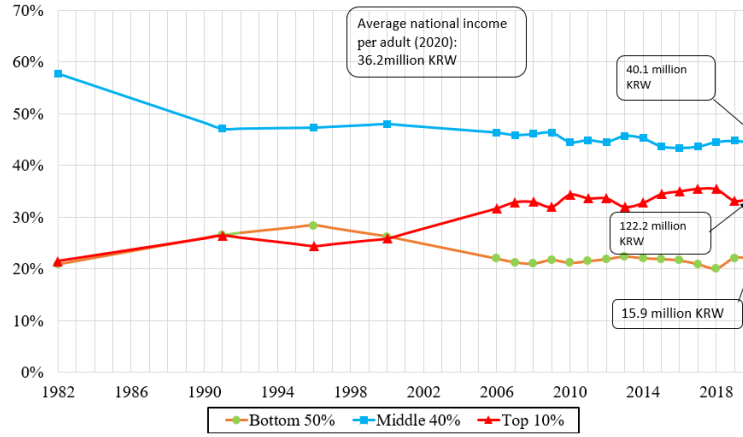
Table 3.1: Income thresholds and income shares in South Korea, 2020

Income group	Number of adults	Income threshold (KRW)	Average income (KRW)	Income share
Full population	42,992,739	0	36.3 million	100.0%
Bottom 50%	21,496,370	0	15.9 million	21.9%
Middle 40%	8,598,548	32.6 million	40.2 million	44.4%
Top 10%	4,299,274	62.6 million	122.2 million	33.7%
Incl. Top 1%	429,927	147.2 million	444.8 million	12.3%
Incl. Top 0.1%	42,993	450 million	2.1 billion	5.9%

Note: The unit is the equal-split unit (aged 20-year-old and over; income of household is split equally into all adults in household). Income here means pre-tax national income (before all taxes and transfers, except for pensions and unemployment insurance). Percentiles are based on the total adult population. In 2020, 1,180 KRW is exchanged for 1 USD.

Then I report thresholds, average income, and shares of main income groups observed in 2020 on table 3.1. In 2020, average adult national income is 36.3 million KRW. Average income per adult in bottom 50% is 15.9 million KRW, which is less than half of the average among the full population. Hence, the bottom 50% income share is 21.9%. The average national income in the

Figure 3.1: Income shares in South Korea 1982-2020



Notes: The unit is the equal-split unit (aged 20-year-old and over; income of household is split equally into all adults in household). Income here means pre-tax national income. Percentiles are based on the total adult population. I linearly interpolated income shares for missing years.

middle 40% is 40.2 million KRW, which is close to the overall average. So, Middle 40% takes 44% of national income. Lastly, the average income within top 10% is 122.2 million KRW, which is about 3.3 times more than the average among the full population. Therefore, top 10% income share is 33.7%.

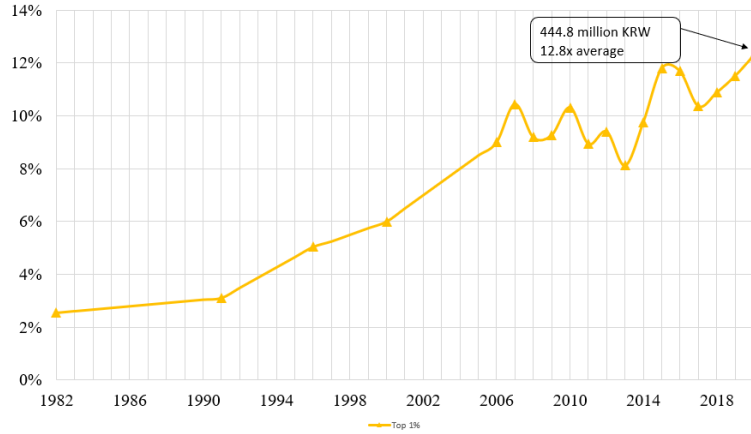
Next, I report the long-run evolution of these income shares from 1982 to 2020. Overall, middle 40% income share has decreased. Bottom 50% income share increased till East Asia financial crisis and then has decreased afterwards. On the other hand, top 10% increased in the 1980s and then from the 1990s, it started to decrease until the financial crisis and has increased again ever since. In Korea, East Asia financial crisis indeed changed much of economic structure in the country, so it is reasonable to capture this discontinuity around the financial crisis. Korean Labor law had been losing its protection power since mid-1990s and in 1996, the right-wing party amended the labor law in favor of employers. This change in labor law enabled companies to create lots of temporary jobs and to sack their employees easier than before. Eventually, it amplified the negative effect of financial crisis on unemployment and wage reduction in 1997 and 1998 (Keum & Cho, 2001; Cho, 2004).

Since 1997, part-time and temporary employment have increased a lot. According to Cho (2004), in 1997, 20.9% of all wage workers have one-year or less contract at work, but this proportion increased to 29.6 % in 1999. This trend has continued ever since, now Korea has a much higher share of temporary or part-time workers in its labor market, compared to other advanced economy. According to Schauer (2018), the total share of non-regular positions at the labor market is 49% in 2013¹. Besides, most non-regular positions gives the relatively lower wages and less social benefits

¹In Korea, regular positions are full-time and tenured. This number comes from when we count employees who have a temporary (fixed-term) or part-time contract. If you count workers whose contract is temporary and part-time, it is 23.4%.

3.2. INEQUALITY SNAPSHOT 1: MASSIVE INCOME GROWTH FOR BOTTOM AND TOP INCOME GROUPS

Figure 3.2: Top 1% income share in South Korea, 1982-2020



Notes: The unit is the equal-split unit (aged 20-year-old and over; income of household is split equally into all adults in household). Income here means pre-tax national income (before all taxes and transfers, except for pensions and unemployment insurance). I linearly interpolated income shares for missing years.

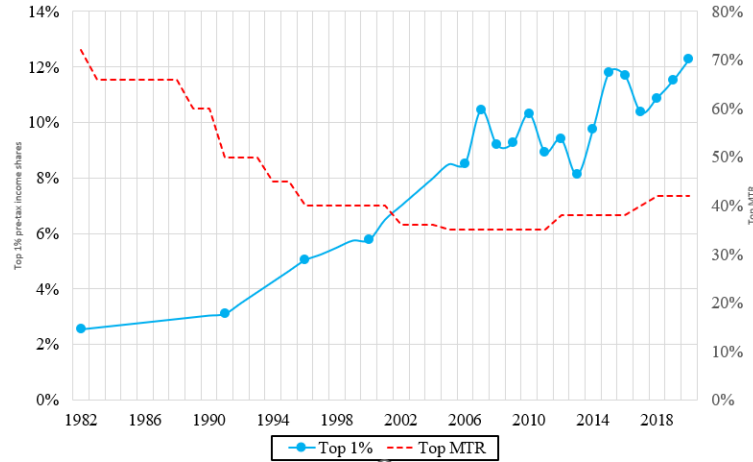
than regular positions. In 2016, a temporary position has its hourly wage about 66 percent of the hourly wage of regular position and a part-time position receives its hourly wage on average 62 percent of regular position's. This labor market reconstructing after the financial crisis shifted the bottom 50% income share trend into downward. Bottom 50% income share has not reinstated its income share to pre-crisis level ever since and now is as low as income share in 1982. It is a new finding by checking the long-run trend of bottom 50% and middle 40% national income shares.

Top income shares have been increasing consistently and top income shares in 2020 are the highest in Korea for the last 40 years. In fact, if we go up higher income level, the income shares rise more. Top 1% income share was less than 3% in 1982 and rose up to 12% in 2020. It got higher 4 times over the last 40 years. The change in top marginal tax rate (MTR) can be one of the stories behind this top income shares increase in the long-run. Indeed, [Alvaredo, Atkinson, Piketty, and Saez \(2013\)](#) and [Piketty, Saez, and Stantcheva \(2014\)](#) show the negative effect of MTR on the pre-tax income inequality. They show the evidence not only in the US but also other countries, including Japan. In fact, in Korea, top MTR and pre-tax national income have moved in the opposite direction as well, especially in the 1980s and 1990s.

3.2 Inequality snapshot 1: massive income growth for bottom and top income groups

Now I move to see the growth incidence curve to better understand the change of income shares in details. Table 3.2 reports the real income growth by income groups. From 1982 to 2020, average national income among adults increased 322% in real terms in Korea. Even though it is a massive increase for all, if you look at the growth incidence curve, bottom 50% and the very top income groups have been benefited much more than other income groups. Bottom 50% income group

Figure 3.3: Top 1% income share and top MTR in South Korea, 1982-2020



Notes: The unit is the equal-split unit (aged 20-year-old and over; income of household is split equally into all adults in household). Income here means pre-tax national income (before all taxes and transfers, except for pensions and unemployment insurance). Top MTR before 1990 includes National Defense Tax. I linearly interpolated top 1% income shares for missing years.

increased impressively and it grew more than top 10% income group. Figure 3.4 graphically depicts this equal distribution of income growth over this period. This pattern is similar to French growth incidence curve during the “Thirty Glorious Years” (Garbinti et al., 2018), though the difference is the very top income groups (top 1%, top 0.1%, top 0.01%) increased together with bottom 50% income group in Korea. To see the distribution of income growth clearly, I compare the share of this income growth by income groups. It is noteworthy that bottom 50% income group took 58% of this accumulated growth in Korea during this period. Yet, it is hard to say Korean economic growth has been equally distributed, because top 1% took 13% of accumulated income growth and 6% of income growth flowed into top 0.1%. Nevertheless, it is surprising that bottom 50% benefited much more than top 10% from economic growth during this period.

Garbinti et al. (2018) explained this similar bottom income group’s growth during “Thirty Glorious Years” by a huge increase in minimum wage after 1968 protests. In fact, in Korea, minimum wage policy started in 1988 and intensified greatly early 1990s. Also, public pension system² started in 1988 and unemployment insurance started in 1995. These new policy implementations increased the wage and pensions more for the bottom 50% income group than the other income groups in this period.

The massive increase in top income distribution is driven by the increase in capital income in recent years. Figure 3.6 and figure 3.9 show the recent increase in capital income in top distribution. This increase actually gets bigger, if you go up in higher top income groups. Kim et al. (2018) also found the rising capital income in top fiscal income distribution causing the top fiscal income shares to

²It is designed very progressively in Korea and in Korea, retirees are located in bottom income distribution. Please see section 3.3 for details.

3.3. INEQUALITY SNAPSHOT 2: STUCK IN POVERTY

Table 3.2: Real income growth and inequality in South Korea, 1982-2020

Income group	Average annual growth rate	Total cumulated growth	Share of total cumulated growth
Full population	3.9%	322%	100%
Bottom 50%	6.6%	1021%	58%
Middle 40%	2.7%	176%	36%
Top 10%	5.1%	563%	35%
Incl. Top10-1%	4.2%	378%	22%
Incl. Top 1%	8.2%	1,927%	13%
Incl. Top 0.1%	11.5%	6,142%	6%
Incl. Top 0.01%	10.7%	4,741%	1%

Note: The unit is the equal-split unit (aged 20-year-old and over; income of household is split equally into all adults in household). Income here means pre-tax national income (before all taxes and transfers, except for pensions and unemployment insurance). Income here means national income. Percentiles are based on the total adult population.

get higher in Korea. My DINA series is compatible with their findings. However, they could not show the full pre-tax national income of distribution and miss out two findings.

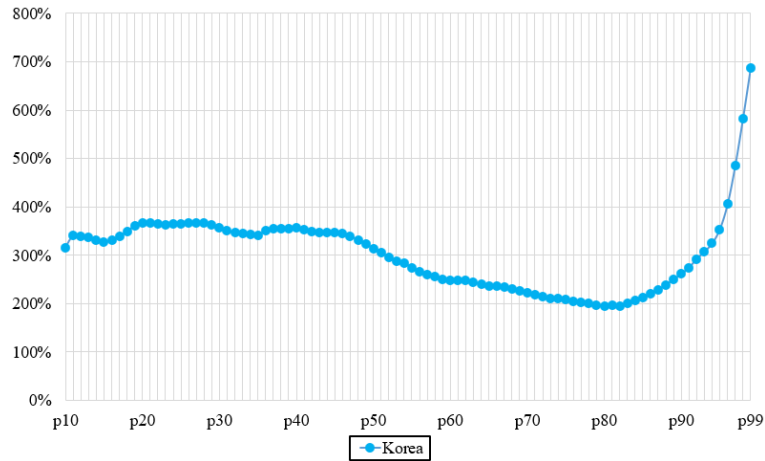
First, top income shares are solely depending on the change in capital income. If you see figure 3.9 and figure 3.6, the labor income in top distribution has not increased much over this period. Conversely, total income in the top distribution has increased greatly from 1982 to 2020. It is the case only for top income groups over this period and if you go up higher in top distribution, this tendency gets stronger. Figure 3.8 depicts the reason behind this result. When you are located in the very top income distribution, e.g., top 1%, your main income source is capital income, although it is not the case for the rest of population in Korea.

Another new finding is the rise of tax-exempted capital income. Figure 3.9 shows the difference between DINA series and fiscal income series. This gap represents tax-exempted income and you can find that in recent years, tax-exempted income has increased a lot compared to old years and it actually affects the pre-tax national income trend in this period. In short, the increase in top income shares has been affected by the rise of capital income and this effect gets bigger when you go higher up to the very top income groups. Especially during the recent years, capital income has increased more in top distribution and it is driven by the increase in the amount of tax exempted income. This result is compatible with the rise of tax exempted capital income that is described in Appendix D.

3.3 Inequality snapshot 2: stuck in poverty

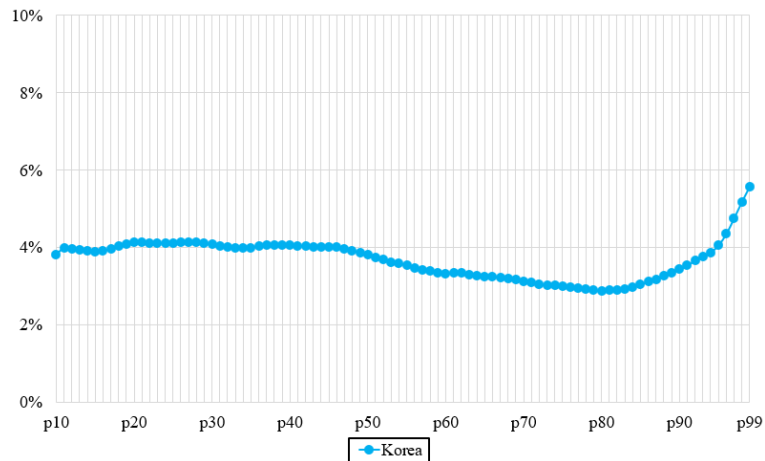
As mentioned in introduction, senior poverty rate is very high in Korea. In fact, if you look at figure 3.10, senior citizens, who are more than 65 years old, have much less total income than average adult. In 1996, people who are more than 65 years old do not make income even 80% of the average adult. In 2020, the situation gets slightly better thanks to the improved public pension in 2008

Figure 3.4: Total accumulated real income growth in Korea, 1982-2020



Notes: The unit is the equal-split unit (aged 20-year-old and over; income of household is split equally into all adults in household). Income here means pre-tax national income (before all taxes and transfers, except for pensions and unemployment insurance).

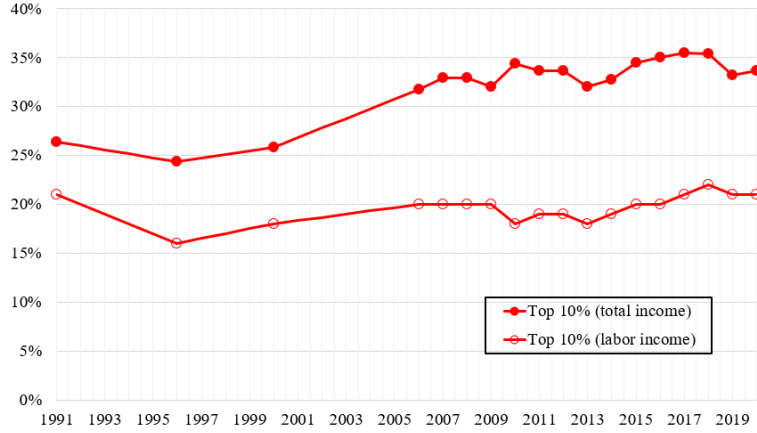
Figure 3.5: Annual real income growth in Korea, 1982-2020



Notes: The unit is the equal-split unit (aged 20-year-old and over; income of household is split equally into all adults in household). Income here means pre-tax national income (before all taxes and transfers, except for pensions and unemployment insurance).

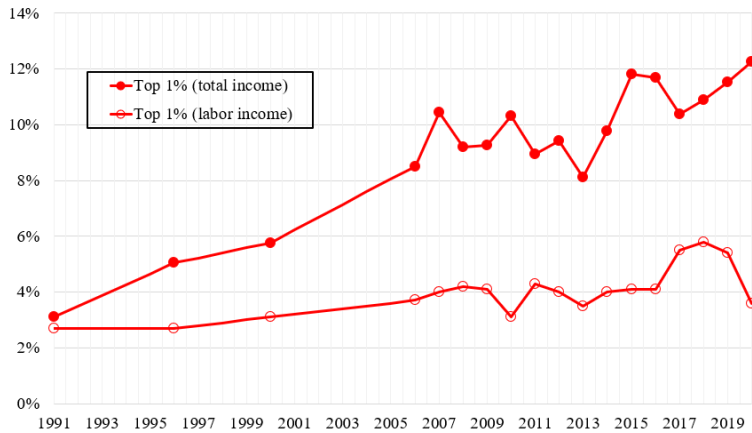
3.3. INEQUALITY SNAPSHOT 2: STUCK IN POVERTY

Figure 3.6: Top 10% income shares: total income vs labor income



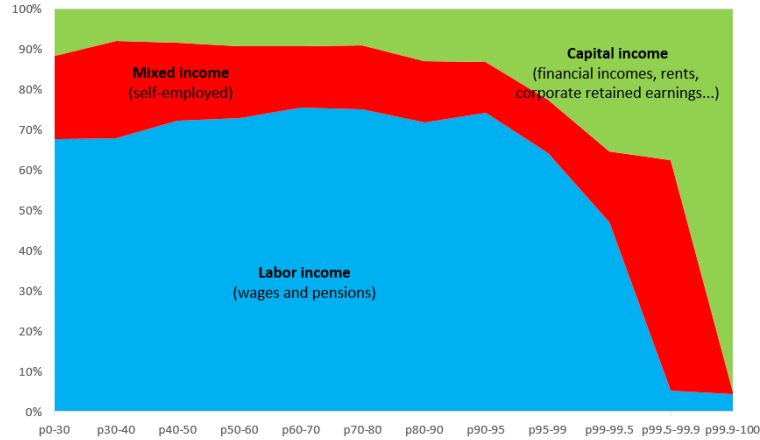
Notes: The unit is the equal-split unit (aged 20-year-old and over; income of household is split equally into all adults in household). Fiscal income series is based on the corrected survey using tax data. Labor income includes wage, pension, unemployment insurance, and 70% of mixed income. I linearly interpolated top 10% income shares for missing years.

Figure 3.7: Top 1% income shares: total income vs labor income



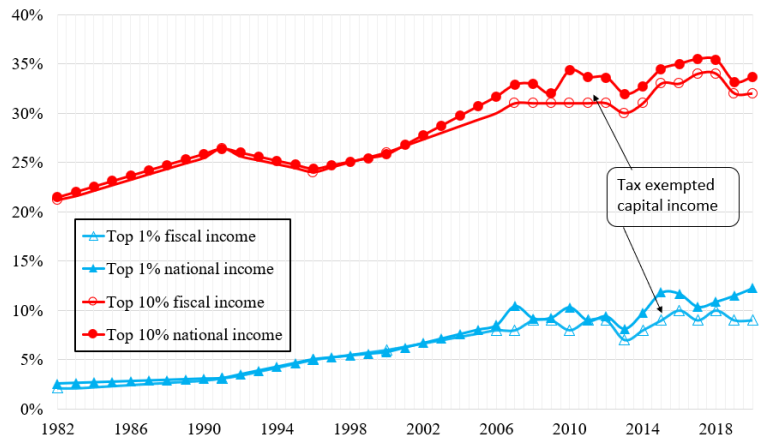
Notes: The unit is the equal-split unit (aged 20-year-old and over; income of household is split equally into all adults in household). Fiscal income series is based on the corrected survey using tax data. Labor income includes wage, pension, unemployment insurance, and 70% of mixed income.

Figure 3.8: Income decomposition by income level in South Korea, 2020



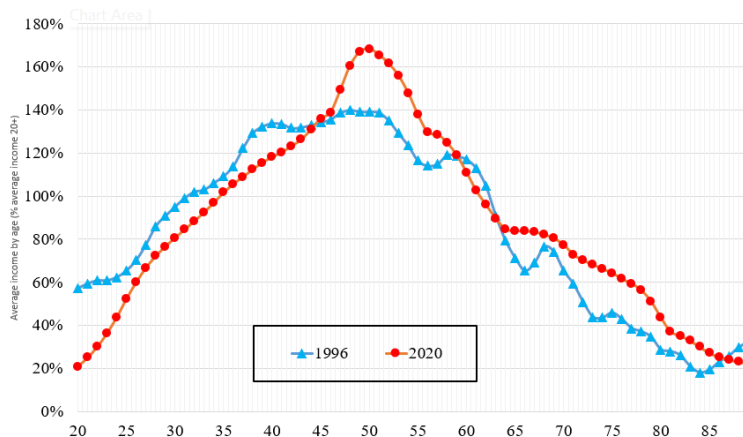
Notes: The unit is the equal-split unit (aged 20-year-old and over; income of household is split equally into all adults in household). Labor income includes wage, pension, unemployment insurance, and 70% of mixed income.

Figure 3.9: Income shares: national income vs fiscal income shares



Notes: The unit is the equal-split unit (aged 20-year-old and over; income of household is split equally into all adults in household). Fiscal income series is based on the corrected survey using tax data. Pre-tax national income includes tax-exempted labor and capital income. I linearly interpolated income shares for missing years.

Figure 3.10: Age-income profile in Korea, 1996-2020



Notes: The unit is the individual unit.

and 2014. Korean government started to give extra public pension to retirees who are located in bottom 70% from 2008. In 2014, they doubled the amount of this extra pension. If you see figure 3.11 and 3.12, you can see the improvement in labor income in 2019 compared to 1996 for senior citizens but you cannot find the similar improvement in capital income. Nevertheless, it did not improve senior citizens' income substantially. Piketty et al. (2018) show that in the US, bottom 50% average income of senior citizens (+65 years old) surpassed average bottom 50% income of full population since mid-2000s. The similar evidence is captured in France (Garbinti et al., 2018).

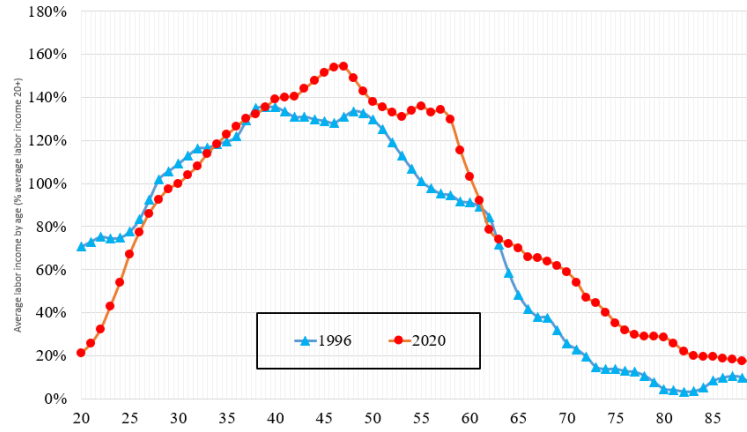
For the younger age group, the average income has shrunk from 1996 to 2020, which is due to the rising unemployment rate among young age adults. People who are 30-45 years old have lower income in 2020 than in 1996. This is because now this age group does not earn capital income as much as the same age group did in 1996. If you look at figure 3.11, there has not been much change of income in this age group. However, figure 3.12 shows that there has been a huge drop of capital income in this age group. This result implies that now it takes longer time to accumulate the private wealth and get capital income out of it than in 1996.

3.4 Inequality snapshot 3: gender inequality

Finally, I look into the inequality trend in depth by gender. My Korea DINA series contributes to providing the long-run trend of gender gap in labor national income, using the data with reliable top income distribution. The general take is a gender gap in labor income has shrunk for the last 25 years, but still it is very severe.

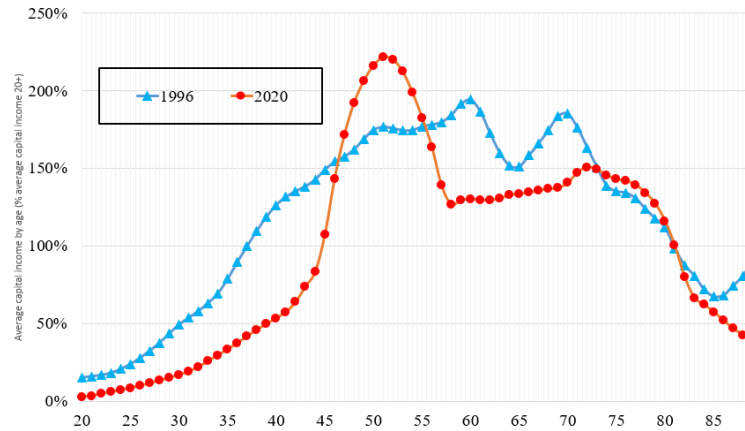
Figure 3.13 shows the ratio of average male labor income to female labor income by age. For the younger generation, gender gap in labor income has shrunk over the last 25 years but it is still big. Men at age 35 earn labor income more than twice as much as their female counterpart in 2020. Given the fact that you cannot see this big gap in much younger age, it is due to the weak child care support and parental leave policy in Korea. Actually, in Korea, it is common for female workers to

Figure 3.11: Age-labor income profile in Korea, 1996-2020



Notes: The unit is the individual unit. Labor income includes wage, pension, unemployment insurance, and 70% of mixed income.

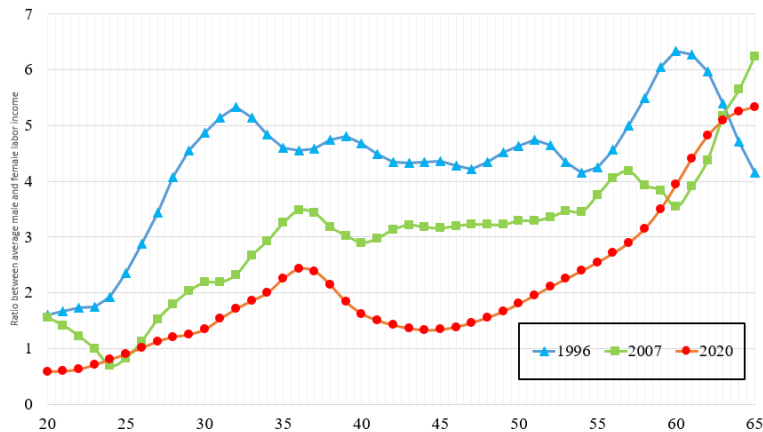
Figure 3.12: Age-capital income profile in Korea, 1996-2020



Notes: The unit is the individual unit. Capital income here includes 30% of mixed income.

3.5. INTERNATIONAL COMPARISON I: KOREA AND EAST ASIA

Figure 3.13: Gender gap in labor income in Korea, 1996-2020



Notes: The ratio of average male labor income to female labor income by age. Labor income includes wage, pension, unemployment insurance, and 70% of mixed income.

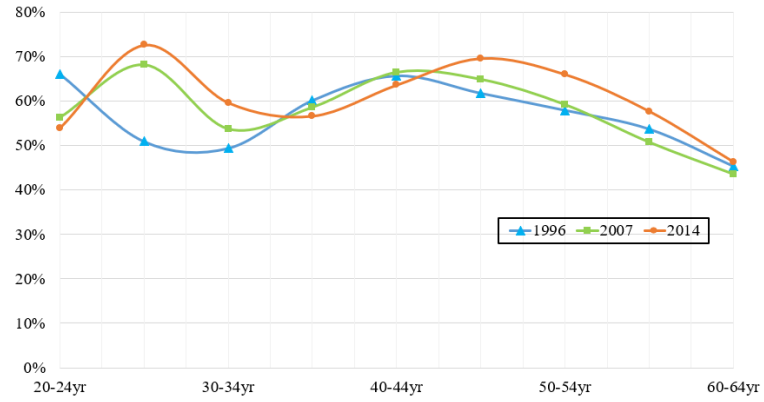
quit her job and provide the full-time support her child. Figure 3.14 shows the female labor market participation by age. In younger age, i.e. around age 25, the female labor market participation rate is a lot higher than the average female labor market rate. In fact, it shows the highest female labor market participation rate throughout their lifetime. Then, it dropped dramatically when they reach 30, normally at the age of getting married and having their first child. This drop has occurred later over time, because in recent years women start to get married and have their child much later in their life than in the past.

Gender gap in labor market started to decrease after age 35. It is because now stay-home moms are trying to get back in the labor market. In figure 3.14, you can see an increase in female labor market participation rate, when women are 40-45 years old. This re-entering labor market phenomenon happens, because it is hard to support your family by one parent's salary. Thus, moms are forced to go to work and earn some money. However, re-entering the labor market after 10 years of career break prohibits them from getting a higher position in a company or well-paid jobs. That is why after age 40-45, a gender gap in labor income continues to grow because men who stayed at workplace now start to get promoted to higher positions. As a result, by the time of age 55, men are getting paid three times more than women. If you look at figure 3.16, around 17% of top 10% income groups are female and less than 10% of top 1% income groups are female. This number is much lower than France, i.e. 30% and 16% respectively (Garbinti et al., 2018). This gender gap trend in Korea gets weaker over the years, but it is still a severe problem.

3.5 International comparison I: Korea and East Asia

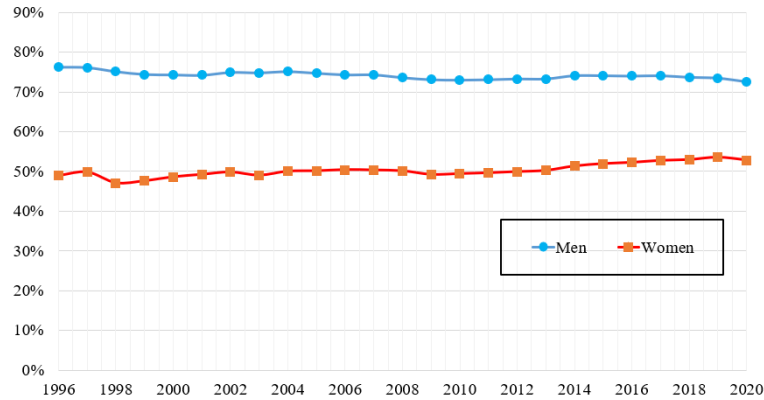
In this last section, I present the comparative income inequality analysis in East Asia. Before I move onto reporting the result, I explain why I compare Korea DINA series with Taiwan and China DINA series.

Figure 3.14: Female labor market participation rate by age in Korea, 1996-2014



Source: Statistics Korea

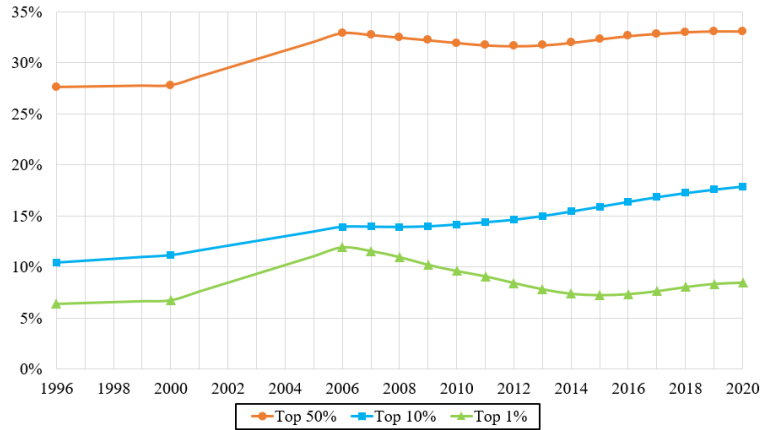
Figure 3.15: Labor market participation rate by gender in Korea, 1996-2020



Source: Statistics Korea

3.5. INTERNATIONAL COMPARISON I: KOREA AND EAST ASIA

Figure 3.16: Shares of women in top labor incomes in Korea, 1996-2020



Notes: The individual unit. Labor income includes wage, pension, unemployment insurance, and 70% of mixed income. I linearly interpolated income shares for missing years.

The most prominent reason is Korea and Taiwan are similar in many ways, especially in terms of their economic background. Both countries are in East Asia with the experience of being colonized by Japan till the end of World War II and had gone through similar economic development process ever since. Korea and Taiwan are densely populated countries without much of natural resource. Even how they overcame these struggles is similar. As [P. W. Kuznets \(1988\)](#) pointed out, these two countries had shifted their main industry from agriculture to manufacturing in a short time. Additionally, trade has been a great importance to both economies and played a very important role in their economic development, since they are small economies. Moreover, their economic development was state-driven and in a political economic point of view, they became democratized in the similar period ³.

Then, I also put China here, because it will help us to see the overview of economic inequality trend of East Asia in general. After all, the aim of constructing DINA series is to put individual country on the map of inequality and enables us to compare the inequality trend with each other.⁴

The starting point of this comparative analysis can be showing average national income in Korea, Taiwan, and China. Expressed in purchasing power parity terms, average national income among adults in Korea was less than 70% of Taiwanese one in 1982. Then, the gap between these two countries gradually shrank and as of 2020, Korean national income per adult is 76% of Taiwanese level. It is interesting that even though both countries experienced similar economic growth at the same time, the gap has shrunk over the years. It means unlike the general perceptions, Korean economy benefited bigger economic growth during this period than in Taiwan. Also, this gap in recent years stems from the gap in productivity between these two countries.

³Politics have been greatly affecting economic inequality throughout the history. Please see [Piketty \(2020\)](#) for detailed discussions with cross-continent examples.

⁴Nonetheless, please note that the inequality comparative analysis between Korea and China is much more meaningful when Taiwan is included.

For China, a story is quite different. This time, China has experience greater economic growth than Korea since 2000. In the 1980s, given that Korea started its economic growth way before China, Korean economic growth was bigger than Chinese one. Then in the 90s, it got stabilized because China also started to experience a great amount of economic growth. Then, finally, since 2000s, this gap in average national income between Korea and China has shrunk, which is due to the improved productivity from Chinese side.

Now, I move onto showing the long-run trend of income shares in Korea, Taiwan, and China. The new finding here is Korea has much lower top 10% and top 1% income shares than China and Taiwan from 1982 to 2020. As we previously discussed in this chapter, it is not because Korean inequality is lower. In fact, it is because top income shares in China and Taiwan were higher than in Korea in 1980s and unlike Korea, top income shares kept increasing rapidly in China and Taiwan until late 2000s. As a matter of fact, in Korea, top 10% income shares decreased in 1990s, until East Asia financial crisis.

The bigger difference that makes Korean inequality level lower than that of China and Taiwan nowadays comes from the different evolution of bottom 50% income shares. Figure 3.21 shows the top 10% and bottom 50% income shares in Korea, China, and Taiwan, from 1982 to 2020. Before the financial crisis, bottom 50% income share increased in Korea, whereas bottom 50% income share declined in China and Taiwan. Even though after financial crisis, bottom 50% income share in Korea declined as well, due to the increase in the 1980s and early 1990s, bottom 50% income share in Korea stays way higher than the other two. This collapse of bottom 50% income in Taiwan explains why bottom 50% average income in Korea is higher than bottom 50% average income in Taiwan, although average national income in Korea is 25% smaller than national income per adult in Taiwan in 2020.

As a matter of fact, bottom 50% income in real terms grew much higher in Korea than in Taiwan. Bottom 50% real income in Korea already outgrew bottom 50% real income in Taiwan during mid-1980s. Then, throughout the 1990s, bottom 50% income kept growing in Korea, while bottom 50% income in Taiwan did not grow. Bottom 50% real income did not increase at all in China before early 2000s. Thus, the gap in bottom 50% real income between Korea and China is staggering now.

Then let's take a look at growth incidence curve to better understand the growth trend of all three countries over this period. By comparing these three countries to France and US DINA from [Piketty et al. \(2018\)](#); [Garbinti et al. \(2018\)](#), Korea has an annual growth shape of bottom and middle income percentiles similar to France ('French type') in their "Thirty Glorious Years" than to US ('US type'). On the other hand, China has the similar trend to US type and Taiwanese one is similar to French one, but in their recent years. In short, even though the economic growth in Taiwan can be seen as fairly distributed ([Chu, Chen, Lin, & Su, 2022](#)), in the context of East Asia, it was not as equal as Korea, which results in gaps in bottom 50% income growth between these two countries.

Then why is there a discrepancy of economic growth distribution among three neighboring countries that all experienced enormous economic growth in East Asia? As previously discussed, in the late 1980s to early 90s, Korea implemented many policies that targeted to increase bottom 50% income, including public pension, minimum wage, and unemployment insurance. On the other hand, these

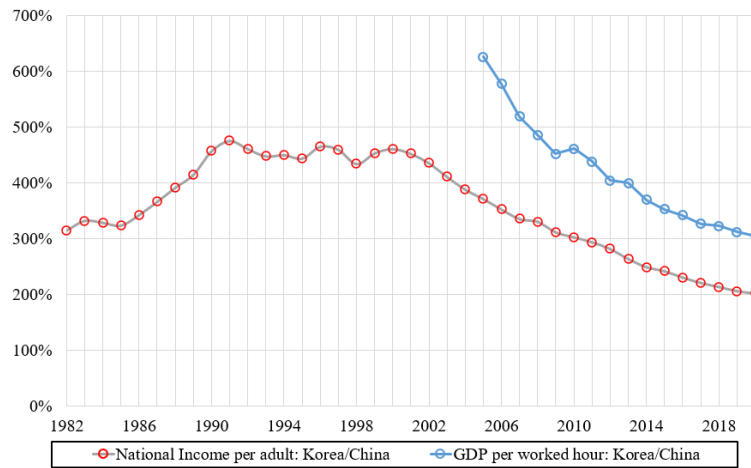
3.5. INTERNATIONAL COMPARISON I: KOREA AND EAST ASIA

Figure 3.17: Average income and productivity: Korea vs Taiwan, 1982-2020



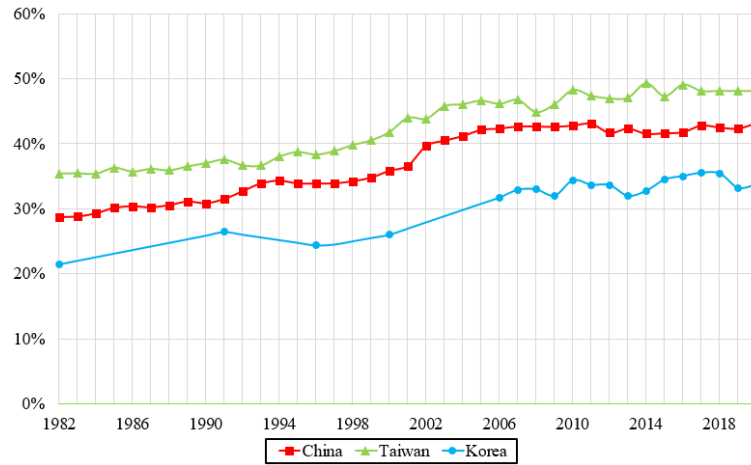
Notes: The ratio of Korea to Taiwan for GDP per worked hour (ILO) and per adult pre-tax national income; Taiwan from WID. Both series are in 2020 PPP USD.

Figure 3.18: Average income and productivity: Korea vs China, 1982-2020



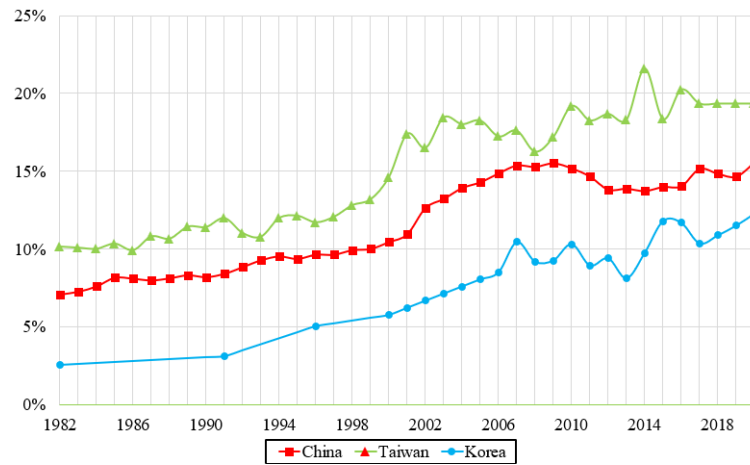
Notes: The ratio of Korea to China for GDP per worked hour (ILO) and per adult pre-tax national income; China from WID. Both series are in 2020 PPP USD.

Figure 3.19: Top 10% income shares in East Asia, 1982-2020



Notes: The equal-split unit (aged 20-year-old and over; income of household is split equally into all adults in household). Taiwan and Chian series are from WID. I linearly interpolated income shares for missing years.

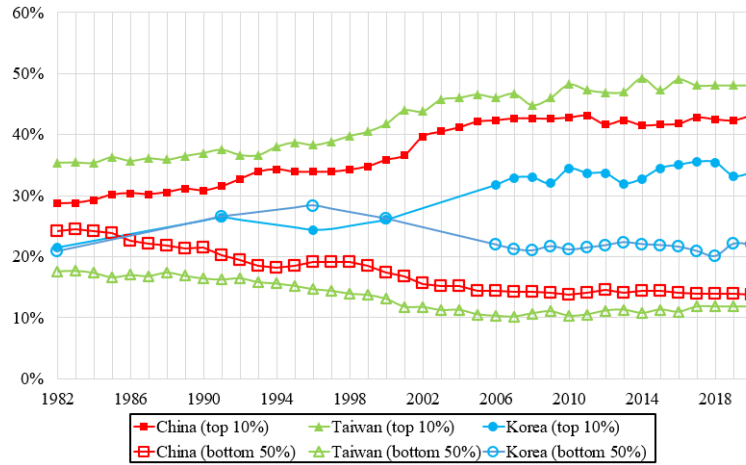
Figure 3.20: Top 1% income shares in East Asia, 1982-2020



Notes: The equal-split unit (aged 20-year-old and over; income of household is split equally into all adults in household). Taiwan and Chian series are from WID. I linearly interpolated income shares for missing years.

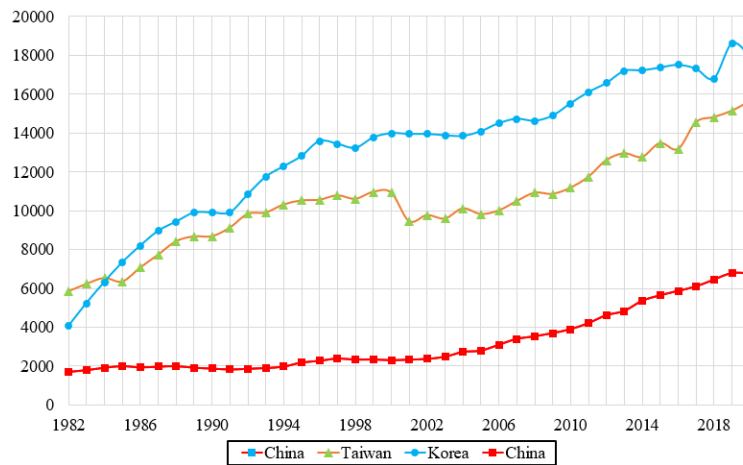
3.5. INTERNATIONAL COMPARISON I: KOREA AND EAST ASIA

Figure 3.21: Top 10% and bottom 50% income shares in East Asia, 1982-2020



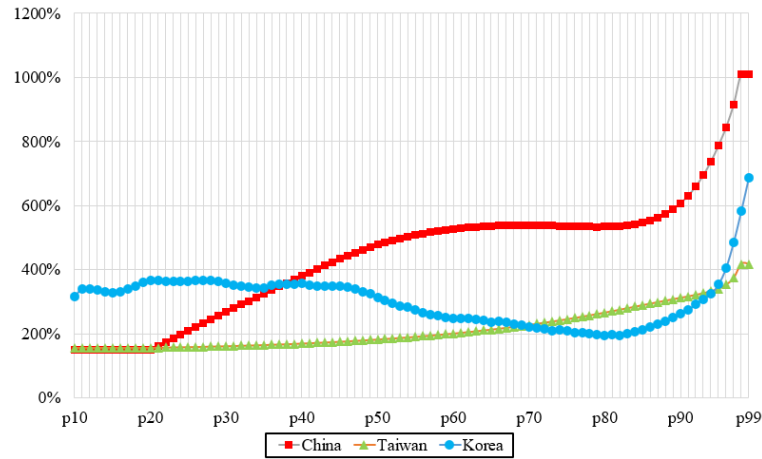
Notes: The equal-split unit (aged 20-year-old and over; income of household is split equally into all adults in household). Taiwan and Chian series are from WID. I linearly interpolated income shares for missing years.

Figure 3.22: Bottom 50% real income (2022 PPP \$) in East Asia, 1982-2020



Notes: The equal-split unit (aged 20-year-old and over; income of household is split equally into all adults in household). Taiwan and Chian series are from WID. I linearly interpolated income shares for missing years.

Figure 3.23: Total accumulated real income growth in East Asia, 1982-2020



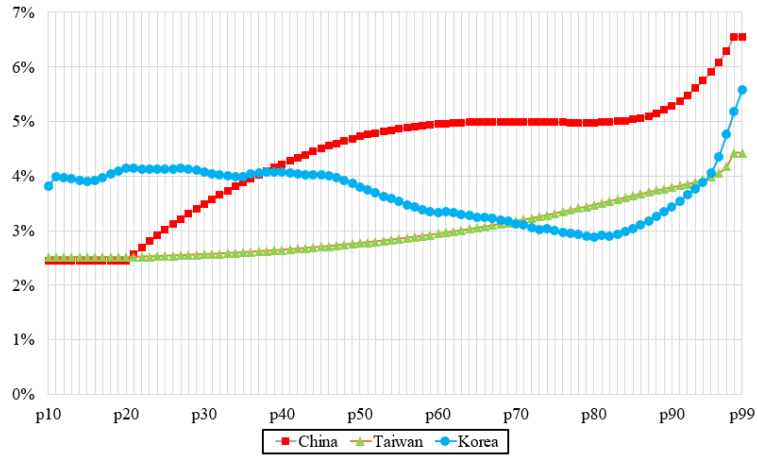
Notes: The total accumulated real pre-tax national income growth by percentiles. The equal-split unit (aged 20-year-old and over; income of household is split equally into all adults in household). Taiwan and Chian series are from WID.

types of policies were absent in China and Taiwan, except for minimum wage in Taiwan. It resulted in drop in bottom 50% shares and because of privatization that had been processing during 1980s and 1990s, this decrease in bottom 50% income share continued.⁵ In summary, as [Garbinti et al. \(2018\)](#) pointed out, this result from comparative analysis among East Asian countries also suggests that the effect of government policies and institutions on inequality is not restricted in post-tax income inequality, but also these policies can affect pre-tax income inequality greatly.

⁵It is not uncommon among states that underwent the transition and privatization during their economic growth. Please see [Atkinson and Micklewright \(1992\)](#), [Novokmet, Piketty, and Zucman \(2018\)](#), and ([Piketty, Yang, & Zucman, 2019](#)) for more details.

3.5. INTERNATIONAL COMPARISON I: KOREA AND EAST ASIA

Figure 3.24: Annual real income growth in East Asia, 1982-2020



Notes: The annual real pre-tax national income growth by percentiles. The equal-split unit (aged 20-year-old and over; income of household is split equally into all adults in household). Taiwan and Chian series are from WID.

Chapter 4

Conclusion

This paper presents the entire distribution of pre-tax national income in Korea from 1982 to 2020. It contributes to measuring the income inequality in Korea in a substantive way. I show this long-run income inequality trend not only by full adult population, but also by gender, age, and income composition. This kind of in-depth analysis was not available in the previous literature. In spite of this contribution, due to the limitation of data, my long-run DINA series should be considered incomplete and it needs to be improved and refined with better data in the future.

By providing the comparative analysis among East Asian countries in a consistent and comprehensive way, this paper may open many doors of further inequality research in East Asia. To my knowledge, this is the first paper to do a comparative analysis on the long-run trend of entire national income in East Asia. In fact, during the rapid economic growth, despite the similar economic development policies implemented at similar time in Korea and Taiwan, the pre-tax national income inequality trend has evolved in a very different way. Through showing the long-run trend of pre-tax national income distribution, I give some answers to explain this discrepancy between these two similar countries. However, this comparative analysis is not complete and should not be treated definite. Without rigorous policy treatment analysis or discussing the political side of the effect on inequality, it can miss some other channels to have caused this difference. I hope this paper will inspire researchers in each country to conduct a further comparative work to answer this question. Furthermore, this paper only covers three countries from East Asia and misses out other countries, e.g., Japan, simply because DINA series of those countries are not available at the moment. In the future, when other East Asian countries' DINA series are added in this analysis, it may give us concise and better story to explain the different inequality development in East Asia for the last 40 years.

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Appendix A

Data Issue

A.1 Household survey microdata

A.1.1 Year 1982

First of all, Statistics Korea does not provide HIES microdata for this year, but tabulation data are available. In fact, 1982 is the first year that contains income decile information in a tabulation. However, it does not give us any detailed information of income sources and individual characteristics, which means I cannot do labor and capital income analysis, gender, and age inequality analysis for 1982. Indeed, my capital and labor income analysis starts in 1991 and the other in-depth analyses start in 1996.

Then, 1982 HIES tabulation data does not cover several types of households. The type of households are not included in the sample in 1982 HIES are following:

- The farm and fishery household (26.6% of full population).
- single-member household (4.9% of full population).
- household whose head are non-wage earners. For example, if a household head is a business owner, it is excluded in the sample (32% of full population).

In this case, I use the income distribution of specific household from other years and merge the distributions to recover the distribution of full population, using generalized pareto interpolation, without any parametric assumption (Piketty et al., 2019; Blanchet, Fournier, & Piketty, 2022). First, with generalized pareto interpolation technique, I estimate income distribution using 1982 HIES tabulation data, along with the income distribution of each missing household from 1991¹. Then, again using generalized pareto interpolation, I merge the income distribution of HIES and the other 2 distribution from 1991 and farm and fishery household income distribution from 1996, assuming that income distribution of these population for these years has not changed in those years.

¹Farm and Fishery household distribution comes from 1996.

Kim et al. (2018) show that the top income distribution is more concentrated in 1991 than 1982, using the global taxation data only. This partial series focuses on the non-wage earners, since non-wage earners are obliged to follow the global taxation. Assuming that all three type of households' income distribution followed the similar trend, for 1982 I estimated the upper bound of inequality.²

After I combine all of raw survey data, I tried to correct the top income distribution in the survey. Since it is only tabulation data, I cannot correct this survey with fiscal data, using bfm correction (Blanchet, Flores, & Morgan, 2022).³ For this matter, I simply replace the top distribution of survey data with that of fiscal data available in 1982. This is not very uncommon (Blanchet, Flores, & Morgan, 2022) and in fact, China DINA is constructed using this replacement method to correct their top income distribution in survey. Unlike the Chinese case (top 0.5%), Korean tax tabulation data covers top 9% of population.

For 1982 and 1991 DINA series, when we adjust fiscal income to pre-tax national income, we allocate the tax-exempted income proportional to their distribution of imputed rent in the survey, assuming that the distribution of imputed rent is well-representing the distribution of other tax-exempted capital income. Although it is not perfect, this is the best approach possible, considering the data availability.⁴ Furthermore, given that tax-exempted income aggregates were very small⁵ in 1982, it should not cause a severe bias.

A.1.2 Year 1991

Unlike 1982 HIES, 1991 HES does not have any problem regarding the coverage of household. However, I do not have an access to 1991 HES microdata. Hence, I have to follow the same procedure of survey correction and tax-exempted income redistribution that I used for 1982 estimates. Only big difference is Korean public pension started in 1988, so 1991 HES has this information on the tabulation data.

A.1.3 Year 2016

For 2016, for the top income earners, income composition from survey were different from any other years, which led to overestimating their shares of retained earnings. In fact, the business income from top 1% were extremely low compared to other years. Hence, I use the income composition data from tax data and conduct income composition calibration when using bfm correction. Please see Appendix C and Blanchet, Flores, and Morgan (2022) for details.

A.1.4 Year 2017-2020

The last issue with HIES is that in the recent years (2017-2020), Statistics Korea does not provide the yearly HIES micro data, but only quarterly data. It can be solved simply by combining the 4

²In fact, figure C.1 shows that top income shares are higher in household survey than the fiscal data. I correct this inflated top income distribution, using fiscal data.

³I chose the merging point, using their formula.

⁴Given that in Korea, housing inequality is very severe (Park, 2021), I do not expect the huge discrepancy in distribution.

⁵Please see Appendix D for this information.

quarter datasets to one yearly data while adjusting its individual weights, following the methodology from [Friedman, Jang, and Williams \(2002\)](#).⁶

A.2 Tax tabulation data

Since the taxpayers of global income taxation are often counted in the withhold income tax data because of their wage, these overlapped taxpayers must be removed in order to combine the two data. To remove this part overlapped, we need to do two tasks in advance. First, the definition of wage of the two data must be matched. The wage in the global income tax data is not total wage, but taxable wage, that is the result of subtracting the tax deduction from gross wage. So we need to turn this wage into the gross wage, estimating the ratio between taxable wage and gross wage from withholding tax data. Then, to remove the overlapped part and to add up two income tax data, we also have to make different income brackets of these two dataset matched. To do this second task, we have to split the brackets of one tax data with new thresholds set by using the other tax data. So, we use the Pareto interpolation method, following [Kim and Kim \(2015\)](#). After these two tasks, we can combine these two datasets and obtain fiscal income by income sources and by brackets of total income. Please see [Moriguchi and Saez \(2008\)](#), [Kim and Kim \(2015\)](#), and [Kim et al. \(2018\)](#) for the detailed description of this methodology.

It is important to note that income of daily workers, some pensions or other incomes are missing in this combined tax data. However, these missing incomes are mainly located in the middle and lower brackets, which does not affect top income distribution. Therefore, it should not matter much, given that this fiscal data are used to correct the representativeness of top income distribution in household surveys.

Additionally, before 2004, income tax data are not based on total income, but on a taxable income without tax exemptions and income deductions. To convert this data to the total income basis, it is necessary to rely on the assumption that the ratio of the total income to tax base by income bracket would not be different from the adjacent year. This rate may change due to changes in the taxation system such as the expansion of income deduction, but again this minor bias should be okay for DINA estimates, because the gap between the tax base and total income decreases as income brackets goes onto top income group.

Lastly, global taxation started in 1975 and its taxation data are available every year, whereas withholding taxation data are available only from 1979 to 1985 and again since 1995. In Korea DINA series, for the year 1991 I only could use global taxation data. Despite of missing withholding taxation data, it really should not be a big issue because global taxation data covers top income earners⁷ and we use tax data to correct top income distribution of household survey data.

⁶In practice, Statistics Korea shuffles the household ID, so I match the quarterly datasets, using individual characteristics. I could match 99.34% of samples. I dropped the 0.66% of samples. I ran a t-test between the original dataset and new dataset to check if it is okay to drop these variables. In 2017 data, for example, the mean values of two datasets are not statistically different at 5% level.

⁷The 1991 tax data cover top 2%, which is a lot smaller than the normal coverage (top 40%). Yet, it is not uncommon to have tax data that cover less than top 2% ([Blanchet, Flores, & Morgan, 2022](#)) and still what matters is we can correct the very top 2% income distribution from survey.

Appendix B

Methodological Issue

There are still several potential biases with survey data that cannot correct fully with fiscal data, using the Bfm correction. [Blanchet, Flores, and Morgan \(2022\)](#) in fact kindly put the limitation of this correction method that you might face in practice. The most critical part is we cannot correct the representativeness of bottom incomes from survey microdata. As previously mentioned, we combine tax data and survey data because tax data do not cover the bottom income distribution¹. Therefore, using the tax data, it is extremely difficult to correct the representativeness of bottom income.

Another issue is there exists the tax-exempted income, tax avoidance/evasion, so that we cannot capture the tax-exempted income or income that is missing in fiscal data, due to the tax evasion. This problem is not be able to be fixed using bfm correction unfortunately. It means we do not know the real distribution of these incomes, so that we have to use assumption. However, these problems exist in all other DINA series ([Khalid & Yang, 2021](#)) and we need the better quality data and approach to solve this issue.

¹Normally, middle income are assumed to be well-represent by the survey.

Appendix C

Survey Data Correction Result

In this section, I present the top 10% shares of pre-tax national income in Korea from 1982 to 2020 based on raw survey, corrected survey with tax data, and DINA series, respectively. For 1982, top income shares are higher in survey data than in tax data. It is because how I combine the raw survey data and still I treat the top income distribution from survey is reliable than survey data. Please see the Appendix A for further details.

When combining survey microdata and tax data with bfm correction, we can calibrate the detailed income composition based on the information from fiscal data. In fact, figure C.2 shows that 2016 household survey data underrepresent business income and property income in top income distribution, compared to 2015. Actually 2016 HIES underrepresents those income composition compared to other recent years. Hence, I am correcting this income composition in the top percentile to be compatible with that of tax data.¹

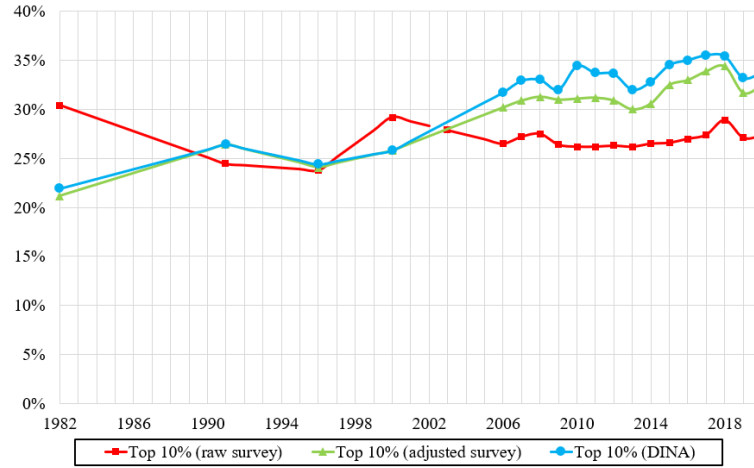
Finally, I compare these correction results with the old WID fiscal income series. This WID series is based on Kim et al. (2018). The oldest year that both data are available is 1996. Please note that since the tax unit is individual in Korea, here I use the DINA series with the individual unit, not equal-split unit.

Figure C.3 presents the result. The gap between the WID/corrected survey series and DINA series represents the amount of tax-exempted (labor and capital) income. This gap increased in the early 2000s. In fact, if you see figure D.1, for those years, in Korea, tax-exempted income has increased. Retained earnings increased for those years and retained earnings are the most common example of tax-exempted capital income.

¹I conduct this calibration when the income composition in the top distribution is very different to other adjacent years. I could not do income composition calibration for all years because detailed income composition in tax data is not available for old years.

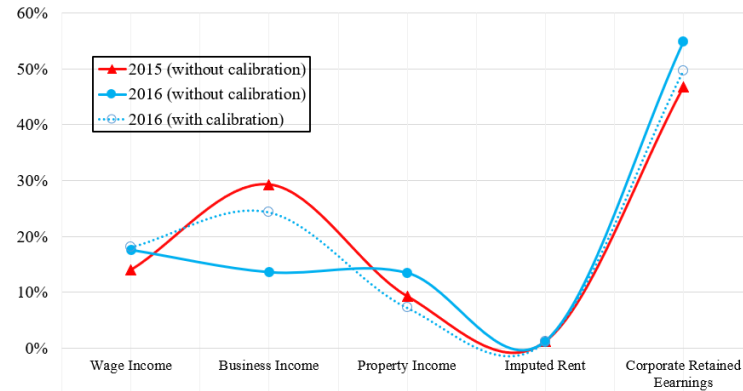
APPENDIX C. SURVEY DATA CORRECTION RESULT

Figure C.1: Correction: raw survey vs corrected survey vs DINA, 1982-2020



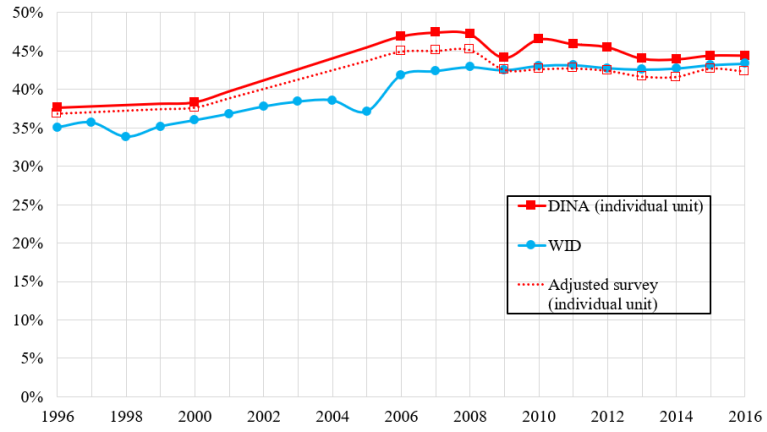
Notes: The equal-split unit (aged 20-year-old and over; income of household is split equally into all adults in household). Survey data are corrected by the tax data using Bfm correction except for 1982 and 1991. For 1982 and 1991, I replace the top income distribution of survey with that of tax data. I linearly interpolated income shares for missing years.

Figure C.2: Income composition calibration: income decomposition of top 1% in Korea



Notes: The equal-split unit (aged 20-year-old and over; income of household is split equally into all adults in household). When correcting the survey data with tax data, I can calibrate the income composition using tax data.

Figure C.3: Top 10% income shares: vs WID series



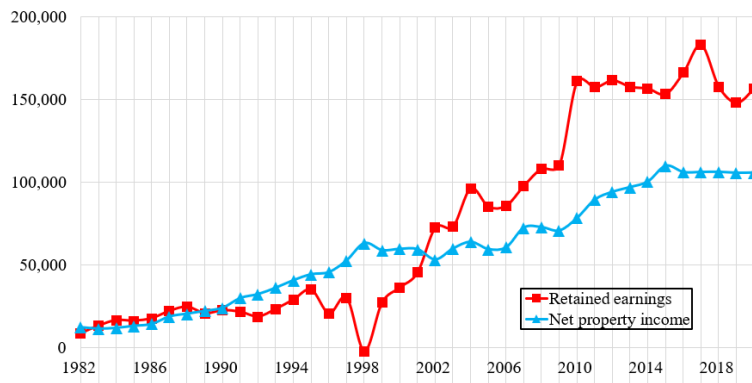
Notes: The individual unit. I linearly interpolated income shares for missing years.

Appendix D

Retained Earnings

Figure D.1 shows the real retained earnings and net property income (both expressed in billion 2015 KRW), from 1982 to 2020. In fact, after the financial crisis in 1998, the retained earnings increased a lot and were restored at the pre-financial crisis level, shortly after the financial crisis. Global financial crisis in 2007-2008 hampered the growing trend of retained earnings, but it did not affect retained earnings in Korea greatly as much as 1997 East Asia financial crisis.

Figure D.1: Retained earnings

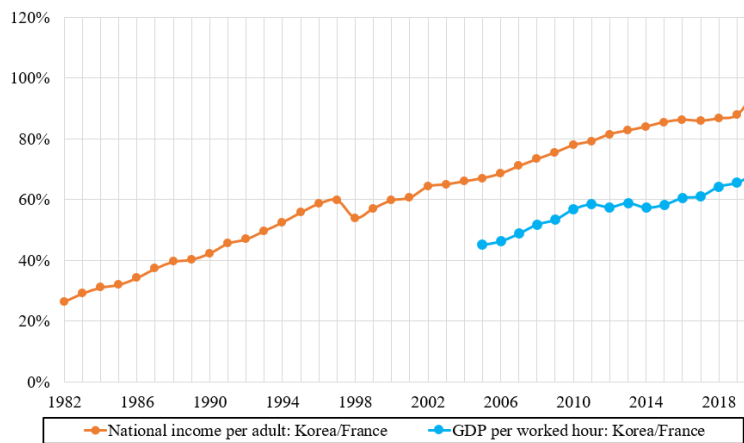


Notes: The real retained earning comes from the net private corporation savings in National Accounts. Net property income also is available in National Account data. Both are expressed in billion 2015 KRW. Source: Bank of Korea.

Appendix E

International comparison II: Korea, US and France

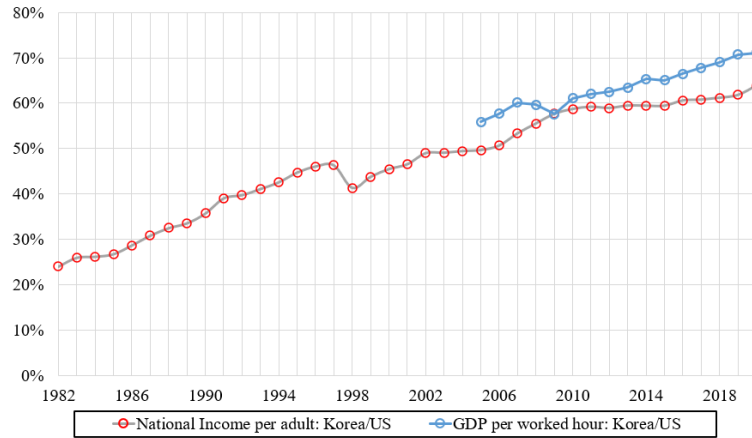
Figure E.1: Average income and productivity: Korea vs France, 1996-2020



Notes: The ratio of Korea to France for GDP per worked hour (ILO) and per adult pre-tax national income; France from WID. Both series are in 2020 PPP USD.

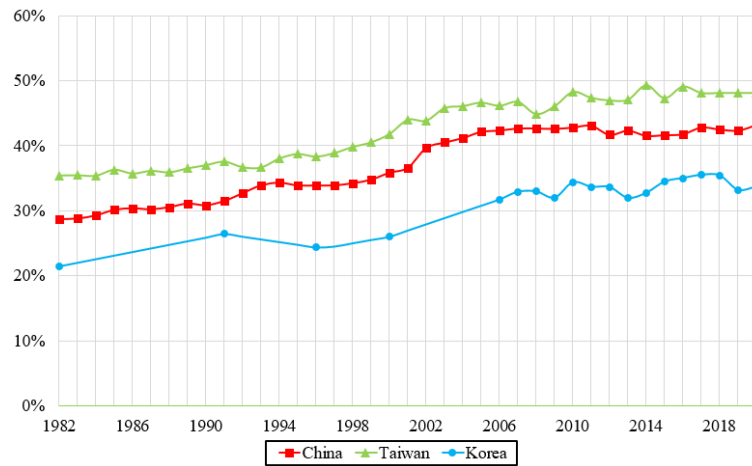
APPENDIX E. INTERNATIONAL COMPARISON II: KOREA, US AND FRANCE

Figure E.2: Average income and productivity: Korea vs US, 1996-2020



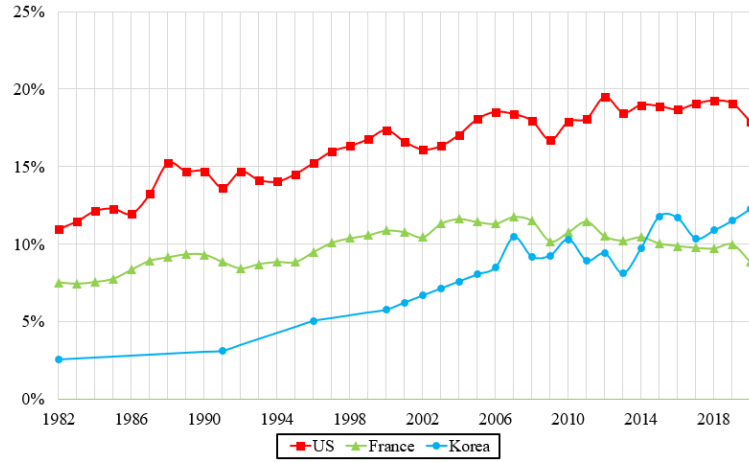
Notes: The ratio of Korea to US for GDP per worked hour (ILO) and per adult pre-tax national income; US from WID. Both series are in 2020 PPP USD.

Figure E.3: Top 10% income shares: Korea vs US/France, 1982-2020



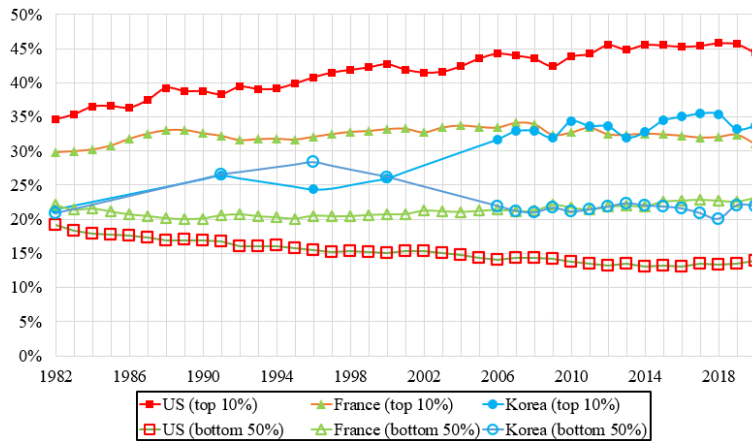
Notes: The equal-split unit (aged 20-year-old and over; income of household is split equally into all adults in household). US and France series are from WID. I linearly interpolated income shares for missing years.

Figure E.4: Top 1% income shares: Korea vs US/France, 1982-2020



Notes: The equal-split unit (aged 20-year-old and over; income of household is split equally into all adults in household). US and France series are from WID. I linearly interpolated income shares for missing years.

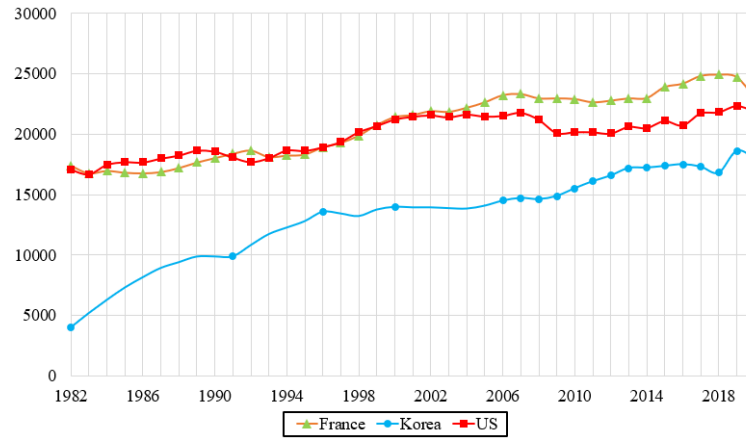
Figure E.5: Top 10% and bottom 50% income shares: Korea vs US/France, 1982-2020



Notes: The equal-split unit (aged 20-year-old and over; income of household is split equally into all adults in household). US and France series are from WID. I linearly interpolated income shares for missing years.

APPENDIX E. INTERNATIONAL COMPARISON II: KOREA, US AND FRANCE

Figure E.6: Bottom 50% real income (2020 PPP \$): Korea vs US/France, 1982-2020



Notes: The equal-split unit (aged 20-year-old and over; income of household is split equally into all adults in household). US and France series are from WID. I linearly interpolated income shares for missing years.