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Economic Development and Its Effect on Income Distribution: Evidence from Australia

by

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Abstract

This study involved investigating the progress of economic development and its effects on income distribution in Australia between 1970 and 2000. Results indicate that Australia exhibited good economic development with increased income inequality. The basis of the estimation of the rate of change and elasticity of income inequality was a new functional form (the double semi-log), using Household Expenditure Survey data. Results illustrate that during high economic growth, income inequality increases. Thus, economic development has a significant positive effect on income distribution even in a developed country such as Australia. This research revisits Kuznets' hypothesis and shows that the inequality of income can increase at any stage of development, not only in the early stages, which Kuznets originally observed.

Keywords: economic development, income inequality, relationship of economic development and income inequality, rate of change of income inequality, and income inequality elasticity.

Economic Development and Its Effect on Income Distribution: Evidence from Australia

This paper involved investigating the progress of economic development and its effects on income distribution in Australia (a developed country) from the early 1970s to the end of the century. The world exhibited tremendous economic development during this period. A well-renowned economist, DeLong (2001) pointed out that since 1975 the world has become a richer place. The incomes of many poor countries grew faster than the incomes of rich countries. In this respect, the world economy has been performing better in the last quarter of a century than in the previous few centuries. For this reason, an apt name for the last quarter of a century could be the world's period of economic development.

The world was a relatively equal place during the

last few centuries, probably because everyone was poor. Suddenly the world changed, and the industrial revolution emerged in Europe, accelerated by technological progress, which outstripped population growth and generated a rising standard of living. As the living standard rose, both birth and death rates fell, and the population underwent a demographic transition to lower rates of fertility, which also occurred in Australia, an already rich country. As a result, Australia transformed into a much more unequal place.

In this study, various economic, modernization, urbanization, and demographic criteria are used in measuring the degree of development. The study also involved determining various economic inequalities based on the Gini coefficient, shares of the incomes by the top and bottom deciles of the population, and the quotient and difference of the top and bottom deciles using information from various Household Expenditure

Surveys (HES) undertaken by the Australian Bureau of Statistics (ABS) during the period. The objectives of the study were as follows:

1. To examine how Australia performed during the world's period of economic development (1975-2000).
2. To investigate whether or not all people within Australia enjoyed the benefit of economic development (in other words, to understand what happened to the income distribution in Australia during the period of economic development).
3. To determine whether any relationship existed between economic development and income inequality measured by various indicators, including some new indicators for Australia.
4. To estimate the rate at which the income inequality changed in Australia and to provide income inequality elasticity based on various inequality measures.

Descriptive statistics and techniques of econometrics aided in investigating the four objectives using HES data from the ABS. The study reflects the following organization: The next section includes a brief description of the data used for the study. Thereafter, another section illustrates the economic development in Australia. Measurements of income inequalities appear in the following section. Next is a discussion of the relationship between economic development and income inequality, and the penultimate section involves comparing the position of Australia with other countries. The final section includes concluding remarks and limitations of the study.

Data

The basis of this study was HES data collected by the ABS. The Commonwealth Bureau of Census and Statistics first attempted to collect household expenditure survey data in 1910/11 and later in 1913, but on both occasions, the response rate was poor. Between 1966 and 1968, a university-sponsored national survey, which is popularly known as the Macquarie University Survey, received considerable attention for various expenditure and income studies until the ABS conducted the 1974/75 HES, covering capital cities only.

The 1975/76 and subsequent surveys covered the whole of Australia, except for remote and sparsely populated areas. These surveys incorporated similar questionnaires and diaries of income and expenditure of all members of the households, although they have undergone some changes from version to version. This study involved estimating the values of various development and inequality indicators based on 1974/75, 1975/76, 1984, 1988/89, 1993/94, and 1998/99 HES data.

Economic Development in Australia

This study included an investigation into the progress of economic development in Australia based on the following broad criteria of development between 1970 and 2000.

1. Per capita income (indicator for direct economic development)
2. Expenditure share for nonfood items (development indicator for modernization)
3. Family size (development indicator for demographic change)

Ram (1995), Papanek and Kyn (1986), Hicks and Streeten (1979), Saith (1983), Simpson (1990), Ahmed (2004) used per capita gross national product as an indicator of direct economic development whereas this study included HES per capita income as a development indicator.

Estimation of economic development is usually based on per capita income, in that the higher the per capita income, the higher the development and vice versa. Many authors, including Ahmed (2004), used the expenditure share for nonfood items as an indicator for development. The idea is that the more money one spends on nonfood items, the better one's economic condition because if households spend a lesser percentage of income on food, more money is available for other essentials, such as housing, clothing, and education. The higher the percentage of household money spent on nonfood items, the higher the standard of living, which means that people will obtain better quality goods and services with increasing economic development.

Related to family size, Kuznets (1976) and Ahmed (2004) showed that with the progress of economic development, the size of households is reducing, probably because the usual expression of size distribution among persons in households is household income per person. General observation includes that the upper income classes reflect small household sizes while the lower income classes exhibit overrepresentation of larger household sizes. Thus, the very identity of the lower and upper groups on the income scale shifts when converting from a size distribution of households by income per household to a size distribution of persons by income per person. Lower family size is an indication of higher development.

To determine the extent of development in a developed country, the study involved gathering information on Australia between 1970 and 2000. The relevant development data appear in Table 1 and Figure 1.

Table 1
Development Indicators for Australia: 1974/75 – 1998/99

Year	Per Capita Weekly Income (A\$)	Expenditure on Nonfood Items (%)	Family Size
1974/75	66.86	79.37	3.08
1975/76	77.89	80.90	3.07
1984	171.41	80.56	2.81
1988/89	245.76	81.36	2.79
1993/94	298.02	81.42	2.63
1998/99	957.17	81.99	2.62

Note. Data from Household Expenditure Survey, 1975, 1976, 1984, 1989, 1994, 1999, Canberra, Australia: Australian Bureau of Statistics.

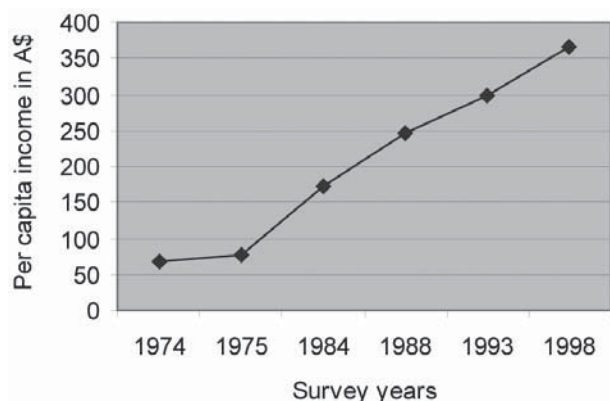


Figure 1. Per capita weekly income (A\$) in Australia: 1974-1998

Note. Data from Household Expenditure Survey, 1975, 1976, 1984, 1989, 1994, 1999, Canberra, Australia: Australian Bureau of Statistics.

The data show that Australia's per capita income grew at a faster rate but that the percentage expenditure on nonfood items developed at a slower rate, while family size declined steadily. The development in Australia expanded reasonably well during this period. Further, the United Nations Development Programme (UNDP, 2008) indicated that Australia's economic growth continued throughout the Bush period (2000-2008) until an abrupt decline at the time of the worldwide credit crisis in October 2008. One of the many reasons for the divesting economic fall down may be bearing heavy war expenses in Iraq and Afghanistan.¹

Income Distribution

Income distribution is extremely important for economic, social, and other development because it influences the cohesion of society; determines the extent of

poverty for any given average per capita income; and affects the poverty reduction strategy, growth, and even people's health. Hence, a fair and acceptable distribution of income among citizens is important for any country to maintain peace and tranquility. In recent years, many wealthy developed countries, such as the United States, the United Kingdom, and Korea, suffered major economic problems due to a high unequal distribution of income and wealth. This section includes information on Australia's performance in terms of distribution of income during the period of economic development.

Australia made good economic progress between 1970 and 2000. The study included determining how Australia managed distribution of income for its citizens. The basis of determination was the following measurements of income inequalities: the share of the income by the top and bottom deciles of the population, the quotients and difference of the top and bottom deciles, and the widely used Gini coefficient. Figures 2 and 3 illustrate the estimates of the income inequality indicators for Australia.

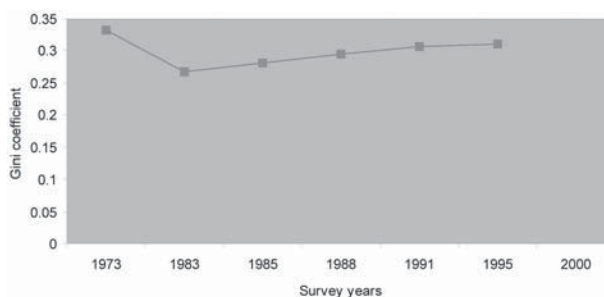


Figure 2. Gini coefficients for Australia: 1973/74-1998/99

Note. Data from Household Expenditure Survey, 1975, 1976, 1984, 1989, 1994, 1999, Canberra, Australia: Australian Bureau of Statistics.

Figure 2 shows the Gini coefficients for various years. An upward trend of income inequality in Australia is noticeable during the world's period of economic development. The Gini coefficient increased steadily from 0.26 in 1975/76 to 0.31 in 1998/99, indicating that income inequality grew during the period of economic development, creating a more significant gap between rich and poor.²

Figure 3 illustrates the income shares for the top and bottom deciles in Australia between 1974/75 and 1998/99. In 1975/76, the bottom 10% of the population shared 3.8% of the income, but in 1998/99, they shared only 2.74% of the income. The corresponding figures for the top decile were 21.01% and 22.53% respectively. The gap between top and bottom deciles has increased from 17.21% in 1975/76 to 19.79% in 1998/99, indicating that poor people become poorer and rich people become richer in the event of economic development even in a developed country such as Australia. Income inequality wors-

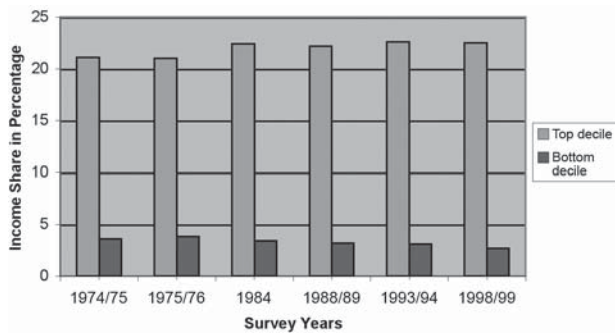


Figure 3. Income share by the top and bottom deciles in Australia: 1974/75-1998/99

Note. Data from Household Expenditure Survey, 1975, 1976, 1984, 1989, 1994, 1999, Canberra, Australia: Australian Bureau of Statistics.

ened in Australia during the world's period of economic development.

Income inequality increased among citizens in Australia, despite the vigorous concerns of social welfare groups and authors, such as Harding (1996, 1997, 2001); Saunders (2001, 2003); ABS (2003); Harding and Greenwell (2002); Barrett, Crossley, and Worswick (2000); Siminski and Norris (2003). These authors identified the problem of income inequality in Australia and advised implementing necessary measures to reduce the inequality, which various levels of government ignored, resulting in an increase in income inequality. To reduce income inequality, private and public instruments should employ the required measures. The government can take the lead in reducing income inequality and creating an egalitarian society through intervention and positive steps in terms of taxation and income subsidy policies and training and financial assistance for the low-income and disadvantaged people of Australia (e.g., the Aborigines).

Such steps are essential during times of high economic growth, even in developed countries such as Australia. During high economic growth periods, only a few privileged people take advantage of the situation and reap the benefit, neglecting the vast majority of the population. Hence, income inequality increases, widening the gap between rich and poor. The poorer section of the community obtains a smaller share of the fruits of economic growth.

An ABS (2005) study indicated that income inequality continued to increase in Australia between 2000 and 2008. The recent economic slowdown affected low-income earners disproportionately. For example, during this period, low-income earners' income increased only 12% compared to 16% for high-income earners. The ratio of top 10% to bottom 10% increased to 4.0 in 2002/03 compared to 3.77 in 1997/98. More importantly, the Gini coefficient increased to 0.309 in 2002/03 from 0.296 in 1996/97, which is an increase of more than 4% over such

a short period. The statistics illustrate that in Australia, the rich became richer, and the poor became poorer, implying that Australia failed to maintain an egalitarian society. The results may shatter the great pride of Australia being a lucky country.

Relationship between Economic Development and Income Inequality

Researchers have long studied the relationship between economic development and income inequality of a country since Kuznets' (1955) pioneering work, which demonstrated the existence of a U relationship between the variables. Since then, particularly during the last couple of decades, several researchers have conducted studies on the topic, but listing them all here is almost impossible. In short, Kuznets' hypothesis has received considerable attention in the literature on development and distribution of resources. Many authors, including Kuznets (1955, 1976), Cromwell (1977), Fields (1979), Knight (1976), Nugent (1983), Robinson (1976), Papanek (1978), Papanek and Kyn (1986), Simpson (1990), Ikemoto and Uehara (2000) developed theoretical models to explain the hypothesis. Nevertheless, others did not support the hypothesis, of which Braulke (1983), Ram (1995), Saith (1983), Anand and Kanbur (1984) are important.

Most of the named authors, such as Simpson (1990), used per capita gross national product as an indicator for economic development, a choice which Bradshaw and Tshandu (1990) and Mbaku and Kmienyi (1992) criticized, suggesting instead use of the Physical Quality of Life Index (PQLI) and Human Development Index (HDI). Mbaku (1997) used the PQLI and HDI as development indicators and proved that the indicators are superior to the widely used per capita gross national product. Thus, in this study on Australia, per capita income, obtained directly from households, aided in determining an appropriate relationship between economic development and income inequality.

The expectation was that a country that had undergone economic development would experience income inequality, which would continue to increase for a relatively long period until implementation of explicit countervailing measures. The research involved determining whether any relationship exists between economic development and income inequality in Australia. Linear function is the norm when investigating such relationships because it is the first approximation for measuring any relationship.

However, other functional forms are widely used to establish the relationship among variables. To ascertain the relationship between income inequality and economic growth, most authors, such as Saith (1983) and Papanek and Kyn (1986), used second-degree polynomials in levels or logarithms of income when they tried to establish the relationship between income and income inequality. However, the theory does not require or even suggest any

such function. A wide variety of functions is acceptable as long as inequality first increases with income and then falls after reaching peak. Most recently, the *World of Work Report* (2008) illustrated the following function to establish the relationship between income inequality and economic growth.

$$\ln(\text{Gini}) = \alpha + \mathbf{X} \beta + \mathbf{Z} \gamma + \delta + \tau + \varepsilon$$

where $\ln(\text{Gini})$ is the natural logarithm of the Gini coefficient in a country; \mathbf{X} is a vector of various labor-related variables; \mathbf{Z} is a vector of various socioeconomic variables, including trade, education, and gross domestic product (GDP) related variables; δ is a dummy variable representing the time variation within countries; τ is the time dummy, relating to shocks affecting all countries simultaneously and seeking to capture any cross-sectional dependence in the errors and to account for the cyclical behavior of all the globalization variables; and ε is the error term. In this equation all variables, except tariff liberalization, capital openness, union density, and collective bargaining structure, are transferred to natural logarithms. Hence, effective use of double-log function occurred in this study.

Selecting a functional form that best fits the data is important because its estimated parameters appreciably depend on the functional form selected. Finding the best functional form is an empirical matter. For that reason, the study incorporated many functions including the following widely used functional forms, to establish the relationship between economic development and various income inequality measures (the Gini index, the shares of the top and bottom deciles of the population, and the quotient and difference of the top and bottom deciles) obtained from years of ABS HES data. For this study, time series data shed more light on the evaluation of the distribution. Time series data not only refer directly to the secular trends but also allow for comparison of data quality. Many researchers in the field, including Fishlow (1972) and Wesskoff (1970), used time series data. The following functional forms are used to find the relationship between per capita income and income inequality in Australia:

Linear (L):	Inequality = $\alpha + \beta$ (per capita income) + ε
Semi-log (SL):	Inequality = $\alpha + \beta \log$ (per capita income) + ε
Quadratic (QAD):	Inequality = $\alpha + \beta$ (per capita income) + γ (per capita income) ² + ε
Double Semi-log (DSL):	Inequality = $\alpha + \beta$ (per capita income) + $\gamma \log$ (per capita income) + ε

where α is the intercept term; β and γ are the regression coefficients, which are expected to be positive and negative respectively due to the nonlinearity of the variable; and ε is the error term, which follows NID (0, 1). Traditionally, researchers use per capita gross national product and its derivatives to measure economic development. However, in this study, per capita income obtained directly from

HES data aided in measuring economic development.

Measurement of inequalities resulted in five quantities: the Gini coefficient, the shares of the top and bottom deciles of the population, and the quotient and difference of the top and bottom deciles. The Gini coefficient is widely used to measure income inequality. Many authors, such as Harding (2001), Harding and Greenwell (2002), Saunders (2003), Ahmed (2004), and Mbaku (1997), have used the top and bottom deciles to measure income inequality. Mbaku (1997), Smeeding (2000), and Barrett et al. (1999), amongst others, have used the quotient of the shares of income by the top and bottom deciles as a measure of income inequality. In addition to these measures, this study included use of the difference between the shares of incomes of the top and bottom deciles as a measure of inequality of income. The difference measure may be superior to other inequality measures because it clearly provides a better understanding of the actual gap between the poor and the rich.

All these functions have separate dependent variables, and running the above regressions entailed using the method of ordinary least squares (OLS).³ Analysis involved running many regressions, including 20 regressions generated from the four functional forms for five different income inequality measures. The DSL function proved to be the best functional form for Australia on the grounds of goodness of fit (based on adjusted R²) compared to the other functions, whose estimated parameters along with other statistics appear in Table 2. More importantly, the DSL function is quite flexible in the sense that it can increase inequality with the rise of income and then decrease after reaching the peak. The function also gives rise to a wide range of shapes. Haque (1989) first used the DSL function for the analysis of the Australian family budget data.

Table 2 shows that the adjusted R² values for all inequality measures, except the Gini coefficient, were very high, indicating that the DSL function fits well for Australian data. The D-W statistic illustrated no autocorrelation problem, so further pursuit of the first-order autoregressive AR (1) and augmented Dickey-Fuller (ADF) test was not required. The mean and the coefficient of variation for all inequality measures were relatively low, but still the share of the top decile was 6.7 times higher than the share of the bottom decile, indicating that significant income inequality existed in Australian society. The regression coefficients for per capita income for both top and bottom deciles were negative, indicating that both groups were losing their shares of the rising income. However, the gap between the shares of the top and bottom deciles was negative, meaning that the income gap between the top and bottom deciles was narrowing as the income increased for Australia, even though the result was not significantly different from zero. The estimated negative regression coefficient of the log of the per capita income of the Gini coefficient and the positive coefficients for both top and bottom income deciles, although not significant, further confirmed the result. This may be explained by the reduction of the share

Table 2
Regression Results for DSL Function and Other Statistics for Australia*

Indep Variables & Other Statistics	Dep Variables				
	Gini ^a	TD	BD	TD/BD	TD – BD
Constant	0.604 (0.166)	12.805 (0.022)	2.694 (0.142)	7.623 (0.094)	10.131 (0.072)
Per capita income	0.00051 (0.373)	-0.00643 (0.234)	-0.00498 (0.088)	0.01195 (0.083)	-0.00145 (0.809)
Log of per capita income	-0.185 (0.408)	4.701 (0.070)	0.738 (0.941)	-1.485 (0.476)	3.964 (0.163)
Adjusted R ²	0.283	0.894	0.921	0.937	0.921
D-W statistics	2.522	3.574	2.977	2.949	3.420
Mean	0.297	21.9633	3.300	6.755	18.6633
C.V	0.083	0.033	0.118	0.150	0.057
Rate of change	0.00012	0.00357	-0.00341	0.008792	0.00698
Elasticity	0.083	0.033	-0.211	0.266	0.076

Note. Data from *Household Expenditure Survey*, 1975, 1976, 1984, 1989, 1994, 1999, Canberra, Australia: Australian Bureau of Statistics.

^a These results are based on the DSL with trends.

*Two-tailed significant values appear in parentheses.

of the bottom decile, which may have occurred due to increased share of the middle class but not the top decile. Recently, the percentage of income of the middle-income earners increased in Australia. Furthermore, the regression coefficient of the per capita income of the Gini coefficient was positive, which clearly indicates that income inequality increased due to economic growth in Australia during the world's period of economic development.

More importantly, Table 2 illustrates the estimation of income inequality elasticity and the rate at which income inequality changes. Both of these measures are important to understand the extent of the problem of income inequality in a society. The DSL function aided in estimating both of these measures:

$$\begin{aligned} \text{Rate of Change of Inequality} &= \beta + \gamma / x. \\ \text{Inequality Elasticity} &= \eta = (\beta x + \gamma) / Y \end{aligned}$$

The rate of change of income inequality with respect to income appears in Table 2. The table shows that the rate of change of Gini income inequality in Australia was 0.00012 with respect to changes in income during the period of development. More interestingly, the rate of change of the top decile increased at a faster rate than those of reduced rate of income share by the bottom decile. As a result, the rate of change of income share gap between top and bottom deciles was 0.00698 with respect to change in income, meaning that the rate of change of income gap increased during the period of economic development.

The estimates of income inequality elasticity for

various inequality measures are evident in Table 2. The interpretation of the income inequality elasticity is straightforward

1. Gini income inequality elasticity = 0.083, meaning that an increase of income inequality of 0.083% will occur for a 1% increase in income.
2. TD inequality elasticity = 0.033, meaning that an increase of 0.033% income share for the top decile will occur for a 1% increase in income.
3. BD inequality elasticity = -0.211, meaning that a decrease of 0.211% income share for the bottom decile will occur for a 1% increase in income.
4. TD/BD inequality elasticity = 0.266, meaning that an increase of 0.266% income share ratio of the top and bottom deciles will occur for a 1% increase in income.
5. (TD – BD) inequality elasticity = 0.076, meaning that an increase of 0.076% income share gap between top and bottom deciles will occur for a 1% increase in income.

The estimates of rate of change of income inequality and income inequality elasticity are important to formulate the social policy of a nation. For example, if the rate of change of income share of the top decile were significantly higher than the declining share of income of the bottom decile, government would need to take immediate and drastic steps to stop the high rate of change of share of income taken by the top decile citizens. Similarly, the income share gap (TD – BD) of inequality elasticity is

useful information for proper policy formulation. For instance, a high increase of the income share gap, say 30%, between TD and BD for only 1% increase in income would be disturbing, and the government would need to implement drastic measures immediately to reduce the income share gap to maintain an egalitarian society.⁴

Various indicators used to measure income inequality elasticity illustrate that income inequality increased in Australia during the period of development. More importantly, a decrease of 0.211% share of income for only a 1% increase in income in the bottom decile of Australia was evident. The result indicates that the bottom 10% of income earners in Australia was worse off during economic development. Thus, poor people are relatively becoming poorer at the time of economic development irrespective of structural location. In contrast, an increase of 0.033% income share was evident for the top decile of income earners in Australia for a 1% increase in income.

Overall, the study clearly shows that poor people relatively became poorer at the time of economic development in Australia. This result is consistent with Haque's (2007) finding that income inequality worsened at a faster rate during the period of economic development in Bangladesh. Thus, income inequality can increase at any time of economic growth irrespective of structural location of the economy, not only at the beginning of economic development, originally observed by Kuznets (1955).

Comparison with Other Countries

Between 1985 and 2005, the world experienced a rapid increase in economic growth together with the development of global trade and internet expansion for most countries. Table 3 illustrates the per capita GDP for Australia and selected countries that exhibited significant economic growth between 1987 and 2005.

Table 3 clearly shows that most developed countries, including some developing countries such as China and India, gained significant economic growth during the 1987 to 2005 period. India reflected the highest per capita GDP increase between 1987 and 2005, followed by China, both of which are still developing countries and are widely known as the economic powerhouses of the world. During this period, Australia achieved the highest percentage increase of per capita GDP among the selected developed countries, followed by the United States, Germany, and Japan, all of which exhibited significant economic growth, although their economic gains were much lower than India and China.

The highest increase in per capita GDP occurred between 1995 and 2005. During this period, India's percentage increase of per capita GDP was 227.83% followed by China's 218.13%. Australia's increase of per capita GDP (169.85%) was the highest among the selected developed nations during this period, followed by the United States and Japan.

Table 3
Per Capita and Percentage Increase of Per Capita GDP for Selected Countries: 1987-2005

Country	Per Capita GDP (US\$)			Increase of Per Capita GDP (%)		
	1987	1995	2005	1987-1995	1995-2005	1987-2005
Australia	11782	19632	31794	66.63	169.85	61.95
USA	17615	26977	41890	53.15	137.81	55.28
Japan	13135	21930	31246	66.96	137.88	42.48
Germany	14730	20370	29461	38.29	100.01	44.63
China	2124	2935	6757	38.18	218.13	130.02
India	1053	1422	3452	35.04	227.83	142.76

Note. Data from *Indicators—2007/2008 Report*, by UNDP, 2008. Retrieved from <http://hdrstats.undp.org/indicators>

After determining that most developed countries, including some developing countries, reflected significant economic growth between 1987 and 2005, the next step was to investigate who gained the economic benefit within a country (i.e., the distribution of the economic benefit among the citizens of a country). The Gini coefficient is popular in establishing the distribution of income within a country. Its value stands between 0 and 1, and the lower the value the better the distribution.

Maintaining equity is more difficult than maintaining efficiency. Most countries studied may have performed all their economic operations efficiently but may not maintain equity. Table 4 indicates that the income distributions for both China and India were highly unequal, even though they achieved higher economic growth than many developed nations during this period of development.

Table 4
Income Inequality for Selected Countries with Significant Economic Growth: 1989-2005

Country	Gini Coefficient	% Share of Top 10%	% Share of Bottom 10%	Ratio of % Share of Top to Bottom 10%
Australia	0.352	25.4	2.0	12.5
USA	0.408	29.9	1.9	15.5
Japan	0.283	21.7	4.8	4.5
Germany	0.249	22.1	3.2	6.9
China	0.469	34.9	1.6	21.6
India	0.368	31.1	3.6	8.6

Note. Data from *Indicators - 2007/2008 Report*, by UNDP, 2008. Retrieved from <http://hdrstats.undp.org/indicators>

The percentage share of the bottom 10% of people in China was only 1.6%, very low compared to even India, which exhibited 3.6% share for its bottom 10%. Their share is better than the share of many developed countries, such as Australia and the United States. Share ratio between top and bottom 10% of the population was again highest in China, followed by the United States and Australia. Japan showed the lowest ratio, followed by Germany and India. India's income was more evenly and better distributed among its citizens than Australia, the United States, and others, even though that country's economic growth was the highest of all the countries studied.

The World of Work Report (2008) indicated that the gap between rich and poor is widening in the world's richest countries, such as the United States and Australia. The United States demonstrated the highest inequality and poverty rates among Organization for Economic Cooperation and Development (OECD) countries after Mexico and Turkey, and the gap between rich and poor has widened substantially since 2000. The report further indicated that the widening gap does not only exist between wealthy households and the poor: Countries, including the United States, Canada, and Germany, are also leaving middle-income earners further behind with potentially ominous consequences if the recent global financial crisis spurs a long recession. More importantly, the report illustrates that ordinary workers obtained a smaller share of the fruits of economic growth.

Further investigation involved determining how Australia compared with 14 selected OECD countries, including Sweden, Denmark, Germany, the United States, and the United Kingdom, based on national progress indices between 2000 and 2007. The results indicated that Australia's rank in terms of income inequality was 12th out of 14, the same as the United Kingdom, a poor result. Stakeholders must change Australia's present condition before delimiting future options for a shared national vision.

The United States earned the worst ranking of the 14 countries considered. The country with the greatest wealth reflected the lowest standard of national wellbeing. The U.S. Institute for Policy Studies investigated poverty and income inequality in the United States using 2002-2006 information and concluded that "the rich have become richer and the poor have become poorer in recent years" (as cited in Appel, October 23, 2008, *The Brunei Times*, p. 7).

The institute further indicated, "If the data included this year, you'd find these numbers going through the roof in almost every state" (p. 7). Green (2008) emphasized, "A culture of inequality had left millions of UK people behind and was running the life chances of millions of children" (November 25, 2008, *The Brunei Times*, p. 7).

Conclusions

This study involved investigating economic development in Australia. Results indicate that Australia has made good economic development in terms of per capita income, shares of nonfood items, and family size. However, examining the distribution of income in terms of income shares of the top and bottom deciles, their quotient and differences, and the Gini coefficient illustrates that income distribution in Australia has worsened with economic development. More importantly, the gap between rich and poor in Australia widened during the period of economic development. Furthermore, the rate of change of income inequality was faster in Australia during economic development. The results reconfirm Kuznets' hypothesis that income inequality could increase at any stage of economic development, not only at the initial stage, as originally observed by Kuznets (1955).

In addition, the study involved estimating the relationship between income inequalities and economic development (taking per capita income as an indicator for economic development). The DSL appeared to be the most appropriate functional form for Australia. The regression coefficient of per capita income for the Gini coefficient was positive, indicating that income inequality increases with the rise of economic development.

The study included additional income inequality measures, such as quotient and difference of the top and bottom deciles, and use of per capita income (rather than per capita GDP) as an indicator of economic development from HES data related to various points in the last quarter of the last century. Time series data aided in identifying the change in economic development and income inequalities. Determining the extent of the growth rate of income inequalities in Australia included estimating the income inequality elasticity and the rate at which the change of income inequalities occurs.

The estimates show that income inequality increased rapidly in Australia. More importantly, the bottom 10% of earners was worse off at the time of economic development, implying that poor people relatively become poorer during economic development. All analyses based on various inequality indicators show that income distribution worsened in Australia during the period of economic development. Thus, the Australian government should strictly monitor the income inequality situation, particularly at times of high economic growth, and should intervene to implement necessary measures to maintain an egalitarian society, should they wish to do so.

This study clearly shows that income inequality has a positive relationship with economic development in Australia, meaning that Australia achieved high economic growth with an increased trend of income inequality. However, a number of countries, such as France and Brazil, achieved significantly high economic growth but managed to reduce income inequality. These

trends prompted a surge of interest in the relationship between economic development and income inequality and, in particular, a reassessment of how a country's level of economic development predicts its subsequent rate of income inequality. This paper involved directly estimating how changes in income relate to changes in income inequality within a given country. Analysis based on Australian data illustrates that in the short and medium term, an increase in a country's economic development has a significant positive relationship with income inequality. However, drawing any definitive conclusions would be inappropriate because of the lack of enough data to measure the relationship accurately.⁵

The research included an investigation into how income, income inequality, and their underlying determinants are interconnected. Results included some positive relationships between economic development and inequality by testing regression coefficients. Even over the short period, the positive relationship between economic development and inequality proved to be robust. However, further testing will be required when more observations are available. Future research should involve further assessment of the reduced form relationship between the two variables and more theoretical and empirical work evaluating the channels through which development, inequality, and any other variables are related.

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Footnotes

- 1 Australia was Bush's war partner.
 - 2 Figure 2 illustrates that the Gini coefficient was significantly higher in 1974/75. A possible reason could be that the 1974/75 HES covered only the capital cities in Australia, indicating that income disparity between rich and poor is generally high in Australian capital cities, where most rich and poor people live. However, a significantly lower Gini coefficient was evident when HES data collection included rural and other urban areas to reflect the whole of Australia. The result shows that a more egalitarian society exists in Australian rural and urban towns and cities, a society better off than are many poor people living in Australian capital cities, hiding the real high income-inequality problem and helping to create a more egalitarian society.
 - 3 SPSS computer software aided in running the regressions.
 - 4 To achieve an egalitarian society, government could impose and implement a progressive taxation policy so that the rich pay more and the poor pay less tax. The government could also provide educational and training programs, particularly a vocational training scheme, for the vast majority of disadvantaged people to improve their skills, which may lead to employment and improvement of their living standards. The government could open other development programs, such as small business and cottage industries, to upgrade the economic conditions of the poor, which would help to reduce the income inequality among its citizens.
 - 5 At the time of this study, analysis included only six HES data points. Since then, only one HES (2003/2004) data became available, which is still not enough to present a definitive conclusion. Moreover, the addition of an extra data point would probably not alter the original findings. The UNDP report also does not include enough data points to measure Australia's income inequality.
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