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THE RELATIONSHIP BETWEEN ECONOMIC  
DEVELOPMENT AND SOCIAL WELFARE: A NEW  
ADJUSTED GDP MEASURE OF WELFARE

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**ABSTRACT.** Existing literature focuses on the issue of preparation of social welfare measurements on the basis of an unadjusted Gross Domestic Product (GDP). This paper extends this method to incorporate cost-benefit analysis of economic growth in a growing economy in calculating the adjusted GDP, termed as the cost-benefit (CB)-adjusted GDP. This approach is empirically applied to Thailand. There are stark differences between GDP per capita and CB adjusted GDP per capita rates for this period. This paper concludes that GDP can be used as an indicator of social welfare if the GDP estimates are undertaken within a cost-benefit analysis framework.

**KEY WORDS:** Development, GDP, Thailand, Welfare

INTRODUCTION

*GDP as a Measure of Social Welfare*

The measurement of social welfare has long been a controversial subject. Economists, social scientists and politicians all wish to measure whether individuals or society are better or worse off as a result of economic or social interventions. The ability to accurately predict the effect of such interventions is a powerful tool and keenly sought by all involved. Without an agreed upon method of measuring welfare within the field of economics, Gross Domestic Product (GDP) is widely used (Sen, 1976; McLean, 1987).

Practical difficulties in such an exercise are numerous. Firstly, debate exists as to whether welfare can be measured at all. If individual welfare can be measured, is social welfare simply the sum of its parts or must certain weights and synergies be taken into account? If welfare (individual or social) can be measured, how is



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it done? Is welfare measured ordinally or cardinally? Can welfare of an individual be measured across time or can the welfare of two individuals (or countries) be compared? Consensus on these issues is rare.

Those interested in this field assume their way through this mine-field of uncertainty. Intertemporal comparison is assumed possible. Tastes and preferences are considered unchanged. Simplifications are sought. Thus, the use of GDP as a measure of welfare is attractive to both economists and non-economists. GDP is tangible and well understood by many. For politicians, the historic Olympian feat of GDP (high, faster, and stronger) provides a positive story to share with their constituents of ever increasing welfare. Comparisons between countries are statistically easy to make.

Hicks (1940) and Pigou (1962) initiated using real national income/GDP as a measure of social welfare. Whilst Pigou recognised that welfare was more than just the sum of economic activities that GDP measures and thus was not a barometer “or index of total welfare” (Pigou, 1962, p. 12), he also noted that there was an “unverified probability” that this is actually the case. Since then, the use of GDP as a measure of welfare, in spite of its limitations, has become a conventional exercise (Nordhaus and Tobin, 1973; Sen, 1976; Beckerman, 1974, 1992, 1994; Dodds, 1997; Drake and Nieuwenhuysen, 1990; Eltis, 1966; Hoselitz, 1960; Manning and de Jonge, 1996; Moss, 1968).

This method is based on several important assumptions: welfarism (utilitarianism), optimal distribution of income, intertemporal separation of utility, the possibility for situational comparisons, cardinal measurability of utility, constancy of tastes, and transitivity.

The logic of using GDP as a measure of welfare is therefore simple and attractive: if the economy is growing, so must our welfare. However, for GDP to become a more appropriate measure of social welfare, the costs and benefits of economic activity should be included in national accounting systems.

*The Relationship Between Social Welfare, Economic Development and GDP: Integrating the Tools of Welfare Economics into Development Economics*

From its recent inception, development economics set itself apart from the rest of the economics field by insisting it alone could solve the backwardness of the third world (Hirschman, 1981). This flaw, long well recognised (Sen, 1984, 1999; Dasgupta, 1993), continues to exist. It is now time to again insist on the incorporation of, at the very least, the use of some tools of welfare economics.

The primary goal of development economics has been to achieve economic growth. The implicit reasoning is that increases in GDP increases the nation's welfare. Whilst this reasoning remains implicit, the value judgements and limitations of GDP as a statistic remains unexplored. The result of this is that the concept of welfare being used is less sophisticated than it could be. Welfare economics however, makes explicit these premises and also allows includes considerations such as liberty, freedom and social capability.

The application of welfare economic tools to development economics ensures that "development is not only a matter of long-run growth" (Sen, 1999, p. 45). Rather, it can take into account the opportunities and entitlements of people to ensure that their human development can occur both in times of high and low economic growth (Sen, 1984).

The tool that will be used in this paper is cost-benefit analysis (CBA). The application of cost-benefit analysis to GDP will better inform policy recommendations, as a fuller and richer understanding of the concept of welfare will occur. Thus, more realistic, effective and utility enhancing policies will be designed and implemented.

By developing a social welfare function (SWF) based on the application of CBA to GDP, all social states can be ranked and explicit value judgements can be included in recommending which policies should be initiated.

This paper addresses how welfare economics can make a positive contribution to development economics through the application of just one specific tool; cost benefit analysis. In doing so, a cost-benefit analysis adjusted GDP becomes a more significant measure of welfare than unadjusted GDP.

### *Limitations of the Existing Literature and Contributions of the Paper*

An integrated framework of cost-benefit analysis based on the GDP index for the measurement for social welfare is not adequately developed in the existing development economics literature. The present study develops an approach to overcome this limitation. It develops a framework that is based on applied welfare economic analysis of social-benefit comparisons of dynamic changes and growth in the Thai economy. A partially developed approach is applied to the Thai economy for the period of 1980 to 1990 to measure and analyse the nature and changes in social welfare in Thailand. However this approach is a work in progress, not a finished methodology. The usefulness though, is that it indicates the importance of incorporating socio-economic costs into national income accounting using traditional cost benefit analysis.

### *Organisation of Paper*

This paper is divided into five sections. The first section introduced this paper. The second explores the issues of welfare measurement and controversies surrounding this measurement. The third section focuses on GDP as a measure of welfare and its limitations. The concept of an adjusted GDP and a new social welfare function for measuring welfare is introduced in the fourth section. The final section includes the paper's conclusions. The appendices contain the data and the details of calculations of different components of welfare measurements.

## SOCIAL WELFARE: CONCEPTUALISATION AND MEASUREMENT

### *What is Welfare?*

The basic objective of welfare economics is to determine whether economic interventions improve or make worse the welfare of individuals and society as compared to alternatives and the status quo. This objective has long been a central theme of economics more generally dating back to Smith's *Wealth of Nations*. But at various times, such as during the 1950s when struggling with prac-

tical application issues, the entire field of welfare economics was considered dead (Page, 1988).

Welfare can be defined in any manner as long as its usage is clear and stated clearly (Sen, 1985). It can be seen as the satisfaction of preferences, which is a formal approach or positive approach, as the theory does not presume to say what things are good for people, but indicates how these things can be found out – by studying revealed preferences. Another approach defines welfare as a mental state; it is happiness or pleasure. This approach describes what is good for people and is thus a substantive or normative approach.

This delineation can be straddled. Consumers seek to maximise their welfare by satisfying their preferences, and preference satisfaction maximises their mental state of happiness or pleasure (Winch, 1971; Hausman and McPherson, 1996).

Other important alternative approaches to understanding do exist but will not be considered in this paper (Sen, 1985, 1993; Rawls, 1971).

#### *Welfare as Satisfaction of Preferences – The First Approach*

The primary method of measuring the value of other goods is through the observations of consumers' revealed preferences. The concept of revealed preferences is described as one of "the most simplest, but also one of the most powerful, in economics (Quiggen, 1996, p. 46). By observing how consumers' income is allocated over a specific period, data can be collected on the consumers' preferences for particular consumption bundles and thus the value of these consumption bundles approximated (Hufschmidt et al., 1983).

Given limited income, if a consumer chooses consumption bundle  $q^0$  in period one then  $q^0$  is the consumption bundle preferred over all other bundles and thus the utility derived from it can be inferred to be the highest level of all consumption bundles. If in period two, the consumer then chooses  $q^1$  when  $q^0$  could have been chosen, it can be shown that  $q^1$  is preferred to  $q^0$  and thus the utility of  $q^1$  is greater than  $q^0$  and welfare has increased. "So even when the consumption bundles are not obviously comparable, the revealed preferences approach may permit us to determine whether consumers are better off" (Quiggen, 1996, p. 46).

### *Welfare as a Mental State – The Second Approach*

The second approach to measuring welfare sought to move beyond utility, consumption bundles and revealed preferences by defining welfare as a concept that itself is intrinsically valuable in itself. Other units of measurement can be used to measure this concept called welfare.

A number of well known social welfare measurement methods include the compensating and equivalent variations, Pareto efficiency and optimality, Debreu's efficiency index, Frisch's marginal utility of money, and translog demand (Islam, 2001).

In addition to all these measures, welfare has also been defined as a function of health, education, security, individual freedom, culture, social relationships, levels of contentment, control over resources, satisfying of wants, freedom, the environment, leisure, housing and almost all combinations of the above. Nicholson in 1949 thought that welfare could be measured by consumption of beer (Atkinson, 1983)! If these options were not enough, welfare should also "include, in addition to economic variables, every other interdependence that directly or indirectly affects men's well being" (Zolotas, 1981, p. 32).

### GDP STATISTICS AS A NUMERICAL MEASURE OF SOCIAL WELFARE

#### *What is GDP?*

GDP is based on the first approach to understanding welfare; the satisfaction of preferences. The basis for this is *monotonic*, in that more is better. Using an index based on quantity and real prices to determine the total value of commodity bundles chosen, the underlying philosophy is that higher total values of commodity bundles is a measure of higher levels of social welfare.

#### (1) **Welfare increases if $q^1 P q^0$**

By multiplying the  $q^1$  by a price,  $p$  (preferably a base price,  $p^0$ ) a total monetary value can be calculated for easier comparisons.

The standard welfare economic framework compares policies on the different allocations of consumption bundles that they generate.

By supposing that society consists of a number of individuals (1, . . . , n) each of whom, it is assumed, have different preferences for different consumption bundles, comparisons between different policy outcomes can be made (Sen, 1984; Quiggen, 1996).

GDP and real national income are based on the calculation of prices and quantities.

$$(2) \quad \mathbf{GDP} = \mathbf{q} \cdot \mathbf{p}$$

where:  $\mathbf{q}$  is a vector of final outputs ( $n \times 1$ ), [ $q^1, q^2, \dots, q^n$ ]  
 $\mathbf{p}$  is a vector of prices ( $1 \times n$ ), [ $p^1, p^2, \dots, p^n$ ]

It is important to determine whether people are becoming worse off or better off between periods because of changes in GDP (Kakwani, 1997b). To make this determination it is necessary to remove price fluctuations in GDP between periods in (2) (Kakwani, 1997a). Using a fixed price can deflate changes in GDP.

$$(3) \quad \mathbf{Real\ GDP} = \mathbf{q} \cdot \mathbf{p}^0$$

where:  $\mathbf{p}^0$  is a vector of base year prices

It should be noted though that within larger countries, price changes can also differ spatially (Kakwani, 1997c).

When comparing welfare over two periods using (3), two clear outcomes can be observed. In the first

$$(4) \quad \mathbf{q}^1 \cdot \mathbf{p}^0 \mathbf{P} \mathbf{q}^0 \cdot \mathbf{p}^0$$

This indicates that the consumer is unambiguously better off because the value of consumption bundle ( $\mathbf{q}^1 \cdot \mathbf{p}^0$ ) in the second period is greater (and thus preferred) than the base period consumption bundle ( $\mathbf{q}^0 \cdot \mathbf{p}^0$ ).

In the second

$$(5) \quad \mathbf{q}^0 \cdot \mathbf{p}^0 \mathbf{P} \mathbf{q}^1 \cdot \mathbf{p}^0$$

the consumer is unambiguously worse off because the total value of the consumption bundle in the second period ( $\mathbf{q}^1 \cdot \mathbf{p}^0$ ) is less (and thus not preferred) than the total value of the consumption bundle in the first period ( $\mathbf{q}^0 \cdot \mathbf{p}^0$ ).

There are also two non-clear outcomes. This is when  $q^0 \cdot p^0$  is chosen in the second period when  $q^1 \cdot p^0$  could have been chosen. Similarly, when  $q^0 \cdot p^0$  is chosen in the base period when  $q^1 \cdot p^0$  could have been selected. In these instances “it is clear that both of them cannot indicate the direction in which the economic satisfaction . . . enjoyed by the group has changed” (Pigou, 1962, p. 64). This has also been called the *index number problem* (Quiggen, 1996).

#### *Limitations of GDP as a Measure of Social Welfare*

GDP as a measure of welfare is limited in two ways. Firstly, it faces the limitations inherent in its own constitution. Secondly, it is limited through the inherent faults of price indices.

Within its own construction GDP is limited as it does not take into account household production such as child rearing, housekeeping and small scale food production. Such activities are very important in developing countries. Likewise, GDP excludes illegal or informal economic activities, which again are often very important in developing countries. GDP calculates the impacts of all economic activities, whether they are positive or negative without discrimination. Double accounting also occurs with economic activity being counted for both the causing of problems, such as pollution, as well as they costs of rectifying those problems. GDP understates the true cost of economic activity as many economic activities treat natural resources as free. Welfare can be increased through increased levels of leisure, however, GDP does not calculate the cost of leisure. Similarly, human freedom is a concept vital to welfare, but it is difficult to value in monetary terms. Finally, sustainable economic growth cannot occur if it is based on the liabilities of foreign assets. Loans for consumption or unproductive assets bolster GDP in the short term, but reduce welfare in the long run when increased resources must be diverted to repay these loans.

In addition to these limitations, there are a number of difficulties associated with GDP being a price index, which further undermines its use as a suitable proxy indicator of welfare. Price indices, such as GDP deflators, are deeply flawed and provide misleading results (Jorgenson, 1997).



Welfare is momentary and “people do not actually face the choice of being someone else or living at another age or time” (Sen, 1985, p. 19). Thus comparing  $q^1$  and  $q^0$  (3) is of limited use. Not only can individuals not choose between living in the future, past or present, they can't choose to experience the welfare of contemporaries. Likewise, preferences change over time (Pigou, 1962) as do peoples' capacities to enjoy satisfaction (Sen, 1970). Changes in income distribution (Jorgenson, 1997) also result in price indices being of limited use. Unlike the inherent problems with the changes in preferences and tastes, etc., the problem of price changes can be overcome through the use of a price deflator.

#### APPROACH ADOPTED IN THIS STUDY – ADJUSTED GDP AS A MEASURE OF WELFARE

##### *Adjusted GDP as a Welfare Measure*

##### *Existing Approaches*

To overcome these limitations Sametz (1968) and Nordhaus and Tobin (1973) attempted to measure welfare by adjusting GDP. The majority of adjusted GDP indices that have since been developed have a similar approach to calculating welfare. This approach can be more formalised within cost benefit framework by considering the costs and benefits of economic growth as the following:

$$(6) \quad NSW = f(GDP - CL) + (B - GC) - AL$$

where: NSW = Net social welfare  
 GDP = Gross domestic product  
 CL = Capital equipment destroyed  
 B = Benefits of economic growth  
 GC = Costs of economic growth  
 AL = Loss of natural resources  
 (Barkley and Seckler, 1972)

Whilst this generic breakdown is an accurate reflection of the basic approach to calculating welfare; the “devil is in the detail”. Different approaches calculate and include and exclude different components, which make up the capital equipment, costs, benefits and loss of natural resources and thus having dramatically different results.

Nordhaus and Tobin (1973) “Measure of Economic Welfare” (MEW) reclassified National Net Product (NNP – a figure similar to GDP) into consumption, investment, and intermediate, imputed services rendered by consumer capital items for both pleasure and the product of household work, and corrected the figure for the “bads of urbanisation”. However they did not take into account environmental damage (Nordhaus and Tobin, 1973).

The conclusion was, that whilst the MEW grew at a lesser rate than the NNP, both did grow over time and therefore NNP was an effective measure of social welfare. An extension of this therefore is that economic growth is beneficial to the social welfare of a society, more so than any costs that may be associated with economic growth.

Using this data, others questioned this conclusion, arguing that in specific time frames Nordhaus and Tobin’s measure of welfare actually fell whilst the GDP continued to rise (Daly and Cobb, 1990). This drew on the concept that:

... for every society there seems to be a period in which economic growth (as conventionally measured) brings about an improvement in the quality of life, but only up to a point – the threshold point – beyond which, if there is more economic growth, quality of life may begin to deteriorate (Max-Neef, 1995, p. 117).

Daly and Cobb then argued that the threshold point had been reached and thus GDP was not a suitable proxy indicator of welfare. They extended the work of the MEW into the Index of Sustainable Economic Welfare (ISEW). Many more costs and benefits, particularly those impacting on the environment are included.

There are difficulties with establishing such an indicator. These include value judgements as well as using statistical data that is new or questionable. However, both the adherents to alternative measures of welfare (Ekins and Max-Neef, 1992; Cobb and Cobb, 1994) note these limitations as well as its critics (Miles, 1992; Brekke, 1997, Neumayer, 1999).

#### *A New Approach – The Cost-Benefit Social Welfare Function*

Consideration of the costs and benefits of economic growth has previously occurred but only in an informal manner and not within the sphere of development economics. The formal applica-

tion of cost-benefit analysis, which incorporates concepts such as intergenerational equity, to GDP to determine welfare in developing countries has not occurred. Approaches undertaken by Nordhaus and Tobin (1973) and Daly and Cobb (1990) have informally calculated costs and benefits of economic growth in measuring welfare. The concept introduced in this paper however, formally applies cost-benefit analysis to GDP through the use of a new social welfare function (SWF).

A SWF needs to be able to rank all social states ordinally or cardinally for it to be useful (Chakravarty, 1990). Arrow (1951) undertook to prove that given four reasonable assumptions, no such social welfare function (other than a dictatorial SWF) could exist in which all social states could thus be calculated. Arrow's theorem was a powerful argument reconfirming economics' reputation as a dismal science.

However, Sen (1970) and then others (Hammond, 1976; Roberts, 1980) argued against these restrictions claiming they were too restrictive and thus not reasonable. The development of democratic SWFs ranking all social states was again made possible.

This paper proposes a democratic SWF that is predicated on the assumption that the sum of revealed preferences of individuals does not equate to the optimal revealed preferences of society as per the Samuelson-Bergson model.

The democratic cost-benefit analysis based SWF used in this study is

$$(7) \quad SWF_t = W_t (DNB_t)$$

where: $W_t$	= welfare
$DNB_t$	= discounted net benefits = $CBAGDP_t$
$CBAGDP_t$	= cost benefit adjusted GDP = $\frac{[(B_t\{GDP_t\}) - (C_t\{GDP_t\})]}{(1+r)^t}$
$t$	= time
$B_t$	= benefits of economic growth
$C_t$	= costs of economic growth
$r$	= discount rate

This SWF is an expression of the costs and benefits of economic growth. The different costs of and benefits of economic growth are discussed below. Normally GDP is a criterion of a SWF, but in this SWF, the costs and benefits of GDP are used. Therefore it is possible to specify a SWF which includes such things as the environmental impact of economic growth. This SWF is not the sum of individual welfare but rather a function of the costs and benefits of economic growth.

This SWF formally incorporates cost-benefit analysis into the process of determining social welfare. Until recently, GDP as a measure of social welfare has focussed only on the winners of economic growth. In terms of cost-benefit analysis, GDP is a measure of the benefits of economic growth. However, to fully measure social welfare, the losers of economic growth must also be taken into account before a rational decision can be made as to the desirability of economic growth. Individuals calculate the benefits and costs within their rational approach to decision making. Similarly, “the cost benefit approach has the characteristics of individual rationality” (Pearce and Nash, 1981, p. 5). And, as with individual choices, cost-benefit analysis is based on value judgements.

The application of cost-benefit analysis to GDP results in an adjusted GDP as both the benefits and costs associated with economic growth are fully taken into account. This paper argues that adjusted GDP is a better measure of social welfare, than unadjusted GDP.

Cost-benefit analysis is a technique to find preferred or optimal levels of welfare (Page, 1988). This paper incorporates cost-benefit analysis into calculating and adjusted GDP so that a more accurate understanding of optimal levels of social welfare can be reached. The use of cost-benefit analysis allows the new measure of welfare to increase and decrease as both costs and benefits of economic are now included, rather than just the benefits.

It is often argued that an appropriate measure of social welfare can be made by a vector of welfare indicators consisting of GDP as well other components of social welfare such as health, literacy, income and personal well-being (Atkinson et al., 1997). However, if a suitable set of weights for different elements of the social

welfare vector can be determined, a scaler of GDP adjusted by other elements can be adapted as a measure of social welfare.

*An Exercise for the Adjusted GDP Index Calculation for Thailand*

Based on the ISEW, a cost-benefit adjusted GDP SWF (CBAGDP SWF) for Thailand is developed. The CBAGDP SWF is divided in two sections; benefits and costs. The benefits include personal income adjusted for income distribution, household production, private consumer durables, public expenditure on education and health, and government provided streets and highways.

The costs included urbanisation, commuting, commercial sex work, private expenditure on health and education, car accidents, air, water and noise pollution, corruption, debts, loss of forests, farmlands non-renewable resources and long-term environmental damage.

A partial application has been made to the Thai economy for the period 1980 to 1990. A complete application based on the above for the period 1975 to 1999 is being undertaken but is currently incomplete.

The preliminary results, based on income adjusted for inequality using the concept of an equally distributed equivalent level of income and the costs of economic growth, which have been identified as the costs of commuting, commercial sex work, private expenditure on health and corruption.

All discussions on income distribution include value judgments. Accepting the current distribution is as arbitrary as assuming welfare is maximised when income is equally distributed (Pearce and Nash, 1981). Therefore an equally distributed equivalent income (Atkinson, 1983) which calculates the equivalent welfare level based on an equally distributed income is a sensible start (see Appendix A).

Commuting is a closely related phenomenon to urbanisation. Like urbanisation, commuting is a cost of economic growth. As cities become increasingly over populated, roads are clogged with increased numbers of private and public vehicles attempting to move large numbers of people around. The end result is increased amounts of wasted time as people spend longer and longer commuting to

and from work. Commuting is a separate problem to urbanisation though, because an efficient mass transport system could reduce such time delays considerably if it replaces the over reliance on private vehicles that economic growth encourages (see Appendix B).

Commercial sex work (CSW) is now considered a part of the Thai culture. "A survey of popular *luk Thung* titles in the late 1980s found as many as one-fifth dealing with prostitution" (Phongpaichit and Baker, 1995, p. 78). In Thailand, sex tourism has almost become part of the official government tourism industry (Phongpaichit and Chiasakul, 1993). Sex tourism has grown in tandem with rates of economic growth. The recent advent of HIV/AIDS has highlighted the welfare cost of commercial sex. Not only are most CSW involved against their wishes, but their average age is progressively becoming younger. Also, the impact of STDs through commercial sex work throughout the rest of society has increased the costs of this industry wider than its own members (see Appendix C).

It is assumed in this paper that private expenditures on health are actually a response to the costs of economic growth. Thus as with the ISEW, one-half of the private expenditure on health will be subtracted as a cost of economic growth (see Appendix D).

A strong case can be put forward for linking the increase of corruption with the increase in economic growth. Corruption in Thailand has its roots in the patron-client relationship and that such activities are not considered corrupt if undertaken at reasonable levels. Corruption is not considered acceptable though if it involves bribes and fees above reasonable levels, is actively sought or harms society. Such practices have increased with the onset of increased levels of economic growth (see Appendix E).

When an CBAGDP SWF is used to measure welfare, a different result is achieved than that of using unadjusted GDP per capita to measure welfare. Table I presents GDP per capita in constant 1990 baht between 1980 and 1990 for Thailand and an index with the base year 1990.

This table presents a steadily rising GDP per capita, increasing by 78% from 1980 to 1990. If GDP is used as a measure of welfare, welfare has close to doubled therefore in this same time. Table II

TABLE I  
Thai GDP per capita, 1980–1990 (constant 1990 baht)

Year	GDP per capita	Index
1980	21815	100
1981	21729	99.6
1982	22395	102.7
1983	23150	106.1
1984	24145	110.7
1985	24749	113.4
1986	25567	117.2
1987	28094	128.8
1988	32042	146.9
1989	35620	163.3
1990	38910	178.4

Source: Authors' calculations based of various NSO *Quarterly Bulletins*.

presents the CBAGDP SWF per capita for the period 1980–1990 in constant 1990 dollars and an Index with a base period of 1990.

This CBAGDP SWF shows an increase of only 20 per cent during this period. It is interesting to note though in comparison with the unadjusted GDP figure, which almost doubled in the same period. It must also be noted that these figures are based on a partial calculation of the fully-adjusted GDP SWF measure of welfare. Calculations on the household production must also be added to the figure.

In addition, the costs of urbanisation, cost of car accidents, costs of air pollution, costs of water pollution, costs of noise pollution, loss of forests, loss of farmlands, costs of non-renewable resources long-term environmental damage and cost of debt must also be subtracted from the adjusted sums in Table II.

A comparison of the GDP and adjusted GDP indices is shown by Figure 1.

It is expected this will reduce the welfare increase and further exacerbate the differences between GDP as welfare and CBAGDP SWF as welfare.

TABLE II  
Thai CBAGDP SWF per capita, 1980–1990 (at constant 1990 baht)

Year	Adjusted GDP per capita*	Index
1980	9016	100
1981	8490	94.2
1982	8019	88.9
1983	8380	92.9
1984	7717	85.6
1985	7713	85.6
1986	7688	85.3
1987	8490	94.2
1988	9870	109.5
1989	10766	119.4
1990	10822	120.0

Source: Authors' own calculations.

\* See Appendices for calculations of this figure.

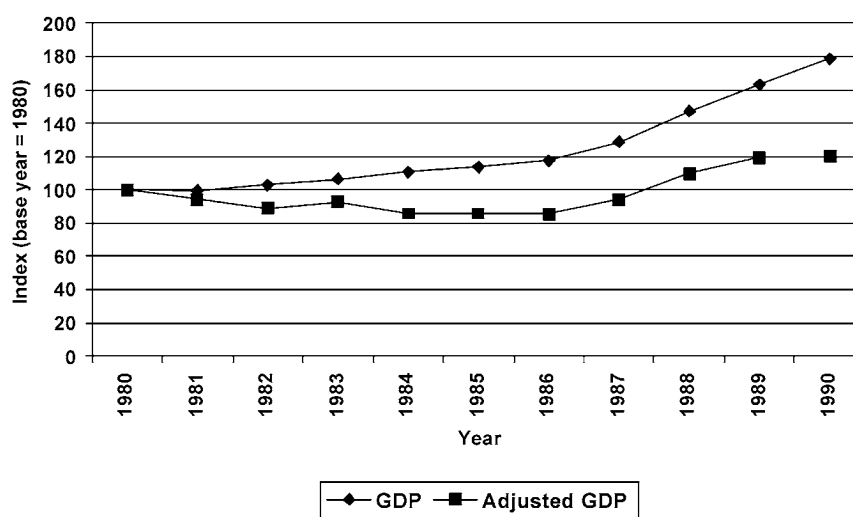


Figure 1. Index of GDP and Adjusted GDP for Thailand 1980–1990.



An adjusted GDP democratic social welfare function therefore provides a more realistic description of welfare as it increases at a slower rate than full GDP. Not only does CBAGDP SWF increase at a slower rate, but it also decreases at times when GDP is actually increasing. The CBAGDP SWF fell for two years between 1980 and 1982 and for another three years between 1983 and 1986. In fact, the CBAGDP SWF was below the 1980 level until 1988. If the CBAGDP SWF is welfare therefore, this calculation suggests that welfare actually fell from 1980 and did not pass this level until 1988. At the same time, GDP increased in all but one year (1981) during the same period. A major reason for these differences is that the CBAGDP SWF takes into account the costs as well as the benefits of economic growth.

There are a number of ways to analyse the results of such an application. Issues of equity can be studied. For example, the major reason why GDP as a welfare measurement is different from the CBAGDP SWF is that income has been adjusted for inequality in its distribution. As a result, if Thai social welfare were to be increased, consideration should be given to the distribution of income. By improving this situation, the social welfare of Thailand would increase dramatically.

In addition, the effects of intergenerational equity can be studied. Not only do the decisions being made now have implications for present generations but they also have consequences on future generations because of irreversibility, etc. (Page, 1988). The efficiency of the new social welfare can be studied as can the inter-temporal allocation of resources. Finally, policy recommendations based on these issues can be made.

#### *Comparisons of the Results and Their Implications with Other Studies*

Few other studies of social welfare exist for Thailand (see Kakwani, 1997b for an exception) however a number of studies focusing on individual aspects of social welfare such as poverty levels and the environment have been undertaken (Riggs, 1995). Popular approaches to measuring welfare based on GDP indicate that welfare has increased dramatically over the past three decades.

However, this approach does not take into account changes in income distribution or environmental damage during that time.

The results from CBAGDP SWF are intuitively correct. Welfare during the 1980s has increased but not evenly with dips and falls perhaps related to increased inequality of income distribution. The benefits of economic growth have been positive but the costs of this growth have also been accounted for. Certainly CBAGDP SWF welfare has not increased as dramatically as the GDP measure of welfare would suggest. Therefore, the CBAGDP SWF measure of welfare is a suitable welfare indicator.

#### *Other Issues and Further Work*

There are some other issues in welfare economics and contemporary development economics, which need to be considered in measuring social welfare of an economy such as that of the Thailand economy. Some of these issues include (1) role of social time preference and intergenerational equity in comparing welfare at different time periods, (2) the effects of possible catastrophic environmental events on social welfare comparisons, (3) the impact of the knowledge economy, globalisation, multi-national investment and foreign trade balances, changes in social structure and political organizations and (4) the need for sustainable human development along with economic development and GDP growth.

This work may include the incorporation of non-welfaristic concepts into a GDP adjusted social welfare index. Sen has begun work on such an approach (Sen, 1982). Whilst Sen cautions the practical difficulty of such an approach, the inclusion of non-welfaristic concepts such as social capability (Abramovitz, 1991), political freedom (Freedom House, 1993), liberty, health and education can occur.

There is no shortage of accurate and reasonable indices that focus on non-welfaristic issues such as life expectancy, health, capability and gender (Morris, 1979; UNDP, 1990, 1995, 1996). The Physical Quality of Life Index (PQLI) ranks states in terms of achievement of life expectancy, infant mortality and literacy. The Human Development Index (HDI) is similar to this with a slightly more economic bias using life expectancy, educational attainment and income per

capita. More recent indices such as the Gender-Related Development Index (GDI) adjusts the HDI for gender inequality, whilst the Gender Empowerment Measure (GEM) measures gender inequality of political participation and decision making. Another approach is based on Sen's (1982) capability approach; the Capability Poverty Measure (CPM). The CPM's basis is people's capability to be well nourished and healthy, have healthy reproduction and be educated and knowledgeable.

There are issues of value judgements, weighting and bias that must be addressed in each of these indices.

It is important to include these concepts as making society economically better off is only one dimension of economic outcomes. Other dimensions include freedom, rights, equality and justice (Hausman and McPherson, 1996).

Further work however is required. Whilst these results may appear intuitively correct, future work should include robustness tests. It would be possible to draw from a larger set of available costs and benefits estimates to produce various narrow and broad values of adjusted GDP per capita growth to standard GDP per capita growth. Inter-temporal comparisons of these new welfare measures will be possible if the new figures are deflated and if various issues of concern such as changing tastes and preferences are appropriately considered.

In addition, having calculated an adjusted GDP measure of welfare for Thailand, a likely next step would be to produce similar measures of welfare for other countries so a new round of inter-country comparisons can take place. Suitable adjustments in the welfare measures by exchange rate considerations, such as the purchasing power parity adjustment, will be necessary for these cross-country adjustments. Whilst possible, particularly if purchasing power exchange rates are used, the usefulness of such comparisons may be limited, unless policy makers are motivated by poor comparisons to actually increase welfare levels across all sub-systems.

## CONCLUSIONS

As a measure of the “sum of all goods produced during a given period, adjusted for duplication, and net of any commodities consumed in the process of production” (Kuznets, 1968, p. 16), GDP is a reasonable calculation. However, allowing GDP to continue to be used as a measure of welfare, as it is in development economics, could actually diminish welfare of those in the third world. As GDP is the development economics indicator of welfare, all policies to increase welfare are actually aimed at increasing GDP instead. As a result, Cobb et al. (1995) argue that GDP-centric policies, especially in developing countries, can undermine household economies thereby reducing the welfare of these societies in addition to harming the environments in which they live.

This paper has incorporated CBA, a key tool of welfare economics, into development economics use of GDP as a measure of welfare. Whilst an CBAGDP SWF does not rectify the inherent problems of using index numbers, it certainly addresses the problems that GDP has of failing to measure non-monetary aspects of the economy and failing to differentiate between positive and negative economic activities. Gross Domestic Product and the CBAGDP SWF both have some problems as an appropriate measure of welfare. However, the comparisons of alternative methods for the measurement of aggregate social welfare suggest that the CBAGDP SWF index numbers still be adopted to measure social welfare in spite of the problems of this method because of the greater difficulties that unadjusted GDP presents.

The CBAGDP measure is an acceptable new measure of welfare within development economics as it is operational and takes in to account the costs and benefits of economic activities and growth. Therefore it is possible to calculate some trends and indicators of movements in welfare. The present study indicates that the results are plausible and intuitively correct. Finally, there are no other alternative aggregate welfare measurements that are well developed other than some preliminary research such as Islam (2000, 2001).

## APPENDICES

## Appendix A

## Income – Adjusted for Inequality

Atkinson's (1983) formula for this equally distributed equivalent income is:

$$I = 1 - \frac{Yede}{u}$$

u = mean income

Yede = equally distributed equivalent income

	1962	1969	1975	1981	1985– 1986	1988	1990	1992	1994
Quintile 1	8	5.13	4.92	4.45	4.55	4.6	4.2	3.94	3.99
Quintile 2	8.6	10.14	10.09	9.41	7.87	8.13	7.38	7.02	7.292
Quintile 3	12.08	14.32	14.79	14.18	12.09	12.46	11.5	11.06	11.6
Quintile 4	21.54	20.37	21.84	21.53	19.86	20.66	19.26	18.95	19.6
Quintile 5	49.79	50.06	48.4	50.44	55.63	54.16	57.67	59.04	57.52
Yede	0.306	0.3461	0.3468	0.3817	0.42	0.41	0.452	0.474	0.461

Year	Income (1990 prices)*	Yede	Income Yede*
1980	83356	37.67	51955
1981	83427	38.17	51583
1982	83626	39.19	50853
1983	90558	40.21	54145
1984	93471	41.23	54932
1985	96384	42.25	55661
1986	99298	41.84	57752
1987	109474	41.43	64119
1988	127029	41.04	74896
1989	142625	43.13	81111
1990	152708	45.21	83669

\* Millions of baht

**Appendix B****Costs of Commuting**

Tanaboriboon Yordipol (1990 cited in Dixon, 1999) estimated the cost of commuting in Bangkok to be \$US 400 million per year. This is in line with other estimates (McGee and Greenberg, 1992, p. 40; Asean Economic Bulletin vol. 9, no. 1, cited in Parnwell and Arghiros 1996; Dixon, 1999)

Year	Cars	Cost in US	Total US	Exchange Rate	Cost of Commuting*	Cost of Commuting (1990 prices)*
1980	571207	219	12509433	20.63	2580	3969
1981	733920	219	16072848	23	3696	5042
1982	849588	219	18605802	23	4279	5550
1983	942635	219	20643706	23	4748	5935
1984	1071664	219	23469441	27.15	6371	7895
1985	1185004	219	25951587	26.65	6916	8373
1986	1376728	219	30150343	26.13	7878	9356
1987	1568449	219	34349030	25.07	8611	9943
1988	1760167	219	38547657	25.24	9729	10858
1989	1644018	219	36003994	25.69	9249	9798
1990	1826468	219	39999964	25.29	10115	10115

\* Millions of baht.

**Appendix C****Cost of Commercial Sex Work**

Phongpaichit et al. (1998) estimated the cost of commercial sex work to be around 3% of GNP

Year	GNP*	Cost of CSW*	Cost of CSW (1990 prices)*
1980	662482	1987	3057
1981	760356	2281	3112
1982	841569	2524	3274
1983	920989	2762	3409

## Appendix C (Continued)

Year	GNP*	Cost of CSW*	Cost of CSW (1990 prices)*
1984	988070	2964	3673
1985	1056496	3169	3834
1986	1133397	3400	4040
1987	1299913	3899	4502
1988	1559804	4679	5222
1989	1856476	5569	4900
1990	2182100	6546	6546

\* Millions of baht

## Appendix D

## Private Expenditure on Health

Thai Statistical books prior to 1988 listed private expenditures into *Personal Care and Health Expenses*. Between 1988 and the present, this was further separated into the two areas of *personal care* and *health expenditure*. For this period, health expenditure was close to 80 per cent of the total budget line for each year. Based on this observation, it is assumed that health expenditures were 80 per cent of the *Personal Care and Health Expenses* figure for each year. Fifty per cent of this figure is then subtracted as a defensive cost of economic growth in the CBAGDP SWF in Thailand

Year	Private Expenditure on health*	50% of Private Expenditure on health*	Cost of Health Expenditure (1990 prices)*
1980	2480	1240	1908
1981	2908	1454	1984
1982	3296	1648	2137
1983	3634	1817	2271
1984	4014	2007	2487
1985	4368	2184	2644
1986	4834	2417	2871
1987	5544	2772	3201
1988	6995	3497	3904
1989	8675	4337	4595
1990	9581	4791	4791

\* Millions of baht.

**Appendix E****Cost of Corruption**

The cost of corruption is based on the estimates of Phongpaichit and Piriyarangsan (1994)

	Sarit	Thanom	Sanya – Kriangsak	Prem	Chatchai
	1960–1963	1964–1973	1974–1981	1981–1988	1988–1990
% of GNP	0.58%	0.98	0.88	0.74	0.70

“Corruption is obviously impossible to quantify with any degree of accuracy. The data which exist are partial, almost random in some cases and politically biased in others” (Phongpaichit and Piriyarangsan, 1994, p. 51). It is however indicative of the cost of corruption to social welfare in Thailand and will be included in the CBAGDP SWF being developed in this paper

Year	GNP*	Percentage	Cost of Corruption*	Cost of Corruption (1990 prices)*
1980	662482	0.88	582.9	896.8
1981	760356	0.88	669.1	912.8
1982	841569	0.74	622.7	807.5
1983	920989	0.74	681.8	852.3
1984	988070	0.74	731.1	905.9
1985	1056496	0.74	781.8	946.5
1986	1133397	0.74	838.7	996.1
1987	1299913	0.74	961.9	1110.7
1988	1559804	0.74	1154.2	1288.2
1989	1856476	0.70	1299.5	1376.6
1990	2182100	0.70	1527.4	1527.4

\* Millions of baht.



## Appendix F

## Adjusted GDP figure (1990 prices)\*

Year	Income Yede*	Commuting* (minus)	CSW* (minus)	Private Expenditure on Health* (minus)	Corruption* (minus)	Total*	Adjusted GDP per capita
1980	51955	3969	3057	1908	896.8	42124	9016
1981	51583	5042	3112	1984	912.8	40532	8490
1982	50853	5550	3274	2137	807.5	39084	8019
1983	54145	5935	3409	2271	852.3	41678	8380
1984	54932	7895	3673	2487	905.9	39134	7717
1985	55661	8373	3834	2644	946.5	39863	7713
1986	57752	9356	4040	2871	996.1	40481	7688
1987	64119	9943	4502	3201	1110.7	45362	8490
1988	74896	10858	5222	3904	1288.2	53627	9870
1989	81111	9798	4900	4595	1376.6	59441	10766
1990	83669	10115	6546	4791	1527.4	60690	10822

\* Millions of baht.

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